(No Model.) 2 Sheets—Sheet 1.

L. P. DIXON.

STEAM PUMP.

No. 458,771. Patented Sept. 1, 1891.

Fig. 1.

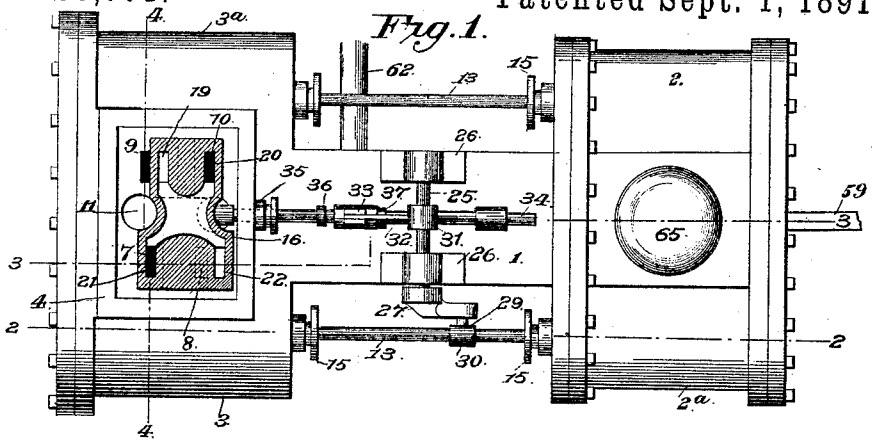


Fig. 2.

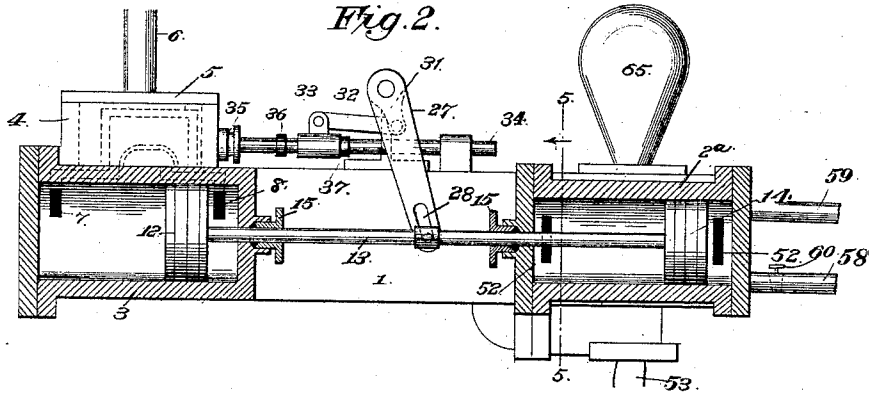
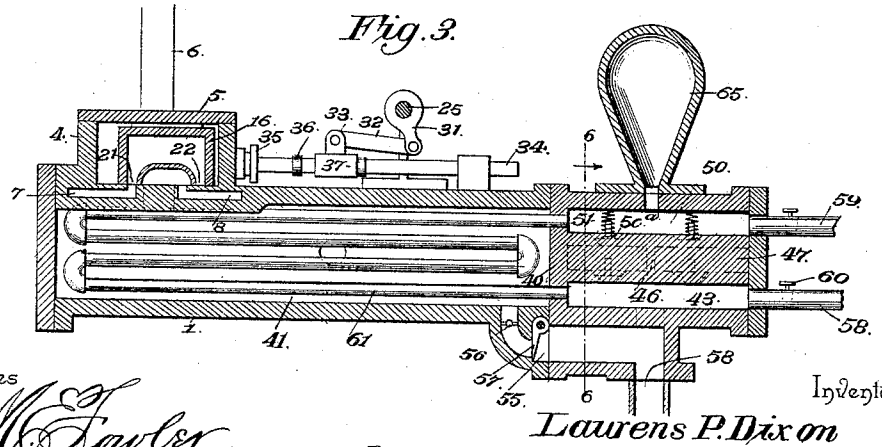


Fig. 3.



Witnesses

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Wm. Bagger.

Inventor

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

2 Sheets—Sheet 2.

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STEAM PUMP.

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Fig. 4.

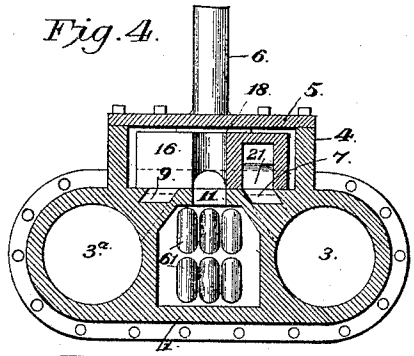


Fig. 8.

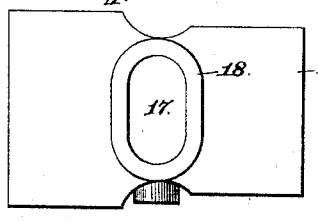


Fig. 5.

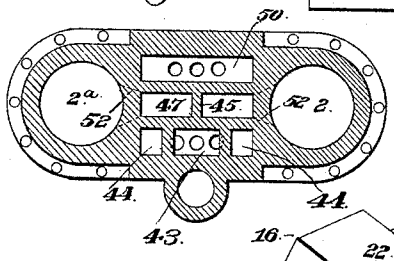


Fig. 6.

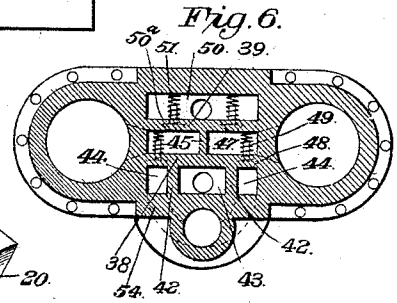


Fig. 9.

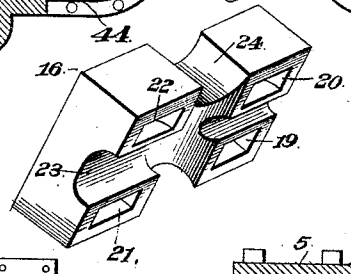


Fig. 10.

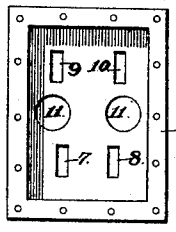
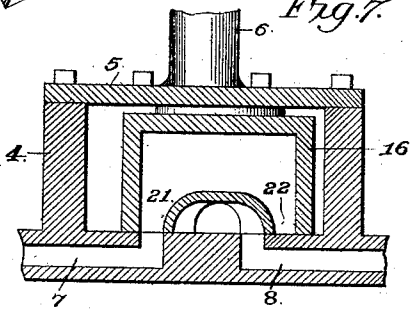


Fig. 7.



Witnesses

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UNITED STATES PATENT OFFICE.

LAURENS P. DIXON, OF TOLEDO, OHIO, ASSIGNOR TO LETTIE DIXON, OF SAME PLACE.

STEAM-PUMP.

SPECIFICATION forming part of Letters Patent No. 458,771, dated September 1, 1891.

Application filed February 20, 1891. Serial No. 382,198. (No model.)

To all whom it may concern:

Be it known that I, LAURENS P. DIXON, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented a new and useful Steam-Pump, of which the following is a specification.

The invention relates to steam-pumps; and it has for its object to provide a device of this class, which shall be simple in construction and durable, which shall be exceedingly compact and powerful, in which a single steam-valve shall be made to serve two independent steam-cylinders, each of which is arranged to operate the plunger or piston of an independent pump-cylinder, and in which the exhaust-steam may be utilized, when desired, to raise the temperature of the water which is being pumped.

The invention consists in the improved construction, arrangement, and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the drawings hereto annexed, Figure 1 is a plan view of a steam-pump constructed in accordance with my invention, the top of the steam-chest having been removed and the valve being shown in section. Fig. 2 is a sectional view taken on the line 2 2 in Fig. 1. Fig. 3 is a sectional view taken on the line 3 3 in Fig. 1. Fig. 4 is a sectional view taken on the line 4 4 in Fig. 1. Fig. 5 is a sectional view taken on the line 5 5 in Fig. 2 and looking in the direction of the steam-cylinders. Fig. 6 is a sectional view taken through the line 6 6 in Fig. 3 and looking in the direction of the discharge end of the pump. Fig. 7 is a sectional view on a larger scale through the steam chest and valve. Fig. 8 is a plan view of the valve. Fig. 9 is a perspective detail view of the steam-valve, showing the same in a tilted or partly inverted position. Fig. 10 is a plan view of the steam-chest, the cover and the valve having been removed from the same.

Like numerals indicate like parts in all the figures.

1 designates the base of the machine, which consists of a box or hollow casting, at one end of which are arranged the pump-cylinders 2 2^a and at the other end the steam-cylinders 3 3^a, the bore of which latter is preferably somewhat larger than that of the former.

4 designates the steam-chest, which is arranged above and between the steam-cylinders 3 3^a. Said steam-chest is provided with the cover 5, having the steam pipe or inlet 6, and the bottom of said steam-chest is provided with ports 7 8 and 9 10, connected by suitable passages with the ends of the cylinders 3 and 3^a, respectively. The ports 7 and 8 are placed more closely together than the ports 9 and 10, thus causing the piston in the cylinder 3^a to begin its stroke slightly in advance of the piston in the cylinders 3, and thus avoiding the danger of stoppage on a dead-center. The bottom of the steam-chest is likewise provided with exhaust-ports 11, located near the front and rear ends, and centrally between the steam-ports said exhaust-ports open into the box or casing 1.

12 designates the pistons, which are arranged in the steam-cylinder and which are connected by the rods 13 with the pistons or plungers 14 in the pump-cylinders, said rods 13 passing through packing-boxes 15 in the heads of the said cylinders.

16 designates the valve, which is arranged in the steam-chest 4. Said valve is provided on its upper side with an opening 17, adapted to register with the steam-inlet and surrounded by a flange 18, which is fitted tightly against the under side of the cover 5 of the steam-chest, so as to prevent leakage of steam. The under side of the valve is provided with openings 19, 20, 21, and 22, adapted to register with the ports 7, 8, 9, and 10, respectively, when either of said ports is covered by the valve. The under side of the latter is provided with a transverse groove or recess 23, and the front and rear sides of said valve are likewise provided with vertical grooves or recesses 24. As will be seen in Fig. 1 of the drawings, when the valve is at either end of its stroke the diagonally-opposite ports 7 and 10 or 8 and 9 will be opened to steam, while the remaining ports are connected with or open to the exhaust-ports 11. Thus in Fig. 1 of the drawings the ports 8 and 9 are connected with the steam-inlet through the hollow body of the valve. At the same time the port 7 is uncovered, and is consequently in

communication with the exhaust-ports 11, while the port 10 likewise communicates with the exhaust-ports through the transverse recess 23 in the under side of the valve. Steam is thus admitted into opposite ends and exhausted from opposite ends of the two steam-cylinders, causing the pistons in the latter to be forced in opposite directions and imparting a corresponding movement to the plungers in the pump-cylinders. At the end of the stroke the position of the valve, and consequently the direction of the movement of the pistons, is reversed.

The mechanism for operating the valve may be of any suitable construction. In the drawings hereto annexed a rock-shaft 25 has been shown mounted in suitable bearings 26 transversely upon the base 1. One end of said rock-shaft is provided with a crank or arm 27, having a slot 28, engaging a pin 29, which extends laterally from a collar 30, suitably secured upon one of the piston-rods 13. The rock-shaft 25, to which an oscillating movement is thus imparted, is also provided with a crank 31, which is connected by a link 32 with a collar 33, which is mounted slidingly upon the valve-stem 34, which latter extends through a packing-box 35 in the front side of the steam-chest. Said valve-stem is also provided with fixed collars 36 and 37, adapted to be engaged by the sliding collar 33 when the latter approaches the limits of its movement, thus imparting a sliding movement to the valve-stem and valve, as will be readily understood.

The end of the box or casing which has the pump-cylinders is provided with horizontal partitions 38 and 39 and with a transverse partition 40, whereby the water-compartments are separated from the body or exhaust-steam compartment 41 of the casing. The horizontal space below the partition 38 is provided with vertical partitions 42 42, arranged longitudinally and parallel to each other and separating the said space into three compartments, of which the central one is designated 43 and the outer ones by 44. The space between the partitions 38 and 39 is separated by partitions 45 and 46, crossing each other, into four separate compartments, each of which is designated by 47. Each of these compartments communicates with one of the compartments 44 by means of a passage 48, having an upwardly-opening valve 49, and each of the compartments 47 likewise communicates with the compartment 50 above the partition 39 by a passage 50^a, having an upwardly-opening valve 51. The chambers or compartments 47 are connected by suitable ports or passages with ports 52 near the front and rear ends of the pump-cylinders.

53 designates the suction-pipe, which extends downwardly from the casing and which is connected by means of passages 54 (shown in dotted lines in Fig. 6 of the drawings) with the chambers 44. Said suction-pipe or inlet is also connected with the exhaust-chamber 41 by means of a passage 55, having a turn-cock 56 and a gravity check-valve 57, as clearly seen in Fig. 3 of the drawings.

The compartments 43 and 50 are provided with exit-pipes, (designated, respectively, 58 and 59,) each having a valve 60, by means of which the outlet of water may be controlled. The said compartments 43 and 50 are also connected with each other by means of pipes 61, extending through the exhaust-chamber 41, in which they are coiled, as clearly shown in Figs. 3 and 4, in order that the water passing through said pipes may be thoroughly exposed to the heat of the steam contained in the said exhaust-chamber, The latter may be provided when desired with a valved exit-pipe, as 62, in order that the exhaust-steam may be permitted to escape when desired from the said casing.

The operation of my invention will be readily understood from the foregoing description, taken in connection with the drawings hereto annexed, by those skilled in the art to which it appertains. The pistons of the steam cylinders are reciprocated in opposite directions, as described, and impart a corresponding movement to the pistons in the pump-cylinders. Suction is thus caused to take place alternately in the ends of the pump-cylinders, causing the water to rise through the suction-pipe, passages 54, chambers 44, valved passages 48, and chambers 47, passing from thence through the ports 52 into the pump-cylinders, being on the return stroke expelled from the pump-cylinders through the ports 52, chambers 47, valved passages 50^a, and into the chamber 50. An air-chamber 65, of ordinary construction, is arranged above and communicates with the latter. The water that is being pumped may when desired be expelled directly from the chamber 50 through the valved pipe 59. If it is desired to heat the water, the outlet-pipe 59 is closed and the valve 60 of the pipe 58 is opened. The water is thus forced through the pipes 61 and subjected to the heat of the steam surrounding the said pipes, thus raising the temperature of the water and condensing the exhaust-steam. The latter—that is, the water of condensation—may be disposed of by opening the valve 56, thus causing said condensed water to be pumped with the fluid passing through the suction-pipe. The check-valve 57 serves to prevent the exhaust-chamber from being flooded. The valve, it will be seen, is exposed at its entire surface to an equal steam-pressure, thus making it a balanced valve and avoiding loss of power incident to the operation of valves that are not balanced, and which thus create more or less frictional resistance. It will also be noted that owing to the construction and arrangement of parts, as herein described, there are no dead-centers to prevent the machine from being started at any point.

Having described my invention, what I claim is—

1. In a steam-pump, the combination of the casing, the steam-cylinders, the steam-chest arranged above and between the cylinders and having ports 7, 8, 9, and 10, connected with the front and rear ends of said cylinders, said ports 9 and 10 being placed farther apart than the ports 7 and 8, the ports 11 opening into an exhaust-chamber in the body of the casing, the slide-valve having a hollow body provided with a top opening registering with the steam-inlet, and bottom ports or openings adapted to register with the steam-ports in the bottom of the steam-chest, substantially as set forth.

2. The combination of the steam-cylinders, the steam-chest having passages communicating with the front and rear ends of said cylinders and provided with intermediate exhaust-ports, and the slide-valve having a hollow body provided with a steam-inlet in its upper side and ports or openings in its under side at the four corners thereof, substantially as set forth.

3. The combination, with the cylinders and the steam-chest having steam and exhaust ports and passages, as herein described, of the slide-valve consisting of a hollow body having a steam-inlet in its upper side, ports or openings in its under side of the four corners, a transverse groove or recess in its under side, and vertical grooves or recesses in its front and rear sides, substantially as and for the purpose described.

4. In a steam-pump, the casing having a compartment adapted to receive the exhaust-steam, in combination with pipes extending through said exhaust-compartment for the passage of the fluid that is being pumped, said pipes being connected with compartments having separate and independent valved outlet-pipes, substantially as and for the purpose set forth.

5. In a steam-pump of the class described, the combination of the casing having a compartment adapted to receive the exhaust-steam, the pump-cylinders, the suction-pipe connected by suitable passages with chambers located at the sides of an intermediate compartment, the valved passages connecting said chambers with the pump-cylinders and the latter with an exit-chamber, suitable pipes extending through the exhaust-steam compartment and connecting the said exit-chamber with the intermediate compartment arranged between the branches of the suction-pipe, and valved exit-pipes extending from said intermediate compartment and from the exit-chamber, substantially as and for the purpose set forth.

6. In a steam-pump, the combination of the box or casing having a compartment adapted to receive the exhaust-steam, means for conveying the liquid that is being pumped through the exhaust-steam compartment, and a valved passage connecting the latter with the suction-pipe, said valved passage being provided with a gravity check-valve opening into or toward the suction-pipe, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

LAURENS P. DIXON.

Witnesses:

A. W. ECKERT,

WILLIAM W. BROWN.