No. 654,811. Patented July 31, 1900.

T. STEBBINS.

PUMP.

(Application filed Oct. 16, 1895.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

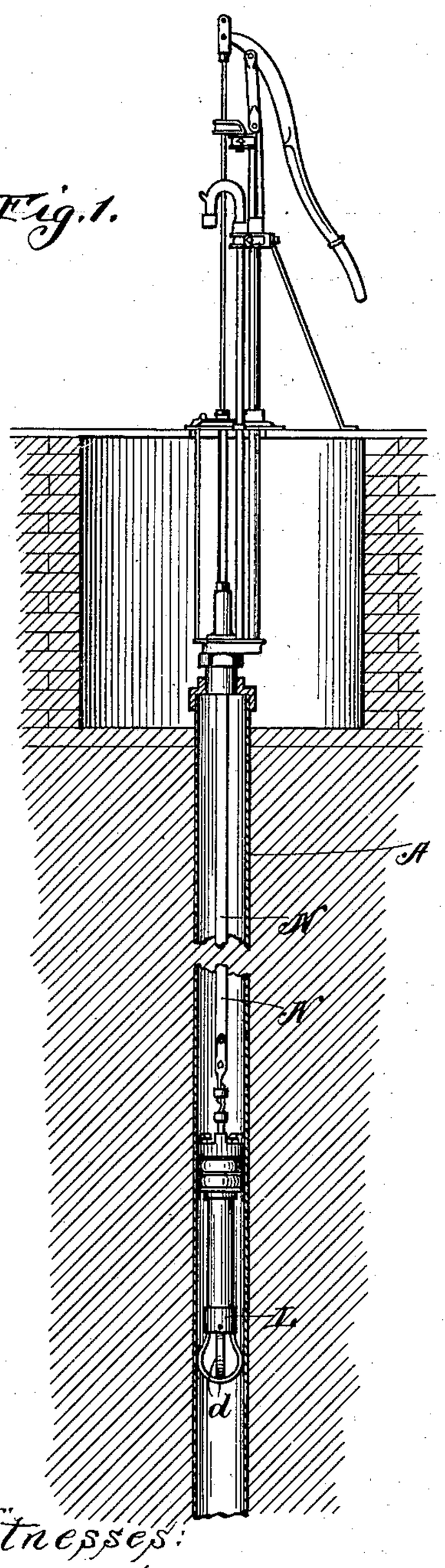


Fig. 2.

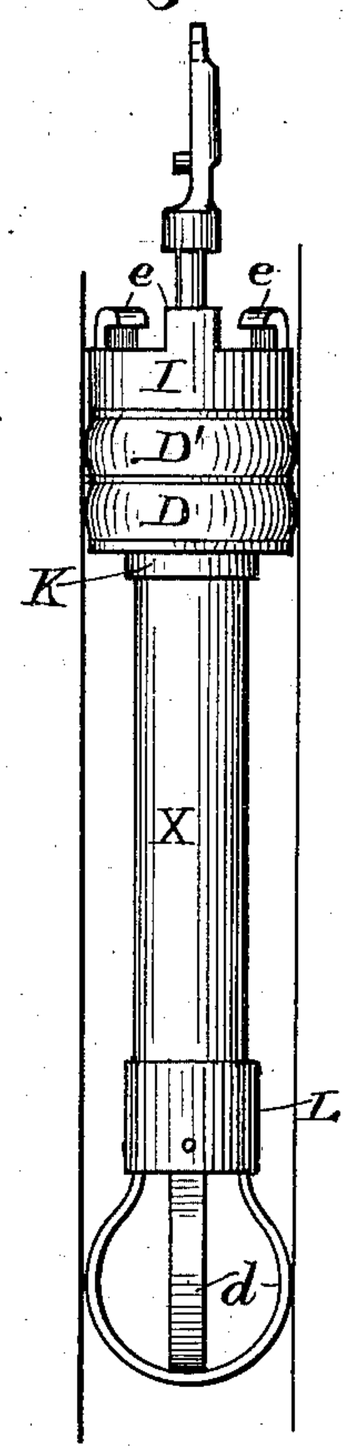


Fig. 3.

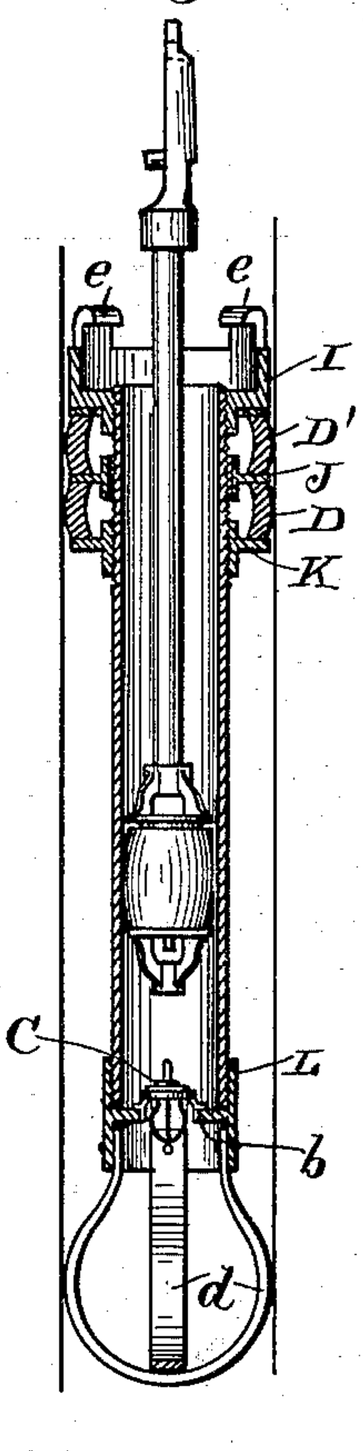
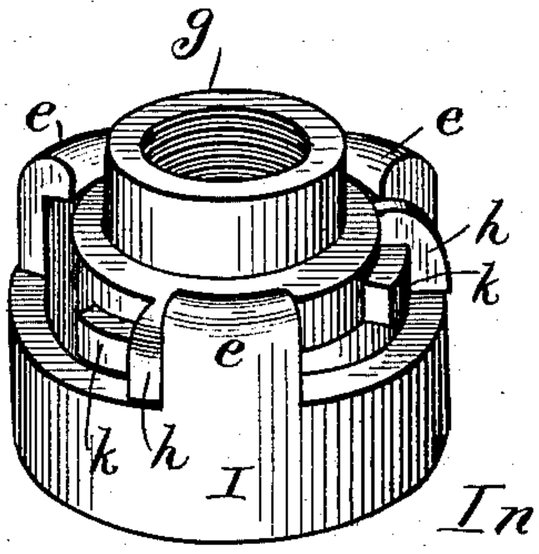


Fig. 4.



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No. 654,811. Patented July 31, 1900.

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(No Model.) 2 Sheets—Sheet 2.

Fig. 6.

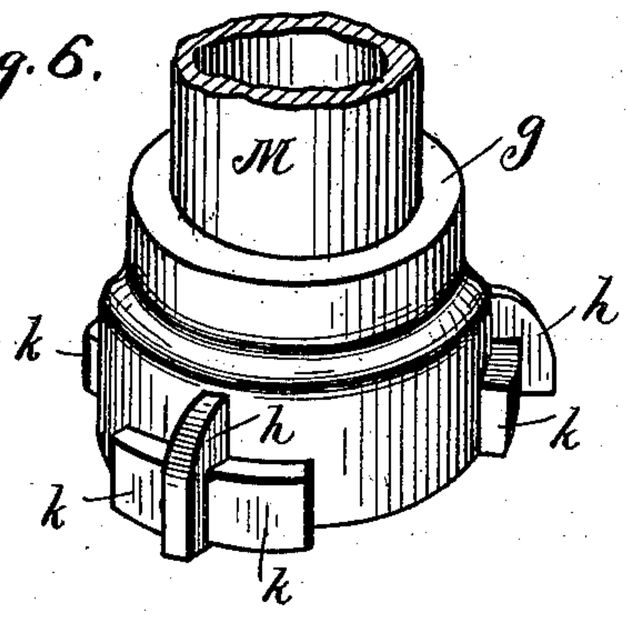


Fig. 5.

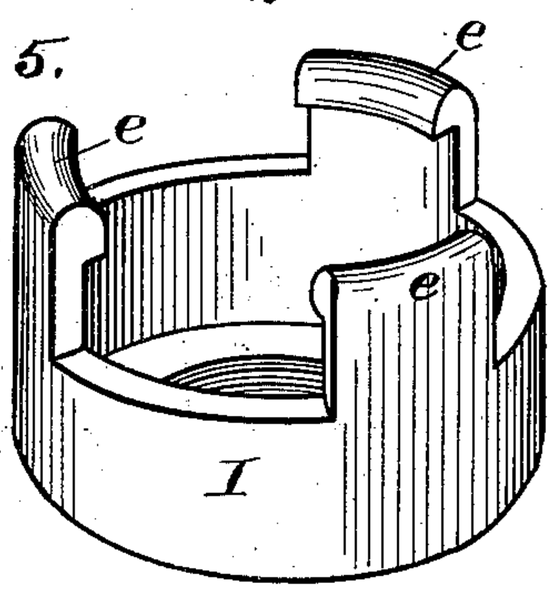


Fig. 7.

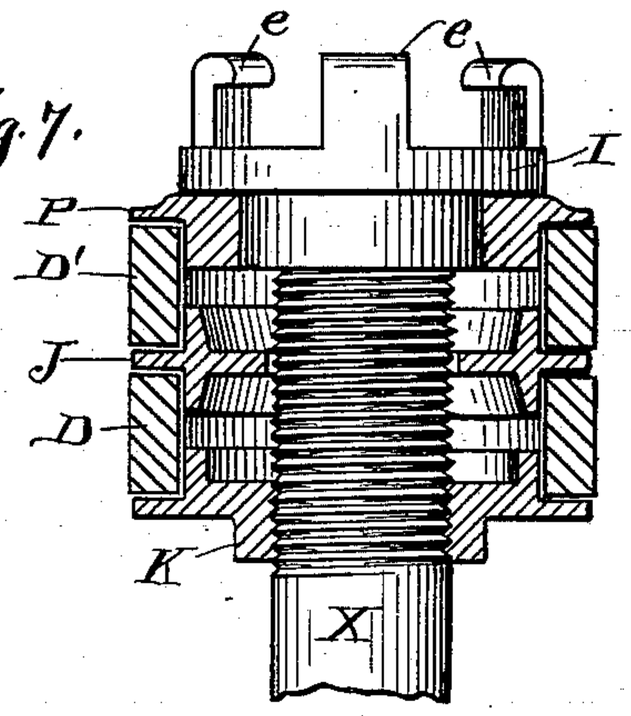


Fig. 9.

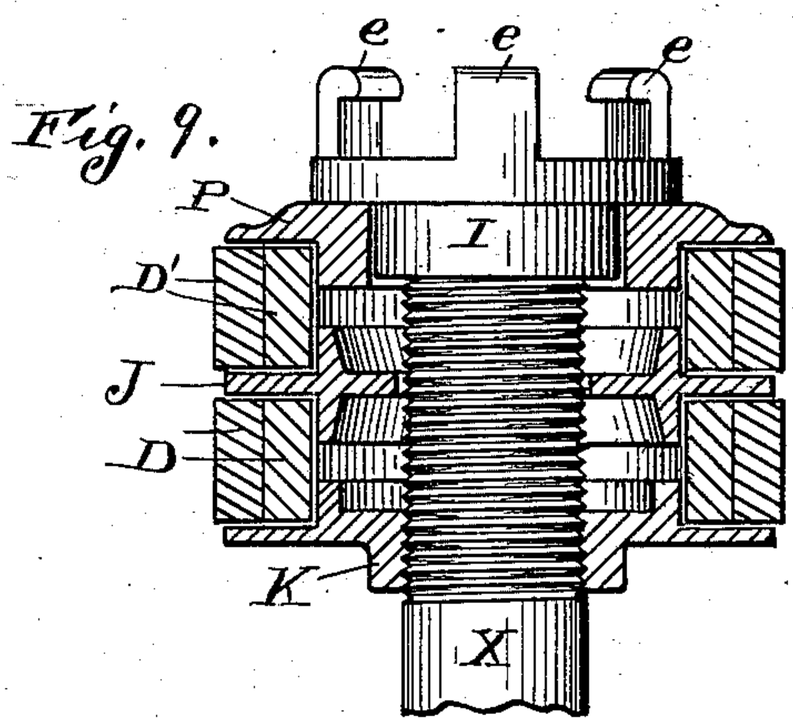
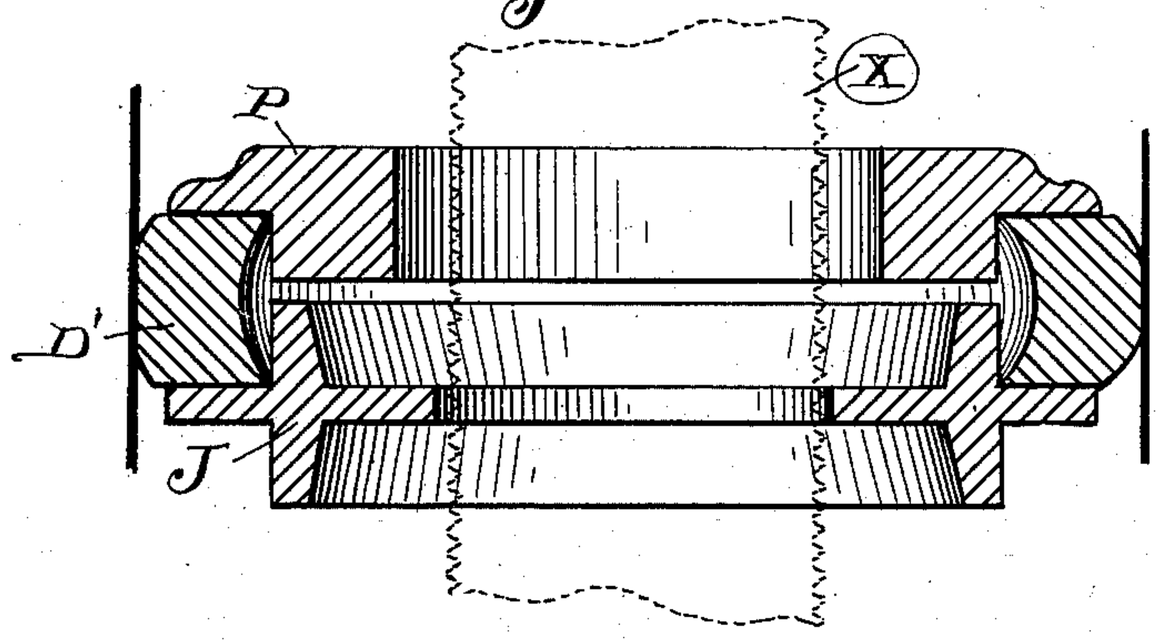


Fig. 8.



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UNITED STATES PATENT OFFICE.

TIMOTHY STEBBINS, OF DAVENPORT, IOWA, ASSIGNOR TO THE RED JACKET MANUFACTURING COMPANY, OF SAME PLACE.

PUMP.

SPECIFICATION forming part of Letters Patent No. 654,811, dated July 31, 1900.

Application filed October 16, 1895. Serial No. 565,824. (No model.)

To all whom it may concern:

Be it known that I, TIMOTHY STEBBINS, a citizen of the United States, and a resident of Davenport, Scott county, Iowa, have invented certain new and useful Improvements in Pumps, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings and to the letters of reference marked thereon.

Heretofore the art of tubular well-pumps has been such that particularly in deep wells the lower cylinder was made to suit the size of the pipe it was secured in—in other words, a two-inch cylinder was used in a two-inch pipe, a three-inch cylinder in a three-inch pipe, a four-inch cylinder in a four-inch pipe, &c., and no matter what the diameter of the pipe the cylinder had to be made with especial reference thereto. It is a well-known fact that the deeper the well the less the diameter of cylinder. This is due to the great weight of water which would otherwise have to be lifted. Now in order to suspend the lower cylinder in place it has heretofore been customary to suspend an inner pipe from the pump-head and attach or secure the lower cylinder to its lower end. In this way the lower cylinder could be made of any diameter desired and the water be drawn therethrough up through the said inner pipe without reference to outer casing of the well or its diameter.

The object of my invention is to dispense with the necessity and great cost of this inner pipe, to enable the lower cylinder to be inserted from above and secured in any position desired in the well-casing in such manner that said cylinder will support any weight of water above it, and to so construct the locking devices of said lower cylinder that a cylinder of any diameter, so long as it is less than the diameter of the pipe or well-casing, can be made to fit any size of said pipe or casing. This I accomplish by means of an expansion-head for the said lower cylinder, the expansive pressure of which can be regulated so as to hold the cylinder in place and said expansion-head being made only with reference to the size of the tube or well-casing, the weight of water above it, and regardless of the diameter of the cylinder, substantially as hereinafter fully described, and as illustrated in the drawings, in which—

Figure 1 is a side view of a pump, showing the well-casing thereof in cross-section and showing my invention in side elevation therein. Fig. 2 is a side view of my improvements drawn to a larger scale than as shown in Fig. 1. Fig. 3 is a vertical transverse section therethrough. Fig. 4 is a perspective view of the upper end or depression-head of my improved adjustable lower cylinder, showing the key for turning the same interlocked with said head. Fig. 5 is a perspective view of said depression-head. Fig. 6 is a perspective view of the lower engaging end of the locking-key. Fig. 7 is a vertical transverse section through a modified construction of my improved lower cylinder. Fig. 8 is a vertical transverse section through a set of expansion rings and washers therefor, taken on enlarged scale; and Fig. 9 is a similar view through a set of expansion-rings placed concentric to one another.

In the drawings, A represents the well-casing, in the lower end portion of which my improved lower cylinder is placed, and N represents the plunger-rod of the pump, with the bucket suitably secured to the lower end thereof.

My improvement consists of a suitable length of pipe or tubing of a less diameter than the well-casing within which it is placed and has screwed or otherwise secured to its lower end a dog-coupling L, having the spring-dogs *d* secured and depending from its lower end. This dog-coupling L has an annular flange projecting from its inner circumference, which restricts the opening therethrough and forms a valve-seat *b* for the puppet or lower valve *c* of the pump, and preferably below the valve-seat the ends of the downwardly-extended loop-shaped dogs *d* are secured diametrically opposite each other. There may be three or more of these dogs. I prefer, however, to use but two and to arrange these at right angles to each other, as shown in the drawings. The lateral spread of dogs *d* is such that they permit cylinder X to be inserted down into the well-casing of the well, but when it is attempted to turn the

head of the cylinder (to which a more extended reference will hereinafter be had) said dogs come in contact with the irregularities and protuberances of the bore of the well-tubing and prevent the cylinder from turning.

The upper portion of the tubular body of the lower cylinder X is screw-threaded and has screwed thereon a "base-flange" K, so called because it has a circumferential flange projecting from about its center of length, upon which is supported a lower ring D. This lower ring D supports and is separated from an upper rubber ring D′ by a dividing-washer J, which latter consists of a ring of metal or other suitable material loosely surrounding the cylinder X, with a circumferential flange of the same diameter as the base-flange K. The washer J rests upon the upper edges of ring D and has resting on it the ring D′.

Screwed onto the screw-threaded upper end of the cylinder X after the expansion-rings are put in place is a compression-head I, consisting of a collar having its lower edge rabbeted to form a shoulder in which the upper edge of ring D′ rests. By properly turning this head I rings D D′ are expanded out at the centers, as shown in Fig. 8, with such pressure against the walls of the bore of the well-casing that said cylinder X is held securely in position. In order to turn this compression-head, I provide it with several upward-projecting lugs *e*, which are located an equal distance apart and have their upper ends overhang toward the center of the head. I engage head I with a tubular key M, inserted into the well-tubing from above, said key being made as long as desired by simply coupling as many sections of pipe as may be deemed necessary to provide the requisite length to push the lower cylinder to the desired depth and lock the same in position when it gets there.

The foot or grapple *g* of the key M consists of a suitable collar screwed unto the lower end of said tubular key, which has a bell-shaped lower mouth, so as to increase its diameter to that of the circle inclosed within the upper ends of the lugs *e* of the compression-head. This bell-shaped mouth of the grapple is provided with a series of radially-projecting lugs *h*, corresponding in number to the lugs *e* of the compression-head and likewise separated an equal distance apart. Now when it is desired to turn the compression-head the grapple is lowered until the bell-shaped lower mouth of the same is confined within the lugs *e* of the head, whereupon it is turned so that the lugs *h* bear against lugs *e* and turn the compression-head, so as to expand the rings D and D′. In order that the grapple may be used to lift the cylinder as well as lower it into place, I provide the lugs *h* with lateral wings *k*, which extend a short distance on either side of said lugs and are of such dimensions that when lugs *h* are turned to come into contact with lugs *e* said wings come under the overhanging upper ends of lugs *e* of the compression-head.

In order to adapt my improved lower cylinder to suit the different sizes of well-casing, the rings D or D′, or both, are increased in number, substantially as shown in Fig. 9. In this figure the two rings D are shown to be concentric and are so arranged that one surrounds the other. Of course in order to do this it is necessary to employ a base-flange K and a compression-head I of such diameter that both rings D will be compressed between the two when said compression-head is properly turned. I can avoid the necessity for changing the compression-head every time it is desired to adapt said rings to a well-casing of greater diameter by employing an extension-washer P, substantially as shown in Fig. 7. In this figure of the drawings the said extension-washer is shown as located between the upper edges of said rings D′ and the compression-head, and the flange of said extension-washer is of such diameter that it bears down upon the upper edge of said ring D′. Not only can the number of rings D′ be increased, but likewise the number of lower rings D can be correspondingly increased. In this event it is necessary that dividing-washers of different diameter be substituted for each change of size in the well-casing.

I do not wish to be confined to the use of two concentric rubber rings, because it is obvious more may be employed, if desired. For example, I will say that if two expansion-rings are sufficient when expanded to securely hold the lower cylinder in a five-inch casing with one hundred feet of water above it it is very probable that two rings would not support the cylinder with one hundred and fifty feet above it. It would be necessary to add another concentric ring. Thus the number of expansion-rings depends upon the diameter of the well-casing or pipe, together with the number of feet of water it will have to support. It is possible that a three-hundred-foot well with a five-inch well-casing would require five or six of said concentric packing-rings. I wish to be understood as considering as my invention the use of two or more expansion-rings in conjunction with an inserted lower cylinder for pump no matter how said rings are placed, concentric or otherwise.

One thing which I desire to emphasize in order to bring out the distinction between my improvements and that which preceded it is the fact that a lower cylinder of any diameter can be inserted in a well casing or tubing of any diameter. Therefore one size of lower cylinder can be used in conjunction with a number of well-casings of different diameters. The value of such improvement to the manufacturer and to the user both in commercial and practical sense is inestimable. Heretofore a special size of lower cylinder had to be made for each size of well-

casing. If the user was removed some distance from the producer and the size of cylinder was too small for a given-size well-casing, inconvenience, delay, and expense was entailed before this (not uncommon) difficulty could be overcome. By my invention this objection is overcome. All that has to be done is to add or substitute a larger rubber ring, and of these there is always a ready supply at hand. It is an axiom in the art of well-digging that the deeper the well the smaller the size of the lower cylinder. By my improvement as there is no limit to the length of the pipe X the lower cylinder can be made the smallest possible practical size and made to depend not only into the smallest-size well-casing, but even below the same when for any reason the well-casing cannot be lowered farther down in the well.

Another very necessary feature to which it is desired to call attention and which is important in and is confined to my invention is that by placing the expansion-rings at or near the top of the lower cylinder the suspension of the same (to which allusion has already been made) is made possible. Sand and other materials and chemicals generated by the water—such as sulphate of lime and sulphate of magnesia—cannot pack around the sides of the cylinder, between the same and the well-tubing, and cement the same, so as to prevent its removal or its being pushed farther down into the well, and the top of the cylinder, as well as the lower end, is steadied and centered in the well, so as to always be in alinement with the plunger of the pump.

In order to prevent the expansion-rings D and D′ from slipping inward toward the cylinder when the compression-head is turned so as to expand them, the dividing-washer is made ⊢ shape in cross-section, the base-flange and extension-washer are made L shape in cross-section, and the engaging annular edges of the compression-head are rabbeted. As thus constructed these several parts provide seats for the edges of the expansion-rings and backs them up, so that when compressed it is impossible for said rings to do otherwise than bulge or expand outward, as shown in Fig. 8 of the drawings.

What I claim as new is—

1. The combination within a pump with the well-tubing, the plunger-rod and bucket on the lower end thereof, of a lower cylinder consisting of a suitable length of tube of less diameter than the bore of said well-tubing having its upper portion screw-threaded, a stationary circumferential base-flange surrounding the same, a compression-head engaging the screw-threaded portion of said cylinder, two expansible rings between said flange and head for suspending said cylinder within said well-tubing, a friction-washer between said expansible rings, and devices for holding the cylinder stationary during the expanding of said rings.

2. In a pump the combination with the well-tubing, the plunger-rod, and the bucket on the lower end thereof, of the cylinder consisting of a suitable length of tube of less diameter than the bore of said well-tubing having its upper portion screw-threaded, a circumferential flange surrounding said cylinder, a compression-head engaging the screw-threaded portion of the same, having two or more lugs projecting up therefrom, the tops of which overhang toward the center thereof, an expansion-ring between said flange and head, devices for preventing said cylinder from turning during the expansion of said rings, and a grapple having lugs projecting from its circumference which is provided with wings, as and for the purpose set forth.

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