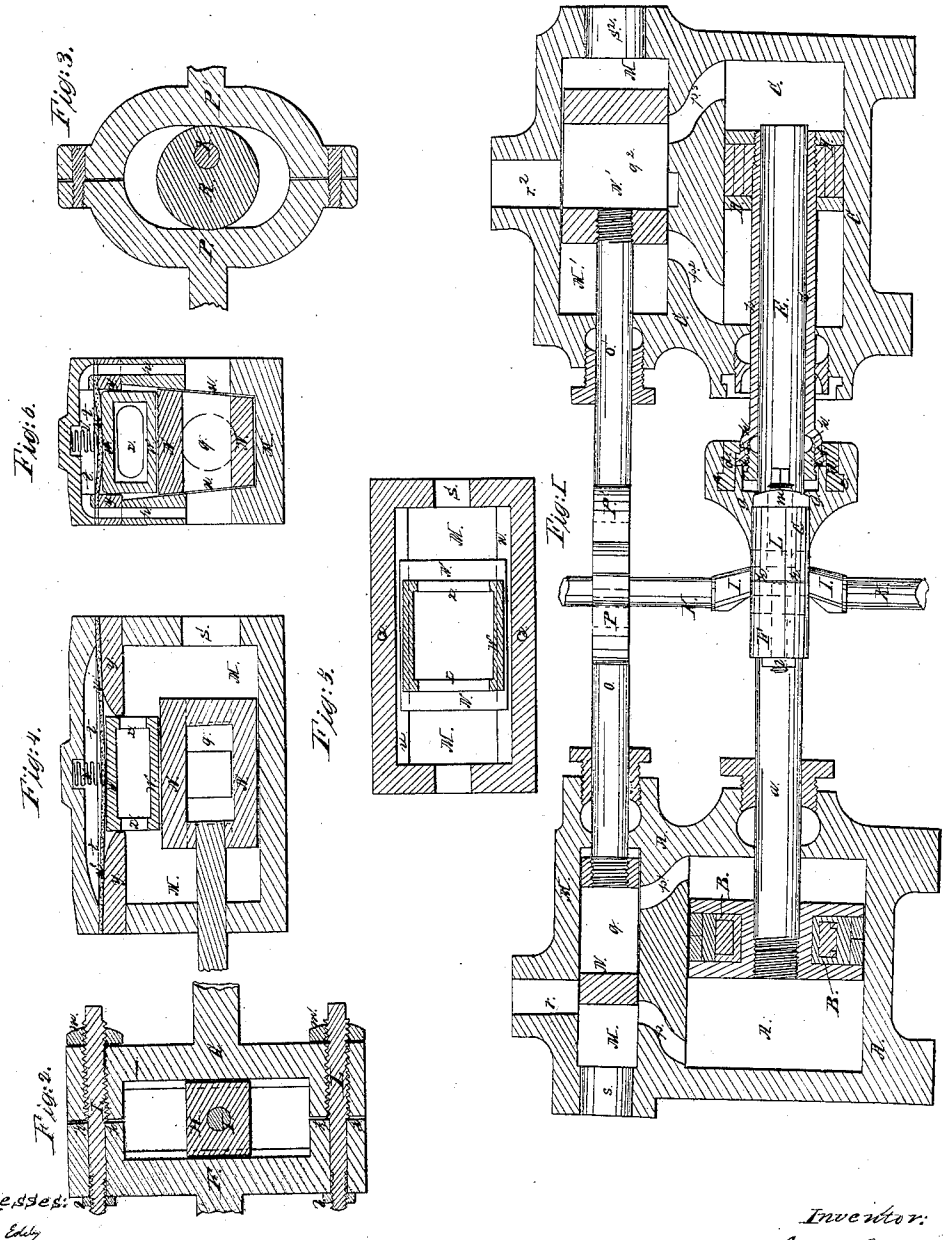
J. S. Barden,

Steam Pump.

No. 27,610. Patented Mar. 27, 1860.



Witnesses:
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JOHN S. BARDEN, OF NEW HAVEN, CONNECTICUT.

STEAM-PUMP.

Specification of Letters Patent No. 27,610, dated March 27, 1860.

To all whom it may concern:

Be it known that I, JOHN S. BARDEN, of the city and county of New Haven and the State of Connecticut, have invented an Improved Steam-Pumping Engine; and I do hereby declare the same to be fully described and represented in the following specification and the accompanying drawings, of which—

Figure 1, denotes a longitudinal section of it taken so as to show the steam engine, the pump, valve chambers, and valves. Fig. 2, is a longitudinal section of the slide box and cross head connections of the steam cylinder and pump pistons. Fig. 3, is a longitudinal section of the eccentric and the connection of the piston rods of the slide valves of the pump and steam engine cylinder. Figs. 4, and 5, are longitudinal sections of the pump slide valve and its chest, the last two sections being taken in planes at right angles to each other. Fig. 6, is a transverse section of the valve chest and pressure chamber.

In the drawings A, denotes the steam engine cylinder of which B, is the piston and *a*, the rod of such piston. Arranged with its axis in a straight line with that of the said cylinder A, is a pump barrel C, provided with a piston D, whose rod *b*, is tubular or constitutes a secondary pump barrel and has a solid piston or plunger E, fitted to and so as to be capable of being moved longitudinally within it. The inner end of the tubular rod *b*, opens into the main pump barrel C. The tubular piston should have some proper means by which it may not only be attached to the secondary piston so as to be moved simultaneously by and with it, but be detached therefrom and so attached to the pump barrel C, as to be maintained stationary therein while the secondary piston may be in movement. This may be accomplished by two or more locking keys *d*, *d*, applied in recesses *c*, *c*, or *f*, *f*, made both in the piston head *g*, and in the pump barrel head *h*, as shown in the drawings, (Fig. 1), each of the said keys when so applied being made to grasp or embrace a projection *i*, extended from the outer end of the tubular piston.

I do not confine my invention to any particular devices or modes of connecting the tubular piston with either the plunger or the pump barrel, as there are various ways in which this may be accomplished. A common tubular screw nut provided with a flanch and cut diametrically into two parts can be made to answer as by placing the two parts on and so as to extend around the piston, they may be screwed either into the piston head or into the pump barrel, the flanch serving to hold the hollow piston confined in place.

Each piston has a cross head F, or G, attached to it and formed and arranged as shown in Figs. 1, and 2. A sliding box H, of a bell crank I, plays between and is guided by these cross heads, the said crank being carried by a driving shaft K. At or near each end of the cross head G, is a screw L, which screws through the cross head and bears against the other cross head by means of a shoulder *k*. The screw rod passes through the other cross head and without screwing into it and has a screw formed on it to receive a nut *t*, which bears against the said cross head and is arranged as shown in Fig. 2. A clamp nut *m*, is screwed on the screw L, and against the cross head G. By means of such screws and nuts so applied to the two cross heads, their distance asunder may be varied so as to enable the box H, to run smoothly and closely within the guides or cross heads. The cross heads and their connections also serve to connect the piston of the steam engine cylinder with the plunger of the pump.

A valve chest M, is arranged on, and applied to the steam engine, while a similar one M′, is applied to the pump barrel as shown in Fig. 1, each being made to contain a slide valve N, or N′. The stems or rods *o*, *o*′, of these two valves are arranged in a straight line with each other and parallel to the piston rod and plunger of the engine cylinder and the pump, and furthermore, the said two stems *o*, *o*′, are connected by cross heads P, P′, which are joined together near their ends and have an eccentric R, arranged between them and fixed on the driving shaft K. During the revolutions of the said shaft,

the pistons and the valves will be simultaneously put in motion so as not only to cause steam to put the engine in operation, but the pump to be "double acting." This will be better understood after a little further explanation.

By reference to Fig. 1, it will be seen that there are two passages, p, p', leading from the steam cylinder into the valve chest, also, that there is a passage g, made through the valve and opening into a steam eduction passage r, leading out of the chest. The steam may be supposed to enter the chest through a passage s, and to flow around the valve on one side of it so as to be capable of entering the cylinder at either end, whose port or steam passage may be open to receive the steam from the chest.

The valve chest and valve of the pump are constructed like those of the steam engine and are furnished with passages, p^2 p^3, q^2, r^2, and s^2, arranged in the same manner and with respect to the pump barrel as the passages p, p', q, r, s, are disposed and applied with respect to the steam cylinder, it being understood that the induction passage s^2, is that by which water or a fluid is to be supplied to the valve chest, and that the said water or fluid by the operation of the pump is to be discharged through the eduction passage r^2.

In order to make a balanced valve or one which shall work with very little pressure and friction, and preserve itself steam or water tight I form the valve and the valve chamber where they come together with tapering sides as shown at u, u, in Fig. 6, in which case, it will be seen that the area of one side of the space within the valve will be a little less than that of the opposite side. This, while the valve is in operation, would cause the pressure to lift the valve off its seats. I counteract this pressure by applying over the valve and to the valve chest, a steam pressure chamber t, having an elastic bottom, u', made of vulcanized india rubber and containing a spring, v. Between the said elastic bottom and the valve, I place a block, w, having a steam passage, x, made longitudinally through it. The area of the bottom of this block, I make a little greater than that of the greater side of the space within the valve and I place the block within an opening formed in a guide plate, y, arranged as shown in the drawings. The interior of the chamber, t, I connect with the valve chest, or space within the valve, by means of one or more passages z, z, whereby steam or water that may be within the valve, may have free access to the chamber, t, and thus, by means of such chamber, t, provided with an elastic bottom, I produce pressure of the steam on the valve so as to keep it down upon its seats and counteract the pressure tending to raise it off such seats.

By putting the steam engine in operation the piston of the pump, as well as the valve thereof, will be set in motion so as to cause the pump during each stroke of such piston to draw water from the valve chest and discharge it into and through the valve the pump being a "double acting" force pump.

The object of the tubular piston and plunger applied to it, is to render the pumping apparatus capable of being used as a single acting pump and for supplying the boiler of the engine with water in much smaller amounts than would be thrown into it were the main pump piston to be employed for such purpose, it being understood, that under such circumstances, the eduction passage of the valve case is to be opened into a pipe leading into the boiler.

With my improved steam pumping apparatus, the operation of the main pump may be arrested whenever it may be desirable to supply the boiler with water. This is not the case with a common steam pump, unless the steam engine be so applied both to the boiler force pump, and the main pump, that the latter may be detached from the engine in such manner as to enable the engine to work the boiler pump alone.

A steam engine, provided with my improved pumping apparatus will be found highly useful in factories, and many establishments where large amounts of water are required to be pumped. The apparatus also constitutes an excellent steam fire engine, as the combination of the boiler pump and the main water pump, its valve, and valve case in the manner described, can be made at very little expense.

I do not claim the combination of a steam engine and a pump having its piston arranged in line with and connected to that of the engine cylinder; nor do I claim a slide valve and its valve chest as ordinarily applied to a steam engine cylinder, but

What I do claim is—

1. The arrangement and combination of a steam engine, a pump, two valve chests, and two slide valves, in manner and so as to operate substantially as described and represented.

2. I also claim the combination and arrangement of the secondary piston with the main pump piston constructed tubular and having appliances substantially as described by which it may be either attached to the main pump barrel or to the secondary piston substantially in manner and for the purpose as specified.

3. I also claim the improved balanced valve and its chest made substantially as described in combination with the pressure

chamber, t, furnished with an elastic bottom, u', and applied to the valve and chest essentially in manner and to operate as explained.

4. I also claim in combination with the steam cylinder piston, the pump piston and the sliding box of the crank of the driving shaft, the two separate cross heads or guides for such box, and screws or equivalents so applied to such cross heads as to enable them either to be drawn together or forced apart in manner and for the purpose specified.

JOHN S. BARDEN.

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