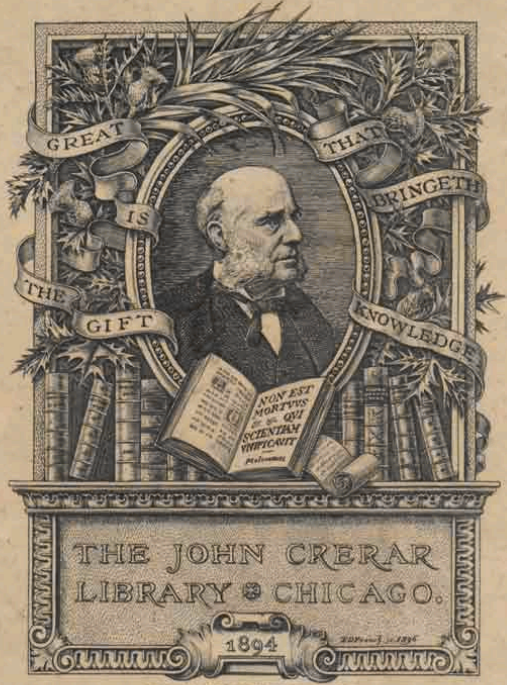
RAILWAY SUPPLIES

NO. 52

FAIRBANKS, MORSE & CO.



PRESENTED BY

Fairbanks, Morse and Co.

Railway Supplies

Railroad Department

Fairbanks Scales, Trucks and Baggage Barrows — Water Stations erected or materials furnished—Locomotive Coaling Stations erected—Tanks—Tank Fixtures Standpipes—Steam and Power Pumps, Boilers—Windmills and Pumps—Gasoline and Gas Pumping Plants—Track Gauges and Levels—Sheffield Hand, Push, Velocipede and Motor Cars—Cattle Guards Jacks for Track, Yard and Bridge Work Producer Gas Plants—Gas, Gasoline and Oil Engines for all power purposes, Electric Lighting and Operating Turn Tables—Dynamos, Motors—Gas, Gasoline and Oil Air Compressors Track Tools—Ballast Loaders

1906 Catalogue Number 52 A

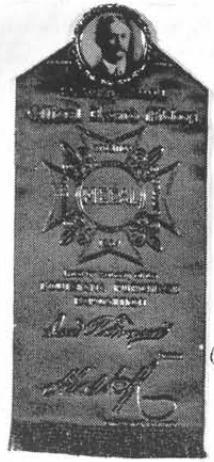
Fairbanks, Morse & Co.

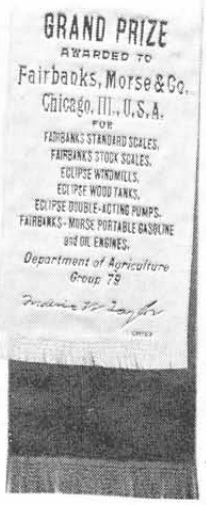
MAIN OFFICE: CHICAGO, ILLINOIS

Principal Offices and Warehouses:

Detroit, Mich.	St. Louis, Mo.	Portland, Ore.
Cincinnati, Ohio.	St. Paul, Minn.	Omaha, Neb.
Cleveland, Ohio.	Louisville, Ky.	Denver, Colo.
Indianapolis, Ind.	Minneapolis, Minn.	San Francisco, Cal.
Salt Lake City, Utah.	Kansas City, Mo.	Los Angeles, Cal.

New York, N. Y. London, Eng.





AWARDED TO ....

FAIRBANKS, MORSE & CO.

BY LOUISIANA PURCHASE EXPOSITION, 1904

GRAND PRIZES

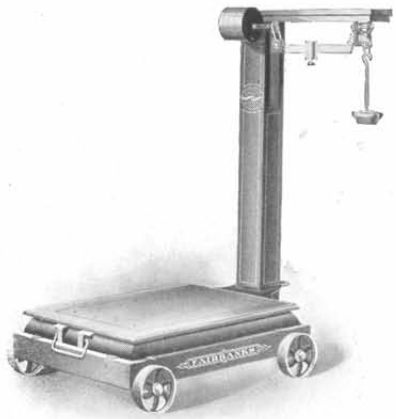
Fairbanks Standard Scales
Fairbanks Stock Scales
Eclipse Windmills
Eclipse Wood Tanks
Eclipse Double-Acting Pumps
Fairbanks-Morse Portable Gasoline and Oil Engines

GOLD MEDALS (This is the highest award on these classes)

Fairbanks-Morse Vertical Gas, Gasoline and Oil Engines
Fairbanks-Morse Horizontal Gas, Gasoline and Oil Engines
Fairbanks-Morse Marine Gasoline and Oil Engines
Fairbanks-Morse Combined Gasoline and Oil Engines and Pumps
Fairbanks-Morse Steam Pump
Eclipse Windmills and Pumps for Irrigation
Sheffield Motor Cars
Sheffield Hand and Push Cars
Sheffield Velocipede Cars
Sheffield Stand Pipes
Barrett Lifting Jacks

(Also another gold medal on Steam Pump from the United States War Department, Philippine Government Board.)

Also five (5) Gold-Medals, four (4) Silver Medals and one (1) Bronze Medal on collective exhibits and special group juries.



With Wheels

With Wheels and Drop Lever

Portable Platform Scales

Adapted for the weighing of all kinds of general merchandise.

The beams have sliding poises with set screws, and are graduated to 100 lbs. by ½-lb. divisions, except in the two smaller sizes which are 50 lbs. by ¼ lb.

Like all scales of our manufacture, these are made of the best materials throughout, with finely tempered steel bearings and pivots where both strength and extreme hardness are required, carefully proportioned iron levers and frame, and hard wood for platform and such parts as require at the same time strength, elasticity, and toughness.

The drop lever relieves the bearings from all wear and strain except during the actual process of weighing. This modification is especially suited for weighing heavy boxes or other compact articles, where there is danger of breaking the mechanism of the scale in the act of loading or unloading.

New No.	Old No.	Capacity Lbs.	Platform Inches	Price	New No.	Old No.	Capacity Lbs.	Platform Inches	Price
1116	7	2,500 x ½	26 x 34	$85.00	1166	7	2,500 x ½	26 x 34	$94.00
1118	8	2,000 x ½	25 x 33	75.00	1168	8	2,000 x ½	25 x 33	82.00
1120	9	1,500 x ½	21 x 28	56.00	1170	9	1,500 x ½	21 x 28	70.00
1122	10	1,200 x ½	20 x 28	49.00	1172	10	1,200 x ½	20 x 28	59.00
1124	10½	1,000 x ½	17 x 26	43.00	1174	10½	1,000 x ½	17 x 26	51.00
1126	10¾	800 x ½	17 x 26	38.00	1176	10¾	800 x ½	17 x 26	46.00
1128	11	600 x ¼	16 x 25	33.00	1178	11	600 x ¼	16 x 25	41.00
1130	11½	400 x ¼	15 x 21	26.00	1180	11½	400 x ¼	15 x 21	34.00

Wagon and Stock Scales

Our well-known wagon scales are not only made of the sizes and capacities shown, but the dimensions may be varied somewhat without adding to the cost of the scale.

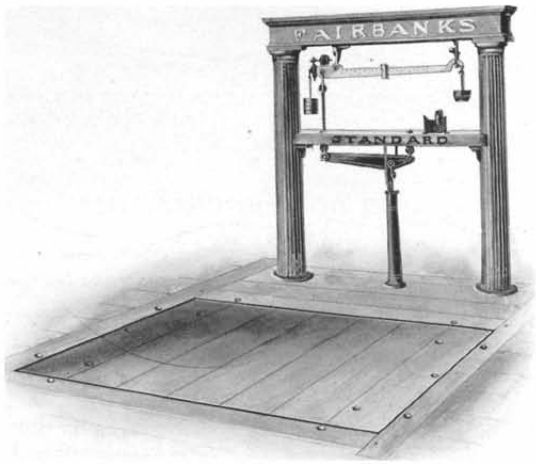
Special scales can be adapted to special situations, and extension levers can be provided to carry the beam farther from the platform of the scale, placing it in an office, if desired. The distance from the platform to the beam may be extended at a price proportionate to the length.

The scales may be fitted with any of the beams shown on page 142 of Scale Catalogue, or with the Columbia Beam (see Scale Catalogue) graduated to such standard as may be desired.

All the prices are exclusive of timber and foundation, which are to be furnished by the purchaser.

Beam outfits, see pages 73 and 74 Scale Catalogue for prices.

No.	Capacity Tons	Size of Platform	Distance from Edge of Platform to Beam Rod	Price Single Beam	Price Double Beam	Price Comp'd Beam
1801	15	22 x 10 ft.	2 ft. 4½ in.	$440.00	$455.00	$470.00
1802	20	22 x 7 ft. 11 in.	3 ft. 1⅜ in.	545.00	560.00	575.00
1824	15	22 x 7 ft. 11 in.	3 ft. 1⅜ in.	420.00	435.00	450.00
1838	15	22 x 7 ft. 2¾ in.	3 ft. 10 in.	420.00	435.00	450.00
1829	10	22 x 7 ft. 11 in.	3 ft. 1⅜ in.	360.00	375.00	390.00
1843	10	22 x 7 ft. 2⅜ in.	3 ft. 9½ in.	350.00	365.00	380.00
1845	8	22 x 7 ft. 2⅜ in.	3 ft. 9½ in.	315.00	330.00	345.00
2101	6	22 x 8 ft.	2 ft. 9 in.	265.00	280.00	295.00
1924	15	16 x 7 ft. 9⅜ in.	1 ft. 10⅞ in.	390.00	405.00	420.00
1928	10	16 x 7 ft. 10 in.	1 ft. 10½ in.	300.00	315.00	330.00
1930	8	16 x 7 ft. 10 in.	1 ft. 10½ in.	275.00	290.00	305.00
1932	6	16 x 7 ft. 10 in.	1 ft. 10½ in.	250.00	265.00	280.00
1922	20	14 x 8 ft. 4½ in.	2 ft. 1 in.	450.00	465.00	480.00
1926	12	14 x 8 ft. 4½ in.	2 ft. 1 in.	320.00	335.00	350.00
1928	10	14 x 8 ft. 4⅜ in.	2 ft. 0¾ in.	300.00	315.00	330.00
1930	8	14 x 8 ft. 4⅜ in.	2 ft. 0¾ in.	275.00	290.00	305.00
2110	6	14 x 8 ft.	2 ft. 2½ in.	225.00	240.00	255.00
2112	5	14 x 8 ft.	2 ft. 2½ in.	200.00	210.00	220.00
2114	4	14 x 8 ft.	2 ft. 2½ in.	170.00	180.00	190.00



Railway Depot Scales

These scales are largely used on the freight platforms of railway and steamship companies, and the platforms are of convenient size for handling freight of all sorts. They are furnished with either single, double or special steel beams. The latter are fitted with roller poises and are very durable and especially convenient for rapid weighing. The graduations on these special steel beams are as follows:

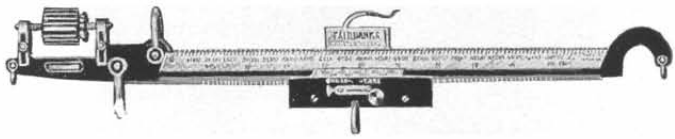
Two and three ton scales, upper bar 800 x 100 lbs.; lower bar 200 x 5 lbs.

Four and six ton scales, upper bar 1,000 x 100 lbs.; lower bar 200 x 5 lbs.

No.	Capacity Tons	Size of Platform	Price Single Beam	Price Double Beam	Price Special Double Steel Beam
2264	6	10 ft. 0 in. x 9 ft. 2¼ in.	$280.00	$295.00	$325.00
2266	4	9 ft. 0 in. x 6 ft. 11 in.	230.00	245.00	275.00
2268	3	6 ft. 0 in. x 4 ft. 11½ in.	210.00	218.50	260.00
2270	2	7 ft. 6 in. x 4 ft. 8⅛ in.	168.00	176.50	218.00

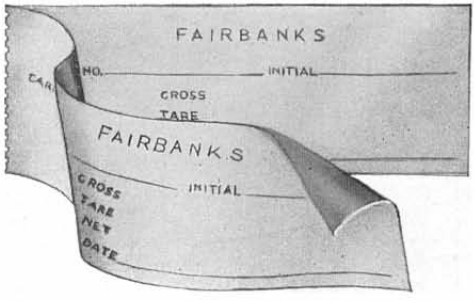
Type Registering Beams

The type registering beam has become a recognized indispensable factor in the commercial world. The record is indisputable and ineradicable. It prevents errors which so frequently arise in reading the weight from the beam. It admits of rapid weighing with positive accuracy.

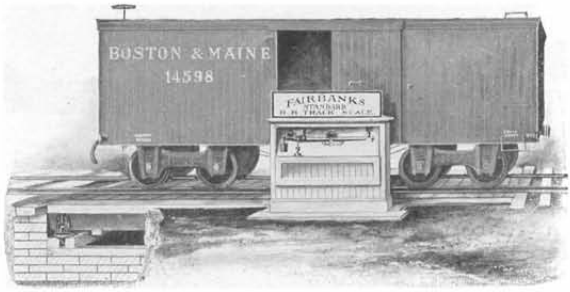


Railroad Scale Pattern Beam

This beam is constructed on the well-known principles of the FAIRBANKS FULL CAPACITY RAILROAD PATTERN BEAM, and has beveled face graduated and figured so that the weights may be read in the usual manner. It is provided with an internal mechanism so that when the weighing has been done in the usual manner a ticket is inserted in the slot of the poise and by means of the handle an impression is made. This impression gives the gross weight of the load. Should the weigher wish to print the tare, the ticket is inserted in the same slot, and by a simple semi-automatic mechanism the record is made just under the previous one, so that the net weight is easily calculated. Only one operation is required for registering either the gross or the tare weight.



Sample Carbon Ticket



Railway Track Scales

PIT PATTERN

These scales are regularly furnished in sizes from 6-foot platform and 15 tons capacity to 80-foot platform and 100 tons capacity. For list of sizes and full information, send for our Scale Catalogue.

No.	Platform Feet	Capacity Tons	Price	No.	Platform Feet	Capacity Tons	Price
4316	38	40	$1,050.00	4346	44	70	$1,200.00
4318	38	50	1,075.00	4348	44	80	1,225.00
4320	38	60	1,100.00	4375	44	100	1,375.00
4322	38	70	1,125.00	4350	46	50	1,175.00
4324	38	80	1,150.00	4352	46	60	1,200.00
4357	38	100	1,200.00	4354	46	70	1,225.00
4326	40	50	1,100.00	4356	46	80	1,350.00
4328	40	60	1,125.00	4381	46	100	1,400.00
4330	40	70	1,150.00	4358	48	50	1,200.00
4332	40	80	1,175.00	4360	48	60	1,225.00
4363	40	100	1,225.00	4362	48	70	1,250.00
4334	42	50	1,125.00	4364	48	80	1,375.00
4336	42	60	1,150.00	4387	48	100	1,425.00
4338	42	70	1,175.00	4366	50	50	1,325.00
4340	42	80	1,200.00	4368	50	60	1,350.00
4369	42	100	1,350.00	4370	50	70	1,375.00
4342	44	50	1,150.00	4372	50	80	1,400.00
4344	44	60	1,175.00	4393	50	100	1,450.00

Fig. 202
RAILROAD AND PACKING HOUSE

Fig. 203
EXTRA IRONED RAILROAD

Railroad and Packing House Trucks

WESTERN PATTERN

No.	Figure	Length of Handle	Width	Diameter of Wheel	Weight	Price
4	202	5 ft.	24 in.	10⅜ in.	120 lbs.	$20.00
4 Extra	203	5 ft.	24 in.	10¾ in.	120 lbs.	22.00
5	202	5½ ft.	25 in.	12 in.	150 lbs.	24.00
4 Double Extra	203	5 ft.	24 in.	10¾ in.	137 lbs.	28.00

No. 4 Extra has center strap welded to nose iron.

No. 4 Double Extra, same as No. 4 Extra, except it has two center straps and dash; side and center straps are extra heavy.

These trucks are made of the best selected second growth ash or oak lumber. Iron on cross pieces extend through to outside of handles, with bolts passing through iron, tenons and handles. All iron parts are heavier than ordinarily used. Axle and collar formed from one piece by special machinery. All parts made in the most substantial manner, and will stand the roughest usage.

Write for catalogue containing list of regular and special trucks for all purposes.

Express Wagons

IMPROVED PATTERN

Wrought steel fifth-wheel, 20 inches in diameter. Front wheels, 28 inches in diameter; rear wheels, 31 inches in diameter. Platform, 10 feet long, 39 inches wide, 35 inches high. Weight, 670 pounds. Price $100.

These wagons are of new improved pattern. All material carefully selected. Thoroughly ironed and braced. Well finished; painted Vermillion and green, striped and varnished.

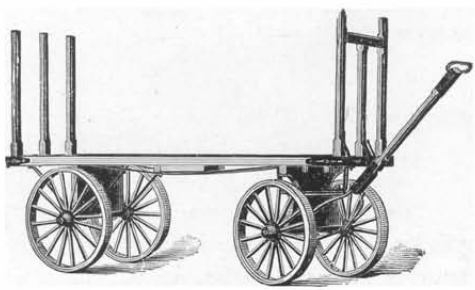


Fig. 257

Express Wagon with "Sarven patent" wood wheels, steel axles. Also furnished with American pattern iron wheels.

Gasoline, Gas, Alcohol, Distillate, Kerosene and Crude Oil Engines

The Fairbanks-Morse Gasoline, Gas, Distillate and Oil Engines are the product of eighteen years of constant work spent in research, experiment and development. The final result is an engine that is economical, safe, durable and simple, and the only engine that embodies all these essential features to their fullest extent.

During these years of development several of the most desirable improvements have been patented, and thus it is that this engine has many exclusive improvements.

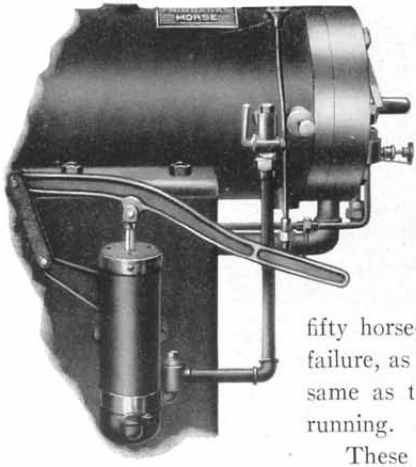
The engines are built from materials of the best quality and in accordance with the highest standards of machine practice. The bearings are all of brass and phosphor bronze throughout. The crank shafts and connecting-rods are of steel forgings, finished all over.

In addition to using the best quality of materials we use more of them. The question is frequently asked why we make our engines heavier than those made by others, while the simplicity of the mechanical principles in our engines would permit us to make even lighter engines than others with safety. Our reply is that although it would be safe to use lighter engines, we believe that the extra material we put into them adds very much to their life, and we find this feature is appreciated by discriminating purchasers.

We are aware that even an ample supply of the best materials will not alone make an engine strong and durable, but that all parts must be properly proportioned, and this subject has been one that has received our special attention; many tests have been made in order that there might be no weak points about the engine.

Patent Self-Starter

The illustration represents the Starter Pump as attached to the engine cylinder. All parts are clearly shown in the illustration. To start by means of the self-starter, the detonator is charged and inserted in the fixture attached to cylinder, and by operating the pump a charge is forced into the engine cylinder to be fired by the detonator, or the electric igniter



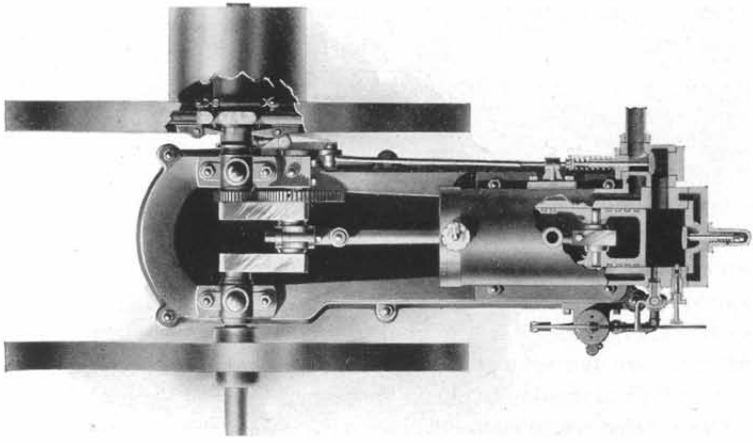
can be used. The expansion of this burning charge has sufficient force to start the engine under about half load without jerk or jar. This is one of the most essential features in the starting of a gasoline engine.

One man can start an engine of from five to one hundred and fifty horse-power. There is no chance of failure, as the quality of the charge is the same as that formed by the engine when running.

These are very essential features of a successful starter, and can be had only on the FAIRBANKS-MORSE Engine.

Details of Construction

The cylinder and piston are in section, thus clearly showing the construction of the head, cylinder, exhaust-chest, valve and piston, also the arrangement of the rings and water-jacket, as well as the connection in the piston for attaching the connecting rod. The exhaust-chest is at-



The accompanying cut shows a plan in section of the Fairbanks-Morse Gasoline Engine

tached to the cylinder by studs, thus making it possible to renew at a small cost should the valve or chest have become damaged by long usage.

The rod is made adjustable at both ends. The piston end is adjusted by a screw elevating a wedge which can be operated from the open end of the cylinder, while the bearing at the crank end is of the marine type, provided with phosphor bronze boxes. The crank-shaft, gear and arrangement of the wheels and shaft are plainly shown, and from this the simplicity of the engine with the minimum number of parts is made clear. The valve mechanism is so constructed that but a single cam is used to operate the valve.

The arrangement of the governor in the wheel is such that it is connected with a catch which operates directly on the exhaust valve, holding same in an open position when the speed of the engine increases above normal. By this action compression is entirely relieved, thus freeing the engine from friction and resistance which would otherwise be caused if the engine was allowed to compress. With this method of governing a saving is effected in both the fuel and the wear on the various parts of the engine, which would take place providing compression was not relieved at such times as the engine was not required to explode.

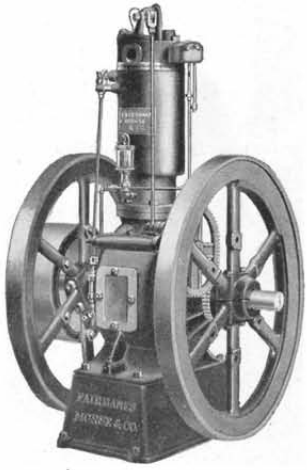
Special Features of Fairbanks-Morse Engine

Slow speed and substantially built. The governor being connected to the flywheel of the engine, requires no gears or belt. The governor automatically regulates the supply of gasoline, at the same time relieving the engine from compression which would cause loss of power and extra friction. A steady motion is maintained under part or full load.

The delivery of oil direct to the air suction in exact and uniform quantities and without the use of a valve or other delicate gasoline-regulating devices, using low grades of gasoline and developing full power.

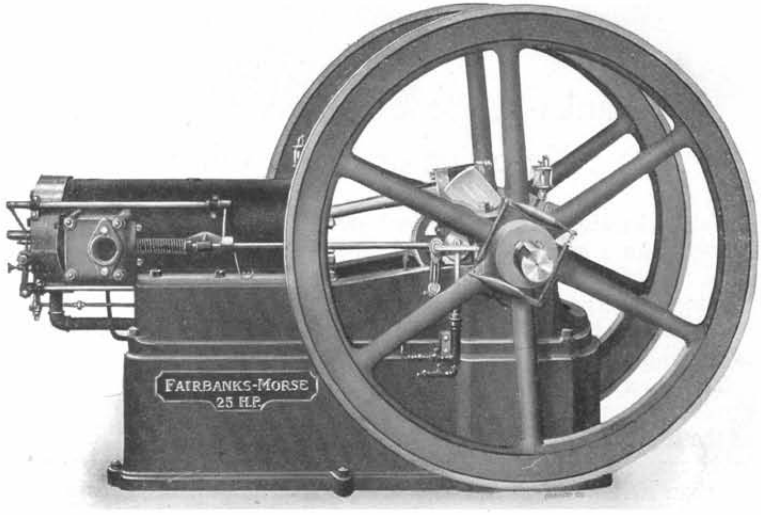
The electric igniter in the Fairbanks-Morse engine is exceptionally simple, having no delicate parts or joints to be operated from quick-acting motions to wear and get out of time. There is only one insulated pole to our igniter, the engine forming the other pole. The movement of the igniter is slow and without jerk. It is also adjustable while running, to vary the time of ignition to obtain the best efficiency of the engine.

The engine can be worked with gasoline, naphtha or distillate, and may be fitted with attachments for using gas, alcohol, kerosene and crude oil.



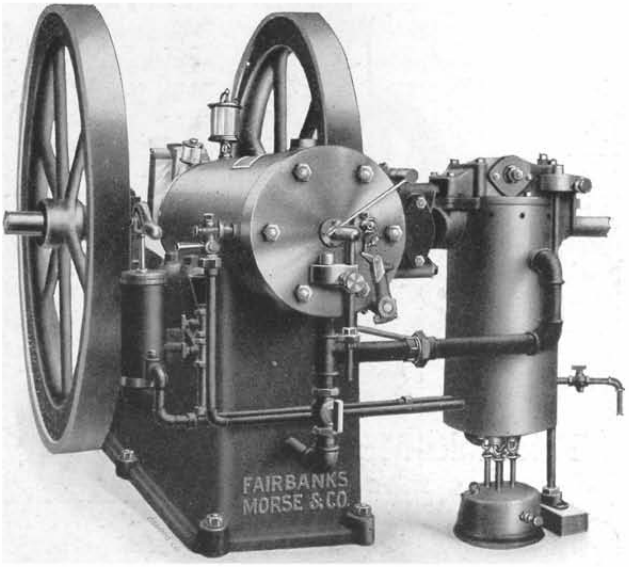
Fairbanks-Morse Vertical Engine

Sizes 2 H. P. to 12 H. P.



Fairbanks-Morse Horizontal Engine

Sizes 5 H. P. to 60 H P.

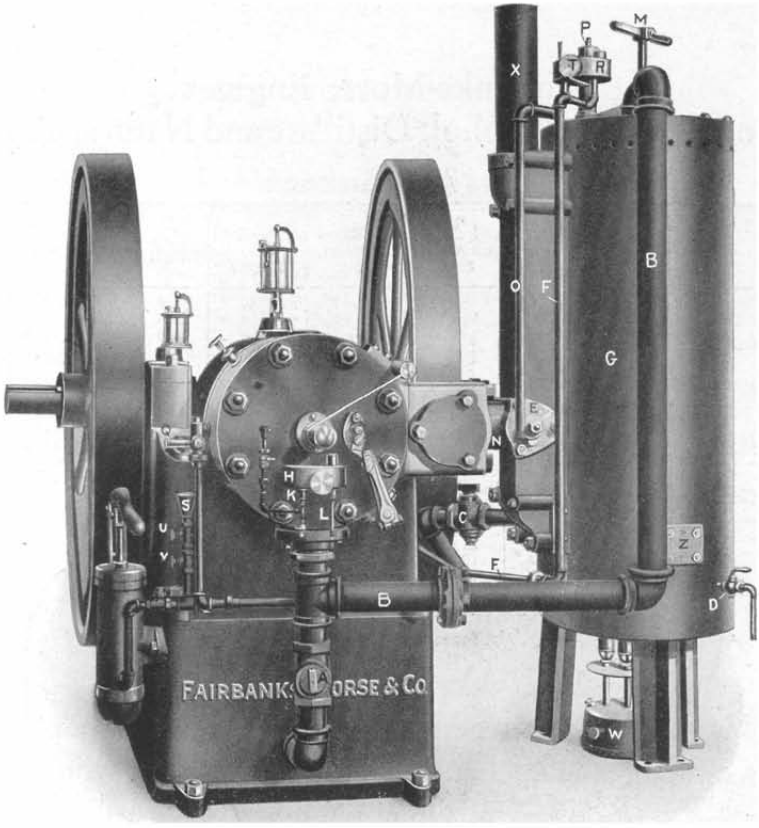


Fairbanks-Morse Engine Arranged for Kerosene or Crude Oil

Fairbanks-Morse engines, when operated on kerosene or crude oil, are fitted with a generator attached directly to the exhaust outlet of the engine. The fuel or oil upon which the engine is to operate is supplied to the top of the generator, and from the heated exhaust gases which pass through the generator the oil is converted into a gas which is drawn directly into the engine cylinder.

The governor of the engine is the same as that used for gasoline, and controls the number of charges admitted, acting directly on the exhaust; thus the engine is relieved of pressure in the cylinder and by this all friction is removed, making the engine more economical under varying loads than if it was required to compress at a time when gas is not admitted.

The most essential feature of an engine is the economical working under partial or full load. This point has been very carefully studied and developed, making it the most efficient and reliable oil engine yet offered.



Fairbanks-Morse Engine Arranged for Very Heavy Crude Oil

For very heavy crude oil, such as is found in the Beaumont, Texas, fields, it is necessary to use a different type of generator from that which we furnish for handling kerosene and the lighter oils.

The heavier the oil the more heat it takes to convert it to a gas. The form of generator shown above is the one we furnish for oils that cannot be handled by the one illustrated on page 14 and is especially constructed so that the maximum amount of heat from the exhaust can be utilized to gasify the oil.

We have made careful tests of various grades of crude oil from many oil fields in this country and abroad, and are willing to test any oil that may be sent us by a prospective customer, if we have not already done so, and will guarantee results obtainable.

Fairbanks-Morse Engines
For Gasoline, Alcohol, Distillate and Natural Gas

SIZES AND DIMENSIONS

	Actual H.P.	Floor Space, Inches	Pulley on Engine Shaft	Fly Wheel Diameter, Face	Speed of Engine	Ship'g Weight	†Packed for Export	
							Gross, Weight	Cubic Feet
* Vertical	2	24 x 30½	8 x 4	24 x 1¾	400	820	775	30.062
	3	28 x 37	10 x 5	28 x 2½	350	1200	965	37.239
	4	28 x 40	12 x 6	28 x 2½	350	1400	1100	41.027
	6	36 x 43	16 x 8	36 x 2½	350	2050	1680	57.822
	9	41 x 44½	16 x 10	41 x 2½	350	2750	2370	79.664
	12	44 x 54	18 x 12	44 x 3	310	3200	2650	85.000
Horizontal	5	67 x 38½	12 x 8	41 x 2½	325	2400	2400	110.000
	8	68 x 39	16 x 10	41 x 2½	300	2575	2600	112.000
	10	86 x 51	18 x 12	55 x 3½	275	4200	4300	168.654
	12	87 x 52	20 x 14	55 x 3½	275	4450	4600	172.000
	15	87 x 52	24 x 14	55 x 3½	250	4750	4800	172.912
	20	105 x 65½	28 x 16	64 x 3½	225	7200	7200	345.576
	25	106 x 66	32 x 16	66 x 4	200	7980	7900	360.000
	32	112 x 71	36 x 10	70 x 5	200	10850	11500	425.000
	40	113 x 73	38 x 12	70 x 5	200	11450	12500	440.000
	50	118 x 67	72 x 12½	72 x 5½	190	14500	18000	600.000
	60	126 x 70	78 x 14½	72 x 6¾	185	17400	19500	650.000

Single Belt / Dbl. Belt

* For larger sizes see pages 49 and 50. †Cooling tank not included.

Pulleys are made with straight faces for shifting belts on all sizes up to and including 25 horse-power.

Fairbanks-Morse Gas Engines
For Illuminating Gas.

SIZES AND DIMENSIONS

	Actual H.P.	Floor Space, Inches	Pulley on Engine Shaft	Fly Wheel Diameter, Face	Speed of Engine	Ship'g Weight	†Packed for Export	
							Gross, Weight	Cubic Feet
* Vertical	2	24 x 30½	8 x 4	24 x 1¾	400	820	775	30.062
	3	28 x 37	10 x 5	28 x 2½	350	1200	965	37.239
	4	28 x 40	12 x 6	28 x 2½	350	1400	1100	41.027
	6	36 x 43	16 x 8	36 x 2½	350	2050	1680	57.822
	9	41 x 44½	16 x 10	41 x 2½	350	2750	2370	79.664
	12	44 x 54	18 x 12	44 x 3	310	3200	2650	85.000
Horizontal	4½	67 x 38½	12 x 8	41 x 2½	325	2400	2400	110.000
	7	68 x 39	16 x 10	41 x 2½	300	2575	2600	112.000
	9	86 x 51	18 x 12	55 x 3½	275	4200	4300	168.654
	11	87 x 52	20 x 14	55 x 3½	275	4450	4600	172.000
	14	87 x 52	24 x 14	55 x 3½	250	4750	4800	172.912
	18	105 x 65½	28 x 16	64 x 3½	225	7200	7200	345.576
	24	106 x 66	32 x 16	66 x 4	200	7980	7900	360.000
	30	112 x 71	36 x 10	70 x 5	200	10850	11500	425.000
	36	113 x 73	38 x 12	70 x 5	200	11450	12500	440.000
	50	118 x 67	72 x 12½	72 x 5½	190	14500	18000	600.000
	60	126 x 70	78 x 14½	72 x 6¾	185	17400	19500	650.000

Single Belt / Dbl. Belt

*For larger sizes see pages 49 and 50. †Cooling tank not included.

Pulleys are made with straight faces for shifting belts on all sizes up to and including 24 horse-power.

With each standard gasoline engine we furnish:

One pulley, standard size.
One electric battery and spark coil.
One galvanized steel supply tank.

Capacity, 10 gallons for 2 H. P.
Capacity, 18 gallons for 3 and 4 H. P.
Capacity, 53 gallons for 5, 6, 7, 8, 9, 10, 12, 15 and 20 H. P.
Capacity, 66 gallons for 25 and 32 H. P.
Capacity, 120 gallons for 40, 50 and 60 H. P.
Capacity, 200 gallons for larger sizes.

With two lengths of pipe and fittings to connect tank to engine.

One or more water tanks, made of No. 22 galvanized iron, of sufficient capacity to keep cylinder at proper temperature.

Two lengths of pipe to connect tank to engine. (See below). Half dozen extra ignition tubes, necessary wrenches and oilers.

All Fairbanks-Morse gasoline, alcohol, gas or oil engines are equipped with our patented self-starter, except the small vertical from two to six horse power.

With all multiple cylinder engines we furnish sparking dynamo, belt and pulley; compressed air-starting equipment consisting of air pump, receiver, safety valve and pipe is furnished with 50, 80, 100 and 150 H. P. sizes in addition to our patented self-starting pump.

Water for Cooling

All gasoline engines require a circulation of water around the cylinder, the cylinders being jacketed so as to allow free circulation.

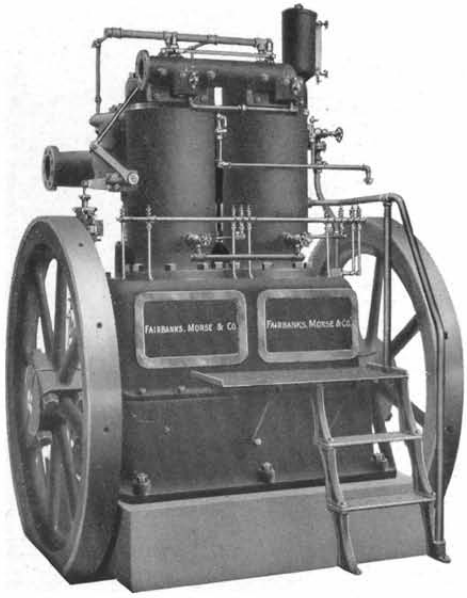
When running water is used, and the engine is connected with city water pipe, the tank is dispensed with.

The water tank varies with the size of the engine and holds sufficient water to keep the engine at proper temperature. The heat of the cylinder causes the water to circulate, the heated water going to top of tank, the cold water entering the cylinder from bottom of tank. There being very slight evaporations, the same water is used continuously.

SIZES OF TANKS REQUIRED

Horse Power	Number of Tanks	Diameter Inches	Height Inches	Horse Power	Number of Tanks	Diameter Inches	Height Inches
2	1	15	35	20	2	36	96
3, 4	1	26	69	25	2	42	96
5	1	30	84	32	2	42	96
6	1	36	96	*40	3	42	96
7, 8, 9, 10	1	36	96	*50	4	42	96
12, 15	1	42	96	*60	5	42	96

*) Circulating pump.



Fairbanks-Morse Vertical Multi-Cylinder 100-H. P. Engine. (Gas or Gasoline.)

Fairbanks-Morse Vertical Multi-Cylinder Engines

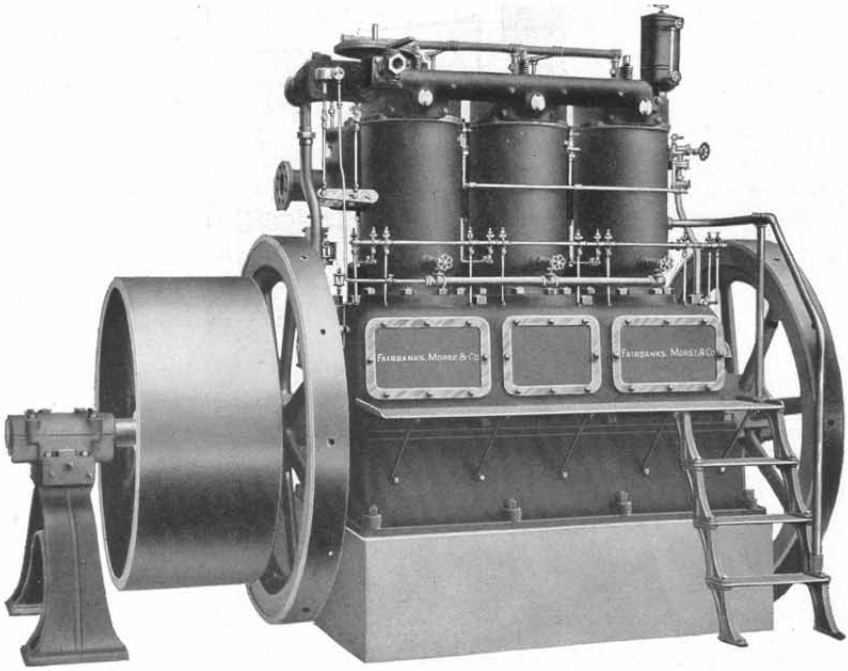
Fairbanks-Morse vertical multiple cylinder engines are the latest development of our twenty years' experience in building gas, gasoline and other oil engines, and embody in their design numerous features peculiar to our engines. The aim has been to produce an engine for continuous, reliable and economical service regardless of expense, and to supply everything in the way of good material, good workmanship, good fittings, and conveniences to accomplish this result. They are suitable for electric lighting and for all other power purposes, and will operate on gasoline, crude oil, kerosene, alcohol, and on natural, illuminating or producer gas.

The frame is of the enclosed type, but as lubrication is entirely positive at every important bearing the base may be opened at any time, or may be regularly run as an open base. Plates are provided on both sides of the base and opposite the cranks affording convenient means for inspecting and adjusting all bearings. The frame is separated horizontally at the center line of the shaft so that the shaft can be removed by raising the upper base. The top of the upper base where the cylinders are attached is very heavy. Large tension bolts pass down through the top of this base and extend well down below the bearings of the lower base, thus bringing a heavy line of resisting metal exactly where it will do the most good. The cast metal of the upper part of the base therefore is not depended upon to carry only the weight of the cylinders.

Adjustments for height are provided for all of the shaft bearings inside of the base by means of large wedges, adjustable from the outside. The two end bearings are not adjustable in this way because it is better to have these two bearings fixed and solid and to arrange all other bearings so that they can be brought into line with these two at any time.

Cylinders and pistons are made from a special mixture of iron. Crank shaft is a single piece of forged steel, slotted out cold and turned true. Connecting rods are forged steel. Other material is cast steel malleable iron or cast iron, as is most suitable for the service.

The shaft bearings are all provided with removable liners made of babbitt metal best adapted to this purpose, and can easily be removed and renewed. In all other



Fairbanks-Morse Vertical Multi-Cylinder 150-H. P. Engine. (Gas or Gasoline.)

bearings bronze or babbitt is used, as may be best for each particular bearing. The lubrication of all bearings is affected from one oil reservoir placed at an elevation on the sides of the cylinder. From this the oil flows by gravity through brass pipes of generous size, and the supply for each bearing is regulated by a graduate sight feed. A tube leads from each sight feed directly to the bearing. The crank pins are positively oiled through centrifugal rings. This system has been found to be more reliable and positive than the commonly used "splash lubrication."

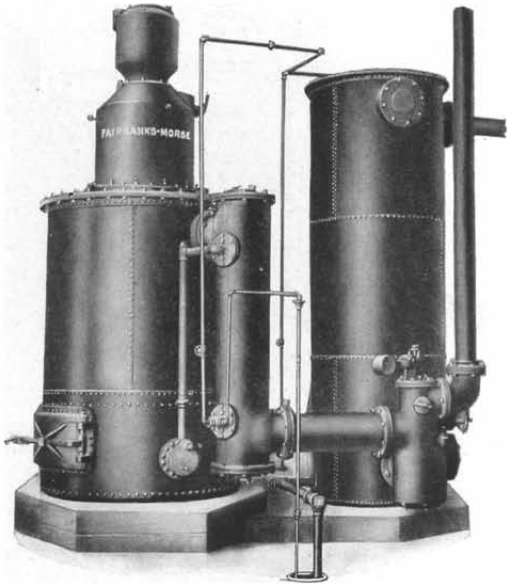
The speed of the engine is controlled by an improved throttling governor which proportions the charge to the load being carried. It is fitted with a speed regulator if ordered, so that the engine can be run at reduced speed. All engines are tested and adjusted under load and then carefully filled and painted before shipment.

Detailed description of our multiple cylinder vertical engines will be found in catalogue 44B which will be furnished promptly upon request.

SIZES AND DIMENSIONS

Actual H. P.	No. of Cylinders	Floor Space, Inches	Pulley on Engine, Inches	Diameter Flywheel, Inches	Speed of Engine	Shipping Weight
35	3	85 x 54	36 x 8½	54	350	8000
50	2	88 x 70	54 x 10½	70	300	12900
80	3	109 x 70	54 x 12½	70	300	17900
100	2	137 x 108	60 x 18½	78	250	27500
150	3	168 x 108	62 x 26½	78	250	32000

NOTE—Weights on the 100 and 150-H. P. sizes include out-board bearing and pulley.



Producer Gas Power Plant

The rapidly advancing cost of various kinds of fuel, and the ever present necessity for reduced cost of production, have lead to the investigation of means for securing power upon a more economical basis than even the most modern steam plant or most highly efficient gasoline engine.

The development of a satisfactory and dependable gas engine having been effected, and its efficiency being beyond question, a simple, inexpensive and reliable source of gas was sought for furnishing the fuel required, and has resulted in the use of producer gas plants of the "suction" type and "pressure" type.

Each type of producer has its advantages and limitations, but all things considered, the suction producer is conspicuously more desirable for a large majority of installations.

Comparison of Pressure and Suction Plants

Practically speaking, a suction producer is limited as to fuel, to the use of either anthracite coal, charcoal or coke, for the reason that bituminous coal and all low grade fuels contain by-products which must be eliminated from the gas by mechanical processes. This limitation as to the kinds of fuel is, however, more than offset by many advantages which a suction plant enjoys in comparison with a pressure producer plant.

A suction plant is less expensive to install than is a pressure plant, and occupies considerably less space.

The efficiency of a suction plant is relatively high by reason of the fact that the power consumed in bringing the gas from producer through its cleaning processes to the engine is less.

Further, this power is produced by a large economical engine rather than a smaller and comparatively uneconomical one.

With a suction plant no steam boiler under pressure is required and there is, consequently, no danger whatever from steam. Neither is there the difficulty of automatically controlling the gas supply as is the case when the amount and quality of gas produced is dependent upon a steam jet blower.

The gas being always below atmospheric pressure there is no opportunity for leakage of gas and consequently no danger therefrom.

Comparison with Steam Plant

When compared with a steam plant installation, a suction producer gas plant is possessed of so many advantages as to justify its use, even were there not the very great saving in fuel cost.

No boiler room is required, as the producer may be set in any convenient place near the engine.

Having no boiler, the expense of smoke stack is dispensed with and the smoke nuisance entirely abated.

There being no steam under pressure, all danger from leakage of steam or explosion of mains or boilers is eliminated, and all boiler insurance unnecessary.

The expense of installing, repairing and maintaining boiler feed pumps, heaters, purifiers, condensers, and steam and exhaust piping, is entirely dispensed with.

The fuel consumed being but about one-sixth that of ordinary steam plants, the expense of handling and storing it is correspondingly less.

With a producer plant there are comparatively few ashes to be handled and disposed of.

On account of the absence of heat about the producer it may be installed for the production of power in warehouses, schools, apartments and other places where the heat from steam boilers is objectionable, and the danger from explosion a menace.

In manufacturing establishments, electric light plants, and in all installations where power is used during a part only of a 24 hour day, the extremely small amount of fuel consumed by the producer when the fire is "banked" increases the day efficiency of the plant very considerably. Steam plants consuming, while operating, five or six times the amount of fuel required by a producer will, during 24 hours, require seven to ten times as much fuel, depending upon the proportion of time fires are "banked," and the skill of the fireman handling the boiler.

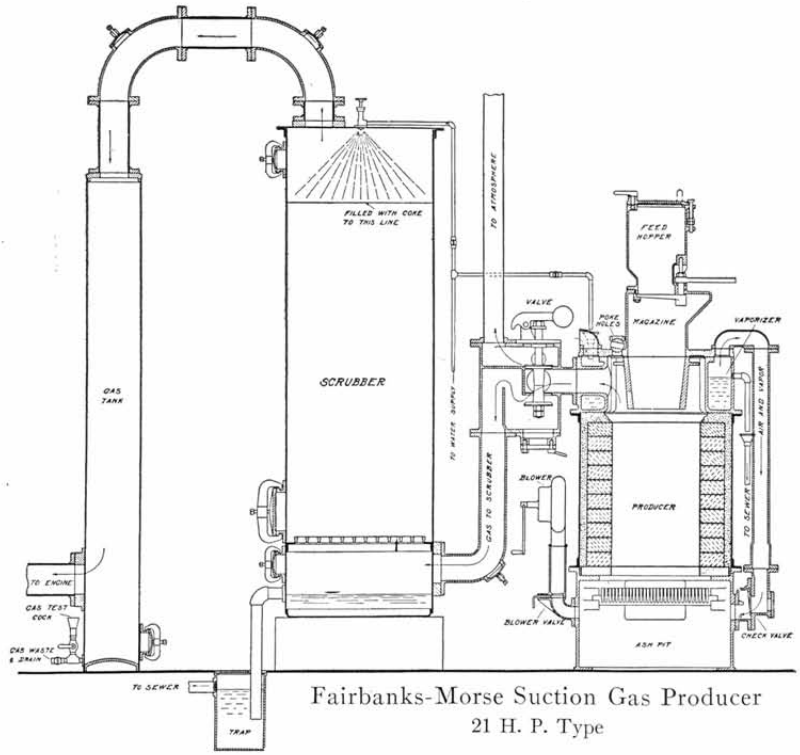
The producer being largely automatic in its operation, a careless or incompetent attendant has not the opportunity to waste fuel, as is frequently done in firing steam boilers.

COMPARATIVE COST OF FUEL

For Producing 100 Brake Horse Power 10 hours per day, 310 days per year

Type of Engine	Kind of Fuel	Cost of Fuel	Fuel Consumption per B.H.P. per Hour	Cost per B.H.P. per Hour	Cost per Year	Saving per year using Producer
Simple steam engine	Bituminous coal	$3.00 per ton	8 pounds	$0.012	$3720.00	$2751.00
Gas engine	Illuminating gas	60c per 1000 cubic feet	18 cubic feet	.0108	3348.00	2379.00
Gasoline engine	Gasoline	10c per gallon	$\frac{1}{10}$ gallon	.110	3100.00	2131.00
Gas engine	Natural gas	30c per 1000 cubic feet	13 cubic feet	.0039	1209.00	240.00
Producer gas engine	Anthracite coal or charcoal	$5.00 per ton	$1\frac{1}{4}$ pounds	.00313	969.00	00.00

The comparisons above refer to the rate of consumption while plant is running. To these amounts must be added the cost of fuel for banked fires and raising steam mornings, cost of boiler feed water, attendance, etc., all of which is in favor of the producer plant, and increases the amount of saving to be made by the use of a producer instead of steam plant.



Fairbanks-Morse Suction Gas Producer
21 H. P. Type

The Standard Producer Plant illustrated on page 22 consists of—

A—The generator or producer in which the gas is generated.

B—The vaporizer or economizer (in small sizes a belt around the top of the producer shell—in large sizes separate and located between the producer and scrubber).

C—The scrubber, in which the gas is cleansed and cooled.

D—The gas receiver, from which the gas is drawn by the engine.

When using coke or certain grades of charcoal it is desirable to interpose a purifier between the scrubber and receiver for the purpose of eliminating impurities and by-products which may pass through the scrubber.

STANDARD PRODUCER GAS POWER PLANTS

FAIRBANKS-MORSE SUCTION GAS PRODUCERS

H. P.	Approximate Shipping Weight, Pounds	Approximate Floor Space, Feet	Head Room Required above Floor, Feet
21	5000	11 x 18	11
21	5000	11 x 18	11
35	7800	12 x 18	12
35	7800	12 x 18	12
50	11700	13 x 13	13
50	11700	13 x 13	13
50	11700	13 x 13	13
75	12800	13 x 13	15
100	16000	14 x 17	16
150	21000	16 x 23	17

FAIRBANKS-MORSE PRODUCER GAS ENGINES

H. P.		Speed in R. P. M.	Size Pulley, Inches	Floor Space, Inches	Approximate Shipping Weight, Pounds
17	Horizontal	250	28 x 16	105 x 65	7200
21		220	32 x 16	106 x 66	7980
26		220	36 x 10	107 x 78	11000
30		220	38 x 12	108 x 82	11600
45		200	72 x 12½	118 x 67	15200
50		200	78 x 14½	126 x 70	17500
43	Vertical	300	54 x 10½	88 x 70	12900
65		300	54 x 12½	109 x 70	17900
100		250	60 x 18½	137 x 108	27500
150		250	62 x 26½	168 x 108	32000

NOTE—Floor space of producers includes two feet on each side for passages.

Choice of Fuel

Our suction gas producers are designed primarily for use on anthracite coal, but may be operated upon charcoal or gas coke when the latter fuels can be obtained to better advantage than coal.

The size of coal used is not material, so it is not excessively large or unusually fine. "Nut," "pea" and "buckwheat" are sizes usually employed in producers, the latter two sizes being ordinarily preferable on account of lower cost.

It is important that the coal, particularly "buckwheat," should be reasonably free from dust or clay, as otherwise the fire becomes choked and heavily clinkered, and an undesirable amount of attention is required to maintain the proper amount and quality of gas supply.

Charcoal from all kinds of wood is a desirable producer fuel, and increases the capacity of producer about 10 per cent. The use of charcoal entirely eliminates clinkering, but the amount of tar and pitch distilled usually makes it desirable to install a purifier in addition to the scrubber. The amount of tar produced depends largely upon the kind of wood used and the thoroughness with which it has been charred.

Specification

GENERATOR—A single generator is used, the smaller sizes having cast iron shells with vaporizer cast in the form of a belt around the top, the larger sizes having iron fire pots, hopper surmounts the generator and is so designed as to prevent admission of air while charging. The generator is carefully lined with first quality fire-brick, is provided with cleaning doors of improved construction and an adequate number of poke-holes.

BALANCED CHECK VALVE—Is located in the air intake near the generator shell and prevents the escape of gas back through vaporizer into the room.

ECONOMIZER OR VAPORIZER—In all sizes, whether constructed as an integral part of generator or separate from it, the economizer is of a design which avoids a multiplicity of small tubes and thereby prevents clogging of tubes and an inadequate vapor supply. Means are provided for maintaining a constant water level in the vaporizer.

COMBINED THREE-WAY AND RELIEF VALVE—A three-way valve is located between the generator and scrubber, and connects the generator to atmosphere before starting and to the scrubber while the plant is in operation. It is designed to also act as an automatic atmospheric relief valve for the protection of the plant against possible excess pressure resulting from sudden stoppage of engine, obstruction in pipes or other cases.

SCRUBBER—The scrubber is a steel shell containing grates near its base and filled to the top with ordinary foundry coke. The passage of gas through this coke and the water spray which plays upon it cleanses and cools it ready for delivery to the receiver and use in the engine. To make this cleaning process as thorough as possible, our scrubbers are built unusually long and are fitted with a spray valve of special design. The construction of spray valve permits of carrying full water pressure at the nozzle and secures a uniform and reliable spray covering the entire bed of coke.

The amount of water required for "scrubbing" may be estimated at one to two gallons per horse power per hour.

RECEIVER OR GAS TANK—Placed conveniently near the engine is a receiver of sufficient capacity to insure a full charge of gas, of proper density, in the engine cylinder. The receiver is designed to also constitute a trap for collecting any moisture or by-products present in the gas and prevent their entry into the engine cylinder. Hand holes and drains are provided for conveniently inspecting and cleaning.

IN GENERAL—All principal pipe connections are flange fitted and provided with hand holes at all elbows, to facilitate inspection and cleaning. All principal water pipe fittings are tees or crosses to permit of cleaning in both directions.

All parts are accurately machined and fitted, and if properly installed will remain absolutely tight indefinitely.

As there are no bearings or wearing surface requiring renewal, repair bills are practically nothing.

All surfaces exposed to direct action of the fire are lined with fire brick so there can be no burn-outs, eliminating expenses for relining.

Useful Information

HEAT UNITS

A British thermal unit (B. T. U.) is the amount of heat required to raise the temperature of one pound of pure water one degree Fahr. at or near 39.2° Fahr.

A French calorie is the amount of heat required to raise the temperature of one kilogram of pure water one degree Cent. at or near 4° Cent.

A pound calorie is the amount of heat required to raise the temperature of one pound of water one degree Cent. at or near 4° Cent.

One B. T. U. equals .252 French calories, equals .555 pound calories.

One French calorie equals 3.968 B. T. U., equals 2.2046 pound calories.

One pound calorie equals 1.8 B. T. U., equals .45 French calories.

One B. T. U. is equivalent to 778 foot pounds.

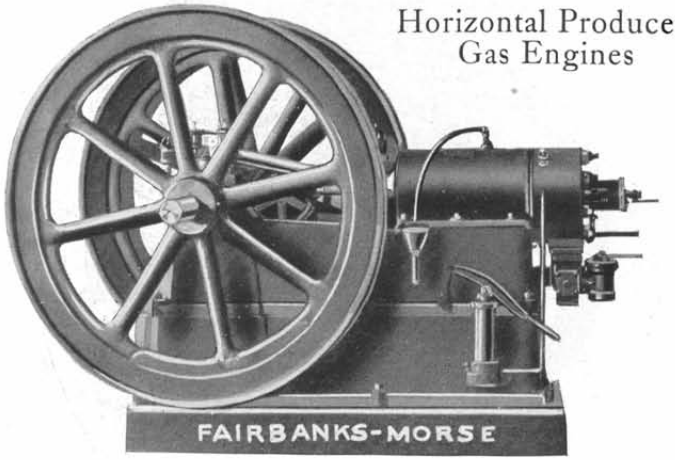
2545 B. T. U. per hour are equivalent to one horse power hour.

CALORIFIC VALUE OF VARIOUS FUELS—APPROXIMATE

	B. T. U. per Pound	Calories, per Pound
Wood Charcoal	14500	3654
Bituminous coal—Pittsburg district	14350	3616
Anthracite coal—Eastern	13500	3402
Thoroughly air-dried wood	5600	1411
Peat—Air-dried, 25 per cent. moisture	7400	1865
Lignites—Average	11200	2822

Illuminating gas averages 600 B. T. U. per cubic foot. Natural gas averages 850 B. T. U. per cubic foot. Producer gas averages 125 B. T. U. per cubic foot.

Horizontal Producer Gas Engines



Fairbanks-Morse Suction Gas Producer Engine, 30 H. P. type

Nine sizes of producer gas engines, ranging in power from 17 B. H. P. to 50 B. H. P. are built of the single cylinder horizontal type shown by illustration, and conforming in general to the designs and construction of gasoline engines in detail in our catalogue No. 44-B.

Fairbanks-Morse Producer Gas Engines

Fairbanks-Morse Producer gas Engines are regularly built in sizes from 17 B. H. P. to 150 B. H. P. (see table, p. 23), and possess all the general features of design and construction which have earned so favorable a name for Fairbanks-Morse gas and gasoline engines. Producer gas engines differ from illuminating or natural gas machines in that they have parts and valves of larger area, and reduced cylinder clearance. The lower thermal value of producer gas (which varies from 110 to 140 B. T. U. per cubic foot) makes necessary increased port areas and a higher degree of compression.

When requesting proposals or asking recommendations, prospective purchasers will enable us to save time in correspondence and give more definite data, if the following information is furnished us:

The approximate horse power required.

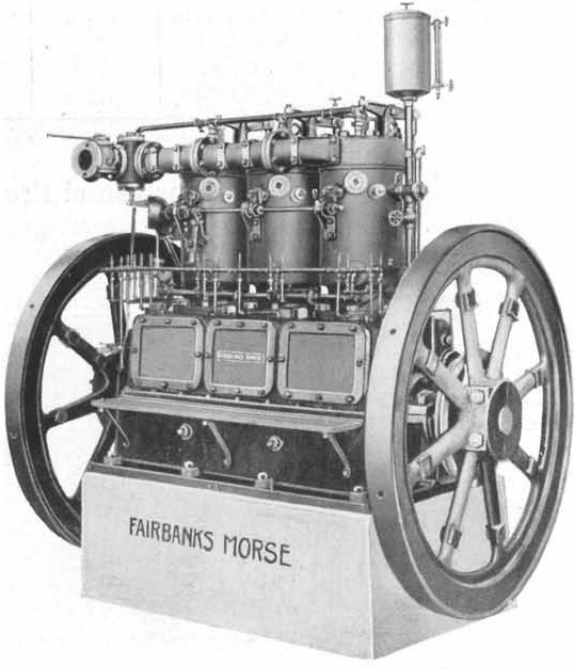
The town or city where the plant is to be installed.

The altitude above sea level.

The purpose for which the engine is to be used.

The approximate length of time engine will be run in each 24 hours, and the average amount of power required during the run.

The cost of pea anthracite coal, bituminous coal, charcoal and gas coke.



Fairbanks-Morse Vertical Multiple Cylinder Producer Gas Engines

Beginning with 43 B. H. P. four sizes of producer gas engines are regularly built of the multiple-cylinder, vertical type described in detail

herein. For plants of larger capacity than 150 H. P. engines are built to order, or several separate units installed which aggregate the total power required.

Like our horizontal machines, our multiple-cylinder vertical engines are all of the four-cycle type, the superiority of which for power service is beyond dispute and evidenced by its adoption by most of the prominent builders. While for a given amount of power, the four-cycle engine is somewhat more expensive to build than a two-cycle machine, its higher efficiency and greater simplicity more than compensate for the added cost.

With the four-cycle construction the burned gases are positively discharged from the cylinder and no power wasted by "scavenging," and no fuel lost by escape past the exhaust valve before compression.

At each complete "cycle" a charge is exploded in each cylinder of the engine resulting in an equal distribution of the load upon each cylinder and crank, and a smooth uniform speed. A practically constant speed under varying loads is maintained by the use of our improved governor, which not only controls the amount of gas admitted to the cylinder but is also instrumental in securing an explosive mixture of proper proportions at all times. The regulation of these engines from no load to full load and under fluctuations of load will compare favorably with best steam engine practice.

The feature of merit peculiar to the Fairbanks-Morse vertical engine may be summarized as follows:

Being of the four-cycle type its efficiency is a maximum and construction simple.

It is equipped with a special governor controlling the speed to meet the most exacting regulation requirements, and also controlling the proportions of the gas mixtures.

It is of the enclosed type, clean and dust-proof but readily accessible for adjustment of all parts.

Crank shaft, cranks and crank pins are turned from a single piece of forged steel.

Frame is split transversely, facilitating handling, aligning and repairing.

Main bearings are carried in frame, not bolted to the end of it.

All bearings are adjustable for wear and alignment.

Trunk pistons are of unusual length and arranged with special lubricating device.

Pistons are accurately centered, to equalize wear on cylinders.

Valves are so located as to insure a full charge and also prevent escape of gas into exhaust before explosion.

All valves and igniters are operated by single cam shaft.

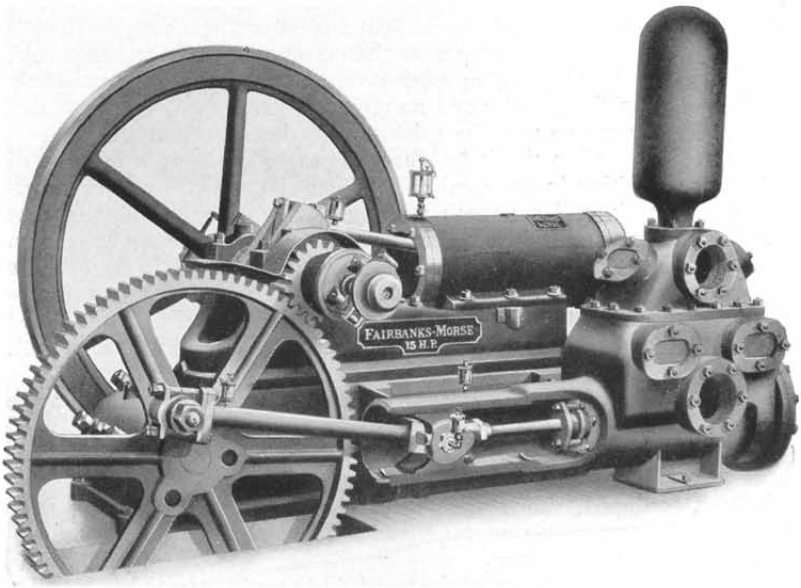
Cylinders, cylinder heads and valve chambers are made from special iron and all are water jacketed.

Instantaneous starting by compressed air. No direct strains carried by adjusting wedges.

An improved oiling system with graduated sight feed for each principal bearing, and recovery of oil for filtering and re-use.

Carefully conducted shop test for load, regulation and efficiency before shipment.

High finish to all parts, including painting and varnishing before shipment.



Fairbanks-Morse
Combined Gasoline Engine and Pump

PISTON PATTERN

We cannot call attention too strongly to the many uses to which this combination can be put and to the many places where it alone could perform economical and satisfactory work, and at a minimum cost and under exceptionally trying conditions. These combinations are built in the sizes shown on page 29. A friction-clutch pinion is furnished.

They are fitted with patent electric igniter, also our patent self-starting device. Our electric igniter dispenses with all flame and handling of gasoline in building and expense of gasoline for heating tube.

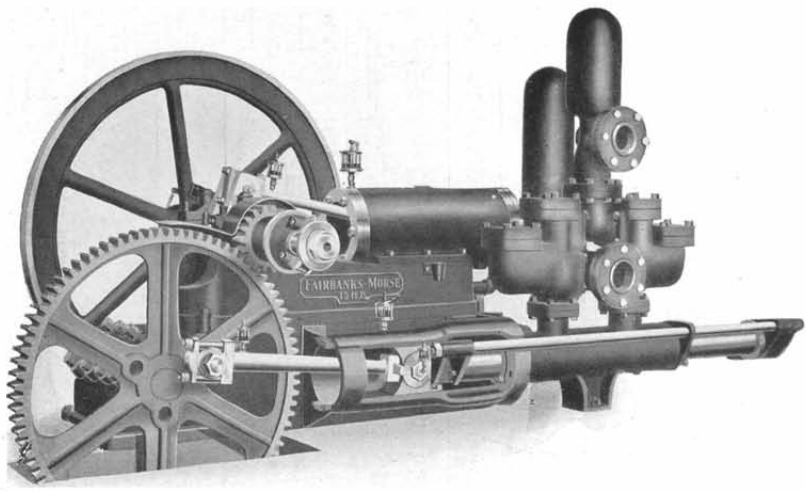
Fairbanks-Morse Combined Gasoline Engine and Pump

(PISTON PATTERN)

H.P.	Combination No.	Change of Stroke	Strokes per Minute	Cylinder	Gallons per Min., Pump Displacem't	Head, Feet	Suction	Discharge	Floor Space	Ship'g Weight
5	1	8 –9–10	91	4½	51 –62½	259–211	3	3	79 x 41½	3550
5	2	8– 9–10	91	5	62 –77½	213–170	4	4	79 x 41½	3550
5	3	8– 9–10	91	5½	75 – 94	176–140	4	4	79 x 41½	3550
5	4	8– 9–10	91	6	89 –111	148–119	4	4	79 x 41½	3550
5	5	8– 9–10	91	6½	104 –131	127–101	4	4	79 x 41½	3550
5	6	8– 9	91	7	121 –137	109– 96	4	4	79 x 41½	3550
8	7	8– 9–10	97½	5	66½– 93	319–228	4	4	79 x 41½	3650
8	8	8– 9–10	97½	5½	80½–100	263–212	4	4	79 x 41½	3650
8	9	8– 9–10	97½	6	95½–119	221–178	4	4	79 x 41½	3650
8	10	8– 9–10	97½	6½	111 –140	191–151	4	4	79 x 41½	3650
8	11	8– 9	97½	7	130 –146	163–145	4	4	79 x 41½	3650
10	12	8–10–12	100	7	133 –200	200–132	6	5	104 x 60½	6600
10	13	8–10–12	100	7½	153 –229	173–115	6	5	104 x 60½	6600
10	14	8–10–12	100	8	174 –261	152–101	6	5	104 x 60½	6600
10	15	8–10–12	100	8½	196 –295	135– 90	6	5	104 x 60½	6600
15	16	8–10–12	105	7	140 –210	281–188	6	5	104 x 60½	7150
15	17	8–10–12	105	7½	161 –240	246–165	6	5	104 x 60½	7150
15	18	8–10–12	105	8	183 –274	216–145	6	5	104 x 60½	7150
15	19	8–10–12	105	8½	206 –310	192–127	6	5	104 x 60½	7150
20	20	8–10–12	110	7	147 –220	360–240	6	5	108 x 70	9375
20	21	8–10–12	110	7½	168 –252	315–210	6	5	108 x 70	9375
20	22	8–10–12	110	8	191 –287	277–184	6	5	108 x 70	9375
20	23	8–10–12	110	8½	216 –324	245–163	6	5	108 x 70	9375
25	24	8–10–12	109½	8	191 –286	346–230	7	6	118 x 75½	11000
25	25	8–10–12	109½	8½	215 –322	306–205	7	6	118 x 75½	11000
25	26	8–10–12	109½	9	242 –362	273–182	7	6	118 x 75½	11000
25	27	8–10–12	109½	9½	269 –404	245–163	7	6	118 x 75½	11000
25	28	8–10–12	109½	10	298 –448	222–147	7	6	118 x 75½	11000
25	29	8–10–12	109½	10½	329 –494	200–134	7	6	118 x 75½	11000

We also furnish special large water boxes for 5, 8, 10, 15 and 20 horsepower combined pumpers (piston pattern) at small advance over the cost of regular combination, as follows:

H.P.	Combination No.	Change of Stroke	Strokes per Minute	Cylinder	Gallons per Min., Pump Displacem't	Head, Feet	Suction	Discharge	Floor Space	Ship'g Weight
5	31	8– 9–10	91	7	121–151	109– 88	6	5	89 x 41	4170
5	32	8– 9–10	91	7½	139–174	95– 76	6	5	89 x 41	4170
5	33	8– 9–10	91	8	158–197	84– 67	6	5	89 x 41	4170
5	34	8– 9–10	91	8½	178–223	74– 59	6	5	89 x 41	4170
8	41	8– 9–10	97½	7	130–162	162–130	6	5	89 x 41	4270
8	42	8– 9–10	97½	7½	149–186	142–114	6	5	89 x 41	4270
8	43	8– 9–10	97½	8	170–211	125–100	6	5	89 x 41	4270
8	44	8– 9–10	97½	8½	191–239	111– 88	6	5	89 x 41	4270
10	51	8–10–12	100	9	220–330	120– 80	7	6	109 x 60½	7600
10	52	8–10–12	100	9½	245–368	112– 72	7	6	109 x 60½	7600
10	53	8–10–12	100	10	272–408	97– 65	7	6	109 x 60½	7600
10	54	8–10–12	100	10½	300–450	88– 59	7	6	109 x 60½	7600
15	55	8–10–12	105	9	231–347	171–114	7	6	109 x 61	8000
15	56	6–10–12	105	9½	257–386	154–102	7	6	109 x 61	8000
15	57	8–10–12	105	10	286–428	138– 92	7	6	109 x 61	8000
15	58	8–10–12	105	10½	315–472	125– 84	7	6	109 x 61	8000
20	45	8–10–12	110	8	191–287	277–184	7	6	114 x 73	12000
20	46	8–10–12	110	8½	216–324	245–163	7	6	114 x 73	12000
20	47	8–10–12	110	9	242–363	218–145	7	6	114 x 73	12000
20	48	8–10–12	110	9½	270–405	196–130	7	6	114 x 73	12000
20	49	8–10–12	110	10	300–459	176–117	7	6	114 x 73	12000
20	50	8–10–12	110	10½	330–495	160–107	7	6	114 x 73	12000

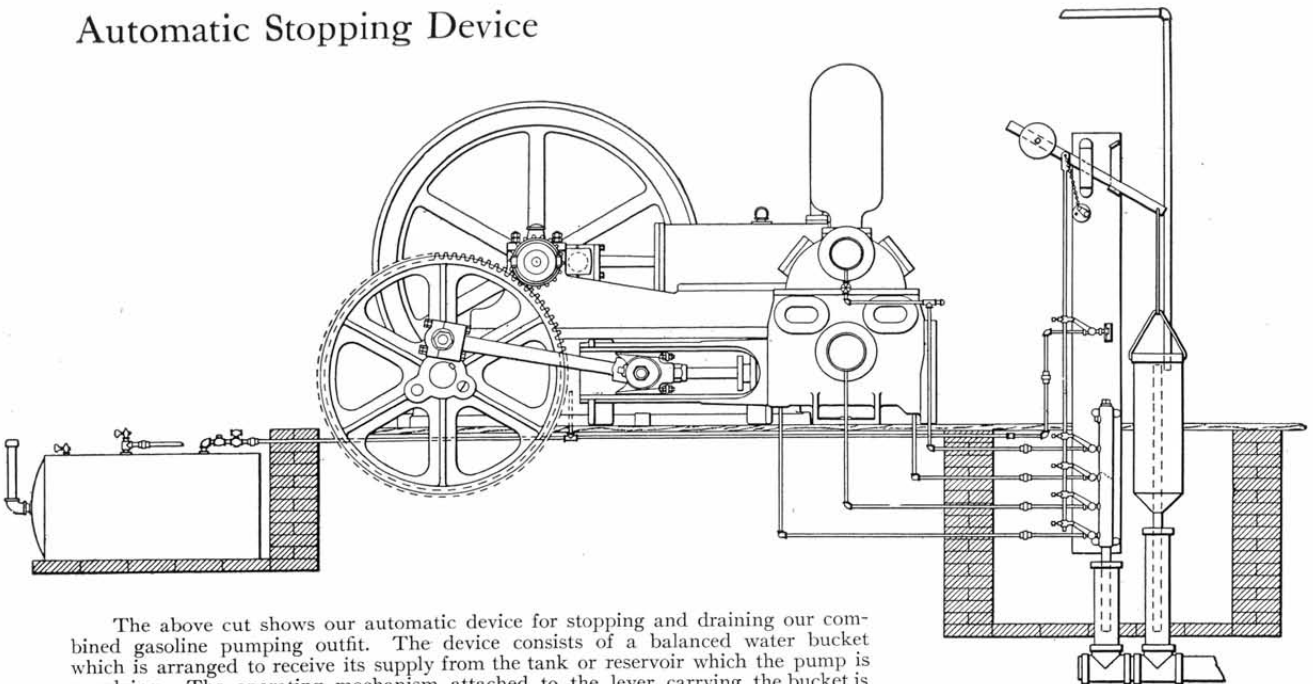


Fairbanks-Morse Combined Gasoline Engine and Outside Packed Outside Connected Pump

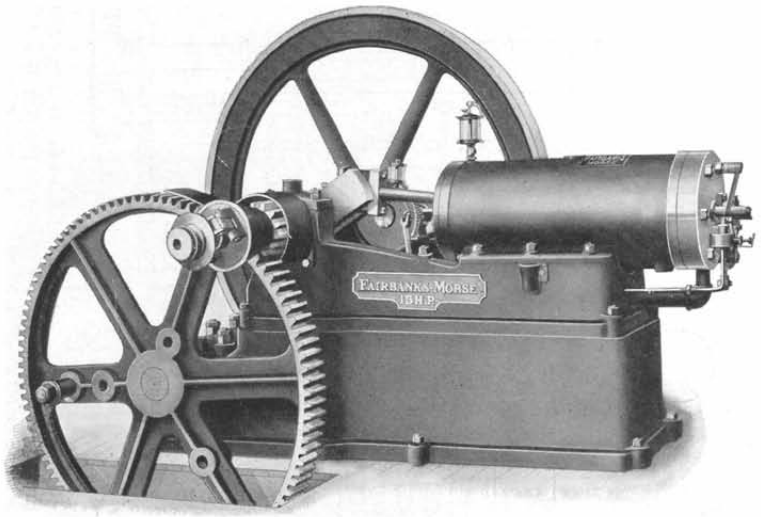
H.P.	Combination No.	Change of Stroke	Strokes per Minute	Cylinder	Gallons per Min., Pump Displacem't	Head, Feet	Suction	Discharge	Floor Space	Ship'g Weight
10	64	8–10–12	100	5	68–102	390–259	4	3½	144 x 60½	7000
15	66	8–10–12	105	5	71–126	555–312	4	3½	144 x 60½	7400
20	70	8–10–12	110	6	108–163	492–330	4½	4	157 x 61	10500
25	74	8–10–12	109½	6	107–161	615–410	4½	4	157 x 61	11500

The O. P. O. C. combined pumper, illustrated above, is built for working against heavy pressures, as indicated in table. There are two externally packed plungers working into the ends of the water box. These plungers are arranged in trombone style, being attached to cross-heads and are connected by wrought iron rods supported by guides to relieve the wear on the plungers, glands and stuffing-box throats.

Automatic Stopping Device



The above cut shows our automatic device for stopping and draining our combined gasoline pumping outfit. The device consists of a balanced water bucket which is arranged to receive its supply from the tank or reservoir which the pump is supplying. The operating mechanism attached to the lever carrying the bucket is so arranged that when the bucket shifts, the engine is automatically shut down, and all pipe connections leading to the pump and engine are automatically drained. By the use of this device it is unnecessary for an attendant to visit the plant for the purpose of shutting down, as the automatic handles all valves as perfectly and completely as though the engineer was present at the time. *Further information and prices on application.*



Fairbanks-Morse Horizontal Gasoline Engine with Geared Base

SIZES AND DIMENSIONS

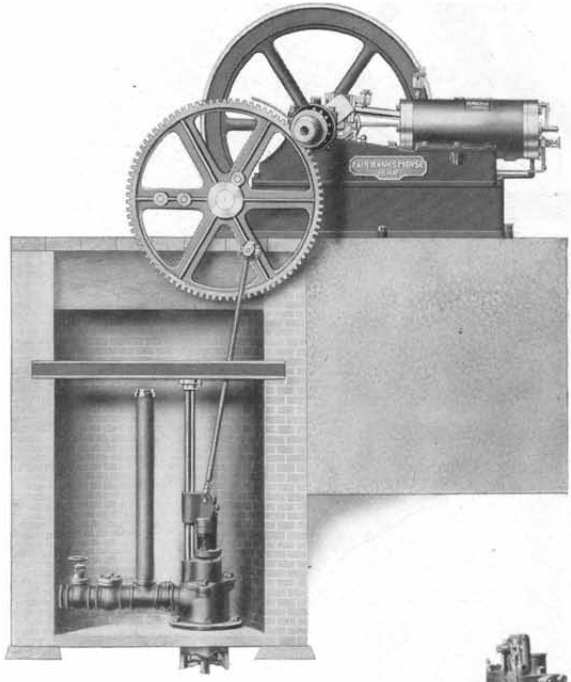
	H. P.	Number	Speed Pump Gear	Maximum Stroke Over Pit	Standard Strokes	Floor Space	Shipping Weight Complete
Vertical	*2	J	47.	10	5– 7–10	68 x 28	925
	†3	13	37.7	20	8–12–16–20	100 x 37	1730
	3	1	38.5	10	8– 9–10	42 x 28	1475
	3	1A	29.2	24	16–20–24	42 x 39	1675
	†4	23	37.7	20	8–12–16–20	100 x 39½	1815
	4	24	29.	24	16–20–24	44 x 39	1800
Horizontal	5	2	45.4	22	8–12–18–22	75 x 40	2800
	5	3	39.	28	12–18–24–28	81 x 43	3100
	5	4	30.5	36	18–24–30–36	93 x 41½	3150
	5	14	26.	46	18–24–30–36	100 x 42	3400
	8	5	41.9	22	8–12–18–22	75 x 44	2900
	8	6	36.	28	12–18–24–28	81 x 48	3300
	8	7	28.	36	18–24–30–36	93 x 46½	3500
	8	15	24.	46	18–24–30–36	100 x 47	3530
	10	8	33.	36	12–18–24–30–36	101 x 62	4900
	10	19	23.9	56	12–18–24–30–36	122 x 60	5750
	15	9	30.	36	12–18–24–30–36	102 x 62	5500
	15	20	21.8	56	12–18–24–30–36	122 x 61	6300

*Mounted on wood base.

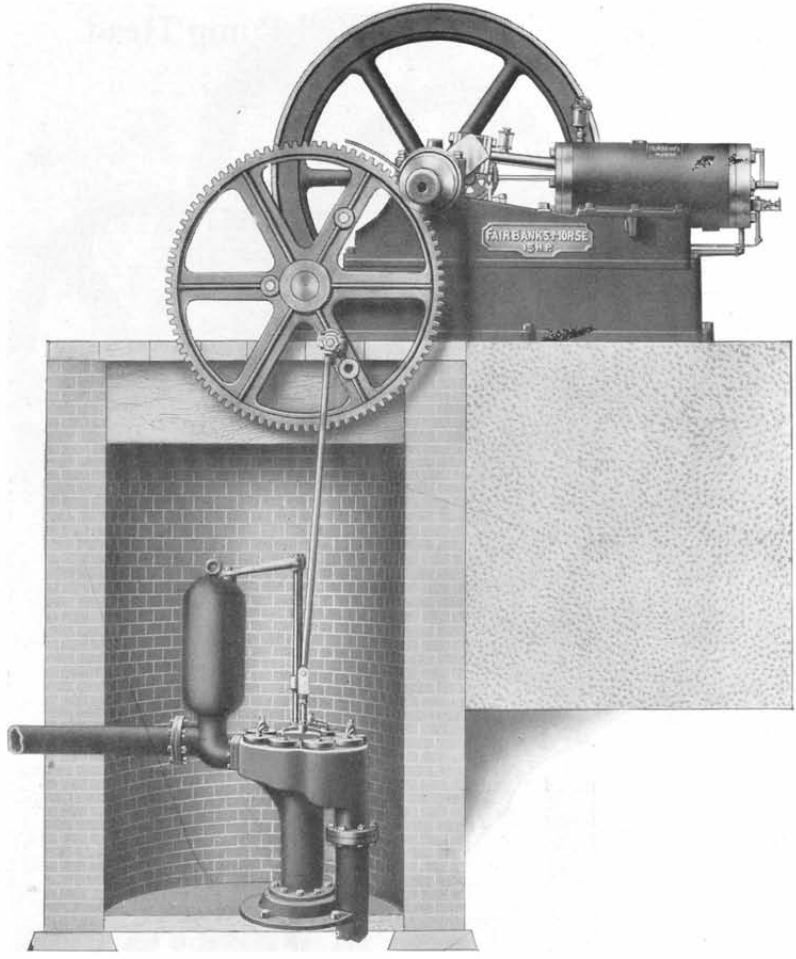
†Mounted on wood base with walking-beam attached.

When used with walking-beams the maximum strokes noted above require shortening in some cases to clear clutch on engine shaft.

Fairbanks-Morse Geared Base Gasoline Engine and Displacing Deep Well Pump Head



Fairbanks-Morse Vertical Engine with Geared Base



Fairbanks-Morse Geared Base Gasoline Engine and Eclipse Pump

See table of sizes and capacities of Eclipse Pumps on page 35

Eclipse Double Acting Pumps

6 x 18

4 x 12

The illustrations show our regular 6 x 18 and 4 x 12 pumps.

The waterways and valve areas are large, allowing the water to move through the pump with minimum friction.

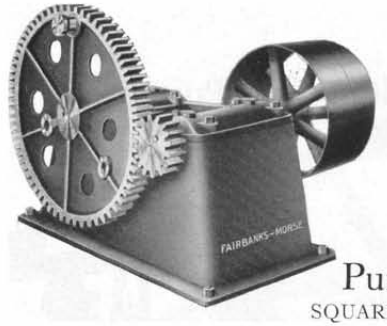
The valves are easy of access, requiring but the loosening of two nuts to get at all four of the valves. The valves can be removed by simply unscrewing a stud and all parts of the pump be gotten at with only a common monkey-wrench.

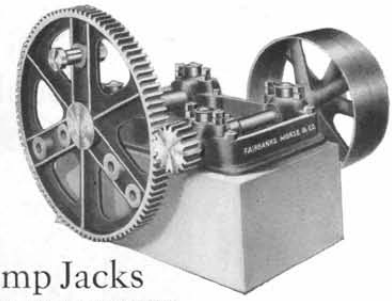
The pump can be taken apart, overhauled, repacked, new valves put in or repairs made without disconnecting either suction or discharge pipe or in any way disturbing the setting of the pump.

All except the last three sizes in table below have two discharge openings. Either can be used, as the location may require, one running up from the top of the air-chamber and the other horizontally from the bottom of the air-chamber.

PRICE LIST

Size		Strokes per Minute	Capacity per Min., Gallons	Suction Pipe	Disch'ge Pipe	Weight, Pounds	Price, with Iron Cylinder	Price, with Brass Cylinder
Diameter Cylinder	Length Stroke							
3	12	65	23	1½	1½	350	$ 42.00	$ 48.00
4	12	78	51	2½	2½	370	58.00	66.00
4	16	59	51	2½	2½	385	70.00	76.00
5	12	84	86	3	3	620	80.00	86.00
5	16	63	86	3	3	640	82.00	92.00
5	18	56	86	3	3	650	84.00	94.00
6	18	70	154	5	4	1125	150.00	168.00
8	18	70	274	6	6	1950	218.00	244.00
8	24	60	313	6	6	2000	240.00	266.00
8	36	40	313	6	6	2150	270.00	300.00





Pump Jacks

SQUARE FRAME TYPE

These illustrations represent types of our pumping jacks for use with our gasoline engines. They are strongly built and very reliable machines.

	No.	Drawing	H. P.	Stroke per Min.	Length of Stroke, Inches	No. of teeth in Gears	Ratio	Gears, Inches	
								Face	Pitch
IRON FRAME JACKS	1	41 G. C.	1¼	40	6–9–12	40–18, 78–20	1 to 13.4	1½ 2	6 P 5 P
	2	42 G. C.	1¼	40	6–9–12	44–17, 78–20	1 to 10.1	1½ 2	6 P 5 P
	4	153 A. P.	1½	40	6–9–12	33–17, 78–20	1 to 7.6	1½ 2	5/16 5 P
	5	182 A. P.	1½	30	5–6–7½–10–12	89–15	1 to 5.9	1¾	13/16
	6	163 G. P.	1¾	30	7–12–15–18–20	96–17	1 to 5.6	2	4
	7	110 A. P.	5	30	12–18–24	70–16	1 to 4.4	3	1¼
	12	184 A. P.	12	30	12–18–24–36	17–96	1 to 5.6	2	¾
	15	191 A. P.	15	30	12–18–24–30–36	12–100	1 to 8.3	4	1½
	16	192 A. P.	8	30	12–18–24–28	12–100	1 to 8.3	3¼	1⅛
	17	203 A. P.	12	30	12–18–24–36	12–100	1 to 8.3	4	1½
	18	204 A. P.	8	30	12–18–24–28	12–100	1 to 8.3	3¼	1⅛
WOOD FRAME JACKS	8	317 G. N.	18	30	20–24–36	12–128	1 to 10.6	3¼	1⅛
	9	94 A. P. 1	12	30	12–18–24–36	12–100	1 to 8.6	4	1½
	10	290 G. N.	22	14	36–48–54	100–126, 19–12	1 to 13.2	6	2½
	11	178 A. P.	28	14	36–48–54	13–100	1 to 7.7	7	2¼

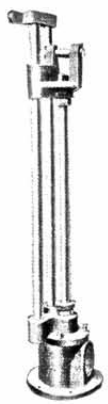
Displacement Plunger Packing Head Fig. 60

(SEE CUT ON LEFT, FIG. 60)

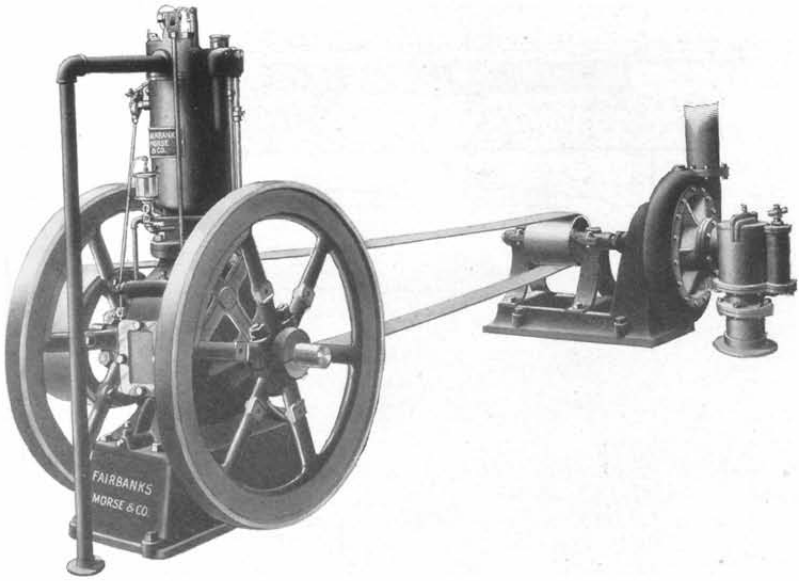
	Size Openings, Inches	Stroke, Inches	Price	Extra for Brass Covered Plungers	
				Diameter	Price
DISPLACEMENT PACKING HEADS	4	24	$30.00	2½ 2¼	$ 3.75 3.25
	4	36	33.00	2½ 2¼	4.44 3.85
	6	24	32.00	3½ 3	6.45 5.70
	6	36	35.00	3½ 3	8.65 7.30
	8	24	52.00	.. ..	....
	8	36	56.00	5 4	13.25 9.70
	8	54	82.00	.. ..	....

(SEE CUT ON RIGHT, FIG. 62)

	Size Opening, Inches	Stroke, Inches	Price	Extra for Brass-Covered Piston Rods
PACKING HEADS	4	24	$14.50	$1.50
	4	36	15.50	2.00
	6	24	19.50	1.50
	6	36	20.50	2.00



Packing Head Fig. 62



Fairbanks-Morse Engine Belted to Centrifugal Pump

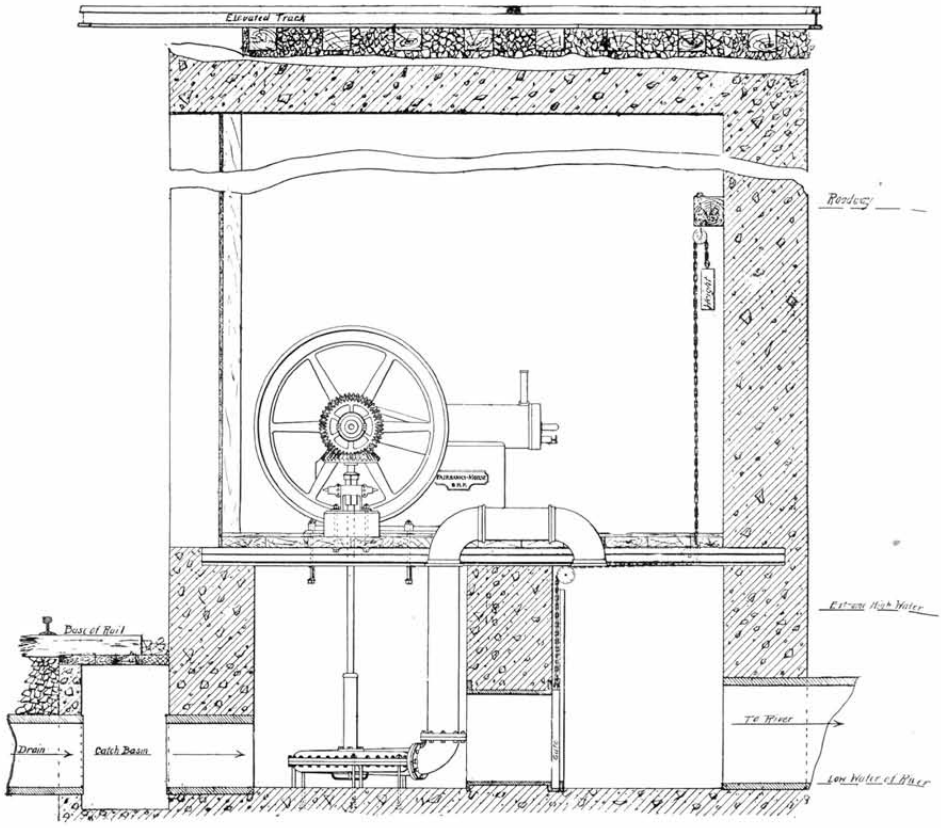
The above cut represents our engine belted to a centrifugal pump. This is a very simple and effective way of raising water. A combination of any size can be made within the sizes of our standard engines.

A rotary pump can be connected in the same manner as the centrifugal and would be best in cases of high lifts.

Some remarkable results have been obtained with our combination of this type.

A gasoline engine mounted upon trucks and belted to a centrifugal pump can be hauled to any desired point, and the work carried on as long as desired, a change of position necessitating merely the hauling of the outfit.

For centrifugal pumps see page 151.



VIEW SHOWING METHOD

OF

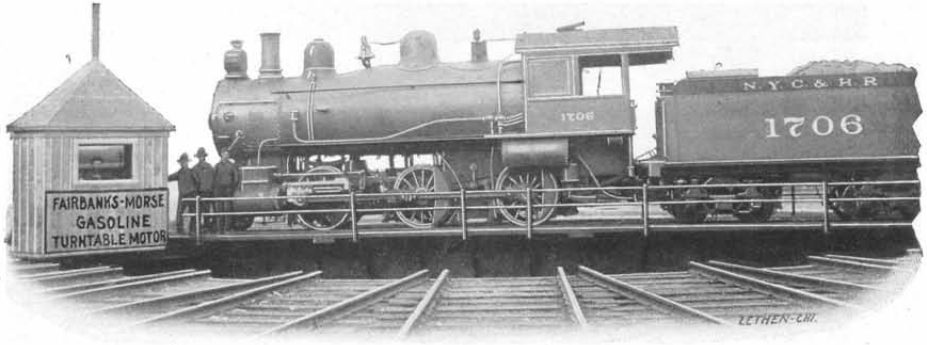
CONNECTING VERTICAL CENTRIFUGAL PUMP

TO

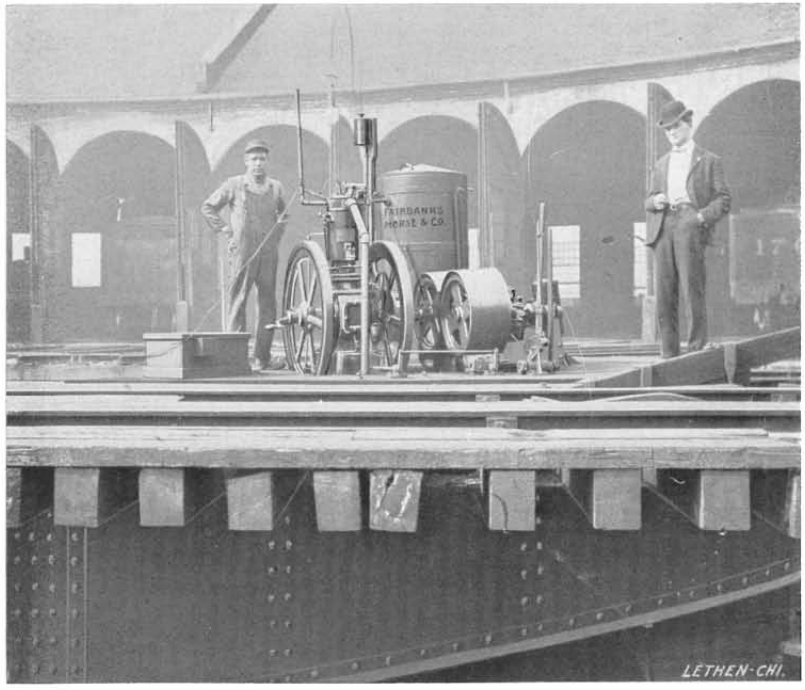
FAIRBANKS-MORSE GAS OR GASOLINE ENGINE

Fairbanks-Morse Turntable Motor, Gas, Gasoline or Electric

THE OLD WAY



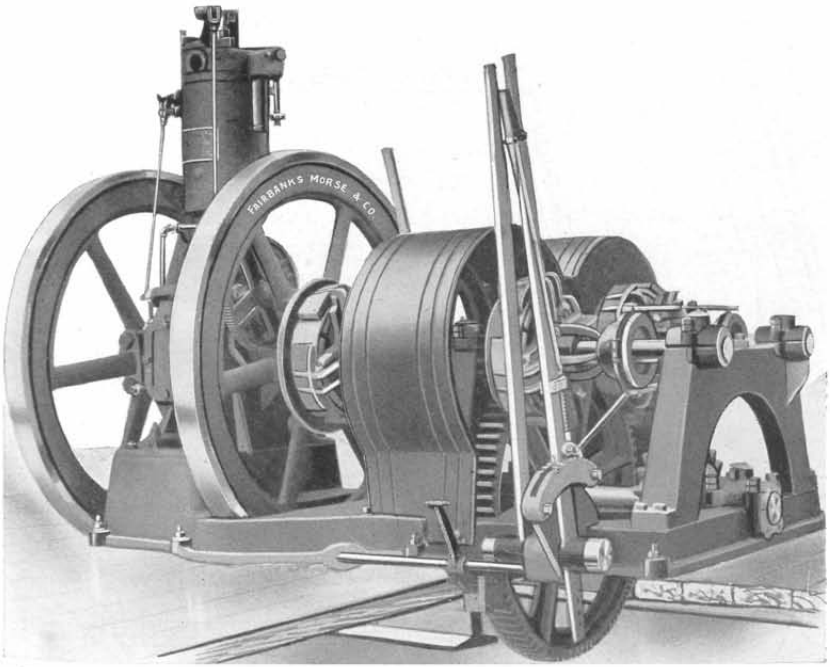
THE NEW WAY



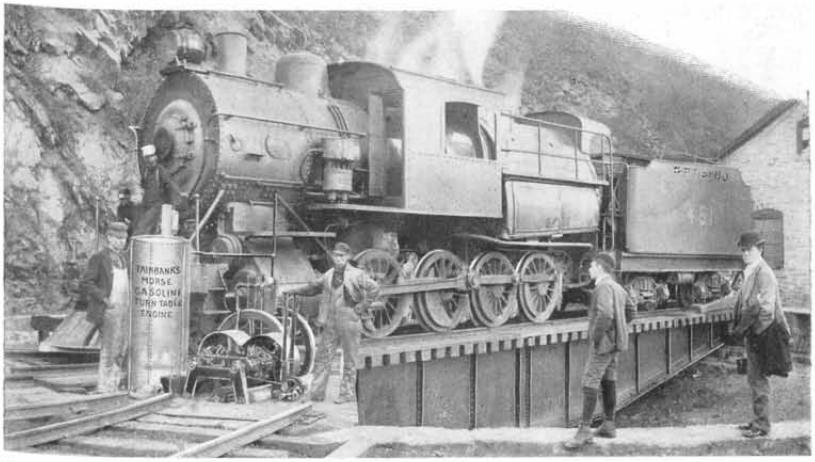
Fairbanks, Morse & Co's gasoline motor for turntables is the most economical power there is for this purpose. It is always ready for use and will turn the heaviest engines under most adverse circumstances. It is a money saver.

If your service is heavy enough to warrant having some one there all the time, a boy who has sense enough to carry a verbal message from the round house to the station is capable of running the motor.

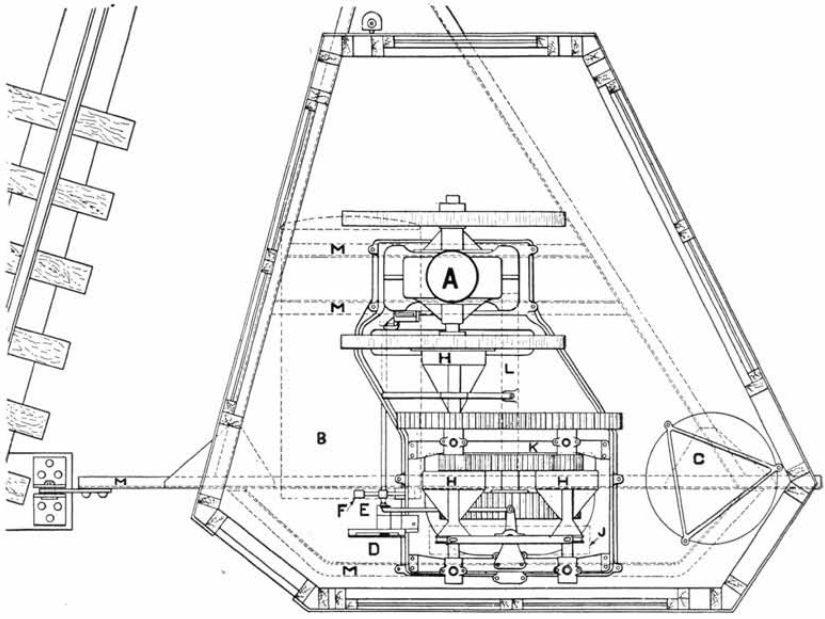
Ask us more about this gasoline turntable motor.



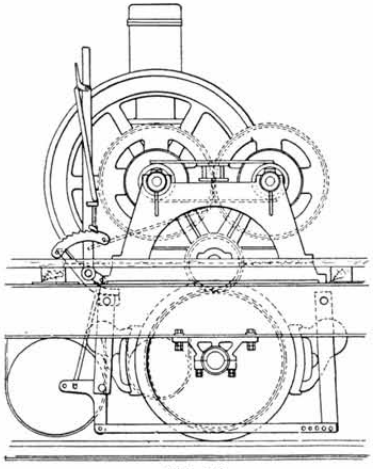
This cut represents an end view, showing the gears and clutch arrangement as connected to a Fairbanks-Morse Gasoline Engine.



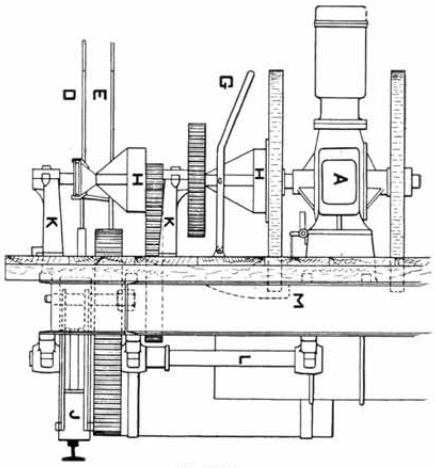
The gasoline motor is fitted with Perfect Speed Regulator, which allows it to turn at slow speed when table is not in operation, and speed is instantly increased by foot lever, which is located near levers controlling clutches and brake.



Top View

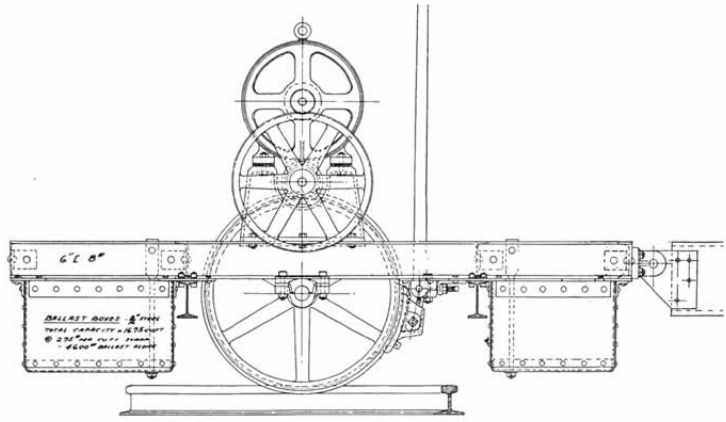


Side View

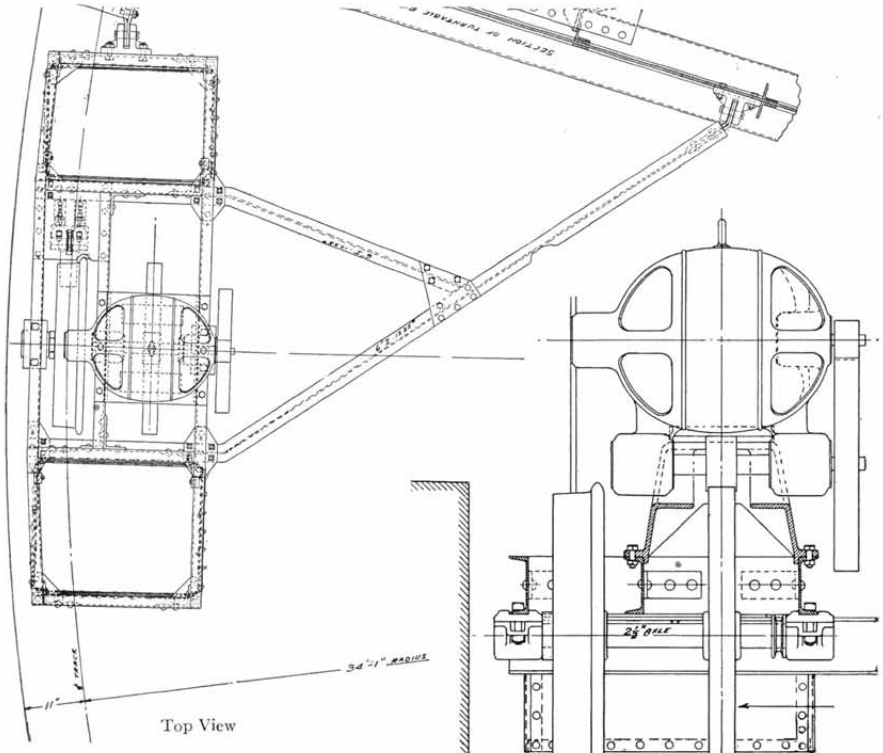


End View

Plan and Elevation of Gasoline Turntable Motor



Side View



Top View

End View

Plan and Elevation of Electrically Driven Turntable

Railroads Using Fairbanks, Morse & Co. Turntable Motors

BOSTON & ALBANY R. R.
Boston, Mass.
Worcester, Mass.
West Springfield, Mass.
Renssalaer, N. Y.
Beacon Park.

BOSTON & MAINE R. R.
Charleston, Maine.
Rottendam Junction, N. Y.
East Cambridge, Mass.
East Deerfield, Mass.
Boston, Mass.

CENTRAL OF GA. R'Y CO.
Columbus, Ga.
Macon, Ga.
Savannah, Ga.

CENTRAL R'Y OF N. J.
Mauch Chunk, Pa.

CHICAGO & ALTON R'Y.
(2) Slater, Mo.
Chicago, Brighton Park.
Venice, Ill.

CHICAGO & WESTERN IND. R'Y.
Chicago (83d Street).

CHICAGO, BURLINGTON & QUINCY R'Y.
Chicago, Western Ave.
Burlington Shops.
Galesburg, Ill.
Lincoln, Neb.

CIN., HAMILTON & DAYTON R'Y.
Dayton, Ohio.

C., R. I. & P. R'Y CO.
Davenport, Iowa, (Transfer).
Blue Island, Ill.

C., M. & ST. PAUL R'Y. CO.
Chicago, Ill., Western Ave. (Transfer).

C. & N. W. RY. CO.
Milwaukee, Wis.

CUMBERLAND VALLEY R'Y.
(3) Chambersburg, Pa.

DELA. & HUDSON CO.
Carbondale Pa.
(3) Oneonta, N. Y.
Lake Placid, N. Y.
Green Island, N. Y.

ERIE RAILROAD CO.
Galion, Ohio.
Cleveland, Wilson Ave.
Susquehanna, Pa.
Youngstown, Ohio.
Bergen, N. J.
Port Jarvis, N. Y.
Jersey City, N. J.

HOCKING VALLEY R. R.
Columbus, Ohio, South Shops.

LEHIGH VALLEY R. R.
Coxton, Pa.
East Buffalo, N. Y.
Wilkesbarre, Pa.
Lehighton, Pa.
South Easton, Pa.
Buffalo, N. Y.
Phillipsburg, N. J.

LONG ISLAND RAILROAD.
Jamaica, N. Y.
(2) Long Island City, L. I.
Patchogue, L. I.

LOUISVILLE & NASH. R'Y.
New Decatur, Ala.
Howell, Ind.
Louisville, Ky.

N. Y. C. & H. R. R. R. Co.
New York, N. Y., 72d Street
Renssalaer, N. Y.
New Durham, N. J.
(2) Mott Haven, N. Y.
(2) East Buffalo, N. Y.
Utica, N. Y.
(2) West Albany.
Ravena, N. Y.
(3) DeWitt, N. Y.
East Rochester, N. Y.
Syracuse, N. Y.
Buffalo, N. Y.
Oswego, N. Y.
Jersey Shore, Pa.
North White Plains, N. Y.
Minoa, N. Y.
New York, 47th Street.
Corning, N. Y.
Watertown, N. Y.

N. Y., N. H. & H. R. R. Co.
(2) South Boston, Mass.
Poquonnock, Conn.
Mansfield, Mass.
(2) New Haven, Conn.
Harlem River, N. Y.
Bridgeport, Conn.
Roxbury Mass.
(22) Valley Falls, L. I.

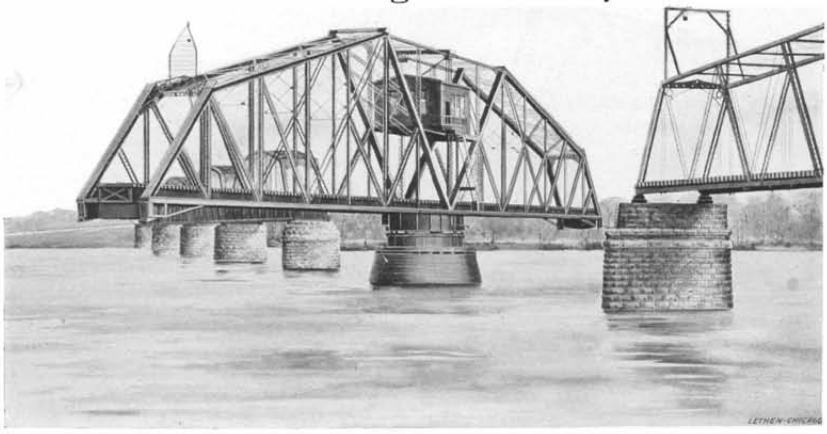
NORFOLK & WESTERN R'Y CO.
Bluefield, W. Va.
Roanoke, Va.
Williamson, W. Va.

PENNA. R. R. CO.
Buffalo, N. Y.
Oil City Shops, Pa.
Olean Shops, N. Y.

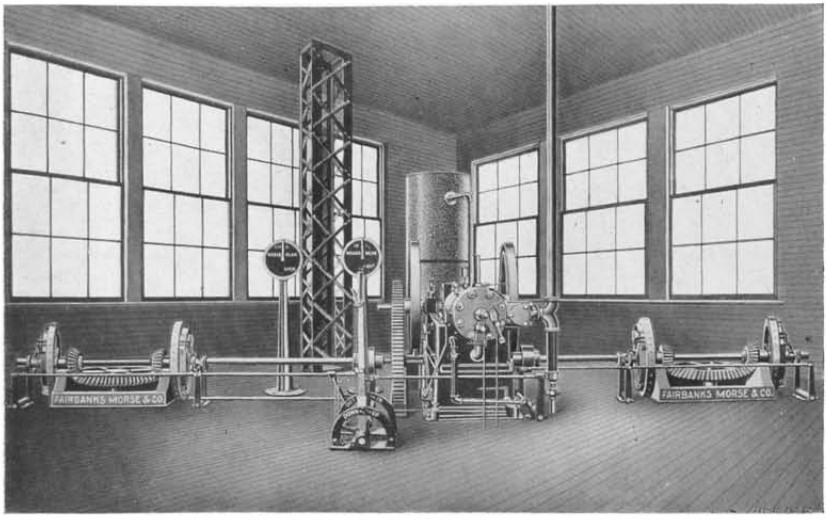
PITTSBURG & LAKE ERIE R'Y.
McKees Rocks, Pa.
Hazelton Yards, Electric.

WABASH R. R. Co.
Decatur, Ill.
Peru, Ind.
Moberly, Mo.
Chicago, 43d St.
St. Louis, Mo., Vandeventer Ave.

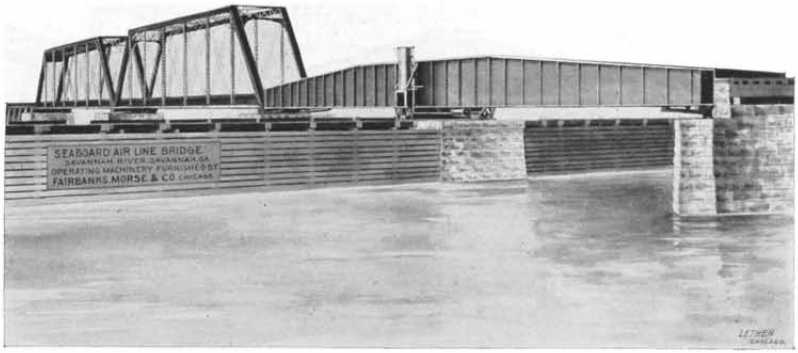
Drawbridge Machinery



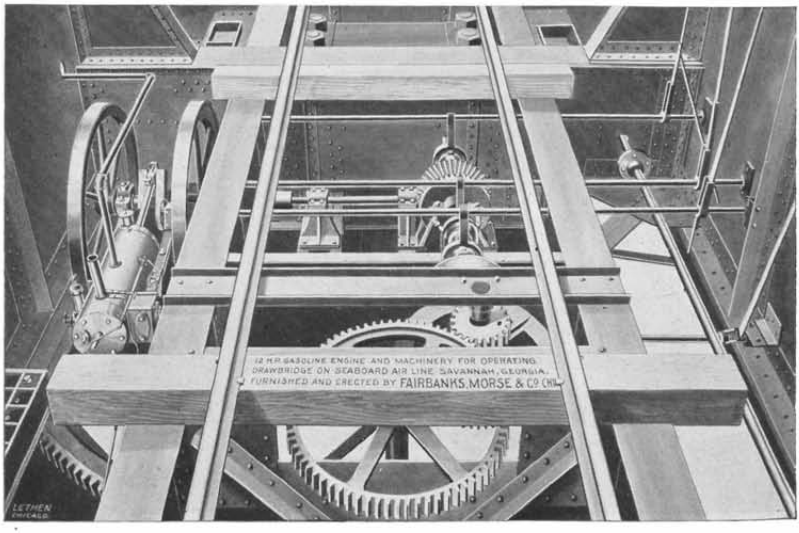
Drawbridge on L. & N. R. R., Danville, Tenn., operated by 28 H. P. Fairbanks-Morse Gasoline Engine. Length of span, 400 feet. Weight of draw, 1,250,000 pounds.



The above cut shows arrangement of machinery operating wedge and turning shafts, also indicators on both wedge and turning shafts on drawbridge at Danville, Tenn., on L. & N. R. R.

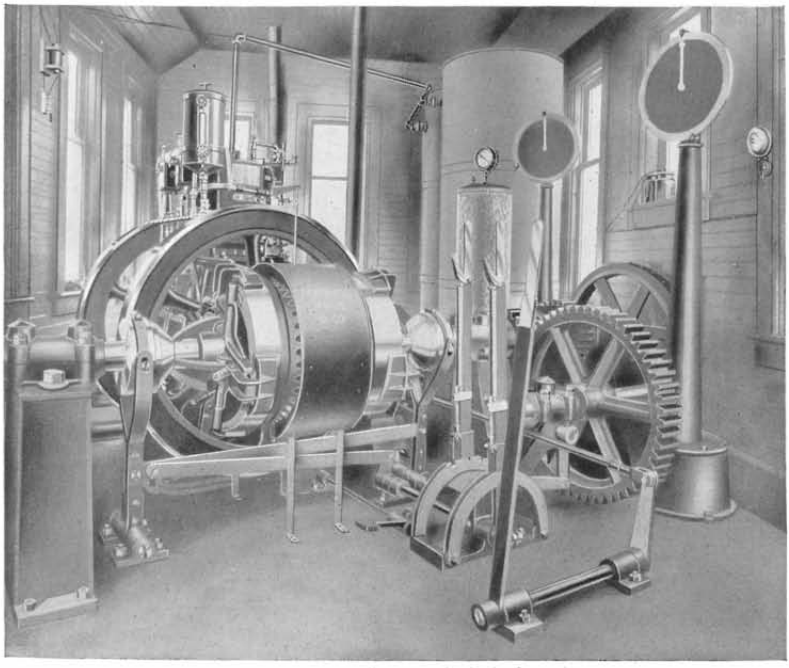


Girder draw across Savannah River, on Seaboard Air Line, Savannah, Ga.
Operated by 12 H. P. Fairbanks-Morse Gasoline Engine.



View showing engine and arrangement of machinery which is placed between
the girders and under track on bridge on Seaboard
Air Line at Savannah, Ga.

Draw bridge over Rouge River, Mich., on Michigan Central R. R.



Arrangement of drawbridge machinery, operated by 20 H P.
Fairbanks-Morse Two-Cylinder Vertical Engine.

Drawbridge Machinery

The following is a partial list of drawbridges being turned by Fairbanks-Morse drawbridge machinery, either electric or in connection with our special gasoline engines arranged for this specific purpose.

No.	H.P.	RAILROAD	LOCATION
1	30	P. R. R.	Philadelphia, Pa.
1	30	P. R. R.	Wilmington, Del.
1	28	L. & N.	Danville, Tenn.
1	22	L. & N.	Hurricane, Ala.
1	25	L. & N.	Cumberland River, Tenn.
1	12	B. & O.	Wilmington, Del.
1	12	C. R. R. of N. J.	Elizabeth, N. J.
2	80	C. R. R. of N. J.	Newark Bay, N. J.
1	5	P. Marquette.	St. Joe, Mich.
1	22	I. I. & I.	Streater, Ill.
1	12	T. & P.	Red River, Ark.
1	12	C. of Ga.	Savannah, Ga.
1	22	C. & N. W.	Milwaukee, Wis.
2	12	N. Y. C. & H. R. R. R.	New Hamburg, N. Y. Little Ferry, N. J.
2	50	N. Y., N. H. & H.	Cos Cob, Conn.
2	50	N. Y., N. H. & H. R. R.	Westport, Conn.
1	6	N. Y., N. H. & H.	Ft. Point, N. Y.
1	16	N. P.	Aberdeen, Wash.
1	16	N. P.	Hoquian, Wash.
1	16	N. P.	Chehalis, Wash.
1	8	G. N.	Everett, Wash.
1	8	G. N.	Whatcom, Wash.
1	8	G. N.	Bellingham, Minn.
1	22	W. & O.	Kalma, Wash.
1	22	P. C. C. & St. L.	Louisville, Ky.
1	16	M. C.	Calumet River, Hammond, Ind.
1	20	M. C.	Rouge River, Mich.
1	16	I. C.	Manchac, La.
1	25	M. H. & L.	White River, Ark.
1	32	M. H. & L.	Arkansas River, Ark.
1	8	Southern Pacific.	Tehama, Cal.
1	30*	Wabash	Rouge River, Mich.

* Electric.

Fairbanks-Morse Ballast Loader

This shows a novel ballast loading machine, designed to permit the economical loading, by power, of material required for ballast renewals, where it would not pay to maintain a steam shovel.

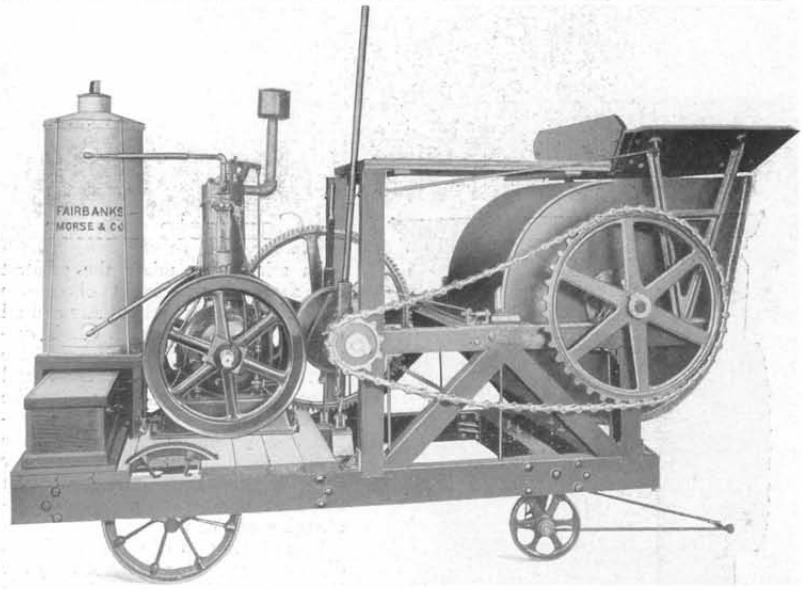
DESCRIPTION — Briefly described, this machine consists of two inclined elevators, or conveyors, suitably supported upon a framework, the lower end of each conveyor extending towards the gravel pit, and the upper end arranged to discharge into the ballast car, power being supplied

by a 6 H. P. Fairbanks-Morse gasoline engine. The entire structure is mounted on a suitable car with gear, so the power of the engine can be utilized to operate the car in either direction. The overhanging frame supports a revolving shaft, on each end of which there is a double crank. From each crank there is a suspended rope, to the lower end of which is attached a scoop shovel of about three times the capacity of the ordinary track shovel.

OPERATION — The material is dug and deposited into two hoppers by the men with scoop shovels. Each man handles his shovel much as in the usual manner, but has the assistance of power derived from the motor, which imparts a constant rising and falling motion to each shovel through the suspension rope supporting the shovel from the overhead frame on the car. In working with this type of shovel each man times his movements with the up and down motion of the shovel. When the shovel is in about its lowest position, the operator presses it back into the bank and continues this pressure during the early part of the upward movement imparted by the power. At about the time of the highest position of the shovel the operator swings it over the hopper and overturns it. He returns the shovel blade to the bank during the downward movement. Thus the filling of the shovel is largely and the lifting of the loaded shovel is completely done by the power, and the manual participation in the work accomplished is required at a time when the vertical movement due to the power is least.

ECONOMY — By this arrangement the bank can be cut away on a level with the under side of the ties to a distance of about ten feet from the hoppers.

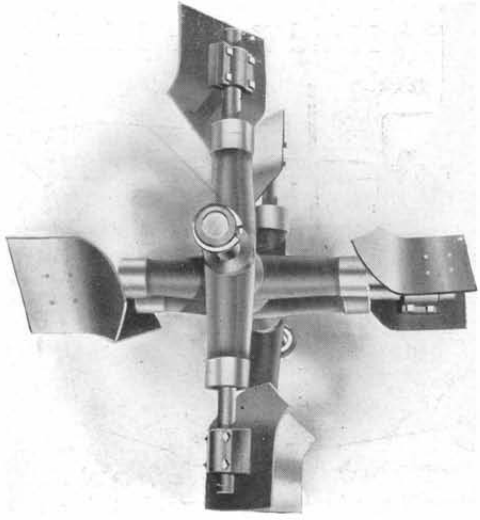
CAPACITY—Four shovelers, with the assistance of two men to pull down the bank, can load twelve cars holding twenty-six yards of gravel each, in a day of ten hours, and the handling of gravel can ordinarily be accomplished by making use of local freight trains, thus permitting the handling of small quantities of gravel at a cost closely approximating that of steam shovel work.



The American Concrete Mixer

WITH FAIRBANKS-MORSE GASOLINE ENGINE

The American Concrete mixer consists of a steel drum supported on a substantial oak frame. Extending through the center of this drum is a heavy steel shaft on which the plow arms are keyed.

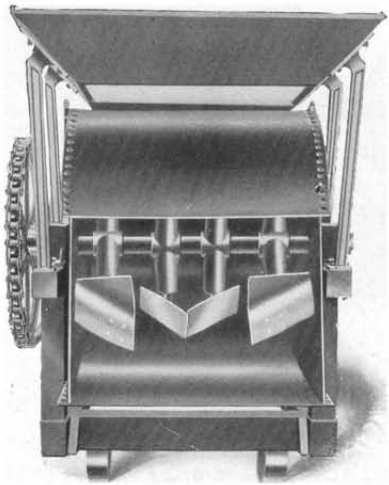


Revolving Plows

These revolving plows certainly mix the concrete thoroughly, uniformly and quickly. They do this by turning it over, by dividing and sub-dividing the batch, bringing the bottom of the mass to the surface and doubling it back. With each revolution of the shaft, to which the plows are keyed, four complete mixes of the batch have taken place. The shaft revolves at the rate of from fourteen to sixteen times per minute.

Think of it, if the charge is left in the machine one minute it receives from forty-five to sixty-four mixes.

Under these conditions, you will see that a machine of small batch capacity can accomplish more in a given time than the larger size machines of other types.



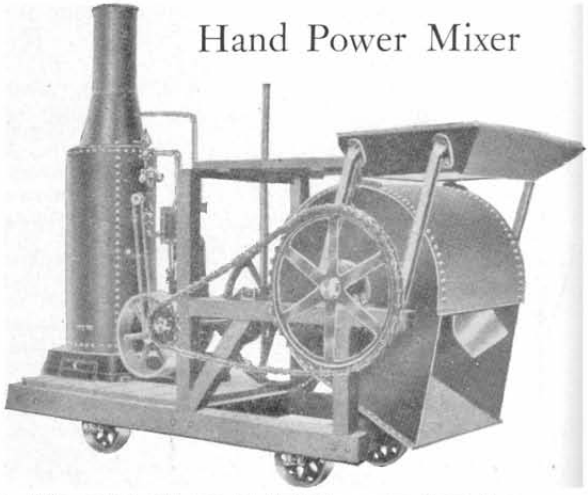
Concrete Mixer

In selecting a mixer the greatest care should be exercised to obtain one that is really adaptable to any and all classes of concrete work. It is certainly advantageous to have a machine that may be quickly charged, and when the batch is perfectly mixed be instantly discharged. The large hopper and drum opening permit the charging of the American from either or both sides without interfering in the least with the gang at the discharging end of the machine.

The illustration of the drum in its discharging position shows clearly the interior plows by which the mixing is accomplished. Their arrangement is such that the circular portion of the drum is kept clean and free from any accumulation. This self cleaning feature is one of the greatest importance and should not be overlooked.

In the construction of this machine only the best obtainable quality of material is used, and all mixers are thoroughly tested before leaving the factory.

Hand Power Mixer



In addition to the four sizes on next page, we manufacture a hand power machine. While we feel confident that ours is equal if not superior to any of the hand power mixers, we cannot recommend it to our customers. If you need a concrete mixer you must certainly need one equipped with power, as any of the hand machines are expensive to operate and at the best have only about one-half the capacity of our No. 1 American.

The No. 1 machine equipped with gasoline engine, will cost a little more but remember, the engine can be operated for about three cents per hour and does double the work of one man. The power will pay for itself in a very short time and is certainly a good investment. Write us for complete catalogue.

SIZES AND CAPACITIES

	No. 1	No. 2	No. 3	No. 4
Average charge in cubic feet	5	8	12	18
Average hourly capacity in cubic yards	6	9	15	21
Horse power furnished	2	3	4	6
Horse power required	1	2	3	5

SHIPPING WEIGHTS

	No. 1 Pounds	No. 2 Pounds	No. 3 Pounds	No. 4 Pounds
On wheels with pulley	1500	1950	2400	3200
On wheels with gasoline engine	2200	2800	3400	4700
On wheels with steam engine	.....	.....	3200	4200
On wheels with steam engine and boiler	.....	.....	4000	5200

The Fairbanks-Morse Air Compressors

GASOLINE, GAS OR DISTILLATE

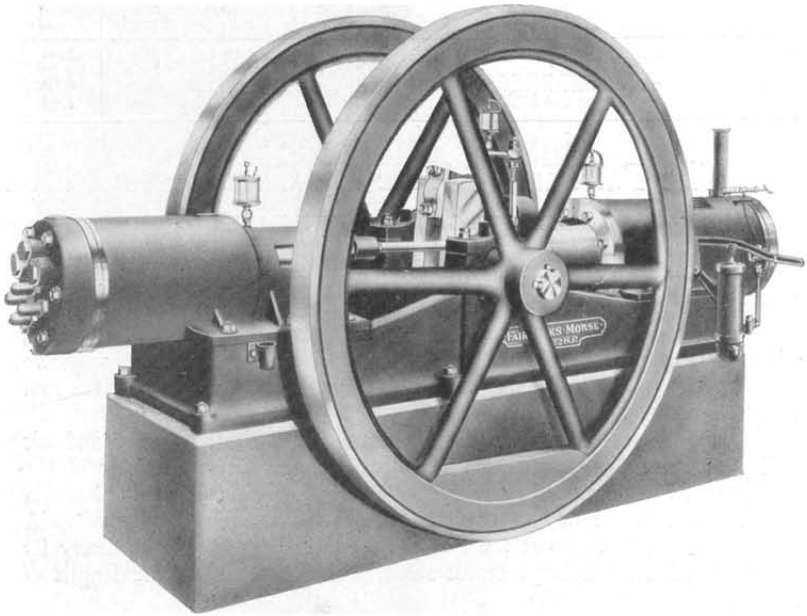
The superior features of our latest designs of direct-connected gasoline air compressors are dry air, high speed, highest economy, greatest efficiency, uniform pressure, small floor space, least loss in clearance, greatest strength, simplest construction, cold induction air, inexpensive foundations, uniform working stress on main shaft, and with valves and seats removable.

Our combined engine and air compressor with the power and air cylinders are arranged tandem. By this arrangement the power of the compressor is transmitted direct from the engine piston to the air piston, a direct end thrust relieving the torsional strain on the crank shaft. A uniform speed throughout the stroke is obtained by means of heavy fly wheels carried on a large crank shaft, which determines the length of stroke.

The compressor is constructed with opening for air intake so arranged as to connect to the cold air outside of the engine room, air arriving as cold as possible within the cylinder. The cylinder and head of compressor are water jacketed, relieving the air of much of its heat as it is being compressed. The air cylinder is single-acting, doing away with stuffing box, and having only one set of valves, which are easily removed, together with valve seat for inspection or renewal, by simply unscrewing a large plug.

The compressor is fitted with a mechanically operated unloading valve, which relieves the compressor from compressing when the desired pressure has been reached in the receiver, by so doing the gasoline engine is under the conditions of no load, and the engine's governor cuts off the supply of gasoline only admitting sufficient to maintain the speed. This arrangement reaches the highest economy possible, as no other class of motor can save fuel in as direct proportion to the work applied as does the gasoline engine.

In the arrangement as described, it will be seen the combination is automatic in its operation, requiring no attendant after starting. The unloading device cannot fail to work at all times, assuring a uniform pressure. The lubrication of both the air and the engine cylinder is perfect; sight feed cups are used, over which the operator has perfect control. The arrangement is compact and rigid, having a heavy base plate, and requires but one foundation. This style is built in 12 and 22 H. P. sizes and is generally used where a light and compact combination is required.

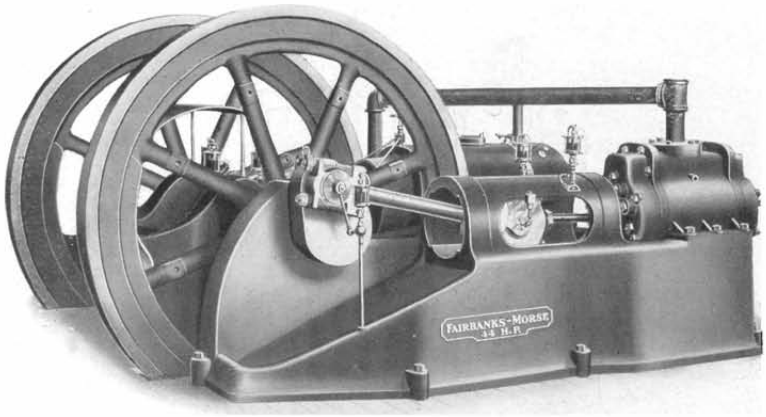


Fairbanks-Morse Gasoline, Gas and Distillate Air Compressors

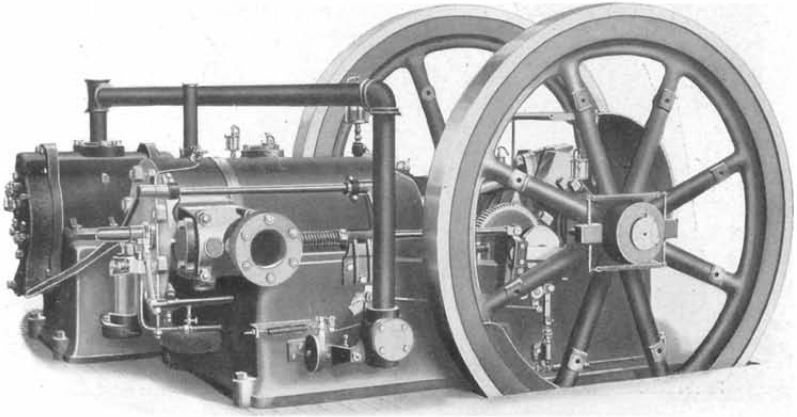
LIST OF SIZES

H.P. of Engine	Speed of Engine R. P. M.	Fly Wheel Dimensions Inches	Cubic Feet of Free Air per Minute—Estimated Piston Displacement	Air Pressure, Pounds	Air Discharge Pipe, Inches	Shipping Weight, Pounds	Floor Space, Inches
12	225	55 x 3½	70	80	2	5300	38 x 104
12A	225	55 x 3½	65	90	2	5300	38 x 104
12B	225	55 x 3½	110	35	2½	5300	38 x 104
12C	225	55 x 3½	130	25	3	5300	38 x 104
12D	225	55 x 3½	140	20	3	5400	38 x 104
22	185	66 x 4	128	80	2½	8500	45 x 132
22A	185	66 x 4	115	90	2½	8500	45 x 132
22B	185	66 x 4	300	14	5	8600	45 x 132

The sizes designated by letters following the horse power are special sizes of air cylinders and are made only upon special order.



View showing Compressor Side

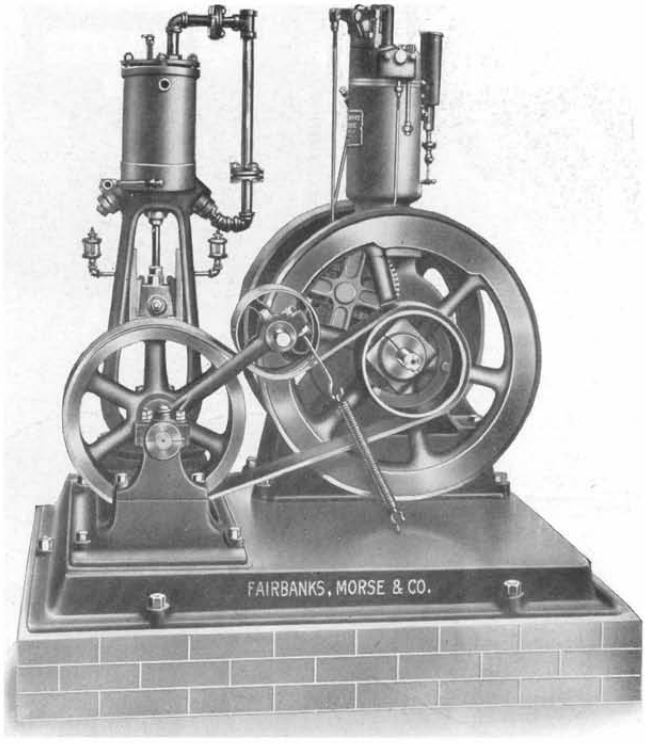


View showing Engine Side

Fairbanks-Morse Cross-Connected Air Compressor

SIZES AND DIMENSIONS

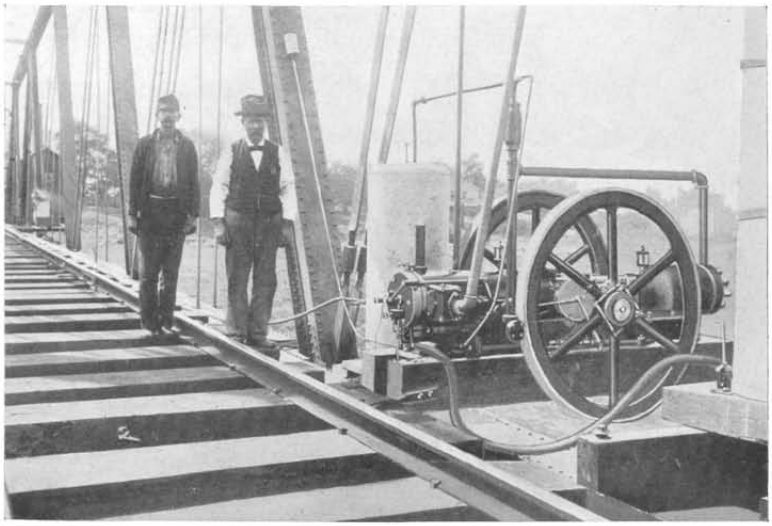
H. P. of Engine	Special Engine R. P. M.	Fly Wheel Dimensions Inches	Cubic Feet of Free Air per Minute–Estimated Piston Displacement	Air Pressure, Pounds	Air Discharge Pipe, Inches	Floor Space, Inches	Shipping Weight, Pounds
44	185	72 x 5½	270	80	3	98 x 123	19800
44A	185	72 x 5½	294	75	3	98 x 123	19800
54	185	72 x 5½	317	80	4	98 x 123	22800



Fairbanks-Morse Vertical Engine and Belted Air Compressor mounted on iron sub-base.

Fairbanks-Morse Vertical Engine and Belted Air Compressor

H. P. Engine	Speed Engine R. P. M.	Size Air Compressor	Cubic Feet Free Air per Minute Piston Displacement	Air Pressure, Pounds	Floor Space, Inches	Approximate Weights
2	400	4 x 4	9	80	42 x 28	1400
3	350	6 x 6	15	80	50 x 38	2500
4	350	6 x 6	20	80	50 x 39	2600
6	350	6 x 6	25	80	56 x 47	3400
6	350	7 x 7	30	80	64 x 50	4200
12	310	8 x 8	50	80	72 x 54	5400



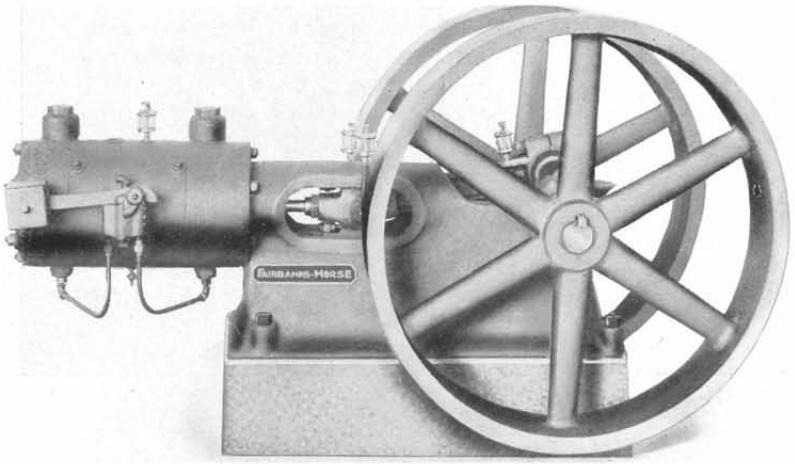
Semi-Portable Plant

The above illustration shows the convenience with which the Fairbanks-Morse Combined Gasoline Air Compressor can be installed. The compressor in this case was used for field riveting in repairing bridges on the Illinois Central Railroad. The compressor being located on the bridge which is undergoing repairs. As the compressor is set outside of the rail a sufficient distance to permit the passing of trains, work can be carried on without interfering with traffic. An entirely new floor system was riveted in position in this particular bridge without interfering in any way with the progress of trains. The compressor occupied a central position on the bridge and air lines were led in either direction from the receiver tank.

Compressors are also used for similar work by

The Michigan Central Railroad,
The Erie Railroad,
The New York Central Railroad,
Manhattan Elevated Railway of New York,
Pencoyd Iron Works, Philadelphia,
P. W. & B. R. R., are using one for testing air brakes,
Buffalo, Rochester & Pittsburg Railway,
Delaware, Susquehanna & Schuylkill R.R.
Delaware, Lackawana & Western R. R.
Hocking Valley R. R. Co.,
Pere Marquette Railroad,
Yazoo & Mississippi Valley Railroad,
Berlin Iron Bridge Company,
Canada Atlantic Railway,
The Louisville & Nashville Railroad,
Southern Pacific Railway,
Union and The Elmira Bridge Companies, constructing Nortwestern Elevated Railroad, Chicago,
Boston & Maine Railroad.

The Pennsylvania Company are using our compressors for testing air brakes and furnishing air for interlocking plant.



Fairbanks-Morse Belt-Driven Air Compressors

The general appearance of the machine is shown by the illustration. Machine is of the center crank belt driven variety having two band wheels, heavy enough to act as fly wheels and equalize the load on the belt throughout the revolution.

SIZES AND DIMENSIONS

Cylinder Diameter, Inches	Stroke, Inches	Revolutions per Minute	Piston Displacement in Cubic Ft. per Minute	H. P. at 100 Pounds at Speed given	Pipe Openings			Fly Wheels		Floor Space	Height above Foundation	Weight	Packed for Export	
					Air Inlet	Air Discharge	Water Jacket	Diameter	Face				Weight	Cubic Feet
6	6	200	38.6	8.0	2	1½		30	5½	27¼ x 58	25½	1100	1400	39
8	8	170	77.8	15.7	2½	2		40	6½	30½ x 74½	33¼	1900	2400	67
10	10	150	134.3	28.0	3½	2½		50	7½	38 x 92½	39	3200	3950	129
12	12	140	217.0	47.0	4	3		60	8½	42 x 104	46	4200	5200	197

Fairbanks-Morse Vertical Belted Air Compressor

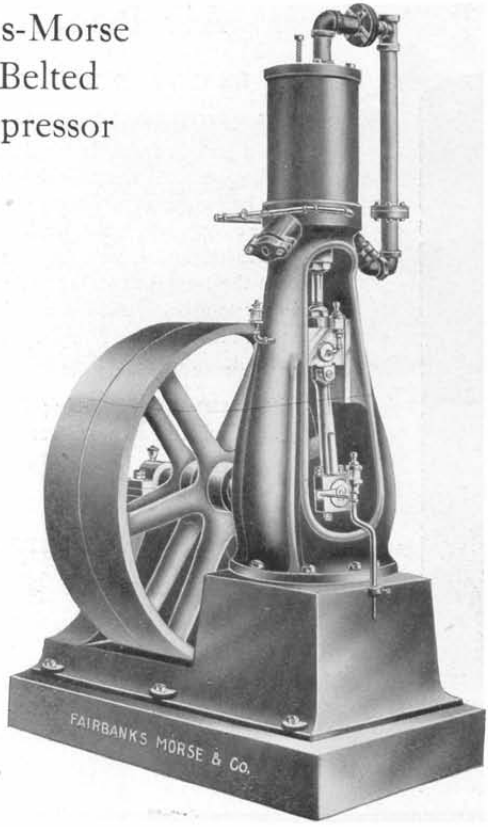


TABLE OF SIZES, CAPACITIES AND PRICES

Diameter of Cylinder, inches	4	6	7	8	10
Length of Stroke, inches	4	6	7	8	10
Revolutions per minute	150	130	130	130	135
Horse Power required for 80 lbs. pressure	1½	4	7	10	20
Size of Discharge Pipe, inches	¾	1¼	1½	2	3
Size of Water Pipe, inches	¾	¾	¾	½	½
Diameter of Tight and Loose Pulleys, in.	16	30	38	48	48
Width of Pulley, inches	4½	5½	6½	7½	10
Floor Space occupied, inches	15 x 28	22 x 40	25 x 49	30 x 57	40 x 72
Height from Floor to top of Compressor	3 ft. 8 in.	5 ft. 9 in.	6 ft. 6 in.	7 ft. 10 in.	9 ft. 2 in.
Weight of Compressor, pounds	400	1100	1700	2400	4200
Cubic Feet of Free Air per minute	8	25	40	60	120
Price	$116	$200	$268	$334	$600

Above prices are for compressors where from 25 to 100 lbs. air pressure is required.
Prices for compressors where higher pressure is required made on application.

Air Receivers

Vertical Air Receiver
Without Manhole

SMALL AND MEDIUM SIZES

The air receiver not only serves to a small extent as a storage reservoir for the air but absorbs the pulsations from the compressor. The receiver should be placed at a distance of about 50 feet from the compressor, so that the heat of compression may pass off into the atmosphere before the air reaches the receiver. It thus acts as a separator and collects a portion of the entrained moisture of the air which may be drawn off through a valve at the bottom.

FIXTURES—The following fixtures are regularly supplied with all receivers:

POP SAFETY VALVE

PRESSURE GAUGE WITH SIPHON

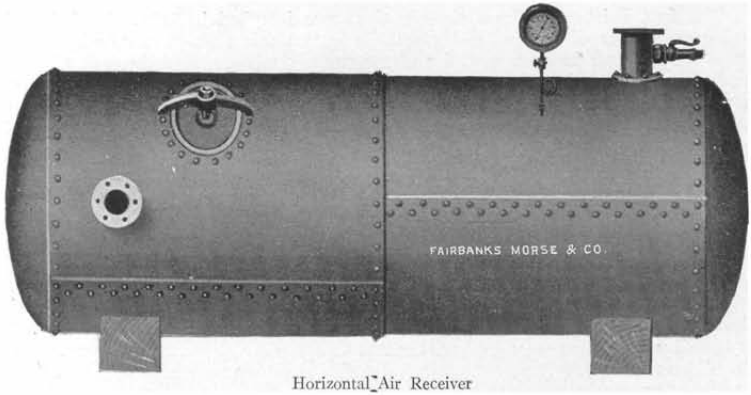
DRAIN VALVE

Made of 60,000 pounds t. s. steel, all longitudinal seams double riveted. Heads dished, one convex the other concave. Tested and made tight under 165 pounds water pressure. Warranted safe and tight under 110 pounds working pressure.

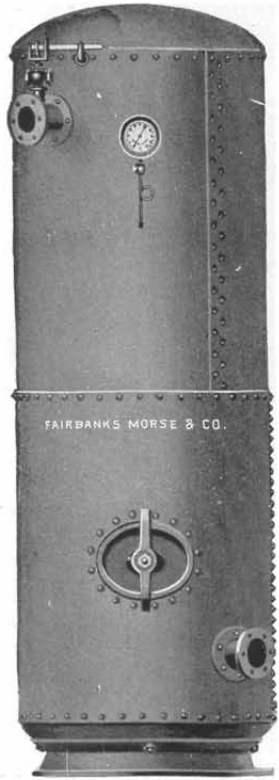
Number of Size	1	2	3	4	5	6	7	8	9	10
Diameter, Inches	18	20	24	24	24	30	36	36	42	42
Height, Feet	5	5	5	6	8	6	6	8	8	10
Thickness of Shell, Inches	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
Thickness of Heads, Inches	5/16	5/16	5/16	5/16	5/16	3/8	3/8	3/8	3/8	3/8
Diameter of Inlet and Outlet Flanges, Inches	2	2	2	2½	3	3	3	3½	4	5
Diameter of Safety Valve, Inches	¾	¾	1	1	1¼	1¼	1½	1½	2	2
Compressor Capacity Receiver is Best Adapted for	50	50 to 75	75 to 100	100 to 120	120 to 150	120 to 150	150 to 200	200 to 300	300 to 500	500 to 700
Weight, Pounds, about	320	400	510	580	700	700	1000	1200	1600	1900

Air Receivers

MEDIUM AND LARGE SIZES



Horizontal Air Receiver



Vertical Air Receiver

These receivers are provided with manhole and can be furnished to rest vertically or horizontally. The price for either being equal for equal sizes. Companion flanges are regularly supplied.

Made of 60,000 pounds t. s. steel. All longitudinal seams double riveted. Girth seams single riveted. Heads dished, both convex. Tested and made tight under 165 pounds water pressure. Warranted safe and tight under 110 pounds working pressure.

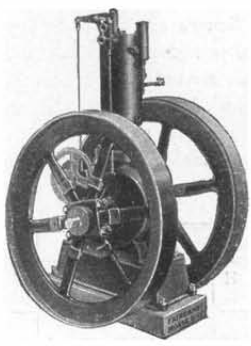
Number of Size	11	12	13	14	15	16	17	18
Diameter, Inches	30	36	36	42	42	48	54	66
Length, Feet.....	6	6	8	8	10	12	12	18
Thickness of Shell, Inches.....	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{3}{8}$
Thickness of Heads, Inches.....	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{7}{16}$	$\frac{1}{2}$
Diameter of Inlet and Outlet Flanges, Inches	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5	6	7	8
Diameter of Safety Valve, Inches	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$	$2\frac{1}{2}$	3
Compressor Capacity Receiver is Best Adapted for	150 and less	150 to 200	200 to 300	300 to 500	500 to 700	700 to 1200	1200 to 3000	3000 and above
Weight, about, Lbs. ..	800	1000	1200	1600	1900	2800	4500	5200

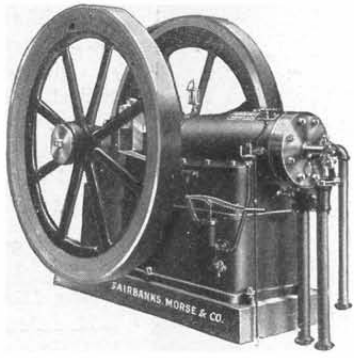
Fairbanks-Morse Gas and Gasoline Engine, Electric Light and Power Plant

The first Fairbanks-Morse electric plant was installed in 1891. Realizing the coming popularity of the gas and gasoline engine electric plant, of which this was one of the first, we made a specialty of the work, studying carefully each plant we installed and improving the machinery where possible. As a result, we are now furnishing hundreds of them yearly, ranging from small and simple plants for lighting small houses, stores, etc., to large and complicated factories and central station plants.

TYPES—Single cylinder vertical engine belted to dynamo.
Single cylinder vertical engine direct connected to dynamo.
Single cylinder horizontal engine belted to dynamo.
Single cylinder horizontal engine direct connected to dynamo.
Multiple cylinder vertical engine belted to dynamo.
Multiple cylinder vertical engine direct connected to dynamo.
Standard engine with underdriven dynamo and disc.

SELECTION OF TYPES—The direct connected type is more expensive than the belted, due to the slow speed of the dynamo and the cost of the engine sub-base. It has the advantage, however, of requiring less floor space and avoiding the use of the belt. There is no difference between the vertical and the horizontal engines, so far as satisfactory results are concerned, nor is there any difference between single and multiple cylinder engines. The speed regulation, which is the vital point in special electric engines, is as good in one as in the other. We guarantee with all our S. E. engines a speed regulation within two (2) per cent. when operating under constant load.

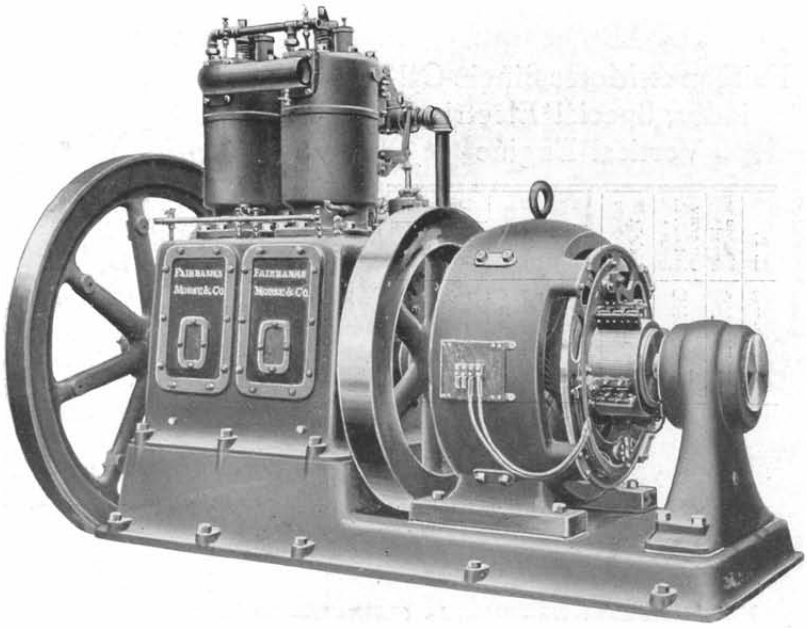




Fairbanks-Morse Special Electric Gas and Gasoline Engine

	H. P.	Speed	Shipping Weight, Pounds	Size of Fly Wheels		Floor Space, Inches
				Diam., Inch.	Face, Inches.	
Vertical	2	400	1055	28	$3\frac{1}{2}$	33 x 28
	3	350	1500	36	$3\frac{3}{4}$	37 x 36
	4	375	1600	36	$3\frac{3}{4}$	41 x 36
	6	350	2440	42	$4\frac{1}{2}$	48 x 42
	9	350	3440	48	$4\frac{3}{4}$	47 x 48
	12	325	4210	54	$5\frac{1}{4}$	56 x 54
Horizontal	10	300	5650	66	5	$89\frac{7}{8}$ x 45
	15	300	6700	68	5	$92\frac{3}{8}$ x 45
	20	280	10200	72	$5\frac{1}{2}$	104 x $56\frac{1}{2}$
	25	280	12150	74	$6\frac{1}{2}$	105 x $56\frac{1}{2}$

All of our multiple cylinder vertical engines are specially adapted to electric service.



Fairbanks-Morse Multi-Cylinder Vertical Engine

DIRECT-CONNECTED TO FAIRBANKS-MORSE DYNAMO

H. P.	No. of Cylinders	Speed	Capacity in 16 C. P. Lamps	Floor Space, Inches	Weight Complete, Pounds	Dynamo	
						No. of Frame	Type
50	2	300	500	129 x 70	21400	9	EE
80	3	300	800	150 x 72	29600	11	EE
100	2	250	1000	166 x 96	38000	12	EE
150	3	250	1500	186 x 100	44000	13	EE

‡ BELTED TO FAIRBANKS-MORSE DYNAMO

H. P.	No. of Cylinders	Engine Speed	Belt Fly Wheels		Capacity in 16 C. P. Lamps	Weight Complete, Pounds	Floor Space † Advised	Dynamo		
			Diam., Inches	Face, Inches				No. of Frame	Approx. Speed	Type
50	2	300	70	8½	500	16500	22′ x 7′ 8″	5	950	E
80	3	300	70	12½	800	22400	23′ x 9′ 5″	7	850	EE
100	2	250	78	16½	1000	29275	25′ x 11′ 7″	8	750	EE
150	3	250	.....*	.....*	1500	38000	26′ x 14′	9	725	EE

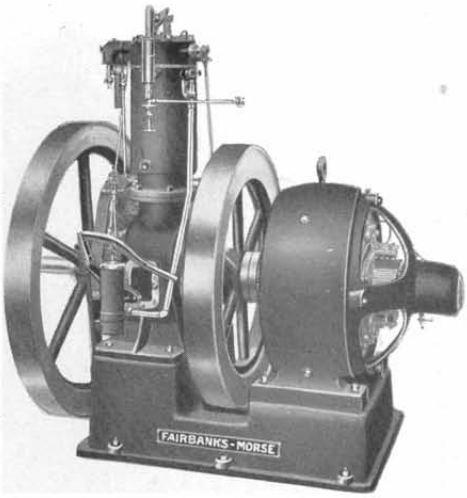
*The fly wheel on this size engine is not used for driving. The engine is supplied with proper size pulley. † Less space can be used if necessary.

‡ The engine is of the same type as shown in the above illustration, except that it is belted to the dynamo instead of direct-connected.

When the full power of the engine is not required for the dynamo, the engine can also be used for driving line shafting, for pumping and other power purposes.

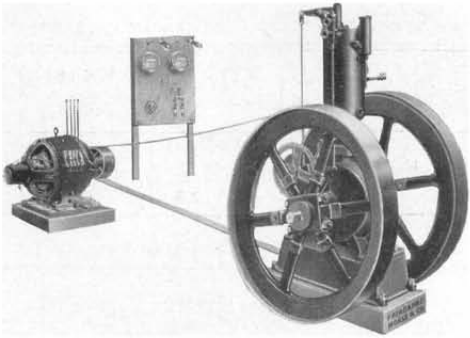
Fairbanks-Morse Single Cylinder, Special Electric Vertical Engine

H. P.	Engine Speed	Capacity in 16 C. P. Lamps	Weight Complete	Floor Space	Dynamo	
					No. of Frame	Type
2	400	20	650	3′ 6″ x 2′ 9″	2–0	E
3	375	30	750	4′ 0″ x 3′ 1″	0	E
4	375	40	1050	4′ 0″ x 3′ 4″	1	E
6	350	60	4250	4′ 9″ x 3′ 6″	2	E
9	350	90	2200	5′ 10″ x 4′ 0″	3	E
12	325	120	7200	6′ 4″ x 4′ 6″	4	E



Direct-connected to Fairbanks-Morse Dynamo

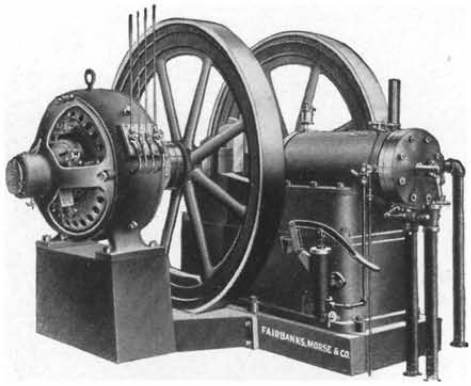
Fairbanks-Morse Single Cylinder, Special Electric Vertical Engine



Belted to Fairbanks-Morse Dynamo

H. P.	Engine Speed	Belt Fly Wheels		Capacity in 16 C. P. Lamps	Floor Space	Dynamo		
		Diameter, Inches	Face, Inches			No. of Frame	Approx. Speed	Type
2	400	28	3½	20	9′x2′ 9″	5–0	1550	E
3	375	36	3¾	30	9′x3′ 4″	5–0	1850	E
4	375	36	3¾	40	11′x3′ 4″	5–0	1900	E
6	350	42	4¼	60	13′x4′ 0″	4–0	1750	E
9	350	48	4¾	90	14′x3′11″	3–0	1600	E
12	325	54	5¼	120	16′x4′ 8″	2–0	1450	E

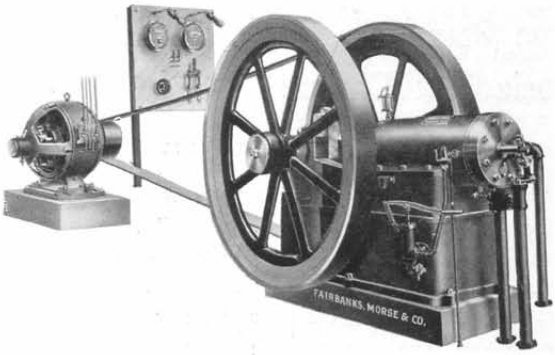
Fairbanks-Morse Single-Cylinder Special Electric Horizontal Engine



DIRECT-CONNECTED TO FAIRBANKS-MORSE DYNAMO

H. P.	Speed	Fly Wheel		Capacity in 16 C. P. Lamps	Weight Complete, Pounds	Floor Space	Dynamo	
		Diam., Inches	Face, Inches				No. of Frame	Type
10	300	66	5	100	8900	7′10″ x 7′ 6″	3	E
15	300	68	5	150	11160	8′ 2″ x 7′ 8″	5	E
20	280	72	5¼	200	15250	9′ 1″ x 8′ 8″	6	E
25	280	74	6½	250	16875	8′ 9″ x 9′ 4″	7	EE

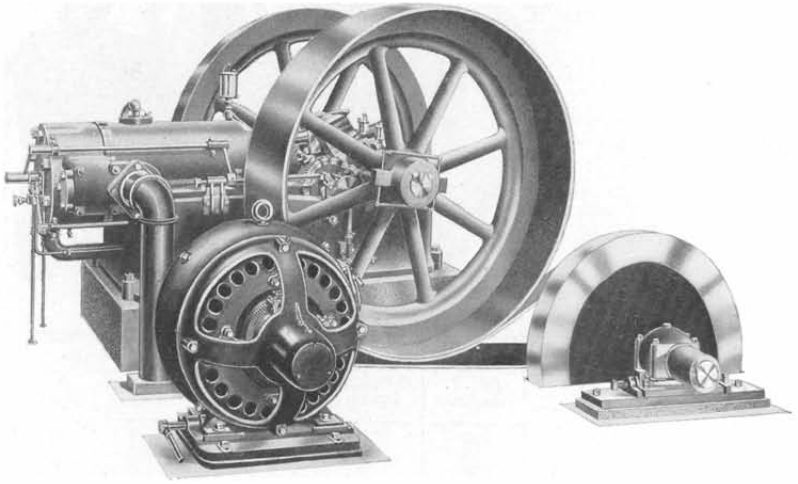
Direct-connected outfits are used principally where space is valuable or limited. Another advantage they have is that there is no belt to care for, and the dynamo has a longer life.



Fairbanks-Morse Single-Cylinder Special Electric Horizontal Engine

BELTED TO FAIRBANKS-MORSE DYNAMO

H. P.	Engine Speed	Belt Fly Wheels		Capacity in 16 C.P. Lamps	Weight Complete. Pounds	Floor Space	Dynamo		
		Diam., Inches	Face, Inches				No. of Frame	Approx. Speed	Type
10	300	66	5	100	6590	23′ x 3′ 9″	2–0	1450	E
15	300	68	5	150	7750	23′ x 3′ 9″	0	1350	E
20	280	72	5¼	200	11600	25′ x 4′ 8″	1	1250	E
25	280	74	6½	250	13200	25′ x 4′ 8″	2	1125	E



Fairbanks-Morse Standard Single-Cylinder Horizontal Engine

OPERATING FAIRBANKS-MORSE DYNAMO BY THE UNDERDRIVE SYSTEM

H.P.	Engine, Speed	Belt Fly Wheels		Capacity in 16 C. P. Lamps	Weight, Complete, Pounds	Floor Space, Feet	Dynamo		
		Diam., Inches	Face, Inches				No. of Frame	Approx. Speed	Type
32	200	70	11½	320	14,250	9 x 12	3	1,050	E
40	200	70	13½	400	16,450	9 x 12	4	1,150	E

The underdrive outfit is valuable where space is limited, but where the expense of a direct-connected outfit is not justified. The system is especially advantageous in cases where the engine is used principally for purposes other than lighting and only a portion of the available power is used for operating the dynamo. The current generated is entirely satisfactory for lighting.

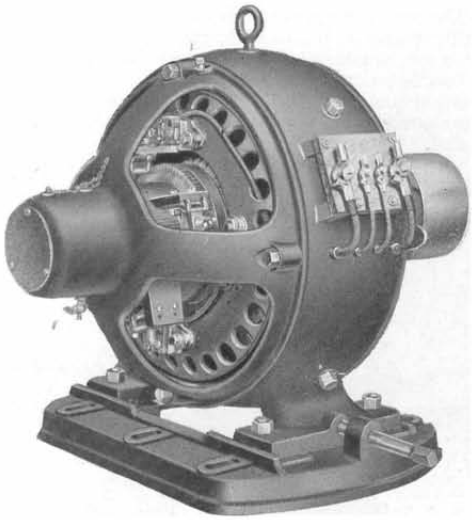


FIG. 1
Standard Open E Type Motor for floor, wall or ceiling

Fairbanks-Morse Standard "E" Type Motors

Fig. 1 shows the style of our Standard Open Motors of this type. The front and rear ends of the pole frame are designed to permit free ventilation and facilitate inspection. The holes for the screw bolts holding the yokes to the pole frame are accurately spaced on quarters so the yoke can be turned and fastened at any of these points. The bearings are of phosphor bronze, self-oiling, and have oil wells of large capacity. The base is provided with a belt-tightening screw, and has clamp bolts of a special design, which facilitate sliding the motor when in suspended position.

GUARANTEE—We guarantee our machines against all defects due to poor material or workmanship that may develop within one year from date of delivery, and further guarantee that they will do the work for which they are intended in the very best manner, up to their full rated capacity.

The front and rear ends of the pole frame of our Semi-Enclosed Motors are provided with perforated covers, which are advisable when there is danger of foreign substances dropping into the motor. The covers are easily removable, to allow inspection, and are designed to interfere with ventilation as little as possible.

FEATURES OF CONSTRUCTION—The customary way of supporting the brush rocker of small machines on the pedestal or yoke outside the commutator has never been found satisfactory, because unless carefully fitted with a long bearing it soon becomes shaky and allows displacement of the brushes from their proper position on the commutator. To overcome this fault we follow the best construction for large units and place the brush rocker of all our machines against the pole frame, where it is securely held by the yoke when in place and is free to turn with the brushes to their best point of commutation. A glance at Fig. 2 will make clear, without further comment, the superiority of this way over the old. When it is further stated that all parts of the rocker and brush holders are fitted to gauges and drilled with jigs made for that purpose; that nothing is laid off by hand or guessed at, it is clear that the spacing of the brushes can be made absolutely correct, and sparking, due to opposing currents, avoided.

ARMATURE—The core of the armature is built up of thin laminations of perfectly annealed steel, with ventilating spaces at intervals, and the notches in which the coils lie are made with a special punching press that gives absolutely correct alignment to the slots without further tooling. For small motors we use form-made coils, making the most symmetrical and perfectly balanced armature ever designed. For large motors we use bar-wound armatures, the bars being forged into shape before the insulation is applied.

COMMUTATOR—This view of our armature is given to show more particularly the commutator and the relatively large size it has compared with the armature. We shall be pleased at any time to send blue-prints showing the details of assembling to anyone wishing them. It is needless to say that nothing but the best material is used through-out. We use drop forge commutator bars from Lake Superior copper exclusively.

FIG. 2

SHAFT—The shaft is made of high grade steel stock, forged down to $\frac{1}{8}$-inch finished size, producing a very dense, rigid metal, which wears well and takes a high polish.

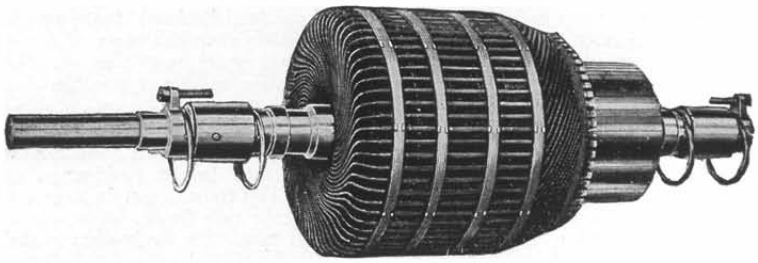


FIG. 3. Armature

JOURNALS—All journals are fitted to standard steel rings and the bearings to corresponding plugs, insuring for this important part of the machine perfect fits and increased durability.

BEARINGS—Our journal bearings are all made of high grade bronze and provided with two ring oilers on each journal. The screws shown in the cut take into threaded holes in the yoke and are used to bring the armature into magnetic alignment with the field. By turning them in or out a nice adjustment of shaft play can be had without trouble, and it is a great convenience when changing armatures. In this respect armatures are seldom alike, and unless some adjustment of bearings is provided, there is danger of a magnetic pull against the shaft, causing it to heat.

ACCESSORIES—With each motor is furnished an automatic starting box, standard pulley and belt tightening base frame. Pulleys of special size or kind on special order.

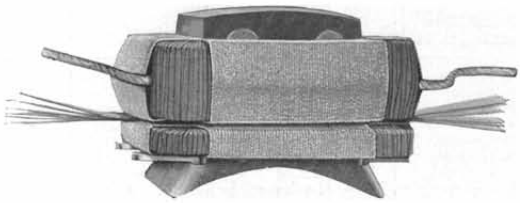


Fig. 4.
Field Poles and Coils

FIELD POLES AND COILS—Our poles are all built up of thin laminations of soft steel pressed solidly together and securely clamped between malleable iron side pieces. Pole tips are punched on the blanks and a slot is made across the face, affording free ventilation and holding the point of commutation practically constant for all loads. Contact between the pole piece and ring pole is made by grinding both surfaces so perfectly that tests show the magnetic resistance is not measurably increased. Our shunt field coils are wound on heavy cast iron forms, every layer is soaked with thick shellac and baked dry. When taken from the form they are hard throughout and perfectly insulated. Our compound coils, not shown in the cut, are separate from the shunt coils. They are made of strip copper, insulated with mica, and protected with a cord winding on the outside.

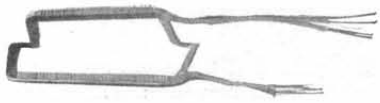


Fig. 5.
Form Made Armature Coil

FORM MADE COIL—This cut illustrates one of our form made coils. They are wound on a machine that perfects them without bending thereafter, avoiding the danger of broken insulation by bending and careless handling. The insulation is completed on the coils themselves and is perfect both as regards material and workmanship. After insulation they are saturated with a high resistance varnish that never thoroughly hardens, and then baked to a point of absolute dryness.

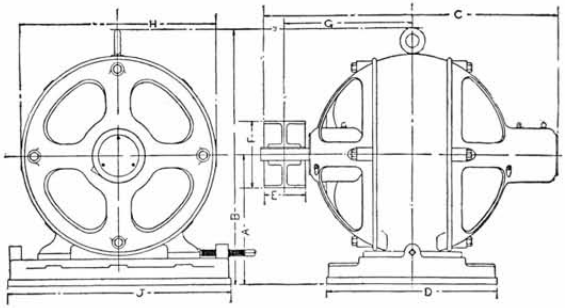
EFFICIENCY—We use the best materials we can purchase, work it up in the most approved manner, and claim for our machine as high efficiency as can be obtained without impairing their durability. We make special claim to a high commercial efficiency, by which we mean a capacity to do work through a period of time at a minimum cost, including repairs and the time lost in making them.

Standard E Type Shunt Wound Motors

	No.	H P	Approx. Speeds 110 V.	Code Word	Approx. Speeds 220 V.	Code Word	Approx. Speeds 500 V.	Code Word	Average Ship'g Weight Crated	Cubic Feet	Export Weight
SLOW SPEED	5–0	1½	1450	Adjunct	1450	Busto	1450	Conduct	300	9.50	390
	4–0	3	1250	Adjust	1250	Butcher	1350	Confess	390	11.73	480
	3–0	5	1150	Administer	1150	Butlem	1200	Confront	550	15.20	610
	2–0	6	1050	Admirable	1050	Butteris	1050	Conjure	700	18.29	780
	0	8½	1000	Adopt	1000	Button	1000	Connection	900	22.12	990
	1	10	850	Admonish	975	Buttress	975	Consider	1100	29.93	1250
	2	15	750	Adore	750	Butts	900	Console	1540	39.30	1775
	3	20	700	Adventure	725	Butyric	825	Constrain	2225	52.12	2465
	4	25	675	Adverse	700	Buxeous	775	Consume	2800	62.48	3060
	5	30	650	Advocate	675	Buxina	700	Contend	3425	75.38	3775
	6	35	625	Adzok	650	Buxom	650	Contest	4000	83.00	4325
	7	50			600	Buxez	600	Cort	4800	101.58	5150
	8	65	See EE Type		550	Buxogy	575	Corlin	5000	117.68	5500
	9	75	Bulletin No. 24		525	Buxul	550	Corked	6500	130.33	6900
MODERATE SPEED	5–0	2	1650	Accuse	1650	Brevity	1650	Cling	300	9.50	390
	4–0	4	1450	Actor	1450	Brisk	1550	Cloak	390	11.73	480
	3–0	6	1350	Action	1350	Brittle	1250	Cloudy	550	15.20	610
	2–0	8½	1250	Acumen	1300	Brotherly	1350	Coincade	700	18.29	780
	0	10	1200	Actual	1250	Bruise	1250	Combat	900	22.12	990
	1	15	1150	Actuate	1175	Brutal	1175	Comely	1100	29.93	1250
	2	20	1000	Adage	1000	Burial	1150	Comic	1540	39.30	1775
	3	25	975	Adapt	975	Burlesque	1000	Commit	2225	52.12	2465
	4	30	900	Addicted	900	Burning	900	Community	2800	62.48	3060
	5	35	850	Adept	875	Burst	875	Company	3425	75.38	3775
	6	40	825	Adox	850	Business	850	Complex	4000	83.00	4325
	7	60			825	Buzet	825	Coskel	4800	101.58	5150
	8	75	See EE Type		800	Buzol	800	Coshan	5000	117.68	5500
	9	90	Bulletin No. 24		775	Buzuk	775	Costegan	6500	130.33	6900

A variation of 5 per cent. either way from the speeds given above may be expected.

All figures are in Inches.



GENERAL DIMENSIONS STANDARD E TYPE MOTORS AND DYNAMOS

No.	A	B	C	D	E	F	G	H	J
5–0	8⅞	15⅞	25 1/16	13	3	5	11 1/16	14	17
4–0	9⅛	17⅛	28 3/16	13¾	3½	5	13	15½	18½
3–0	10⅜	22	31 1/16	15⅜	4	6	14 1/16	17⅝	21¾
2–0	12½	24½	33 1/16	17¾	4	6	15 1/16	19½	23½
0	13½	27½	34	17¾	5	8	15⅝	22	24¾
1	15¾	30½	37 1/16	21	5	8	16 3/16	24	27½
2	17¼	34½	40 1/16	23½	6	10	18 7/16	28	32
3	18¼	37½	46 1/16	27	7	12	20 5/16	30	33½
4	19⅝	40⅜	48 1/16	28½	8	14	21 5/16	33	35¾
5	20¾	43½	54 9/16	29½	9	16	24 1/16	34¾	37
6	22¼	45¾	56 9/16	31	10	18	25 3/16	36½	40½
7	23½	49⅛	66 9/16	33	11	20	30 3/16	38¾	44
8	25⅝	51⅝	67 9/16	34	12	22	30 3/16	40½	46½
9	26½	54¼	71	36	14	24	31 1/16	43	48½

Dimensions subject to change. For construction or installation see only certified print.

Fairbanks-Morse Standard "E" Type Dynamos

Fig. 6. Standard "E" Type Dynamos

In general appearance there is little difference between our Standard motors and dynamos. In fact, they are exactly alike, except in the winding. The general construction is the same as in our "E" type motors, as described on previous pages.

STANDARD "E" TYPE DYNAMOS

	Frame No.	K. W. Capacity	Approxim. Speed 110 V.	110 V Code Word	Approxim. Speed 220 V.	220 V Code Word	Approxim. Speed 500 V.	500 V Code Word	Average Shipping Weight, Crated	Capacity in 16 C. P. Lamps	Packed for Export, Weight
SLOW SPEED	5–0	1	1550	Abundant	1500	Blend	1550	Celestial	300	20	390
	4–0	2	1500	Abuse	1450	Blunt	1500	Certify	390	34	480
	3–0	3	1400	Accelerate	1325	Blustering	1400	Champion	550	52	610
	2–0	5	1225	Access	1225	Boasting	1250	Character	700	86	780
	0	6	1175	Accession	1175	Bode	1200	Charity	895	104	990
	1	7½	1100	Acclivity	1125	Bodily	1150	Charm	1100	125	1250
	2	10	1000	Accomplice	900	Boisterous	975	Cheer	1540	166	1775
	3	15	850	Accord	875	Bold	900	Cheerless	2225	250	2465
	4	20	800	Accost	850	Border	850	Cherish	2800	332	3060
	5	25	750	Accredited	750	Bore	775	Clamor	3425	400	3775
	6	30	700	Acdom	700	Boundless	725	Clear	4000	480	4325
	7	40	650	Acdel	650	Blodger	650	Cotton	4800	640	5150
	8	50	See EE Type		625	Bloder	625	Cotham	5000	800	5500
	9	60	Bulletin No. 24		600	Blodam	600	Cothus	6500	960	6900
MODERATE SPEED	5–0	1½	1850	Abdicate	1900	Balmy	1900	Calculate	300	26	390
	4–0	3	1750	Abominate	1650	Baneful	1800	Calling	390	52	480
	3–0	5	1600	Aboriginal	1600	Banquet	1650	Callous	550	86	610
	2–0	6	1450	Abortion	1425	Barbarous	1500	Canvass	700	104	780
	0	7½	1350	Abound	1275	Barely	1425	Capable	875	130	990
	1	10	1250	Abridge	1250	Battle	1400	Caprice	1100	166	1250
	2	15	1125	Abrupt	1125	Bearing	1250	Captious	1540	250	1775
	3	20	1050	Abscond	1100	Beauty	1175	Captive	2225	332	2465
	4	25	1150	Absent	1050	Becoming	1150	Carnage	2800	400	3060
	5	30	950	Absolute	1000	Beginning	950	Carnal	3425	480	3775
	6	40			900	Blameless	875	Cast	4000	640	4325
	7	50	See EE Type		850	Blodjal	900	Cothel	4800	800	5150
	8	60	Bulletin No. 24		800	Blome	875	Cothid	5000	960	5500
	9	75			775	Blocket	825	Cothlan	6500	1200	6900

All of the above dynamos are over-compounded, the range being from 5 to 10%, depending on the size.

Fig. 7. Standard EE Type Dynamo for direct current lighting and power

Fairbanks-Morse Standard EE Type Dynamos and Motors

In general appearance there is little difference between our Standard EE Type Motors and Dynamos. In fact, they are exactly alike, except in the winding.

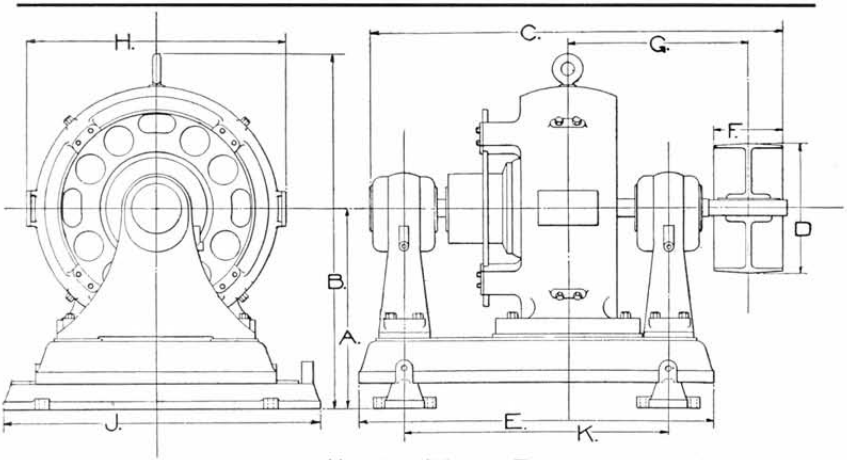
The construction of our EE Type is quite similar to the E, with the exception that a heavy base is furnished which supports the pedestal bearings instead of having them supported from the frame of the machine.

Standard EE Type Shunt Wound Motors

	Frame No.	H. P.	Pulley Diameter, Inches	Pulley Face, Inches	Approximate Speeds, 110 V.	110 V. Code Word	Approximate Speeds, 220 V.	220 V. Code Word	Approximate Speeds, 500 V.	500 V. Code Word	Average Shipping Weight	Packed for Export, Weight	Cu. Ft.
Slow Speed	6	35	18	10	625	Aerial	625	Buzzan	650	Convene	4700	4900	104.
	7	50	20	11	600	Affable	600	Buzzard	625	Converse	6000	6300	125.58
	8	65	22	12	550	Affirm	575	Buzzing	600	Cordial	7000	7250	135.24
	9	75	24	14	500	Afraid	550	Byzant	575	Couple	7850	8400	151.04
	10	100	26	16	500	Aram	525	Byzam	550	Costam	.....	10250	135.90
	11	125	28	18	475	Afrek	500	Byzeg	525	Costez	.....	12000	166.35
Mod. Speed	6	40	18	10	800	Adhere	775	Busber	875	Compre	4700	4900	104.
	7	60	20	11	750	Adherent	850	Buskeg	850	Comprise	6000	6300	125.58
	8	75	22	12	725	Adieu	825	Bust	825	Comrade	7000	7250	135.24
	9	90	24	14	700	Adjourn	800	Bustle	800	Concert	7850	8400	151.04
	10	125	26	16	675	Adjog	750	Bustum	750	Concesh	.....	10250	135.90
	11	150	28	18	650	Adjozen	700	Bustoz	700	Concom	.....	12000	166.35

Standard EE Type Compound Wound Dynamos

	Frame No.	K.W. Capacity	Pulley Diameter, Inches	Pulley Face, Inches	Approximate Speeds, 125 V.	125 V. Code Word	Approximate Speeds, 250 V.	250 V. Code Word	Approximate Speeds, 500 V.	500 V. Code Word	Average Shipping Weight	Packed for Export, Weight	Cu. Ft.
Slow Speed	6	30	18	10	700	Accumulate	700	Bounteous	725	Clement	4700	4900	104.
	7	40	20	11	650	Accuracy	650	Bountiful	650	Clemency	6000	6300	125.58
	8	50	22	12	625	Accurate	625	Brave	625	Clever	7000	7250	135.24
	9	60	24	14	600	Accusation	600	Brawny	600	Climb	7850	8400	151.04
	10	75	26	16	575	Accel	575	Brawzeg	575	Clinkes	.....	10250	135.90
	11	100	28	18	550	Accezen	550	Brawzom	550	Clinder	.....	12000	166.35
Mod. Speed	6	40	18	10	900	Absolve	900	Blasert	875	Cat	4700	4900	104.
	7	50	20	11	850	Abstain	850	Blast	900	Catch	6000	6300	125.58
	8	60	22	12	750	Abstruse	800	Blatant	875	Cavity	7000	7250	135.24
	9	75	24	14	725	Adulac	775	Blemish	825	Celebrate	7850	8400	151.04
	10	100	26	16	700	Abondz	725	Blemjig	800	Celegan	.....	10250	135.90
	11	125	28	18	675	Abonges	700	Blemken	750	Celegaz	.....	12000	166.35



General Dimensions "EE" Type Dynamos and Motors

ALL FIGURES ARE IN INCHES

Frame No.	A	B	C	D	E	F	G	H	J	K
6	$29\frac{1}{2}$	53	$61\frac{3}{8}$	18	$51\frac{1}{2}$	10	26	$39\frac{3}{4}$	$45\frac{1}{2}$	$39\frac{3}{4}$
7	$31\frac{3}{4}$	$56\frac{3}{4}$	$69\frac{3}{8}$	20	$61\frac{1}{2}$	11	$29\frac{1}{4}$	41	$51\frac{1}{4}$	$45\frac{1}{2}$
8	$33\frac{1}{2}$	60	$73\frac{3}{4}$	22	$65\frac{1}{2}$	12	$30\frac{3}{4}$	$42\frac{3}{4}$	$51\frac{1}{2}$	$49\frac{7}{8}$
9	$35\frac{1}{4}$	$63\frac{1}{4}$	$78\frac{7}{16}$	24	$67\frac{1}{4}$	14	$32\frac{7}{16}$	$45\frac{1}{4}$	$55\frac{1}{2}$	$50\frac{3}{4}$
10	$36\frac{1}{2}$	62	$79\frac{5}{8}$	26	$66\frac{3}{4}$	16	$36\frac{5}{8}$	47	$58\frac{1}{2}$	$49\frac{1}{4}$
11	$39\frac{1}{4}$	$65\frac{3}{4}$	$84\frac{3}{8}$	28	$69\frac{1}{4}$	18	$33\frac{1}{4}$	50	62	$50\frac{3}{4}$

Fig. 8. Single Belt Reversing Elevator Motor for floor, wall or ceiling

The Fairbanks-Morse Special Motors

The motor illustrated above is designed for single belt reversing elevators and can be depended upon to do the work required of it in a most satisfactory manner and with minimum cost. With the exception of the field winding the construction is identical with our Standard E Type Motors.

GUARANTEE—We guarantee our machines against all defects due to poor material or workmanship that may develop within one year from date of delivery, and further guarantee that they will do the work for which they are intended in the very best manner, up to their full rated capacity.

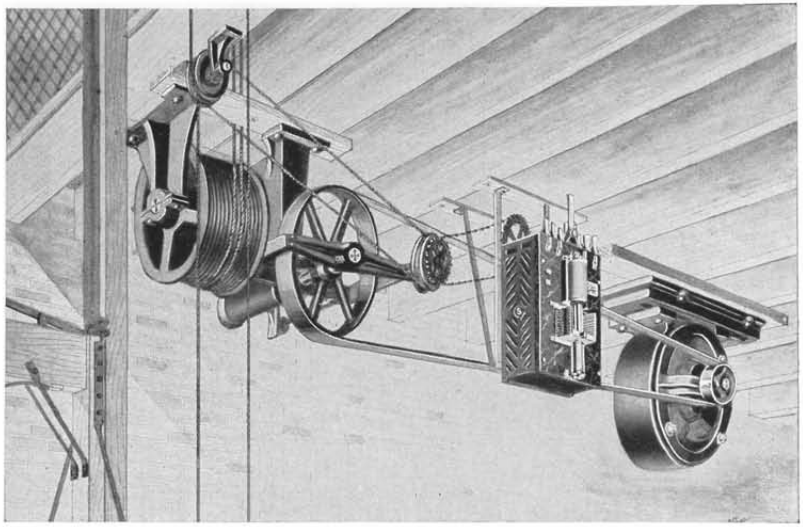


Fig. 9

The above illustration shows one method of arrangement for motor controller and belted elevator gearing. In this cut the motor and controller are both shown mounted on the ceiling. If more convenient, however, either one or both can be placed on the floor or on the wall. In changing over double-belt outfits to conform to this system, the two loose pulleys on the shaft are done away with, and for obvious reasons it is always advisable that they be removed.

When convenient the controller sprocket should always be connected directly to the "automatic," or shaft in connection with the same; but when this is not possible, and there is a countershaft, connection may be made through it. Sometimes, however, it is necessary to connect directly to the sheave wheel. This is a simple matter in ordinary cases, but when the sheave wheel is horizontal, connection should be made through a five-sixteenth inch cable from the sheave wheel (alongside the sheave rope) over two sheave wheels on the wall and thence to the controller sprocket by means of a chain attached to the ends of the cable.

This type of motor is intended to be used in connection with any standard make of elevator controller. When used so it runs only when elevator is in actual operation, thus consuming a minimum amount of current.

SINGLE BELT REVERSING ELEVATOR MOTORS

No.	H. P.	Approx. speed, 110 V.	Code Word	Approx speed, 220 V.	Code Word	Approx. speed, 500 V.	Code Word	Average Shipping Weight, lbs.
0000	5	1200	Addis	1200	Advem	1200	Afloor	390
000	5	900	Adman	900	Advise	900	Afoot	550
00	7½	850	Adoft	850	Adviser	850	Afore	700
0	10	750	Admire	800	Advint	800	Afloat	895
1	15	700	Admit	750	Advial	750	Afield	1100
2	20	650	Admix	700	Adviz	700	Afire	1540
3	25	600	Admel	650	Advex	650	Afrog	2225

For dimensions see corresponding frame numbers in Bulletin No. 20

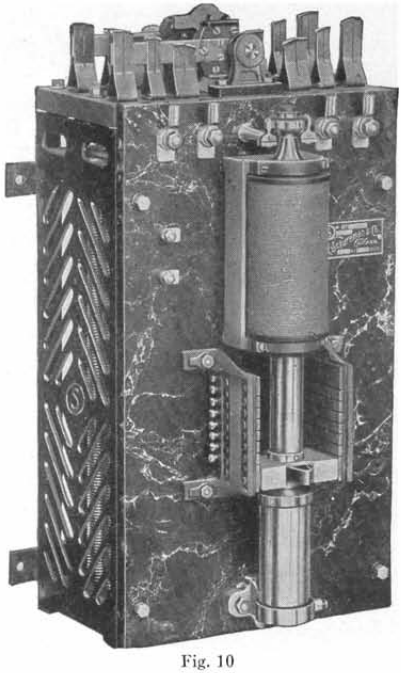


Fig. 10

Freight Elevator Controller

The above controller is built in sizes to correspond with our single belt reversing elevator motors.

It is easy to install, positive in action and sparkless in operation. If desired, it will be supplied with bottom supports or with switch mounted separately.

Operation

When installed, as shown in Fig. 9, it is operated from the shipper rope in the elevator.

Pulling the rope throws the switch (shown on top of the controller), which starts the motor and, consequently, the elevator. A short reverse pull at the rope stops the motor and elevator, and a third reverse pull starts them in the opposite direction.

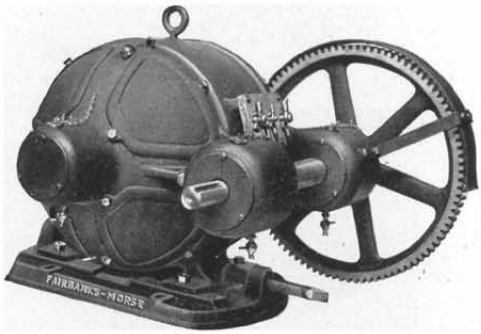


Fig. 11—Fairbanks-Morse Enclosed Back-Geared Motor

Back Geared Motors

These back-geared motors are built in enclosed, semi-enclosed, and open types.

The countershaft mounted on the pedestals of the motor parallel to the armature shaft, and driven by gear and pinion, adapts this motor for slow speed work.

The bearing housings, which support the countershaft, are a part of the end yoke castings.

The countershaft extends beyond the motor and can be adapted for direct coupling, for gear and pinion, for belt transmission, for link belt transmission, or for rope transmission.

All journals are of the self-oiling ring type.

A shield is furnished over gear and pinion, as shown in cut.

The motors are regularly furnished with adjustable base frame, pulleys on back-gear shaft, and automatic release starting boxes.

OPEN AND ENCLOSED TYPE BACK GEARED MOTORS

SLOW SPEED						MODERATE SPEED					
Frame Number	H. P. of Open Type.	H. P. of Enclosed Type	Approximate Speed of Armature Shaft	Usual Approximate Speed of Back Geared Shaft	Minimum Speed of Back Geared Shaft	Frame Number	H. P. of Open Type.	H. P. of Enclosed Type	Approximate Speed of Armature Shaft	Usual Approximate Speed of Back Geared Shaft	Minimum Speed of Back Geared Shaft
5–0	1½	⅝	1450	290	180	5–0	2	1	1650	330	205
4–0	3	1⅝	1250	250	155	4–0	4	2	1450	290	180
3–0	5	3	1150	230	145	3–0	6	4	1350	270	170
2–0	6	4	1050	210	130	2–0	8½	6	1300	260	160
0	8½	6	1000	200	125	0	10	7½	1250	250	155
1	10	7½	975	195	120	1	15	10	1175	235	145
2	15	10	750	150	95	2	20	12½	1000	200	125
3	20	12½	725	145	90	3	25	15	975	195	120
4	25	15	700	140	87	4	30	20	900	180	112
5	30	20	675	135	85	5	35	25	875	175	110
6	35	25	650	130	80	6	40	30	850	170	105

Enclosed Type Motor

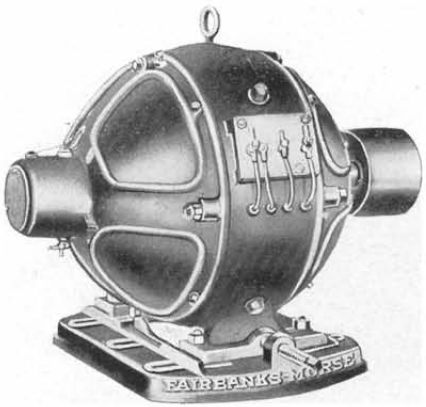


Fig. 12. Enclosed Type Motor

This type of motor is especially adapted for places where dirt, chips, water, or fumes are likely to interfere with the operation of motors of the ordinary type. They may be suspended from the ceiling, wall, or post.

They are completely enclosed, aside from the small holes for drawing off the oil, and some that are underneath the terminal board, through which the lead-wires pass.

By plugging up these holes and placing felt washers under the covers, we have made them practically water-tight, suitable for out-door use and for sinking pumps, etc.(see Fig. No. 20). The covers can be easily removed for inspection of the commutator and brushes.

Being entirely enclosed, these motors are necessarily large for their output, because there is no opportunity for the heat generated in the windings to escape by radiation from the outside surface. In order to keep these motors from being too bulky for ordinary purposes, the parts are designed to run at a higher temperature than is our practice with open or semi-enclosed type motors.

The motors are noiseless in operation, and are so designed that the brushes can be set in a fixed position, and the load varied anywhere from nothing to 25 per cent. overload, without necessitating the shifting of the brushes on account of sparking.

The general construction of the interior of the machine is similar to our Standard "E" Type.

ENCLOSED TYPE MOTORS

SLOW SPEED						MODERATE SPEED					
Frame Number	Horse Power	Approximate Speed at 110 Volts	Approximate Speed at 220 Volts	Approximate Speed at 500 Volts	Average Shipping Weight, Crated	Frame Number	Horse Power	Approximate Speed at 110 Volts	Approximate Speed at 220 Volts	Approximate Speed at 500 Volts	Average Shipping Weight, Crated
5–0	½–¾	1450	1450	1450	300	5–0	1	1650	1650	1650	300
4–0	1–1½	1250	1250	1350	390	4–0	2	1450	1450	1550	390
3–0	3	1150	1150	1200	550	3–0	4	1350	1350	1350	550
2–0	4	1000	1050	1050	700	2–0	6	1250	1300	1300	700
0	6	1000	1000	1000	900	0	7½	1200	1250	1250	900
1	7½	850	975	975	1100	1	10	1150	1175	1175	1100
2	10	750	750	900	1540	2	12½	1000	1000	1150	1540
3	12½	700	725	825	2225	3	15	975	975	1000	2225
4	15	675	700	775	2800	4	20	900	900	950	2800
5	20	650	675	700	3425	5	25	850	875	875	3425
6	25	625	650	650	4000	6	30	800	850	850	4000
7	35	600	600	600	4800	7	40	750	825	825	4800
8	45	550	550	575	5000	8	55	725	800	800	5000
9	55	500	525	550	6500	9	65	700	775	775	6500

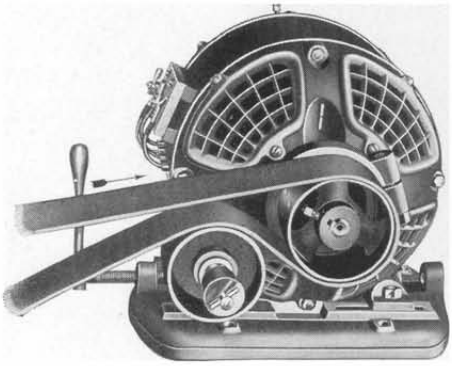


Fig. 13—Semi-Enclosed Motor, Showing Belt Tightening Idler

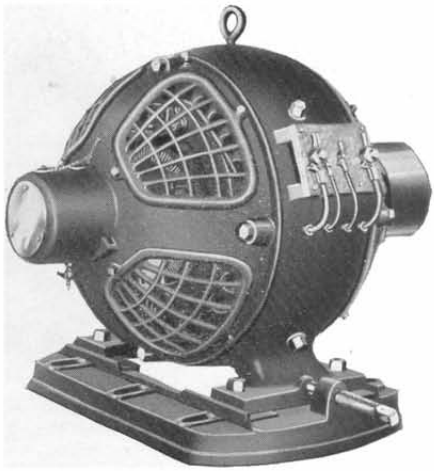


Fig. 14—Semi-Enclosed Type Motor

Semi-Enclosed Type Motors

These motors differ from our Standard "E" Type only in the covers, which prevent foreign substances (excepting water, dust, and finely ground substances) from dropping into the motor. At the same time these covers do not prevent inspection, or a reasonable amount of ventilation; in fact, there is hardly any appreciable difference in heating between these and our Standard.

In sizes and speeds they are the same as our Standard "E" Type. They may be suspended from ceiling, wall or post.

Motors with Belt Tightening Idlers

In order to avoid the necessity of using slow-speed motors, which are expensive, a belt-tightening idler is sometimes resorted to.

The idler insures a greater surface of belt contact on the pulley, and thus less belt slippage than would be the case with a standard high-speed machine.

Any of our motors (or dynamos) can be equipped with them, from our No. 5-O frame to our No. 5 frame inclusive.

Variable Speed Motors

We make a specialty of Variable Speed Motors for machine tool drive, using in most cases the economical method of varying the speed by field control.

We can easily obtain, in this manner, a speed range of 2 to 1, and in extreme cases a range of 4 to 1.

The proper design of Variable Speed Motors depends greatly on the type of machines to be operated; therefore we issue no standard list of these motors.

Give us the following information, and we will be pleased to submit specifications and prices on motors of the proper design.

(a) The class of tool to be driven.
(b) The minimum and maximum speed.
(c) The H. P. at minimum and maximum speeds.
(d) The number of intermediate speeds.
(e) The voltage of the circuit.

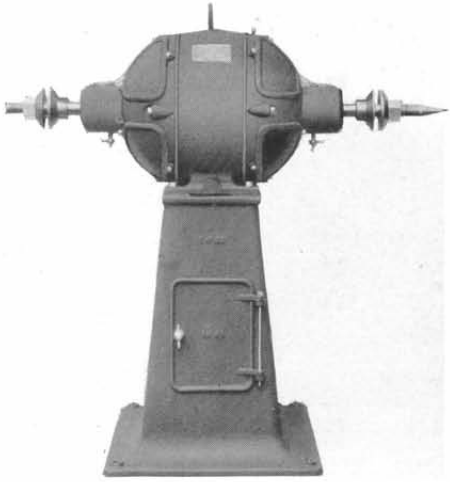


Fig. 15. Buffing Lathe Motor

Buffing Lathe Motors

Our Buffing Motors are entirely enclosed, to prevent dust and grit from reaching the vital parts. The starting box is connected up in the base under the motor; thus it is also protected.

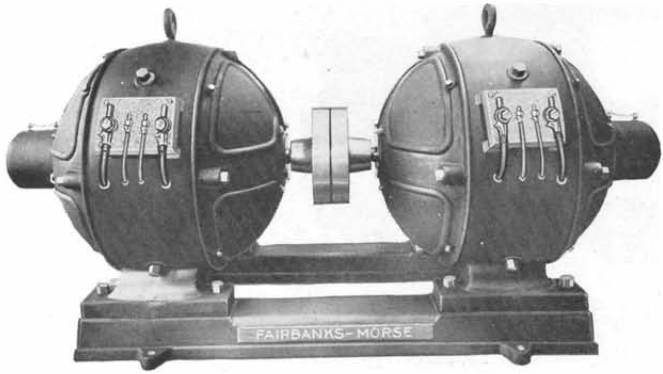


Fig. 16. Motor Generators of the Enclosed Type

Motor Generators

Motor generators of the kind illustrated are very convenient when cheap electric power is available and current of another voltage is required for service. In most cases it is cheaper than steam, and has the further advantage of not requiring skilled or constant attendance. We are prepared to make motor generators of the illustrated type for any combination of voltages and any output within our standard listed sizes, and can guarantee most satisfactory results. Both machines are carefully insulated from the base and also from each other by a flexible coupling of special design. Both motor and generator are made standard with our regular line, and any part can be duplicated from stock. Unless specified to be of the enclosed or semi-enclosed type, they will be furnished in the open type.

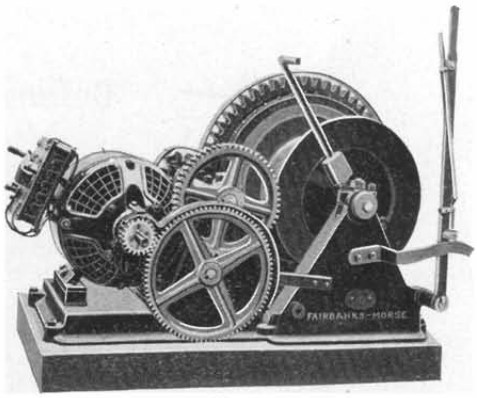


Fig. 17

Fairbanks-Morse Prospecting Geared Hoist, operated by 2 H. P. Compound Wound, Semi-enclosed Motor. For Flat Friction Hoist see page 87.

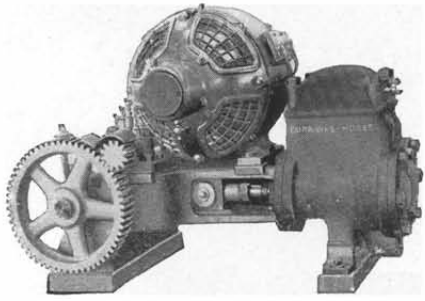


Fig. 18

Fairbanks-Morse 3″ x 4″ Duplex Piston Pattern Pump, geared to 1½ H. P., 110 Volt, 1350 R. P. M., Compound Semi-enclosed Type Motor. See also page 144.

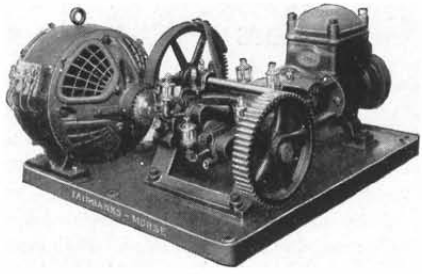


Fig. 19

Fairbanks-Morse Duplex Piston Pattern Pump, geared to motor on same base.

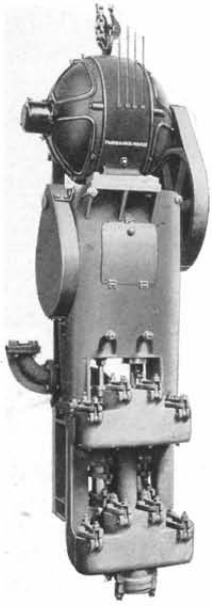
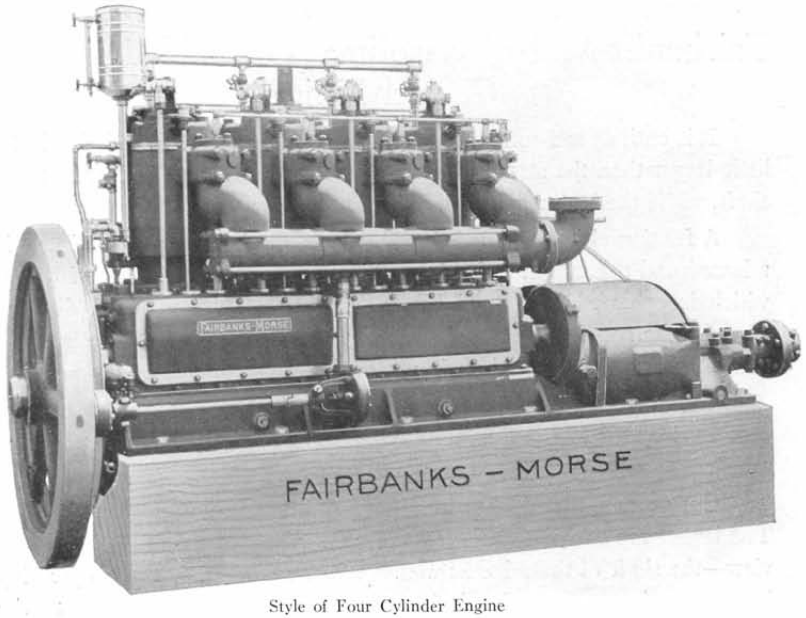


Fig. 20

4¼″ x 6″ Sinking Pump, geared to 15 H. P., 220 Volt, 700 R. P. M. Compound Wound, Enclosed Type Motor.



Style of Four Cylinder Engine

Fairbanks-Morse Marine Engine

These engines can be arranged to operate on gasoline or kerosene oil.

With each engine, 40 H. P. and smaller, we furnish one sparking dynamo attached to engine, also one electric battery, spark coil, switch, wire, reversing gear with combined thrust bearing, inboard stuffing box with gland, outboard stern bearing, stern tube, propeller wheel, wheel shaft, coupling, exhaust pot, exhaust discharge fitting, circulating pump and sea-cock with bilge connection, gasoline, water and exhaust pipes, with fittings, wrenches, oilers, etc. With engines larger than 40 H. P. no exhaust pipe nor exhaust fittings are furnished unless specially ordered. Equipment furnished for fresh or salt water service as ordered.

In addition to the parts mentioned in the complete outfit, we furnish with all four-cycle engines a self-starter pump and an air pump for furnishing air to operate a whistle, which is quite essential on large boats. No whistle nor tank is furnished unless specially ordered. For further information see our Marine Engine Catalogue.

SIZES AND DIMENSIONS

H. P.	No. of Cylinders	R.P.M.	Height from Foot Plate to Top of Engine	Height from Foot Plate to Shaft	Width of Base	Space Required Fore and Aft	Diameter of Flywheel	Approx. Weight of Engine	Approx. Shipping Weight
10	1	350	39	$3\frac{3}{4}$	25	50	$27\frac{1}{2}$	1700	2500
10	2	400	34	3	19	63	$27\frac{1}{2}$	1575	1900
15	3	400	34	3	19	73	$27\frac{1}{2}$	2000	2500
20	2	350	39	$3\frac{3}{4}$	25	70	32	2300	3400
30	3	350	39	$3\frac{3}{4}$	25	84	32	3100	4200
40	4	350	39	$3\frac{3}{4}$	25	100	32	4300	5300
50	2	300	62	$4\frac{1}{2}$	38	103	48	9900	10500
75	3	300	62	$4\frac{1}{2}$	38	120	48	11000	11600
100	4	300	$70\frac{3}{4}$	$8\frac{3}{4}$	43	176	60	17800	18300

Fairbanks-Morse Gasoline, Gas and Distillate Geared Hoists

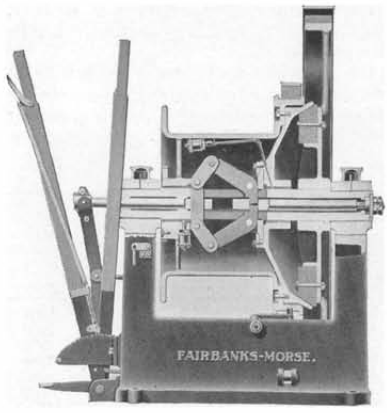
It is entirely self-contained, very compact, requires a foundation but a little larger than the standard engines. The drum itself is loose on the shaft, while the larger gear is keyed fast.

A friction clutch is used for hoisting. In lowering, this clutch is released and the weight is held by a band brake on the end of drum, which is operated by a hand lever. A speed-changing device is used whereby the speed of the engine can be very much reduced when not doing the actual work of hoisting.

This device is arranged to operate by foot pedal, and when not depressed by the foot will cause the engine to run at its lowest practical speed.

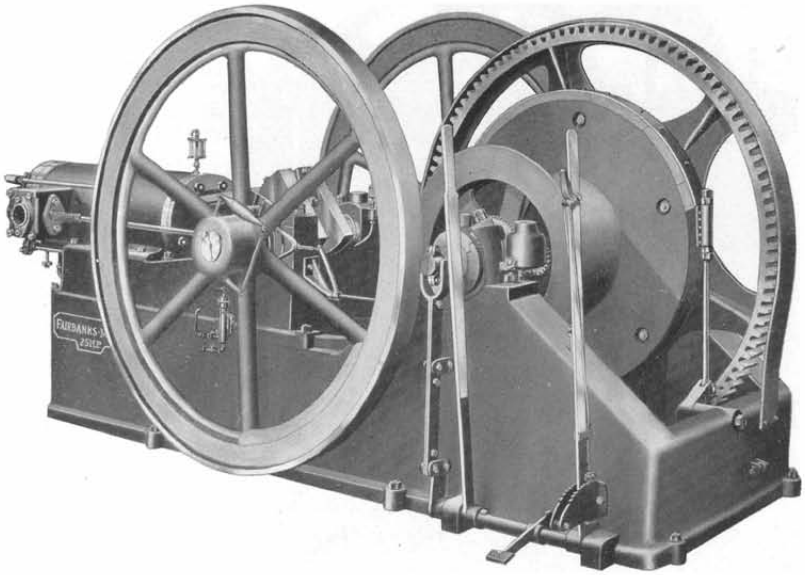
Cut gears are used, thus reducing noise and adding to the efficiency. The levers are so located that the operator has the entire machine in view—the shaft of the mine as well. When so ordered, these operating levers may be set near the shaft and suitable connections made to the engine, which can be located at a suitable distance from the shaft or work.

Indicators of the column type can be furnished to show position of bucket in mine shaft. The engine is so arranged that it can be used to furnish power for other purposes, such as pumping of water and driving of compressors, etc.



Clutch Mechanism

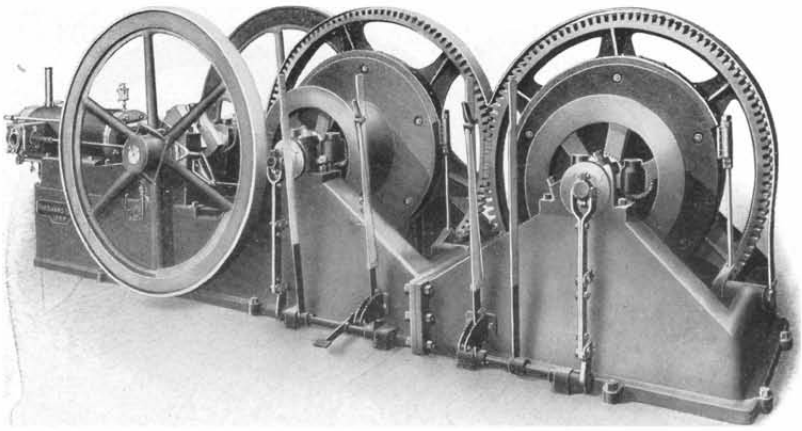
The clutch used on this hoister is new and is the only one which uses a conical-shaped surface, and does not cause end thrust to the shaft, which would give extra strain and friction on bearing. With our clutch there is no hardened steel collar or points required. The clutch is operated with a lever and not a screw. The mechanism is locked in with toggle when the clutch is engaged and can be released with the slightest motion to the lever operating same.



Fairbanks-Morse Gasoline, Distillate and Kerosene Geared Hoister

SIZES AND DIMENSIONS

H.P.	Teeth in Gear		Drum		Hoist, Speed, Feet	Gross Load, Pounds	Size Steel Rope, Inches	Feet Rope in One Layer	Shipping Weight, Pounds
	Gear	Pinion	Diameter, Inches	Face, Inches					
8	128	14	18	14	155	1360	½	135	4500
8A	128	14	26	14	225	930	½	180	4580
15	111	15	20	16	180	2200	½	170	7600
15A	111	15	28	16	243	1600	½	235	7700
15B	111	15	24	16	217	1820	½	205	7650
15C	111	15	18	16	163	2400	½	155	7600
25	112	18	22	18	190	3500	⅝	170	13300
25A	112	18	32	18	273	2500	⅝	246	13400
25B	112	18	38	18	330	2000	⅝	288	13450
40	116	20	24	20	222	4700	⅝	205	18300
40A	116	20	40	20	370	2800	⅝	340	18200
50	90	15	48	22	405	3200	⅝	445	25000
50A	90	14	28	22	220	6000	¾	220	24850
60	90	15	32	22	272	6000	¾	250	27800
60A	90	14	48	22	368	4300	¾	375	28500

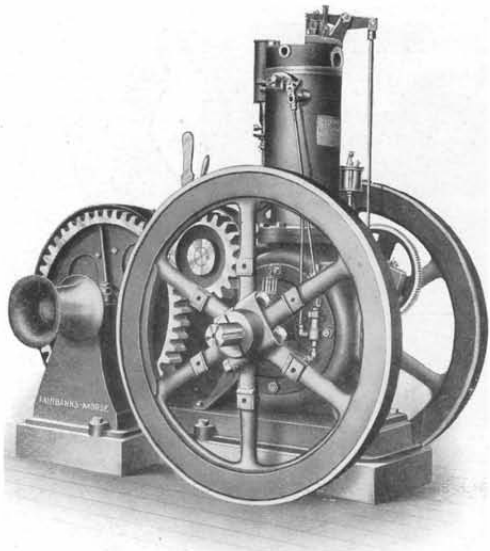


Fairbanks-Morse Combined Gasoline Engine and Double Drum Tandem Hoist

SIZES AND DIMENSIONS

H. P.	Teeth in Gear		Drum		Speed, Feet per Minute	Gross Load, Pounds	Size Steel Rope, Inches	Feet Rope in One Layer	Shipping Weight, Pounds
	Gear	Pinion	Diameter, Inches	Face, Inches					
15	111	15	20	16	180	2200	½	170	10900
15A	111	15	28	16	243	1600	½	235	11300
15B	111	15	24	16	217	1820	½	205	11200
15C	111	15	18	16	163	2400	½	155	10850
25	112	18	22	18	190	3500	⅝	170	16200
25A	112	18	32	18	273	2500	⅝	246	16500
25B	112	18	38	18	330	2000	⅝	288	16600
40	116	20	24	20	222	4700	⅝	205	22800
40A	116	20	40	20	370	2800	⅝	340	23100
50	90	15	48	22	405	3200	⅝	445	31500
50A	90	14	28	22	220	6000	¾	220	31300
60	90	15	32	22	272	6000	¾	250	34500

The general design of our double drum hoist is identical with that of our single drum geared hoist described on the previous pages. Each drum works independently of the other, or both drums can be operated together. Each drum has its own brake, which is a duplicate of that used in the single drum outfit. The speed pedal controls the engine speed. Each drum has an independent indicator which shows the position of the bucket or cage on either drum.

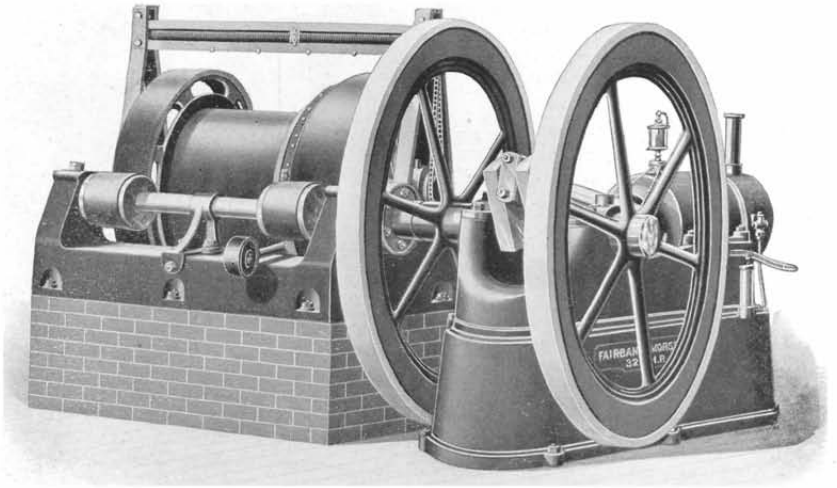


Fairbanks-Morse Gasoline and Distillate Vertical Geared Hoist

SIZES AND DIMENSIONS

H. P.	Teeth in Gear		Drum		Hoist Speed, Feet	Gross Load, Pounds	Size Steel Rope, Inches	Feet Rope in One Layer	Shipping Weight, Pounds
	Gear	Pinion	Diameter, Inches	Face, Inches					
2	55 58	12 18	12	12	87	600	$\frac{3}{8}$	100	1330
4	55 56	20 15	12	12	110	960	$\frac{3}{8}$	100	2500
6	48 48	15 20	16	10½	195	800	$\frac{1}{2}$	90	3133
6A	48 48	15 20	9	10	113	1440	$\frac{1}{2}$	50	3133
6B	48 48	15 20	10	10	119	1320	$\frac{1}{2}$	55	3133
9	48 75	24 14	18	14	185	1500	$\frac{1}{2}$	135	3860
9A	48 75	24 24	26	14	222	1070	$\frac{1}{2}$	180	3860
12	49 81	26 13	20	16	140	2260	$\frac{1}{2}$	170	6300
12A	49 81	26 13	28	16	195	1625	$\frac{1}{2}$	235	6400
12B	49 81	26 13	24	16	167	1900	$\frac{1}{2}$	205	6350
12C	49 81	26 13	18	16	125	2500	$\frac{1}{2}$	155	6300

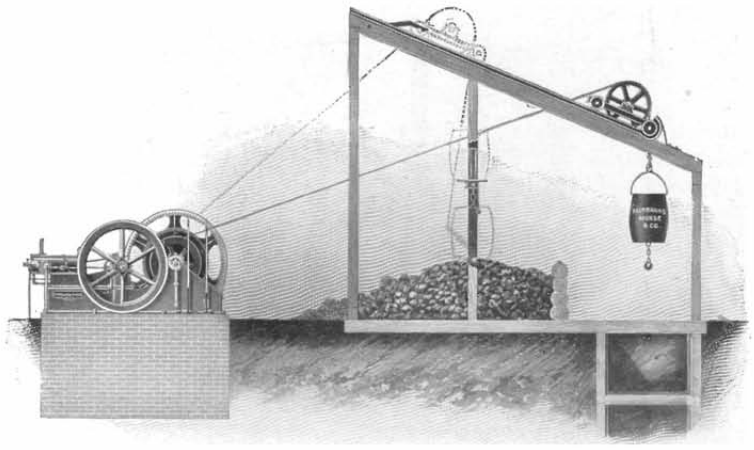
The 9 and 12 H. P. Hoists are fitted with same clutch and drum as the standard Horizontal Hoists, and therefore differ in that particular from the 2, 4 and 6 H. P. Vertical Hoists, otherwise are same in general design. Nigger Head not regularly furnished on the 9 and 12 H. P. size.



Fairbanks-Morse Gasoline, Distillate and Kerosene Flat Friction Hoists

SIZES AND DIMENSIONS

Engine H.P.	Frictions, Inches			Drum, Inches		Hoisting Speed, Feet	Gross Load, Lbs.	Steel Rope, Inch	Shaft Diam. Inches		Total Floor Space, Inches	Shipping Weight Complete, Pounds
	Large	Small	Face	Diam.	Face				Main	Drum		
8	44	7½	6¼	23	18	314	500	⅜	2 15/16	2 15/16	70 x 100	6100
10	44	7½	6¼	23	18	285	700	⅜	2 15/16	2 15/16	86 x 107	7800
12	44	7½	6¼	23	18	289	825	½	2 15/16	2 15/16	87 x 108	7900
15	44	7½	6¼	23	18	262	1125	½	2 15/16	2 15/16	88 x 108	8310
20	44	7½	6¼	23	18	237	1675	⅝	2 15/16	2 15/16	105 x 125	10770
25	44	7½	6¼	23	18	210	2350	⅝	2 15/16	2 15/16	106 x 125	11670
32	44	7½	6¼	28	18	255	2500	⅝	2 15/16	2 15/16	112 x 133	14550
32	50	8½	7¼	31	22	285	2225	⅝	3 7/16	3 15/16	112 x 138	15530
40	50	8½	7¼	31	22	285	2800	⅝	3 7/16	3 15/16	114 x 144	16130
40	54	10	8¼	35	24	345	2300	⅝	3 7/8	3 15/16	114 x 150	17050
50	54	10	8¼	35	24	328	3025	⅝	3 7/8	3 15/16	120 x 150	20190
50	70	10½	10½	35	24	265	3750	⅝	4 7/8	4 7/8	123 x 186	26000
60	70	13½	12½	35	24	333	3600	¾	4 7/8	4 7/8	126 x 186	30200



25-H. P. Fairbanks-Morse Gasoline and Distillate Hoist

OPERATING WITH OUR AUTOMATIC BUCKET DUMP.

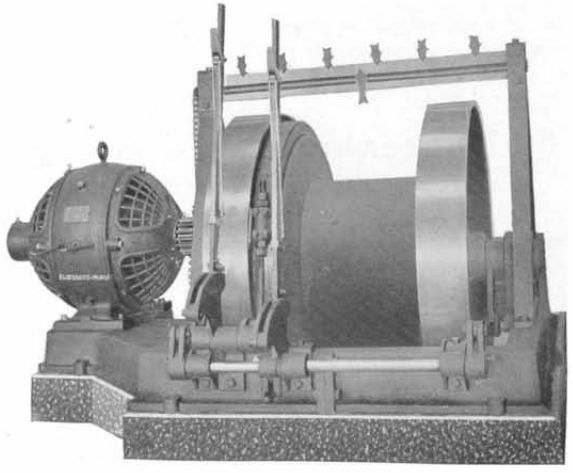
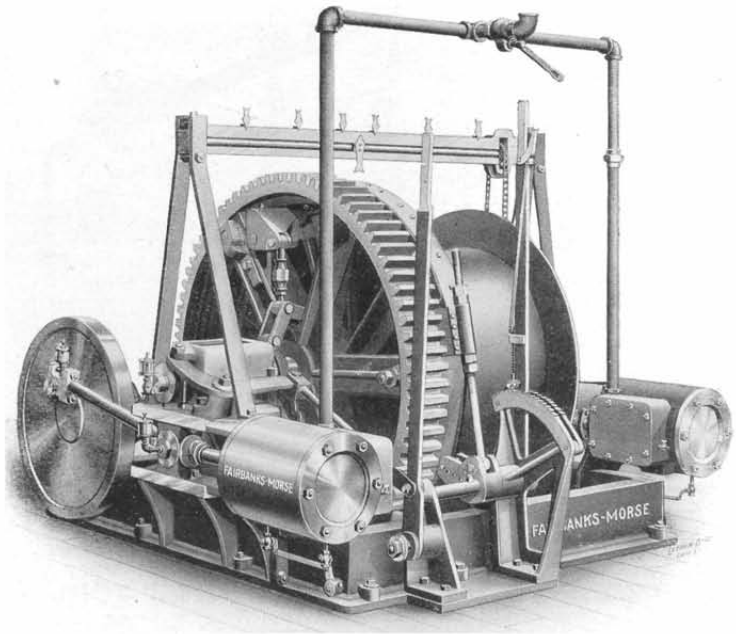


Fig. 21
Fairbanks-Morse Flat Friction Hoist, Geared to 10 H. P., 220 Volt, Semi-enclosed Type Motor.

Various hoists are furnished geared to Fairbanks-Morse motors instead of gas engines when so desired.



8 x 10 Steam Geared Hoist

WITH DEPTH INDICATOR AND THROTTLE VALVE

SIZES AND DIMENSIONS

Cylinder						Size of Drum		Teeth in Gear		Diam. of Shafts		Pipes for Each Cylinder		Diam. of Throttle Valve	Size of Bed		Weight in Pounds	Code Word	Packed for Export, Weight in Pounds	Cubic Feet
Diameter	Stroke	Horse Power	Hoisting Load in Lbs.	Hoisting Speed in Ft.	Diameter of Cable	Feet of Cable in One Layer	Total No. of Feet Can be Wound	Diameter	Face	Large	Small	Drum	Crank Shaft	Steam	Exhaust		Width	Length				
6	8	26	2300	320		118	1800	28	18	94	14	$2\frac{1}{16}$	$2\frac{1}{16}$	$1\frac{1}{4}$	$1\frac{1}{2}$	2	54	56	4500	Bunker	5300	156
8	10	50	4000	400		274	2000	32	24	82	15	$3\frac{3}{16}$	$2\frac{3}{16}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	$62\frac{1}{2}$	69	7000	Cop	8100	248
10	14	90	6000	450		508	2500	$46\frac{1}{2}$	36	75	13	$4\frac{3}{16}$	$3\frac{3}{16}$	$2\frac{1}{2}$	3	4	86	96	16000	Green	18000	515
12	14	130	7500	500		650	3200	60	36	86	14	$5\frac{3}{16}$	$4\frac{3}{16}$	3	4	4	90	108	18000	Hazard	20300	758

We also build a line of steam friction hoists. Detailed information furnished on application.

Locomotive Coal and Sand Stations

With the present stage of advanced railroading and the thorough manner in which the costs of the various departments pertaining to the operating of a railroad are kept, it is natural that the officials in charge of this branch should watch the cost of delivering coal and sand to their locomotives, and like all officials, they are looking for every chance to reduce the cost of handling these supplies and reducing the time consumed in delivery. If, in considering this subject, the latest design of modern stations be brought to their attention and they consider it from all standpoints, the advantage of the modern station as designed and erected by us, will appeal to them.

The following pages illustrate a few of the many stations which we have erected for handling locomotive coal and sand.

The designing of these stations is handled by a corps of engineers especially fitted for the work in question and each separate design is worked out to properly fit the location and meet the local conditions as to storage capacity for coal and sand, also the number of tracks to which delivery must be made.

The stations are constructed on approved mechanical principles and each design is worked out with the view of making it as nearly as possible an ideal one for its location, not only as to shape and construction of the frame work, but also in the mechanical treatment.

They may be constructed to weigh the coal while stored in the pocket, or with small scales to weigh it as delivered to the locomotives.

Operating power may be steam, electricity or gasoline, of which gasoline is frequently the most economical, especially where power is needed for but a few hours each day or a few days in a week, as it is under no operating expense when not in actual use.

The power operating this machinery may also be used for pumping water for locomotive supply, the tank being located as the yard or track layout may require.

The operating cost varies with local conditions, but we have a number of stations in service where the AVERAGE cost per ton of handling coal is about one cent.

Following is a description of one of our more modern stations and we call particular attention to the same:

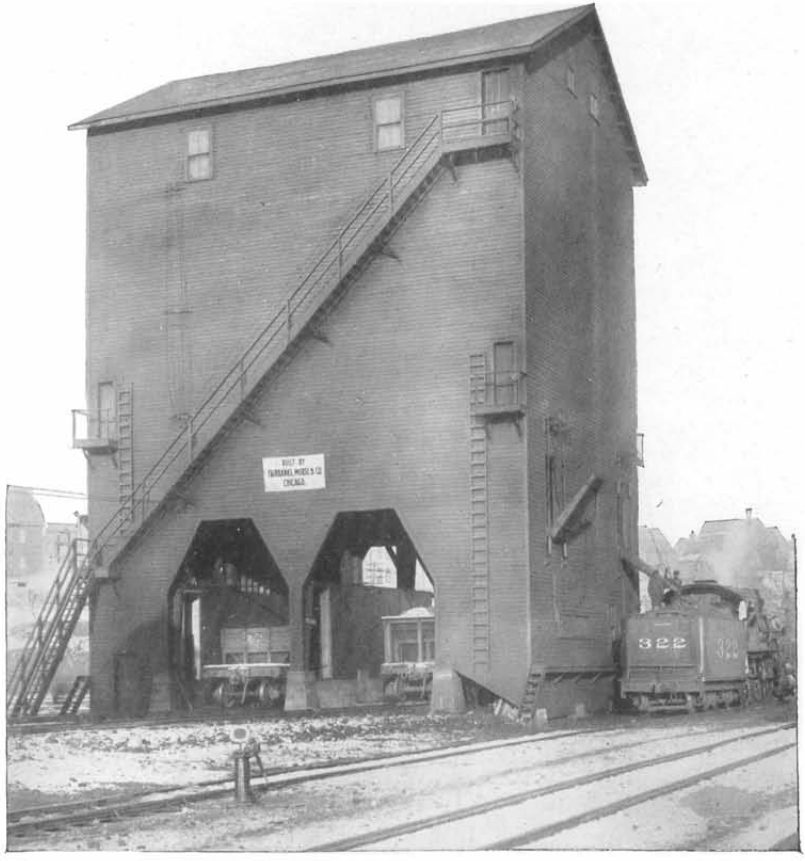
Coaling Station Constructed for the C., M. & St. P. Ry., at West Milwaukee, Wis.

The station was completed and put in operation the latter part of 1904, and is especially adapted to the requirements in the yards at West Milwaukee.

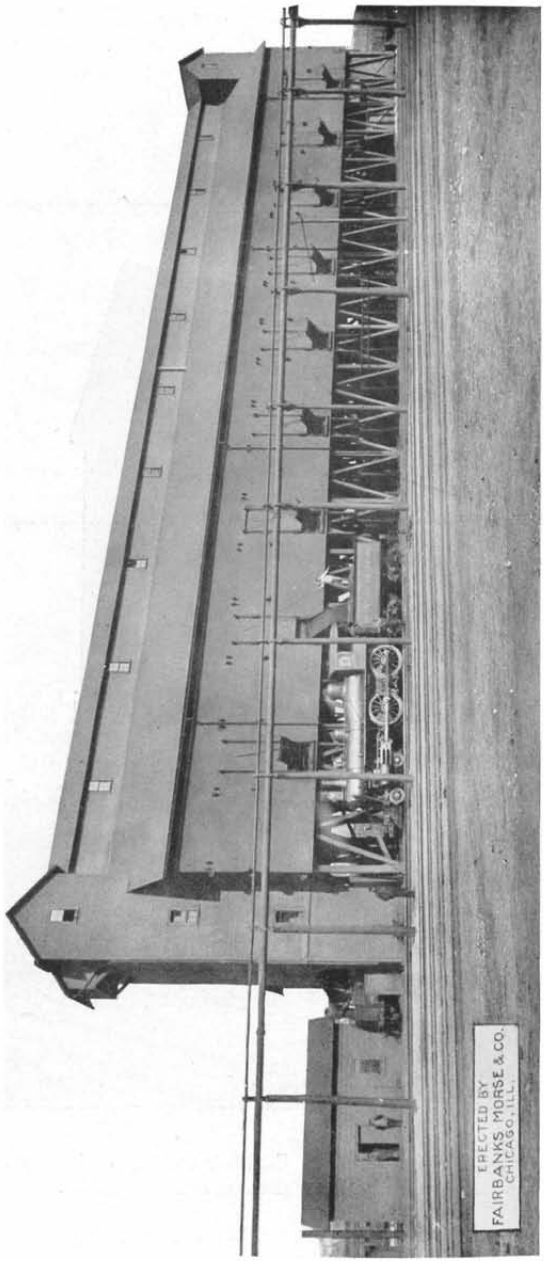
It is designed with receiving hoppers on two tracks, both being located under the building, and the machinery is in duplicate throughout so that either bucket conveyor will deliver coal to all of the four overhead storage pockets which have a capacity of one hundred twenty-five tons each, making the storage pocket capacity five hundred tons. The coal is drawn from the large storage pockets into four ten-ton suspended hopper scale pockets from which in turn it flows to the locomotives on either of two tracks outside the building. The scales are provided with plus and minus beams fitted with a type registering device which stamps in the body of duplicate tickets figures indicating the amount of coal taken by each locomotive. Coal is delivered from the receiving hoppers by two of our patent automatic loaders into two thirty by thirty inch crushers, each having an hourly capacity of sixty tons and discharging directly into the conveyors.

The operating power is electricity, the motors which drive the elevator conveyors being located above the storage pockets; those driving the crushers, in two motor rooms at ground level. The hourly capacity of each conveyor is sixty tons, or one hundred and twenty tons for the whole station.

A station such as described above can handle coal at a great saving over many of the other methods.



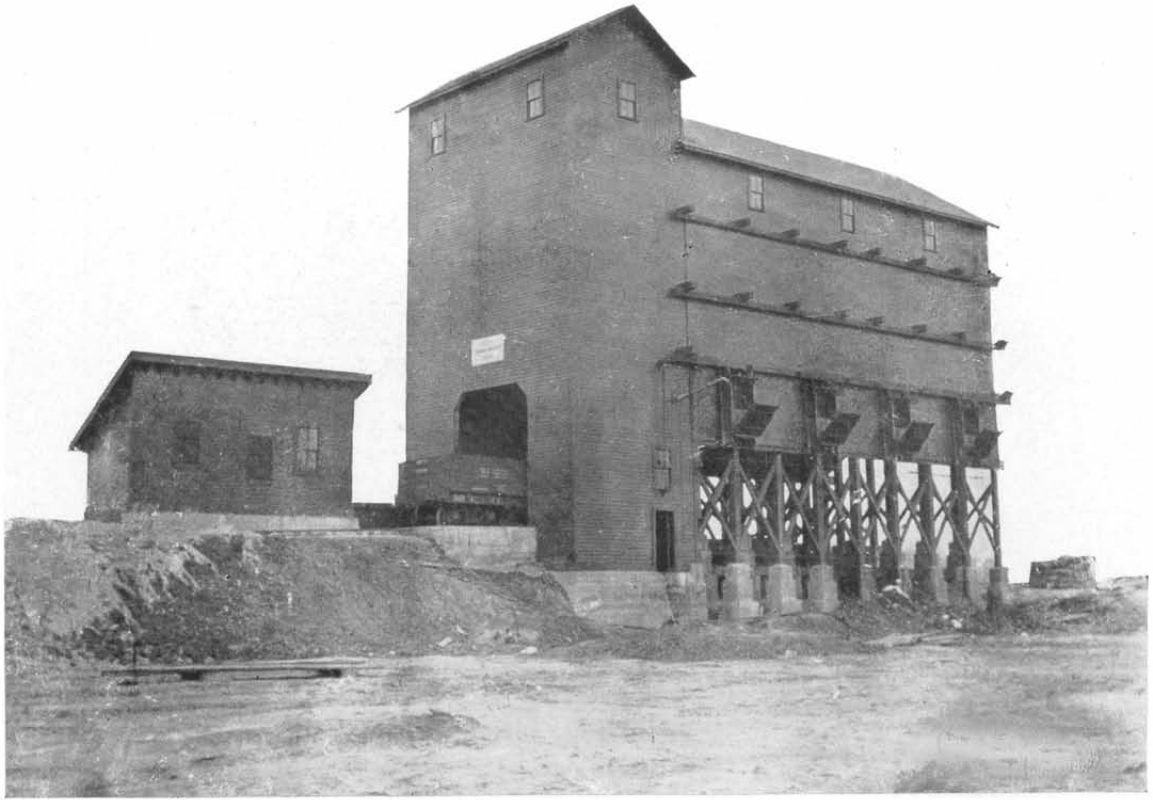
Coaling Station at West Milwaukee, Wis., on C., M. & St. P. Ry. Storage capacity, 540 tons. Pockets fitted with Fairbanks Standard Scales.



Coaling Station for N. Y., N. H. & H. Ry. at South Boston, Mass. Storage capacity, 4,500 tons. Machinery is driven by Fairbanks-Morse 44 H. P. Gasoline Engine. Elevating capacity, 200 tons per hour.

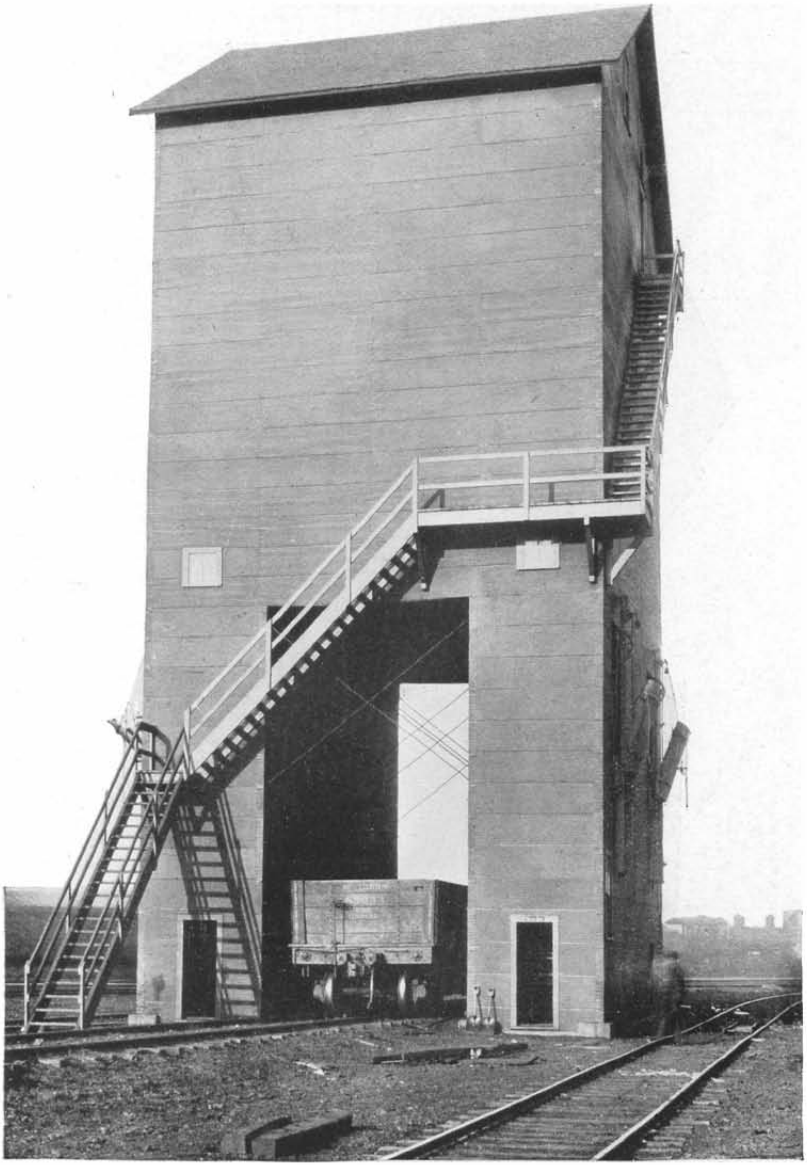
Coaling Station at Port Huron, Mich., on Pere Marquette Ry. Storage capacity, 160 tons. We have erected twelve similar coaling stations for this road.

Coaling Station at Florence, Kan., on A. T. & S. F. Ry. Storage capacity, 300 tons. Coal is weighed in Fairbanks Standard Hopper Scales.

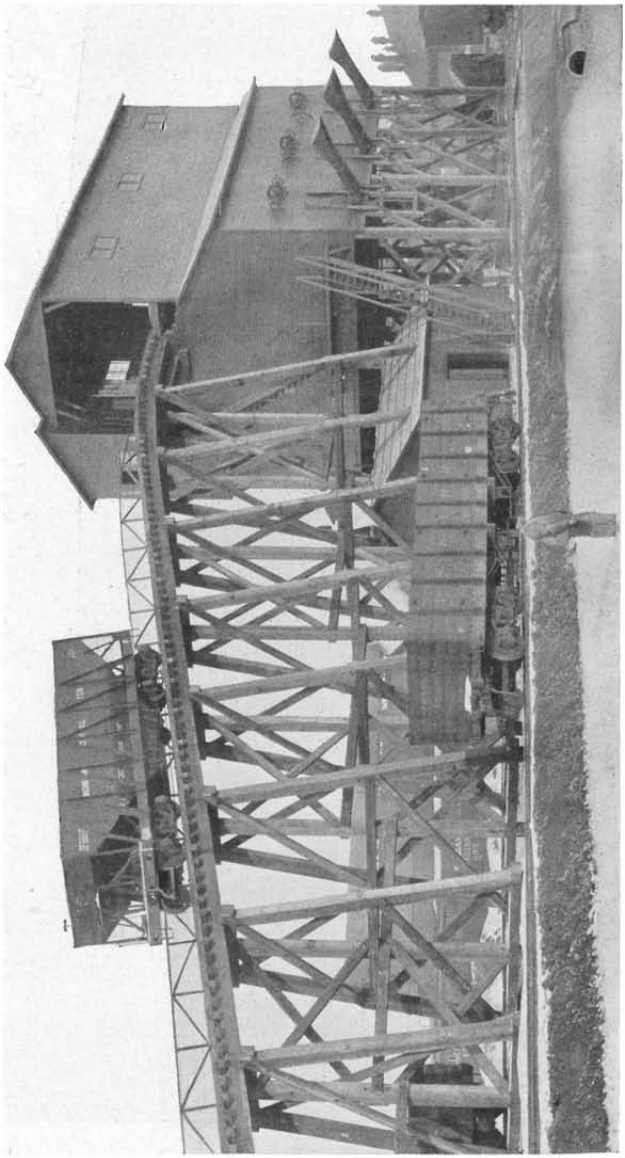


Coal and Sand Station on Mo. Pacific Ry. at McGehee, Ark. Storage capacity, coal 1,000 tons; sand 45 tons.

Coaling Station at Raleigh, N. C., on Seaboard Air Line.
Storage capacity, 850 tons.



Coaling Station for Kentucky & Indiana Bridge & Railroad Company, Louisville, Ky.
Capacity, 535 tons. With Fairbanks Standard Hopper Scales.



Coaling Station for Michigan Central Railroad, at West Detroit, Mich. Capacity, 500 tons.

Railroad Coaling Stations

Erected by Fairbanks, Morse & Co.

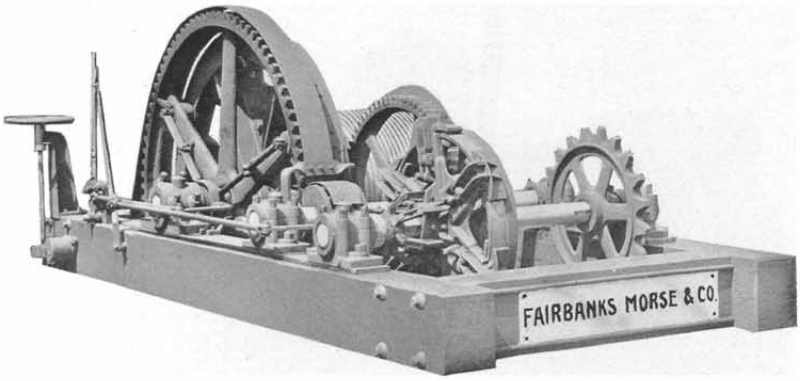
LOCATION	RAILROAD	Coal (Tons)	Sand (Tons)	Cinders (Tons)
White Plains, N. Y.	N. Y. C. & H. R. R.	300	45	
DeWitt, N. Y.	N. Y. C. & H. R. R.	850	165	
Syracuse, N. Y.	N. Y. C. & H. R. R.	820	96	
East Rochester, N. Y.	N. Y. C. & H. R. R.	375	65	
Reels Mills, Md.	B. & O. R. R.	250		30
Hyndman, Pa.	B. & O. R. R.	300		50
Glassport, Pa	B. & O. R. R.	75		50
Parkersburg, W. Va.	B. & O. R. R.	80 W'gh'g		50
New Martinsville, W. Va.	B. & O. R. R.	80 "		
Canal Dover, Ohio	C. L. & W. Ry.	180		
Lorain, Ohio	C. L. & W. Ry.	220		
Dayton, Ohio.	C. H. & D. Ry.	40 "		
North Dayton, Ohio	C. H. & D. Ry.	40 "		
East Dayton, Ohio.	C. H. & D. Ry.	40 "		
Austin, Ohio	C. H. & D. Ry.	40 "		
Hamilton, Ohio.	C. H. & D. Ry.	80 "		
Wellstown, Ohio.	C. H. & D. Ry.	80 "		
Montezuma, Ind.	C. H. & D. Ry.	80 "		
Cincinnati, Ohio.	C. H. & D. Ry.	80 "		
Ivorydale, Ohio.	C. H. & D. Ry.	120 "	5	
Frankfort, Ind.	T. St. L. & W. R. R.	80 "		
Chicago, Ill.	C. T. T. R. R	80 "	200	
Stickney, Ill.	C. U. T. Ry.	80 "		
Cincinnati, O., (Wood St.)	C. C. C. & St. L. Ry.	80 "		60
Cincinnati, O. (3d St.)	C. C. C. & St. L. Ry.	80 "		50
Columbus, Ohio.	C. C. C. & St. L. Ry.	80 "		6
Nelsonville, Ohio.	Hocking Valley Ry.	200		
Columbus, Ohio.	Hocking Valley Ry.	300		
Walbridge, Ohio	Hocking Valley Ry.	100		
W. Columbus, Ohio.	T. & O. C. Ry.	100		
Kankakee, Ill.	I. I. & I. R. R.	100 "	300	
Douglas, Ariz.	El. Paso & S. W. R. R.	226		
Hachita, N. M.	El. Paso & S. W. R. R.	226		
Binghampton, N. Y.	D. & H. Co.	300		40
Windsor, Ont.	Grand Trunk Ry.	280		
Orilla, Ont.	Grand Trunk Ry.	75		
Brighton Park, Chicago.	C. & A. Ry.	140 "	115	
Ridgely, Ill	C. & A. Ry.	120 "		
Garfield, Ind.	T. H. & L. Ry.	260		
Haileyville, Okla.	C. O. & G. R. R.	80 "		
Buffalo Creek, N. Y.	B. R. & P. Ry.	200	110	
Buffalo, N. Y.	B. C. Ry.	80 "	30	
Youngstown, Ohio.	Penn. Ry	130	15	
W. Milwaukee Wis.	C., M. & St. P. Ry.	540 "		
Channing, Mich.	C., M. & St. P. Ry.	100 "		
Washington, Ia.	C., M. & St. P. Ry.	60 "		
Nahant, Ia.	C., M. & St. P. Ry.	60 "		
Ebner Junction, Ill	C., M. & St. P. Ry.	60 "		
Dubuque, Ia.	C., M. & St. P. Ry.	75 "		
Green Bay, Wis.	C., M. & St. P. Ry.	75 "		

Railroad Coaling Stations—*Continued*

Erected by Fairbanks, Morse & Co.

LOCATION	RAILROAD	Coal (Tons)	Sand (Tons)	Cinders (Tons)
Fond du Lac, Wis.	Wisconsin Central Ry.	13000W'gh'g		
Poquonnock, Conn.	N. Y. N. H. & H. R. R.	2500		
So. Boston, Mass.	N. Y. N. H. & H. R. R.	4500 "		
Bridgeport, Conn.	N. Y. N. H. & H. R. R.	3500 "		
Howells, Ga.	Seaboard Air Line	620	105	65
Raleigh, N. C.	Seaboard Air Line	850		120
Louisville, Ky.	K. & I. B. & R. R. Co.	535 "		
Flint, Mich.	P. M. R. R.	80 "		
Grand Ledge, Mich.	P. M. R. R.	160 "		
Edmore, Mich.	P. M. R. R.	80		
Port Huron, Mich.	P. M. R. R.	160		
Ludington, Mich	P. M. R. R.	80		
Muskegon, Mich.	P. M. R. R.	160		
Grand Rapids, Mich.	P. M. R. R.	100 "		
Baldwin, Mich.	P. M. R. R.	160		
Chicago, Ill.	P. M. R. R.	80		
Traverse City, Mich.	P. M. R. R.	160		
St. Thomas, Ont.	P. M. R. R.	80 "		
Benton Harbor, Mich.	P. M. R. R.	160		
West Detroit, Mich.	Mich. Cent. R. R.	500		
Bald Knob, Ark.	Mo. Pac. Ry.	230		
McGehee, Ark.	Mo. Pac. Ry.	1000	45	
Cotter, Ark.	Mo. Pac. Ry.	310	45	
Van Buren, Ark.	Mo. Pac. Ry.	500	24	
Canandaigua, N. Y.	Nor. Cent. Ry.	100		
Altoona, Pa.	A. & L. V. Ry.	604 "		
Allen Jct., Minn.	D. & I. R. R. R.	100		
Cloquet River, Minn.	D. & I. R. R. R.	100 "		
Pennington, Wis.	M. St. P. & S. Ste. M. Ry.	80 "		
Rhinelander, Wis.	M. St. P. & S. Ste. M. Ry.	100 "		
Weyerhauser, Wis.	M. St. P. & S. Ste. M. Ry.	100 "		
Gladstone, Mich.	M. St. P. & S. Ste. M. Ry.	100 "		
Shoreham, Minn.	M. St. P. & S. Ste. M. Ry.	100 "		
Amery, Wis.	M. St. P. & S. Ste. M. Ry.	100 "		
Hankinson, N. D.	M. St. P. & S. Ste. M. Ry.	100 "		
Pembine, Wis.	M. St. P. & S. Ste. M. Ry.	100 "		
Kensal, N. D.	M. St. P. & S. Ste. M. Ry.	50 "		
Enderlin, N. D.	M. St. P. & S. Ste. M. Ry.	50 "		
Thief River Falls, Minn.	M. St. P. & S. Ste. M. Ry.	50 "		
Glenwood, Minn.	M. St. P. & S. Ste. M. Ry.	50 "		
South Haven, Minn.	M. St. P. & S. Ste. M. Ry.	100 "		
Minnesota Trans., Minn.	M. Transfer Ry.	100 "		
Florence, Kas.	A. T. & S. F. Ry.	300 "		
Felton, Mo.	C. B. & Q. Ry.	200 "	10	
Novinger, Mo.	C. B. & Q. Ry.	80 "		
Mendota, Ill.	C. B. & Q. Ry.	200 "	69	
Cameron Jct., Mo.	C. B. & Q. Ry.	200 "	60	
St. George, S. I., N. Y.	S. I. R. T. Ry.	300	35	40
Weyburn, Va.	Southern Ry.	4000 "	115	30
Pelham, N. C.	Southern Ry.	4000 "	115	30
Charleston, Ill.	T. St. L. & W. R. R.	100	165	
Ely, Minn.	D. & I. R. Ry.	50		
Shaw, Minn.	D. M. & N. Ry.	100		

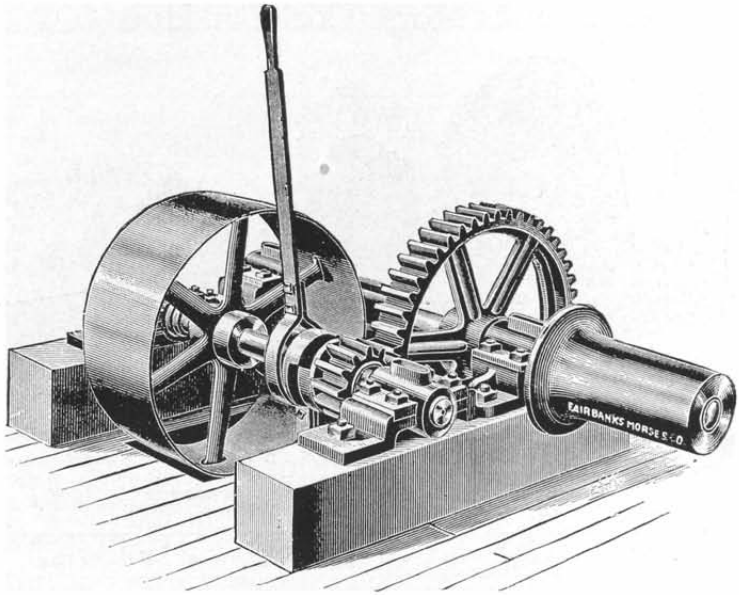
Fairbanks-Morse Coal Car Hoist



Coaling Stations

For which we have supplied some machinery.

LOCATION	RAILROAD
Carter, Wyo.	Union Pacific R. R.
Rock River, Wyo.	Union Pacific R. R.
Rock Springs, Wyo.	Union Pacific R. R.
Deer Trail, Colo.	Union Pacific R. R.
Snyder, Colo.	Union Pacific R. R.
Mirage, Colo.	Union Pacific R. R.
Salina, Kan.	Union Pacific R. R.
Topeka, Kan.	Union Pacific R. R.
Toronto, Ont.	Grand Trunk R'y.
Allandale, Ont.	Grand Trunk R'y.
El Paso, Tex.	El Paso S.-W. R. R.
Alden, Pa.	E. & W. V. R'y.
Swanton, Vt.	Canada Atlantic R'y.
Coteau Jc., Ont.	Canada Atlantic R'y.
Ottawa, Ont.	Canada Atlantic R'y.
Valentine, Neb	C. & N. W. R'y.
Cody, Neb.	C. & N. W. R'y.
Gordon, Neb.	C. & N. W. R'y.
Buffalo Gap, S. D	C. & N. W. R'y.
Rapid City, S. D.	C. & N. W. R'y.
Whitewood, S. D.	C. & N. W. R'y.
Laredo, Mo.	C. M. & St. P. Ry.
Crawford, Neb.	C. B. & Q. Ry.
West Frankfot, Ill.	C. & E. I. R. R.
Haileyville, Okla.	C. R. I & P. Ry.
Union, Mo.	C. R. I. & P. Ry.
Windsor, Mo.	C. R. I. & P. Ry.
One Station.	Missouri Pacific R'y.
Five Stations	Canadian North. R'y.
Kolze, Wis. and four others	Wisconsin Central Ry.



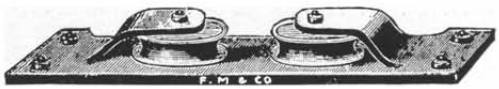
Samson Car Puller

The above cut illustrates our Samson Car Puller. It can be mounted on a horizontal wood frame laid on the floor or masonry foundation, or can be mounted on vertical timbers placed between floors.

Floor space required, 5 feet 6 inches x 3 feet 9 inches.

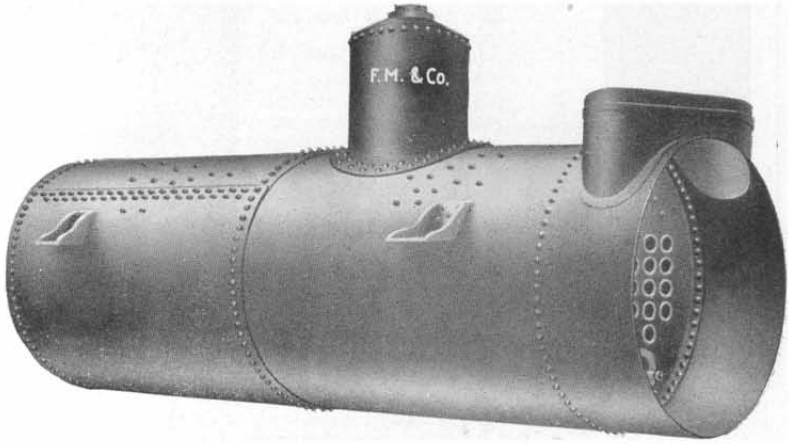
	PRICE	CODE WORD
With square-jaw drive clutch, weight 1,500 lbs.	$150.00	Eano
With friction drive clutch, weight 1,600 lbs.	200.00	Eamid

Double-Sheave Guide Blocks for Car Pullers

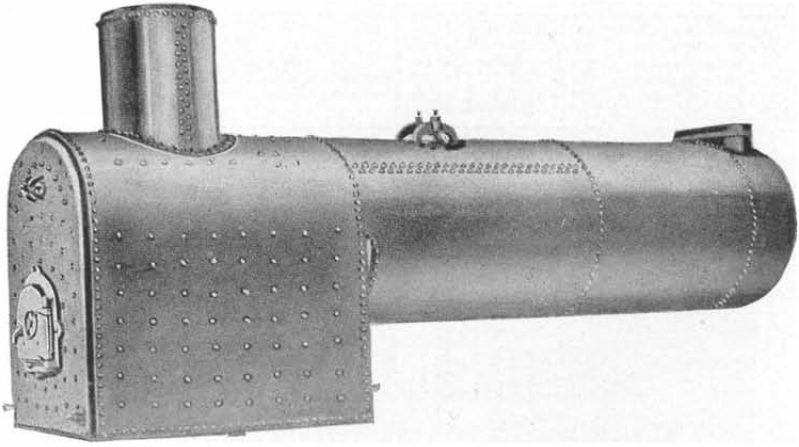


The frame is made of solid cast iron with sheaves securely fastened and will stand any strain put upon the rope.

	PRICE	CODE WORD
Double-sheave guide block, weight 300 lbs.	$20.00	Emal
Single-sheave guide block	8.00	Enos



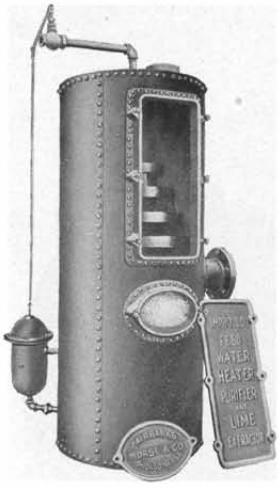
Standard Horizontal Tubular Boiler



Portable Boiler—Locomotive Style

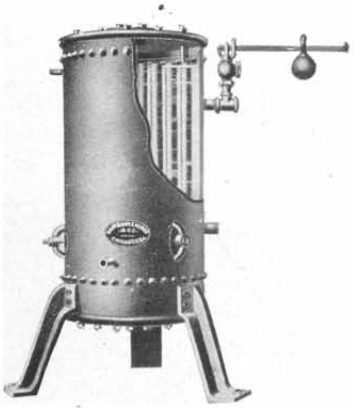
WATER FRONT. OPEN BOTTOM

Improved Water Heater, Purifier and Lime Extractor



Most efficient, economical, inexpensive and simple in construction. Will save its cost in fuel every six months.

Our heater is of the open type, utilizing the waste exhaust steam from the engine, and is superior to the closed or pressure heater on account of its accessibility and the ease with which it can be cleaned, it simply requiring the removal of the large front plate which gives complete access to the inside of heater and renders the removal of the pans, upon which the deposit is collected, an easy matter.



Standard Tubular Pattern Feed Water Heater

It will heat the water to about 212°, condensing nearly all the steam and precipitating the impurities.

At a small additional cost, we provide the heater with an automatic feed water regulator (as shown in cut), which allows no more water to pass to the heater than the pump requires to supply the boilers. *Never pump cold water into a hot boiler.*

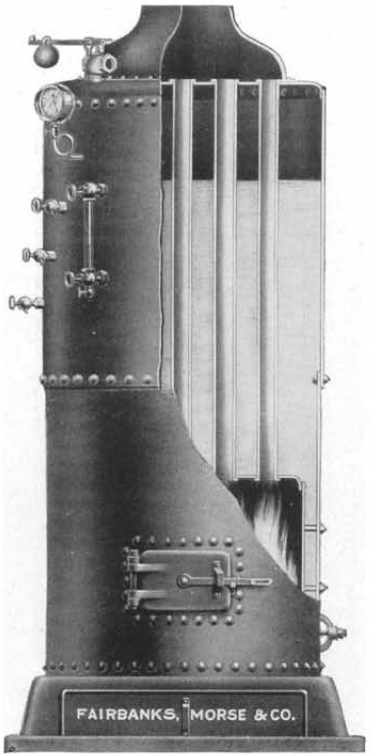
Size of Heater, Inches	Horse Power	Approximate Weight, Lbs.	Price	Auto. Feed Regul.	Size of Heater, Inches	Horse Power	Approximate Weight, Lbs.	Price	Auto. Feed Regul.
18 x 48	15 to 25	500	$ 70.00	$43.00	30 x 84	150 to 238	1260	$170.00	$45.00
18 x 60	30 to 50	600	88.00	43.00	36 x 84	200 to 342	1400	210.00	45.00
20 x 60	50 to 75	650	120.00	43.00	36 x 96	250 to 386	1600	220.00	53.00
24 x 60	75 to 100	725	140.00	43.00	40 x 96	300 to 482	2200	260.00	53.00
24 x 72	100 to 130	850	150.00	43.00	42 x 96	375 to 532	2350	270.00	53.00
30 x 72	125 to 200	1080	160.00	45.00					

Fairbanks-Morse Feed Water Heater

SPECIFICATIONS AND PRICES

Number of Size	1	2	3	4	5	6	7	8	9	10
Code Word	Giant	Glazier	Goat	Gown	Gust	Gulf	Grape	Gleam	Glade	Gird
Horse Power, as usually rated	35	50	60	75	80	100	150	200	300	350
Diameter of Heater, inches	20	20	20	24	24	30	30	36	42	42
Length over all, inches	42	42	48	48	52	58	68	78	84	84
No. of Tubes, all 2-inch. diam	15	20	20	27	32	46	52	66	80	100
Length of Tubes, inches	30	30	36	36	36	42	48	54	60	60
Thickness of Shell, inches	7/32	7/32	7/32	7/32	9/32	1/4	1/4	1/4	5/16	5/16
Thickness of Heads, inches	7/32	7/32	7/32	7/32	9/32	1/4	1/4	1/4	5/16	5/16
Diameter of Exhaust, inches	3	3 1/2	4	4 1/2	4 1/2	6	7	10	10	10
Diameter of Feed Pipe, inches	1/2	3/4	1	1 1/4	1 1/4	1 1/2	2	2	2 1/2	2 1/2
Size of Safety Valve, inches	1	1	1	1 1/4	1 1/4	1 1/2	2	2	2 1/2	2 1/2
Weight, pounds	1000	1050	1100	1300	1400	1800	2000	2800	3400	3600
Price, with Iron Tubes	$76	$80	$84	$100	$106	$140	$154	$190	$240	$272

Prices include safety valve.



Standard Plain Vertical Tubular Boilers

SPECIFICATIONS

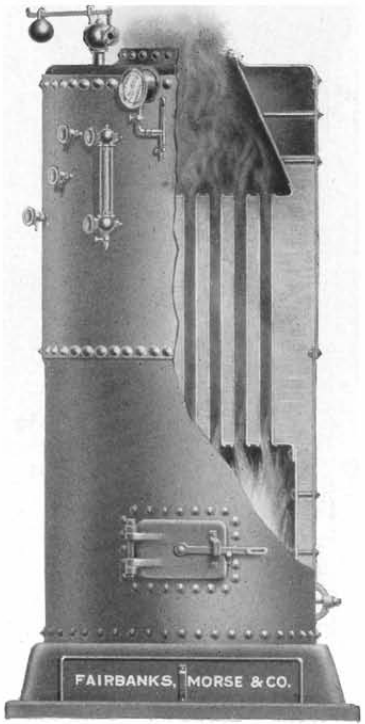
Code Word	Palace	Palm	Panel	Panther	Parable	Parade	Paragon	Parapet	Parasol	Parret	Partner	Player	Padlock
Horse Power	5	8	10	12	14	16	20	25	30	35	40	45	50
Diameter, inches	24	30	30	36	36	36	42	42	42	48	48	48	48
Height, inches	60	60	72	72	84	96	96	108	120	96	102	108	120
Height of fire box, inches	24	28	28	30	30	30	30	30	30	30	30	30	30
Number of tubes	31	49	49	61	61	61	79	85	91	138	144	144	144
Diameter of Tubes, inches	2	2	2	2	2	2	2	2	2	2	2	2	2
Length of Tubes, inches	36	32	44	42	54	66	66	78	90	66	72	78	90
Thickness of shell, inches	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
Thickness of Fire Box, inches	9/32	9/32	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
Thickness of Heads, inches	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	1/16	1/16	1/16	1/16
Size of Safety Valve, inches	1 1/4	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2 1/2	2 1/2	2 1/2	3
Size of Check and Stop Valve, inches	1/2	1/2	1/2	3/4	3/4	3/4	3/4	3/4	3/4	3/4	1	1	1
Size of Blowoff Valve, inches	1	1	1	1	1	1	1	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
Diameter of Stack, inches	12	15	15	18	18	18	20	20	20	24	24	24	24
Weight of Boiler	1000	1200	1400	1700	2000	2500	3200	3500	3800	4000	4400	4600	5000
Weight of Boiler and Fixtures	1500	1750	1900	2250	2650	3150	4100	4400	4700	5700	6100	6300	6700

Boilers over 36 inches in diameter have shell extended 8 inches to form ash pit and have flat base plate.

Vertical seams double riveted. All boilers have hand holes above flue sheet and at bottom of fire box for cleaning out.

Fixtures for the above boilers include base, grates, doors and sheet iron hood.

Fittings include glass water gauge, gauge cocks, steam gauge and siphon, safety valve, check valve, stop valve and blow off valve.



Standard Submerged Tube Boilers

SPECIFICATIONS

Code Word	Sabre	Sack	Safe	Sago	Salter	Sandal	Sapphire	Saxon	Satan	Sash	Satchel	Sable	Saucer
Horse Power	5	8	10	12	15	18	20	25	30	35	40	45	50
Diameter, inches	24	30	30	30	36	36	42	42	48	48	48	54	54
Height, inches	60	60	72	84	84	96	96	108	102	108	120	114	120
Height of Fire Box, inches	24	25	28	28	30	30	30	30	30	30	30	30	30
Number of Tubes	31	54	54	54	68	68	85	85	132	132	132	174	174
Diameter of Tubes, inches	2	2	2	2	2	2	2	2	2	2	2	2	2
Length of Tubes, inches	18	19	27	38	38	48	48	60	45	51	63	54	60
Thickness of Shell, inches	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	5/16	5/16
Thickness of Fire Box, inches	3/8	3/8	3/8	3/8	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
Thickness of Heads, inches	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	7/16	7/16	7/16	7/16	7/16
Thickness of Cone, inches	3/8	3/8	3/8	3/8	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
Size of Safety Valve, inches	1	1¼	1¼	1½	1½	1½	2	2	2	2½	2½	2½	3
Size of Check Valve, inches	½	½	½	½	¾	¾	¾	¾	¾	¾	1	1	1
Size of Stop Valve, inches	½	½	½	½	¾	¾	¾	¾	¾	¾	1	1	1
Size of Blow-off Valve, inches	1	1	1	1	1	1	1	1	1¼	1¼	1¼	1¼	1¼
Diameter of Stack, inches	12	15	15	15	18	18	20	20	24	24	24	26	26
Weight of Boiler	700	1075	1250	1450	1930	2200	2600	3250	4000	4200	4600	5200	5400
Weight of Boiler and Fixtures	1200	1500	1700	1900	2700	3200	3500	4450	5700	5900	6300	7500	7700

This type of boiler made throughout of 60,000 T. S. Homo. flange steel.

Fixtures for the above include base, grates, doors, glass water gauge, steam gauge and siphon, gauge cocks, safety valve, check valve, stop valve, blow-off cock, smoke stack.

Vertical seams double riveted.

All boilers have hand holes above the flue sheet and at bottom of fire box for cleaning out.

All boilers over 36 inches in diameter have sheel extended 8 inches to form ash pit, and have flat base plate,

Fairbanks Injectors

DOUBLE TUBE

FOR STATIONARY, MARINE AND PORTABLE BOILERS

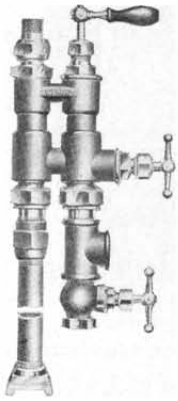


Fig. 399

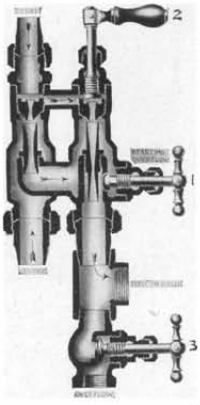


Fig. 398

Size	$8\frac{3}{4}$	10	$12\frac{1}{2}$	15	$17\frac{1}{2}$	20	$22\frac{1}{2}$	25	30	35	40	45	50	55
Price	$18	$20	$25	$30	$40	$45	$55	$60	$75	$90	$110	$125	$150	$175
Gals. per hour with 60 lbs. steam pressure and 4 ft. lift	90	120	220	300	420	540	720	900	1260	1740	2230	2820	3480	3650
Maximum H. P.	12	15	25	35	50	65	90	110	155	180	290	350	430	450
Size steam	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	1	1	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2
Size suction	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	1	1	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$	$2\frac{1}{2}$
Size delivery	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	1	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$	$2\frac{1}{2}$
Size overflow	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	1	1	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	2

With feed water at a temperature of 75° Fahrenheit, and lift of 4 feet, the above capacities are actual.

With 45 pounds steam pressure, water can be lifted 25 feet and forced $112\frac{1}{2}$ feet above the injector, a total of $137\frac{1}{2}$ feet. Will force water above it $2\frac{1}{2}$ feet for each pound pressure of steam.

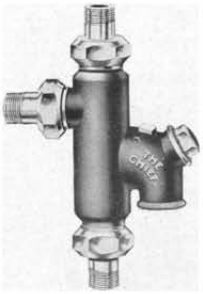
Water of 140° Fahrenheit it will lift 3 or 4 feet, or take it under a head; water at 90° to 100° Fahrenheit it will lift 25 feet and increase its temperature about 100° Fahrenheit.

The lifter side will deliver water to tanks or like duty. A steam pressure of 30 pounds will increase the water temperature about 30° Fahrenheit.

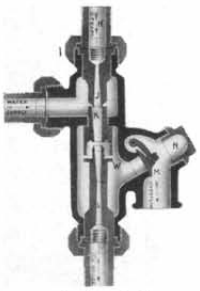
We present our injector as the most reliable boiler feeder known, and claim it is the best and most economical machine for the purpose.

It takes less steam in accomplishing results than any injector on the market, as has been proven by many tests and trials.

Does not require any adjustment of steam or water supply for varying steam pressure.



J —Steam Jet
K—Suction Jet
L —Delivery Tube
W—Delivery Valve
H—Tail Pipe
I —Coupling Nut
N—Overflow Cap
M—Overflow Valve



Sectional View

The Chief Automatic Injector

WORKING RANGE

Starts 22 to 25 pounds, works high to 140 pounds, on 4 feet lift. Greatest vertical lift, 18 feet; pressure, 65 to 80 pounds. Handles hot water supply 106° at 100 pounds, to 115° and 120° at 65 pounds pressure, 3 feet lift, according to size of injector.

PRICE LIST SUBJECT TO DISCOUNT

Size	Price	Gallons per Hour 65 Pounds Pressure 4 Feet Lift	Size of Pipe Connections	Horse Power
2½	$ 16.00	80	⅜	4 to 8
3	18.00	120	½	8 to 12
3½	20.00	165	½	12 to 15
4	25.00	250	¾	15 to 25
4½	30.00	340	¾	25 to 35
5½	45.00	575	1	35 to 70
6½	60.00	900	1¼	70 to 120
7	75.00	1300	1½	120 to 160
7½	90.00	1740	1½	160 to 220
8	110.00	2270	2	220 to 290
8½	125.00	2800	2	290 to 350

The above capacity can be cut down one-half by throttling water supply.

PRICE LIST OF PARTS OR REPAIRS

Size Injector.....	2½	3 or 3½	4 or 4½	5½	6½	7	7½	8	8½
J—Steam jet	.50	.70	.85	1.00	1.15	1.30	1.30	1.60	1.75
K—Suction jet	.50	.70	.85	1.00	1.15	1.30	1.30	1.60	1.75
L W—Delivery jet	2.50	3.00	4.00	5.00	6.00	7.50	9.00	11.50	13.00
I—Coupling nut.....	.50	.65	.75	1.00	1.15	2.00	2.00	3.00	3.00
H—Tail pipe.....	.50	.65	.75	1.00	1.15	1.60	1.60	2.00	2.00
N—Overflow cap.....	.70	.85	1.00	1.15	1.30	1.60	1.60	1.75	1.75
M—Overflow valve....	.50	.70	.85	1.00	1.15	1.25	1.50	2.00	2.00
Brass strainer	.75	.75	.80	1.00	1.25	.....	.....	.....	.....

A liberal discount to the users from these prices.

SPECIAL NOTICE—Parties returning injectors for repairs must write us and mention the number of the injector they return or put on their business shipping tag. There might be two or three of the same size arrive the same day, and unless we know the number we do not know by whom the injector is returned. Do not fail to mention the serial number also when ordering parts.

PHILIPPINE EXPOSITION BOARD:
W. P. WILSON, Chairman
GUSTAVO NIEDERLEIN, Director of Exhibits
PEDRO A. PATERNO, Member in Charge of Representation
LEON M. GUERRERO, Secretary

War Department,
Bureau of Insular Affairs.
Office of the
Philippine Government Board in the United States,
For the Louisiana Purchase Exposition, St. Louis, 1904.

EDMUND A. FELDER, Executive Officer
CARSON TAYLOR, Disbursing Officer
HARRY C. LEWIS, Cashier
Offices:
Philippine Exposition Grounds,
World's Fair, St. Louis

St. Louis, Mo., Noviembre 1, 1904.

Senor:

Tenemos el gusto de poner en su conocimento que el Honorable Jurado Internacional Filipino de la Exposicion, bajo la presidencia del Secretario de Guerra, Honorable William H. Taft, le ha adjudicado a V. una

Medalla de oro

en calidad de colaborador por su bomba à vapor

Al felicitarle a V. por esta merecida distincion y agradecerle de nuevo su entusiasta participacion en el Certamen en que las Islas Filipinas han sobresalido de modo notabilisimo, tenemos el honor saludarle

Muy respetuosamente

Gustavo Niederlein
Secretario
del Jurado Superior.

Leon M. Guerrero
Sub-Secretario.
del Jurado Superior.

Srs. Fairbanks, Morse & Co.
Chicago, Ill.

ST. LOUIS, MO., November 1st, 1904.

DEAR SIRS:—

We have pleasure in advising you that the Honorable International Philippine Jury of the Exposition, under the presidency of the Secretary of War, the Honorable William H. Taft, has awarded you

GOLD MEDAL

in the quality of Collaborators as Exhibitors of

Steam Pumps.

Congratulating you on this merited distinction, and thanking you again for your enthusiastic participation in the enterprise in which the Philippine Islands have come out with such honors, we have the honor to remain,

Very respectfully,

(Signed) GUSTAVO NIEDERLEIN,
Secretary of the Superior Jury.

(Signed) LEON M. GUERRERO,
Sub-secretary of Superior Jury.

MESSRS. FAIRBANKS, MORSE & CO.,
Chicago, Ill.

FAIRBANKS-MORSE
STEAM PUMPS

Figs. S. P. 95 and S. P. 96 show sectional views of our packed piston pattern pumps. In this design the water pistons are "submerged" and the water valves are all located above the pistons.

Figs. S. P. 97 and S. P. 98 show our plunger and ring pattern pumps, Fig. S. P. 98 being arranged to use packed water pistons. In this design the water passages are very direct and the pumps may be operated at a high piston speed without excessive shock or jar. For situations where the water is clear, such as water works hydraulic elevator service, etc., these pumps give excellent satisfaction.

Figs. S. P. 99 and S. P. 100 show our outside packed plunger pumps, Fig. S. P., 99 being the end packed and Fig. S. P. 100 being the center packed plunger pattern.

These types are particularly adapted for handling hot water or water containing considerable grit or sand.

They are also recommended for high pressure boiler feeding and for situations where the pressure is heavy and the service severe, as in mine work and hydraulic work of various kinds.

We also build pumps with water ends of the valve pot type, which are better adapted than any of the foregoing machines for extremely heavy service in many situations; but this, as many similar subjects, we would prefer to take up with our customers by correspondence in each case. In this manner we would have an opportunity of submitting the question to our engineering department, and thus serve the best interests of our customers by making such selection of style and size as will be most suitable for each particular case.

We guarantee all our pumps to be made of first-class material and in a workmanlike manner, and that they will, when properly installed, perform the work for which they were designed. If it is shown that any part proves defective within one year from installation due to any fault in material or workmanship, we will furnish a new part to replace same without charge.

In any line of machinery containing such a diversity of sizes and styles, of which the larger machines must of necessity be modified somewhat in design from the smaller sizes, it is almost impossible to refer in a catalogue to every slight difference in these details of design. Hence, it will be advantageous for our customers to obtain from us specific information for the particular pump they may have under consideration.

The Fairbanks-Morse Duplex Pumps

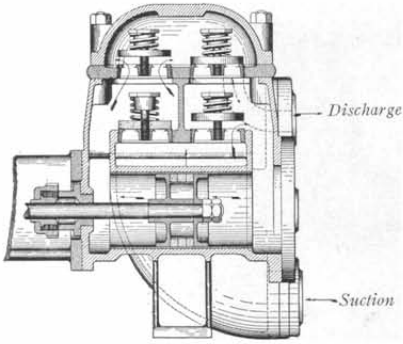


Fig. S. P. 95.
Piston pattern with driven liners.

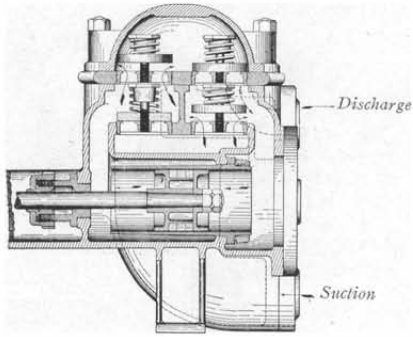


Fig. S. P. 96.
Piston pattern with removable liners.

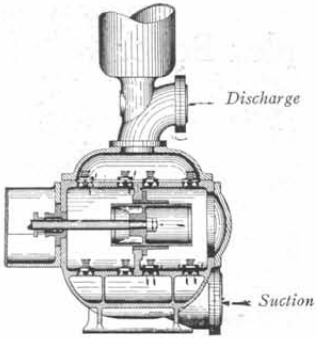


Fig. S. P. 97.
Plunger and ring pattern.

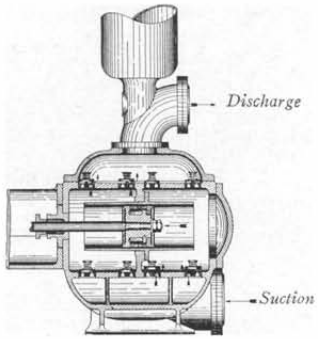


Fig. S. P. 98.
Plunger and ring pattern arranged to use packed pistons.

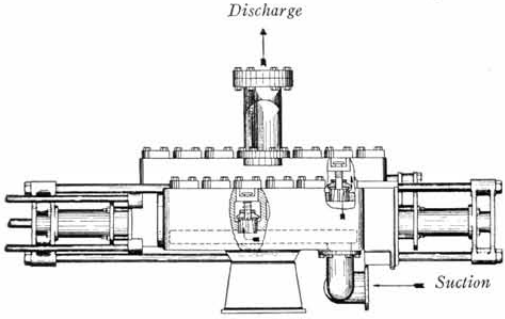


Fig. S. P. 99.
Outside end packed plunger pattern.

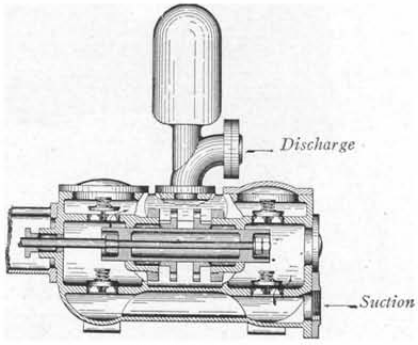


Fig. S. P. 100.
Outside center packed plunger pattern.

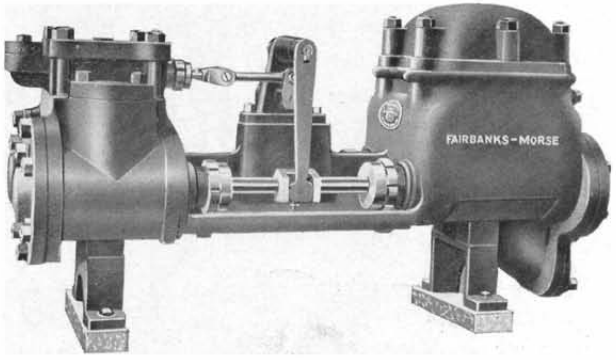
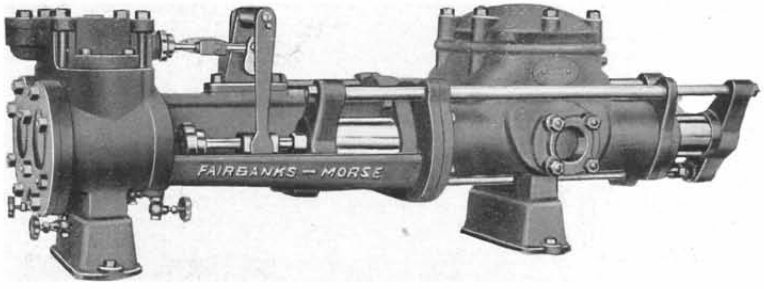


Fig. S. P. 84. Size 6 x 4 x 6

The Fairbanks-Morse Duplex Boiler Feed Pump

PACKED PISTON PATTERN



The Fairbanks-Morse Duplex Boiler Feed Pump

RAM PATTERN

The Fairbanks-Morse Duplex Boiler Feed Pump

PISTON PATTERN FOR BOILER PRESSURES NOT EXCEEDING 150 LBS.

While nearly all the regular pattern pumps given on pages 115 and 116 may be used for boiler feeding, yet the following sizes are selected as being perhaps the best proportioned for that particular service when pumping clean water.

The water end of these pumps is shown in section by Fig. S. P. 95, on page 111.

These pumps are fitted with either brass or rubber valves, as desired, and are especially adapted for pumping hot water.

When sandy or gritty water is to be pumped, or when the boiler pressure exceeds 150 pounds per square inch, we recommend the use of our outside packed plunger pump.

	Diameter of Steam Cylinder	Diameter of Water Cylinder	Length of Stroke	Capacity in Gallons per Stroke of one Piston	H. P. of Boilers Pump will Supply at an Easy Speed	Diameter of Pipe for Short Lengths				Floor Space, Inches	Telegraphic Code Word
						Steam Pipe	Exhaust Pipe	Suction Pipe	Discharge Pipe		
	3	2	4	.05	100	$\frac{3}{4}$	$\frac{3}{4}$	$1\frac{1}{4}$	1	30 x $11\frac{1}{2}$	Pabalai
	$4\frac{1}{2}$	3	4	.12	200	$\frac{3}{4}$	$\frac{3}{4}$	2	$1\frac{1}{2}$	$35\frac{1}{2}$ x $13\frac{1}{2}$	Pabaleon
	$5\frac{1}{2}$	$3\frac{1}{2}$	5	.20	400	1	$1\frac{1}{4}$	$2\frac{1}{2}$	$1\frac{1}{2}$	$39\frac{1}{2}$ x 16	Pabalela
	6	4	6	.33	550	1	$1\frac{1}{4}$	3	2	45 x 17	Pabalier
*	7	$4\frac{1}{2}$	7	.48	700	$1\frac{1}{2}$	2	4	3	50 x 20	Pabaloll
*	7	5	7	.59	800	$1\frac{1}{2}$	2	4	3	50 x 20	Pabalom
*	7	$4\frac{1}{2}$	10	.69	950	$1\frac{1}{2}$	2	4	3	72 x 23	Pabaloni
*	7	5	10	.85	1100	$1\frac{1}{2}$	2	4	3	72 x 23	Pabalora
†	8	5	12	1.02	1300	$1\frac{1}{2}$	2	4	3	76 x 26	Pabalosi
†	10	6	12	1.47	1700	2	$2\frac{1}{2}$	5	4	82 x 28	Pabaloti

*Sizes 7x4½x7 to 7x5x10, inclusive, are similar in appearance to Fig. S. P. 71, on page 114.
†Sizes 8x5x12 and 10x6x12 are similar in appearance to Fig. S. P. 76, on page 114.

The Fairbanks-Morse Duplex Ram Pattern Pump

FOR BOILER PRESSURES NOT EXCEEDING 200 LBS.

In this type of pump the plungers being outside (i. e., externally) packed, are always in sight of the attendant engineer, and the stuffing box packing is easily adjusted, or replaced when necessary, without having to break joints or remove cylinder covers.

The element of slippage is reduced to a minimum in this type, and the volumetric efficiency is correspondingly increased.

These pumps are adapted for handling water at a high temperature, or water containing sand or grit, and for high pressure boiler feeding they offer many advantages.

$4\frac{1}{2}$	3	4	.12	170	$\frac{1}{2}$	$\frac{3}{4}$	2	$1\frac{1}{2}$		Pabanise
$5\frac{1}{2}$	$3\frac{1}{2}$	5	.20	280	1	$1\frac{1}{4}$	$2\frac{1}{2}$	$1\frac{1}{2}$		Pabanisin
6	4	6	.33	470	1	$1\frac{1}{2}$	3	2		Pabanisoc

Any of the above pumps will be furnished brass fitted at a slight additional cost.

The Fairbanks-Morse Duplex Piston Pattern Pump

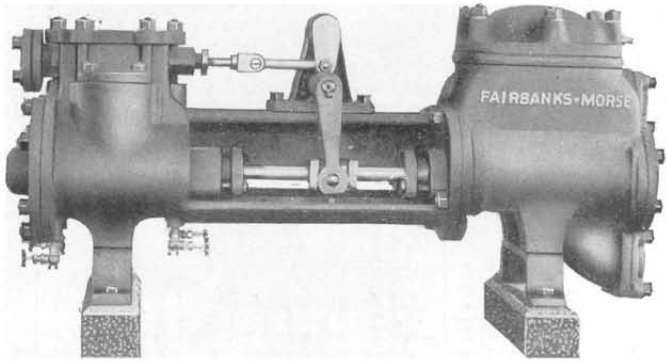


Fig. S. P. 71. Size 7 x 4½ x 7.

FOR GENERAL SERVICE

The Fairbanks-Morse Duplex Piston Pattern Pump

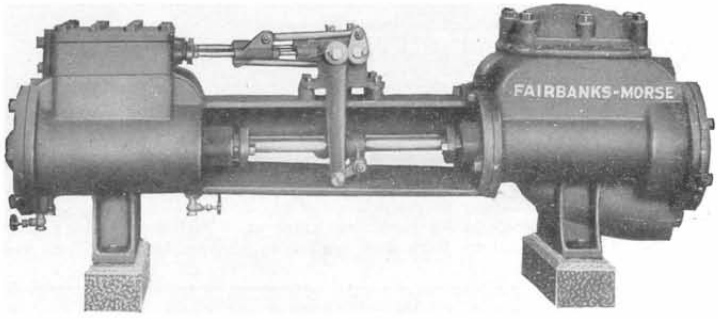


Fig. S. P. 76. Size 8 x 5 x 12.

FOR GENERAL SERVICE

The Fairbanks-Morse Duplex Piston Pattern Pump

FOR GENERAL SERVICE

The cuts on the opposite page illustrate the Fairbanks-Morse Piston Pattern Pumps for general service. They are designed for water pressures not exceeding 150 pounds per square inch.

The water ends are shown in sections by Fig. S. P. 95, on page 111.

The stuffing boxes are all of ample depth, and all parts of the machines easily accessible for examination or repairs.

Diameter of Steam Cylinder	Diameter of Water Cylinder	Length of Stroke	Capacity in Gallons per Stroke of one Piston	Strokes per Minute of Each Piston	Gallons per Minute at stated Strokes	Sizes of Pipes for Short Lengths				Floor Space, Inches	Telegraphic Code Word
						Steam Pipe	Exhaust Pipe	Suction Pipe	Discharge Pipe		
*3	2	4	.05	100 to 250	10 to 22	⅜	½	1¼	1	30 x 11½	Pabbalo
*4½	3	4	.12	100 to 200	24 to 48	½	¾	2	1½	35½ x 13½	Pabbata
*5¼	3½	5	.20	100 to 200	40 to 80	1	1¼	2½	1½	39½ x 16	Pabbasi
*6	4	6	.33	100 to 150	66 to 100	1	1½	3	2	45 x 17	Pabbewa
7	4½	7	.48	100 to 150	96 to 144	1½	2	4	3	50 x 20	Pabbexo
7	5	7	.59	100 to 150	118 to 177	1½	2	4	3	50 x 20	Pabeca
7	4½	10	.69	75 to 125	104 to 163	1½	2	4	3	72 x 23	Pabedal
7	5	10	.85	75 to 125	127 to 212	1½	2	4	3	72 x 23	Pabedum

*Sizes 3x2x4 to 6x4x6 inclusive, are similar in appearance to Fig. S. P. 84, on page 112.

The Fairbanks-Morse Piston Pattern Pumps in the following sizes are made with the style of steam valve mechanism shown by Fig. S. P. 76, on opposite page.

Aside from this feature the details of design are practically the same as in the smaller sizes mentioned above.

They will stand a constant water pressure not exceeding 150 pounds.

8	4	12	.66	75 to 125	99 to 165	1½	2	4	3	76½ x 26	Paccede
8	5	12	1.02	75 to 125	153 to 255	1½	2	4	3	76½ x 26	Pacchile
10	5	12	1.02	75 to 125	153 to 255	1½	2	5	4	76½ x 26	Pacchone
8	6	12	1.47	75 to 125	220 to 367	1½	2	5	4	76½ x 26	Paceda
10	6	12	1.47	75 to 125	220 to 367	2	2½	5	4	82 x 28	Pacefal

Any of the above pumps will be furnished brass fitted at a slight additional cost.

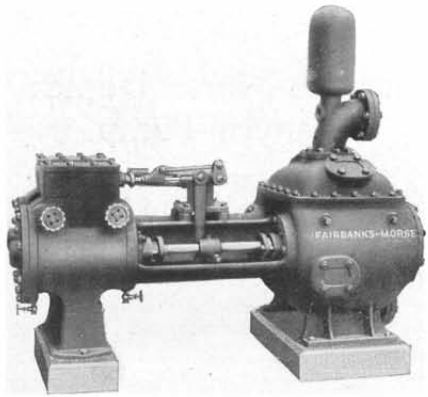


Fig. S. P. 2. Size 12 x 7 x 12

The Fairbanks-Morse Duplex Plunger and Ring Pattern Pump

FOR GENERAL SERVICE

The design of the water box is shown in section by Figs. S. P. 97 and S. P. 98, on page 111.

These pumps are designed for water pressures not exceeding 150 pounds.

Diameter of Steam Cylinder	Diameter of Water Cylinder	Length of Stroke	Capacity in Gallons per Stroke of One Plunger	Strokes per Minute of Each Plunger	Gallons per Minute at stated Number of Strokes	Sizes of Pipes for Short Lengths				Floor Space, Inches	Telegraphic Code Word
						Steam Pipe	Exhaust Pipe	Suction Pipe	Discharge Pipe		
10	6	12	1.47	75 to 125	220 to 367	2	2½	5	4	82 x 26	Palda
12	6	12	1.47	75 to 125	220 to 367	2½	3	5	4	82 x 30	Paldace
10	7	12	2.00	75 to 125	300 to 500	2	2½	6	5	82 x 28	Paldome
12	7	12	2.00	75 to 125	300 to 500	2½	3	6	5	82 x 30	Paldure
14	7	12	2.00	75 to 125	300 to 500	2½	3	6	5	85 x 40½	Paldsai
12	8	12	2.61	75 to 125	391 to 652	2½	3	6	5	82 x 35	Palfo
14	8	12	2.61	75 to 125	391 to 652	2½	3	6	5	85 x 40½	Palfine
16	8	12	2.61	75 to 125	391 to 652	2½	3	6	5	90 x 40½	Palfrade
14	8½	12	2.94	75 to 125	441 to 731	2½	3	7	6	85 x 40½	Pallin
16	8½	12	2.94	75 to 125	441 to 731	2½	3	7	6	90 x 40½	Pallinan
14	9	12	3.30	75 to 125	495 to 825	2½	3	7	6	87 x 43	Pallinavi
16	9	12	3.30	75 to 125	495 to 825	2½	3	7	6	91 x 43	Palsand
18	9	12	3.30	75 to 125	495 to 825	3	3½	8	7	96 x 48	Palserum
16	10	12	4.08	75 to 125	612 to 1020	2½	3	8	7	91 x 43	Palsorei
18	10	12	4.08	75 to 125	612 to 1020	3	3½	8	7	96 x 48	Pamba
16	12	12	5.87	75 to 125	880 to 1468	3	3½	10	8	97 x 56	Pambele
18	12	12	5.87	75 to 125	880 to 1468	3	3½	10	8	102 x 56	Pambepo
16	9	18	4.95	50 to 85	495 to 825	2½	3	7	6	115 x 48	Pangoe
18	9	18	4.95	50 to 85	495 to 825	2½	3	7	6	115 x 48	Pangost
16	10	18	6.12	50 to 85	612 to 1020	2½	3	8	7	115 x 48	Pangpale
18	10	18	6.12	50 to 85	612 to 1020	3	3½	8	7	108 x 48	Pangpan
20	10	18	6.12	50 to 85	612 to 1020	4	5	10	7	113 x 48	Pangpet
16	12	18	8.81	50 to 85	880 to 1500	2½	3	10	8	111 x 56	Pangpost
18	12	18	8.81	50 to 85	880 to 1500	3	3½	10	8	114 x 56	Panica
20	12	18	8.81	50 to 85	880 to 1500	4	5	10	8	113 x 56	Panifell
18	14	18	12.00	50 to 85	1200 to 2039	3	3½	12	10	114 x 56	Panlac
20	14	18	12.00	50 to 85	1200 to 2039	4	5	12	10	120 x 56	Panlad
18	16	18	15.67	50 to 85	1567 to 2663	3	3½	14	12	132 x 64	Panlefe
20	16	18	15.67	50 to 85	1567 to 2663	4	5	14	12	132 x 64	Paoli

Any of the above pumps will be furnished brass fitted at a slight additional cost.

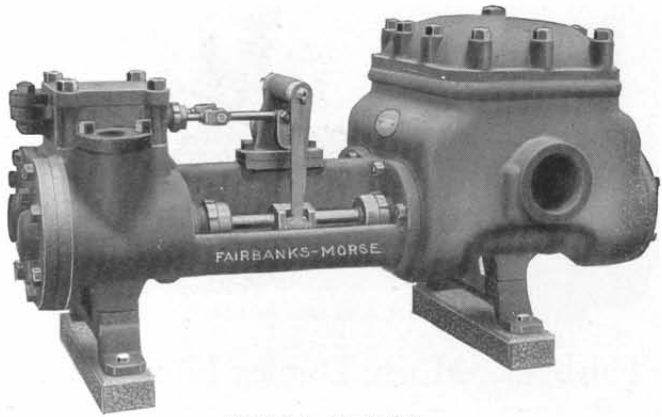


Fig. S. P. 4. Size 6x5¾x6.

The Fairbanks-Morse Duplex Piston Pattern Low Service or Tank Pump

Our piston pattern pumps of this type have water ends of the design shown by Fig. S. P. 95, on page 111. These pumps are especially designed for elevating water, or other liquids, to a moderate height with a small consumption of steam.

For work where the head to be pumped against is not too high, they are, by reason of their cylinder proportions, more economical in consumption of steam than our general service pumps.

They have water pistons nearly or quite the diameter of their steam pistons, therefore cannot feed their own boilers; but when it is desired an auxiliary boiler feed pump may be attached for this purpose at a small expense.

They are designed for use in connection with railway water stations, breweries, distilleries, gas works, tanneries, oil works, bleacheries, sugar refineries, etc.

They are designed for water pressures not exceeding 75 pounds per square inch.

Diameter of Steam Cylinder	Diameter of Water Cylinder	Length of Stroke	Gallons per Stroke of one Piston	Strokes per Minute of Each Piston	Gallons per Minute at stated Number of Strokes	Pipe Sizes for Short Lengths				Floor Space, Inches	Telegraphic Code Word
						Steam Pipe	Exhaust Pipe	Suction Pipe	Discharge Pipe		
3	2½	4	.06	100 to 200	12 to 44	¾	¾	1¼	1	29½ x 11½	Para
*4½	3¾	4	.19	100 to 200	38 to 77	¾	¾	2½	2	34½ x 13½	Parada
5½	4½	5	.31	100 to 150	62 to 93	1	1¼	3	2	39½ x 16	Paradin
5½	5	5	.42	100 to 150	84 to 126	1	1¼	4	3	42 x 18	Paradom
*5¾	5¾	5	.56	100 to 150	112 to 168	1	1¼	4	3	42 x 18	Paradonic
6	5	6	.51	100 to 150	102 to 153	1	1½	4	3	45 x 17	Parados
*6	5¾	6	.67	100 to 150	134 to 201	1	1½	4	3	49 x 17	Parafal
*7	6	7	.85	100 to 150	170 to 255	1½	2	5	4	58 x 20	Parafalem
*7	7	7	1.16	100 to 150	232 to 348	1½	2	6	5	58 x 22	Parafed
7	6	10	1.22	75 to 150	183 to 201	1½	2	5	4	72 x 23	Parahid
*7	7	10	1.66	75 to 150	249 to 498	1½	2	6	5	72 x 23	Parahone

*Sizes 4½x3¾x4, 5¼x5¾x5, 6x5¾x6, 7x6x7, 7x7x7, and 7x7x10 have suction opening on the side. All other sizes have suction opening on the end.

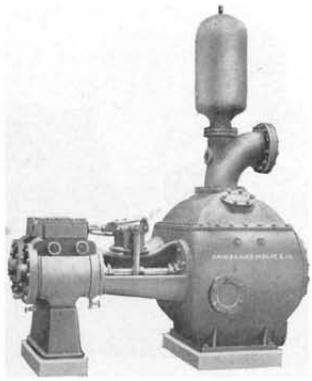


Fig. S. P. 66. Size 14x14x12

The Fairbanks-Morse Duplex Plunger and Ring Pattern Low Service or Tank Pump

The Fairbanks-Morse Low Service or Tank Pumps, in the larger sizes, are made of the plunger and ring pattern, as illustrated by Fig. S. P. 66

The design of the water end is shown in section by Figs. S. P. 97, and S. P. 98, on page 111.

The valve areas are large and the water passages very direct. All stuffing boxes are large and deep, and all interior parts of the valve chambers may be easily reached through conveniently arranged hand holes.

These pumps are designed for water pressures not exceeding 75 pounds per square inch.

Size of Pump			Gallons per Stroke of one Piston	Stroke per Minute of Each Piston	Gallons Delivered per Minute by Both Pistons	Diameter of Pipes for Short Lengths				Floor Space, Inches	Telegraphic Code Word
Diameter of Steam Cylinder	Diameter of Water Cylinder	Length of Stroke				Steam Pipe	Exhaust Pipe	Suction Pipe	Discharge Pipe		
8	7	12	2.00	75 to 125	300 to 500	1½	2	6	5	79 x 28	Parda
8	8	12	2.61	75 to 125	391 to 652	1½	2	6	5	82 x 35	Pardasso
10	8	12	2.61	75 to 125	391 to 652	2	2½	6	5	82 x 35	Pardeti
8	10	12	4.08	75 to 125	612 to 1020	1½	2	8	7	90 x 43	Pardella
10	10	12	4.08	75 to 125	612 to 1020	2	2½	8	7	90 x 43	Pardellin
12	10	12	4.08	75 to 125	612 to 1020	2½	3	8	7	90 x 43	Pardemine
14	10	12	4.08	75 to 125	612 to 1020	2½	3	8	7	90 x 45	Pardemill
10	12	12	5.87	75 to 125	880 to 1468	2	2½	10	8	90 x 56	Pardenal
12	12	12	5.87	75 to 125	880 to 1468	2½	3	10	8	90 x 56	Pardene
14	12	12	5.87	75 to 125	880 to 1468	2½	3	10	8	90 x 56	Pardell
10	14	12	7.99	75 to 125	1200 to 2000	2	2½	12	10	93 x 56	Pardepull
12	14	12	7.99	75 to 125	1200 to 2000	2½	3	12	10	93 x 56	Pardepow
14	14	12	7.99	75 to 125	1200 to 2000	2½	3	12	10	93 x 56	Pardeval
16	14	12	7.99	75 to 125	1200 to 2000	2½	3	12	10	97 x 56	Parfaloe
12	14	18	12.00	50 to 85	1200 to 2040	2½	3	12	10	122 x 56	Parral
14	14	18	12.00	50 to 85	1200 to 2040	2½	3	12	10	107 x 56	Parrand
16	14	18	12.00	50 to 85	1200 to 2040	2½	3	12	10	111 x 56	Parranta
12	15	18	13.77	50 to 85	1377 to 2340	2½	3	12	10	126 x 57	Parreme
12	16	18	15.67	50 to 85	1567 to 2663	2½	3	14	12	132 x 64	Parrena
14	16	18	15.67	85	1567 to 2663	2½	3	14	12	132 x 64	Parrensi
16	16	18	15.67	85	1567 to 2663	2½	3	14	12	132 x 64	Parrent

Any of the above pumps will be furnished brass fitted at a slight additional cost.

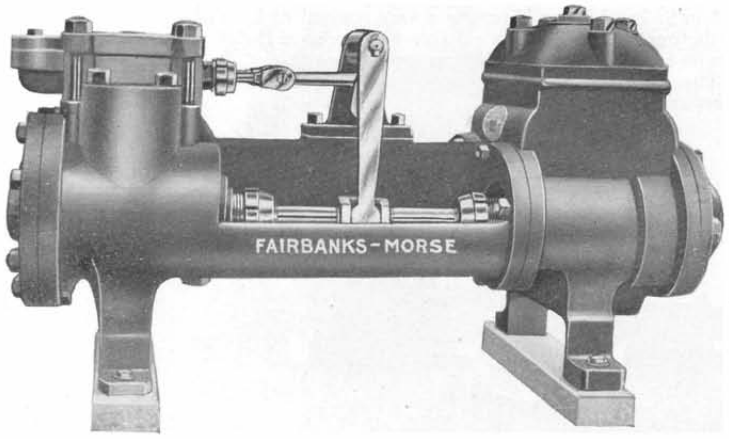


Fig. S. P. 67. Size 6x2x6

The Fairbanks-Morse Duplex Low Steam Pressure Pump

In appartment houses, halls, and public buildings, and in private residences, where a low pressure heating system is used, a very moderate pressure of steam must be used to operate the pumps. Therefore the relative proportions of steam and water cylinders must differ from those in a pump operated under a higher steam pressure. We furnish our special low steam pressure pumps for such service. They are smooth and noiseless in their action and consequently best adapted for such buildings. They will operate with a steam pressure of from 10 to 15 pounds.

Size of Pump			Capacity in Gallons per Hour at Easy Speed	Diameter of Pipe for Short Lengths				Floor Space, Inches	Telegraphic Code Word
Diameter of Steam Cylinder	Diameter of Water Cylinder	Length of Stroke		Steam Pipe	Exhaust Pipe	Suction Pipe	Discharge Pipe		
3	1½	4	125 to 200	¾	¾	1¼	1	20½ x 5½	Pate
4½	2	4	200 to 300	¾	1¼	1¼	1	35½ x 13½	Patela
4½	2½	4	250 to 375	¾	1¼	1½	1	35½ x 13½	Patelin
5½	2	5	350 to 450	1	1½	1½	1¼	39½ x 16	Patelom
5½	2½	5	450 to 650	1	1½	1½	1¼	39½ x 16	Patemi
6	2½	6	700 to 1000	1	1½	2	2	40 x 17	Patemal
6	3	6	900 to 1200	1	1½	2	2	40 x 17	Patemona
7	3½	10	1800 to 2400	1¼	2	3	2	72 x 23	Patenode
8	3½	12	2000 to 3000	1½	2	3	2	76½ x 26	Patenos
8	4	12	2500 to 3800	1½	2	3	2	76½ x 26	Patent

Any of the above pumps will be furnished brass fitted at a slight additional cost.

The Fairbanks-Morse Duplex Pump

Fig. S. P. 63 below illustrates a very convenient form of drip pan of such design that the pump is raised to a suitable height above the floor, permitting all parts to be easily reached for adjustment or repair.

The pan is tapped to receive a drain pipe so that all drippings may be readily carried away.

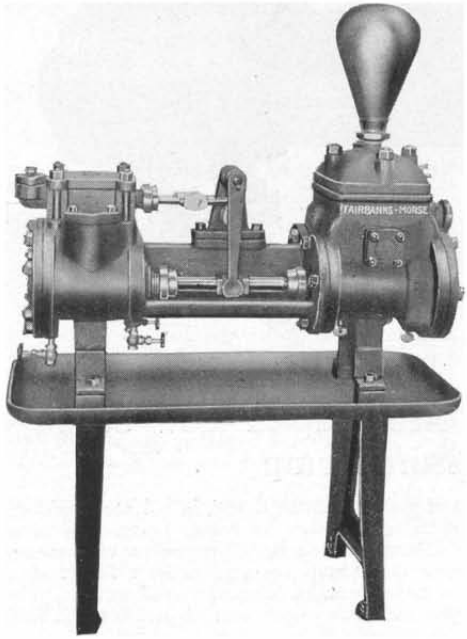


Fig. S. P. 63 showing pump mounted on elevated Drip Pan

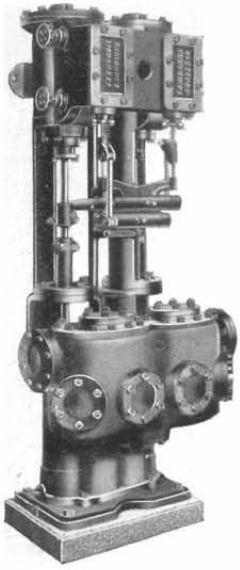


Fig. S. P. 74. Size 10 x 6 x 12

The Fairbanks-Morse Vertical Duplex Boiler Feed Pump

MARINE TYPE

The type of pump illustrated above, Fig. S. P. 74, is of a form designed primarily for marine service, on account of the minimum floor space required, etc. They are also admirably adapted for use in office buildings, or for any situation where a restricted space makes a vertical form of pump preferable.

Every part of the pump is easy of access, and the water passages are very free and direct. The interior of the pump chambers may be easily reached through conveniently arranged hand holes. The water pistons may be packed through the top of the water boxes and without having to disturb either the steam pistons or any part of the valve motion.

These pumps are designed for water pressure up to 200 pounds per square inch.

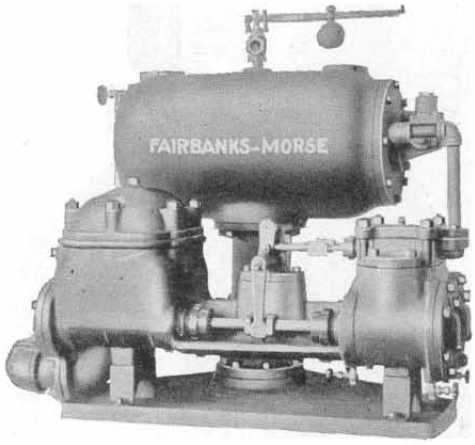


Fig. S. P. 83. Size 6x4x6

The Fairbanks-Morse Duplex Automatic Feed Pump and Receiver

This is a simple and effective combination of our Duplex steam pump attached to a receiving tank, which receives the water of condensation and automatically returns it to the boiler at the highest possible temperature.

These machines are especially useful for returning water of condensation from steam heating coils, drying cylinders, evaporating effects or in any place where it is desirable to return such condensation to the boiler at as high a temperature as possible.

By the use of feed pumps and receivers such annoyances as are experienced with steam traps, tanks and similar devices are entirely obviated.

No.	Size of Pump, Inches	Size of Receiver, Inches	Capacity per Minute, Gallons	Square Feet of Heating Surface it will Drain	Floor Space, Inches	Height, Inches	Telegraphic Code Word
1	3 x 2 x 4	12 x 24	9	5000	32 x 22	23½	Pavade
2	4½ x 3 x 4	12 x 24	15	12500	39 x 24	27¾	Pavallo
3	5¼ x 3½ x 5	14 x 28	36	25000	45 x 20	33	Pavami
4	6 x 4 x 6	16 x 30	50	40000	50½ x 32	35½	Pavant
5	7 x 4½ x 7	16 x 30	65	45000	58 x 34	.....	Pavast

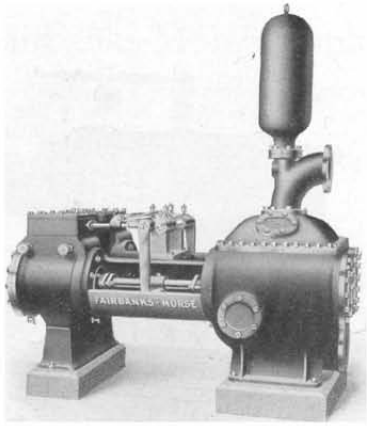


Fig. S. P. 1. Size 16x9x12

The Fairbanks-Morse Duplex Fire Pump

These pumps are designed and constructed as quick working fire pumps; the valve areas and water passages are unusually large, to insure the complete and easy filling of the pump chambers when the pump is running at its greatest speed.

The valve motion is of new and superior design throughout and enables the pumps to be run at a very high rate of speed when required, without jar or any possibility of derangement.

The steam cylinders of the larger sizes of fire pumps may be compounded when desired.

We usually fit these pumps with packed water pistons, but solid plungers will be furnished if so ordered.

For list of Underwriter Fire Pumps, see page 123.

Size of Pump			Gallons per Stroke of one Piston	Stroke per Minute of Each Piston	Gallons Delivered per Minute by Both Pistons	Diameter of Pipe for Short Lengths				Floor Space, Inches	Telegraphic Code Word
Diameter of Steam Cylinder	Diameter of Water Cylinder	Length of Stroke				Steam Pipe	Exhaust Pipe	Suction Pipe	Discharge Pipe		
10	5	12	1.02	100 to 150	204 to 306	2	2½	5	4	78 x 26	Peda
10	6	12	1.47	100 to 150	294 to 441	2	2½	6	5	84 x 32	Pedamic
12	6	12	1.47	100 to 150	294 to 441	2½	3	6	5	84 x 32	Pedamo
12	7	12	2.00	100 to 150	400 to 600	2½	3	8	6	84 x 35	Pedant
14	7	12	2.00	100 to 150	400 to 600	2½	3	8	6	85 x 40¼	Pedantic
14	8	12	2.61	100 to 150	522 to 783	2½	3	8	6	85 x 40½	Pedantos
16	8	12	2.61	100 to 150	522 to 783	2½	3	8	6	90 x 40½	Pedeci
16	8½	12	2.94	100 to 150	598 to 882	2½	3	8	6	90 x 40¼	Pedecoe
16	9	12	3.30	100 to 150	660 to 990	2½	3	10	7	95 x 48	Pedical
18	9	12	3.30	100 to 150	660 to 990	3	3½	10	7	96 x 48	Pedicam
18	10	12	4.08	100 to 150	816 to 1224	3	3½	10	8	96 x 48	Pedicamo
18	10	15	5.10	80 to 120	816 to 1224	3	3½	10	8	109 x 48	Pedicanti
20	10	15	5.10	80 to 120	816 to 1224	4	5	10	8	109 x 48	Pedicemic
20	12	15	7.34	80 to 120	1174 to 1761	4	5	12	10	113 x 56	Pedicemo
18	10	18	6.12	67 to 100	816 to 1224	3	3½	10	8	118 x 48	Pedicenot
20	10	18	6.12	67 to 100	816 to 1224	4	5	10	8	118 x 48	Pedoga
20	12	18	8.81	67 to 100	1174 to 1761	4	5	12	10	123 x 56	Pedogee

These pumps are fitted with two, four or six way hose connections, when required, at cost.

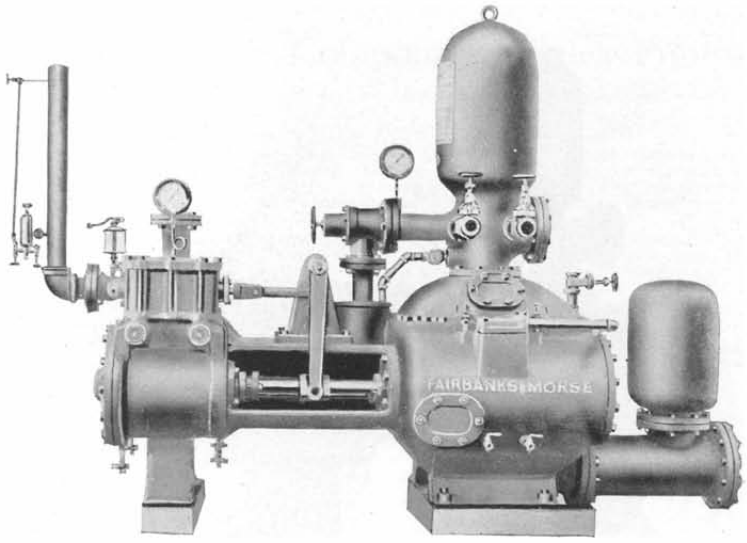


Fig. S. P. 79. Size 18x10x12

The Fairbanks-Morse Duplex Underwriter Fire Pump

The Underwriter Fire Pump is the title adopted by the Factory Mutual Fire Insurance Companies of Boston, Mass., to designate a duplex steam fire pump that is built in strict accordance with the specifications issued by those companies. These pumps are built of unusual strength, with very large valve areas, and the design contains several important features not found in other pumps of the usual construction.

These pumps are brass fitted throughout to prevent any possibility of the working parts rusting together in case the pump stands idle for a time.

With every pump there are furnished certain fittings called for by the specifications which are not required with our other fire pumps. Among these fittings are the following:

A suction elbow or tee, suction air chamber, brass priming pipes with air cocks and check valves, stroke gauge, capacity plate, steam gauge, water gauge, air relief valve, water relief valve with funnel, hose gate valves, lever handle drain valves for both the steam and water ends, sight feed lubricator and a hand oil pump for the steam cylinders.

We give every pump a most rigid test before shipment, including a test of the water end to 300 pounds static pressure.

Size of Pump			Underwriters' Rating Gallons per Minute	Diameter of Pipes for Short Lengths				Floor Space, Inches	Telegraphic Code Word
Diameter of St. Cylinder	Diameter of Water Plunger	Length of Stroke		Steam Pipe	Exhaust Pipe	Suction Pipe	Discharge Pipe		
14	7	12	500	3	4	8	6	103 x 43	Pegatin
16	9	12	750	3½	4	10	7	108 x 44	Pegaso
18	10	12	1000	4	5	12	8	110 x 50	Pegammic
20	12	16	1500	5	6	14	10	134 x 66	Peganilo

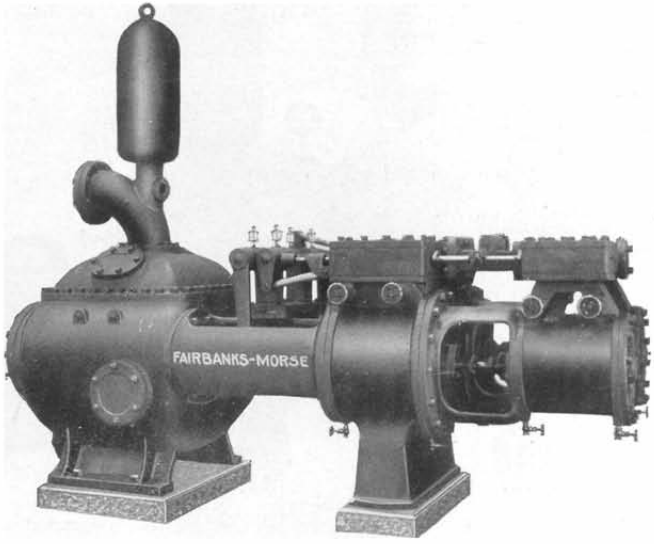


Fig. S. P. 82. Size 12 x 18 x 10 x 12. Illustrating our No. 1 Style Steam End.

The Fairbanks-Morse Compound Duplex Pumps

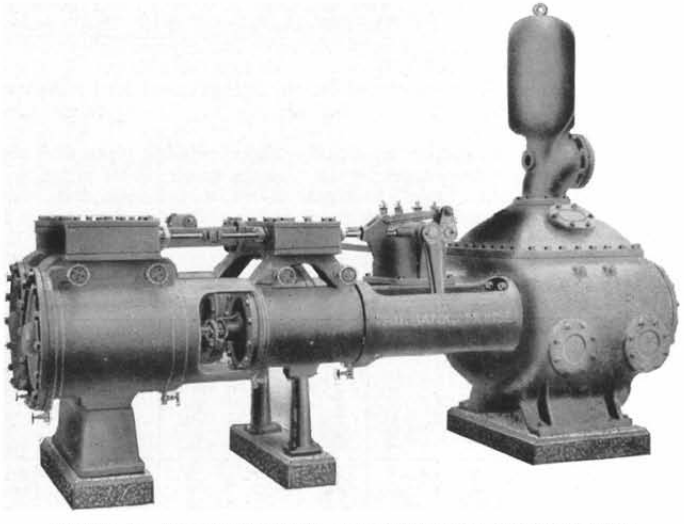


Fig. S. P. 64. Size 14 x 20 x 12 x 18 Illustrating our No. 2 Style Steam End.

Fairbanks-Morse Compound Duplex Pumps

The machines illustrated on the opposite page are our standard designs of Compound Duplex Pumping Engines.

The water boxes are shown in section by Figs. S. P. 97 and S. P. 98, on page 111.

The valve area in these pumps being large, and the arrangement of the water valves such as will give a very direct course for the water through the pump, they may be operated at maximum speed without undue shock or vibration, and with perfect safety to all moving parts. The stuffing boxes are all large and deep, and the interior of the valve chambers may be easily reached through ample size hand holes.

By compounding the steam ends of our pumps, whereby the effect of a cut-off is secured, a saving of from 30 to 35 per cent. is made in the amount of steam used over that of simple duplex pumps. While the first cost is more than that of a simple duplex pump, yet the saving in fuel, when the work is of such a character as to require regular service, very soon pays for the difference in first cost.

Compound cylinders are applied extensively to hydraulic elevator pumps, pressure pumps, tank pumps, mine pumps, and pumps used in larger size water works plants.

A special attachment can be fitted to these pumps whereby steam at boiler pressure may be admitted to both the high and low pressure cylinders for fire service. This is accomplished by the single movement of a lever, and a compound pump is instantly converted into a high pressure fire pump, the full power of all four cylinders being obtained.

These machines will stand a constant working pressure not exceeding 150 lbs. per square inch.

Diameter of Steam Cylinders	Diameter of Water Cylinders	Length of Stroke	Capacity in Gallons per Stroke of one Piston	Strokes per Minute of Each Piston	Gallons per Minute by Both Pistons at Stated Speed	Pipe Sizes for Short Lengths				Floor Space, Inches	Telegraphic Code Word
						Steam	Exhaust	Suction	Discharge		
8 & 12	7	12	2.00	75 to 125	300 to 500	1¼	3	6	5	113 x 35	Peka
9 & 14	7	12	2.00	75 to 125	300 to 500	2	3	6	5	113 x 37	Pekant
8 & 12	8	12	2.61	75 to 125	391 to 652	1½	3	6	5	113 x 35	Pelade
9 & 14	8	12	2.61	75 to 125	391 to 652	2	3	6	5	122 x 40	Peladic
10 & 16	8	12	2.61	75 to 125	391 to 652	2	3	6	5	122 x 40	Pelaffeg
8 & 12	8½	12	2.94	75 to 125	441 to 731	1¼	3	7	6	113 x 35	Peleda
9 & 14	8½	12	2.94	75 to 125	441 to 731	2	3	7	6	122 x 40	Pelegol
10 & 16	8½	12	2.94	75 to 125	441 to 731	2	3	7	6	122 x 40	Pelegomi
8 & 12	9	12	2.94	75 to 125	495 to 825	1½	3	7	6	116 x 43	Pemace
9 & 14	9	12	3.30	75 to 125	495 to 825	2	3	7	6	127 x 48	Pemada
10 & 16	9	12	3.30	75 to 125	495 to 825	2	3	7	6	127 x 48	Pence
12 & 18	9	12	3.30	75 to 125	495 to 825	2½	3½	7	6	129 x 48	Pencig
14 & 20	9	12	3.30	75 to 125	495 to 825	2½	5	7	6	132 x 48	Pencone
8 & 12	10	12	4.08	75 to 125	612 to 1020	1½	3	8	7	116 x 43	Penconil
9 & 14	10	12	4.08	75 to 125	612 to 1020	2	3	8	7	127 x 48	Penda
10 & 16	10	12	4.08	75 to 125	612 to 1020	2	3	8	7	127 x 48	Pendel
12 & 18	10	12	4.08	75 to 125	612 to 1020	2½	3½	8	7	129 x 48	Pendemo
14 & 20	10	12	4.08	75 to 125	612 to 1020	2½	5	8	7	132 x 48	Pendest
8 & 12	12	12	5.87	75 to 125	881 to 1468	1½	3	10	8	121 x 56	Pendetic
9 & 14	12	12	5.87	75 to 125	881 to 1468	2	3	10	8	129 x 56	Pengede
10 & 16	12	12	5.87	75 to 125	881 to 1468	2	3	10	8	129 x 56	Pengedic
12 & 18	12	12	5.87	75 to 125	881 to 1468	2½	3½	10	8	130 x 56	Pengela
14 & 20	12	12	5.87	75 to 125	881 to 1468	2½	5	10	8	133 x 56	Pengeled
9 & 14	10	18	6.12	50 to 85	612 to 1040	2	3	8	7	148 x 48	Pevogen
10 & 16	10	18	6.12	50 to 85	612 to 1040	2	3	8	7	148 x 48	Pevogeni
12 & 18	10	18	6.12	50 to 85	612 to 1040	2½	3½	8	7	152 x 48	Pevolo
14 & 20	10	18	6.12	50 to 85	612 to 1040	2½	5	8	7	160 x 48	Pevona
9 & 14	12	18	8.81	50 to 85	881 to 1497	2	3	10	8	152 x 56	Pevonic
10 & 16	12	18	8.81	50 to 85	881 to 1497	2	3	10	8	152 x 56	Pevonji
12 & 18	12	18	8.81	50 to 85	881 to 1497	2½	3½	10	8	152 x 56	Pevril
14 & 20	12	18	8.81	50 to 85	881 to 1497	2½	5	10	8	165 x 56	Pevroni
9 & 14	14	18	12.00	50 to 85	1200 to 2040	2	3	12	10	160 x 56	Pevrox
10 & 16	14	18	12.00	50 to 85	1200 to 2040	2	3	12	10	160 x 56	Pexati
12 & 18	14	18	12.00	50 to 85	1200 to 2040	2½	3½	12	10	165 x 56	Pexaton
14 & 20	14	18	12.00	50 to 85	1200 to 2040	2½	5	12	10	165 x 56	Pexatra
10 & 16	16	18	15.67	50 to 85	1567 to 2664	2	3	14	12	162 x 68	Pexenni
12 & 18	16	18	15.67	50 to 85	1567 to 2664	2½	3½	14	12	165 x 68	Pexefele
14 & 20	16	18	15.67	50 to 85	1567 to 2664	2½	5	14	12	174 x 68	Pextanta

Any of the above pumps will be furnished brass fitted, if desired, at a slight additional cost.

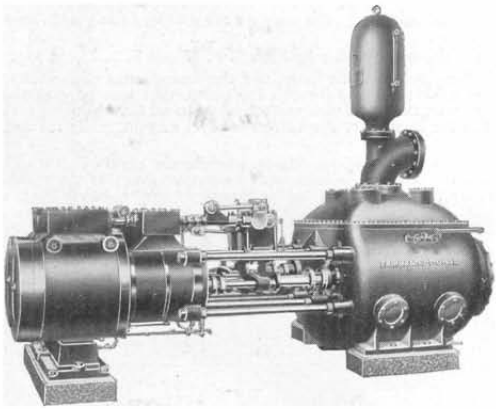


Fig. S. P. 77

The Fairbanks-Morse Compound Duplex Pumping Engine

CAPACITY 3,000,000 GALLONS IN 24 HOURS

Above is shown a medium size pumping engine especially designed for water works, elevator service, for water supply for large factories, or any situation where high efficiency is desired.

The design embodies many excellent features which will be at once apparent to an engineer familiar with this class of machinery.

The engine is of the three rod cross head type. The high and low pressure steam cylinders are placed end to end without an intermediate cradle, thus economizing floor space, reducing the length of the rods, etc. The high pressure piston rods are connected to the cross heads independently of the low pressure rods, and in such a manner as to render all steam cylinders easy of access whenever it becomes necessary to examine them or adjust the pistons. The steam cylinders as well as the steam cylinder heads may all be steam jacketed in order to secure the highest economy in operation. The water end is of the plunger and ring pattern, with conveniently arranged hand holes through which the valves may be easily reached.

Detail specifications and prices for pumping engines of this class will be furnished on application.

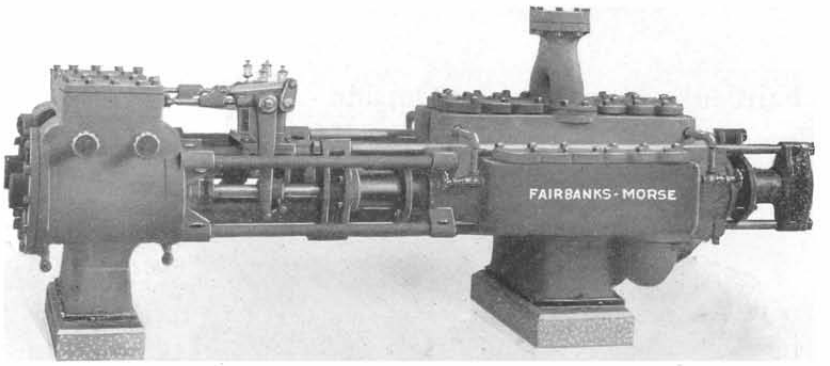


Fig. S. P. 51. Size 14 x 6 x 12

The Fairbanks-Morse Duplex Outside Packed and Outside Connected Plunger Pump

These pumps are designed for service in mines, or for any service where the working pressure varies from 150 to 700 pounds per square inch. The water boxes are in two separate castings, with partitions in the center. There are four externally packed plungers working into the ends of the water boxes. These plungers are arranged in trombone style, being attached to cross heads and are connected by wrought iron rods supported by guides to relieve the wear on the plungers, glands and stuffing box throats.

We also furnish these pumps with compound condensing or compound non-condensing steam ends whenever this construction is desired.

The design of the water end is shown in section by Fig. S. P. 99, on page 111.

Size of Pump			Capacity, Gallons per Minute	Diameter of Pipes for Short Lengths				Maximum Water Pressure Pump End will Stand in Pounds per Square Inch	Floor Space Inches	Telegraphic Code Word
Diameter of Steam Cylinders	Diameter of Water Plungers	Length of Stroke		Steam Pipe	Exhaust Pipe	Suction Pipe	Discharge Pipe			
6	3	6	36	1	1½	3	2	300	73 x 24	Piagil
6	4	6	64	1	1½	3	2	300	73 x 24	Piagini
8	4	12	104	1½	2	4	3	700	120 x 33	Piagol
10	4	12	104	2	2½	4	3	700	120 x 33	Piagome
10	5	12	155	2	2½	5	4	400	136 x 44	Piagorun
12	5	12	155	2½	3	5	4	400	137 x 44	Piamgan
12	6	12	234	2½	3	6	5	450	138 x 44	Piancast
14	6	12	234	2½	3	6	5	500	138 x 44	Pianche
14	7	12	319	2½	3	7	5	500	148 x 51	Piati
16	7	12	319	2½	3	7	5	500	146 x 51	Piatiami
16	7	18	522	2½	3	8	6	500	189 x 53	Piatian
16	8	18	550	2½	3	8	6	500	189 x 53	Piatiate
18	7	18	522	3	3½	8	6	500	189 x 53	Pibbian
18	8½	18	589	3	3½	8	6	500	189 x 53	Pibbiate

We can furnish them with composition water ends, if desired.

The Fairbanks-Morse Duplex Outside Center Packed Plunger Pump

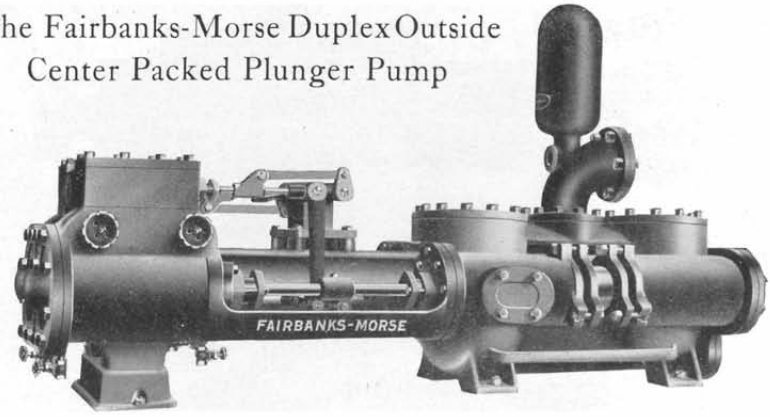


Fig. S. P. 14. Size 14 x 7 x 12.

The Fairbanks-Morse Duplex Outside Center Packed Plunger Pump

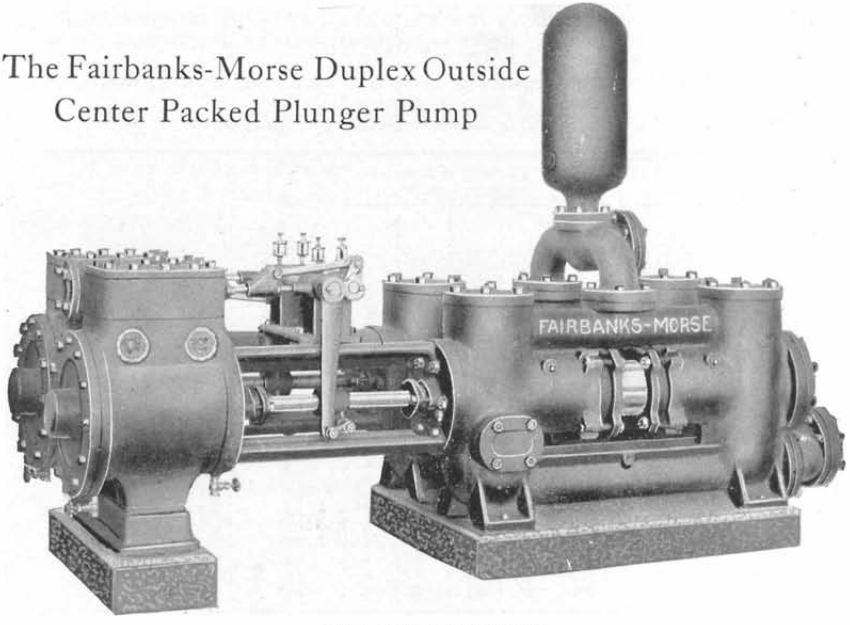


Fig. S. P. 78. Size 10 x 6 x 12.

The Fairbanks-Morse Duplex Outside Center Packed Plunger Pump

These pumps are of a type especially adapted for situations where the liquid to be handled contains considerable grit or sand, or where the pressure to be pumped against is moderately high. They are also well adapted for handling hot water.

In this type of pump, the plungers being externally packed, are always in sight of the attendant engineer, and any leakage can be at once detected, and the stuffing boxes adjusted or re-packed very quickly.

All parts of these pumps are easy of access, the arrangement of the water end being such as to permit the water valves being easily reached. All the stuffing boxes are large and deep, so that an ample allowance of packing may be used.

All parts of the pumps are heavily proportioned, with the view to their being durable under the heavy service for which they are commonly used.

These pumps are designed for water pressures up to 250 pounds per square inch.

The design of the water end is shown in section by Fig. S. P. 100, on page 111.

Diameter of Steam Cylinders	Diameter of Water Plungers	Length of Stroke	Capacity in Gallons per Stroke of One Plunger	Stroke per Minute of Each Plunger	Gallons Delivered per Minute by Both Plungers	Sizes of Pipes for Short Lengths				Telegraphic Code Word
						Steam	Exhaust	Suction	Discharge	
* 7	4½	7	.48	75 to 125	72 to 120	1½	2	4	3	Pibbana
* 7	5	7	.59	75 to 125	88 to 147	1½	2	4	3	Pibbang
† 8	5	12	1.02	50 to 100	102 to 204	1½	2	4	3	Pibbeda
†10	5	12	1.02	50 to 100	102 to 204	2	2½	4	3	Pibbehan
† 8	6	12	1.47	50 to 100	147 to 294	1½	2	5	4	Pibilamo
†10	6	12	1.47	50 to 100	147 to 294	2	2½	5	4	Pibiland
12	6	12	1.47	50 to 100	147 to 294	2½	3	5	4	Pibilanti
10	7	12	2.00	50 to 100	200 to 400	2	2½	6	5	Pibilara
12	7	12	2.00	50 to 100	200 to 400	2½	3	6	5	Pibilarin
14	7	12	2.00	50 to 100	200 to 400	2½	3	6	5	Pibileme
12	8	12	2.61	50 to 100	261 to 522	2½	3	6	5	Pibileno
14	8	12	2.61	50 to 100	261 to 522	2½	3	6	5	Pibileris
16	8	12	2.61	50 to 100	261 to 522	2½	3	6	5	Pibileta
14	9	12	3.30	50 to 100	330 to 660	2½	3	7	6	Pibiletos
16	9	12	3.30	50 to 100	330 to 660	2½	3	7	6	Pibilevin
18	9	12	3.30	50 to 100	330 to 660	3	3½	7	6	Pibilexo
14	10	12	4.08	50 to 100	408 to 816	2½	3	8	7	Pibilin
16	10	12	4.08	50 to 100	408 to 816	2½	3	8	7	Pibiliste
18	10	12	4.08	50 to 100	408 to 816	3	3½	8	7	Pibilone
18	10	18	6.12	40 to 80	489 to 979	3	3½	8	7	Pibilonti
20	10	18	6.12	40 to 80	489 to 979	4	5	8	7	Pibilorum
14	12	18	8.81	40 to 80	704 to 1408	2½	3	10	8	Pibinae
16	12	18	8.81	40 to 80	704 to 1408	2½	3	10	8	Pibsac
18	12	18	8.81	40 to 80	704 to 1408	3	3½	10	8	Pibsadi
20	12	18	8.81	40 to 80	704 to 1408	4	5	10	8	Pibsaen
18	14	18	12.00	40 to 80	960 to 1920	3	3½	12	10	Pibsagil
20	14	18	12.00	40 to 80	960 to 1920	4	5	12	10	Pibsago

*Sizes 7x4½x7 and 7x5x7 are similar in appearance to Fig. S. P. 13, on page 112.
†Sizes 8x5x12 to 10x6x12, inclusive, are similar in appearance to Fig. S. P. 78.
Other sizes listed are similar in appearance to Fig. S. P. 14.

Any of the above pumps will be fitted with composition plungers, lined glands, and bronze rods at a slight additional cost.

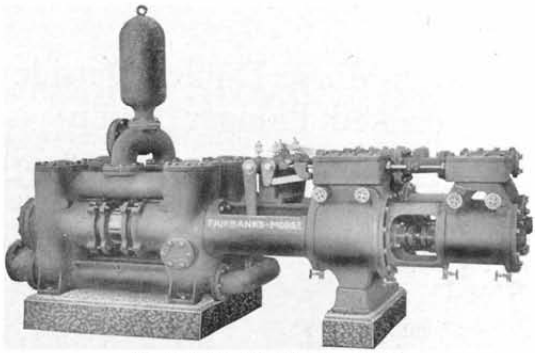


Fig. S. P. 17. Size 12 x 18 x 10 x 12

Fairbanks-Morse Compound Duplex Outside Center Packed Plunger Pump

The pump illustrated above is of the same general design as shown by Fig. S. P. 14, on page 111, but arranged with compound steam cylinders. By compounding the steam end of these pumps there is obtained a saving of from 30 to 35 per cent. in the amount of steam required for a given service over that used by a simple duplex pump, and if a condenser is added to a properly proportioned steam end a very high efficiency may be obtained.

The water end is shown in section by Fig. S. P. 100, on page 111.

These pumps will all stand a constant working pressure not exceeding 250 pounds per square inch.

Diameter of Steam Cylinder	Diameter of Water Plungers	Length of Stroke	Capacity in Gallons per Stroke of one Plunger	Strokes per Minute of Each Plunger	Gallons Delivered per Minute by Both Plungers	Pipe Sizes for Short Lengths				Telegraphic Code Word.
						Steam	Exhaust	Suction	Discharge	
8 and 12	5	12	1.02	50 to 100	102 to 204	1½	3	4	3	Piccane
9 and 14	5	12	1.02	50 to 100	102 to 204	2	3	4	3	Piccanos
10 and 16	5	12	1.02	50 to 100	102 to 204	2	3	4	3	Piccaril
8 and 12	6	12	1.47	50 to 100	147 to 294	1½	3	5	4	Piccario
9 and 14	6	12	1.47	50 to 100	147 to 294	2	3	5	4	Piccato
10 and 16	6	12	1.47	50 to 100	147 to 294	2	3	5	4	Piccates
8 and 12	7	12	2.00	50 to 100	200 to 400	1½	3	6	5	Piccavera
9 and 14	7	12	2.00	50 to 100	200 to 400	2	3	6	5	Piccaverum
10 and 16	7	12	2.00	50 to 100	200 to 400	2	3	6	5	Piccavin
12 and 18	7	12	2.00	50 to 100	200 to 400	2½	3½	6	5	Piccavost
8 and 12	8	12	2.61	50 to 100	261 to 522	1½	3	6	5	Piccavoti
9 and 14	8	12	2.61	50 to 100	261 to 522	2	3	6	5	Piccera
10 and 16	8	12	2.61	50 to 100	261 to 522	2	3	6	5	Piccesem
12 and 18	8	12	2.61	50 to 100	261 to 522	2½	3½	6	5	Piccifi
14 and 20	8	12	2.61	50 to 100	261 to 522	2½	5	6	5	Picciore
8 and 12	10	12	4.08	50 to 100	408 to 816	1½	3	8	7	Picciosin
9 and 14	10	12	4.08	50 to 100	408 to 816	2	3	8	7	Piceade
10 and 16	10	12	4.08	50 to 100	408 to 816	2	3	8	7	Picegen
12 and 18	10	12	4.08	50 to 100	408 to 816	2½	3½	8	7	Picegil
14 and 20	10	12	4.08	50 to 100	408 to 816	2½	5	8	7	Picegome
10 and 16	8	18	3.92	40 to 80	313 to 626	2	3	8	7	Picelag
12 and 18	8	18	3.92	40 to 80	313 to 626	2½	3½	8	7	Picelagon
14 and 20	8	18	3.92	40 to 80	313 to 626	2½	5	8	7	Picelico
10 and 16	10	18	6.12	40 to 80	489 to 978	2	3	8	7	Picelon
12 and 18	10	18	6.12	40 to 80	489 to 978	2½	3½	8	7	Piceranti
14 and 20	10	18	6.12	40 to 80	489 to 978	2½	5	8	7	Picerarum
10 and 16	12	18	8.81	40 to 80	704 to 1408	2	3	10	8	Picile
12 and 18	12	18	8.81	40 to 80	704 to 1408	2½	3½	10	8	Piciliban
14 and 20	12	18	8.81	40 to 80	704 to 1408	2½	5	10	8	Picilica
12 and 18	14	18	12.00	40 to 80	960 to 1920	2½	3½	12	10	Picilicum
14 and 20	14	18	12.00	40 to 80	960 to 1920	2½	5	12	10	Picilicos

Any of the above pumps will be fitted with composition plungers, lined glands and bronze rods at a slight additional cost.

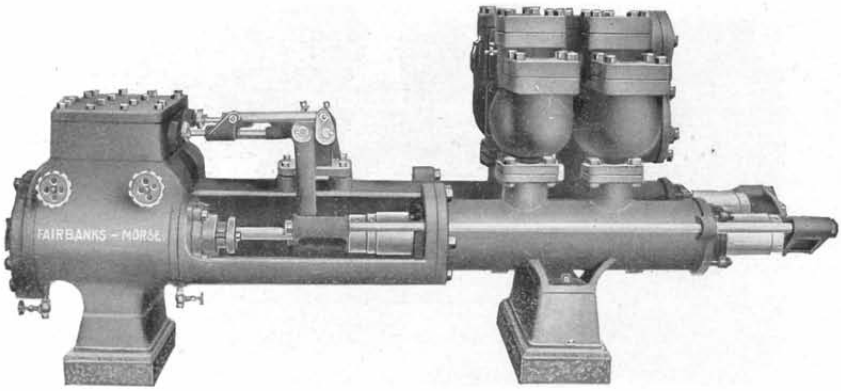


Fig. S. P. 88. Size 10 x 4 x 10

The Fairbanks-Morse Special Duplex Valve Pot Pump

The pumps listed below and illustrated above are designed for pressures not exceeding 300 pounds per square inch. The pump end is of the valve pot design and the pots are interchangeable. The plungers are arranged in trombone style, being connected by means of cross heads and wrought iron side rods.

These pumps are designed for oil line service, hydraulic lifts, for mine service in some situations, and for other work where a moderately high pressure is called for.

They also make very efficient boiler feed pumps, where high boiler pressure requires a machine stronger than our regular pattern boiler feed pumps.

Diameter of Steam Cylinders	Diameter of Water Plungers	Length of Stroke	Gallons per Stroke of One Plunger	Strokes per Minute of Each Plunger	Gallons per Minute at Stated Number of Strokes	Pipe Sizes for Short Lengths				Telegraphic Code Word
						Steam	Exhaust	Suction	Discharge	
6	4	6	.33	40 to 80	26 to 52	1	1½	3	2	Picillap
7	5	8	.68	40 to 80	54 to 108	1½	2	4	3	Picillast
8	4	10	.54	50 to 100	54 to 108	1½	2	4	3	Picillea
10	4	10	.54	50 to 100	54 to 108	2	2½	4	3	Picillet
10	5	10	.85	50 to 100	85 to 170	2	2½	4	3	Picillev
12	5	10	.85	50 to 100	85 to 170	2½	3	4	3	Picillex
12	6	10	1.22	50 to 100	122 to 244	2½	3	5	4	Picillifan
14	6	10	1.22	50 to 100	122 to 244	2½	3	5	4	Picillin
14	7	10	1.66	50 to 100	166 to 332	2½	3	6	5	Picillipa
16	7	10	1.66	50 to 100	166 to 332	2½	3	6	5	Picillis

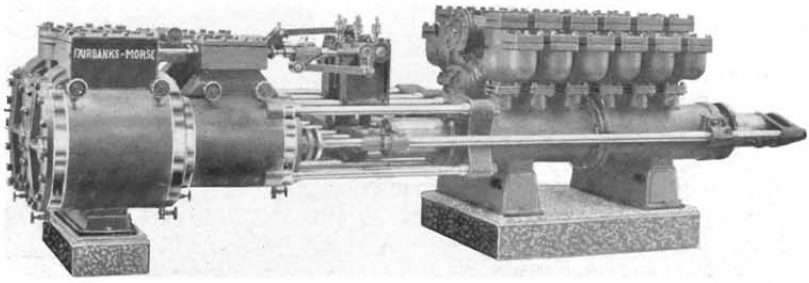


Fig. S. P. 16. Size 12 x 20 x 8½ x 18.

The Fairbanks-Morse Compound Duplex Hydraulic Pressure Pump

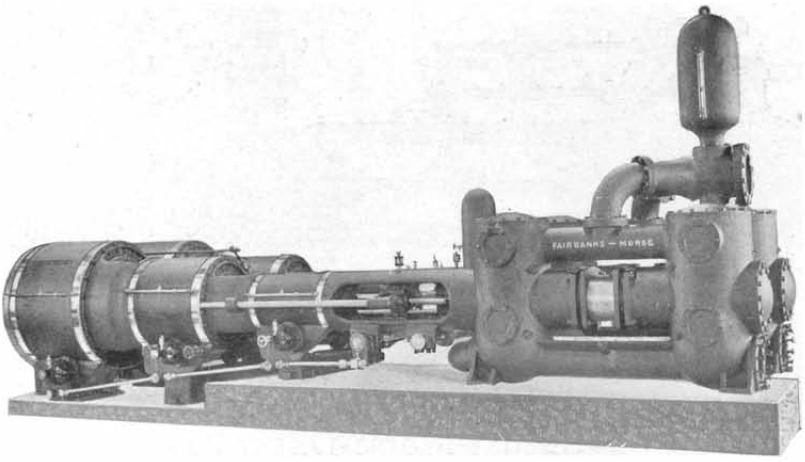
The style of pump illustrated herewith is a machine designed to operate with the highest efficiency. The water end is of the valve pot type, and we build these machines for working pressures varying from 300 to 10,000 pounds per square inch. For the heavier pressures the pump ends are made of cast steel.

The steam end illustrated is of the three rod crosshead type, and the machine as a whole is of a most compact and durable design. The pumps are provided with four externally packed plungers working into the ends of the cylinders. These plungers are attached to crossheads which are connected by steel side rods running through babbitted bearings, whereby the weight of the heavy moving parts is taken from the stuffing boxes and glands.

The water valves are located in separate valve chambers or pots, which are interchangeable. Thus, in case of possible accident to any of the valve pots it is not necessary to renew the entire pump end. We build these pumps with simple, compound or triple expansion steam ends.

These machines are particularly adapted for use in mines, steel works, rolling mills, for operating hydraulic cranes, etc.

Full specifications and drawings will be furnished on application.



Size 15, 25, 40, 15, 24, Horizontal Triple Expansion Pumping Engine with outside center packed, plunger water end.

The Fairbanks-Morse Triple Expansion Pumping Engine

The machine illustrated above is of a design which has proven very economical in the consumption of steam and the economy of operation is such that when considered in connection with the first cost of the pump it gives this type of machine the preference in many situations.

The steam end is fitted with semi-rotative valves, and the main valve on the high pressure steam cylinders is fitted with a riding cut-off valve, which can be adjusted by hand while the engine is in operation.

The machine is designed with a view to rendering all parts easy of access, and the arrangement of the piston rods and cradles is such as to permit removing the steam pistons when necessary without having to take down any of the cylinders or cradles.

These machines are designed to be operated condensing, using a surface condenser arranged in the suction or discharge line, as may be best suited to a particular situation or exhausting into a jet condenser, if such type is preferred.

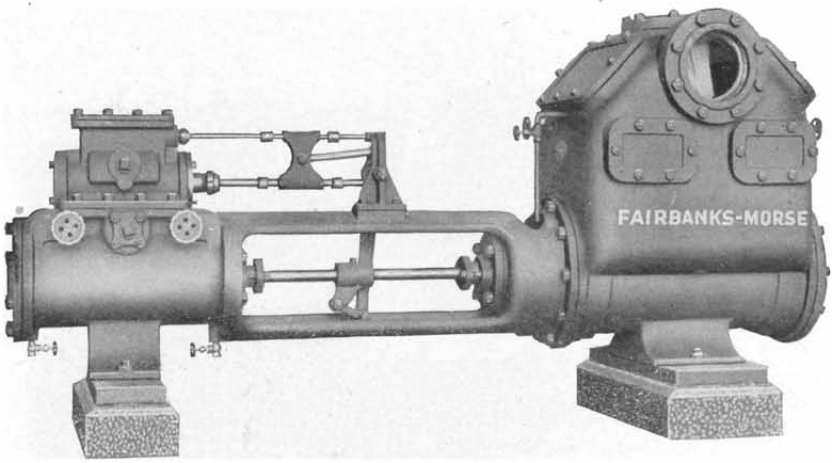


Fig. S. P. 73. Size 10 x 14 x 18

The Fairbanks-Morse Direct Acting Vacuum Pump

To meet the exacting requirements of an efficient vacuum pump, we offer the machine shown by Fig. S. P. 73.

The steam mechanism is positive in operation and the design of the vacuum cylinder is such as will maintain steadily a high vacuum.

A submerged stuffing box on the vacuum cylinder end of the piston rod prevents air from leaking into the cylinder around the rod and vitiating the vacuum.

These pumps are intended for use in connection with evaporating effects for either the wet or dry system. Also in sugar refineries, chemical works, dye works, heating systems, surface condensers, keel condensers, etc.

Diameter of Steam Cylinder	Diameter of Vacuum Cylinder	Length of Stroke	Cubic Feet per Stroke	Steam Pipe	Exhaust Pipe	Suction Pipe	Discharge Pipe	Floor Space, Inches	Telegraphic Code Word
4½	6	7	.056	¾	1¼	3	3	55 x 18	Piclot
6	8	12	.34	1	1	4	4	78 x 20	Picloni
8	10	12	.54	1	1½	6	6	80 x 26	Picluse
8	12	12	.78	1	1½	6	6	80 x 26	Picofant
10	12	18	1.17	1½	2	6	6	102 x 34	Picofele
10	14	18	1.60	1½	2	8	8	102 x 34	Picoga
12	14	18	1.60	2	2½	8	8	102 x 34	Picogen
10	16	18	2.09	1½	2	8	8	102 x 34	Picoloft
12	16	18	2.09	2	2½	8	8	102 x 34	Picolom
12	18	18	2.65	2	2½	8	8	102 x 34	Picomo
14	18	24	3.53	2	2½	10	10	127 x 38	Picopire
14	20	24	4.36	2	2½	10	10	129 x 38	Picrant
14	22	24	5.27	2	2½	12	12	162 x 44	Picroce
16	24	24	6.27	2	2½	12	12	164 x 44	Picune
16	26	24	7.37	2	2½	14	14	170 x 54	Picunec

The Fairbanks-Morse Independent Condensing Apparatus (See page 136)

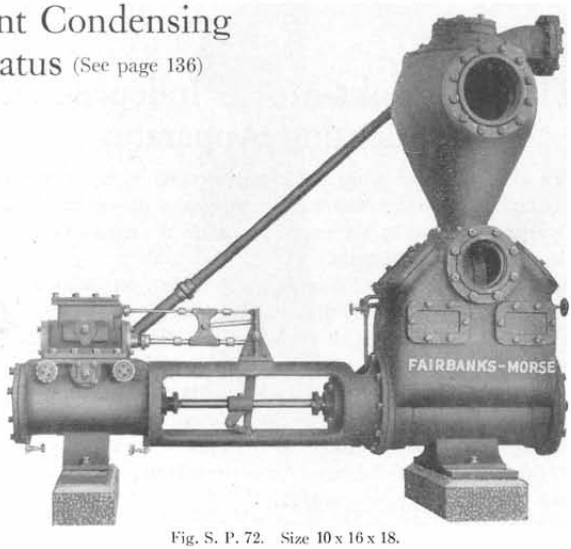


Fig. S. P. 72. Size 10 x 16 x 18.

The Fairbanks-Morse Independent Condensing Apparatus (See page 136)

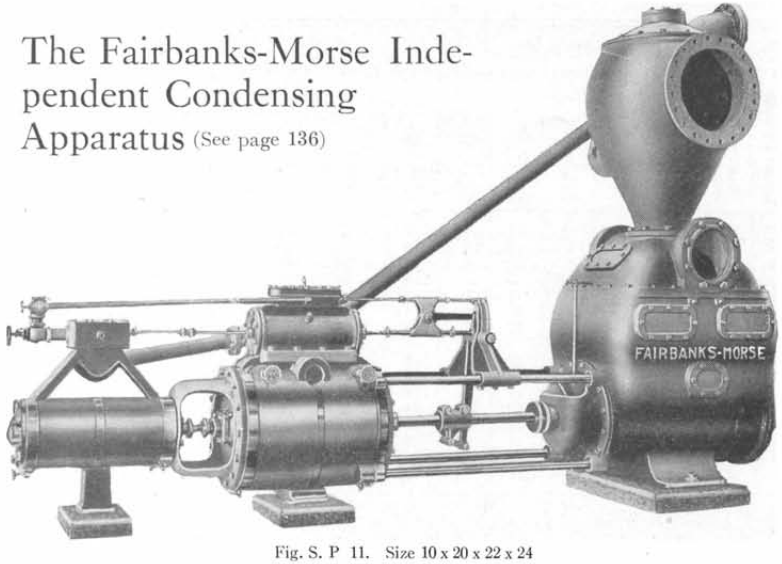


Fig. S. P 11. Size 10 x 20 x 22 x 24

The Fairbanks-Morse Independent Condensing Apparatus

The office of a condenser when used in connection with a steam engine is to remove the atmospheric pressure from the exhaust side of the engine piston and either increase the power developed by the engine or enable the engine to develop a given power with less expenditure of steam.

The machine shown on page 135 is simple in design, yet embodies all necessary features to render it positive and durable in operation.

The saving in steam effected by the use of an efficient condensing apparatus varies from 15 to 40 per cent., depending upon the conditions.

Correspondents should give complete information on the following questions:

1. What is the type of engine; simple, compound or triple expansion?
2. How many pounds of steam are to be condensed per hour? Or state diameter of engine cylinder, length of stroke, revolutions per minute, and maximum cut off.
3. What is the steam pressure carried?
4. What is the maximum temperature of injected water?
5. What are the distances both vertically and horizontally from surface of injection supply to floor of room where condenser is to be located?

When desired, we furnish these machines with compound steam ends as illustrated by Fig. S. P. 11, page 135.

Diameter of Steam Cylinder	Diameter of Water Cylinder	Length of Stroke	Sizes of Pipes for Short Lengths					Approximate Dimensions, Inches			Telegraphic Code Word
			Steam	Exhaust	Engine Exhaust Opening	Injection	Discharge	Length	Width	Height	
4½	6	7	¾	¾	4	2½	3	55	18	60	Pida
6	8	12	1	1	5	4	4	78	23	67	Pidalen
8	10	12	1	1½	6	4	6	80	26	83	Pidame
8	12	12	1	1½	8	5	6	80	26	83	Pidando
10	12	18	1½	2	8	5	6	102	34	87	Pidant
10	14	18	1½	2	10	6	8	102	34	87	Pidasel
12	14	18	2	2½	10	6	8	102	34	95	Pidaser
10	16	18	1½	2	10	6	8	102	34	95	Pidassi
12	16	18	2	2½	10	6	8	102	34	95	Pidato
12	18	18	2	2½	10	8	10	102	34	95	Pidere
14	18	24	2	2½	12	8	10	127	38	105	Prideracil
14	20	24	2	2½	12	8	10	129	38	128	Prideralen
14	22	24	2	2½	14	8	12	164	44	130	Pidesin
16	24	24	2	2½	14	8	12	164	44	130	Pidessonti
16	26	24	2	2½	14	8	12	170	54	140	Pidessontica

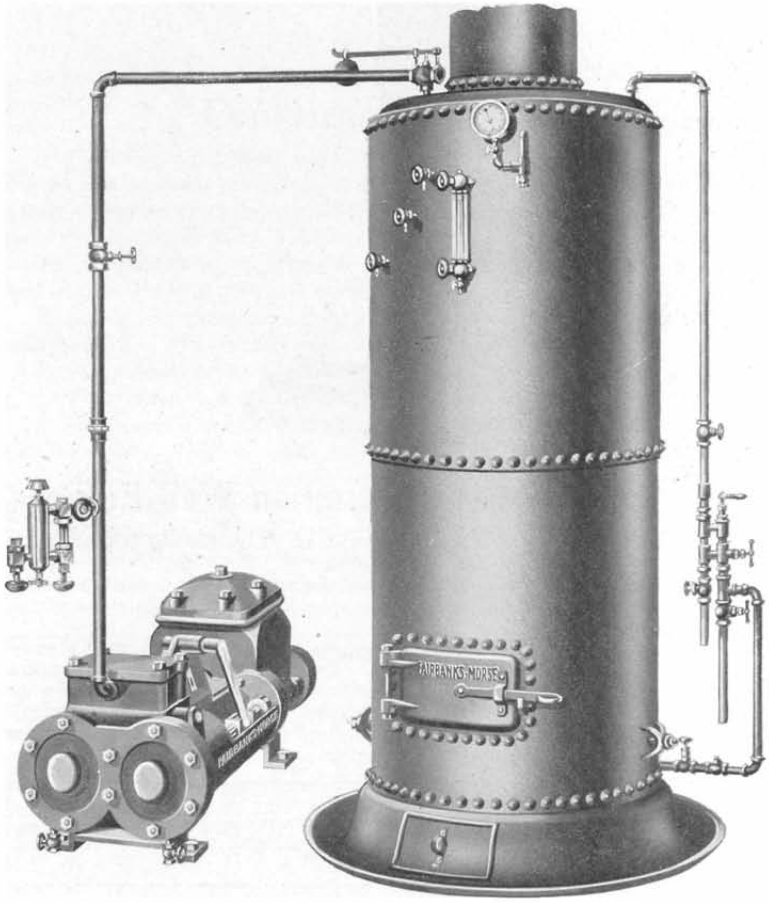
The Fairbanks-Morse Artesian Well Engine

This engine is placed directly over the well and the piston rod is continued to the required depth connected to the pump piston.

The steam valve is perfectly controlled and the speed of the engine on both up and down strokes is uniform. The apparatus may be run at a high speed without excessive shock or jar.

These engines will pump from the deepest wells, forcing the water in a steady stream into an elevated tank or other reservoir. To remove the pump rods and pistons the bolts which connect base to the frame are loosened and the steam cylinder and uprights are drawn back on the base by a screw. The upper displacing cylinder discharges one-half the volume pumped on the down stroke, thus tending to balance the machine and insure a smooth and easy action.

Size of Engine		Size of Pipe, Inches		Floor Space, Inches	Telegraphic Code Word
Diameter of Steam Cylinder, Inches	Length of Stroke, Inches	Steam	Exhaust		
6	18	1	1½	48 x 20	Pigilase
6	36	1	1½	48 x 20	Pigilat
8	24	1¼	1½	51½ x 23	Pigileme
10	36	1½	2	62 x 25	Pigilero
12	36	1½	2	62 x 25	Pigilos
14	36	2	3	73 x 34½	Pigiloten
16	36	2	3	73 x 34½	Pigmen



The Fairbanks-Morse Duplex Pump
and Boiler

The Fairbanks-Morse Duplex Pumps

WITH SUBMERGED TUBULAR BOILER, WITH FITTINGS COMPLETE, READY FOR USE

The cut on page 137 illustrates a combination of our duplex steam pump with a vertical boiler, complete in itself with auxiliary, boiler feed pump, or inspirator, boiler base, smoke box extension, grate bars, steam gauge, water gauge, gauge cocks, blow-off cock, safety valve, boiler feed connections, steam pipe and necessary fittings, etc. It is the safest, most compact and serviceable machine of its kind for supplying water for railway stations, hotels, public buildings, or for use in quarries, irrigating land and in all places where an independent pumping plant is desired.

It is light, compact and strong, and can be placed at the point of supply and the water forced to any distance and height required. It is easily understood and does not need a skilled mechanic to operate it.

Size of Pump			Gallons per Stroke of One Plunger	Strokes per Minute of Each Plunger	Pipes				Dimensions of Boiler			Telegraphic Code Word
Diameter of Steam Cylinders	Diameter of Water Plunger	Length of Stroke			Steam Pipe	Exhaust Pipe	Suction Pipe	Discharge Pipe	Diameter of Shell	Height of Shell	Number of 2-inch Tubes	
3	2	4	.05	100 to 250	⅜	½	1¼	1	24	60	31	Daily
4½	3	4	.12	100 to 200	½	¾	2	1½	24	60	31	Daisy
5¼	3½	5	.20	100 to 200	1	1¼	2½	1½	30	72	54	Dash
6	4	6	.33	100 to 150	1	1½	3	2	30	72	54	Deal
6	5	6	.51	100 to 150	1	1½	4	3	30	72	54	Decent
7	5	10	.85	75 to 125	1½	2	4	3	30	84	54	Decoy
7	6	10	1.22	75 to 125	1½	2	5	4	30	84	54	Define
8	5	12	1.02	75 to 125	1½	2	4	3	36	84	70	Deluge
8	6	12	1.47	75 o 125	1½	2	5	4	36	84	70	Demand
8	7	12	2.00	75 to 125	1½	2	6	5	36	84	70	Design
8	8	12	2.61	75 to 125	1½	2	6	5	36	84	70	Detach
10	6	12	1.47	75 to 125	2	2½	5	4	36	96	70	Device
10	7	12	2.00	75 to 125	2	2½	6	5	36	96	70	Devote
10	8	12	2.61	75 to 125	2	2½	6	5	36	96	70	Direct
12	7	12	2.00	75 to 125	2½	3	6	5	42	96	85	Dilate

The boilers are made of the best 60,000 T. S. steel, with fire-box flange steel in the furnace and heads.

Stack extra to order, when desired.

In addition to the sizes given in the above list a large number of combinations can be supplied to meet the requirements of any desired service.

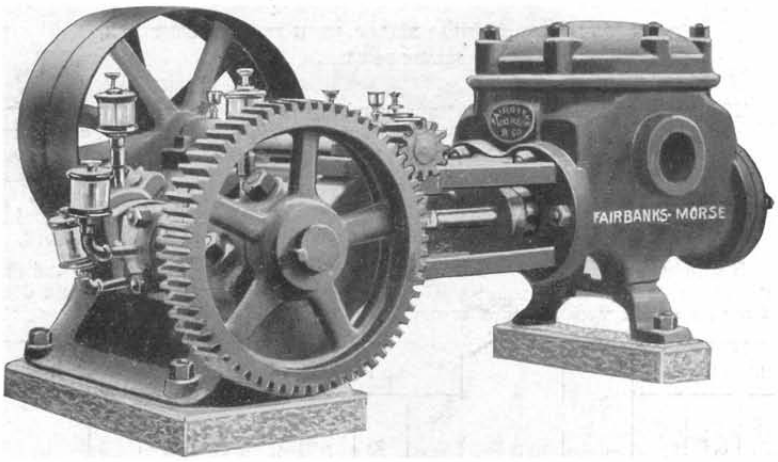


Fig. S. P. 81. Size 3¼ x 4

Fairbanks-Morse Duplex Piston Pattern Power Pump

Our Duplex Piston Pattern Power Pumps are illustrated by Fig. S. P. 81. The water boxes are of the design illustrated by Fig. S. P. 95, on page 111.

The power end is of particularly strong design, both frames being in a single casting giving maximum strength and rigidity. The moving parts are all adjustable for wear; the gearing is of charcoal iron machine cut, and every pump is carefully tested before shipment.

Size of Pump		Maximum Water Pressure	Capacity			Pipe Sizes for Short Lengths		Ratio of Gearings	Pulleys		Telegraphic Code Word.
Diameter of Water Cylinders	Length of Stroke		Gallons per Revolution	Revolutions per Minute	Gallons per Minute	Suction	Discharge		Diameter of Tight and Loose	Width of Belt	
3	4	140	.48	75	36	2	1½	5 to 1	14	3	Pilico
3¼	4	80	.76	75	56	2½	2	5 to 1	14	3	Piligan
3½	6	150	.97	60	58	2½	1½	5 to 1	24	4	Pilimen
4	6	140	1.32	60	78	3	2	5 to 1	24	4	Pilique
5	6	90	2.04	60	120	4	3	5 to 1	24	4	Pilisto
5¾	6	65	2.68	60	160	4	3	5 to 1	24	4	Pilixen
6	6	60	2.92	60	174	4	3	5 to 1	24	4	Pillabo
4½	10	140	2.76	50	136	4	3	5 to 1	28	6	Pillage
5	10	140	3.40	50	170	4	3	5 to 1	28	6	Pilleter
6	10	80	4.88	50	245	5	4	5 to 1	28	6	Pillitas
7	10	60	6.66	50	334	6	5	5 to 1	28	6	Pillonel

For list of pumps having greater capacities, see page 141.

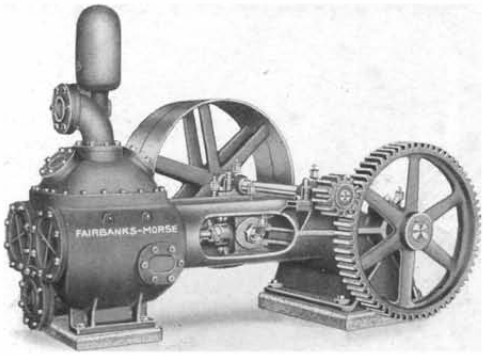


Fig. S. P. 5. Size 6 x 10

Fairbanks-Morse Duplex Power Pump

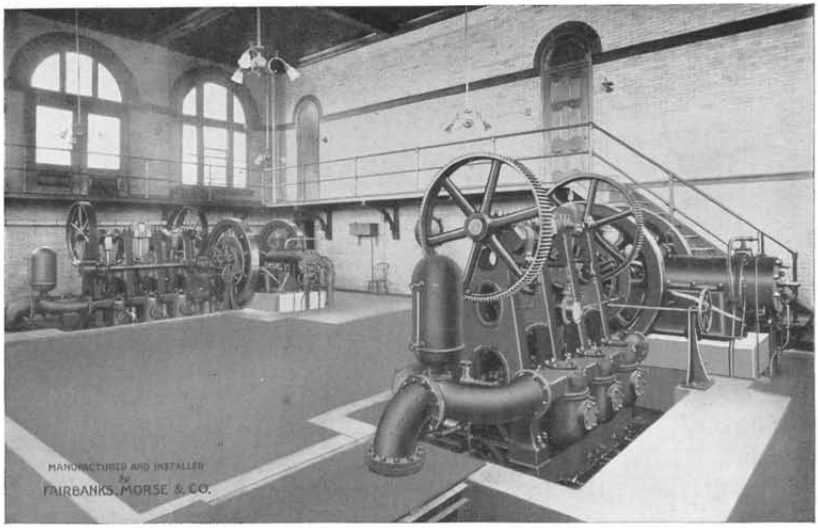
PLUNGER AND RING PATTERN

Our Plunger and Ring Pattern Power Pumps are illustrated by Fig. S. P. 5, which shows a pump strongly and substantially designed with a rigid power end. All parts of this machine are easy of access for examination or adjustment.

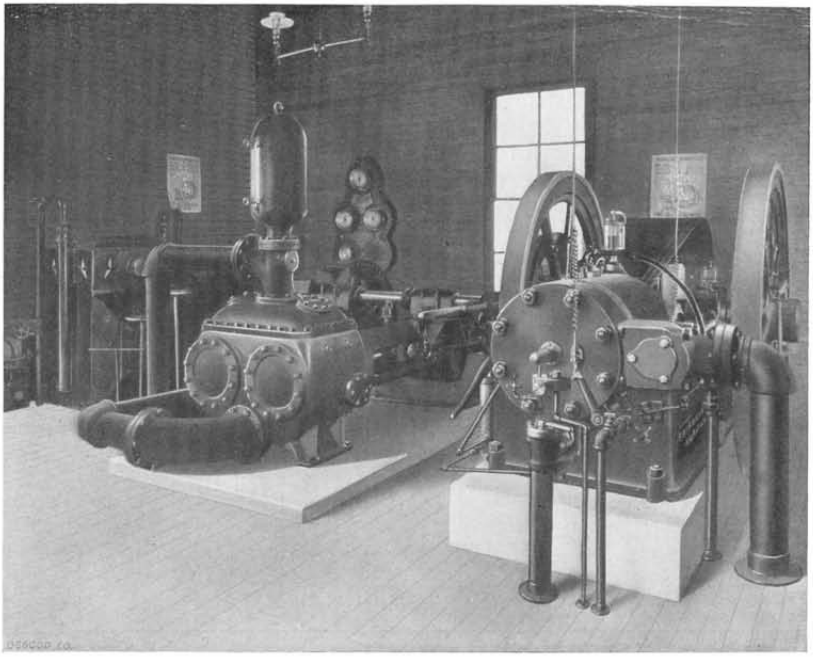
The design of the water end is shown in section by Figs. S. P. 97 and S. P. 98, on page 111. The cross heads have adjustable shoes; the connecting rods have adjustable boxes; the gearing is of charcoal iron, with teeth accurately machine cut. Every pump is carefully tested before shipment.

Size of Pump			Capacity			Pipe Sizes for Short Lengths			Pulleys		
Diameter of Water Cylinders	Length of Stroke	Maximum Water Pressure	Gallons per Revolution	Revolutions per Minute	Gallons per Minute	Suction	Discharge	Ratio of Gearing	Diameter of Tight and Loose	Width of Belt	Telegraphic Code Word.
6	10	150	4.88	50	245	5	4	5 to 1	40	8	Pillum
7	10	140	6.66	50	334	6	5	5 to 1	40	8	Pilocol
8	10	100	8.70	50	434	6	5	5 to 1	40	8	Pilodom
8	10	70	8.70	50	434	7	6	5 to 1	40	8	Pilolin
8½	10	90	9.84	50	492	6	5	5 to 1	40	8	Pilome
8	12	140	10.44	50	522	6	5	Varies according to service	.....	.....	Piloven
8½	12	125	11.76	50	590	7	6		.....	.....	Pilovic
9	12	105	13.20	50	620	7	6		.....	.....	Pilovon
10	12	85	16.32	50	816	8	7		.....	.....	Pilovoque
10½	12	80	18.00	50	900	8	7		.....	.....	Pilowag
12	12	60	23.48	50	1176	10	8		.....	.....	Pilphin
10	12	120	16.32	50	816	8	7		.....	.....	Pilphore
10½	12	105	18.00	50	900	8	7		.....	.....	Piluson
11	12	.....	19.74	50	987	10	8		.....	.....	Pilvamos
12	12	.....	23.48	50	1176	10	8		.....	.....	Pilvarmo
14	12	.....	32.00	50	1600	12	10		.....	.....	Pilvassi
16	18	.....	.....	33	2067	14	12		.....	.....	Pilvatin
18	18	.....	.....	33	2616	16	12		.....	.....	Pilvavis
18	24	.....	.....	25	2643	16	12		.....	.....	Pilvemoa
20	24	.....	.....	25	3262	18	14		.....	.....	Pilvoso

For list of pumps of smaller capacities, see page 140.



Fairbanks-Morse 60 H. P. gas engines directly connected with vertical double acting triplex power pumps, at the filtration plant, Upper Roxborough Pumping Station, Philadelphia, Pa., water works.



8½x12 Fairbanks-Morse Duplex Power Pump operated by a 50 H. P. Fairbanks-Morse Gas Engine at Duluth, Minn., water works.

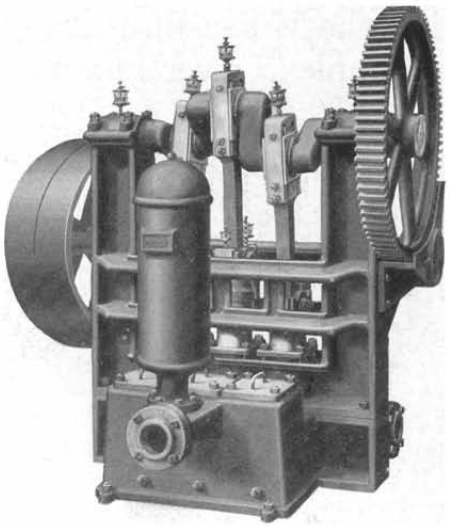


Fig. 957. Size 7x8 inches

Single Acting Triplex Power Pump

(FOR LIGHT SERVICE)

FIG. 957—SIZES, CAPACITIES, ETC.

FOR ELEVATIONS TO 100 FEET, EQUIVALENT TO 43 POUNDS PRESSURE

PLUNGERS		Capacity One Rev. of Crank Shaft, Gallons	SPEED AND CAPACITY		SIZES OF PIPE		Geared	Tight and Loose Pulleys, Inches	Cipher
Diam., Inches	Stroke, Inches		Revolu. Per Min.	Gallons Per Min.	Suction, Inches	Disch'ge, Inches			
4	6	1.0	45	45	2	2	5 to 1	20 x 3	Wraivj
5	8	2.0	45	90	3	3	5 to 1	26 x 4	Wraiwl
7	8	4.0	45	180	5	5	4 to 1	30 x 5	Writhes
8	10	6.5	40	260	6	5	5 to 1	36 x 6	Writin
8	12	7.8	40	312	6	5	5 to 1	36 x 6	Wroken

FIG. 1140. SIZES, CAPACITIES, ETC.

FOR ELEVATIONS TO 250 FEET, EQUIVALENT TO 108 POUNDS PRESSURE

PLUNGERS		Capacity one Rev. of Crank Shaft, Gallons	SPEED AND CAPACITY		SIZES OF PIPE		Geared	Tight and Loose Pulleys, Inches	Cipher
Diam., Inches	Stroke, Inches		Revolu. Per Min.	Gallons Per Min.	Suction Inches	Disch'ge, Inches			
4	6	1.0	45	45	2	2	5 to 1	20 x 3	Tobeul
5	8	2.0	45	90	3	3	5 to 1	30 x 5	Tobevy
6	8	2.9	45	130	4	4	5 to 1	30 x 6	Tobewx
7	8	4.0	45	180	4	4	5 to 1	30 x 6	Tobid
8	10	6.5	40	260	5	5	5 to 1	36 x 6	Tobick

The Fairbanks-Morse Electrically Driven Duplex Power Pumps

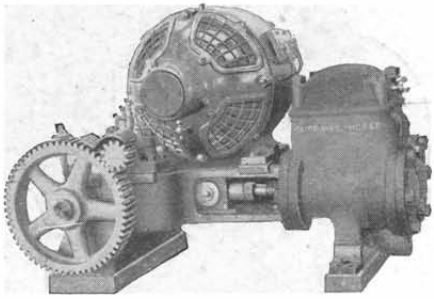
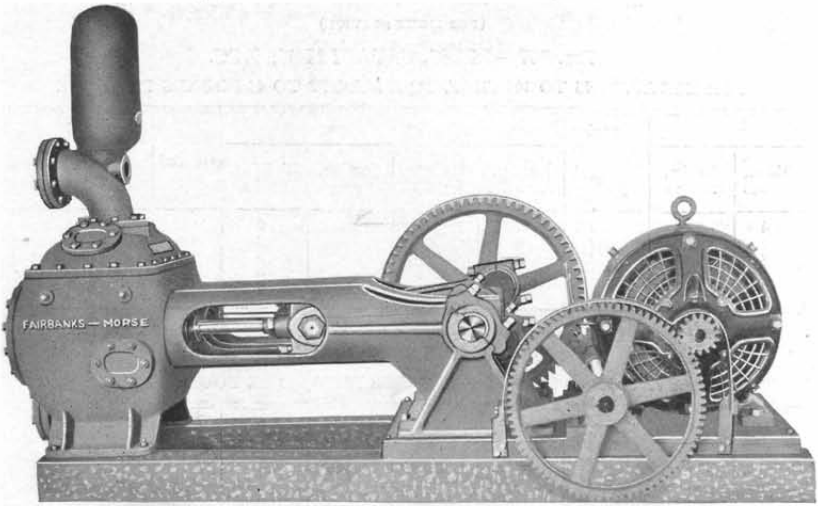


Fig. S. P. 160

Size 3 x 4 Horizontal Duplex Piston Pattern Power Pump, directly connected with a Fairbanks-Morse 1½ horse power Direct Current Motor, the motor arranged on the pump frames and speed reduced from motor to pump by a double reduction of gearing. See also page 80.



Size 8½ x 10 Horizontal Duplex Plunger and Ring Pattern Power Pump, with extended bed plate to receive a Fairbanks-Morse 15 horse power Direct Current Motor, the motor being directly connected with the pump by a double reduction of gearing.

Single Acting Triplex Power Pump

FOR GENERAL SERVICE

FIGURE 924. SIZES, CAPACITIES, ETC.

For Elevations to 300 Feet, Equivalent to 130 Pounds Pressure

Plungers		Capacity One Rev. of Crank Shaft, Gallons	Usual Speed and Capacity per Minute		Sizes of Pipe		Geared	Tight and Loose Pulleys, Inches	Cipher
Diam., Inches	Stroke, Inches		Revolu.	Gallons	Suction, Inches	Discharge Inches			
2½	4	0.25	50	12	1½	1½	5 to 1	15 x 3	Wench
3	4	0.36	50	18	1½	1½	5 to 1	15 x 3	Wend
4	4	0.65	45	29	2	2	5 to 1	20 x 3	Wennel
4	6	1.0	45	45	2	2	5 to 1	20 x 3	Wenta
5	6	1.5	45	67	3	3	5 to 1	26 x 4	Wereba
5	8	2.0	40	80	3	3	5 to 1	30 x 5	Werste
6½	8	3.4	40	136	4	4	5 to 1	30 x 6	Wooing
8	8	5.2	40	208	5	4	5 to 1	36 x 6	Werte
8	10	6.5	40	260	5	4	5 to 1	42 x 6	Zylode
9	10	8.2	40	328	6	5	6 to 1	42 x 8	Zylom

FIGURE 1009. SIZES, CAPACITIES, ETC.

For Elevations to 350 Feet or Equivalent Pressure

Plungers		Capacity One Rev. of Crank Shaft, Gallons	Usual Speed and Capacity per Minute		Sizes of Pipe		Geared	Tight and Loose Pulleys, Inches	Cipher
Diam., Inches	Stroke Inches		Revolu.	Gallons	Suction, Inches	Discharge Inches			
1¼	2	0.03	60	1.8	¾	¾	5 to 1	12 x 1½	Crag
1¾	2½	0.07	60	4.2	1	1	5 to 1	12 x 2½	Craggy
2	3	0.12	50	6.0	1½	1½	5 to 1	12 x 2½	Crachom
2½	4	0.25	50	12.0	1½	1½	5 to 1	15 x 3	Cragify
3½	4	0.5	50	25.0	2	2	5 to 1	15 x 3	Craftul
4	6	1.0	45	45.0	2	2	5 to 1	20 x 3	Crajum
5	6	1.5	45	67.0	3	3	5 to 1	26 x 4	Crajyx
5	8	2.0	40	80.0	3	3	5 to 1	30 x 5	Crakal
6	8	2.93	40	117.0	4	4	5 to 1	30 x 6	Cusick
7	8	4.0	40	160.0	4	4	5 to 1	36 x 6	Cusjoe
8	10	6.5	40	260.0	5	5	5 to 1	42 x 6	Cuskus

FIGURE 920

For Elevations to 350 Feet or Equivalent Pressure

Plungers		Capacity One Revo. of Crank Shaft, Gallons	Speed and Capacity per Minute Varying With Kind of Work and Pressure		Sizes of Pipes		Geared
Diam., Inches	Stroke, Inches		Revolutions	Gallons	Suction, Inches	Discharge Inches	
10	12	12.2	25 to 41	300 to 500	8	7	5⅜ to 1
11	12	14.8	25 to 41	370 to 600	10	8	5⅜ to 1
12	12	17.6	25 to 40	440 to 700	10	8	5¾ to 1

Artesian Deep Well Pump

COOK PATTERN

SIZES AND PRICES

Diam., Steam Cylinder, Inches	Length of Stroke, Inches	Steam Pipe Connections, Inches	Exhaust Pipe Connections, Inches	Weight, Pounds	Price, Steam Head Only	Code Word
6	12	1	1¼	500	$165.00	Dew
6	18	1	1¼	750	176.00	Frost
6	24	1	1¼	800	198.00	Hail
6	36	1	1¼	1050	220.00	Ice
8	24	1¼	1½	1150	242.00	Rain
8	36	1¼	1½	1550	264.00	Sleet
10	24	1¼	2	1400	330.00	Snow
10	36	1¼	2	1800	374.00	Steam
12	36	1¼	2	2300	396.00	Vapor
14	36	1½	2	3300	660.00	Waterloo

"Erb" Patent Double Acting Deep Well Pumps

Referring to the accompanying engraving, D 1 is discharge valve on up stroke, D 2 is discharge valve on down stroke. S 1 suction valve on down stroke and S 2 suction valve on up stroke.

The pump valves are made of rubber having a brass cap to stop the lift and the piston is packed with cup leathers.

By the use of this invention water is discharged at both up and down stroke.

This pump can be used in place of any single acting pump and will deliver over double the amount of water.

The engine will run smoothly as the load is nearly balanced.

We claim that for simplicity, economy in use of steam, durability and large capacity, to have produced the best deep well pump on the market.

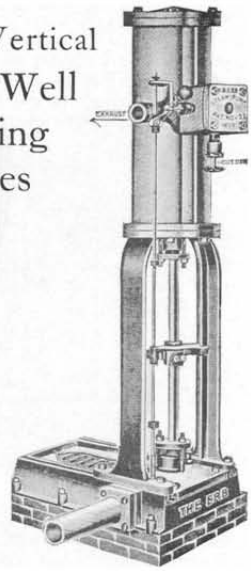
We make these pumps of brass and any length stroke desired.

Sizes and Capacities

OF THE DOUBLE ACTING PUMPS

Extreme Outside Diameter, Inches	Stroke of Pump, Inches	Size of Pipe for Top Attachment, Inches	Size of Pipe Bottom Attachment, Inches	Size of Pipe Pump Rods, Inches	Capacity in Gals. per Revolution	Capacity in Gals. per hour at 100 ft. per minute	Price
2½	18	1½	1¼	⅝	.51	1020	$ 50.00
3	24	1½	1½	⅝	1.04	1560	75.00
3½	24	2	2	1	1.44	2160	100.00
4	24	2	2½	1	2.00	3000	125.00
4½	24	2½	2½	1¼	2.48	3720	150.00
5	24	2½	3	1½	2.72	4080	250.00
5½	24	2½	3	1½	3.48	5220	275.00
6⅝	24	3½	3½	2	4.92	7380	380.00
7⅝	24	3½	3½	2	7.04	10560	575.00
8⅝	36	4	4	2½	13.62	13620	750.00
9⅝	36	4	4½	2½	17.76	17760	875.00
10⅝	36	6	6	3	21.48	21480	1000.00
11¾	36	6	6	3½	25.68	25680	1250.00
12¾	36	7	7	4	30.24	30240	1500.00
14	36	8	8	4½	35.22	35220	2000.00

"Erb" Vertical Deep Well Pumping Engines



This engine is provided with hand cut-off which controls main slide valve by which the admission of steam on down stroke may be regulated to equalize the speed and utilize the weight of the pump rods.

Steam on up stroke is controlled by globe or throttle valve.

Having no cushion valves and only one port from steam chest to each end of cylinder reduces the clearance at least 50 per cent. over that of the ordinary five port engine.

The bed plate is so constructed that engine may readily be moved to one side and our double acting pump removed without disturbing discharge pipe.

To regulate speed on downward stroke loosen brass lock nut and set screw on cut-off slightly, then turn hand wheel to right to reduce speed, or left to increase.

After proper adjustment is obtained, tighten lock nut and set screw and no further adjustment will be necessary.

Sizes of Artesian or Deep Well Pumping Engines

Diam. of Cylinder	Length of Stroke	Steam Pipe	Exh'st Pipe	Price
5	24	¾	1	180.00
6	24	1	1¼	250.00
8	24	1	1¼	290.00
8	36	1	1¼	320.00
10	36	1½	2	410.00
12	36	2	2½	490.00
16	36	2	2½	900.00

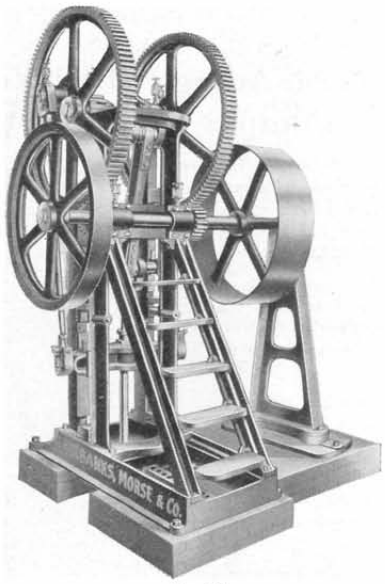


Fig. 33

Direct Double-Acting Deep Well Working Pump Head

MADE IN THREE SIZES

No.	Height of Pump	Floor Space	Shipping Weight, Pounds	Price without Working Barrels, Tubing or Rods
32	9′ 3″	4′ 0″ x 5′ 0″	4,000	$ 800.00
33	9′ 6″	4′ 4″ x 5′ 8″	5,000	1000.00
34	9′ 8″	5′ 6″ x 6′ 0″	6,500	1200.00

No. 32 Direct Double Acting Geared Pump

TABLE OF CAPACITIES

The table also shows the size of working barrel, and the extreme depth it should be placed from surface, and also the proper size of tubing to use. Stroke of each piston, 18 inches. Each revolution gives 36 inches displacement. The figures below are based on 40 revolutions per minute.

Inside Diameter of Barrel, Inches	Size of Tubing, Inches, Inside Diameter	Extreme Depth Working Barrel Should be Placed from Surface	Theoretical H. P. Required to Operate at this Depth	Size of Double Rods, Inches	Capacity per Hour, Gallons
2¾	3	500	4.69	1¼	2221
3¼	3½	500	6.6	1¼	3104
3¾	4	400	6.98	1¼	4129
4	*4¼	350	7.	1¼	4700
4¼	4½	300	6.68	1¼	5305
4¾	5	250	6.96	1¼	6626
5¼	*5⅝	200	6.79	1¼	8092
5¾	6	150	6.08	1½	9705
6¼	*6⅝	100	4.81	1½	11450
6¾	7	100	5.65	1½	13377
7¼	*7⅝	100	6.02	1½	15451
7¾	8	90	6.68	1½	17640
8	*8¼	75	5.81	1½	18800

Sizes marked with * are oil well casing.

No. 33 Double-Acting Geared Pump

TABLE OF CAPACITIES

The size of working barrel, and extreme depth it should be placed from surface, are shown. Stroke of each piston, 18 inches. Each revolution, 36 inches displacement. The figures below are based on 35 and 40 revolutions per minute.

Inside Diameter of Barrel, Inches	Size of Tubing, Inches, Inside Diameter	Extreme Depth Working Barrel should be placed from Surface	Theoretical H.P. required to operate at this Depth	Size of Double Rods, Inches		Capacity per Hour, Gallons
3¾	4	500	8.7	1½	40 Rev.	4129
4	*4¼	500	9.86	1½	40 Rev.	4700
4¼	4½	450	10.07	1½	40 Rev.	5304
4½	5	400	11.18	1½	40 Rev.	6626
5¼	*5⅝	400	13.65	1½	40 Rev.	8092
5½	6	350	14.7	1½	40 Rev.	9705
6¼	*6⅝	300	12.7	2	35 Rev.	10035
6½	7	250	12.34	2	35 Rev.	11705
7¼	*7⅝	200	11.41	2	35 Rev.	13519
7½	8	175	11.39	2	35 Rev.	15435
8	*8¼	150	9.95	2	35 Rev.	16450

Sizes marked with * are oil well casing.

No. 34 Direct Double Acting Geared Pump

TABLE OF CAPACITIES

The size of working barrel and extreme depth it should be placed from surface are shown. Stroke of each piston, 18 inches. Each revolution gives 36 inches displacement. The figures below are based on 35 revolutions per minute. Sizes marked with * are oil well casing.

Inside Diameter of Barrel, Inches	Size of Tubing, Inches, Inside Diameter	Extreme Depth Working Barrel Should be Placed from Surface	Theoretical H.P. Required to Operate at this Depth	Size of Double Rods, Inches	Capacity per Hour, Gallons
5¾	6	500	17.97	2	8492
6¼	*6⅝	450	19.01	2	10035
6½	7	400	19.74	2	11705
7¼	*7⅝	350	19.63	2	13519
7½	8	300	19.51	2	15435
8	*8¼	275	19.07	2	16450
9	10	250	20.75	2	20820
10	11	200	21.66	2	25704
11	12	150	19.67	2	31101
12	*12½	125	19.52	2	37013

Working barrels 9, 10, 11 and 12-inch, are made to order only.

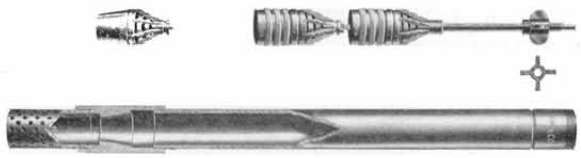
Sucker Rods for Double Acting Pumps

These sucker rods are double and made in pairs of matched lengths and weights, so that in use they will balance each other. The inside rod is made of round or square iron with steel screw socket joints and ranges in size from ⅝ to 1½ inches. The outside is of special prepared tubing, and of same weight and ranges in size from 1 to 2 inches extra heavy tubing.

The prices given below are for the double rods, as used on the double acting geared pumps Nos. 32, 33 and 34.

The ⅝-inch rods are used on double wind mill pumps only.

Number of Rods	Inside Rod, Inches	Outside Rod, Inches	Weight of Each Rod, Pounds	Price per Foot
1	⅝	1	1.67	$0.30
2	⅞	1¼	2.24	.45
3	1	1½	3.63	.60
4	1¼	2	5.02	1.00



Working Barrels and Valves

USED ON

Double Acting Geared Pumps

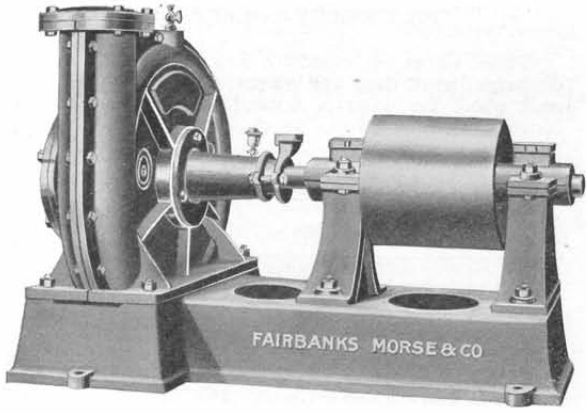
TEN FEET LONG, INCLUDING THE STRAINER. MADE OF SOLID BRASS

These working barrels are made any required inside diameter from $2\frac{3}{4}$ to 8 inches. The size is uniformly designated by the *diameter of the bore*, which should be at least $\frac{1}{4}$ inch less than the inside diameter of the *tubing* used, so that the valves may be removed *without taking out the tubing*. They are made specially for the double acting pump, and the prices quoted in the price list include one upper plunger, one lower plunger, one check valve.

SIZES, PRICES, ETC.

Inside Diameter of Working Barrels, Inches	Upper Valve	Lower Valve	Check Valve and Strainer	Size of Pipe Used for Tubing Inside Diameter. *Oil Well Casing, Inches	Length of Working Barrels, Feet	Price
$2\frac{1}{4}$	$7.00	$ 7.00	$ 8.00	$2\frac{1}{2}$	$6\frac{1}{2}$	$ 50.00
$2\frac{3}{4}$	9.00	9.00	10.00	3	$6\frac{1}{2}$	60.00
$3\frac{1}{4}$	12.00	12.00	13.00	$3\frac{1}{2}$	$6\frac{1}{2}$	75.00
$3\frac{3}{4}$	15.00	15.00	16.00	4	$6\frac{1}{2}$	100.00
4	17.00	17.00	18.00	*$4\frac{1}{4}$	$6\frac{1}{2}$	120.00
$4\frac{1}{4}$	19.00	19.00	20.00	$4\frac{1}{2}$	$6\frac{1}{2}$	130.00
$4\frac{3}{4}$	20.00	20.00	22.00	5	$6\frac{1}{2}$	150.00
$5\frac{1}{4}$	22.00	22.00	25.00	*$5\frac{5}{8}$	$6\frac{1}{2}$	175.00
$5\frac{3}{4}$	25.00	25.00	28.00	6	$6\frac{1}{2}$	200.00
$6\frac{1}{4}$	30.00	30.00	35.00	*$6\frac{5}{8}$	$6\frac{1}{2}$	225.00
$6\frac{3}{4}$	33.00	33.00	38.00	7	$6\frac{1}{2}$	275.00
$7\frac{1}{4}$	35.00	35.00	40.00	*$7\frac{5}{8}$	$6\frac{1}{2}$	300.00
$7\frac{3}{4}$	38.00	38.00	43.00	8	$6\frac{1}{2}$	350.00
8	40.00	40.00	45.00	9	$6\frac{1}{2}$	375.00

*Larger sizes are made of cast brass to order.



Centrifugal Pumps

PRICE LIST OF PLAIN HORIZONTAL PUMPS

No.	Disch'ge Diameter, Inches	Suction Diameter, Inches	Iron	Brass	Capacity Per Min., Gallons	Shipping Weight, About	Packed for Exp. Weight	With Primer	
								Iron	Brass
1½	1½	2	$ 35.00	$ 65.00	150	120	.....	$ 45.00	$ 80.00
1¾	2	2	50.00	100.00	200	175	.....	60.00	120.00
2	2	2½	70.00	125.00	300	225	.....	85.00	150.00
2½	2½	3	80.00	150.00	450	290	.....	95.00	175.00
3	3	4	95.00	175.00	650	325	.....	110.00	210.00
3½	3½	5	110.00	230.00	1000	400	.....	135.00	270.00
4	4	5	130.00	275.00	1250	450	.....	155.00	330.00
5	5	6	165.00	350.00	1850	510	.....	195.00	420.00
6	6	8	200.00	410.00	2600	900	.....	240.00	495.00
8	8	10	310.00	.....	4750	1440	.....	375.00	.....
10	10	12	395.00	.. ...	7500	1680	.....	470.00	.....
12	12	14	500.00	. .. .	10000	1820	.....	600.00	.....
15	15	18	710.00	. ....	16000	3800	.....	850.00	.....
18	18	22	.....	.....	22000	6500	.....	....	.....

Larger or special pumps according to specifications.

Combined Check Valves and Air Chambers

FOR DISCHARGE PIPES OF PUMPS

These valves are especially recommended for discharge line of deep well pumps, and should be used where the water is elevated some distance above the surface.

LIST OF SIZES AND PRICES

For Discharge Pipe	Check and Air Chamber
1 -inch Iron Body and Rubber Valves	$ 3.50
1¼-inch Iron Body and Rubber Valves	5.00
1½-inch Iron Body and Rubber Valves	7.50
2 -inch Iron Body and Rubber Valves	12.00
2½-inch Iron Body and Rubber Valves	14.00
3 -inch Iron Body and Rubber Valves	16.00
3½-inch Iron Body and Rubber Valves	20.00
4 -inch Iron Body and Rubber Valves	24.00
5 -inch Iron Body and Rubber Valves	35.00
6 -inch Iron Body and Rubber Valves	50.00

Price of check valves or air chambers separate, with companion flanges, 40 per cent off above prices.

Fig. 694
Submerged Type

Vertical Centrifugal Pump

FIG. 694, SUBMERGED TYPE

Fig. 694 shows our Vertical Pump, intended to be submerged in the liquid to be pumped.

Pump No. Diam. Discharge Opening, Inches	Economical Capacity per Minute, Gallons	Diameter and Face of Pulley, Inches	Floor Space Required, Inches	Distance from Bottom of Pump to Center of Coupling	Coupling Bored for Connecting Shaft, Diameter, Inches	Fig. 694. Submerged Type, with Elbow, One Pair Couplings, Pulley and One Bearing.		Suction Type with Elbow, One Pair Couplings, Pulley and One Bearing	Pump No. Diam. Discharge Opening, Inches
						Iron	Brass	Iron	
1½	70	5 x 6	17 x 21	2′ 9″	1	$ 46.00	$ 55.70	$ 44.00	1½
1¾*	90	6 x 6	21 x 29	3′ 0″	1	50.00	90.00	55.00	1¾*
2	120	7 x 8	23 x 30	3′ 4″	1 1/16	65.00	110.00	72.00	2
2½	185	7 x 8	24 x 30	3′ 4″	1 1/16	80.00	135.00	88.00	2½
3	260	7 x 8	25 x 32	3′ 6″	1 1/16	95.00	150.00	105.00	3
4	470	8 x 10	29 x 39	4′ 0″	1 7/16	110.00	240.00	122.00	4
5	735	10 x 10	34 x 45	4′ 7″	1 7/16	140.00	315.00	155.00	5
6	1050	12 x 12	37 x 48	4′ 7″	1 7/16	170.00	360.00	190.00	6
8	2000	18 x 12	45 x 56	5′ 5″	2	265.00	.....	295.00	8
10	3000	20 x 12	51 x 68	5′ 5″	2	330.00	.....	365.00	10
12	4200	24 x 14	63 x 72	6′ 0″	2 3/8	420.00	.....	475.00	12
15	7000	30 x 16	77 x 102	6′ 6″	3 1/16	600.00	.....	665.00	15
*15	7000	30 x 15	60 x 71	6′ 6″	3 1/16	480.00	.....	530.00	*15
18	10000	36 x 18	98 x 126	7′ 0″	3 3/16	950.00	.....	1050.00	18
*18	10000	30 x 16	66 x 78	6′ 6″	3 1/16	850.00	.....	940.00	*18
20	12000	36 x 20	73 x 92	4′ 6″	4	1200.00	.....	1325.00	20

* Refers to Low Lift Pumps.

The Fisher Steam Pump Governor

FOR USE ON WATER WORKS PUMPS, HYDRAULIC ELEVATORS, BOILER FEED PUMPS AND ALL PUMPS WORKING UNDER PRESSURE

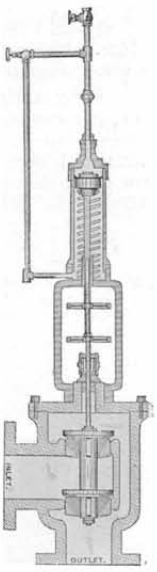
Will regulate the pressure of the pump so it cannot exceed the pressure at which it is set. The regulation is very simple and is quickly made. Loosen the upper lock wheel by turning to the left; adjust with the lower wheel until the desired pressure is reached, then lock with upper wheel by turning to the right. There is a wide limit of variation in pressure with the different size springs we use.

The steam and hydraulic pressures should always be given with each order. This is important in order that we may fit the governor for the service for which it is intended.

We make special governors for air compressors, carrying a very low pressure, or as high as desired.

Angle and globe style in screwed and flanged patterns, are furnished in all sizes, as per price list.

Screwed and angle pattern always shipped, on one-half to three-inch inclusive unless otherwise specified in the order.



The valves and seats are made of the best phosphor-bronze.

The flanges on our governors are "Master Steam and Hot Water Fitters' Standard." Governors with special flanges made to order.

We use brass pipe work on all our governors, which conforms to the rules and regulations of the Underwriters Fire Association.

Screwed		Flanged	
½-inch	$25.00	1½-inch	$45.00
¾-inch	27.50	2 -inch	50.00
1 -inch	30.00	2½-inch	60.00
1¼-inch	35.00	3 -inch	75.00
1½-inch	42.50	3½-inch	87.50
2 -inch	50.00	4 -inch	100.00
2½-inch	58.00	5 -inch	125.00
3 -inch	70.00	6 -inch	150.00
		8 -inch	225.00

Pump Valves

SOFT VALVES—These valves are for use in cold water only. They are soft, with a perfectly smooth surface, and will stand a moderate pressure.

MEDIUM HARD VALVES—We manufacture several grades of these for semi-hot water. They will be found very durable, and can be used where considerable pressure exists.

HARD VALVES—These valves are made to stand oily water of very high temperature. Being compounded both hard and tough, they will last a long time and stand a great pressure.

SPECIAL VALVES—In addition to ordinary pump valves, we have a number of special valve stocks which we mould to any shape and style required. When ordering please state for what purpose the valves are to be used, and whether water to be pumped is oily, hot or cold, etc., as with our experience we can generally recommend the grade that will give the best results. Careful attention given to orders for marine, waterworks fire engine, and special valves of all kinds.

Spiral Valve Springs

MADE IN ALL SIZES

Piston Packings

ROUND DUCK PACKING—Rubber core enclosed in heavy duck, securely vulcanized together. Made in 12-foot lengths.
List price, per pound $0.85

RUBBER BACK PACKING — Made in lengths of 20 feet.
List price, per pound $1.00

ROYAL RED SHEET PACKING — Our Royal brand is a tough and durable packing made especially for high pressure, and is guaranteed equal to the best on the market. It conforms readily to any joint or surface. Any thickness.

PURE ROUND AND SQUARE PACKING—Same quality as pure sheet packing or valve gum.
List price, per pound $1.40

Square Duck Packing

Made in lengths of 12 and 24 feet. List price, per pound . . . $0.85

Special Square Duck Packing

For steam pumps. A superior article of fine duck and white rubber. List price per pound $1.00

Steam Packing—Cloth Insertion

CLOTH ON ONE OR BOTH SIDES

There is one ply of cloth to every $\frac{1}{16}$-inch thickness. Each cloth, whether insertion or outside, to count as one ply.

	1 Ply	2 Ply	3 Ply	4 Ply
$\frac{1}{64}$-inch, per lb.	$0.70			
$\frac{1}{32}$-inch, per lb.	.65			
$\frac{1}{16}$-inch, per lb.	.60	$0.63	$0.66	
$\frac{3}{32}$-inch, per lb.	.55	.58	.61	
$\frac{1}{8}$-inch, per lb.	.....	.55	.58	$0.61
$\frac{3}{16}$-inch, per lb.	.....	.....	.55	.58
$\frac{1}{4}$-inch, per lb.	.....	.....	.....	.55

Three cents per pound additional will be charged for each extra ply of cloth. All cloth insertion packing is one yard wide and any length desired.

Cloth Insertion Gaskets or Rings

Thickness, $\frac{1}{16}$-in. or less, per lb., $1.25. Thickness, $\frac{3}{32}$-in. and upward, per lb., $1.00.

In all sizes above $\frac{3}{32}$ there is one ply of cloth to every $\frac{1}{16}$-inch thickness. Each cloth, whether insertion or on outside, to count as one ply. Five cents per pound additional will be charged for each extra ply of cloth.

Round and Square Piston Packing

ROUND—Cotton fabric and rubber core; from $\frac{1}{4}$ to $1\frac{1}{2}$ inches in diameter, in lengths of 12 feet, per pound $0.85

SQUARE—Cotton fabric; from $\frac{1}{4}$ to $1\frac{1}{2}$ inches square, lengths of 12 feet, per pound $0.85

Pure Sheet Rubber and Valve Gum

Of superior quality and all thicknesses, per pound $1.40

Pure Rubber Valves, Gaskets, Washers, Rings, Etc.

Per pound $1.50

Steam Packing

Hemp packing, Italian A, per lb. $0.25
Hemp packing, Italian B, per lb. 20
Hemp packing, American, per lb. 15
Selden's packing, per lb. 50
Selden's packing, rubber core, per lb. 60
Hair felting, $\frac{1}{2}$ inch thick, per square foot . . .09
Hair felting, $\frac{3}{4}$ inch thick, per square foot . . $0.11
Hair felting, 1 inch thick, per square foot . . .13
C. H. No. 1 waste, per lb. 12
Lamp wick, per lb. 30
Gas fitters' cement, per lb. 12

Artesian Well Brass Cylinders, with Bronze Ball Valves

This cut represents our No. 448 all brass cylinder or working barrel, the shell being made of heavy seamless brass tubing, fitted with hard brass or bronze ball valves, which are supplied with best oak tanned leather cups. The plunger and lower valves can be removed through the connecting pipe, which is larger in diameter than the bore of the cylinder, thus making it convenient when repairs are necessary. Wood sucker rods with forged couplings are recommended, connecting the plunger and suction rods by means of the valve rod. Standard wrought iron threads used in fittings.

No. 448

PRICE LIST OF No. 448

Inside Diam., Inches	Length Stroke, Inches	Capacity per Stroke, Gallons	Length Pump Barrel, Inches	Outside Diameter Caps, Inches	Top and Bottom Connecting Pipe, Inches	Size of Pin in Plunger, Inches	Square of Wood Sucker Rod, Inches	Price
1⅜	16	.10	36	2 3/16	1¼	⅝	1⅛	$15.00
1⅜	24	.154	44	2 3/16	1¼	⅝	1⅛	16.50
1½	10	.10	27	2 5/16	2	⅝	1⅛	17.50
1½	16	.16	33	2 5/16	2	⅝	1⅛	19.00
1½	24	.25	41	2 5/16	2	⅝	1⅛	21.00
2¼	10	.172	29	3 9/16	2½	⅝	1¼	26.00
2¼	16	.275	35	3 9/16	2½	⅝	1¼	28.00
2¼	24	.41	43	3 9/16	2½	⅝	1¼	30.00
2¼	36	.61	55	3 9/16	2½	⅝	1¼	34.00
2⅜	10	.257	31	3⅝	3	⅝	1½	34.00
2⅜	16	.401	37	3⅝	3	⅝	1½	36.00
2⅜	24	.61	45	3⅝	3	⅝	1½	38.00
2⅜	30	.77	51	3⅝	3	⅝	1½	40.00
2⅜	36	.925	57	3⅝	3	⅝	1½	42.00
3¼	10	.36	35	4 7/16	3½	⅝	2	45.00
3¼	16	.574	41	4 7/16	3½	⅝	2	48.00
3¼	24	.862	49	4 7/16	3½	⅝	2	52.00
3¼	30	1.06	55	4 7/16	3½	⅝	2	55.00
3¼	36	1.292	61	4 7/16	3½	⅝	2	58.00
3¾	10	.478	37	5⅛	4	⅝	2¼	67.50
3¾	16	.764	43	5⅛	4	⅝	2¼	70.00
3¾	20	1.05	47	5⅛	4	⅝	2¼	72.50
3¾	24	1.147	51	5⅛	4	⅝	2¼	75.00
3¾	28	1.34	55	5⅛	4	⅝	2¼	77.50
3¾	30	1.374	57	5⅛	4	⅝	2¼	80.00
3¾	36	1.72	63	5⅛	4	⅝	2¼	85.00
3¾	42	2.00	69	5⅛	4	⅝	2¼	90.00
4¼	10	.614	39	5¾	4½	1⅛	2½	87.50
4¼	16	.982	45	5¾	4½	1⅛	2½	90.00
4¼	20	1.23	49	5¾	4½	1⅛	2½	92.50
4¼	24	1.473	53	5¾	4½	1⅛	2½	95.00
4¼	28	1.72	57	5¾	4½	1⅛	2½	97.50
4¼	30	1.842	59	5¾	4½	1⅛	2½	100.00
4¼	36	2.21	65	5¾	4½	1⅛	2½	105.00
4¼	42	2.60	71	5¾	4½	1⅛	2½	110.00
4¾	10	.767	41	6¼	5	1⅛	3	120.00
4¾	16	1.227	47	6¼	5	1⅛	3	127.50
4¾	20	1.53	51	6¼	5	1⅛	3	131.50
4¾	24	1.84	55	6½	5	1¼	3	$135.00
4¾	28	2.15	59	6½	5	1¼	3	138.50
4¾	30	2.30	61	6½	5	1¼	3	142.50
4¾	36	2.76	67	6½	5	1¼	3	150.00
4¾	42	3.22	73	6½	5	1¼	3	157.50
5¾	10	1.12	48	7½	6	1½	3½	172.00
5¾	16	1.798	54	7½	6	1½	3½	180.00
5¾	20	2.2	58	7½	6	1½	3½	187.50
5¾	24	2.696	62	7½	6	1½	3½	195.00
5¾	28	3.1	66	7½	6	1½	3½	202.50
5¾	30	3.36	68	7½	6	1½	3½	207.50
5¾	36	4.04	74	7½	6	1½	3½	217.50
5¾	42	4.71	80	7½	6	1½	3½	227.50
6¾	16	2.479	59	8⅝	7	1½	4	280.00
6¾	20	3.097	63	8⅝	7	1½	4	290.00
6¾	24	3.716	67	8⅝	7	1½	4	300.00
6¾	28	4.336	71	8⅝	7	1½	4	310.00
6¾	30	4.646	73	8⅝	7	1½	4	320.00
6¾	36	5.576	79	8⅝	7	1½	4	335.00
6¾	42	6.506	85	8⅝	7	1½	4	350.00
7¾	16	3.26	62	9½	8	1½	5	425.00
7¾	20	4.08	66	9½	8	1½	5	435.00
7¾	24	4.9	70	9½	8	1½	5	450.00
7¾	28	5.718	74	9½	8	1½	5	465.00
7¾	30	6.126	76	9½	8	1½	5	480.00
7¾	36	7.34	82	9½	8	1½	5	500.00
8¾	16	4.164	63	11	9	2	5½	685.00
8¾	20	5.205	67	11	9	2	5½	705.00
8¾	24	6.247	71	11	9	2	5½	725.00
8¾	28	7.288	75	11	9	2	5½	750.00
8¾	30	7.809	77	11	9	2	5½	775.00
8¾	36	9.37	83	11	9	2	5½	825.00
9½	24	7.24	76	12	10	2	6	915.00
9½	30	9.18	82	12	10	2	6	955.00
9½	36	11.02	88	12	10	2	6	1000.00
11½	24	10.77	82	14	12	2	7¼	1150.00
11½	30	13.47	88	14	12	2	7¼	1200.00
11½	36	16.16	94	14	12	2	7¼	1250.00

All Brass and Brass Lined Working Barrels

No. 655

FITTED WITH FOUR LEATHER PLUNGER AND BRONZE BALL VALVES

Cylinders will be furnished for well casing at list price below for corresponding sizes; intermediate sizes will take list of next larger size.

Gum packers with brass attachments for seating barrels listed on page 160.

PRICE LIST OF No. 655 AND No. 654

Size of Well, Inches	Inside Diameter of Cylinder, Inches		Length Stroke, Inches	Length Barrel Inches	Price of Cylinder, Complete	
	No. 655	No. 654			No. 655	No. 654
2	1 13/16	1 13/16	10	23	$10.50	$11.50
2	1 13/16	1 13/16	14	27	11.00	12.00
2	1 13/16	1 13/16	24	37	12.50	13.50
2	1 13/16	1 13/16	36	49	14.00	15.50
2 1/2	2 1/4	2 1/4	10	24	14.00	15.50
2 1/2	2 1/4	2 1/4	14	28	14.50	16.50
2 1/2	2 1/4	2 1/4	24	38	15.50	18.00
2 1/2	2 1/4	2 1/4	36	50	17.00	19.50
3	2 3/4	2 3/4	10	26	18.50	21.50
3	2 3/4	2 3/4	14	30	19.50	22.50
3	2 3/4	2 3/4	24	40	21.00	24.50
3	2 3/4	2 3/4	36	52	23.00	27.00
3 1/2	3	3 1/4	10	28	29.00	31.50
3 1/2	3	3 1/4	14	32	30.00	32.50
3 1/2	3	3 1/4	24	42	33.00	35.00
3 1/2	3	3 1/4	36	54	37.00	38.00
4	3 1/2	3 3/4	10	28	39.00	44.50
4	3 1/2	3 3/4	14	32	40.50	46.00
4	3 1/2	3 3/4	24	42	43.00	49.00
4	3 1/2	3 3/4	36	54	45.50	52.50
4 1/2	4	4 1/4	10	34	48.00	54.50
4 1/2	4	4 1/4	14	38	49.50	56.00
4 1/2	4	4 1/4	24	48	51.50	61.50
4 1/2	4	4 1/4	36	60	54.50	65.50
5	4 1/2	4 3/4	24	48	70.50	78.00
5	4 1/2	4 3/4	36	60	74.50	86.00
6	5 1/2	5 3/4	24	52	92.00	112.00
6	5 1/2	5 3/4	36	64	100.00	124.00
7	6 1/2	6 3/4	24	56	136.00	152.00
7	6 1/2	6 3/4	36	68	146.00	166.00
8	7 7/16	7 7/16	24	58	212.00	236.00
8	7 7/16	7 7/16	36	70	222.00	250.00
9	.....	8 1/2	24	60	.....	285.00
9	.....	8 1/2	36	72	.....	325.00
10	.....	9 1/2	24	68	.....	460.00
10	.....	9 3/8	36	76	.....	490.00

No. 654

Please order by trade number.

No. 453

All-Brass Eureka Cylinders

WITH BRONZE BALL VALVES

This cylinder is made of seamless drawn brass tubing, fitted with four leather plunger, bronze ball valves. It is designed for use in deep wells where heavy work is performed, and where a large capacity is wanted. It is fastened into the walls of the pipe by a seating tool attached to drill rod. The spring dog coupling holds firmly to pipe while the cylinder proper is revolved by the seating tool as it screws down on the coupling, expanding rubber packing between the cylinder and coupling and locking it to the pipe. For cylinders of larger diameter than three inches we recommend using our cylinder support. See description, page 160.

Price List

COMPLETE WITH VALVES AND SPRING DOG COUPLING

Size of Well, Inches	Inside Diameter of Cylinder. Inches	Stroke, Inches	Price of Cylinder complete	Size of Well, Inches	Inside Diameter of Cylinder, Inches	Stroke, Inches	Price of Cylinder complete
2	$1\frac{13}{16}$	10	$ 4.50	$4\frac{1}{2}$	4	16	$ 41.00
2	$1\frac{13}{16}$	16	5.00	$4\frac{1}{2}$	4	24	45.00
$2\frac{1}{2}$	$2\frac{1}{4}$	10	9.00	5	$4\frac{1}{2}$	24	60.00
$2\frac{1}{2}$	$2\frac{1}{4}$	16	10.50	5	$4\frac{1}{2}$	36	70.00
3	$2\frac{3}{4}$	10	12.50	6	$5\frac{1}{2}$	24	90.00
3	$2\frac{3}{4}$	16	13.50	6	$5\frac{1}{2}$	36	104.00
$3\frac{1}{2}$	3	12	23.00	7	$6\frac{1}{2}$	24	120.00
$3\frac{1}{2}$	3	16	24.50	7	$6\frac{1}{2}$	36	136.00
$3\frac{1}{2}$	3	24	26.00				
4	$3\frac{1}{2}$	12	31.00	8	$7\frac{7}{16}$	24	240.00
4	$3\frac{1}{2}$	16	32.50	8	$7\frac{7}{16}$	36	260.00
4	$3\frac{1}{2}$	24	35.50				

Please order by trade number.

Plain Brass and Brass-Lined Irrigating Cylinders

PLAIN BRASS TO BE USED IN PIPE AFTER WELL IS MADE

Cylinders will be furnished for well casing at list price below for corresponding sizes; intermediate sizes will take list of next larger size.

For directions for seating and fastening in well, see page 160.

No. 651

PRICE LIST OF No. 650 AND No. 651

Size of Well, Inches	Inside Diam. of Cylinder, Inches		Length Stroke, Inches	Length Barrel, Inches	Size of Pin in Plunger, Inches	Price of Cylinder Complete	Price of Cylinder with Valves
	No. 650	No. 651				No. 650	No. 651
2	1 7/8	1 13/16	10	21	5/8	$ 7.00	$ 6.00
2	1 7/8	1 13/16	14	26	5/8	8.00	6.50
2	1 7/8	1 13/16	24	42	5/8	10.50	9.00
2	1 7/8	1 13/16	36	54	5/8	12.00	10.50
2 1/2	2 1/4	2 1/4	10	21	7/8	11.00	9.50
2 1/2	2 1/4	2 1/4	14	26	7/8	12.00	10.00
2 1/2	2 1/4	2 1/4	24	42	7/8	14.50	12.00
2 1/2	2 1/4	2 1/4	36	54	7/8	16.00	13.50
3	2 3/4	2 3/4	10	21	7/8	16.00	13.00
3	2 3/4	2 3/4	14	26	7/8	17.50	14.00
3	2 3/4	2 3/4	24	42	7/8	21.00	17.00
3	2 3/4	2 3/4	36	54	7/8	23.50	19.00
3 1/2	3 1/4	3	10	21	7/8	19.50	17.00
3 1/2	3 1/4	3	14	26	7/8	21.00	18.00
3 1/2	3 1/4	3	24	42	7/8	25.00	20.00
3 1/2	3 1/4	3	36	54	7/8	28.00	23.00
4	3 3/4	3 1/2	10	21	7/8	24.00	20.00
4	3 3/4	3 1/2	14	28	7/8	26.00	21.50
4	3 3/4	3 1/2	24	42	7/8	31.50	25.50
4	3 3/4	3 1/2	36	54	7/8	34.50	28.00
4 1/2	4 1/4	4	14	30	1 1/8	32.00	26.00
4 1/2	4 1/4	4	24	42	1 1/8	38.50	29.50
4 1/2	4 1/4	4	36	54	1 1/8	42.50	32.00
5	4 3/4	4 1/2	14	32	1 1/8	40.00	34.00
5	4 3/4	4 1/2	24	42	1 1/8	45.00	38.00
5	4 3/4	4 1/2	36	54	1 1/8	50.50	42.00
6	5 3/4	5 1/2	24	42	1 1/8	65.00	54.00
6	5 3/4	5 1/2	36	54	1 1/8	74.00	60.00
7	6 3/4	6 1/2	24	42	1 1/2	90.00	76.00
7	6 3/4	6 1/2	36	54	1 1/2	102.00	84.00
8	7 7/16	7 7/16	24	*48	1 1/2	120.00	98.00
8	7 7/16	7 7/16	36	*60	1 1/2	135.00	108.00
10	9 1/2	9 3/8	24	50	1 1/2	350.00	200.00
10	9 1/2	9 3/8	36	62	1 1/2	380.00	235.00

No. 650

* The length of barrel of No. 651 for 24-inch stroke is 42 inches; for 36-inch stroke, 54 inches.

Please order by trade number.

Gum Packers, with Brass Attached

FOR SEATING WORKING BARRELS NOS. 651 AND 655

No. 496

Diameter of Well Casing, Inches	Price	Diameter of Well Casing, Inches	Price
2	$1.15	4½	$ 4.75
2½	1.60	5	5.25
3	2.10	6	6.15
3½	2.95	7	8.70
4	3.40	8	11.40

Please order by trade number.

Valve and Plunger Leathers

MADE OF PURE OAK TANNED STOCK

Diameter Cylinder .	2	2¼	2½	2¾	3	3¼	3½	3¾	4	4½	5	6
Diameter Leather ..	2½	2¾	3	3¼	3½	3¾	4	4¼	4½	5¼	5¾	6¾
Price, per Gross ...	$4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	10.00	15.00	20.00

Specify if lower valve leather or flat plunger leather is wanted.

Cup Leathers

Size, Inches .	½	¾	⅞	1	1⅛	1¼	1½	1¾	2	2¼	2½	2¾	3
Price per 100	$1.00	1.20	1.30	1.40	1.60	2.00	2.50	3.25	3.50	4.00	5.00	6.00	7.00
Size, Inches .	3¼	3½	3¾	4	4¼	4½	4¾	5	5¼	5½	5¾	6	.....
Price, per 100	$8.00	9.00	10.00	12.00	16.00	20.00	24.00	28.00	32.00	36.00	40.00	44.00	.....

No. 703

Rubber Packers for Tubular Well Valves

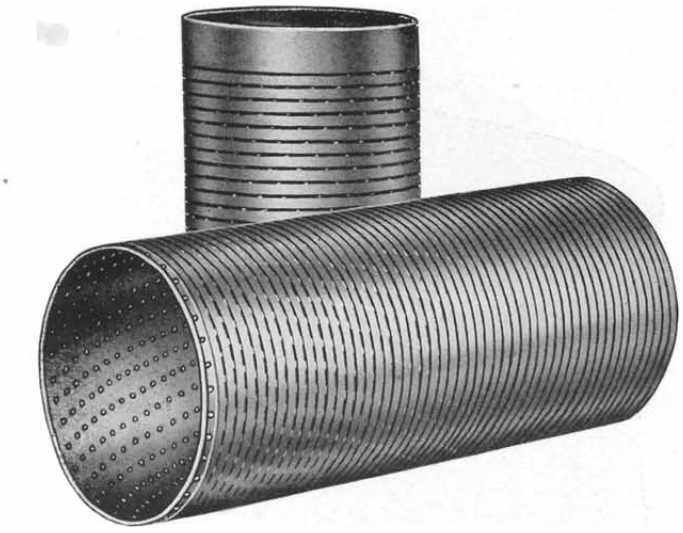
Valves, Inches	Price	Valves, Inches	Price	Valves, Inches	Price
2	$0.16	3½	$0.60	5	$3.00
2½	.30	4	.80	6	4.00
3	.40				

Octagon Wood Pump Rods

WITH WROUGHT FORGED COUPLINGS

Our wooden pump rods are made of the best quality selected ash, and are furnished, unless otherwise specified, in random lengths of about 20 feet.

Size of Rod, Inches	Adapted for Working Barrels, Diameter, Inches	Price, per Foot, blank	Price per Foot, Fitted with Forged Sucker Rod Couplings	Price per Foot, Galvanized Forged Sucker Rod Couplings and Copper Rivets
1⅛	1⅜ to 2¼	$0.04	$0.08	$0.15
1⅝	2¼ to 2¾	.05	.11	.20
1⅞	2¾ to 3¾	.09	.18	.30
2¼	3¾ to 5¾	.14	.25	.40
3½	5¾ to 8¾	.30	.65	1.10



The Johnson Patent Well Screen

THE LATEST AND BEST SCREEN ON THE MARKET.

Notice that the slit is spiral in shape and continuous so that the full area is obtained completely around the screen. This gives an available water area 50 per cent. greater in the same length than is secured in any other, that is: a 10-foot screen of this type would have a water area equal to that in a 15-foot screen of any other make.

It is amply strong and will withstand even greater strains than other styles.

It is impossible to choke it because the interior perforations or round holes are larger in diameter than the width of the slits, and any sand or solid substance that will pass through the slits will, of course, readily pass through the holes on the inside.

The slits can be made any width desired, and in ordering, the width wanted should be specified. They can vary from two one-thousandths of an inch up.

All sizes are made to go inside of iron pipe from 3-inch to 12-inch in diameter.

Screens will be furnished with lead packer unless otherwise specified.

PRICE LIST

Size, Inches	3	3½	4	4½	5	6	7	8	9	10	12
Screen, per foot.....	$2.50	$3.50	$4.00	$4.50	$5.20	$6.60	$8.90	$11.50	$15.50	$17.75	$23.50
Bale Nipple and Packer ..	2.50	3.50	4.00	4.00	5.00	6.00	7.00	8.00	12.00	18.00	24.00

The above cut shows one of our standard 50,000-gallon railroad tanks on cast columns.

We also contract for the erection, complete, of reservoir tanks on towers of either steel, stone, brick or wood.

Plans and estimates cheerfully furnished on application.

20 x 30-Foot Tank on 50-Foot Steel Tower

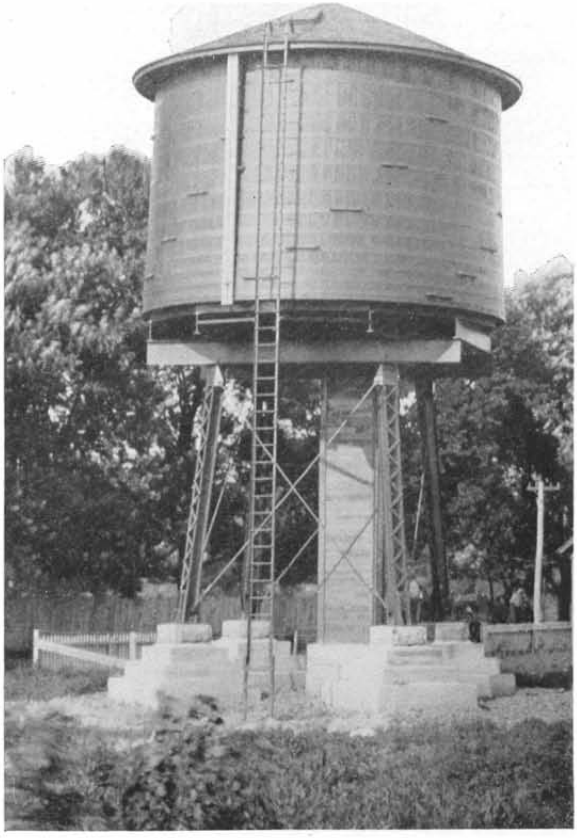
100,000 gallons capacity. Erected for C. & E. I. R R. at Dolton, Ill.

100,000-Gallon Tank

20 x 30

30-FOOT, 12-POST LARIMER COLUMN

We have built a large number of steel towers of various heights for railroad and water-works purposes, and are prepared to quickly furnish or erect anything required in this line.



16 x 24-foot Tank on 20-foot Steel Tower

C. R. I. & P. Ry. at Belle, Mo.

20 x 18-foot Tank on 90-foot Steel Tower

Four-Post Steel Tower for Tanks

For 7x8 and 10x8 Tanks				For 12x8 and 14x8 Tanks			
Height Tower	Painted One Coat			Height Tower	Painted One Coat		
	Weight	Telegraph Name	Price		Weight	Telegraph Name	Price
10	1017	Packer	$ 80.00	10	1144	Pedal	$ 92.00
15	1327	Paddle	100.00	15	1519	Peeler	116.00
20	1659	Page	128.00	20	1910	Peg	144.00
25	1944	Palfrey	152.00	25	2247	Pelican	174.00
30	2164	Pamper	168.00	30	2515	Pencil	192.00
35	2560	Panek	200.00	35	2992	Pelvis	236.00
40	2768	Pansy	216.00	40	3246	Perfidy	250.00
45	3079	Pantry	236.00	45	3621	Perplex	276.00
50	3455	Parboil	272.00	50	4082	Perusal	316.00
55	3678	Pardon	284.00	55	4360	Pedicle	336.00
60	3965	Patriot	306.00	60	4709	Pedigree	360.00
65	4437	Partician	334.00	65	5269	Pedagogue	408.00
70	4643	Patron	360.00	70	5557	Pediment	424.00
75	4965	Pause	384.60	75	5926	Peevish	456.00
80	5435	Payday	424.00	80	6498	Pegging	504.00
85	5697	Pathos	444.00	85	6814	Pelting	524.00
90	6018	Passage	468.00	90	7228	Pendulum	560.00
95	6510	Password	508.00	95	7801	Penurious	610.00
100	6791	Pastor	530.00	100	8150	Pepper	628.00

For 8x10 and 10x10 Tanks				For 12x10 and 14x10 Tanks			
Height Tower	Painted One Coat			Height Tower	Painted One Coat		
	Weight	Telegraph Name	Price		Weight	Telegraph Name	Price
10	1418	Pillar	$108.00	10	1521	Eams	$114.00
15	1829	Pioneer	138.00	15	1982	Eat	148.00
20	2278	Pivot	172.00	20	2494	Ealt	162.00
25	2657	Pitcher	202.00	25	2921	Ealan	220.00
30	2991	Pitchfork	226.00	30	3315	Eadam	250.00
35	3556	Pigeon	278.00	35	3932	Eadil	300.00
40	3859	Picnic	296.00	40	4285	Eadeg	326.00
45	4205	Pickle	322.00	45	4682	Eadban	356.00
50	4813	Pincushion	370.00	50	5348	Eadfil	408.00
55	5121	Pigment	394.00	55	5709	Eadgan	436.00
60	5492	Pinchbeck	420.00	60	6134	Eadger	466.00
65	6106	Piggery	468 00	65	6807	Eadgil	520.00
70	6473	Pittance	496.00	70	7228	Eadhol	552.00
75	6866	Pilgrimage	516.00	75	7675	Eadfus	585.00
80	7513	Pinafore	580.00	80	8386	Eadfem	642.00
85	7871	Pinnacle	606.00	85	8798	Eadfad	672.00
90	8303	Pindaric	636.00	90	9317	Eadfog	710.00
95	8965	Pipkin	690.00	95	10008	Eadhus	766.00
100	9353	Pincers	710.00	100	10464	Eadmus	798.00

Four-Post Steel Towers for Tanks

For 10x12 and 12x12 Tanks

Height Tower	Painted One Coat		
	Weight	Telegraph Name	Price
10	2162	Goal	$162.00
15	2545	Goard	190.00
20	3156	Goam	234.00
25	3627	Goans	272.00
30	4056	Goash	304.00
35	4793	Goabs	362.00
40	5230	Goace	394.00
45	5647	Goarel	426.00
50	6334	Poodle	478.00
55	6866	Goant	520.00
60	7303	Popular	552.00
65	8081	Goach	612.00
70	8520	Portfolio	644.00
75	9046	Goage	684.00
80	9813	Goaza	746.00
85	10320	Goaje	782.00
90	10828	Goapa	822.00
95	11682	Goapus	886.00
100	12143	Goazy	920.00

For 14x12 Tanks

Height Tower	Painted One Coat		
	Weight	Telegraph Name	Price
10	2270	Gona	$168.00
15	2718	Gonace	196.00
20	3385	Gonabe	250.00
25	3908	Gonel	292.00
30	4408	Progress	330.00
35	5193	Gonba	392.00
40	5684	Pro'ection	428.00
45	6147	Gonbec	462.00
50	6909	Prow	520.00
55	7400	Gonbin	558.00
60	7992	Proffer	602.00
65	8825	Gonbus	668.00
70	9337	Gonboz	702.00
75	9917	Gonbuts	748.00
80	10803	Gondi	816.00
85	11326	Gondel	856.00
90	11922	Gondob	900.00
95	12806	Gondace	968.00
100	13330	Gonce	1008.00

For 10x14 and 12x14 Tanks

Height Tower	Painted One Coat		
	Weight	Telegraph Name	Price
10′ 6″	2572	Gofan	$192.00
15′ 6″	3185	Gofact	240.00
20′ 6″	3623	Gofabe	275.00
25′ 6″	4575	Gofades	345.00
30′ 6″	5104	Gofet	389.00
35′ 6″	5745	Gofels	439.00
40′ 6″	6662	Gofeut	510.00
45′ 6″	7180	Gofenk	547.00
50′ 6″	7675	Gofetus	590.00
55′ 6″	8608	Gofema	659.00
60′ 6″	9063	Gofebil	695.00
65′ 6″	9735	Gofebka	750.00
70′ 6″	10376	Gofebut	809.00
75′ 6″	11350	Gofebon	875.00
80′ 6″	11924	Gofecit	937.00
85′ 6″	12897	Gofecas	992.00
90′ 6″	13490	Gofecarn	1042.00
95′ 6″	13855	Gofedas	1084.00
100′ 6″	14525	Gofed	1132.00

For 14x14 and 16x14 Tanks

Height Tower	Painted One Coat		
	Weight	Telegraph Name	Price
10′ 6″	3086	Godan	$230.00
15′ 6″	3822	Godals	288.00
20′ 6″	4347	Godabe	330.00
25′ 6″	5490	Godace	414.00
30′ 6″	6125	Punt	466.00
35′ 6″	6894	Goddess	526.00
40′ 6″	7994	Puppet	612.00
45′ 6″	8616	Goden	656.00
50′ 6″	9209	Punge	708.00
55′ 6″	10329	Godians	790.00
60′ 6″	10875	Purport	834.00
65′ 6″	11682	Godot	900.00
70′ 6″	12451	Godeta	970.00
75′ 6″	13620	Purbling	1050.00
80′ 6″	14288	Purifier	1100.00
85′ 6″	15476	Godeza	1190.00
90′ 6″	16187	Godoma	1250.00
95′ 6″	16625	Godole	1300.00
100′ 6″	17430	Godusan	1360.00

Four-Post Steel Towers for Tanks

For 14x16 and 16x16 Tanks

Height Tower	Painted One Coat		
	Weight	Telegraph Name	Price
11	4000	Gogal	$ 300.00
16	4550	Gogace.....	346.00
21	5150	Plaiter	392.00
26	6468	Gogant.....	488.00
31	7100	Plaudit.....	540.00
36	7800	Gogeb	600.00
41	9200	Playful.....	712.00
46	9800	Gogels	760.00
51	10575	Plainness.....	820.00
56	11850	Gogba	912.00
61	12300	Pleasing.....	950.00
66	13150	Gogben	1005.00
71	14600	Gogbus	1124.00
76	15500	Gogca.....	1196.00
81	16000	Pliant.....	1234.00
86	17532	Gogcen	1356.00
91	18223	Gogus.....	1414.00
96	19033	Gogman	1475.00
101	20750	Gogiz.....	1600.00

For 18x18 and 20x18 Tanks

Height Tower	Painted One Coat		
	Weight	Telegraph Name	Price
11	6378	Gola.....	$484.00
16	7100	Golats	540.00
21	7700	Peccant	600.00
26	9981	Golaba.....	770.00
31	10625	Peculiar.....	810.00
36	11350	Golaus.....	866.00
41	13426	Peerage	1030.00
46	14337	Golade.....	1100.00
51	14989	Golast	1156.00
56	17256	Goleds	1330.00
61	18032	Penal	1390.00
66	19213	Golct	1482.00
71	21340	Penman.....	1640.00
76	22380	Golces	1728.00
81	23131	Pension	1786.00
86	23649	Golcun.....	1834.00
91	25093	Golom	1940.00
96	27354	Goloz.....	2084.00
101	28346	Peracute	2186.00

For 20x20 and 22x20 Tanks

Height Tower	Painted One Coat		
	Weight	Telegraph Name	Price
11	9150	Goeas.....	$ 690.00
16	10150	Goeba	780.00
21	11251	Prefect	856.00
26	13663	Goebus	1044.00
31	14869	Prelacy	1140.00
36	15915	Goebot.....	1240.00
41	17278	Premise.....	1330.00
46	19804	Goebons	1532.00
51	20959	Preside.....	1616.00
56	22093	Goeboma.....	1706.00
61	24863	Prestige	1920.00
66	25970	Goebols.....	2006.00
71	26983	Goebolet.....	2086.00
76	28590	Goebolon.....	2210.00
81	31413	Prettily.....	2438.00
86	32752	Goeca.....	2534.00
91	33704	Goecus.....	2616.00
96	36897	Goecet	2854.00
101	38380	Goecan	2972.00

For 22x21 and 24x21 Tanks

Height Tower	Painted One Coat		
	Weight	Telegraph Name	Price
11	9442	Goblet	$ 720.00
16	10740	Goba	814.00
21	12035	Gobab	922.00
26	14643	Gobace	1126.00
31	16045	Gobade	1232.00
36	17437	Gobafs.....	1346.00
41	19096	Gobafec.....	1470.00
46	21568	Gobag	1666.00
51	22919	Gobages	1770.00
56	24249	Gobageg	1876.00
61	27215	Gobels	2100.00
66	28518	Gobeca	2200.00
71	29643	Gobedus	2290.00
76	31530	Gobef	2446.00
81	34549	Gobena	2662.00
86	36085	Gobems.....	2794.00
91	37232	Gobeza	2884.00
96	40871	Gobet	3164.00
101	42300	Gobols.....	3280.00

Twelve-Post Steel Towers for Tanks

For 18x22 and 16x24 Tanks				For 18x24 and 20x24 Tanks			
Height Tower	Painted One Coat			Height Tower	Painted One Coat		
	Weight	Telegraph Name	Price		Weight	Telegraph Name	Price
11	7800	Goca	$ 540.00	11	9200	Goha	$ 700.00
16	9300	Gocaca	710.00	16	11350	Gohabe	880.00
21	11000	Rabid	840.00	21	13370	Gohacl	1034.00
26	13200	Gocabe	1014.00	26	16000	Gohads	1236.00
31	14700	Racket	1128.00	31	18100	Rackish	1390.00
36	16500	Gocads	1270.00	36	19800	Gohel	1524.00
41	18600	Radical	1430.00	41	22200	Gohus	1710.00
46	21400	Gocaer	1648.00	46	25200	Gohez	1944.00
51	22850	Radius	1764.00	51	27300	Ramhead	2106.00
56	24300	Gocars	1874.00	56	28900	Gohute	2240.00
61	26700	Rafter	2060.00	61	32000	Gohons	2470.00
66	28100	Gocast	2164.00	66	33300	Gohonea	2572.00
71	29700	Gocases	2294.00	71	36100	Gohors	2790.00
76	33150	Gocate	2550.00	76	39400	Gohoran	3048.00
81	34300	Railer	2652.00	81	40900	Rankle	3160.00
86	35700	Gocatus	2760.00	86	42600	Gohosat	3300.00
....	.....	Gocel	.....	....	.....	.....	.....
91	38968	Gocema	3012.00	91	46100	Gohomi	3578.00
96	40350	Gocenus	3120.00	96	48200	Gohic	3734.00
101	41669	Gocez	3230.00	101	49800	Gohina	3850.00

For 18x30 and 20x30 Tanks

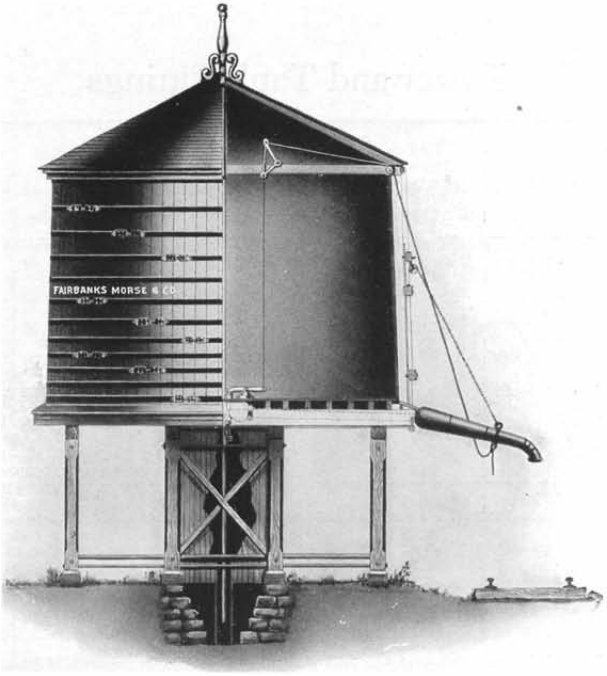
Height Tower	Painted One Coat		
	Weight	Telegraph Name	Price
11	14667	Goian	$1060.00
16	16578	Goiabe	1210.00
21	18541	Goiabus	1360.00
26	22389	Goiabez	1630.00
31	24686	Goiaces	1850.00
36	26731	Goialem	2022.00
41	28988	Goibal	2178.00
46	33143	Goiben	2500.00
51	35068	Goicans	2644.00
56	37093	Goiaze	2800.00
61	41364	Goiales	3138.00
66	43540	Goizen	3306.00
71	45760	Goizal	3480.00
76	50115	Goifan	3810.00
81	52023	Goifus	3950.00
86	54599	Goifem	4168.00
91	57882	Goige	4400.00
96	60815	Goigan	4634.00
101	63448	Goigus	4888.00

Tower and Tank Fittings

Sizes of Tanks	7 x 8 or 10 x 8		12 x 8 or 14 x 8		8 x 10 or 10 x 10		12 x 10 or 14 x 10		10 x 12 or 12 x 12	
	Wt.	Price	Wt.	Price	Wt.	Price	Wt.	Price	Wt.	Price
Painted steel tank balcony	750	$60.00	800	$66.00	950	$76.00	1050	$88.00	1646	$120.00
Painted wood tank balcony	785	18.00	785	18.00	845	28.00	845	28.00	1300	50.00
Painted steel tank balcony railing	120	13.00	120	13.00	129	14.00	129	14.00	146	16.00
Conical shingled tank roof	368	14.00	368	14.00	570	24.00	570	24.00	660	30.00
Center pole for tank roof	30	3.00	30	3.00	30	3.00	30	3.00	30	3.00
Set (4) roof brackets	20	4.00	20	4.00	20	4.00	20	4.00	20	4.00
Set (8) tank brackets	40	6.00	40	6.00	40	6.00	40	6.00	40	6.00

Sizes of Tanks	14 x 12		10 x 14 or 12 x 14		14 x 14 or 16 x 14		14 x 16 or 16 x 16		18 x 18 or 20 x 18	
	Wt.	Price	Wt.	Price	Wt.	Price	Wt.	Price	Wt.	Price
Painted steel tank balcony	1884	$140.00	2900	$214.00	3200	$250.00	3850	$294.00	5350	$400.00
Painted wood tank balcony	1300	50.00	3500	80.00	3500	80.00	5000	110.00	8000	160.00
Painted steel tank balcony railing	146	16.00	190	20.00	190	20.00	300	22.00	225	25.00
Conical shingled tank roof	669	30.00	1000	40.00	1000	40.00	2000	60.00	2700	80.00
Center pole for tank roof	30	3.00	30	3.00	30	3.00	30	3.00	85	4.00
Set (4) roof brackets	20	4.00	20	4.00	20	4.00	20	4.00	20	4.00
Set (8) tank brackets	40	6.00	40	6.00	40	6.00	.....	.....	.....	.....
Set (16) tank brackets	.....	.....	.....	.....	.....	.....	80	12.00	80	12.00

Sizes of Tanks	20 x 20 or 22 x 20		22 x 21 or 24 x 21		18 x 22 or 16 x 24		18 x 24 or 20 x 24		18 x 30 or 20 x 30	
	Wt.	Price	Wt.	Price	Wt.	Price	Wt.	Price	Wt.	Price
Painted steel tank balcony	6727	$520.00	7975	$620.00	5000	$380.00	5500	$416.00	10126	$778.00
Painted wood tank balcony	11136	260.00	13664	300.00	6500	140.00	7000	144.00	11000	250.00
Painted steel tank balcony railing	240	26.00	250	28.00	260	30.00	260	30.00	350	38.00
Conical shingled tank roof	3300	96.00	3500	100.00	4000	130.00	4000	130.00	8000	224.00
Center pole for tank roof	85	4.00	85	4.00	85	4.00	85	4.00	85	4.00
Set (4) roof brackets	20	4.00	20	4.00	20	4.00	20	4.00	20	4.00
Set (16) tank brackets	80	12.00	80	12.00	80	12.00	80	12.00	80	12.00



Railroad Tanks

These we build of any dimensions, giving capacities up to 100,000 gallons.

Special machinery enables us to accurately shape the staves and bottom so they make a perfectly water-tight tank when assembled.

We contract for erection complete, or for supplying the needful plans and materials for building these tanks on wooden, steel or cast-iron substructures of any height for railroads, stock yards, factories, town and village water supply, etc., including all pipe work, and the furnishing and setting of pumping machinery where required.

Standard Frost-Proof Roofs

IN KNOCK-DOWN, ALL MATERIAL SHAPED AND READY TO PUT TOGETHER

	Weight	Price		Weight	Price
For tank 10 ft. dia....	1260	$32.00	For tank 20 ft. dia....	4000	$ 88.50
For tank 12 ft. dia....	1580	38.00	For tank 22 ft. dia....	4900	106.00
For tank 14 ft. dia....	2305	53.50	For tank 24 ft. dia....	5300	117.00
For tank 16 ft. dia....	2740	67.00	For tank 30 ft. dia....	8100	173.00
For tank 18 ft. dia....	3340	82.00			

Water Indicators

COMPLETE WITH INDICATOR BOARD, PULLEY AND CHAIN FOR TANKS

10 ft. stave	$5.00	16 ft. stave	$ 8.00
12 ft. stave	6.00	18 ft. stave	9.00
14 ft. stave	7.00	20 ft. stave	10.00

Railroad Water Tanks

MADE OF THREE-INCH SELECTED

WHITE PINE OR CYPRESS

Length Stave, Feet	Diameter Bottom, Feet	Capacity, Gallons	Capacity, Barrels	No. of Hoops	No. of Pairs Lugs ea. Hoop	Pine Estimated Shipping Weight	Pine Price with Lugged Hoops	Cypress Shipping Weight	Cypress Price with Lugged Hoops
10	10	4750	150	7	1	2600	$ 85.00	3700	$149.00
10	12	7053	224	7	2	4000	100.00	4800	188.00
10	14	9773	310	8	2	4700	134.00	5900	222.00
12	10	5700	182	8	1	3000	95.00	4300	169.00
12	12	8488	269	8	2	4500	120.00	5600	190.00
12	14	11774	374	8	2	5800	150.00	6700	230.00
12	16	15597	495	8	2	6700	170.00	8200	270.00
12	18	19956	633	9	2	7500	205.00	9300	320.00
12	20	24852	788	9	3	9000	240.00	10100	375.00
14	12	9902	314	10	2	5400	145.00	6300	215.00
14	14	13750	436	10	2	6700	165.00	7600	260.00
14	16	18229	579	10	2	7500	196.00	9000	305.00
14	18	23340	741	10	2	8600	230.00	10600	360.00
14	20	29080	923	10	3	11000	270.00	12200	415.00
14	22	35451	1125	10	3	12500	300.00	13900	470.00
16	12	11293	358	12	2	6000	173.00	7100	240.00
16	14	15701	498	12	2	7100	190.00	8500	290.00
16	16	20833	661	12	2	8000	225.00	10000	340.00
16	18	26689	847	12	2	9500	260.00	11800	400.00
16	20	33270	1056	12	3	12500	310.00	13600	455.00
16	22	40576	1288	12	3	13000	345.00	15300	515.00
16	24	48606	1543	12	3	14000	375.00	17300	580.00
16	25	52660	1671	12	3	15500	405.00	.....	.....
16	26	57360	1821	12	3	16500	420.00	19000	678.00
16	30	77044	2446	14	3	20200	535.00	23900	820.00
18	16	23406	743	13	2	10200	275.00	11200	375.00
18	18	30004	952	13	2	11000	312.00	13200	450.00
18	20	37423	1191	14	3	13800	370.00	15100	510.00
18	22	45660	1449	14	3	14500	410.00	17000	565.00
18	24	54714	1737	14	3	15000	455.00	19000	640.00
18	26	64587	2050	14	3	18000	505.00	20800	730.00
18	30	86790	2755	14	3	25500	600.00	25800	890.00
20	18	33288	1057	15	2	13000	350.00	14400	485.00
20	20	41540	1319	15	3	14600	400.00	16500	550.00
20	22	50702	1609	15	3	16000	450.00	18600	615.00
20	24	60778	1929	16	3	16000	505.00	20800	690.00
20	26	71766	2278	16	3	20000	560.00	22900	790.00
20	30	96480	3063	16	3	28000	660.00	28300	960.00
22	20	45636	1448	17	3	16000	505.00	18100	600.00
24	21	58275	1850	20	3	19000	584.00	.....	.....
24	30	120728	3833	22	3	30500	1017.00	.....	.....

Measurements given above are from outside to outside. Prices include staves, bottom, dowel-pins, hoops, and lugs.

Shipped knocked-down f. o. b. cars at factory. We build tanks of any size. Write us, giving full specifications.

Round Reservoir Tanks

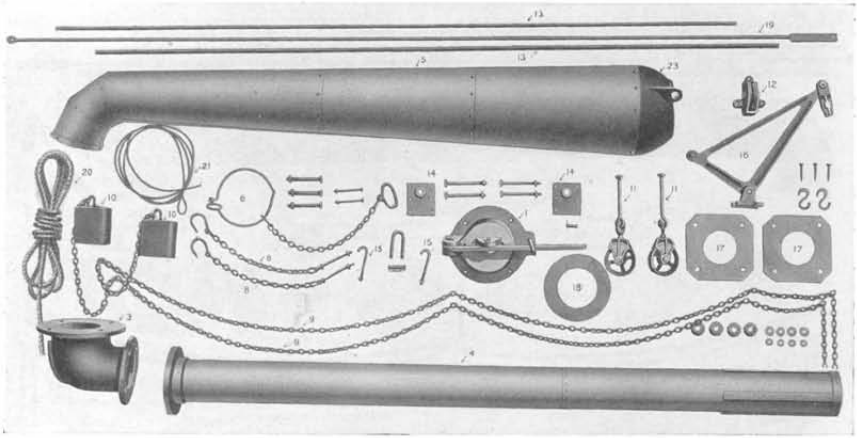
MADE OF TWO-INCH STANDARD

WHITE PINE OR CYPRESS

Length Stave, Feet	Diameter Bottom, Feet	Capacity, Gallons	Capacity, Barrels	No. of Hoops	No. of Pairs Lugs ea. Hoop	Estimated Shipping Weight	Pine Price with Lug Hoops	Cypress Price with Lugged Hoops
4	4	271	9	4	1	275	$13.50	$16.51
4	5	448	15	4	1	380	16.50	21.00
4	6	644	21	4	1	450	20.00	24.50
4	7	905	29	4	1	600	24.00	29.50
4	8	1198	38½	4	1	700	28.00	35.00
5	4	355	12	4	1	385	15.00	18.50
5	5	575	19	4	1	450	18.50	23.50
5	6	839	27	4	1	525	22.50	28.50
5	7	1163	37	4	1	700	27.00	33.50
5	8	1555	50	4	1	950	32.00	40.00
6	4	425	14	5	1	400	17.50	21.50
6	5	703	23	5	1	575	21.50	26.50
6	6	1025	33	5	1	700	26.00	32.00
6	7	1422	46	5	1	800	31.00	38.00
6	8	1883	61	5	1	900	36.50	45.00
6	9	2410	75	5	1	1000	42.50	52.00
6	10	3020	96	5	1	1400	49.00	60.00
6	12	4403	140	5	1	1550	62.00	.....
7	5	832	27	6	1	694	25.00	31.00
7	6	1212	39	6	1	750	30.00	37.00
7	7	1680	54	6	1	900	35.00	43.00
7	8	2226	72	6	1	1000	41.00	50.00
7	9	2870	91	6	1	1200	47.00	57.50
7	10	3570	114	6	1	1700	54.00	66.00
7	12	5204	165	6	1	2100	68.00	.....
8	6	1325	43	6	1	850	34.00	42.00
8	7	1939	62	6	1	950	39.00	48.50
8	8	2569	83	6	1	1200	45.00	56.00
8	9	3286	106	6	1	1450	52.00	64.00
8	10	4092	132	6	1	1700	60.00	73.00
8	12	5970	192	6	1	2000	75.00	93.00
10	6	1760	57	7	1	950	42.00	52.00
10	7	2456	76	7	1	1250	48.00	60.00
10	8	3254	105	7	1	1500	55.00	69.00
10	9	4162	134	7	1	1700	63.00	78.00
10	10	5109	163	7	1	1900	72.00	88.00
10	12	7567	244	7	1	2300	90.00	110.00
12	8	3938	126	8	1	1750	65.00	85.00
12	9	5039	162	8	1	1950	74.00	98.00
12	10	6275	202	8	1	2100	84.00	112.00
12	12	9154	297	8	2	2500	105.00	140.00
14	9	5923	191	10	1	2100	85.00	112.00
14	10	7367	237	10	1	2500	96.00	127.00

All measurements from outside to outside. Prices include staves, bottom, dowel-pins, hoops and Eclipse pressed steel draw lugs.

Shipped knocked-down, f. o. b. cars at factory. We build tanks of any size. Write us, giving full specifications.



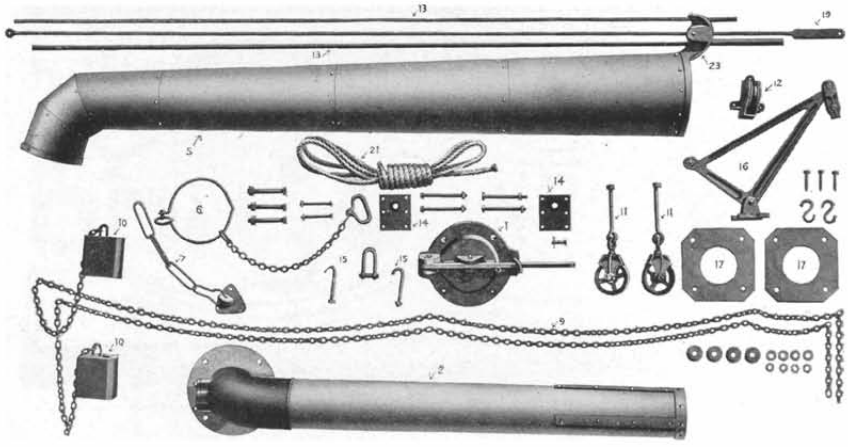
No. 2 Improved Tank Fixtures

PRICES IMPROVED ECLIPSE TANK FIXTURES

Description	Weight, Pounds	Price
7-inch, for tank 24 feet diameter, and less	734	$ 80.00
7-inch, for tank 30 feet diameter	784	86.00
8-inch, for tank 24 feet diameter, and less	844	88.00
8-inch, for tank 30 feet diameter	900	95.00
10-inch, for tank 24 feet diameter, and less	1095	140.00
10-inch, for tank 30 feet diameter,	1175	150.00
12-inch, for tank 24 feet diameter,	1358	170.00

Prices include 24 feet $\frac{3}{4}$-inch manila rope, two gaskets, valve rod, and 15 feet $\frac{3}{8}$-inch wire rope.

For list of parts see page 177.



No. 1 Tank Fixtures

PRICE COMPLETE SETS ECLIPSE TANK FIXTURES

Size, Inches	Pattern, Illustrated opposite	Fixtures, Complete	Shipping Weight, Full Set
6	No. 1	$56.00	576
7	No. 1	60.00	596
8	No. 1	68.00	659

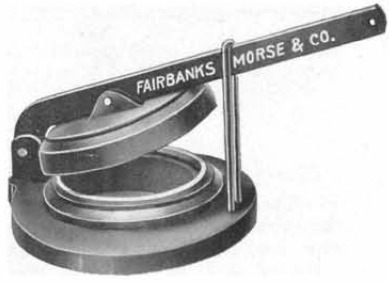
Prices include 24 feet ¾-inch manila rope, two gaskets for valve and flange of elbow and one valve rod.

Price List of Extra Parts Eclipse Tank Fixtures

No.		No. 1 or Old Pattern			No. 2 or New Pattern			
		6-inch	7-inch	8-inch	7-inch	8-inch	10-inch	12-inch
1	1 tank valve, complete	$11.70	$13.50	$14.40	$13.50	$14.40	$25.20	$30.60
2	1 galv. outlet pipe, cast elbow	10.80	12.60	13.30	.....	.....	.....	.....
3	1 cast outlet elbow	.....	.....	.....	12.60	14.40	17.10	22.50
4	1 galvanized outlet pipe	.....	.....	.....	12.60	15.10	19.80	25.00
5	1 galv. sway spout, cast butt	12.60	12.60	14.40	14.40	16.20	27.00	28.80
6	1 center ring, pull chain and h'dle	.90	.90	.90	1.45	1.45	1.80	1.80
7	1 hanger chain, complete	.90	.90	.90	.....	.....	.....	.....
8	2 hanger chains, complete	.....	.....	.....	1.45	1.45	1.45	1.45
9	2 weight chains, complete	4.30	4.30	4.30	4.30	4.30	4.30	4.30
10	2 cast balance weights	5.40	5.40	5.40	5.40	5.40	8.65	8.65
11	2 sheaves and eye bolts	1.25	1.25	1.25	1.25	1.25	1.25	1.25
12	1 sheave and stand	1.10	1.10	1.10	1.10	1.10	1.10	1.10
13	2 guide pipes	2.70	2.70	2.70	2.70	2.70	2.90	2.90
14	2 guide plates, pipe	.70	.70	.70	.70	.70	.70	.70
15	2 hook bolts and washers	.25	.25	.25	.25	.25	.25	.25
16	1 quadrant lever, complete	2.90	2.90	2.90	2.90	2.90	5.40	5.40
17	2 rubber gaskets	.55	.55	.70	.55	.70	.90	1.10
18	1 wood gasket	.....	.....	.....	.35	.35	.45	45
19	1 valve rod for 16-ft. stave	2.15	2.15	2.15	2.15	2.15	3.60	3.60
20	24 ft. of ¾-inch manila rope	1.15	1.15	1.15	1.15	1.15	1.15	1.15
21	15 ft. of ⅝-inch wire rope	.....	.....	.....	2.15	2.15	2.15	2.15
22	1 moulded rubber for tank valve	1.80	2.15	2.45	2.15	2.45	4.50	7.20
23	1 butt casting for sway spout	1.35	1.35	1.80	2.70	3.60	4.50	5.40

Tank Valves

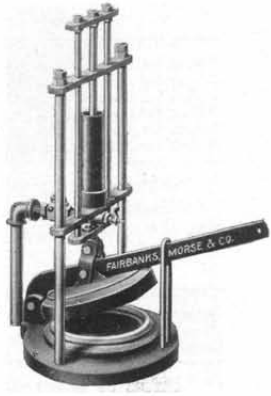
6-inch	$11.70
7-inch	13.50
8-inch	14.40
10-inch	25.20
12-inch	30.60
14-inch	60.00

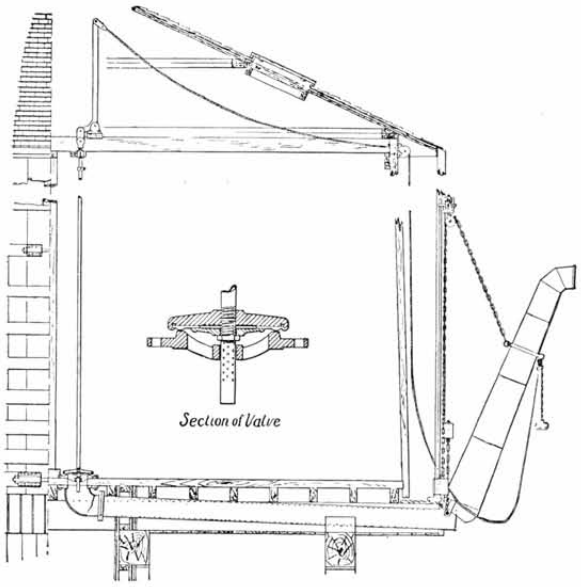


Closing Device for Tank Valves

It is the invention of a practical water service man. It positively prevents the pounding or rebounding of tank valves by controlling the speed with which they close. It prolongs the life of the valve seat and stops the waste of water because it does away with the shock and pounding which usually follow the release of the valve lever.

The device is extremely simple, cannot get out of order, and can be attached to any tank valve.





Improved Tank Fixtures

WITH REMOVABLE OUTLET VALVE

The object of this valve is to prevent the loss of a tank of water when renewing the valve rubber. This is accomplished by clamping a cap over the end of outlet pipe, inserting a rod through the hollow valve stem, which forms a guide so that the valve can easily be pulled out, repaired and returned with the loss of only the water contained in the outlet pipe. The valve lifting rod is hollow and prevents the formation of a vacuum when valve is closed.

PRICES OF ABOVE FIXTURES, COMPLETE

7-inch for tanks 24 feet diameter and less	$ 94.00
7-inch for tanks 30 feet diameter	99.00
8-inch for tank 24 feet diameter and less	107.00
8-inch for tank 30 feet diameter	113.00
10-inch for tank 24 feet diameter and less	165.00
10-inch for tank 30 feet diameter	180.00

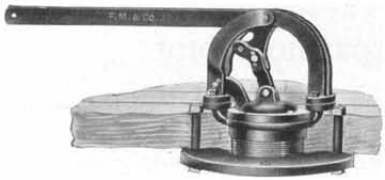
When ordering always state size of tank and distance to center of track.

These valves can be used with any style of tank fixtures, in which case we furnish the valve complete, valve rod, lever, cap and clamp for outlet spout.

PRICES

7-inch valve, rod, etc	$23.00
8-inch valve, rod, etc	26.00
10-inch valve, rod, etc	37.00

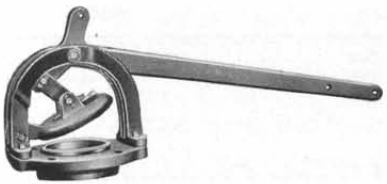
Prices of larger sizes on application.



Tank Flush Valve

LIST PRICE

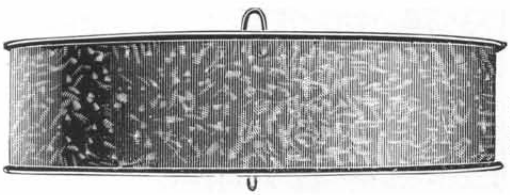
Three-inch Flush Valve $17.00



Railroad Float Valves

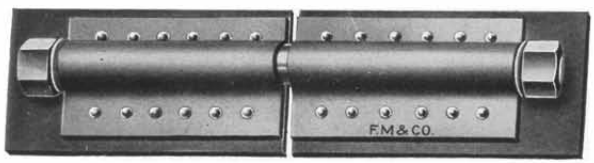
LIST PRICES

Size, Inches	2	2½	3	4	5	6	7	8
Screwed	$5.00	$10.00	$15.00	$22.00	$32.00	$45.00	$60.00	$75.00
Flanged	.....	.....	.....	25.00	36.00	50.00	65.00	80.00



Galvanized Floats

4 x 16 ..... $1.75
8 x 24 ..... 5.00
8 x 36 ..... 6.00



Eclipse Steel Lug

PRICE PER PAIR

With Draw-Rod and Rivets.

For 1½ x ⅛ Hoops	$0.50	For 4 x ⅛ Hoops	$1.65
For 2 x ⅛ Hoops	.75	For 4½ x ⅛ Hoops	1.75
For 2½ x ⅛ Hoops	.90	For 5 x ⅛ Hoops	2.75
For 3 x ⅛ Hoops	1.15	For 5½ x ⅛ Hoops	3.15
For 3½ x ⅛ Hoops	1.40	For 6 x 3/16 Hoops	3.50

Expansion Joint

PRICES

4-inch	$ 30.00
6-inch	50.00
8-inch	75.00
10-inch	110.00

Balance Float Valve

PRICES

4-inch	$ 30.00
6-inch	36.00
8-inch	50.00
10-inch	70.00

Flanged Tank Connection

LOWER END TO FIT FLANGED, SCREWED OR HUB END PIPE

Diameter, Inches	Length, Feet	Price	Extra Length, per Foot, Net
4	3	$ 8.00	$2.00
6	3	10.00	3.00
8	3	14.00	3.90
10	3	18.00	4.75
12	3	21.00	5.75
14	3	25.00	6.75

Stuffing Box

FOR ANY SIZE PIPE

Above we illustrate stuffing-box for making water-tight joints around pipes entering bottom of water tank, etc., etc.

Joint is made by means of a rope gasket or other suitable packing pressed into an annular space around pipe by flange-rim being forced up by suitable bolts.

We are prepared to furnish these stuffing-boxes for either wrought or cast pipes in any size from two inches up.

The standard thickness of planking through which the joint is ordinarily expected to reach is $2\frac{3}{4}$ inches.

LIST PRICES

Size, Inches	Price	Size, Inches	Price	Size, Inches	Price
2	$1.00	5	$1.75	8	$2.70
3	1.20	6	2.00	10	3.50
4	1.50	7	2.30	12	4.80

When ordering state if wanted for cast or wrought pipe.
Prices of larger sizes on application.

Sheffield Improved Direct-Acting Automatic Standpipe

Our improved form of standpipe, or locomotive water crane, retains the desirable features of former pipes, namely: flexible spout, freedom from water hammer by reason of operation of the valve by pressure of water in the main, thereby allowing the speed of opening or closing to be regulated at the will of the man in charge. Positive locking of pipe parallel to track when not in use; automatic drain valve, etc.

It has also the following advantages over pipes heretofore made by us:

FIRST—Free passage of water; this is obtained by horizontal main valve permitting water to enter the vertical column direct by only one change in direction of flow from horizontal to vertical. This, so far as we know, is not obtained in any other pipe.

SECOND—Accessibility of parts, as all operating mechanism is on outside of pipe.

THIRD—Convenience. The operating lever is so situated as to be within more convenient reach of the fireman than in other pipes and requires a smaller motion to open or close valve.

FOURTH—Ease of repair in case of accident, as the valve can be removed from the pipe in the pit by simply taking off the cylinder head and taking it out, the pipe itself not requiring to be molested.

FIFTH—Non-corrosive. The cylinder being lined with brass and brass main valve stem is not subject to the action of corrosive waters.

SIXTH—Less liability of leakage. The valve being provided with rubber seat remains perfectly tight under all pressures

This pipe is easily rotated by one man from tender or from ground, as the flexible drop pipe is balanced by counterweight, thus avoiding any side strain. The whole is pivoted upon a center bearing at bottom of upright pipe and is automatically locked with a positive lock whenever pipe is thrown back parallel with track.

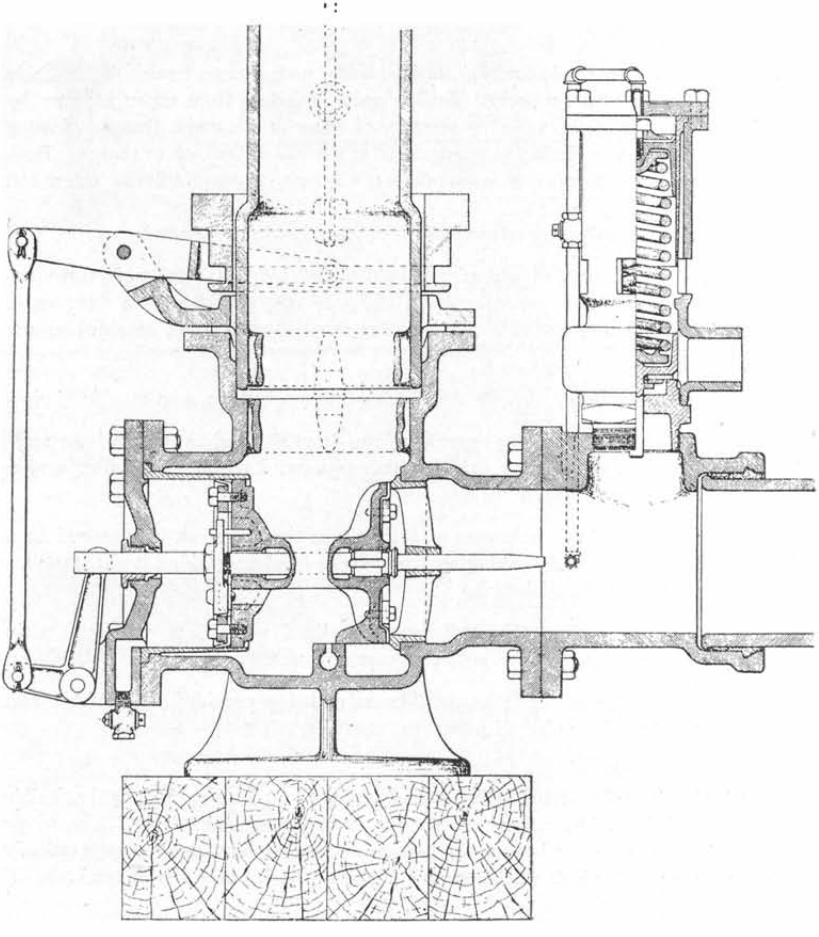
In ordering please state:

FIRST—Size wanted.

SECOND—Mention source of water supply. If from ordinary tank, give height of bottom above track. If from water works, give normal pressure in pounds per square inch or height of head above top of rail.

THIRD—Say if standpipe is to be used between tracks or otherwise. In either case give measurement either from center of pipe to center of track, or center to center of tracks.

FOURTH—Give height desired, measured from top of rail to opening in discharge spout, when horizontal.



Sectional view of main valve and connections with automatic relief valve.

Relief Valve with Sleeve for connecting to water main

Relief Valve with Saddle for attaching to water main

Sheffield Automatic Hydraulic Relief Valve

PREVENTS WATER HAMMER

There has long been a demand for a reliable hydraulic automatic relief valve for use on water mains at points where valves are suddenly opened and large volumes of water are being drawn, reducing pressure and necessitating either a very slow closure of valve or the employment of some device which will offer a gradually increasing resistance to the flow, thus avoiding injurious water-hammer when valve is closed quickly.

This valve has been designed to meet the above conditions, particularly where quick service is desired. They are entirely automatic, adjusting themselves to any pressure, up to the capacity of the spring, and by their use under any ordinary pressure all shocks and dangerous blows from back pressure are avoided.

It is believed that this device is something that hydraulic engineers have sought for years, and is confidently offered as aiding in the solution of many difficult problems in connection with handling quick changes of pressure in water systems. It is covered by broad patent protection and is offered at low prices considering the benefits resulting.

The above cuts show two methods of attaching the valves to the mains. The cast iron sleeves or saddles are not furnished unless specially ordered, and are then charged for extra.

PRICE LIST OF VALVES, SLEEVES AND SADDLES

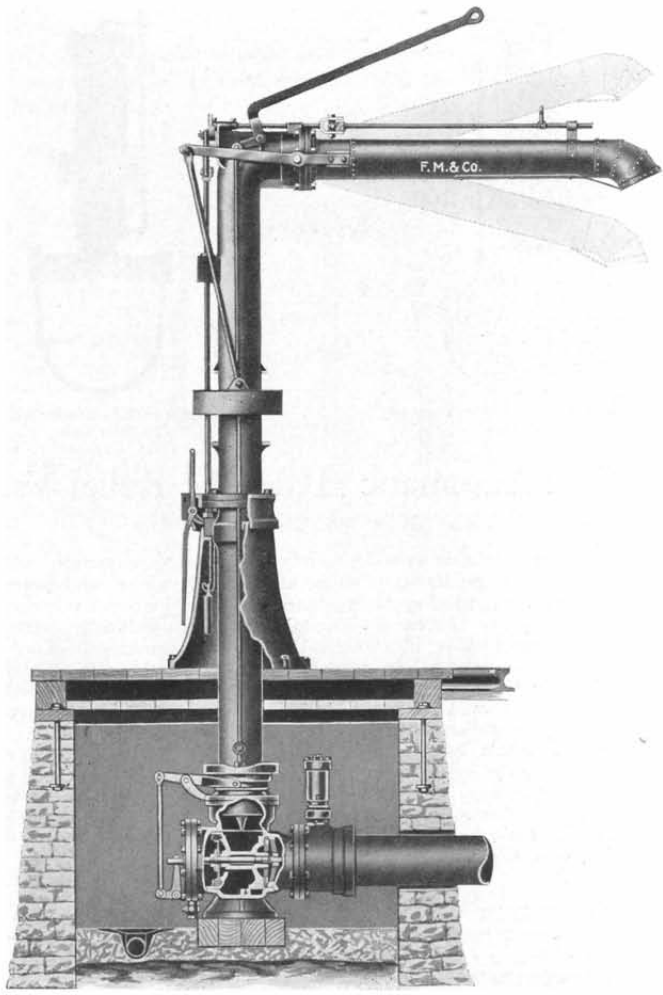
Valve only, ... $38.00

Standard Bell End Connections for Nos. 6, 7 and 8 Standpipe

ALL WITH BOSS TAPPED TO TAKE RELIEF VALVE

Size of Main, Inches	Size of Standpipe	Price
4	For 6-inch Standpipe	$ 8.00
6	For 6-inch Standpipe	8.75
8	For 6-inch Standpipe	9.50
6	For 8-inch Standpipe	9.75
8	For 8-inch Standpipe	10.50
10	For 8-inch Standpipe	11.25
8	For 10-inch Standpipe	11.50
10	For 10-inch Standpipe	12.25
12	For 10-inch Standpipe	13.00
10	For 12-inch Standpipe	13.35
12	For 12-inch Standpipe	14.00
14	For 12-inch Standpipe	14.75

List of Saddles	Price
Saddle for 4-inch cast iron pipe	$ 8.25
Saddle for 6-inch cast iron pipe	10.90
Saddle for 8-inch cast iron pipe	14.10
Saddle for 10-inch cast iron pipe	16.50
Saddle for 12-inch cast iron pipe	21.75
Saddle for 14-inch cast iron pipe	25.50



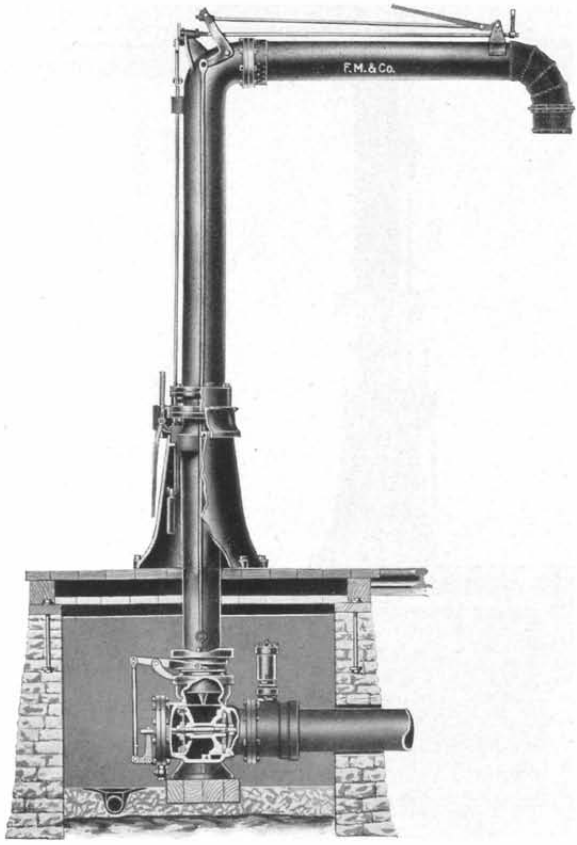
Sheffield Improved No. 8 Direct Acting Automatic Standpipe

WITH PACKED METALLIC JOINT

Same in all details as No. 6, except the metallic joint.

Size..... 8 inches	Weight .....3000 pounds	Price.....$300.00
Size.....10 inches	Weight .....3400 pounds	Price..... 350.00
Size .....12 inches	Weight .....4400 pounds	Price..... 440.00

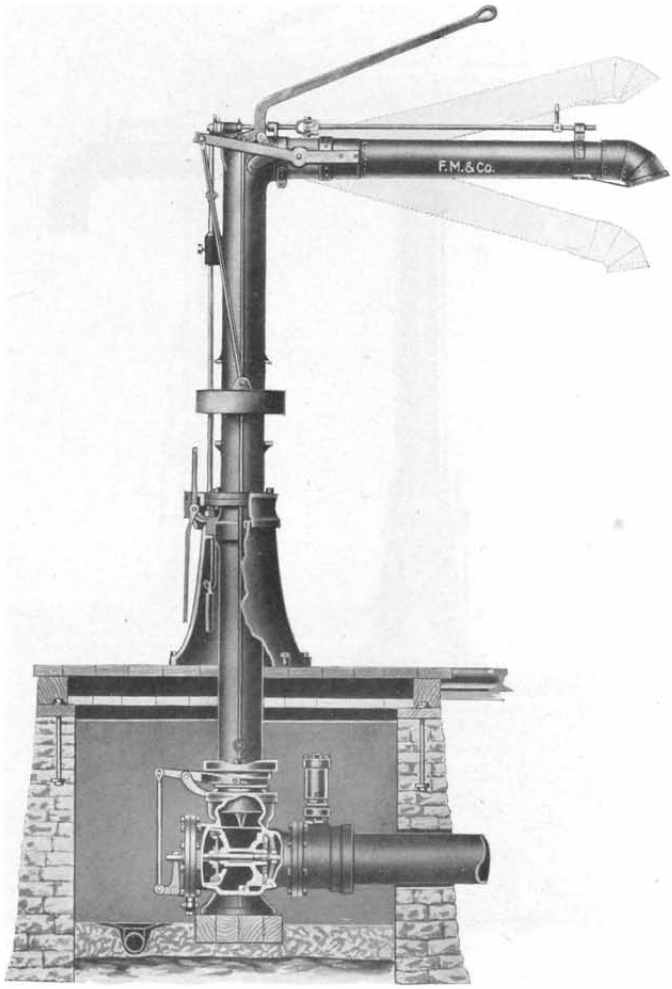
The flexible joint packing is practically indestructible and is easily adjusted. It can be repacked in a few minutes and at small expense.



Sheffield Improved No. 7 Direct Acting Automatic Standpipe

RIGID SPOUT—ANTI-SPLASH NOZZLE

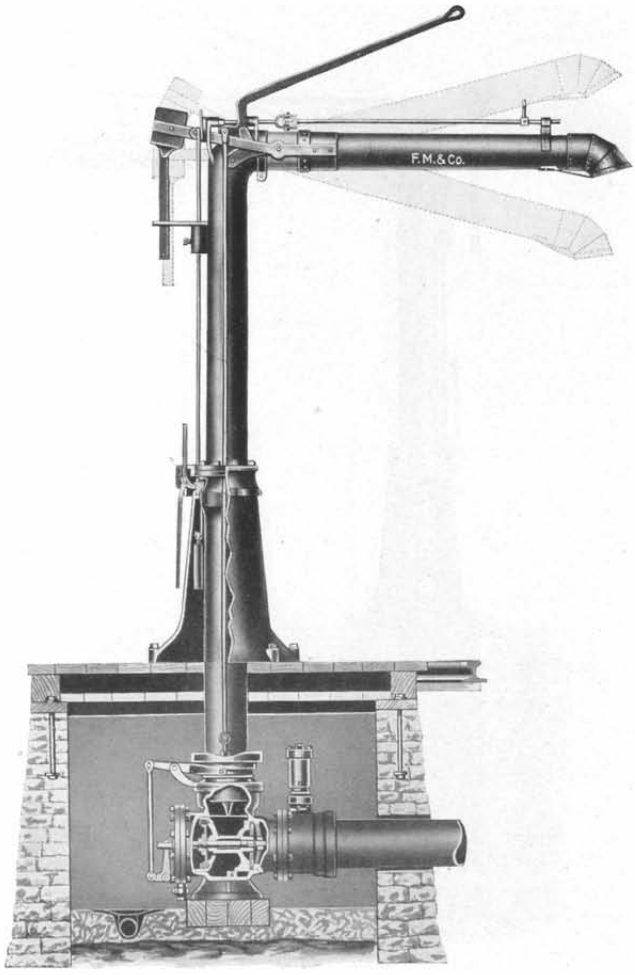
Size..... 6 inches	Weight .....2500 pounds	Price.....$250.00
Size..... 8 inches	Weight .....3000 pounds	Price..... 300.00
Size.....10 inches	Weight .....3300 pounds	Price 350.00
Size.....12 inches	Weight .....4250 pounds	Price..... 400.00



Sheffield Improved No. 6 Direct Acting Automatic Standpipe

WITH CIRCULAR COUNTERWEIGHT. FLEXIBLE SPOUT

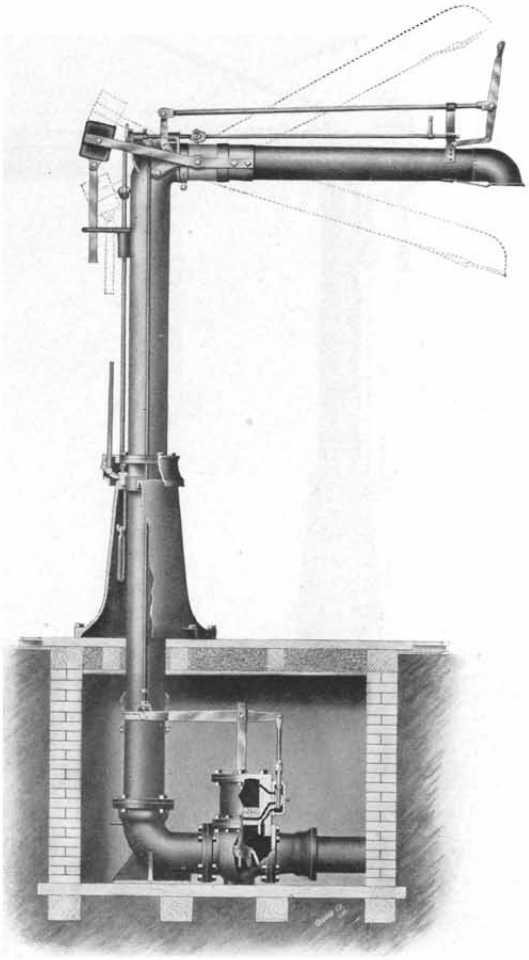
Size..... 6 inches	Weight .....2500 pounds	Price.....$250.00
Size..... 8 inches	Weight .....3000 pounds	Price..... 300.00
Size.....10 inches	Weight .....3400 pounds	Price..... 350.00



Sheffield Improved No. 6 Direct Acting Automatic Standpipe

WITH BLOCK COUNTERWEIGHT. FLEXIBLE SPOUT

Size..... 6 inches	Weight .....2500 pounds	Price.....$250.00
Size..... 8 inches	Weight .....3000 pounds	Price..... 300.00
Size.....10 inches	Weight .....3400 pounds	Price..... 350.00

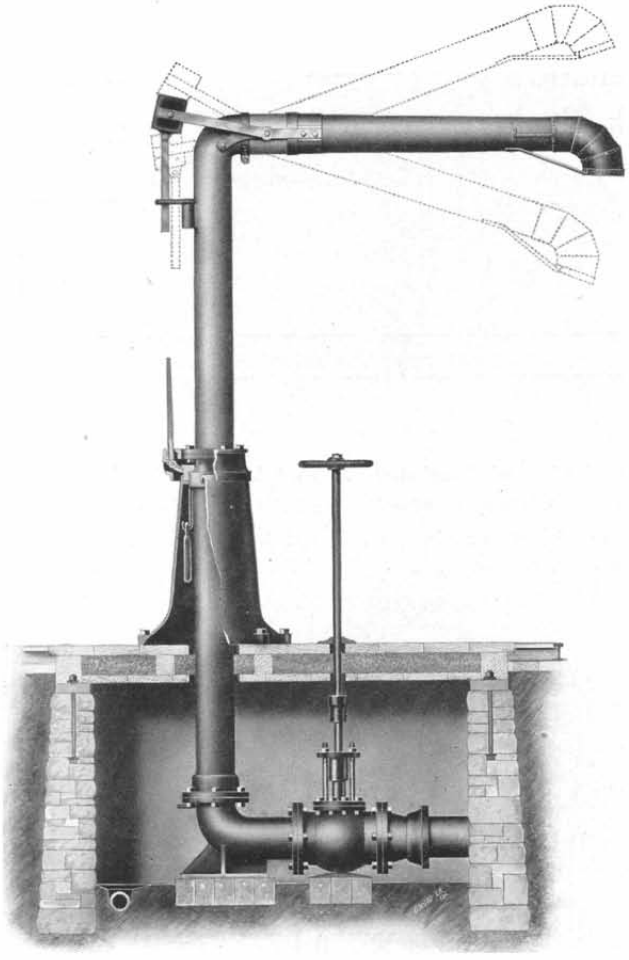


Sheffield No. 1 Automatic Standpipe

FLEXIBLE SPOUT

Center Bearing. Automatic locking device.

Size, Inches	Weight, Pounds	Price
6	2500	$250.00
7	3000	300.00
8	3500	350.00



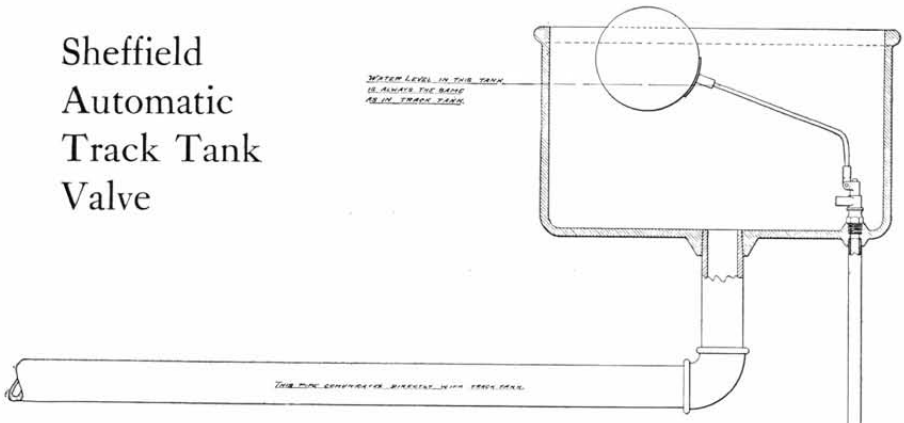
Sheffield No. 2 Plain or Two-man Standpipe

FLEXIBLE SPOUT

Center Bearing. Automatic locking device.

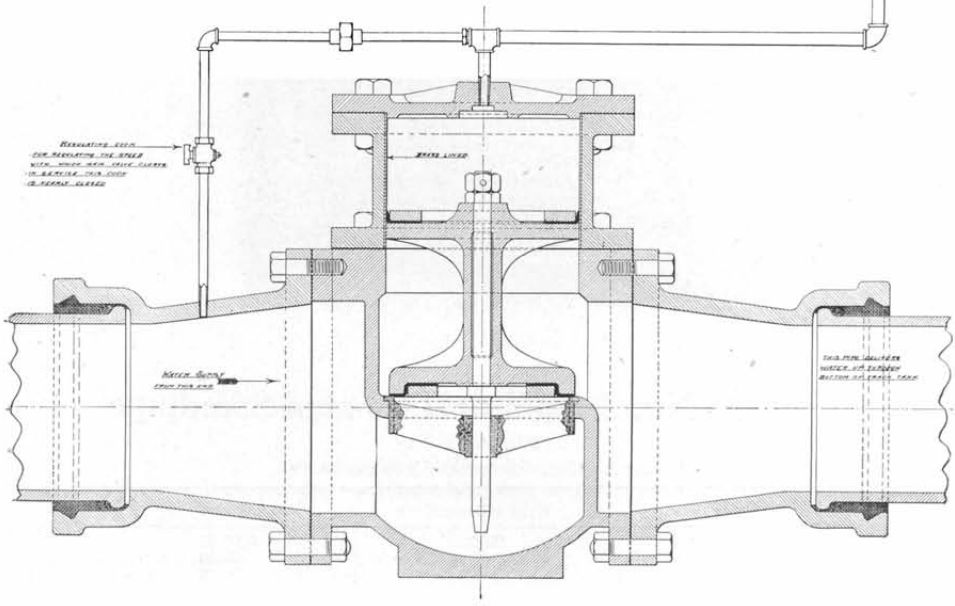
Size, Inches	Weight, Pounds	Price
6	2000	$200.00
7	2400	225.00
8	2800	250.00

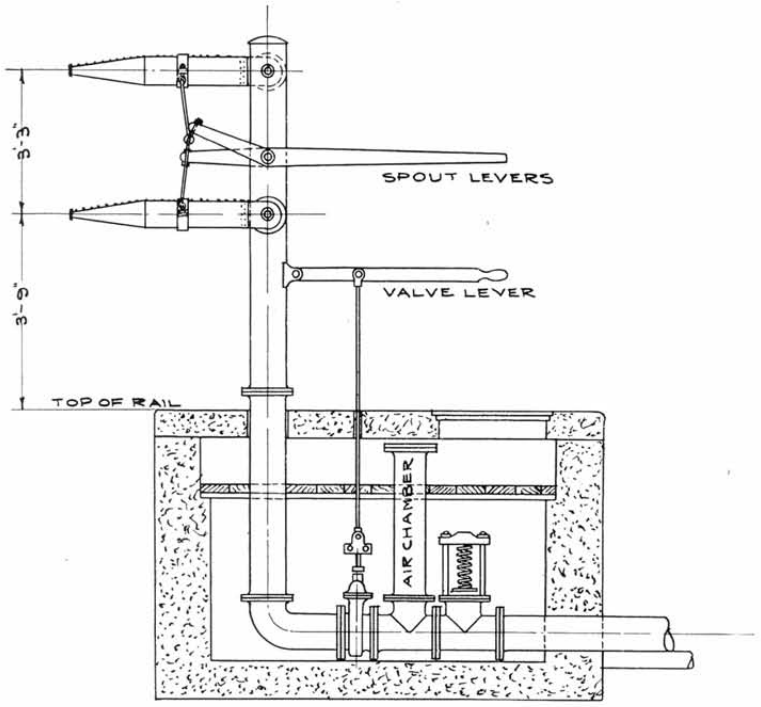
Sheffield Automatic Track Tank Valve



This valve is a combination of our No. 1 Automatic Stand-pipe valve and a ball cock, and is used to automatically supply water to track tanks.

It is entirely automatic in operation and can be adjusted for use with tanks of any elevation or city pressure.





Stock Drenchers

These are designed for the purpose of drenching cattle and hogs in cars.

They are usually attached to main leading to tank, but can be connected direct to city water main if desired, as our special relief valve will prevent water hammer.

Sheffield Gasoline Motor Cars

We present herein for your consideration in addition to the line of direct-connected Sheffield motor cars, some styles of motor cars of the automobile type especially adapted to the use of different departments of railroad service.

OUR AIM

A line of motor cars adapted for different classes of railroad work.

THE RESULT

Motor cars for *you*, irrespective of your department.
Motor cars that you can operate.
Motor cars that will take you anywhere and when you want to go.
Motor cars that are simple and practical in construction.
Motor cars that are strong and durable.
Motor cars with all parts easily accessible.

Sheffield Gasoline Inspection Motor Cars

ARGUMENTS
IN FAVOR OF
GASOLINE MOTOR-DRIVEN INSPECTION CARS

FIRST—Officials can make very quick and frequent inspections with comfort, and at less than it would cost to "fire up" either a locomotive or inspection engine.

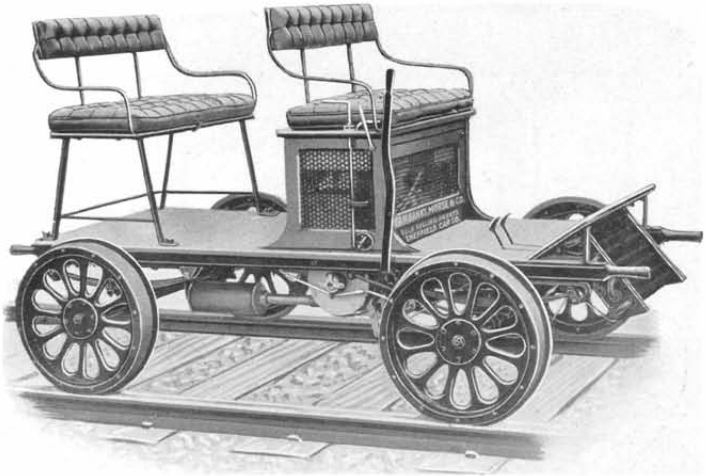
SECOND—Saves time of and annoyance to officials, also the saving of expense of locomotive and crew, which locomotive at the time might be handling paying business.

The expense of a locomotive used for inspection during a season would buy a motor car.

THIRD—Easily and quickly started or stopped.

FOURTH—Figure up the cost of last year's inspection, with locomotive and crew, as compared with the price of a motor car.

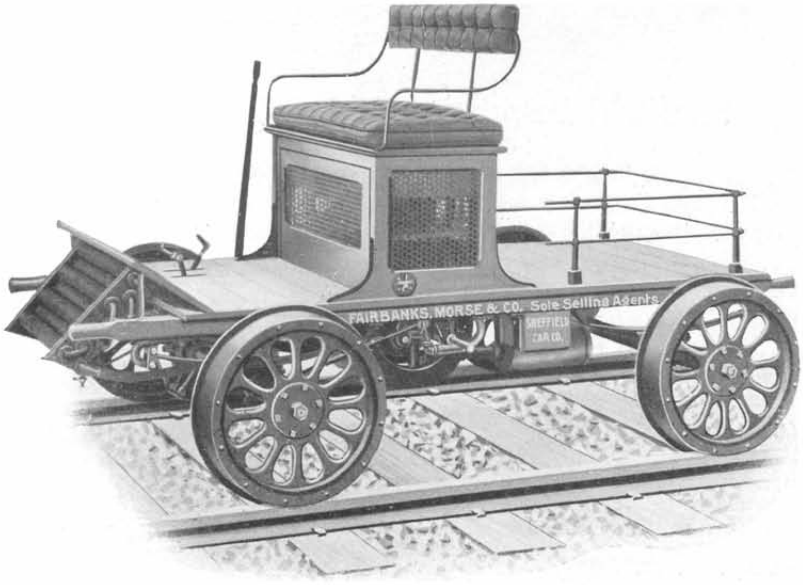
FIFTH—The motive power on all cars is in excess of actual requirements.



Sheffield Inspection Motor Car No. 15

AUTOMOBILE TYPE

Motor Car No. 15, ready for service, can be operated at any speed desired, at will of operator, up to thirty miles per hour, and ten miles per hour on the reverse Weight, 1000 lbs.; packed for export, 1865 lbs.



Motor Car with rear seat omitted, making car available for carrying mail bags or packages. We can supply wheels with narrow tread and flange, if desired, to operate on electric roads in paved streets. Weight, 950 lbs.; packed for export, 1815 lbs.

Sheffield Inspection Motor Car No. 15

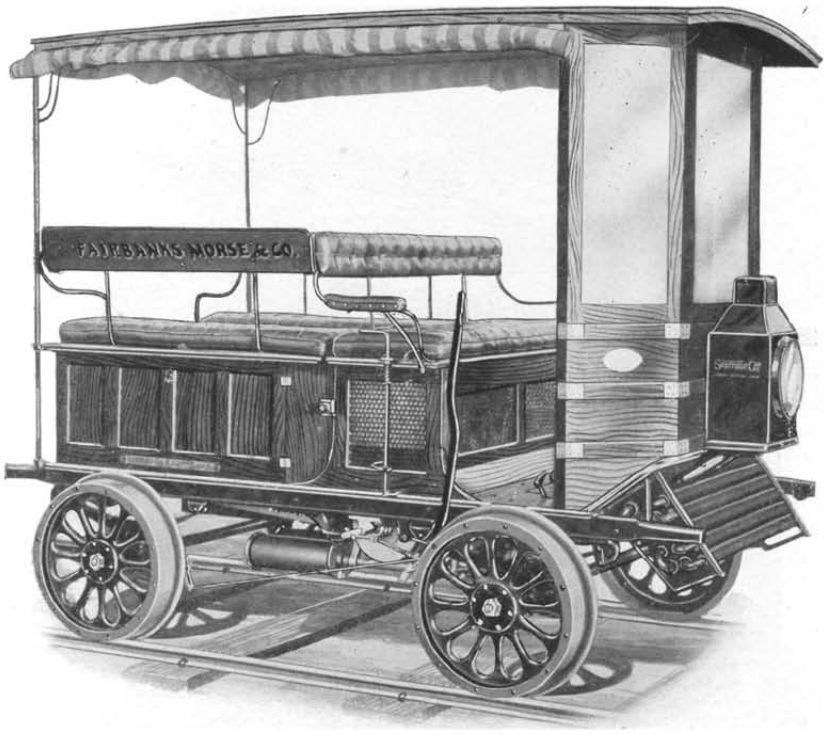
(AUTOMOBILE TYPE)

Weight, 1100 lbs. Packed for export, 2000 lbs.

No. 15 Motor Car with canopy top. The canopy top is not included in the regular equipment, but can be supplied at an extra price when desired.

SPECIFICATIONS

WHEELS	22-inch diameter, wood center.
AXLES	1¼-inch steel, which are placed inside 2¼-inch tubing with roller bearings
BRAKE	Trussed brake wooden shoe operated by foot lever.
SEATING CAPACITY	Four people. Leather upholstering; rear seat detachable; frame steel and wood, carried on springs.
POWER	Single cylinder vertical engine, about 6 horse-power.
TRANSMISSION	Planetary type, liberally constructed. Gears running in oil, giving two forward speeds and one reverse.
IGNITION	By jump spark, using non-breakable plug of our own design.
LUBRICATION	A system of forced feed lubrication is used. It is entirely automatic and needs no attention other than that of filling the tank once a week when car is in use.
SPEED	The maximum speed of the car is about thirty miles per hour. The speed, however, is in perfect control from this down to three or four miles per hour.
GASOLINE	Use ordinary stove gasoline; car carries enough to run 150 miles.



Sheffield Inspection Motor Car No. 16

(AUTOMOBILE TYPE)

This car is arranged to seat nine people, and can be operated at any speed up to thirty-five miles per hour ahead, and twelve miles per hour reverse, at will of operator. Frame is made of steel, securely riveted.

Power is supplied by a two-cylinder 12 H. P. gasoline engine.

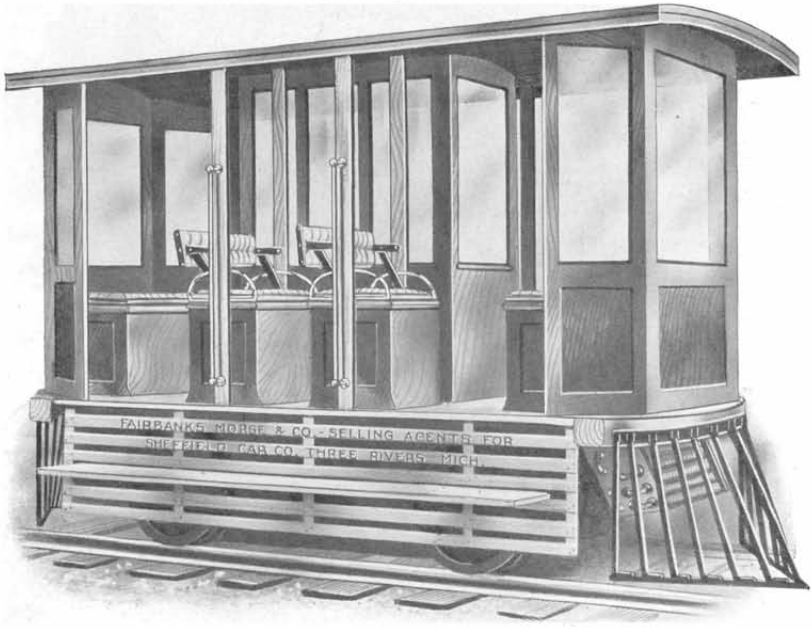
The car is regularly equipped with canopy top, glass front, and leather upholstered seats. Rear seats can be easily and quickly removed, thus making car available for carrying packages or material.

An ideal car for inspection trips in either summer or winter. Can also be used for passenger service on branch lines or small roads.

Weight 1650 pounds; packed for export, 2700 pounds.

General specifications same as No. 15 Motor Car.

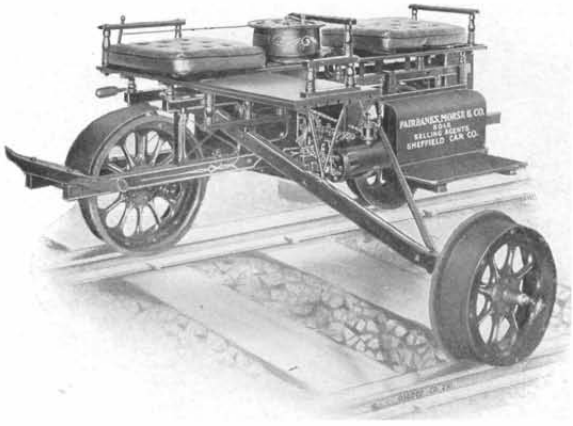
Headlight not included in price.



Sheffield Switchmen's Motor Car No. 18

(AUTOMOBILE TYPE)

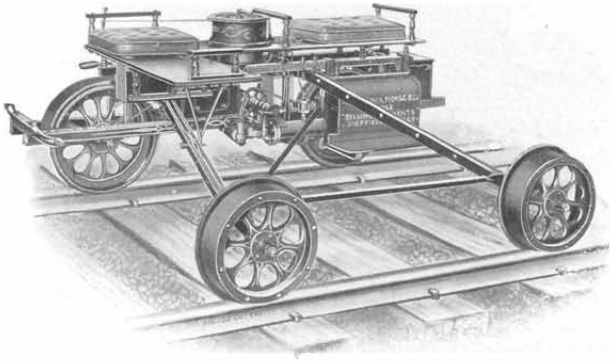
For transferring switchmen at a Hump Yard; will seat 10 persons, but will carry 20 persons



Sheffield Gasoline Motor Car No. 1

DIRECT-CONNECTED. FOR TWO PERSONS.

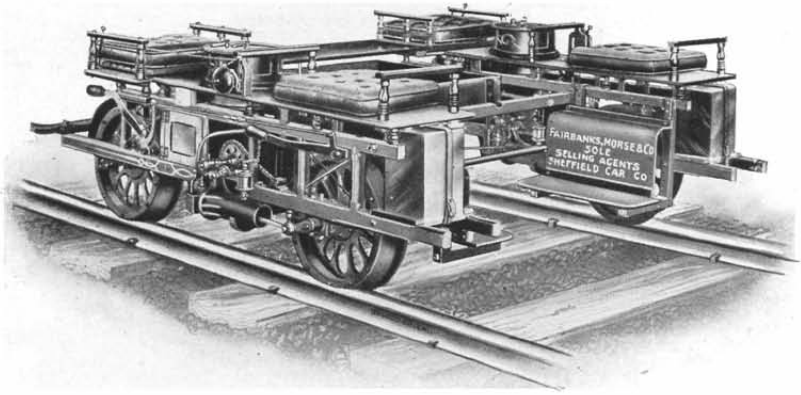
Weight, 350 lbs.; packed for export, 690 lbs. Practically any speed desired up to 30 miles per hour. Capacity, two persons and the operator. Power, gasoline and an electric battery supply the motive power. The battery consists of a series of eight dry cells, which with proper care will run the car about 900 miles.



Sheffield Gasoline Motor Car No. 2

DIRECT-CONNECTED. FOR TWO PERSONS

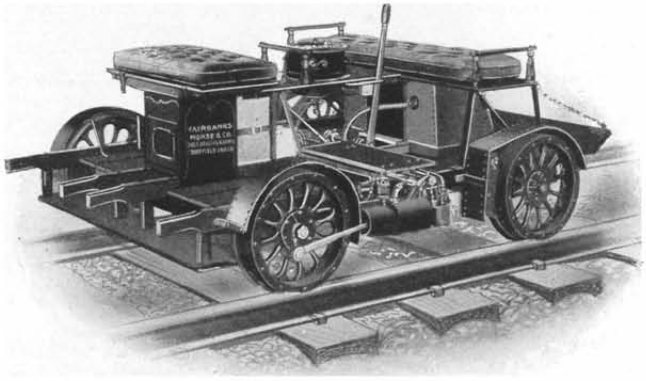
This car is identical with our No. 1 car, excepting as follows: Tool box is placed under front seat, also has extra guide arm and wheel for greater stiffness in running. All machinery parts interchangeable with No. 1 car. Weight, ready for service, 385 lbs.; packed for export, 700 lbs.



Sheffield Gasoline Motor Car No. 3

DIRECT CONNECTED. FOR SIX PERSONS

Weight, 650 pounds. Packed for export, 1050 pounds.



Sheffield Gasoline Motor Car No. 9

DIRECT CONNECTED. FOR FIVE PERSONS

Weight, ready for service, 750 pounds. Packed for export, 1450 pounds.
Electric spark ignition.
Cooling tank capacity, 10 gallons.
Gasoline feeding tank capacity, 2 gallons; sufficient to run 125 miles.
Engines are of the 4 cycle type. Cylinders, 3½ inches diameter, 6-inch strokes, water jacketed.
Wood center wheels, with steel tire; tread, 3½ inches.
Gauge, 36 inches to 56½ inches.

No. 14. Section Motor Car

Motor Cars vs. Hand Cars

CONSTRUCTION

Frame of steel, strong and light; machinery simple, practical and easily operated by foreman or any inexperienced person.

SAVING

By the use of a little gasoline, a section gang of from three to six men can save from forty-five minutes to two hours each day in traveling to and from work, thus lengthening the actual working time for each man.

FUEL

Fuel — ordinary stove gasoline, obtainable almost anywhere at little cost.

SECTION GANG

The section gang are delivered at work in "fresh" condition, and will utilize all their energy in their work, knowing that in the evening they will not have to propel an old-style hand car back to the starting point.

SAVING

In case additional material or tools are required, one or two men can go after them, leaving the rest of the gang at work. The saving resulting is self-evident.

A FEW FIGURES

For example, take a section gang of eight men, traveling five miles to work. With a hand car, the loss in time would be two hours per day, leaving but eight hours' actual working time per day for the tired men, resulting in actual loss of about $2.16 per day (figuring laborers at $1.35 per day).

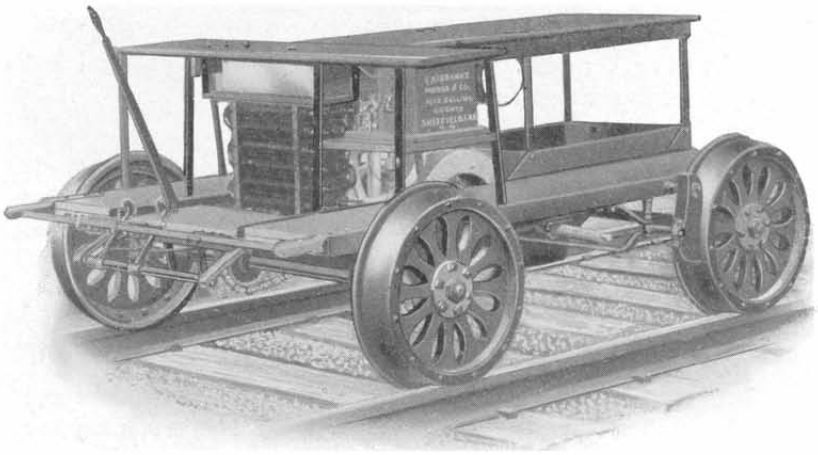
By using Motor Car No. 14, the trip would take about twenty minutes each day, leaving eight fresh men to work nine and one-third hours, making actual loss about 72 cents per day, to which should be added the cost of gasoline used, about six cents, making total loss 78 cents, thus effecting a saving of $1.38 per day.

SUGGESTIONS

Estimate this for one year for all your regular gangs, and an allowance for trouble, and see if it would pay you to have our Motor Car No. 14, or not.

Write us. FAIRBANKS, MORSE & CO.

"A man will do more if you make the means of doing it easy for him"



Sheffield Section Motor Car No. 14

(AUTOMOBILE TYPE)

Weight, 1100 lbs. Packed for export, 1900 lbs.

SPECIFICATIONS

WHEELS . . . . . 20-inch wood center or pressed steel, M. C. B. flange and tread.

AXLES . . . . . $1\frac{3}{4}$-inch and $1\frac{1}{2}$-inch steel, M. C. B. standard gauge.

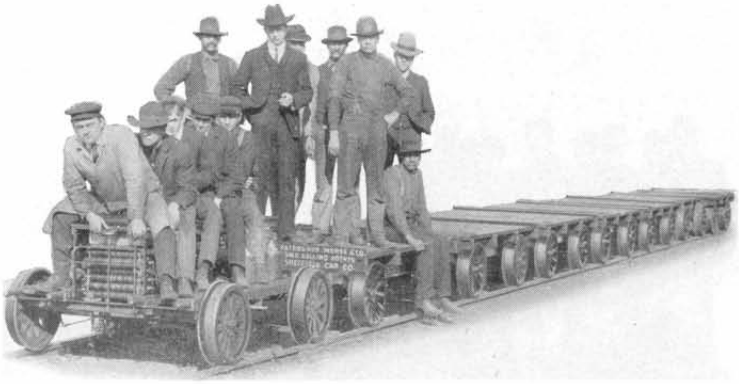
FRAME . . . . . Of steel angles and channels riveted together.

BRAKE . . . . . Brake on two wheels.

POWER . . . . . Single cylinder, 4-cycle engine of ample size to propel car and load over any grades that a locomotive will go over.

SPEED . . . . . Maximum speed, ahead, fifteen miles per hour; and reverse, five miles per hour. Variable at will of operator.

TRANSMISSION . . . Planetary type, giving slow and fast speed ahead, and slow speed reverse.



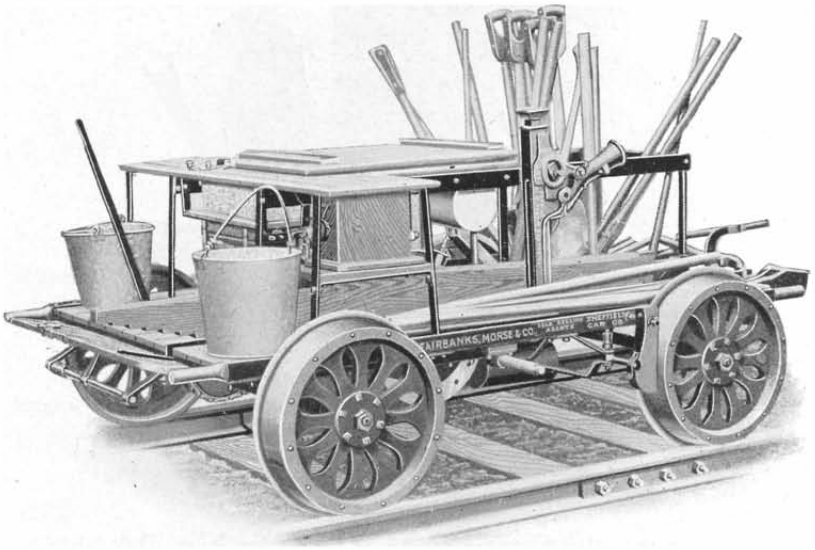
The Section Motor Car No. 14 pulling seven push cars, with fourteen men, at fifteen miles per hour, on level track. Total weight of cars and load, 6,016 pounds. Its utility is evident.

Sheffield Section Motor Car No. 14

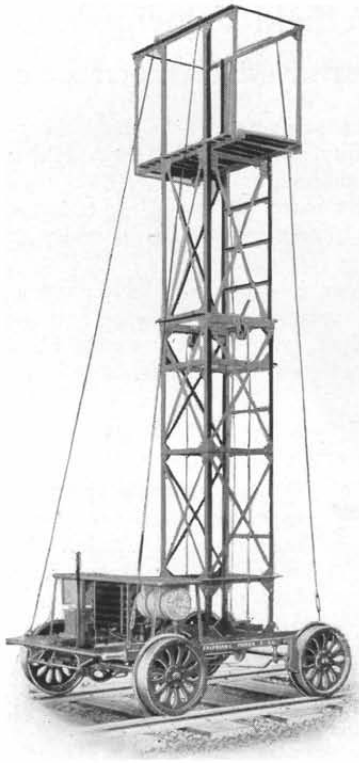
(AUTOMOBILE TYPE)

Section Motor Car No. 14, in service, can be used by two or three men, or full gang. By its use every section hand is trained for inspection service.

Showing one of the practical uses of the Section Motor Car No. 14. Load, 86 men; total weight including car, 17,351 pounds, at a speed of five miles per hour on level track. Send for special Motor Car Catalogue No. 480.



In case of trouble on the line the No. 14 Motor Car will carry men, tools and supplies, at much less cost than a locomotive, and also save time.



Sheffield Gasoline Trolley Repair Motor Car No. 17

(AUTOMOBILE TYPE)

This car is designed for repair work on electric roads. The cut shows tower in position ready for use. The tower will be made of angle steel, or wood, as preferred, in two sections; the upper section is telescoped inside of lower when traveling over the line.

Wood center wheels with M. C. B. standard flange regularly furnished. If desired, we can supply standard steel wheels, or wheels with street car flange and tread.

For trolley construction car and trolley repair car, see page 223.

Sheffield Velocipede Cars

THE EASIEST RUNNING VELOCIPEDE CARS MADE

The essentials of a satisfactory car of this kind are light weight, ease of propulsion and durability, and in no other cars on the market are these qualities so thoroughly combined as in the Sheffield velocipedes. They have been on the market for many years and are today so well known among railroad men that it is unnecessary to enlarge on their advantages here.

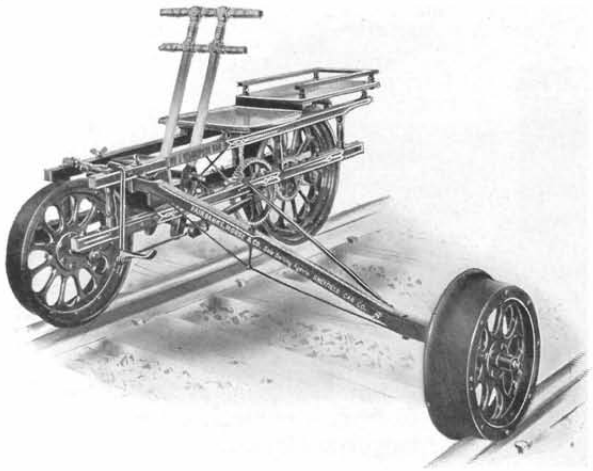
While from the very first the cars have given excellent satisfaction, the constant aim has been to improve them, and from time to time new features have been added, so that today we are offering cars that we feel will meet every expectation of our friends.

Below we mention briefly a few of the latest improvements.

BALL BEARINGS—For many years we have been experimenting to produce a satisfactory ball bearing for our velocipedes. We have now perfected one, which like every other improvement that has been put on our cars, has been thoroughly tested for a sufficient time to demonstrate its durability and practicability. Cars equipped with these ball bearings and machine cut gear wheels are as easy to propel as they can possibly be made. Axles are made of tool steel with balls and cones specially hardened.

CUT GEARS—No part of the car is more closely connected with the ease of propulsion than its gear wheels. If they are roughly finished, as are ordinary sand castings, they make the car run hard and the gears wear very fast. If the teeth are cut out by machinery, giving them a smooth finish, they work together with the very least amount of friction and wear. Therefore, the cut gears with which our velocipedes are now equipped add materially to their easy running and durability, two very important and practical advantages.

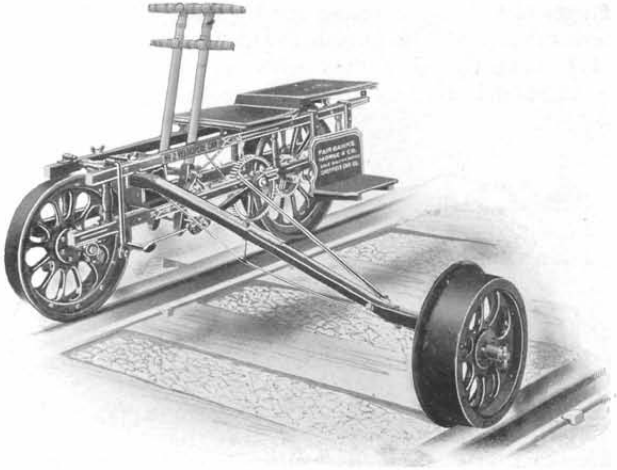
THE AXLE—The HUBS of the track wheels of velocipede cars were formerly shrunk on the axles. This was found not to be an entirely desirable form of construction when the axle became worn and needed to be replaced. The axle is made of steel and has an enlarged center for wheel bearing, see cut page 206. This is turned to a slight taper and held in place by a heavy nut, tightly fitting a threaded portion of the axle, and is readily removed at any time repairs are necessary. The driving gear, which was formerly fastened to crank shaft by key, is now fastened by taper, fitting in the same manner as the driving wheel on its axle.



No. 1 Velocipede Car

BALL BEARING

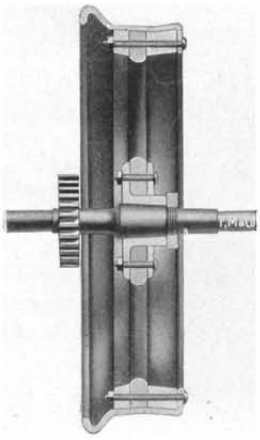
Actual weight, 150 lbs.; packed for export, 300 lbs. Can be arranged adjustable from narrow to standard gauge, if desired.



No. 2 Velocipede Car

BALL BEARING

It is the same in general design as the No. 1, but has in addition a seat and foot rest in rear of operator for carrying a second person. It makes an excellent inspection car, as the inspector can sit facing the track and carefully note its condition as the car proceeds. Weight same as No. 1 car.



CONCAVE TREAD—The steel tires now used on our velocipedes are rolled with concave instead of straight tread, which practically does away with the tendency of the wheels to leave a wet or frosty rail.

GAUGE OF VELOCIPEDE CARS—All our three-wheeled cars, except the telegraph car, can be so made that the arm will be adjustable in the main frame, so that the car can be adapted to run on any gauge of track from three feet up to five, or even a greater gauge, and without any extra expense.

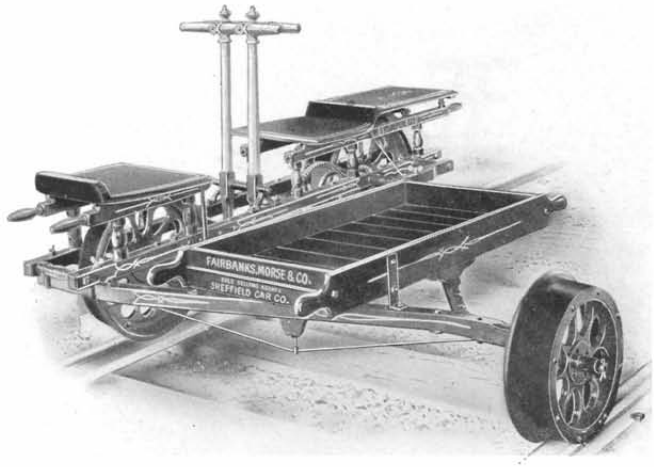
We, however, when cars are ordered and no gauge is specified, understand that they are wanted for standard gauge track, and in such cases send the regular arm for standard gauge, which is not adjustable to different gauges. Parties, therefore, wishing car with arm so arranged as to run on different gauges of track, will please specify same with their order, when arm of this description will be furnished without extra charge. Where the No. 3 or Telegraph Car is wanted with this adjustability, it will be best to order an additional arm and brace rod, which will be $3.50 extra.

VELOCIPEDE CAR EXTRAS

Cushions, each	$1.50
Lock and chain, each	1.50
Detachable foot-rest, when ordered separately	1.50

We can also, when desired, arrange any of these cars to throw out of gear when going down grade. For this attachment there is an additional charge of $5.00.

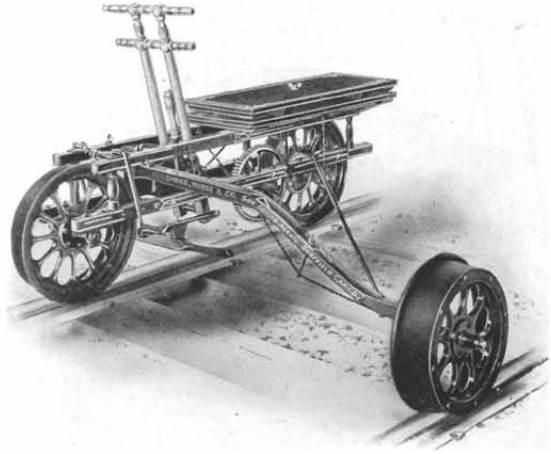
An adjustable wrench and oil can are furnished with each without extra charge.



No. 3 Velocipede or Telegraph Car

BALL BEARING

Designed especially for use of telegraph companies. It will carry three persons, although it can be readily handled by one man. A small tray is provided for carrying tools and materials. It is a great convenience for linemen, enabling them to make careful inspections and to carry with them supplies needed to promptly make any necessary repairs. Weight, 185 lbs.; packed for export, 350 lbs. Made for any gauge desired, but not adjustable.

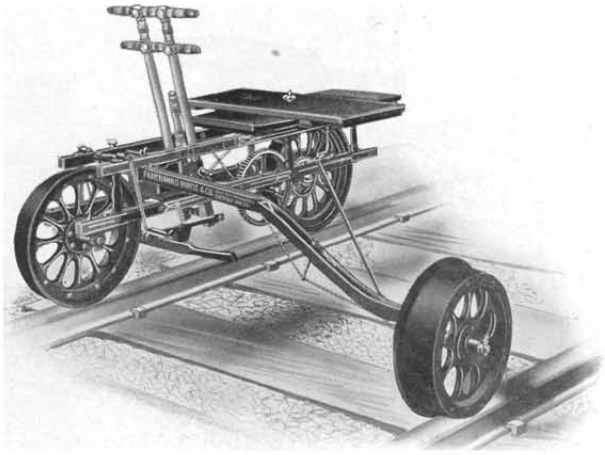


No. 4 Velocipede Car

As arranged for one rider

BALL BEARING

The change to accommodate two riders is instantly made, the seat being so arranged as to swing crossways of the car at will, and will carry three persons. Actual weight, 165 lbs.; packed for export, 345 lbs.

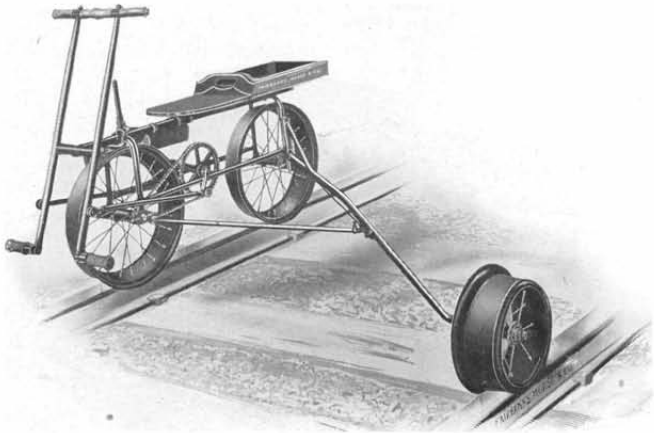


No. 4 Velocipede Car

As arranged for two or three riders

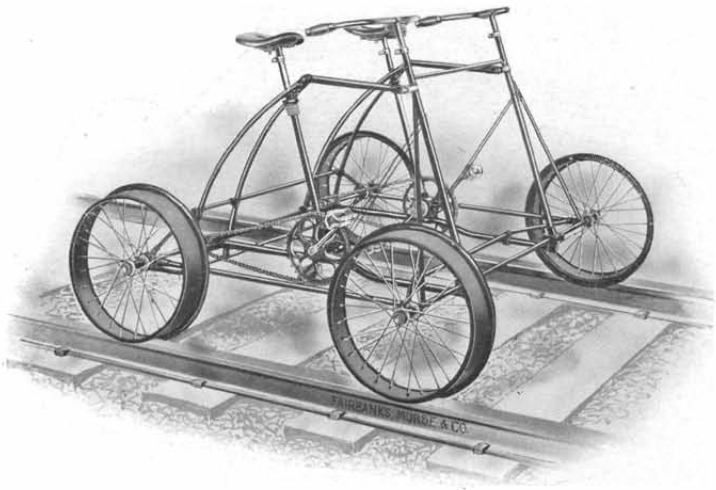
BALL BEARING

The above cut shows the No. 4 car with the adjustable seat board crosswise, so that both riders can assist in propelling. Actual weight, 165 lbs. Packed for export, 345 lbs.



No. 16 Velocipede

The lightest car ever constructed for the purpose of conveying a rider over a railroad track. It is made with very light and simple frame, constructed of seamless tubing, which carries two 17-inch track wheels rolled up from very light stock, the centers being built up with wire spokes. Provided with anti-friction bearings, the hubs similar to those of bicycles. Weight, 55 pounds. Packed for export, 165 lbs.



No. 14 Velocipede

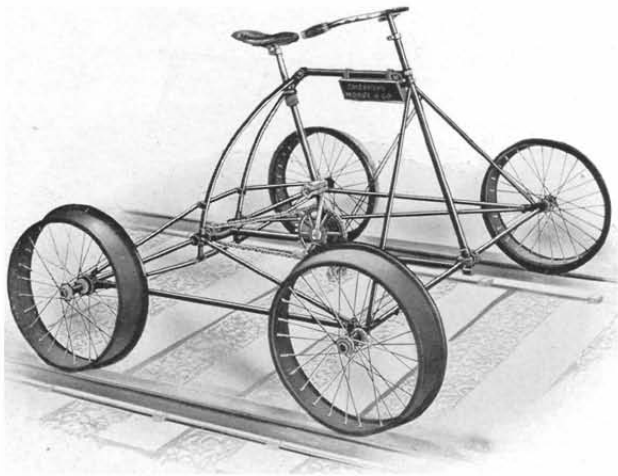
ARRANGED FOR TWO RIDERS

This car is built in a general way on the principles of the safety bicycle so universally used, the frame being of weldless steel tubing, trussed in such a way as to be amply strong to carry any ordinary rider. The wheels are built with wire spokes and have rubber tires. The propelling power is foot motion, transmitted to rear axles by sprockets and endless steel chain. Both crank shaft and all wheels are carried on ball bearings, so that friction is reduced to a minimum. The handle bar in front is not for the purpose of steering, but for steadying the rider.

Car can be run at a very high speed, and is propelled so easily as to be a pleasure rather than a matter of labor.

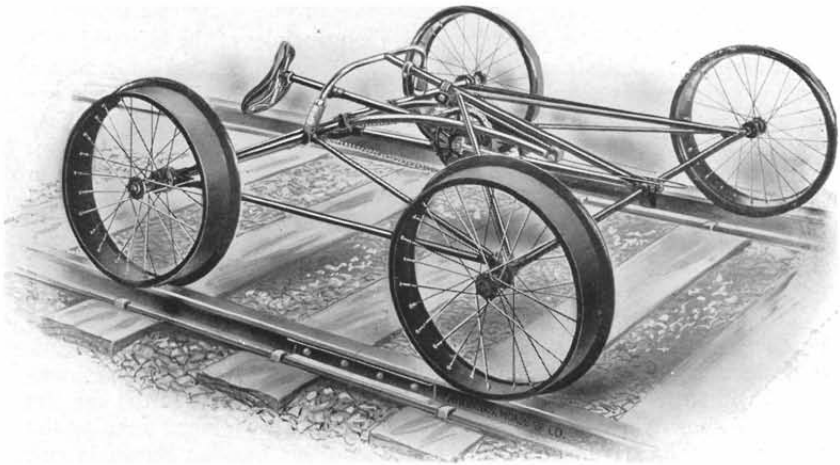
As will be seen by cut on preceding page, the cars fold into a very compact space for transportation in baggage car or other conveyance where it is desirable to occupy as little room as possible. This folding is accomplished without the removal of a single bolt or even a nut from the car, the hand nut shown on seat post being unscrewed drops to a lower point on the post, when the car can be readily folded into the position shown in cut.

It is equipped with Garford saddle, unless other make is preferred. A leather tool pouch is furnished with each car, containing wrench, screwdriver and oiler. Weight, 105 lbs.; packed for export, 300 lbs.



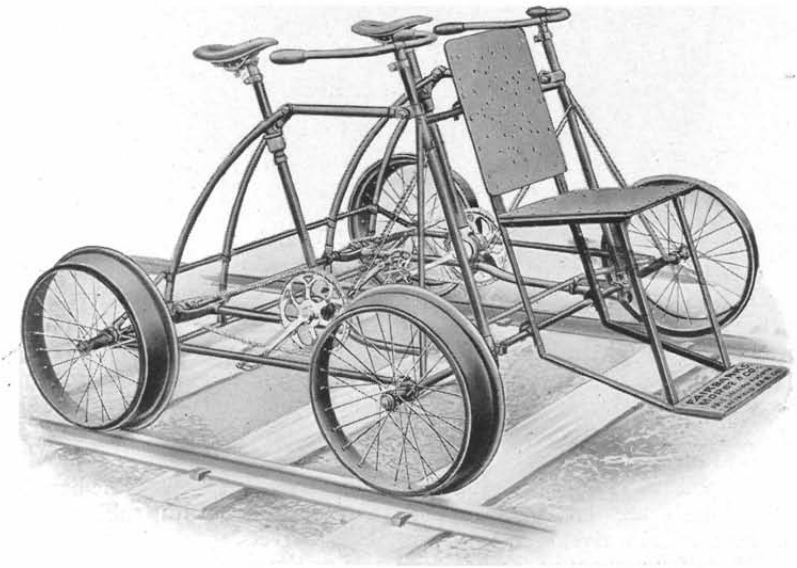
No. 14 Velocipede

CAR IN POSITION ON TRACK READY TO RUN



CAR FOLDED FOR TRANSPORTATION

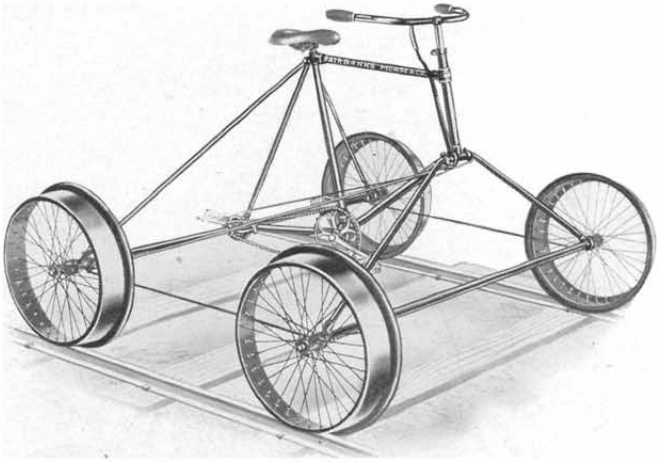
Weight, 70 lbs. Packed for export, 260 lbs.



No. 14 Velocipede

Weight, 110 lbs. Packed for export, 305 lbs.

This shows our No. 14 Velocipede arranged for three men. The extra seat is light and substantial and adds very little to the weight of the velocipede. It can be easily detached if desired.



No. 17 Velocipede

Weight, 70 lbs. Packed for export, 290 lbs.

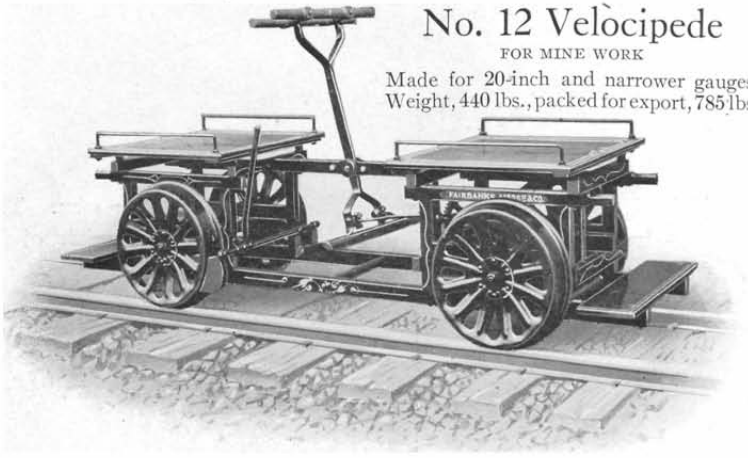
It is of exceedingly light, yet strong construction, and is offered for the use of such persons as do not consider the folding device used on our No. 14 Velocipede a necessary feature.

The frame is made from the best seamless steel tubing and the bicycle form of construction is used, as this gives the greatest strength for a given weight yet devised.

Ball races are of pressed steel, hardened.

A band brake is provided, which is operated by a lever at the handle bar. Wheels are 17 inches diameter, 36 spokes, with rubber tire cemented on, also riveted to tread with copper rivets.

Made for any gauge, and for one, two or three persons.



No. 12 Velocipede

FOR MINE WORK

Made for 20-inch and narrower gauges.
Weight, 440 lbs., packed for export, 785 lbs.

No. 1 Standard Section Hand Car with Pressed Steel Gallows Frame

STANDARD GAUGE

Weight 525 lbs. Packed for export, 835 lbs.

THE SHEFFIELD HAND CARS ARE THE BEST MADE

Platform 6 feet long by 4 feet 4 inches wide. Wheels wood center or all steel, 20 inches in diameter. Steel wheels are standard and always furnished unless otherwise ordered.

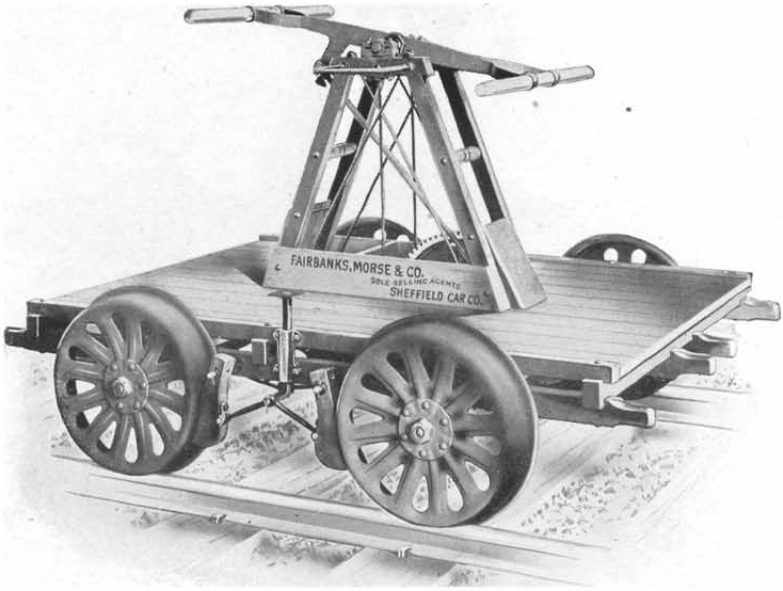
Diameter of wheels—20 inch wheels are furnished on all hand cars unless otherwise specified, but any other size ordinarily used can be furnished if desired.

Our steel wheel cars can be insulated for use on roads having the electric block signal system.

Improved Pressed Steel Gallows Frame

PATENTED

Formed from a single sheet of metal.



No. 1 Standard Section Hand Car

(STANDARD GAUGE)

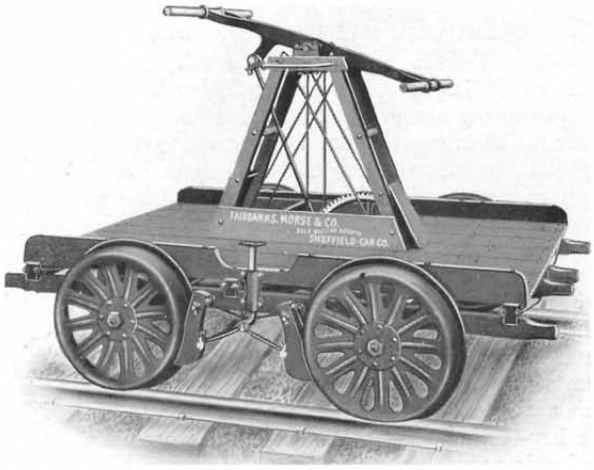
Weight, 525 lbs. Packed for export, 835 lbs.

THE SHEFFIELD HAND CARS ARE THE BEST MADE

Platform 6 feet long by 4 feet 4 inches wide. Wheels wood center or all steel, 20 inches in diameter. Steel wheels are standard and always furnished unless otherwise ordered.

Diameter of wheels—20-inch wheels are furnished on all hand cars unless otherwise specified, but any other size ordinarily used can be furnished if desired.

Our steel wheel cars can be insulated for use on roads having the electric block signal system.



No. 20 Standard Section Hand Car

Similar to No. 1, but with high side rails extending 3 inches above deck. Actual weight, 565 lbs. Packed for export, 765 lbs.

No. 2 Special Hand Car

Platform 7 feet 6 inches by 4 feet 4 inches. Frame heavier than No. 1 car. Seats running lengthwise over wheels, supported by four wrought-iron brackets. Steel wheels, 20 inches diameter, or wood center wheels, if desired. Actual weight, 625 lbs. Packed for export, 915 lbs. Walking beam is 3½ inches longer than used on No. 1 Hand Car, giving much greater leverage.

Section Hand Cars

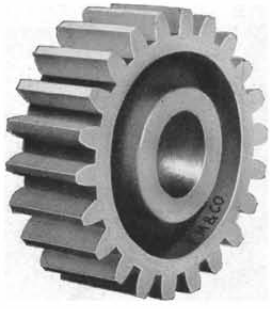
IMPROVEMENTS IN FOUR-WHEEL CARS

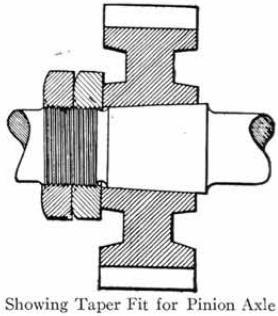
MACHINE CUT GEARS—These are exclusive features of our cars, possessing many important advantages. All the teeth are made an exact size and shape and perfectly smooth, in contrast with the rough and uneven teeth on the ordinary cast gear. Result: The drive gear and pinion work together with minimum amount of friction and wear, cars run much easier (a saving of time and labor), and the life of the gears is greatly prolonged (a saving of repairs).

TAPERING WHEEL FIT—By making ends of axles tapering and boring hubs of wheels in same manner, the screwing on of the nut forces the two cones together so as to make a tight fit without the troublesome and objectionable key-seating. By this method the wheels are made absolutely perpendicular and revolve in a perfect circle—not the case with key-seated wheels.

UPSET COLLAR ON THE AXLE—This new feature is of comparatively recent date and effectually stops lateral or end play after the axles become worn. The collar being a part of the axle itself will never give annoyance by coming loose, as was sometimes formerly the case.

PINION GEAR





Showing Taper Fit for Pinion Axle

Provision has also been made for securing the pinion gear to driving axle by tapering fit, because with the old way the driving of the key forced this wheel out of center with the axle, consequently it described an eccentric circle and would bind more or less on the drive gear at a certain point in every revolution. This, of course, interfered with the smooth and easy running of the car. With the taper fit this wheel revolves in a true circle.

INSULATED AXLES—Are furnished on any of our standard hand cars for use where electric signals are in use. These are always extra and should be specially ordered if wanted.