N. W. WHEELER.

PUMPS.

No. 188,450. Patented March 13, 1877.

Fig I.

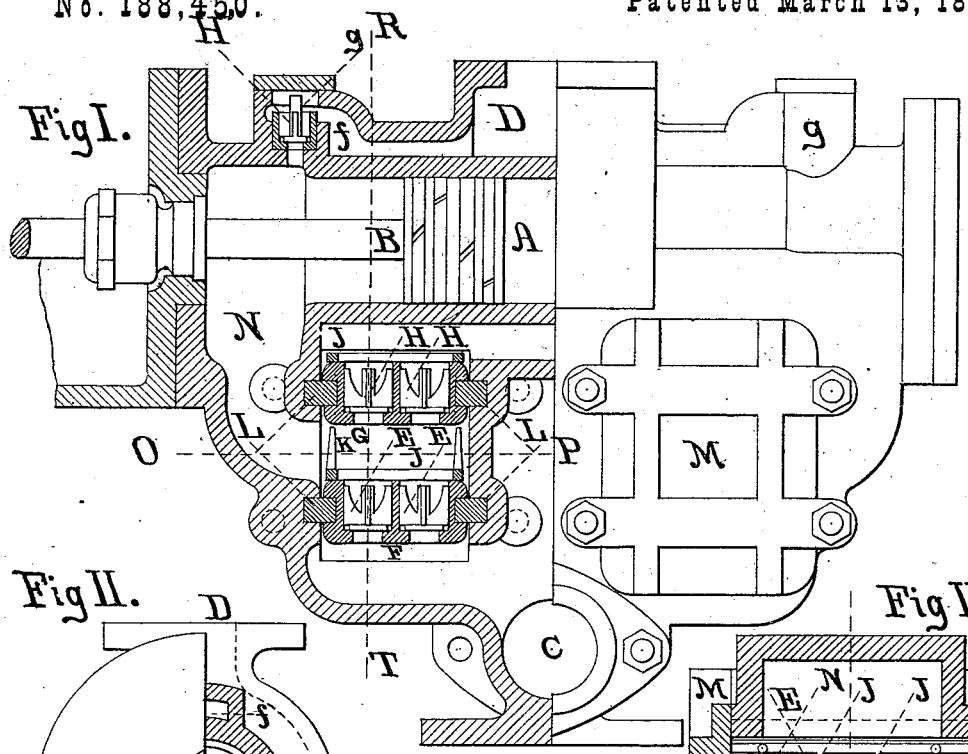

Fig II.

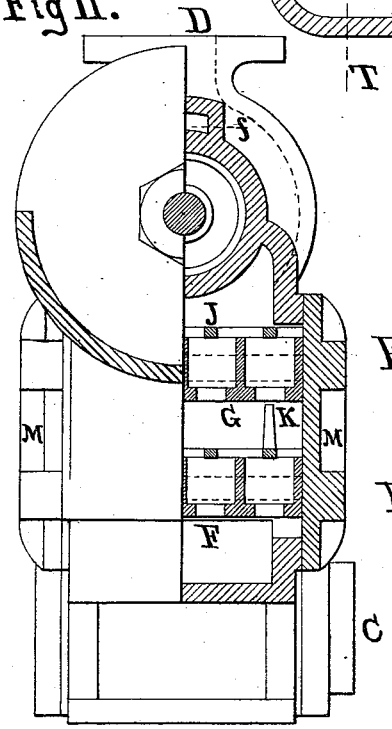

Fig III.

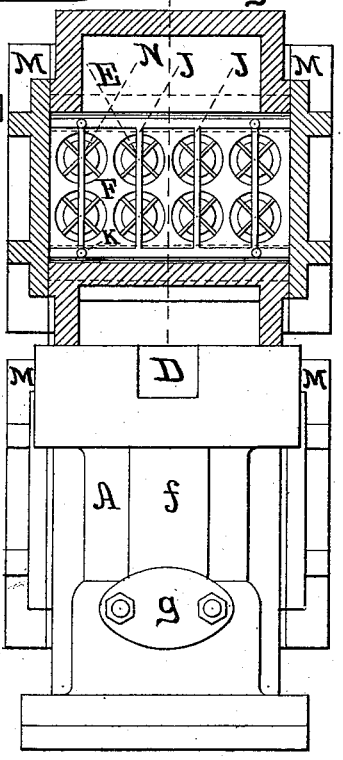

Fig. IV.

Fig V. j

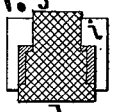

Fig VI. 1

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NORMAN W. WHEELER, OF NEW YORK, N. Y.

IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. **188,450**, dated March 13, 1877; application filed February 9, 1877.

To all whom it may concern:

Be it known that I, NORMAN W. WHEELER, of the city, county, and State of New York, have invented a new and useful Improvement in Steam and other Pumps, which improvement is fully set forth in the following specification and the accompanying drawing, in which—

Figure I is an elevation with one end of the pump shown in section. Fig. II is an end elevation, with one side shown in section upon the line R T. Fig. III is a plan, with one end shown in section upon the line O P. Fig. IV is a plan; Fig. V a section, and Fig. VI a mole's-eye plan of a rubber and metal valve, drawn upon a larger scale than that of the other figures.

The object of my invention is to provide devices for preventing the gathering of sand and grit in the working-barrel; for preventing the accumulation of gases in the working-barrel; for the easy insertion and removal of the valve-seats and their appurtenances; and for the adaptation of rubber or other elastic material to the seat and check faces of pump-valves.

In the drawings, A is the pump-barrel; B, the plunger or piston; C, the flange for the suction-pipe, and D the delivery-channel.

The general valve-chamber, connected with each end of the barrel A by a channel, N, has openings in its sides, to be closed by the bonnets M M, and is divided into suitable compartments and channels by diaphragms; but such division is only made complete by the insertion of the seat-drawers F and G, which carry the suction-valves E E and H H respectively, and completely inclosed by bolting on the bonnets M M.

The seat-drawers F and G are carried upon tongue-bars or pieces L L, which pieces are tightly fixed in parallel slots worked in the metal of the chambers. The drawers F and G have corresponding slots worked in their sides, so that they may be pushed into or drawn out of their places in the same way as a cabinet-drawer is pushed into or drawn out of its place.

The lengths of the tongue-pieces L L and seat-drawers F and G are equal to the breadth of the chamber between the faces provided for the bonnets M M, so that these bonnets make tight contact with the ends of the seat-drawers F and G and pieces L L, as well as with their proper faces, thus completing the inclosure and the division of the chamber into compartments and channels.

The valves, in the example before us, are common puppet-valves, E E and H H H′, each working in a cylindrical cavity, with a proper valve-seat at the lower end, and guided by wings which fit the cavity above the seat.

The device of the seat-drawer renders it easy to use and keep in order numerous small valves, having but little lift in lieu of a smaller number of larger valves having greater lift, which mode of construction carries with it a gain in the matters of readily securing ample area of water-way past the valves, and of a small loss by regurgitation while the valves are going to their seats, as well as little wear of valves and seats. It also renders convenient the use of small round puppet-valves disposed in groups, which I deem better, *per se*, than either hinged valves or oblong puppet-valves, working upon seats fixed in the chambers, for many reasons. When the seats are permanently fixed, or are difficult of withdrawal, or when the seats and the valves have to be put in place separately, neither the convenience of the act nor the probability of accuracy is so great as when the manipulator may readily insert or withdraw whole groups of valves already adjusted in their several places, as he may do in the case under consideration.

In those cases wherein the valve-seats form parts of wing-diaphragm plates fitting into a bored chamber, it is necessary to make the fit very tight to prevent leakage, so that the valve-seats are practically permanently fixed in the bored chamber, and only the valves removable, upon ordinary occasions; whereas, in my device, when the tongue-pieces L L and seat-drawers F and G are of metal not liable to great corrosion, the seats are easily withdrawn, together with the valves they carry, and the pressure upon the seats and valves when the pump is working tends to make close contact between surfaces, and thus prevent leakage, although the fit be easy between the grooves and the tongue-pieces.

The tongue-and-groove arrangement for holding in place the seat-drawers F and G may be varied in several ways. For instance, the tongues L L may be worked out of the metal of the chambers, or the tongue-pieces may be represented by feathers worked upon the seat-drawers, which may slide in grooves in the chambers; and considering that the chief pressure will come upon the upper face of each seat-drawer, the metal forming one side of each groove may be omitted, thus leaving the drawer supported by a rabbet in the chamber, and one in itself. I regard these and similar differences of construction as colorable variations of my invention.

The valves E E and H H are checked, and prevented from rising too far from their seats by means of the grid-bars J J, which consist each of two bars going across the chamber and joined together by cross-bars, so disposed as to cover the middle of each valve-chamber when the grid-bars are laid upon the upper faces of the seat-drawers. The grid-bars for the valves H H are held down by the ends coming under the metal of the bonnet-opening at the sides of the chamber, and those for the valves E E are held down by the studs K K, which reach nearly to the under side of the seat-drawer G. When the grid-bars are made exactly as long as the seat-drawers the bonnets M M bear against them, and hold them in place, without especial provision to that end.

It will be observed that by a reciprocating movement of the plunger B in the barrel A, the liquid to be pumped will alternately be drawn up past the suction-valves E E, through the channel N, into the barrel A, and forced downward through the channel N, and then upward past the delivery-valves H H, and through the delivery-channel D.

This arrangement of the delivery-valves H H below the level of the wearing parts of the working-barrel A in itself ameliorates the evils arising from the passage of gritty water through the pump, because of the specific gravity of the grit, which favors the accumulation or concentration of gritty matter in the lower and quieter parts of the pump. In the common sort of pumps, with the valves above the level of the bottom of the working-barrel, this lower and quieter part is the barrel itself, and by reason of the accumulation of grit in and about the wearing parts, the barrel and plunger are rapidly worn; and this evil is not avoided when the plunger is long and works through a stuffing-box, whereas in the arrangement before us the lower and quieter parts, where the concentration of grit tends to form, are far below the wearing parts of both barrel and plunger, and if the channel N be large, the gritty matter of the water at any time contained in the barrel A may be less even than that in the general mass of liquid operated upon.

But this location of the delivery-valves H H at a low level entails a serious disadvantage, which should be obviated. Air and gas may, from various causes, be mingled with the liquid as it comes into the pump, and these will separate from the liquid in the barrel A, and accumulate to form an elastic cushion upon each side of the plunger B, the resilience of which will prevent the proper filling of the barrel with liquid at each stroke of B.

To avoid this difficulty, I place one or more of the delivery-valves, as H′, in a proper valve-chamber, *g*, one or more chambers, *g*, connecting with each end of the barrel A at the highest level attainable, and connect such chambers *g g* with the general delivery-channel by the small channels *f f*, so that whatever of air or gas rises to the inlet of the chamber *g* will pass off along with that part of the liquid which passes the valve H′.

If the valve H′ were large in proportion to the valves H H, so that a large part of the liquid could be discharged from the higher parts of the barrel A, the grit would tend all the more to rise and lodge in the barrel A by reason of the preponderance of the upward over the downward currents through the channel N, especially if the channel N were unduly contracted, so that it will be well to confine the capacity of H to such dimensions as will allow of the passage of not much more than the gases which may come into the pump with the liquid, a greater capacity being required when effervescing liquids are operated upon, and also when the suction-connections are complicated and liable to leak, than under more favorable conditions.

And, further, if the main delivery-valves are located between the levels of the highest and lowest levels of the barrel, as A, or if the channels, as N, are so shaped as to make the barrel a depressed pocket, the object of preventing concentration of grit in the barrel will be defeated.

In Figs. IV, V, and VI is shown a metal and rubber valve, suitable for use in the chambers above described, composed of a hollow skeleton metal valve, *i*, provided with proper guide-wings to fit the chambers. Into this skeleton valve is fitted a plug of rubber or other elastic material, having a valve-face, *l*, and a check-face, *j*. This plug is to be molded in shape to fit the tubular cavity in the skeleton, so that each end will project beyond the metal, so that both seating and checking blows will come upon the rubber. As the seating-blows will be greater than the checking-blows, the rubber plug will not need to be especially fastened into the skeleton *i*, as inspection of the drawing will show. Worn plugs may be taken out and new ones inserted with great facility.

I claim as my invention, and desire to secure by Letters Patent, the following, to wit:

1. The combination of the seat drawer or drawers F G, tongue-pieces L L, and bonnet or bonnets M, substantially in the manner and for the purposes described.

2. The combination of the seat drawer or drawers F G and grid-bar check or checks, substantially in the manner and for the purposes described.

3. The arrangement of the delivery-valves H H H′, substantially as described—that is to say, the greater part H H below the level of the lowest wearing part of the barrel A, in combination with the lesser part H′ at or above the level of the highest wearing part of the barrel A, substantially in the manner and and for the purposes described.

4. The combination of the skeleton metallic valve *i* and the withdrawable rubber plug, having seat and check faces *j l*, substantially in the manner and for the purposes described.

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Witnesses:

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JOHN F. ROBERTS.