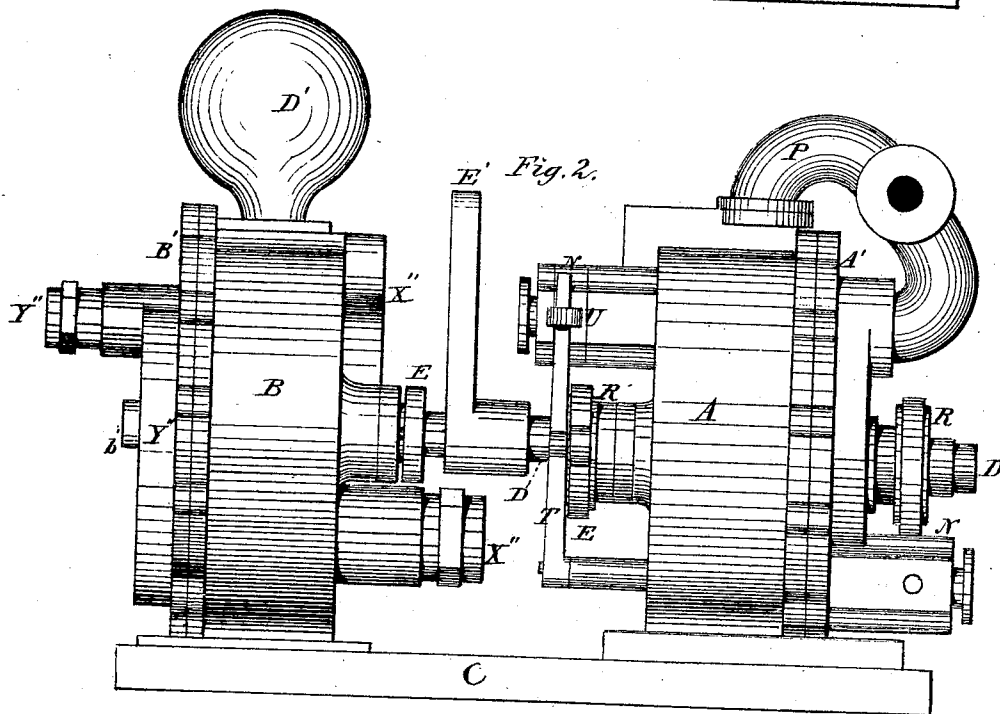
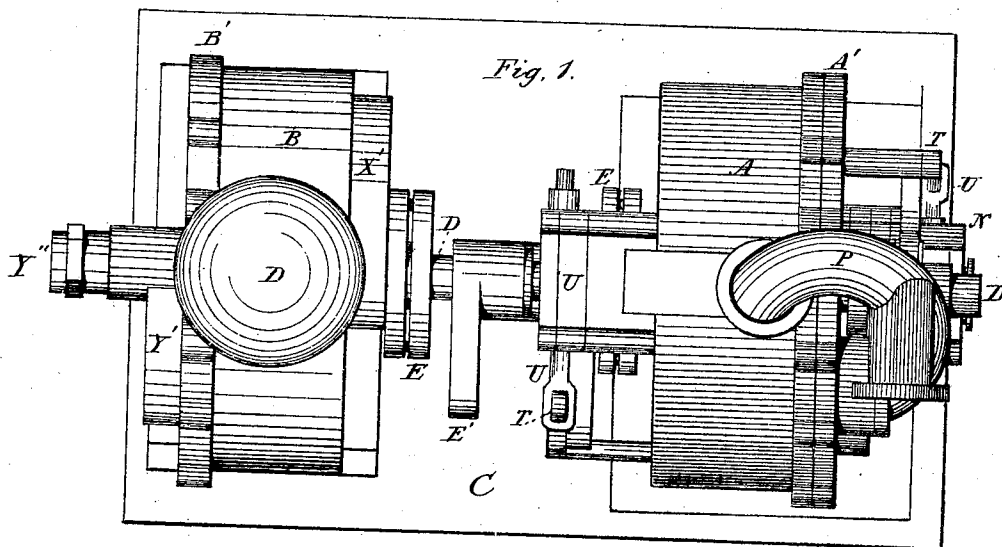


G. W. ROGERS.

Improvement in Steam-Pumps.

No. 128,426.

Patented June 25, 1872.



Witnesses.
Chas. Hoole
John R. Young

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Geo. W. Rogers, by
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attys

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Fig. 3.

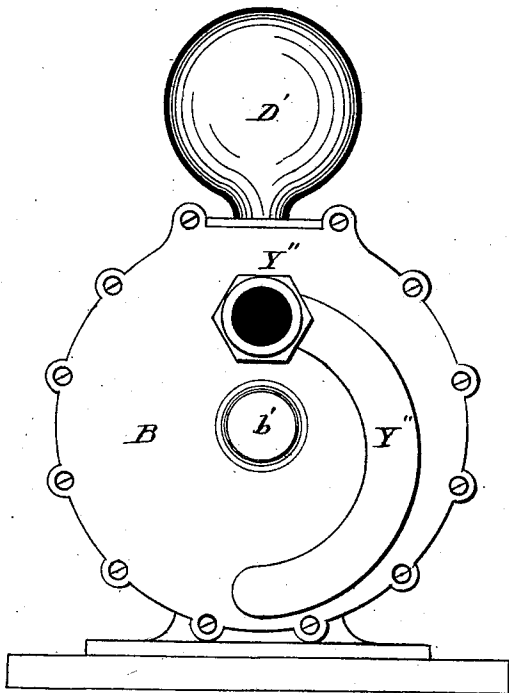


Fig. 4.

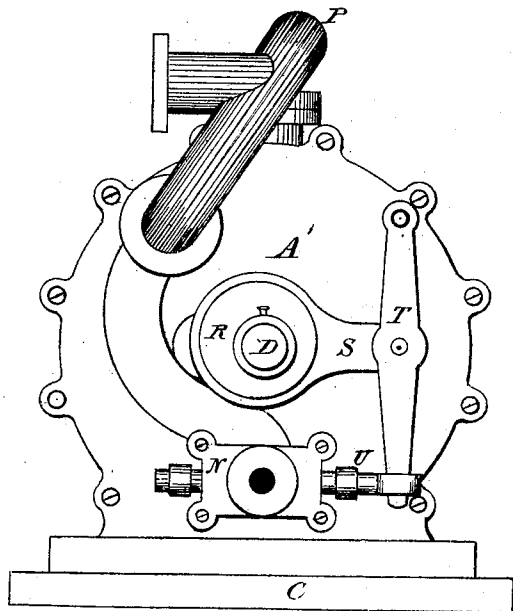
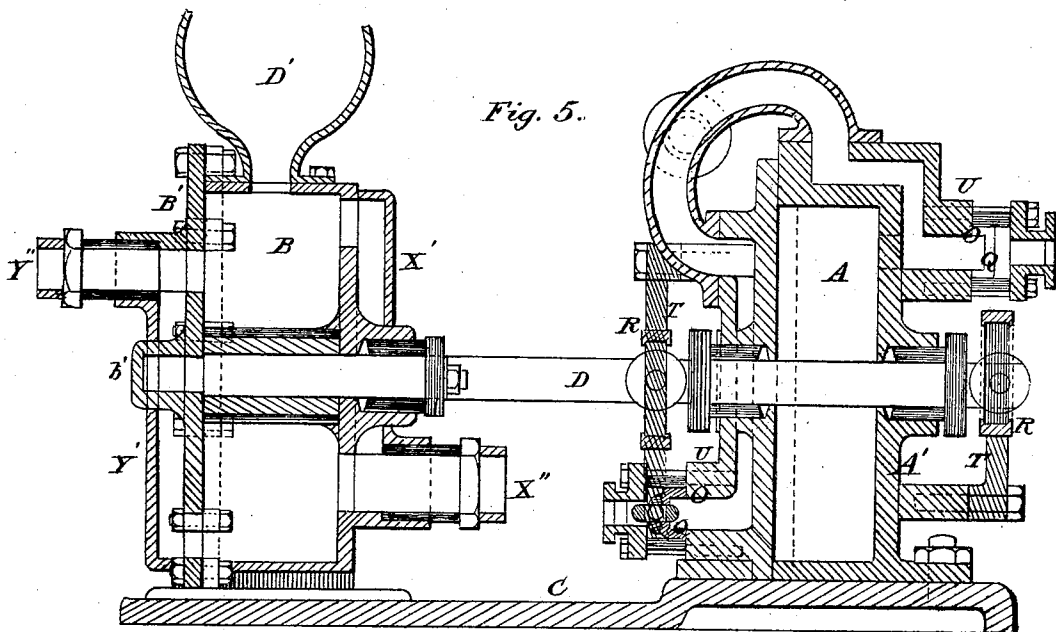


Fig. 5.



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Fig. 6.

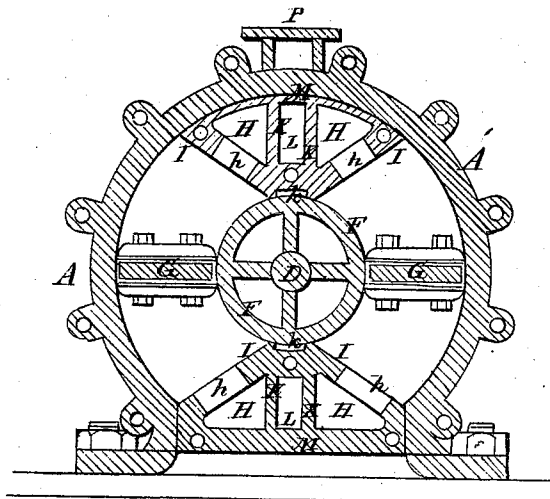
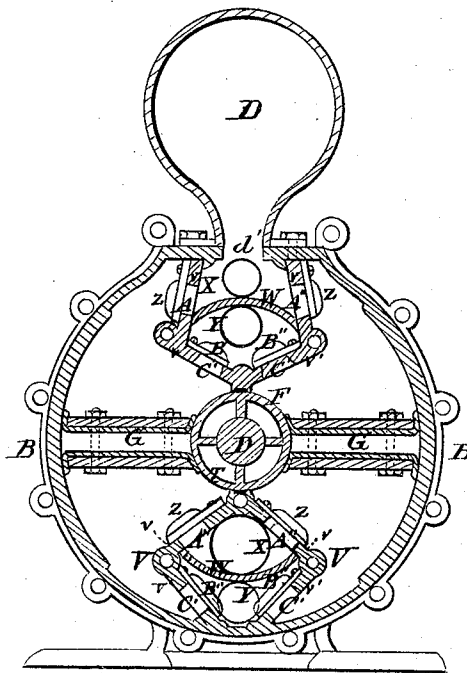


Fig. 7.



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 Attys

UNITED STATES PATENT OFFICE.

GEORGE W. ROGERS, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN STEAM-PUMPS.

Specification forming part of Letters Patent No. 128,426, dated June 25, 1872.

To all whom it may concern:

Be it known that I, GEORGE W. ROGERS, of Brooklyn, in the county of Kings and in the State of New York, have invented certain new and useful Improvements in Steam-Pumps; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing making a part of this specification, in which—

Figure 1 is a plan view of my improved device. Fig. 2 is a side elevation of the same. Figs. 3 and 4 are, respectively, elevations of the pump and steam ends of said device. Fig. 5 is a vertical longitudinal section on line $x x$ of Fig. 1. Fig. 6 is a vertical central cross-section of the steam-cylinder; and Fig. 7 is a like view of the pump-cylinder.

Letters of like name and kind refer to like parts in each of the figures.

My invention is an improvement in a class of steam-pumps in which the pistons have a semi-rotary reciprocating movement; and it consists principally in the combination and relative arrangement of the valves of the pump, substantially as and for the purpose hereinafter shown. It consists further in the peculiar arrangement of the supply and delivery chambers within the pump-cylinder, substantially as and for the purpose hereinafter set forth. It consists further in the combination and relative arrangement of the double-acting pump-piston, the pump-cylinder, and double sets of valves, substantially as and for the purpose hereinafter shown and described. It consists further in the construction and relative arrangement of the steam-supply and exhaust chambers within the steam-cylinder, substantially as and for the purpose hereinafter specified. It consists further in the combination and relative arrangement of the double-acting steam-piston, the steam-cylinder, and the duplicate slide-valves, substantially as and for the purpose hereinafter shown.

In the annexed drawing A represents the steam-cylinder, and B the water-cylinder, secured to or upon a bed-plate, C, in such position as to bring their longitudinal axis upon the same line. Upon their inner ends the cylinders A and B are each inclosed by means of a permanent head, while their outer ends are provided with removable heads A' and B', respectively,

which are secured in place by means of bolts in the usual manner. Passing horizontally through both heads of the steam-cylinder, and through the inner head of the pump-cylinder, are suitable openings for the reception of the piston-rod D, which openings are provided with stuffing-boxes and glands E, by means of which the usual packing-joint is made between the exterior of said rod and the interior of said openings. The end of the piston-rod within the pump-cylinder rests within an exteriorly-inclosed socket, b' , formed in the head B', which socket forms a bearing for and within which said rod-end rotates. Within the steam-cylinder is a second cylinder, F, having a diameter equal to about one-third the diameter of said steam-cylinder, and a length equal to the space between the heads thereof, which inner cylinder is connected to or with the piston-rod D in any suitable manner, and is provided with two arms or pistons, G, which extend from opposite sides radially outward to or near the inner surface of said cylinder, and between said heads, and, being packed upon their outer edge and ends, closely fill the space between said cylinder F and the heads and inner side of said steam-cylinder, so as to effectually prevent the passage of steam. This cylinder forms the inner wall of the steam-cylinder, between which and the outer wall is left the available working-space, and has heretofore been stationary instead of moving with the pistons. Within each of the upper and lower sides of the steam-cylinder A is formed a steam-space, H, by means of two plates, I, which, from the central cylinder F, extend outward and apart upon lines substantially corresponding to the sides of the pistons G, and have their outer ends connected to or with the contiguous portions of said cylinder. Two vertical plates, K, extending inward from the upper and lower sides of the cylinder to the converging plates I, form within or from said space H a central rectangular space, L, which spaces are cut off from the interior of said cylinder (except as hereinafter explained) by causing said plates I and K to extend between the ends of said cylinder and form steam-tight joints. If desired an exterior plate, M, conforming to the circle of the interior of the steam-cylinder, may be extended between and form a part of the outer ends of the plates I

and K, in which event the only joints to be made will be at the ends of said parts. The inner joined ends of the plates K conform to the circle of the inner cylinder F, and have a bearing upon the periphery of the same. A recess within said bearing-end of said plates receives suitable packing *k*, by means of which a steam-tight working-joint is formed between the same and said cylinder. Secured upon each head, immediately over or against one set of the spaces H, is a steam-chest, N, which is provided with a valve-seat, O, containing two induction-ports, *o*, each of which communicates with one of said spaces and with an exhaust-port, *o'*, which opens into a suitable duct or pipe, P, that extends to the upper side of the cylinder, and is there connected to or with the usual extension for conveying the exhaust steam to the desired point. Steam is admitted to the steam-chest at any suitable point, and from thence, by means of an ordinary D-shaped slide-valve, Q, is admitted alternately into the spaces H, and from thence, through an opening, *h*, to the interior of the cylinder. Motion is imparted to each valve by means of an eccentric, R, which is secured upon the piston-rod immediately outside of the stuffing-gland, and, through a connection, S, is connected to or with a lever, T, near its longitudinal center. One end of said lever is pivoted to or upon the cylinder-head, while its opposite end is contained within the slotted end of a valve-stem, U, which passes into the steam-chest, and is connected with the valve in the usual manner.

As the steam-chests and valves are so arranged as to enable each to control the admission of steam to one side of both pistons, it will be seen that, in order that the power of said steam may be made effective, it must be caused to operate upon opposite sides of said piston, so as to exert its force upon each in the same direction. Being thus arranged, the pressure of the steam will be simultaneously exerted in the same direction upon both pistons, so as to move them to the limits of their stroke, when, by a change in position of each valve, steam is thrown upon opposite sides of said pistons, and their motion arrested and reversed.

It will be seen that, by the use of steam in this manner, the pressure exerted by one piston upon the bearings of the piston-rod is equalized by the pressure of the opposite piston, so that said rod will move as freely and with no more friction when the engine is heavily loaded than when running light.

By securing the inner wall of the steam-chamber to or upon the piston-rod, instead of having said wall stationary and causing the pistons to move around it, greater simplicity of construction and ease and efficiency of operation of said parts are secured, while their strength and durability are materially increased.

In the pump the inner wall F and pistons G are constructed in the same manner as in the steam-cylinder, with the exception that the

packing employed upon or in connection with said piston is more especially adapted to the requirements of a water-joint. Within the lower side of the water-cylinder is placed a valve-box, V, (having a diamond shape transversely, as shown in Fig. 7,) which extends horizontally between the heads and vertically from the inner wall F (upon which it has a bearing,) to the outer wall B, so as to divide the space within said cylinder and below the pistons. A transverse semicircular partition, W, divides the valve-box into an upper and a lower compartment, X and Y, respectively, the former of which communicates, through a suitable opening, with the suction-pipe, while the latter is similarly connected with the discharge-pipe. Upon each of the upper outer faces *v* of the valve-box is placed a clack-valve, Z, which incloses an opening, A'', provided in and through said face *v*, and effectually prevents the inward passage of water from the pump-cylinder into the compartment X, while offering no obstruction to the reverse motion of such water. A second set of similar valves B'' are placed upon the inner lower faces *v'* of the valve-box over corresponding openings C', and, opening inward and upward, permit the inward passage only of water from the pump-cylinder to the compartment Y.

As thus arranged, it will be seen that, upon giving a vibratory motion to the pistons, water will be simultaneously drawn inward through one of the upper valves Z and forced outward through the opposite lower valve B'', the movement of said valves and the ingress or egress of the water alternating as the direction of the pistons is changed. Within the upper portion of the cylinder is a second valve-box similar in all respects to that hereinbefore described, except that its upper end is made somewhat wider, and is provided with a vertical opening, *d'*, which communicates with an air-chamber, D', placed immediately above. The compartments X are connected together and with the suction-pipe X', by means of a side pipe, X'', which is secured upon the outer face of the inner head of the pump-cylinder, while a similar side pipe, Y', secured upon the opposite head connects the compartments Y with each other and with the discharge-pipe Y''. This arrangement of the valves and water-ways makes each part readily accessible, secures their efficiency and durability, and enables more than double the quantity of water to be moved than has heretofore been practicable with other pumps of like construction. A starting-bar, E', secured upon and extending upward from the piston-rod, midway between the steam and water-cylinders, completes the device, the operation of which has been fully described.

Having thus fully set forth the nature and merits of my invention, what I claim as new is—

1. The combination and relative arrangement of the double sets of valves Z and B''

(with their seats) within the pump-cylinder B, substantially as and for the purpose shown.

2. The arrangement of the supply and delivery chambers X and Y, respectively, within and with relation to the pump-cylinder B, substantially as and for the purpose set forth.

3. The combination and relative arrangement of the double-acting pump-pistons G, the pump-cylinder B, and the double sets of valves Z and B'', substantially as and for the purpose shown and described.

4. The construction and relative arrangement of the steam, supply, and exhaust chambers H and L within the steam-cylinder A, substantially as and for the purpose specified.

5. The combination and relative arrangement of the double-acting steam-pistons G, the duplicate slide-valves Q, (with their attachments,) and the steam-cylinder A, substantially as and for the purpose shown.

In testimony that I claim the foregoing I have hereunto set my hand this 25th day of March, 1872.

GEORGE W. ROGERS.

Witnesses:

E. H. DOTY,
SAMUEL SNEDEN.