GASKILL'S

PATENT STEAM PUMP,

MANUFACTURED BY

The Holly Manufacturing Co.,

LOCKPORT, N. Y.

FAIRBANKS & CO.,

No. 715 Chestnut Street, PHILADELPHIA, PA.

ILLUSTRATED CATALOGUE

OF

GASKILL'S

STEAM PUMPS

AND

PUMPING ENGINES,

MANUFACTURED BY

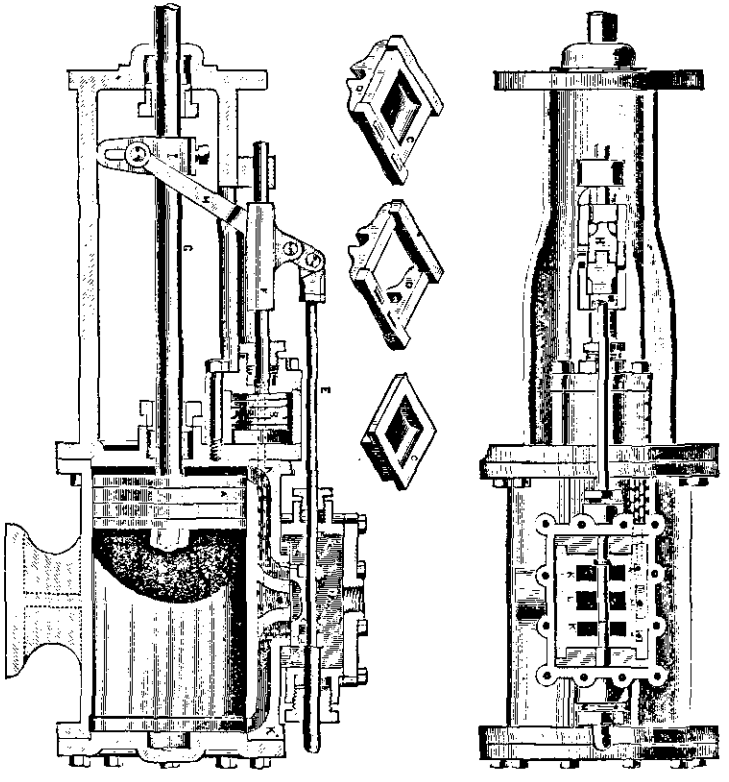
THE HOLLY MANUFACTURING CO.,

LOCKPORT, N. Y.

BUFFALO:
GIES & Co., Eng. and Prs., 338 and 340 Washington St.

1884.

HOLLY MANUFACTURING CO.



GASKILL'S PATENT STEAM PUMP.

DESCRIPTION OF OPERATION, &c.

In all "direct-acting" steam pumps, the object aimed at by the inventor has been to obtain a reciprocating motion without the complication of the crank and fly-wheel.

In order to properly reverse the piston at the end of its stroke, it is necessary that the valve of the engine receive a motion independent of the motion of the main piston. This can only be accomplished by the aid of some extraneous power. In the older styles of steam pumps, this power was supplied by the aid of springs. In the latter styles, a small auxiliary steam-cylinder has been substituted for the spring, and all of the better class of steam pumps of to-day are built with the so-called auxiliary steam cylinder.

In the Gaskill Steam Pump, an ingenious motion has been obtained by combining the motion of the main and auxiliary pistons. The result is, that the main piston retains sufficient control of its valve to insure a perfect and uniform action; also, the piston cannot, no matter how fast the pump is run, be made to strike the cylinder-heads.

It will be seen by an inspection of the cut of the steam pump, that the piston cannot move without carrying with it, through the action of the lever, the valves that control its motion; so that any movement, beyond its natural and proper travel, is at once checked. This arrangement of parts, each controlling the other, insures perfect action at the highest speeds without shock or jar.

OPERATION.

In this steam pump, the valves are operated in a novel manner, and in a way that gives it an advantage over other pumps in which the engine is operated by an auxiliary steam-piston. The object has been to simulate the motion of the ordinary engine valve, as driven by the eccentric; the main valve is so moved, as to close as the main piston approaches the end of the stroke—a feature not common to other steam pumps.

The valves are two in number: a main valve (C) and an auxiliary valve (D); the valve D surrounds the valve C, and C is moved by D, the latter only being connected to the valve-stem, and by means of the lost motion between the two, the valve D has a longer motion than C. The lever H is connected to the piston-rod at its lower end, and has a fulcrum at F, and is connected to the valve stem E at its upper end. The auxiliary piston B being connected to the lever H, the operation is as follows:

When the main or driving-piston A approaches the end of its stroke, the auxiliary valve D, by the action of the lever H acting on F as a fulcrum, with I the power and E the load, uncovers the auxiliary port N, and admits steam against the left-hand face of the auxiliary piston B, forcing the piston B to the right-hand end of the auxiliary cylinder, and carrying with it the lever H and the valves C and D, which operation promptly opens the port K to the steam-chest O, and the port K to the exhaust port L, thus reversing the action of the steam on the main piston, and causing it to travel in an opposite direction; also, by this same motion, the

main valve C is moved so that the main port K is on the point of being uncovered. Thus it will be seen that any further travel of the main piston will open the port K positively, and admit steam behind the main piston, making it impossible for the piston to strike the head under any conditions.

As the main piston A approaches the opposite end of its stroke, from that described above, the valves are operated upon in a similar manner, to reverse the action of the engine.

To prevent the piston B from striking the head of the auxiliary cylinder, part of the exhaust steam is confined in the cylinder by the valve D, so that the piston strikes against a cushion of steam, and stops without concussion.

The superiority of the Gaskill Steam Pump consists:

In the simplicity of its mechanism.

In the fact that it has fewer moving parts than any other pump.

That the main and auxiliary valves are both plain slide-valves.

That the auxiliary piston is in one piece, and, hence, not liable to derangement.

That the main piston having control of the valve, renders it impossible for it to strike the heads of the cylinder.

That the connection between the main piston and its valve is such, that it renders it absolutely impossible for the piston to move without moving the valve.

That it will start from any position.

That it will pump hot or cold liquids.

That it is made with interchangeable parts.

That *every pump is thoroughly tested before shipment.*

That it will do its work with a less consumption of steam than any other pump in the market.

That it will operate with water or air pressure, as well as with steam.

DIRECTIONS FOR SETTING UP AND OPERATING PUMPS.

Care should be taken to have suction-pipe of ample size and *absolutely free from air leaks*, and all unnecessary bends should be avoided.

When a long suction-pipe is unavoidable, the size should be increased above that given in the table, and a suction air-chamber should be added.

When the pump is required to pump water of a high temperature, the pump should be placed low enough, so that the water will flow in by gravity.

TO OUR CORRESPONDENTS.

Before furnishing a pump, we can best meet the needs of our customers by being fully informed on the following points:

First—The amount of water required per hour.

Second—The height to which it is to be raised.

Third—The length of suction-pipe and height of suction-lift.

Fourth—What is the average steam pressure?

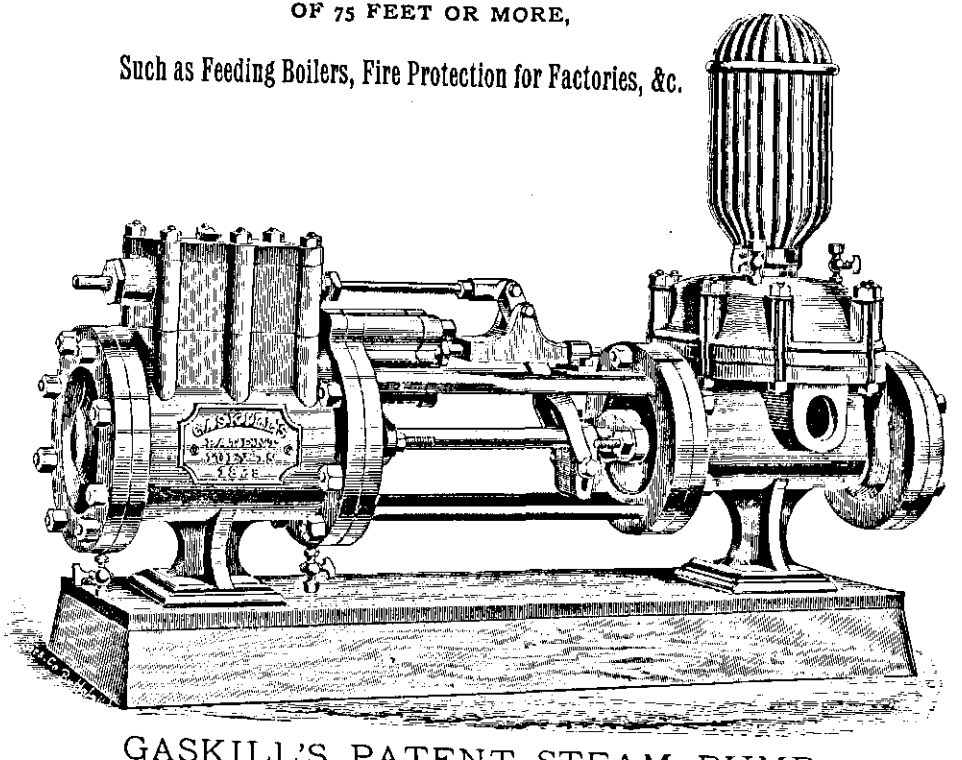
Fifth—What is the character of the liquid to be pumped?

Sixth—What is the length and size of discharge-pipe?

PUMPS FOR HIGH LIFTS OF WATER

OF 75 FEET OR MORE,

Such as Feeding Boilers, Fire Protection for Factories, &c.



GASKILL'S PATENT STEAM PUMP.

GASKILL'S PATENT

Boiler Feeding and Heavy Pressure Pumps,

SUITABLE FOR EITHER HOT OR COLD WATER.

These pumps can be operated at the lowest speed that will be required, without stopping on the center.

The pumps are constructed with large openings, so that they can be operated at a high speed without shock.

The valves are all on one plate, both suction and discharge, and all are exposed by removing the cover of the pumps.

By removing the steam-chest cover, both steam-valves are exposed, and can be taken out if necessary.

These pumps are suitable for fire service, and will do effective work up to their capacity.

DIMENSIONS AND PRICES.

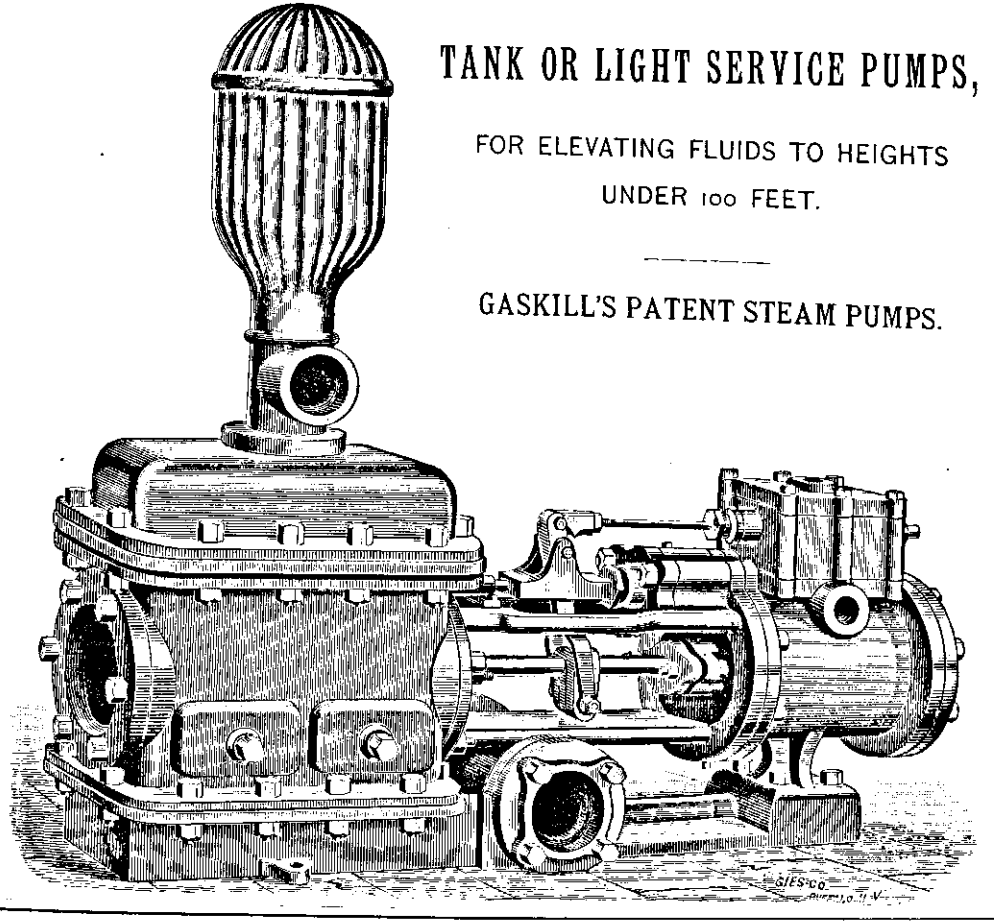
Number.	Diameter of Steam-Cylinder.	Length of Stroke.	Diameter of Pump-Cylinder.	Diameter of Steam-Pipe.	Diameter of Exhaust-Pipe.	Diameter of Suction-Pipe.	Diameter of Discharge-Pipe.	Weight.	Floor Space, Inches.	Galls. Discharged, per Stroke.	Capacity per Minute, in Gallons, at Ordinary Speed.	Price.
1	4	6	2½	¾	1	1½	1¼	225	36 x 25 x 8½	.12	100 strokes, 12	$150
2	6	7	3½	1	1¼	1½	1½	425	44 x 29 x 12	.277	100 " 27.95	225
3	7	10	3½	1¼	1½	2	2	585	56 x 32½ x 12½	.387	100 " 38.75	300
4	7	10	4	1¼	1½	2	2	600	56 x 32½ x 12½	.51	100 " 51.5	315
5	7	10	4½	1¼	1½	2	2	625	56 x 32½ x 12½	.661	100 " 66.05	325
6	8	10	3½	1¼	1½	2	2	675	56 x 32½ x 12½	.387	100 " 38.75	375
7	8	10	4	1¼	1½	2	2	685	56 x 32½ x 12½	.51	100 " 51.5	387
8	8	10	4½	1¼	1½	2	2	696	56 x 32½ x 12½	.661	100 " 66.05	400
9	10	12	5	1½	2	3	2½	1250	68½ x 47 x 17	.974	100 " 97.4	425
10	10	12	6	1½	2	3	2½	1300	68½ x 47 x 17	1.422	100 " 142.25	450
11	10	12	7	1½	2	4	2½	1350	68½ x 47 x 17	1.953	100 " 195.3	460
12	10	12	8	1½	2	4	3½	1400	68½ x 47 x 17	2.56	100 " 256.53	470
13	10	12	8½	1½	2	4	3½	1425	68½ x 47 x 17	2.9	100 " 290.445	480

In case of necessity, these pumps can be operated at a much higher speed than given in the table, and can be operated from 10 to 150 strokes per minute; but for continuous service, such as boiler feeding, &c., we would advise a somewhat slower speed than given in the table.

TANK OR LIGHT SERVICE PUMPS,

FOR ELEVATING FLUIDS TO HEIGHTS UNDER 100 FEET.

GASKILL'S PATENT STEAM PUMPS.



TANK OR LIGHT SERVICE PUMPS.

For raising liquids to limited elevations, where a large quantity is required, these pumps are both economical in steam and very effective.

They are used for railroad water station reservoirs, tanneries, chemical works, &c.

For the service of pumping out pits, quarries, coffer dams, and removing water for foundations, they are also very efficient, having large water-passages.

SIZES AND PRICES AS FOLLOWS:

Number.	Diameter of Steam-Cylinder.	Length of Stroke.	Diameter of Pump-Cylinder.	Diameter of Steam-Pipe.	Diameter of Exhaust-Pipe.	Diameter of Suction-Pipe.	Diameter of Discharge-Pipe.	Weight.	Floor Space, Inches.	Gals. Discharged per Stroke.	Capacity per Minute, in Gallons, at Ordinary Speed.	Price.
1	4	6	3	¾	1	2½	2	560	36 x 29 x 10	.17	100 strokes, 17.5	$200
2	6	7	5	1	1¼	3½	2½	700	45 x 42 x 12	.58	100 " 58.3	250
3	7	10	6	1¼	1½	3½	3	1650	60 x 51½ x 17	1.2	100 " 120	375
4	8	10	7	1¼	1½	3½	3	1700	60 x 51½ x 17	1.63	100 " 163.5	400
5	8	10	8	1¼	1½	5	4	1730	60 x 51½ x 17	2.14	100 " 214.5	425
6	10	12	8	1½	2	5	4	2050	70 x 57 x 17½	2.53	100 " 253.5	600
7	10	12	9	1½	2	6	5	2070	70 x 57 x 17½	3.25	100 " 325	625
8	12	12	10	2	2½	8	6	3000	73 x 65 x 19	4.06	100 " 406	675
9	12	12	11½	2	2½	8	6	3050	73 x 65 x 19	5.32	100 " 532	725

Estimates furnished on application, for pumps of larger capacity than those given in the table.

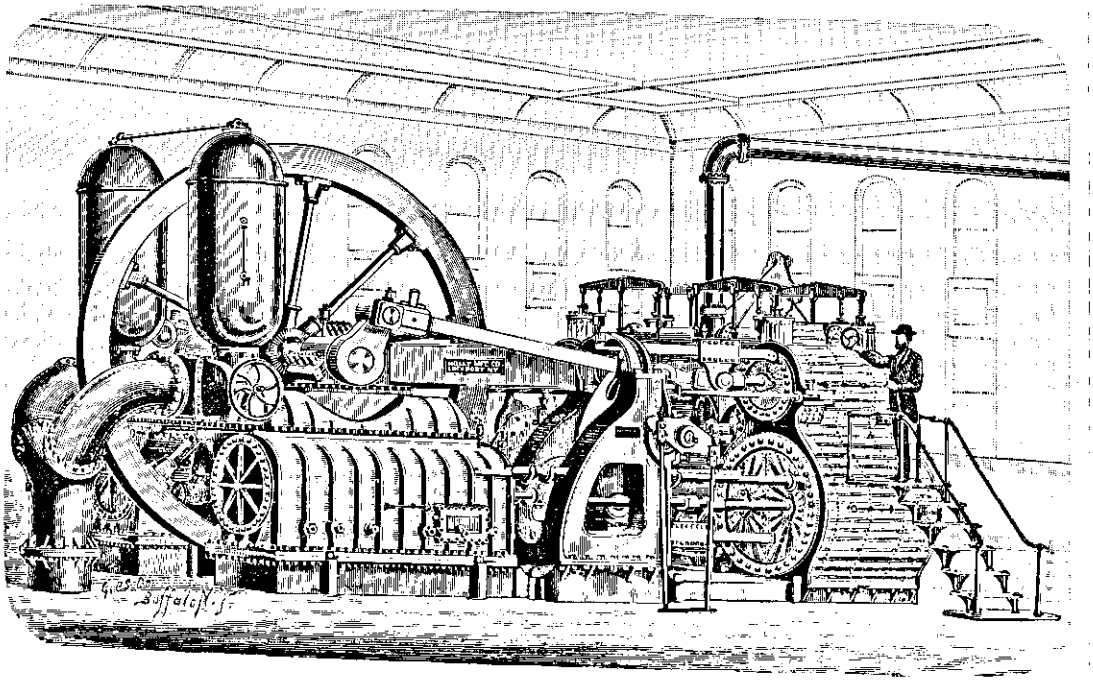
The valves of these pumps are placed on separate plates, the suction below, and the discharge above, *the body of the cylinder, thus giving the most direct passage for the water into* and out of the pump. Hand-hole plates are provided for easy access to the valves.

The water-cylinders are arranged with bronze lining when ordered, and all pumps have bronze valves and stuffing-boxes.

The pistons are packed with adjustable fibrous packing.

Pumps with cylinders of bronze furnished, when required, at specified prices.

The conditions of service should be fully stated when ordering pumps.



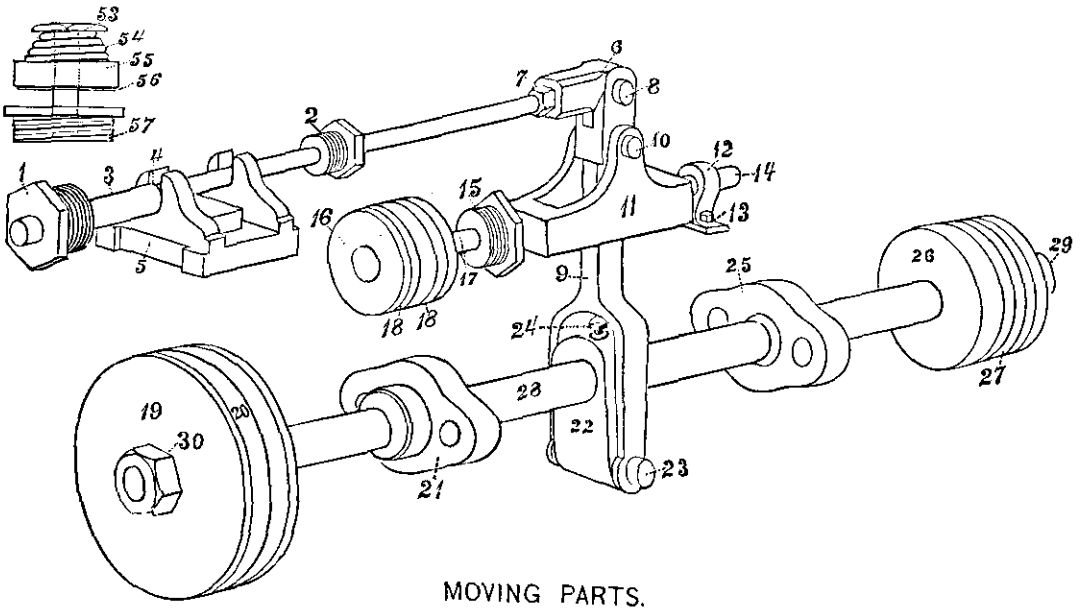
GASKILL'S COMPOUND PUMPING ENGINE.

WEEKLY DUTY REPORT
OF THE
GASKILL PUMPING ENGINE,
AT SARATOGA SPRINGS, N. Y.

Record of the Performance of the Gaskill Pumping Engine, at Saratoga, N. Y. David L. Holland, Engineer.	Revolutions per Week.	Pounds of Coal per Week.	Water Pressure, Pounds.	Steam Pressure, Pounds.	Vacuum, Inches.	Gallons Pumped per Week.	Duty.
Week ending Jan. 5th, 1884, . . .	81,070	29,500	104.16	65	28.6	15,559,278	105,377,342
" " " 12th, " . . .	91,310	34,000	108.11	65	28.5	17,524,580	106,886,417
" " " 19th, " . . .	92,070	33,600	105.85	65	28.5	17,670,442	106,778,534
" " " 26th, " . . .	94,670	34,700	107.3	65	29	18,169,445	107,771,936
" " Feb. 2d, " . . .	95,840	34,000	105.2	65	29	18,393,996	109,170,900
" " " 9th, " . . .	95,590	33,400	106.4	65	29	17,770,243	108,587,489
" " " 16th, " . . .	89,090	31,900	105.88	65	29	17,098,509	108,859,770
" " " 23d, " . . .	85,870	30,400	105.53	65	29	16,480,513	109,740,750
" " Mar. 1st, " . . .	86,880	30,000	102.4	65	29	16,674,357	109,174,589
" " " 8th, " . . .	92,210	32,500	102.14	65	29	17,697,312	106,687,477
" " " 15th, " . . .	42,590	14,900	102	65	29	8,174,043	*107,335,834
" " " 22d, " . . .	63,090	22,400	102.33	60	29	12,108,485	†106,105,936
" " " 29th, " . . .	72,320	26,400	102	60	29	13,879,943	102,867,408
" " April 5th, " . . .	70,530	25,600	102	60	29	13,536,399	103,456,254
" " " 12th, " . . .	66,590	24,000	102	60	29.5	12,780,219	104,188,675
" " " 19th, " . . .	61,930	22,400	102.3	60	29	11,885,853	104,124,060
" " " 26th, " . . .	59,410	22,400	103.57	60	29	11,402,204	101,127,239
" " May 3d, " . . .	62,360	23,200	103.9	60	29	11,968,380	102,814,930
" " " 10th, " . . .	58,020	22,400	104.3	60	29	11,135,430	99,457,194
" " " 17th, " . . .	59,790	22,400	104.9	60	29	11,475,136	103,081,123
" " " 24th, " . . .	65,350	23,200	103.9	60	29	12,542,233	107,744,798
" " " 31st, " . . .	48,430	16,800	102.8	60	29	9,294,879	‡109,099,170
" " June 7th, " . . .	75,840	27,200	103.65	60	29	14,555,516	106,397,383
" " " 14th, " . . .	79,250	28,000	103.86	60	29	15,209,977	108,222,177
" " " 21st, " . . .	88,680	31,200	103.86	60	29	17,019,820	108,679,134
" " " 28th, " . . .	85,640	30,400	104.3	60	29	16,436,371	108,175,434
" " July 5th, " . . .	94,020	34,400	108	60	29	18,044,694	108,669,751
" " " 12th, " . . .	88,340	32,000	104.86	60	29	16,955,566	106,567,789
" " " 19th, " . . .	92,420	33,600	104.28	60	28.5	17,737,616	105,595,059
" " " 26th, " . . .	94,160	32,600	102.55	60	29	18,071,563	109,043,163
" " Aug. 2d, " . . .	89,420	32,800	101.3	60	29	17,161,844	§101,674,496
" " " 9th, " . . .	94,800	34,400	105.3	60	29	18,194,395	106,836,422
						Average duty for 32 weeks, ...	106,259,332

* Run by water-power, 3½ days. † Run by water-power, 1½ days. ‡ Run by water-power, 2 days. § Extra boiler fired.

HOLLY MANUFACTURING CO., Lockport, N. Y.



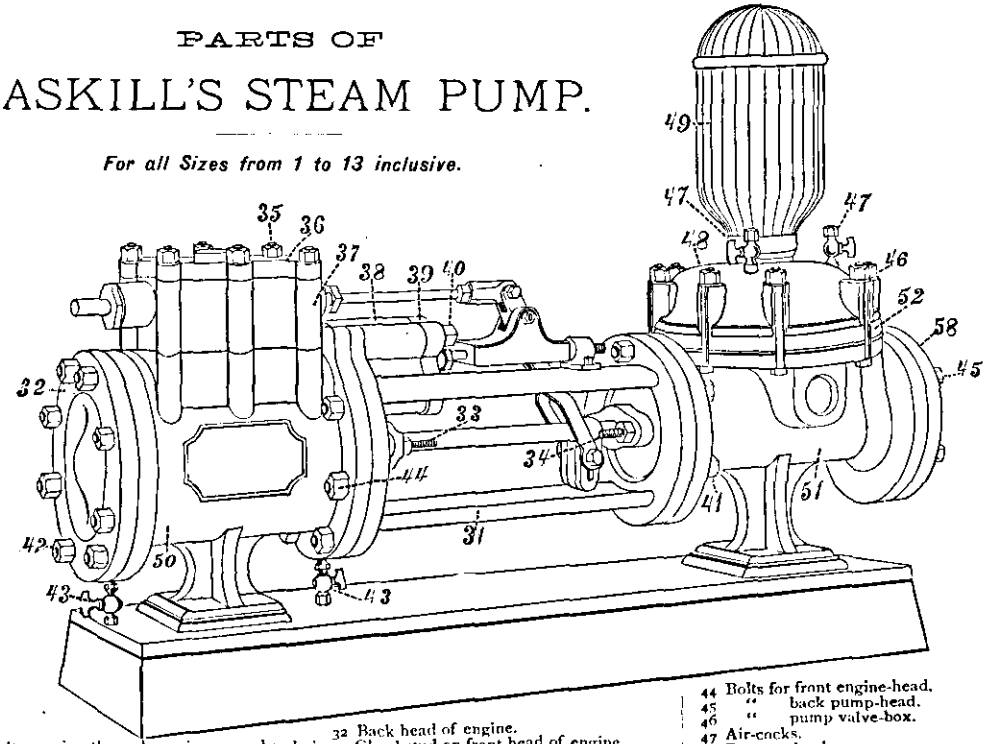
MOVING PARTS.

1 Back gland on steam-chest.
2 Front " " "
3 Valve-rod.
4 Outside steam-valve.
5 Inside " "
6 Joint on valve-rod.
7 Nut " "
8 Bolt passing through lever and valve-rod joint.
9 Forked lever.
10 Bolt passing through auxiliary piston cross-head and lever.
11 Auxiliary piston cross-head.
12 Bearing for auxiliary piston cross-head.
13 Bolt on auxiliary piston cross-head bearing.
14 End bearing on auxiliary cross-head.
15 Gland on auxiliary piston-rod.
16 Auxiliary piston.
17 Auxiliary piston-rod.
18 Two rings on auxiliary piston.
19 Engine piston.
20 Two rings on engine piston.
21 Gland on engine piston-rod.
22 Cross-head on engine piston-rod.

PARTS OF

GASKILL'S STEAM PUMP.

For all Sizes from 1 to 13 inclusive.

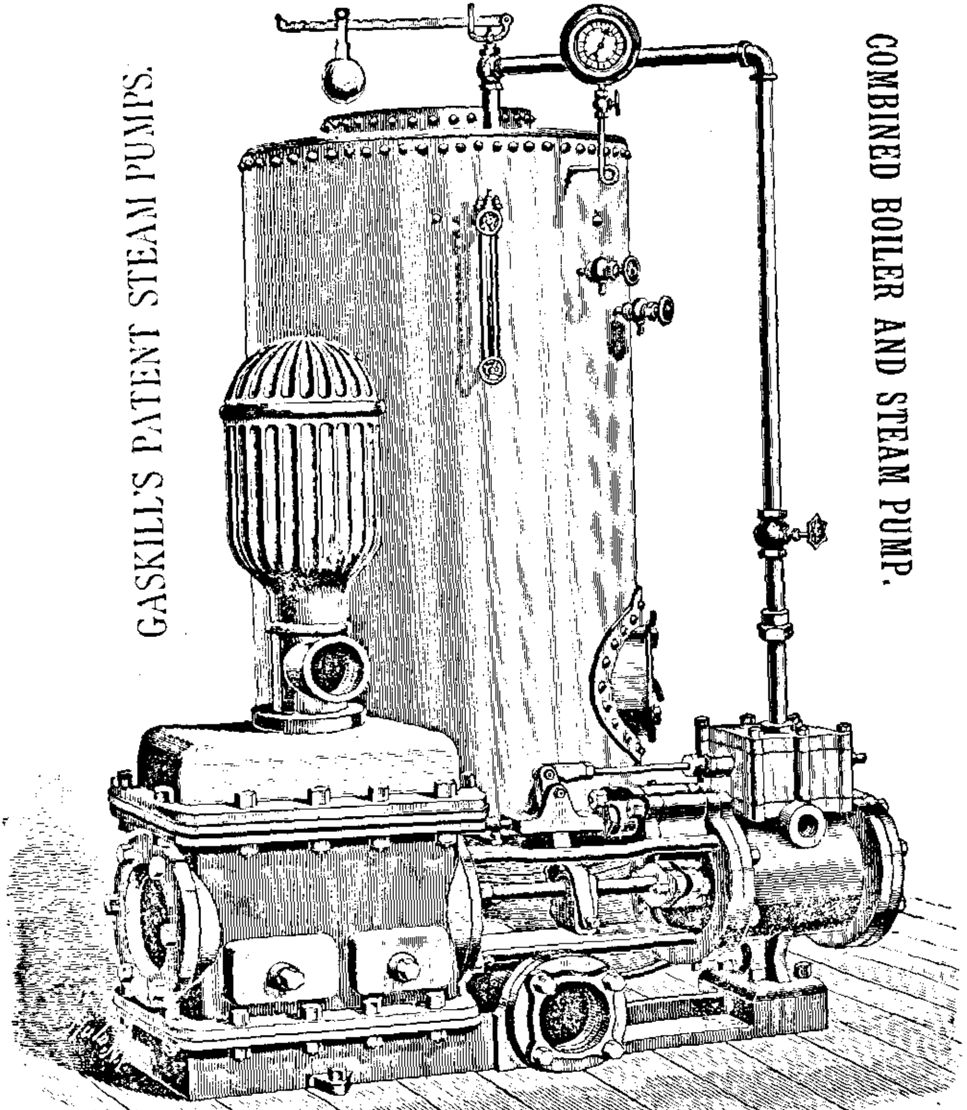


23 Bolt passing through engine cross-head and *forked lever.*
24 Set-screw on engine cross-head.
25 Gland on pump piston-rod.
26 Pump-piston.
27 Packing on pump-piston.
28 Engine and pump piston-rod.
29 Nut on pump piston-rod.
30 Nut on engine piston-rod.
31 Stretcher, including front heads of engine and pump.

32 Back head of engine.
33 Gland stud on front head of engine.
34 *Gland bolt on front* head of engine.
35 Studs for steam-chest.
36 Cover " "
37 Steam-chest.
38 Auxiliary steam-cylinder.
39 " " " " head.
40 Bolts for *auxiliary steam cylinder-head.*
41 Bolts for front pump-head.
42 " back engine "
43 Drip-cock.

44 Bolts for front engine-head.
45 " back pump-head.
46 " pump valve-box.
47 Air-cocks.
48 Pump valve-box.
49 *Air-chamber.*
50 Engine cylinder.
51 Pump "
52 Valve-plate.
" bolt.
53 Spring for valve (light and heavy).
54 Cap for *valve.*
55 Rubber valve.
56 Valve-seat.
57 Rack pump-head.
58

GASKILL'S PATENT STEAM PUMPS.



COMBINED BOILER AND STEAM PUMP.

GASKILL'S

COMBINED PUMP AND BOILER.

Complete with cast-iron dome, grate-ring, safety-valve, steam-gauge, three gauge-cocks, water-gauge, check-valve, blow-off cock; also, cast-iron base with sliding doors, with bracket bolted to same, on which to set pump; also, steam-pipe connections from boiler to pump, with globe-valve and three way exhaust-cock, connections, &c., entire and ready for operation.

This arrangement of steam pump, boiler, and fixtures complete, combines simplicity, safety, and efficiency in the highest possible degree. All materials are of first quality, the boiler being guaranteed to be perfectly safe, to a pressure of 100 pounds per square inch.

It is the most complete and perfect machine, for the purpose for which it is designed, in the market, and can be placed at the source of supply, and the water forced to the required height or distance; it does not require a skilled mechanic to operate it, for its entire management can be learned by any person of ordinary intelligence in a few hours.

SIZES AND PRICES AS FOLLOWS:

	DIMENSIONS OF PUMP.								DIMENSIONS OF BOILERS.				
Number.	Diameter of Steam-Cylinder.	Length of Stroke.	Diameter of Pump-Cylinder.	Diameter of Steam-Pipe.	Diameter of Exhaust-Pipe.	Diameter of Suction-Pipe.	Diameter of Discharge-Pipe.	Galls. Discharged per Stroke.	Diameter of Shell, inches.	Height of Shell, inches.	Tubes, inches.	Length of Tubes, inches.	Price, complete.
1	4	6	3	¾	1	2½	2	.175	22	48	20–2	32	$ 425
2	6	7	5	1	1¼	3½	2½	.583	24	60	25–2	42	500
3	7	10	6	1¼	1½	3½	3	1.2	30	72	44–2	48	675
4	8	10	7	1¼	1½	3½	3	1.635	30	72	44–2	48	700
5	8	10	8	1¼	1½	5	4	2.145	30	72	44–2	48	725
6	10	12	8	1½	2	5	4	2.535	34	78	52–2	53	975
7	10	12	9	1½	2	6	5	3.25	34	78	52–2	53	1000

Larger sizes, with any desired style of boiler, furnished on short notice.

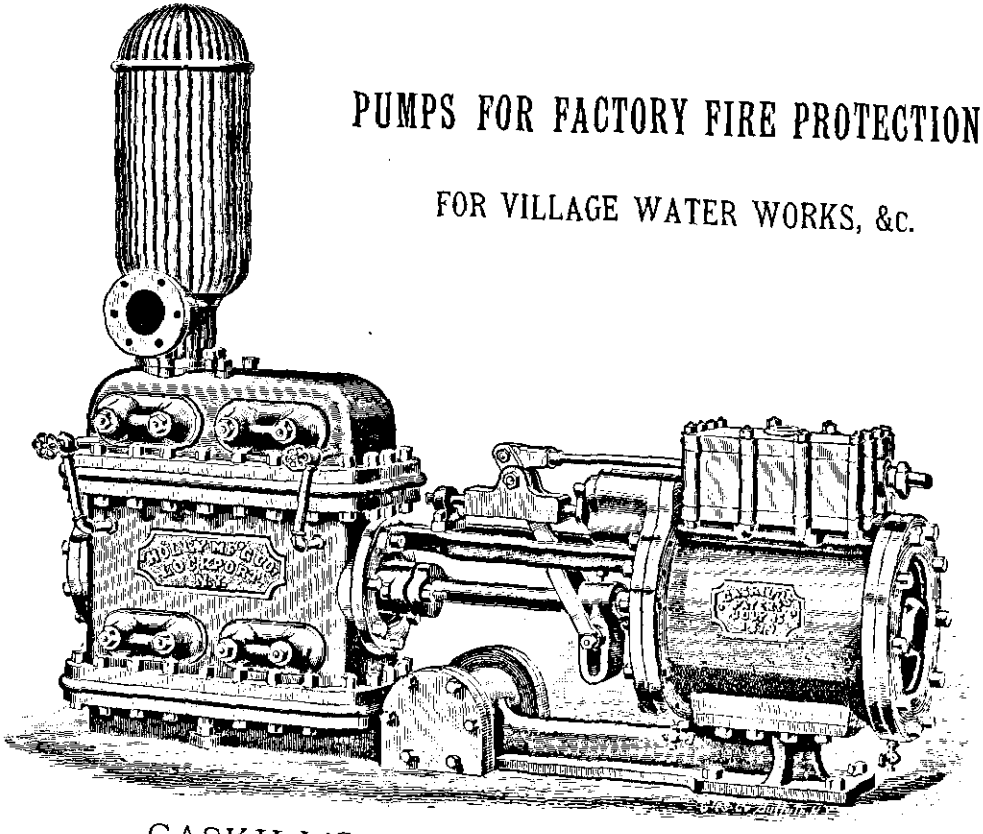
The above list embraces tank pumps, and pumps for low service only, and for heads under 100 feet. For pumps which are required to lift water to a high elevation, high service pumps, such as are illustrated on page 6, are used in place of the tank pumps.

The different parts are marked, so that if, for any reason, the machine is taken apart, it can be put together again without difficulty.

Every machine is fully guaranteed.

PUMPS FOR FACTORY FIRE PROTECTION,

FOR VILLAGE WATER WORKS, &c.



GASKILL'S PATENT STEAM PUMP.

GASKILL'S PATENT

Steam Pumps for Factories, Public Buildings, &c.

These steam pumps have been used for fire pumps with the best results. They are strong, noiseless in their action, and the most efficient, durable and economical steam pumps in the market.

The water-passages are the shortest and most direct possible, and the valve area is large. The pumps are supplied with Gaskill's Patent Pump-Valve, which is the most perfect in use, working noiselessly under heavy loads and at high speeds.

Much higher speeds than those given in the table can be used. They can be operated from 10 to 150 strokes per minute, but for continuous service, slower speeds than those given in the table, are more economical.

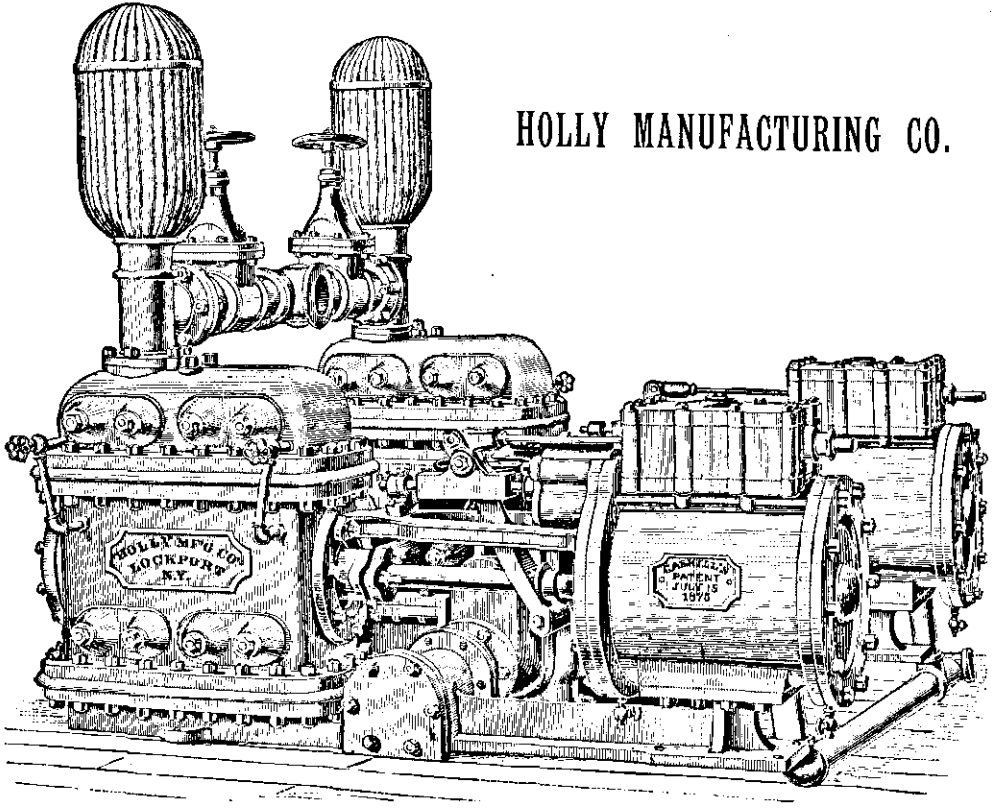
Number.	Diameter of Steam-Cylinder.	Length of Stroke.	Diameter of Pump-Cylinder.	Diameter of Steam-Pipe.	Diameter of Exhaust-Pipe.	Diameter of Suction-Pipe.	Diameter of Discharge-Pipe.	Gallons Discharged, per Stroke.	Capacity per Minute, in Gallons, at Ordinary Speed.	Price.
14	12	12	5	2	2½	5	4	.974	100 strokes, 97.4	$490
15	12	12	6	2	2½	5	4	1.422	100 " 142.25	500
16	12	12	7	2	2½	5	4	1.953	100 " 195.3	525
17	12	12	8	2	2½	5	4	2.565	100 " 256.53	535
18	12	12	8½	2	2½	5	4	2.904	100 " 290.445	550
19	12	12	9	2	2½	5	4	3.258	100 " 325.85	575
20	14	20	7	2½	3	6	5	3.159	75 " 236.96	
21	14	20	8	2½	3	6	5	4.155	75 " 311.662	
22	14	20	9	2½	3	8	6	5.335	75 " 400.162	
23	16	20	10	3	3½	8	6	6.626	75 " 496.95	
24	16	20	11	3	3½	8	6	8.051	75 " 604.125	
25	16	20	12	3	3½	8	6	9.61	75 " 720.75	

All pumps are tested thoroughly before leaving the shops.

Sizes not in the table can be furnished to suit conditions not covered by the sizes the regiven.

Every pump guaranteed to give complete satisfaction, or it can be returned.

HOLLY MANUFACTURING CO.



GASKILL'S PATENT DUPLEX STEAM PUMPS.

GASKILL'S

DUPLEX STEAM PUMP.

FOR SMALL PUMPING STATIONS, SUCH AS SMALL VILLAGES, FACTORY FIRE PROTECTION, HOTELS, PUBLIC AND PRIVATE BUILDINGS, &c.

These pumps can be used on either the direct pressure, reservoir, or stand-pipe systems, and are very efficient fire service pumps; they are the cheapest and most efficient that can be used.

The pumps can be used either singly or combined.

They are very strong, and are thoroughly well made.

The water-passages are very direct, the suction-valves being under, and the discharge-valves over the body of the pump, thus giving the most direct passage for the water.

These pumps are furnished with Gaskill's Patent Pump-Valves, which are noiseless in their action, and of the most durable description.

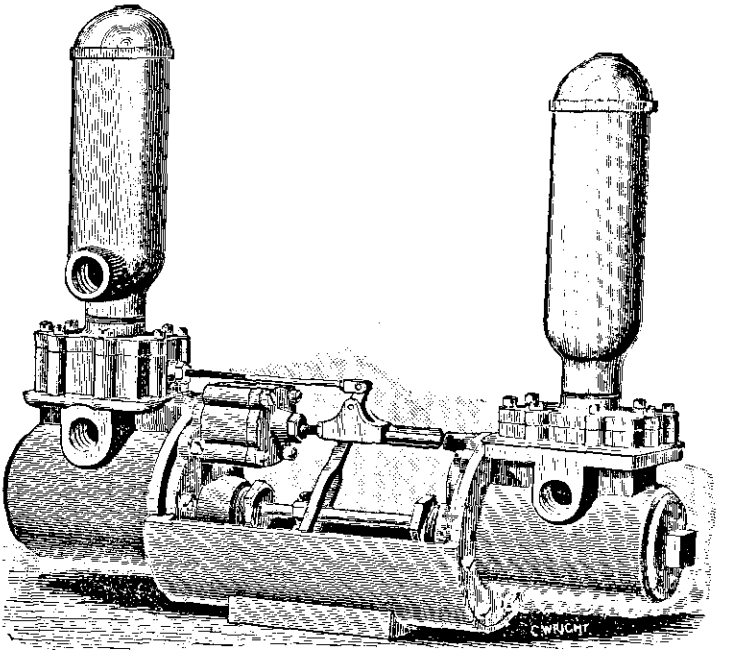
When the condition will admit, air pumps and condensers can be attached to the large sizes, over No. 6, of these pumps, to great advantage, saving very largely in fuel.

SIZES AND PRICES.

Number.	Diameter of Steam-Cylinder.	Length of Stroke.	Diameter of Pump-Cylinders.	Gallons Discharged, per Stroke.	Capacity per Minute, in Gallons, at Ordinary Speed.	Price.
1	12	12	5	1.94	100 strokes, 194.8	$ 980
2	12	12	6	2.84	100 " 284.50	1000
3	12	12	7	3.906	100 " 390.6	1050
4	12	12	8	5.13	100 " 513.06	1070
5	12	12	8½	5.808	100 " 580.89	1100
6	12	12	9	6.517	100 " 651.70	1150
7	14	20	7	6.319	75 " 473.92	
8	14	20	8	8.311	75 " 623.324	
9	14	20	9	10.671	75 " 800.324	
10	16	20	10	13.252	75 " 993.9	
11	16	20	11	16.102	75 " 1208.25	
12	16	20	12	19.22	75 " 1441.5	

A Pump Operated by Water from the Street Water-Pipes,

FOR SUPPLYING TANKS WITH CISTERN WATER, IN CASES WHERE THE PUBLIC WATER SUPPLY IS NOT SUITABLE FOR DOMESTIC PURPOSES.



PATENTED JULY 15, 1879.

GASKILL'S HYDRAULIC PUMPING ENGINE.

GASKILL'S

HYDRAULIC PUMPING ENGINE.

This engine is designed to do the labor of pumping the water for household uses, in cases where the cistern water is preferred to the public water supply, for toilet, potable and culinary purposes.

The engine is provided with two cylinders, one being a hydraulic engine, and the other a pump, both being supplied with air-chambers. The water from the street mains is brought to the engine, and after having performed its work there, can be either emptied into the sewer, or used for irrigating lawns, or other uses that do not require it to be raised to any considerable height. The pump takes water by suction from the house cistern, and delivers it into an elevated tank, usually located in the attic.

Both cylinders are lined with bronze, and, in fact, all working parts are of composition, and so arranged, as to be easily accessible.

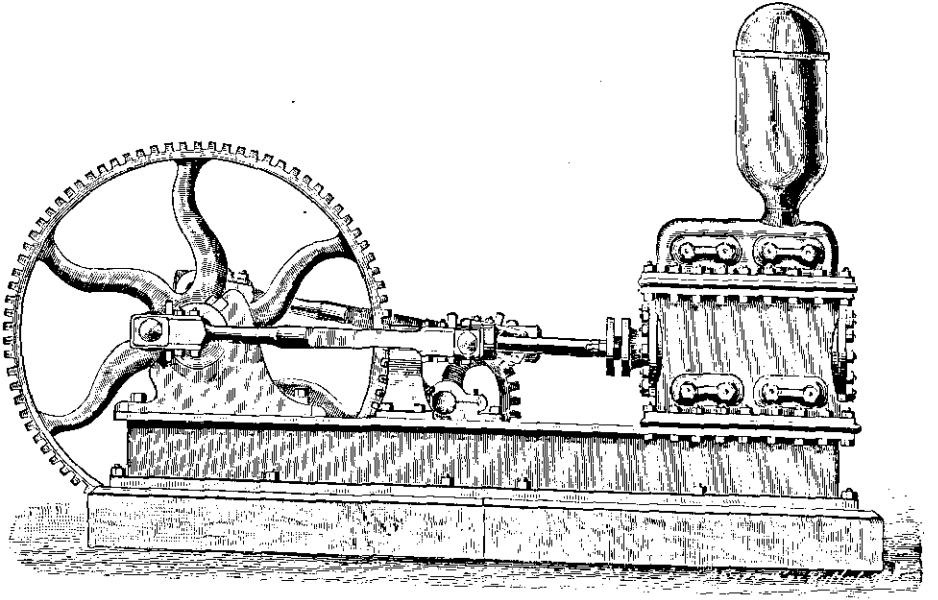
In order to avoid waste of water, it is the best to have a valve in the supply-pipe of the power-cylinder, to be operated by a float in the tank, so that, as soon as the tank is filled, the engine will be stopped, and again started when the water in the tank is drawn down far enough for the float to operate the valve. The tank should in all cases be provided with an overflow-pipe.

A safe rule is to calculate that one pound pressure on the engine will raise the cistern water one foot.

These engines are made with power-cylinder, 2½ inches diameter, and 3½ inches stroke, and with two sizes pump-cylinders, viz.: 2 inches and 1⅝ inches diameter, adapting it to different water pressures.

Capacity, about 300 gallons per hour.

Weight, boxed, 60 lbs. Price, $70.00.



GASKILL'S DUPLEX POWER PUMP.

GASKILL'S

DUPLEX POWER PUMPS.

These pumps, arranged to be driven by extraneous power, from a water-wheel, or a shop or mill engine, we can furnish of all capacities up to 5,000,000 gallons daily.

These are, without doubt, the best power pump made. The valves being placed on plates below and above the body of the cylinder, the water has hardly to change direction in passing through the pump, and the use of Gaskill's Patent Pump-Valves insure perfect and noiseless action.

Air-chambers of ample size are furnished both on the suction and discharge-pipes.

The pumps are driven from cranks placed 90 degrees apart, so that a steady flow of water is produced, and, if desired, one pump can be disconnected and the other run by itself.

Single pumps can be furnished, when desired, of any capacity up to 2,500,000 gallons daily.

The larger sizes are made with plungers working through a center gland, and the smaller sizes with pistons working in a bored cylinder.

When used for water works, we furnish an automatic regulator, to govern the pressure of water in the street pipes.

The gearing used to communicate the power from the wheel to the pump, has machine-cut teeth, and the shafting is made of the best forged scrap.

The following are conspicuous places where those pumps are in use:

	Daily Capacity in Gallons.
Niagara Falls, Ont., Great Western R. R. Water Supply,	500,000
Suspension Bridge, N. Y., Village Water Works,	5,000,000
Denver, Col., (3 sets,) City Water Works,	10,000,000
Fort Collins, Col., (2 sets,) City Water Works,	1,500,000
Sauk Center, Minn., City Water Works,	750,000
Indianapolis, Ind., (2 sets,) City Water Works,	10,000,000
New Tacoma, W. T., (2 sets,) City Water Works,	1,000,000
Spokane Falls, W. T., (2 sets,) City Water Works,	1,500,000

DUTY OF PUMPING ENGINES.

"Duty," as ordinarily defined, is a measure of the economy of an engine, and represents the amount of foot pounds of work done, per hundred pounds of coal consumed under the boilers; hence, it will be seen that it is as much the measure of the economy of the boilers as of the engine; and when no test is made to determine the economy of each, the duty obtained is a measure of the economy of the plant taken as a whole; and where the guarantee of the builder is such as to include the boilers, the separate efficiency is rarely determined.

But in cases where the engine is furnished by one party and boilers by another, then the duty guarantee of the engine is generally based on a stated performance of the boilers, usually on an assumption that the boilers will evaporate from and at 212 degrees, ten pounds of water, with the consumption of one pound of coal.

In cases where it is impossible to make an actual measurement of the water delivered, the duty is determined from "pump measurement," and the head in pounds pressure, taken from the source of supply to the point of delivery, (and the head due to friction,) × by the area of pump piston, × by the number of feet traveled by the piston, × by 100, and this divided by the coal burned, represents the duty, or by the formula,

$$D = \frac{P \times A \times F \times 100}{C}$$

When P = load in pounds pressure per square inch, A = area of pump piston, F = feet traveled by piston during trial, C = coal consumed.

An allowance of one pound (or 2,308 feet) for frictional resistance is usually made, and is ample for well-constructed pumps.

BELOW ARE GIVEN THE DUTIES OF SOME OF THE MOST NOTED PUMPING ENGINES IN THE WORLD.

Location.	Date.	Engine.	Designer.	Duty.	Capacity.	Authority.	Builder.
United Mines.	1842	Single Cyl.	Taylor.	114,361,700		Wm. Pole.	
Carn Brea.	1841	Compound.	Jas. Sims.	101,702,000		"	
Haarlem Meer.	1848	Single Cyl.	Gibbs & Dean.	80,000,000	200,000,000	Appleton's Dict.	
Newark, N. J.	1870	Compound.	H. R. Worthington.	76,386,262	5,000,000	Geo. H. Bailey.	H. R. Worthington.
Fall River, Mass.	1876	"	"	70,977,177	5,500,000	Worthington.	"
Providence, R. I.	1876	"	A. F. Nagle.	84,637,245	2,000,000	Hermany.	
Lynn, Mass.	1873	"	E. D. Leavitt.	103,923,215	4,938,000	B'd of Experts.	
Lawrence, Mass.	1876	"	"	96,201,900	9,800,000	"	
Pawtucket, R. I.	1878	"	Geo. H. Corliss.	133,522,000	2,500,000	"	Geo. H. Corliss.
Providence, R. I.	1882	"	"	113,035,000	9,105,604	S. M. Gray.	"
Evansville, Ind.	1881	"	H. F. Gaskill.	88,688,866	4,000,000	Jno. W. Hill.	Holly Mfg. Co.
Memphis, Tenn.	1882	"	"	99,672,837	4,000,000	"	"
Saratoga, N. Y.	1882	"	"	112,899,983	5,000,000	D. M. Greene and Jno. W. Hill.	"
Saratoga, N. Y.	1883	Same Engine	"	106,838,000	5,000,000	Chas. T. Porter.	"
Omaha, Neb.	1883	Compound.	"	102,000,000	5,000,000	J. D. Cook.	"
Columbus, O.	1884	"	"	115,400,000	10,000,000	T. C. Mendenhall	"

WATER WORKS PUMPING MACHINERY.

GASKILL'S

COMPOUND PUMPING ENGINE

HAS OBTAINED A LARGE SALE, AND IS THE BEST PUMPING ENGINE BUILT.

The numerous test trials of efficiency and economy has demonstrated its great value as a pumping engine for water works.

A 5,000,000 gallon engine at Saratoga, N. Y., gave, on a trial conducted by Jno. W. Hill, M. E., of Cincinnati, O., and Prof. D. M. Greene, of Troy, N. Y., a duty of nearly 113,000,000 foot pounds. A subsequent trial, conducted by Prof. Charles T. Porter, of New York City, gave a duty of 106,838,000 foot pounds, and the same engine gave a duty in regular service, for 30 weeks, of over 105,000,000. A 5,000,000 gallon engine at Omaha, Neb., gave a test duty of 102,000,000, and a 10,000,000 engine at Columbus, O., gave a trial duty of 115,000,000.

DESCRIPTION.

On a pair of iron bed-plates, are mounted the two pumps, and in a direct line therewith the two low-pressure steam-cylinders, with the piston-rods of the low-pressure steam-cylinders connected to the pump piston-rods.

Between the pumps and steam-cylinders, are placed beam-supports, which are firmly bolted to the bed-plates, and also rigidly stayed by wrought-iron struts to the pumps and steam-cylinders. These beam-supports carry the beam-shafts and beams, the lower end of the latter being connected to the cross-heads of the low-pressure cylinders by means of links.

On the top of the pumps, are placed the main shaft-bearings, which support the shaft, fly-wheel and cranks; the latter being keyed to the shaft at right angles to each other. On top of the low-pressure steam-cylinders, are mounted the two high-pressure steam-cylinders, with their centers in the same horizontal plane as the center of the main crank-shafts. The cross-heads of the high-pressure steam-cylinder are connected by means of links to the upper ends of the beams, and the beams are in turn connected by means of connecting-rods to the crank-pins. From the high-pressure steam-cylinders, heavy cast-iron girders extend to the pillow-blocks. On

the inner end of each of the beam centers, an arm is keyed, from which the air-pumps are driven. The valves of the steam-cylinders are operated by means of eccentrics on a shaft, which is driven from the main shaft through small bevel-gears. The admission-valves to the high-pressure steam-cylinders are of the double-beat poppet pattern; so arranged, as to open at the proper time, and to close at any desired point of the stroke. The exhaust-valves of the high-pressure cylinders are also the admission-valves to the low-pressure steam-cylinders, and are ordinary slide-valves, remaining open somewhat less than the time required to make a complete stroke. The exhaust-valves from the low-pressure cylinders are also plain slide-valves, operating the same as the high-pressure exhaust-valves.

The pump-plungers are arranged to work through glands in the center of the pumps, and are accessible from the covers at the and of the pump-cylinder. The pump-valves are placed on horizontal plates below and above the line of plunger travel. The glands above mentioned divide the valves of one end of the pump from those of the other end at the center of the valve-plates.

The operation of the machine is as follows:

Steam is admitted through the automatic cut-off valves into the high-pressure steam-cylinders, urging the pistons forward under full boiler pressure, until the point of cut-off is reached. The valve then closes, and the remaining portion of the stroke is accomplished by the elastic force of the steam. When the piston has nearly reached the end of its travel, the exhaust-valve between the high and low-pressure cylinder opens, and the steam remaining in the high-pressure cylinder rushes into the low-pressure cylinder and against its piston, which at that time is at the end of its travel and at the opposite of the high-pressure piston. The low-pressure cylinder-piston is then in turn urged forward by the incoming steam, which is expanded to four times the volume it occupied in the high-pressure cylinder at the time of its release therefrom. The release from the low-pressure cylinder is accomplished by means of the exhaust-valves in the return strokes. This operation is repeated on each side and at each end at proper times. The close connection between the two cylinders reduces the clearance spaces to a minimum, which, with thorough jacketing, insures the most economical use of steam.

This engine is also built to operate as a non-compound engine, in which case the upper or high-pressure steam-cylinders and connections are omitted, and the lower steam-cylinders are provided with automatic cut-off valves. Steam is admitted to these cylinders direct from the boiler and exhausted into the condenser. This mode of construction is adapted to small places and to cities and villages where the cheapness of fuel renders the first cost of the machine a matter more to be considered than the annual saving of fuel. Although even when constructed as a non-compound engine, a duty of 50,000,000 foot pounds of work can be obtained from 100 pounds of coal.

SOME OF THE LARGER

CITIES AND VILLAGES SUPPLIED WITH PUMPING MACHINERY,

BY THE HOLLY MANUFACTURING COMPANY.

CALIFORNIA.	Galls. daily.
Fresno,	1,000,000
Sacramento,	3,000,000
COLORADO.	
Colorado Springs,	1,000,000
Denver,	2,000,000
"	2,500,000
"	2,500,000
"	5,000,000
Fort Collins,	750,000
"	750,000
Golden,	1,500,000
Pueblo,	1,500,000
"	1,500,000
Silver Cliff,	1,500,000
DAKOTA.	
Fargo,	1,500,000
"	750,000
Sioux Falls,	1,500,000
DELAWARE.	
Dover,	1,000,000
GEORGIA.	
Atlanta,	3,000,000
"	4,000,000
ILLINOIS.	
Decatur,	1,000,000
Evanston,	2,000,000
Hyde Park,	2,000,000
Litchfield,	750,000
Rock Island,	2,000,000
" "	3,000,000
Rockford,	2,000,000
"	3,000,000
Town of Lake,	4,000,000
" "	4,000,000
INDIANA.	
Columbus,	1,500,000
Connersville,	1,000,000
Evansville,	4,000,000
"	4,000,000
Fort Wayne,	3,000,000
" "	2,000,000
Indianapolis,	6,000,000
"	5,000,000
"	5,000,000
La Porte,	2,000,000
Richmond,	4,000,000
IOWA.	
Atlantic,	1,500,000
"	1,000,000
Burlington,	3,000,000
Des Moines,	5,000,000
Iowa City,	1,500,000
" "	1,000,000
Keokuk,	1,500,000
Oskaloosa,	1,500,000
"	1,000,000
Sioux City,	2,000,000
" "	2,000,000
KANSAS.	
Abilene,	1,000,000
Clay Center,	1,500,000
Emporia,	1,500,000
Olathe,	750,000
Salina,	1,500,000
Topeka,	1,500,000
"	1,500,000

KENTUCKY.

	Galls. daily.
Covington,	4,000,000
Lexington,	1,500,000
"	1,500,000
Newport,	4,000,000
"	4,000,000
Owensborough,	2,000,000

MAINE.

Bangor,	4,000,000
Rockland,	1,000,000

MARYLAND.

Cumberland,	1,500,000
"	2,000,000

MASSACHUSETTS.

Milford,	1,500,000
Taunton,	2,000,000
"	2,000,000

MICHIGAN.

Allegan,	1,000,000
Alpena,	2,000,000
Adrian,	1,500,000
"	1,500,000
Bay City,	2,000,000
Big Rapids,	1,000,000
East Saginaw,	2,000,000
" "	6,000,000
Flint,	1,500,000
"	1,500,000
Jackson,	1,500,000
Kalamazoo,	2,000,000
Marquette,	1,500,000
Manistee,	2,000,000
"	750,000
Port Huron,	2,000,000
Saginaw City,	2,000,000
" "	4,000,000
West Bay City,	1,500,000
" " "	1,500,000

MISSOURI.

Carrollton,	1,000,000
Kansas City,	3,000 000
" "	1,500,000
Kansas City,	4,000,000
" "	7,000,000
" "	4,000,000
Sedalia,	1,500,000

NEW JERSEY.

Burlington,	1,500,000
East Orange,	1,500,000
Salem,	1,500,000

NEW YORK.

Auburn,	4,000,000
"	7,500,000
"	7,500,000
Batavia,	1,500,000
Binghamton,	2,000,000
"	6,000,000
"	1,000,000
Buffalo,	4,000,000
"	6,000,000
"	15,000,000
Dunkirk,	2,000,000
Flushing,	1,500,000
Garden City,	1,500,000
Gouverneur,	1,500,000
Jamestown,	3,000,000
Lockport,	2,000,000
Long Island City,	3,000,000
Middletown,	2,000,000
Ogdensburgh,	2,000,000
Potsdam,	1,500,000
Rochester,	2,000,000
"	2,000,000
"	3,000,000
Rockaway Beach,	1,500,000
Saratoga Springs,	2,000,000
" "	5,000,000
Schenectady,	2,000,000
Suspension Bridge,	1,500,000
" "	5,000,000
Troy,	6,000,000
"	6,000,000

NEW MEXICO.

Albuquerque,	1,000,000

OHIO.

	Galls. daily.
Canton,	2,000,000
Columbus,	3,000,000
"	4,000,000
"	10,000,000
Dayton,	4,000,000
"	4,000,000
Ironton,	2,000,000
Kenton,	1,500,000
"	1,000,000
Mansfield,	2,000,000
Middletown,	2,000,000
Norwalk,	2,000,000
Portsmouth,	2,000,000
Sidney,	2,000,000
Urbana,	1,500,000
Youngstown,	2,000,000
Tiffin,	1,500,000

PENNSYLVANIA.

Beaver Falls,	1,500,000
Danville,	1,500,000
Doylestown,	1,500,000
Titusville,	2,000,000
Towanda,	1,000,000

TENNESSEE.

Memphis,	4,000,000
"	4,000,000
"	4,000,000
Nashville,	10,000,000

TEXAS.

	Galls. daily.
Austin,	3,000,000
Colorado City,	1,500,000
Denison,	1,500,000
"	1,500,000
Fort Worth,	3,000,000
Gainesville,	1,500,000

VERMONT.

Vergennes,	1,000,000

VIRGINIA.

Norfolk,	2,000,000

WEST VIRGINIA.

Martinsburg,	1,500,000

WISCONSIN.

Oshkosh,	4,000,000
"	4,000,000

WASHINGTON TERRITORY.

New Tacoma,	1,000,000
Spokane Falls,	750,000
" "	750,000

CANADA.

St. Cunegonde,	1,500,000
Fredericton,	1,500,000
Brockville,	1,500,000