

C. ROGERS.
Double Acting Steam-Pumps.

No. 155,464.

Patented Sept. 29, 1874.

Fig. 1.

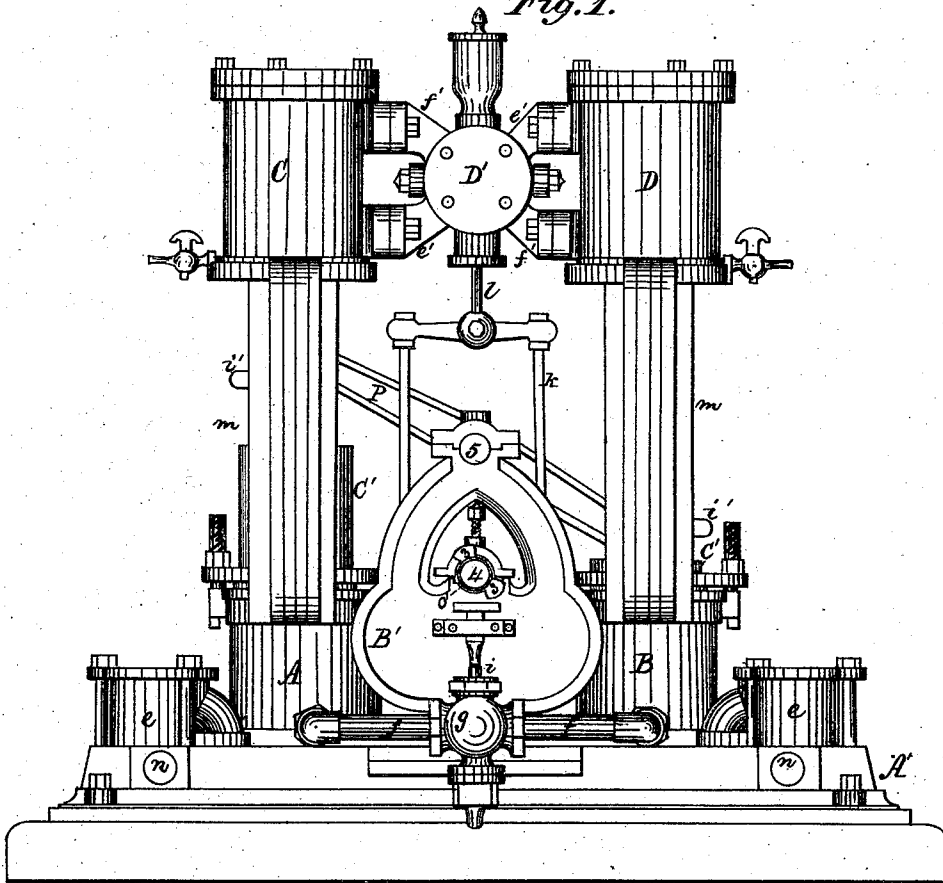
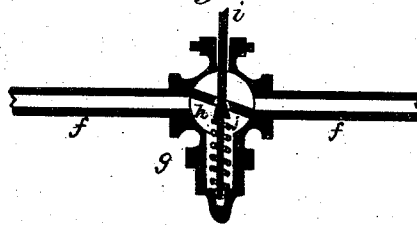


Fig. 2.



WITNESSES

Philip W. Hale,
A. L. Davis

By

INVENTOR

Charles Rogers
Per Parker & Co. Sweet, Jr.
Associate Attorney

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Fig. 3.

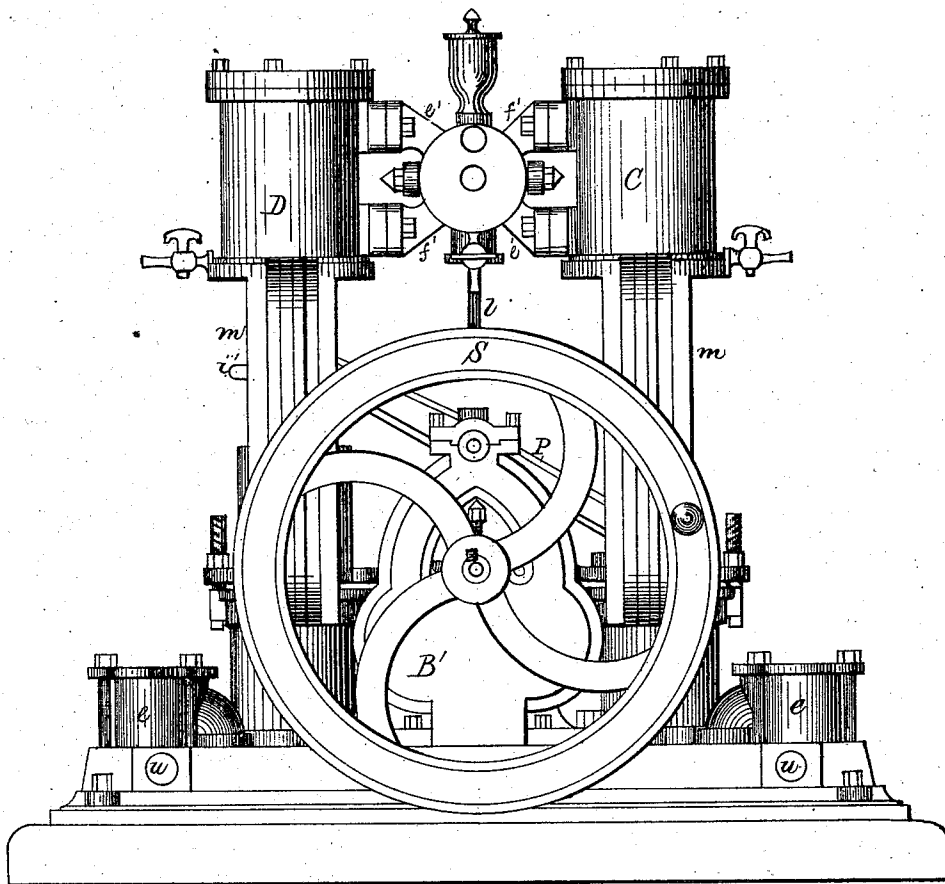


Fig. 11.



WITNESSES
Philip W. Heale
A. L. Van Ness

By

INVENTOR
Charles Rogers
Geo. Parker & Sweet, Jr.
 Associate Attorney

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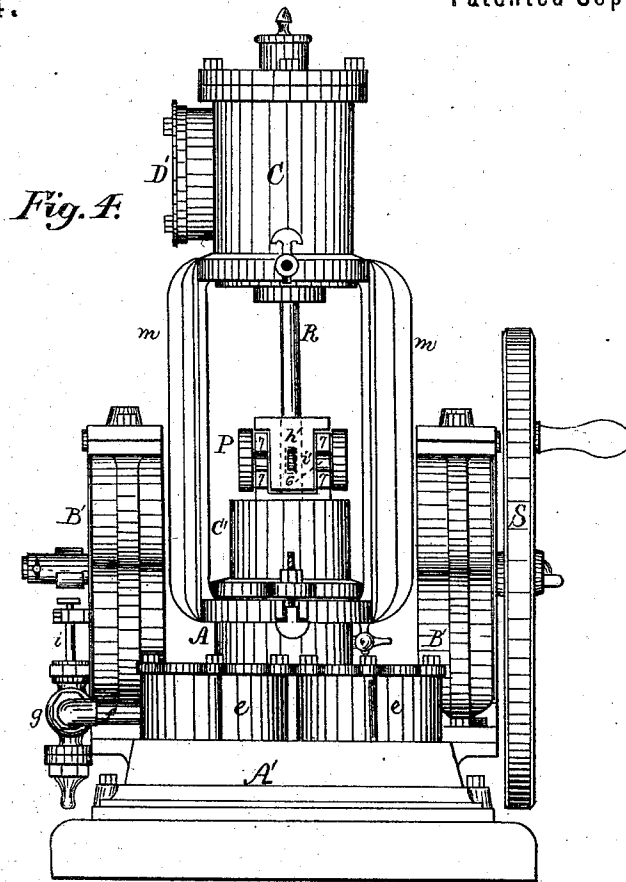


Fig. 5.

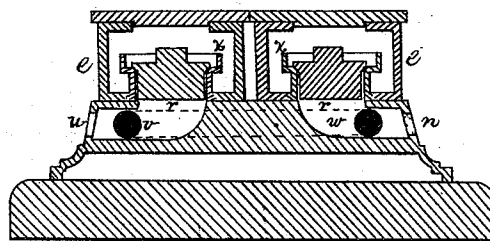


Fig. 6.



WITNESSES
Philip W. Hale,
A. L. Van Ness.

By

INVENTOR
Charles Rogers
Per Parker H. Sweet, Jr.
Associate Attorney

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Fig. 7.

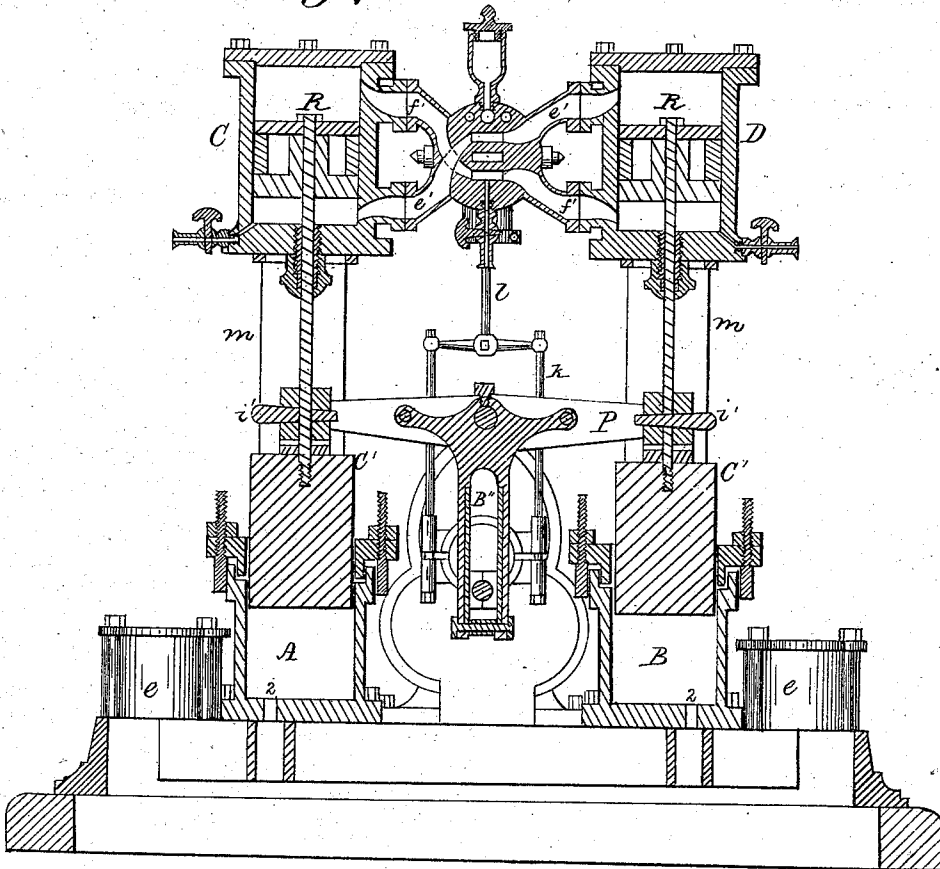


Fig. 9.

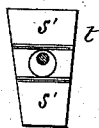


Fig. 8.

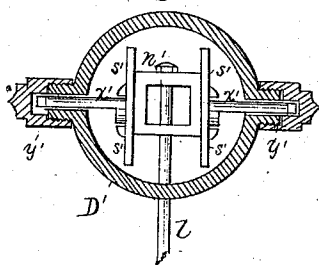
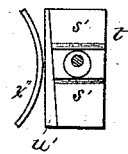


Fig. 10.



WITNESSES

Philip W. Hale,
A. L. Van Ness.

By

INVENTOR

Charles Rogers
Per Parker & Sweet, Jr.
Associate Attorney

UNITED STATES PATENT OFFICE.

CHARLES ROGERS, OF ALLEGHENY, ASSIGNOR TO JAMES A. HUTCHINSON,
OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN DOUBLE-ACTING STEAM-PUMPS.

Specification forming part of Letters Patent No. **155,464**, dated September 29, 1874; application filed August 18, 1874.

To all whom it may concern:

Be it known that I, CHARLES ROGERS, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Double-Acting Steam-Pumps; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon.

My invention relates to an improvement in what is known as double-acting steam-pumps; and consists, first, in the combination of two steam-cylinders, two working-barrels, two plungers, and a walking-beam, so arranged with relation to each other that the steam from one cylinder acts for the purpose of lifting the plunger of one pump, and the steam from the other cylinder acts for the purpose of forcing down the plunger of the other pump, in such manner that the combined power of both cylinders (with exception of enough to lift one of the plungers) is brought to bear upon the descending plunger through the medium of the walking-beam; second, connecting the pumps together through the medium of a pipe furnished with a valve, operated through the medium of projections or knockers on the crank-shaft, for opening the valve of said pipe when the crank is approaching and receding from the dead-points, whereby the pressure in the pump of the descending plunger is allowed to pass into the pump of the ascending plunger, thereby relieving the descending plunger from pressure, allowing the crank to pass easily the dead-points; third, in adjusting the balance-plate for the slide-valve through the medium of wedges operated by cams, thereby dispensing with the use of set-screws, as described in the patent granted to me January 6, 1873, No. 140,309; fourth, so constructing the stands or bearings for the crank-shaft and axis of the walking-beam that they serve the purpose of air-chambers for the pump; fifth, the combination of the connecting-pins at the outer ends of the walking-beam with sliding bearings, arranged in adjustable blocks on the lower ends of the piston-rods; sixth, surrounding each pump-valve with a flange, for the purpose of pre-

venting the back action of the water or other fluid from holding the valve off its seat.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

In the accompanying drawings, which form part of my specification, Figure 1, Sheet 1, is a front elevation of my improvement in steam-pumps. Fig. 2 is a detached section of the pipe which connects the two pump-chambers, and also represents the valve of said pipe. Fig. 3, Sheet 2, is a rear-side elevation of the pump. Fig. 4, Sheet 3, is an end elevation of the pump. Fig. 5 is a transverse section at line *y* of Fig. 1. Fig. 6 is an end view of the pump-valves. Fig. 7, Sheet 4, is a vertical section of the pump. Fig. 8 is a transverse section of the steam-chest, representing the arrangement of the eccentrics for adjusting the plates used for relieving the slide-valve from the pressure of steam. Figs. 9 and 10 are detail views of the plates used for relieving the slide-valve from the pressure of steam, and represents the arrangement of said plates with relation to each other, and also a spring used for holding the plate, which covers the outer face of the slide-valve in juxtaposition with the plates arranged at the side of said valve. Fig. 11 is a detail view of the sliding blocks in the forked end of the walking-beam.

In the accompanying drawings, *A'* represents the base of the pump, and is furnished with water-chambers *v* and *w*, which communicate with each other, as indicated by the dotted lines in Fig. 5. *A* and *B* represent the pump-cylinders and *C'* *C'* represent the plungers. *C* and *D* represent the steam-cylinders, which are supported by means of the uprights *m*, the lower ends of which are connected to the upper ends of the pump-cylinders. The steam-chest *D'*, and side pipes *e'* and *f'*, are cast in one piece, and arranged between the steam-cylinders *C* and *D*, and serve as a brace coupling them together, so as to give stiffness and firmness to them, their supports, and the pump-cylinder. *eee* represent the valve-chambers of the pumps *A* and *B*. The pump-valves *r*, and their seats, are of ordinary construction. The said valves are

each surrounded with a flange, x , for the purpose of preventing the back action of the water from holding them off their seats. The chambers of the pumps A and B communicate with each other through the medium of a pipe, f , which is furnished with a valve, h , which is held closed by a spiral spring, j , and is opened through the medium of knockers 3, (arranged on the crank-shaft 4,) as the crank approaches and recedes from the dead-points, for the purpose of allowing the pressure in the pump-chamber of the descending plunger to pass into the pump-chamber of the ascending plunger, whereby the crank is allowed to pass the dead-points with ease, and but little loss of power. The supports or bearings B', for the crank-shaft 4 and axis 5 of the walking-beam P, are hollow, forming air-chambers, which communicate with the water-chambers v and w , which are known as "supply" and "discharge" chambers. The ends of the walking-beam P are forked, and provided with pins 6, furnished with sliding bearings 7, placed in the recess sides of the block h' , held in position on the piston-rod R, through the medium of a slot in it and the piston-rod, and a key, i , driven into said slotted block and piston-rod, as shown in Figs. 4 and 7. The walking-beam is provided with a slotted arm, B'', which is arranged at right angle to it, as shown in Fig. 7. In the slot of the arm B is placed the crank 9 of crank-shaft 4, which is constantly varying its position in the slot with the vibrating motion of the arm B'', when the pump is in operation. K is a cam-yoke connected to the stem l of the slide-valve in the steam-chest D' of the steam-cylinders C and D. The yoke K is operated by a cam arranged on the crank-shaft 4. The yoke, cam, stem, and slide-valve are all of ordinary construction and operation. On the outer end of the crank-shaft 4 is a sleeve, o' , provided with projections or knockers 3, which, operating on the upper end of the valve-stem i , presses it down, and thereby opens the valve h , for the purpose of forming through the medium of the pipe f a communication between the chambers of the pump A and B, whereby the descending plunger is relieved from pressure, as hereinbefore stated. The sleeve o' is adjustable, and is held in position on the crank-shaft by means of a set-screw, r' . The balance-wheel s is arranged on the crank-shaft 4, and is used for giving uniformity of action to the several parts of the pump. The steam-ports e' and f' , which communicate between the steam-chest D' and the steam-cylinders C and D, cross each other at such angle that the steam, passing through the ports or side pipes, enters the lower end of one cylinder and the upper end of the other cylinder, so that the steam of the ascending piston is brought to bear on the descending piston through the medium of the walking-beam P coupled to the pistons R. The slide-valve n'' is provided with a balance-plate, u' , which is furnished with an incline re-

cess on each side, to which is fitted the outer edge of two plates, t , having a corresponding incline, one plate arranged on each side of the slide-valve n'' , the said plates t having each two ribs or projections, s' , between which is arranged an eccentric on the inner end of the set-screw x' , projecting through the side walls of the steam-chest, the outer and operative ends of said screws being covered with a cap, y' . The plate u' is held in juxtaposition with the valve n' and the plates t by means of a curved spring, x'' . By removing the caps y' , and turning the screws x' , which will move the plates t , the plate u' may be adjusted, with relation to the slide-valve n' , without the necessity of removing the cap of the steam-chest, such adjustment being accomplished while the steam-pump is in operation. The chambers v and w are each furnished with two openings, n , for the connection of the supply and discharge pipes. When only one supply and one discharge pipe is used, the other two openings are closed by a suitable plug. This arrangement of the openings n will be found to be of great advantage in arranging the pump with relation to the position it has to occupy relative to other mechanism. The pump-chambers communicate with the chambers v and w by means of the openings 2. (See Fig. 7.) Having thus described my improvement, what I claim as of my invention is—

1. The steam-cylinders C and D, and pump-cylinders A and B, in combination with the side pipes e' f' and walking-beam P, provided with the slotted arm B and crank 9, pistons R, and plungers C', substantially as herein described, and for the purpose set forth.

2. The pump-chambers A and B, connected through the medium of the pipe f , furnished with the valve h , in combination with the knockers 3, substantially as herein described, and for the purpose set forth.

3. The combination of the balance-plate u' , side plates t , and eccentrics on the inner end of the screws x' , with the slide-valve n' , substantially as herein described, and for the purpose set forth.

4. The hollow stands B', for supporting the axis of the walking-beam P and crank-shaft 4, in combination with the chambers v and w , substantially as herein described, and for the purpose set forth.

5. The combination of the pins 6 in the outer ends of the walking-beam P, with the block h' , key i , sliding blocks 7, and piston R, substantially as herein described, and for the purpose set forth.

6. The pump-valves r , surrounded with flanges x , in combination with the supply-chambers v , and discharge-chambers w , substantially as described, and for the purpose set forth.

CHAS. ROGERS.

Witnesses:

JAMES A. HUTCHISON,
A. C. JOHNSTON.