

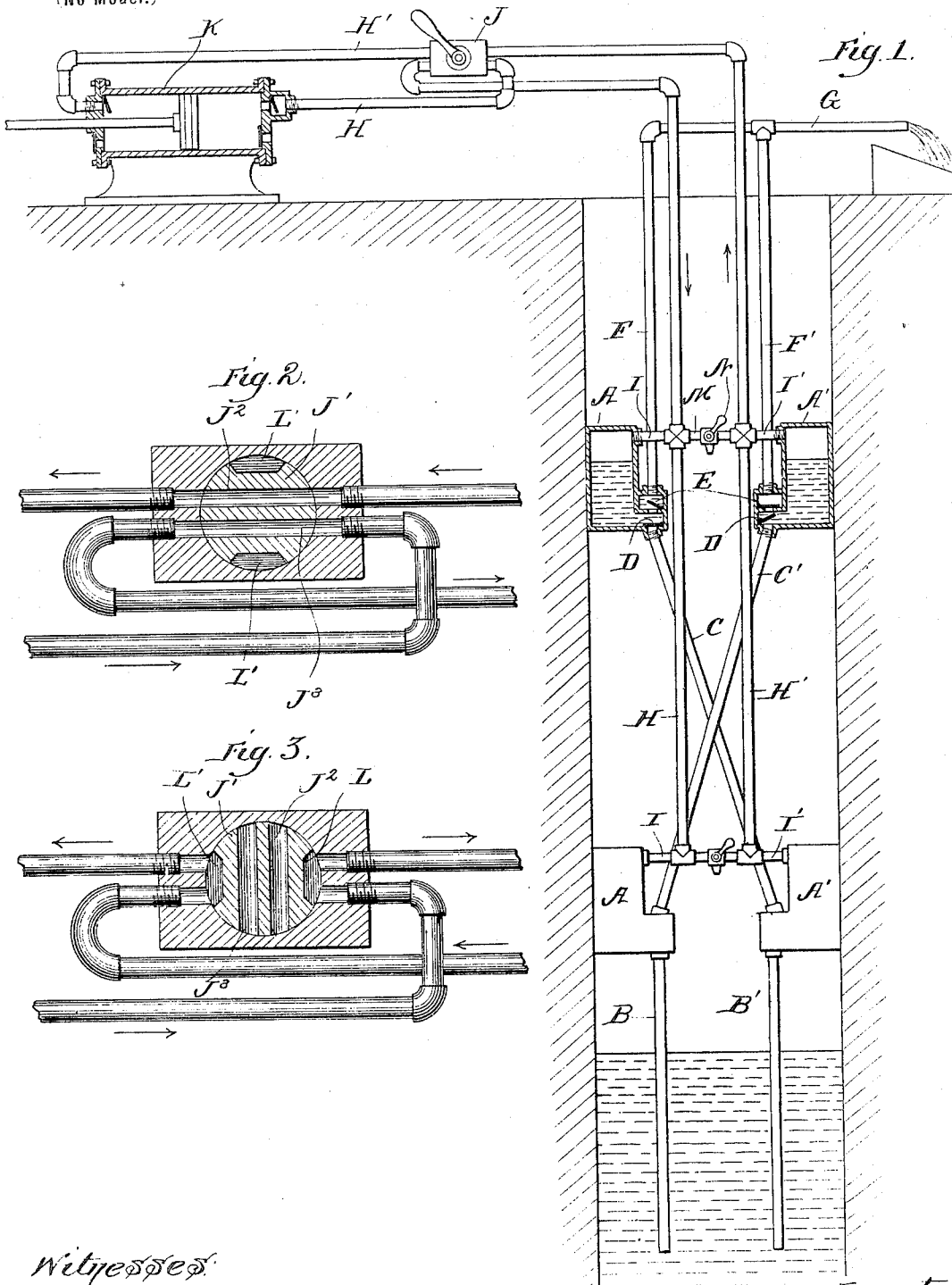
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Patented Jan. 2, 1900.

C. WRIGHT.
PUMPING SYSTEM.

(Application filed July 14, 1898.)

(No Model.)



UNITED STATES PATENT OFFICE.

CHARLES WRIGHT, OF IRONTON, OHIO.

PUMPING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 640,349, dated January 2, 1900.

Application filed July 14, 1898. Serial No. 685,971. (No model.)

To all whom it may concern:

Be it known that I, CHARLES WRIGHT, a citizen of the United States, residing at Ironton, in the county of Lawrence and State of Ohio, have invented a certain new and useful Improvement in Pumping Systems, of which the following is a specification.

My invention relates to a new and useful improvement in systems and apparatus for elevating water from mines and the like, and is especially adapted for use where it is necessary to elevate the water from considerable depths, and has for its object to provide an exceedingly simple mechanism for accomplishing the result which will overcome the many disadvantages heretofore attendant upon pumping of water from mines, among which are the enormous pressure to which the water-pipes are subjected, the wear and tear incident to the passage of the muddy water through the pumps, the liability to breakage, expense and delays occasioned thereby, and the maintenance of elevating parts within the shaft, such as the plunger-rods.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, the construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a sectional view showing my improved system applied to a mine or deep well; Fig. 2, an enlarged section of the reversing-valve for connecting the vacuum and pressure end of the pump with the air-pipes, showing the valve-plug in its straightway position; and Fig. 3, a similar view showing the valve in its reversed position, whereby the vacuum and pressure pipes are crossed.

In carrying out my invention as here embodied I place a series of reservoirs or tanks A and A' within the shaft of the mine or well, and these reservoirs are located in pairs, as shown, and there may be any number of these pairs, in accordance with the depth of the shaft, the object being to have the distance between each pair so limited as to prevent undue pressure within the pipes during the

elevation of the water from one pair of reservoirs to the next above. The lowest pair of reservoirs are connected by the pipes B and B' with the water in the shaft, and they in turn are connected by the cross-pipes C and C' with the pair of reservoirs next above, the object of crossing these pipes being to carry the water from a pressure-tank to a vacuum-tank, as will be hereinafter set forth. Where each of the pipes enter the bottom of the reservoir a valve D is so placed as to open inward, thus permitting the inflowing of the water to the reservoir, but preventing its outflow, as is well understood, and where the pipes lead upward from the reservoir a valve E is so located as to open outward, thus permitting the water to flow upward to the pipe, but preventing its downward flow to the reservoir. The highest pair of reservoirs are connected by the pipes F and F' with the discharge-pipe G.

H and H' are air-pipes connected by the branch pipes I and I' to the reservoirs, as shown, and these pipes pass through the reversing-valve J and are connected to the opposite ends of the pump-cylinder K, the end to which the pipe H is connected being arranged to compress air, while that to which the pipe H' is attached is arranged to create a pressure-vacuum. The plug J' of the reversing-valve has two straightway passages J² and J³ therein, and when these passages are horizontal, as shown in Fig. 2, that portion of the air-pipe H which leads to the shaft receives the compressed air from its pump, while the same portion of the pipe H' has the air drawn therefrom. When the plug J' is turned through ninety degrees, the straightways therethrough will be thrown out of action, while the recesses L and L' will be brought into register with the pipes in such manner as to connect the pipe H with the vacuum end of the cylinder, while the pipe H' will be connected with the pressure end, as will be readily understood, and this will convert that portion of the pipe H which extends in the shaft into a vacuum-pipe, while the similar portion of the pipe H' will be converted into a pressure-pipe.

From this description it will be seen that the operation of my improved system will be as follows: When the pump is put in action and the valve-plug J' is in the position shown

in Fig. 2, a suction will be created in each of the reservoirs A' by the drawing of the air therefrom through the pipe H', and this, as is obvious, will first cause the water to rise from the bottom of the shaft through the pipe B' to the lowest reservoir A', and when this has been filled a reversal of the valve J will create a pressure in the pipe H. The air-pressure thus transmitted to the lowest reservoir A' will force the water therefrom upward through the pipe C to the opposite reservoir A next above, and this elevation of the water will be assisted by the partial vacuum then created in this reservoir A next above by the suction therefrom of air through the pipe H. When the water has been thus elevated to the top reservoir A in the system here shown, a second reversal of the valve J will create a pressure within this reservoir A, which will close the valve D and open the valve E, forcing the water upward through the pipe F to the discharge G. While this is taking place a similar action takes place in the opposite reservoir, thus bringing about a continuous flow of water from the discharge-pipe fed by the pipes F and F'. The valve J may be manipulated either by hand or by automatic means, which will reverse the plug thereof at the proper time to bring about the change in the pipes H and H'.

To avoid the undue waste of compressed air after it has performed its work in the reservoirs, a short pipe M connects the pipes I and I', and in this short pipe is located a valve N, so that when the reservoir A has been emptied of its water by the admission of compressed air thereto the reversal of the valve N will permit this compressed air to be discharged into the opposite reservoir A' until the pressure in the reservoirs has become equalized, and this reversal of the valve N should take place at the proper time relative to the reversal of the valve J, so as to produce the above results, and may be accomplished automatically, if so desired. In Fig. 2 the position of the valve J is shown when the compressed air is being directed to the reservoir A. In order to utilize the compressed air accumulated in the reservoir A, the valve N must be opened, and at the same time the valve J must be turned to a position intermediate of the showing in Figs. 2 and 3, so that the compressed air from the pump may augment the pressure diverted from the reservoir A. As there are many methods of producing this automatic movement, I have not deemed it necessary to show the same in this connection.

If found desirable, the bottom pair of reservoirs may be submerged, and thus the pressure of the water will cause it to flow within these reservoirs, from whence it may be elevated, as above described.

By my improved system it will be seen that all of the operating mechanism is so located that access may be had thereto for oiling, repairing, and the like and that the water

does not pass through the pump, and consequently the latter is not injured by the grit contained in most waters drawn from mines and the like, and, further, only a comparatively small pressure is necessary, since the elevation of the water takes place in steps from one side of the reservoirs to another, the height of each from the other being such as to require but a comparatively small pressure, and since this system may be extended indefinitely water may be elevated thereby from shafts or mines of any depth, and another considerable advantage of this system is that the water may be elevated regardless of the formation either of the shaft or tunnels connected therewith, since the reservoirs when properly placed and connected by pipes will perform their function upon a horizontal line, at an angle, or vertically.

This system is well adapted for waterworks in cities or factories, and for such purpose will generally require only two sets of tanks, one submerged in or near the river or lake of supply and the other about the level of the town, with arrangements for furnishing the proper pressure for ordinary delivery and, if desired, an increase of pressure for fire purposes.

Having thus fully described my invention, what I claim as new and useful is—

1. In combination, a pump adapted to create an air-pressure and a partial vacuum, pipes leading from said pump, one for conveying the compressed air and the other for conveying air to the suction portion of the pump, a reversing-valve for changing the connection of the pipes with the pump, a series of cylinders arranged in pairs to which the air-pipes are connected, short pipes connecting the air-pipes, a valve located in each of the short pipes, water-pipes leading to the lower reservoirs, valves located within said reservoirs and adapted to open inward, pipes leading from the lower reservoirs to the reservoirs next above, said pipes being crossed, valves arranged within the reservoirs and adapted to open outward, and a discharge-pipe connected with the upper reservoirs as and for the purpose set forth.

2. In combination, a series of reservoirs, a pump adapted to create an air-pressure and a vacuum, pipes connected to each end of the pump and suitable valved connections from the pump to the reservoirs, short pipes connecting the air-pipes and a valve in each short pipe and connections whereby the water, through suction, is drawn into the reservoir, and through a combined suction and pressure expelled therefrom, substantially as described.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

CHARLES WRIGHT.

Witnesses:

MARY A. MCGEE,
G. K. ROBERTS.