

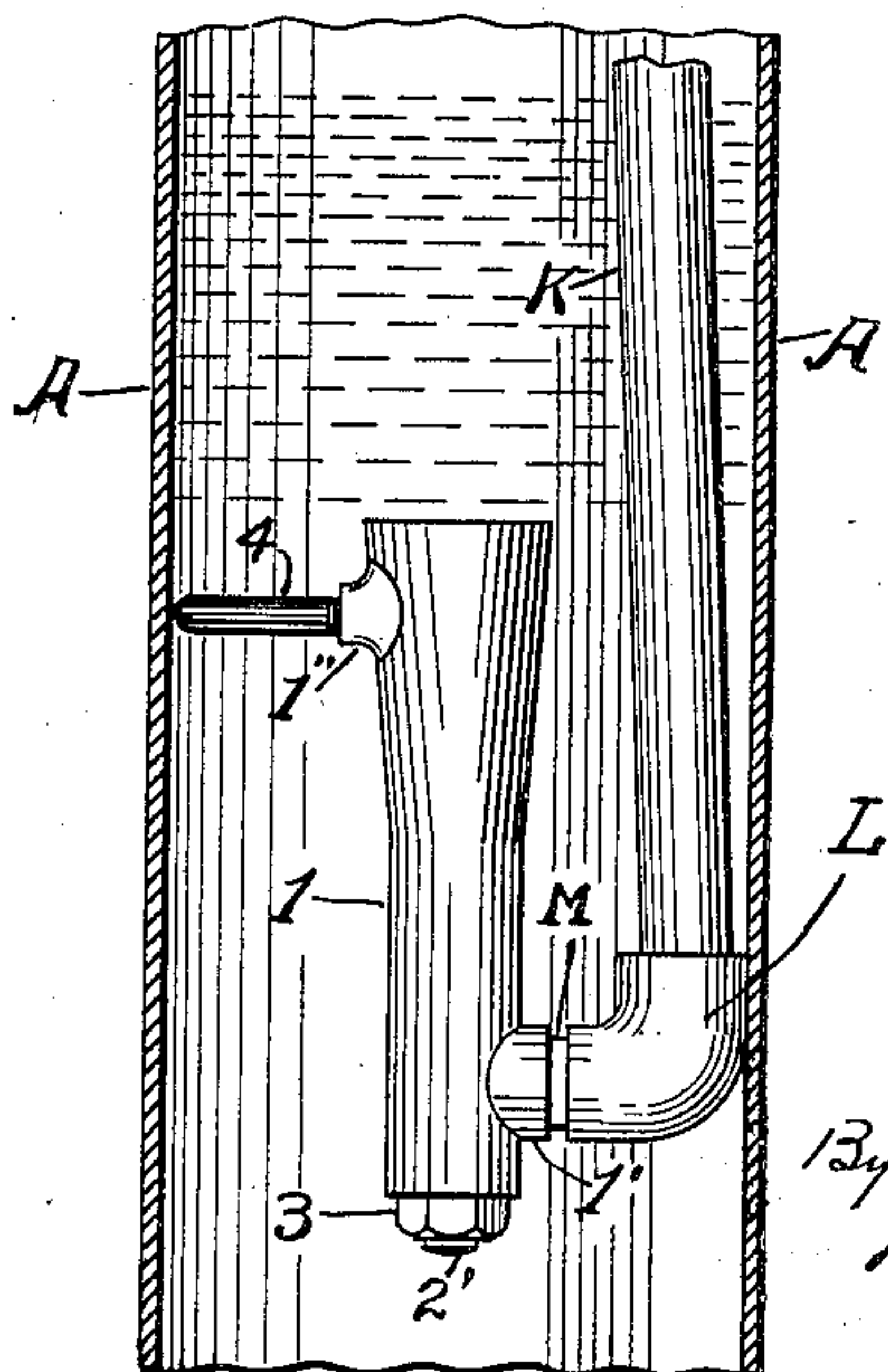
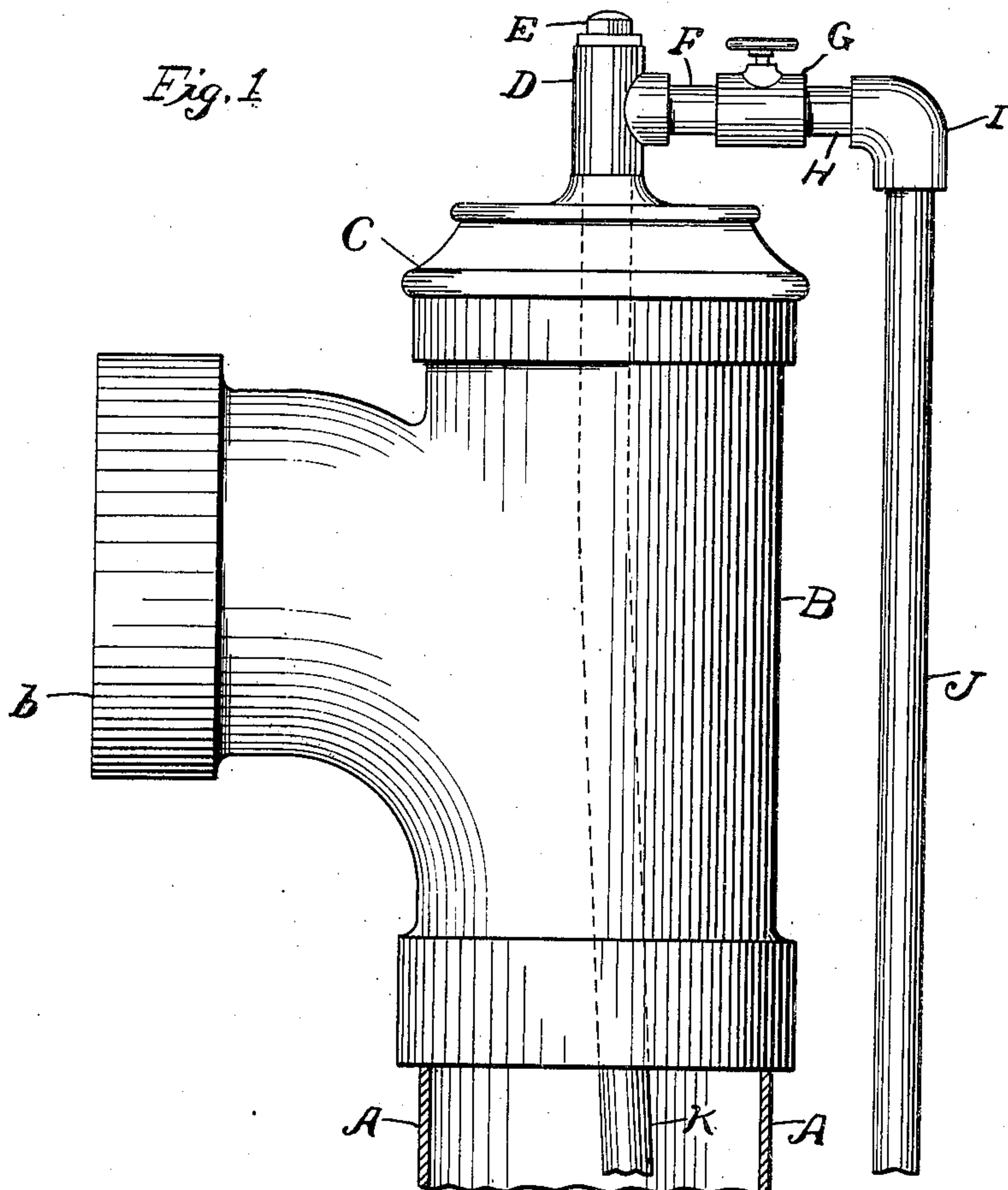
No. 898,015.

PATENTED SEPT. 8, 1908.

W. F. SPANGLER.
AIR LIFT PUMP.

APPLICATION FILED DEC. 6, 1907.

2 SHEETS—SHEET 1.



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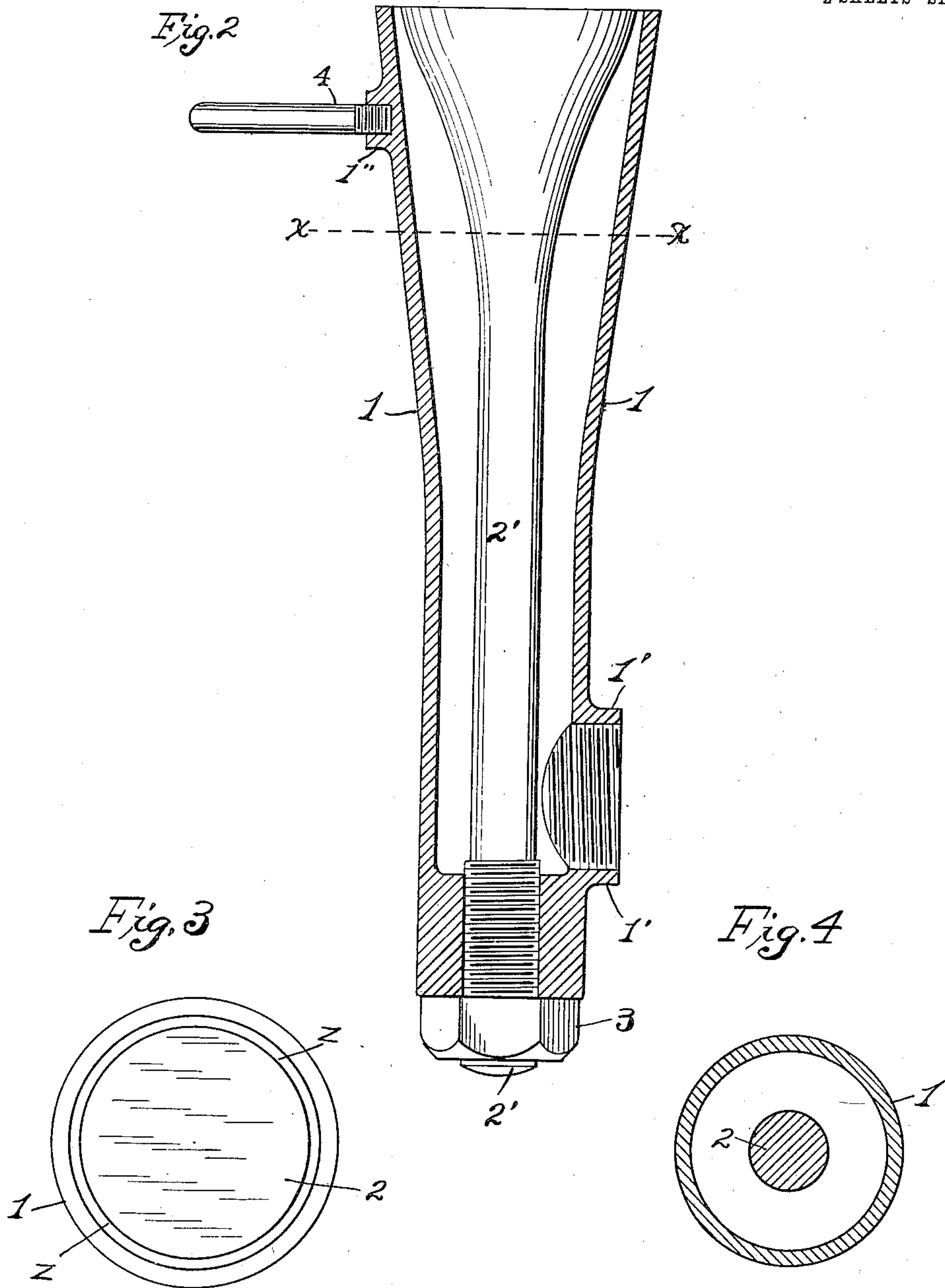
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Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM F. SPANGLER, OF GREENFIELD, INDIANA.

AIR-LIFT PUMP.

No. 898,015.

Specification of Letters Patent.

Patented Sept. 8, 1908.

Application filed December 6, 1907. Serial No. 405,328.

To all whom it may concern:

Be it known that I, WILLIAM F. SPANGLER, a citizen of the United States, residing in Greenfield, in the county of Hancock and State of Indiana, have invented certain new and useful Improvements in Air-Lift Pumps, of which the following is a full, clear, and accurate specification, which when taken in connection with the accompanying drawings, forming a part thereof, will be found such as to enable others skilled in the art to which the invention relates to make and use the same with exactitude.

This present invention relates, more particularly, to a mechanical construction to be employed in connection with a system of water distribution, by which the water is drawn from the well and forced into a containing reservoir, or the like, the power employed being compressed air.

The objects of the invention, broadly speaking, is the provision of means for employing compressed air in withdrawing water from tubular wells; to provide for conducting the compressed air to the point of utilization; to provide a device for utilizing the compressed air, which device will be strong and durable in construction, easily adjusted and controlled, and which will afford a maximum of efficiency with a minimum of power applied.

More particularly stated, my object is to provide an air-lift pump which will be economically efficient, having no operating parts to wear or become inoperative through inadvertent displacement, and by the use of which the loss of power will be practically nil.

Other general objects and particular advantages will be brought out in the course of the following specification, and the features which are new will be hereinafter claimed.

The preferred manner for the construction and operation of my invention is shown most clearly in the accompanying drawings, in which—

Figure 1 shows a side elevation of a portion of a well-casing and a hydrant or T-fitting, and the application of my invention in connection therewith. Fig. 2 shows a central longitudinal view of my invention proper. Fig. 3 is a plan view of the upper end of the parts shown in Fig. 2. And Fig. 4 is cross-sectional view, as taken on the line X—X of Fig. 2.

Similar indices denote like parts throughout the several views.

In order that the construction and operation of my invention may be more fully understood I will now take up a description thereof in concrete detail in which he will set forth the construction and operation of the invention as briefly and as compactly as I may.

Referring to the drawings, the letter A denotes a portion of a well-casing, being shown in longitudinal section in order that my invention may be seen in operative position therein.

The letter B denotes an ordinary hydrant or T-fitting secured above the ground onto the upper end of said casing. Said hydrant or T-fitting is provided with a discharge nozzle *b* extending out at right angles therefrom. On the upper end of the hydrant or T-fitting is removably secured the cap C.

Secured in the center of the cap C is a T-fitting D, which may be secured in the position shown. The upper end of the fitting D should be closed by the plug E.

Threaded into the horizontal portion of the fitting D is a nipple F and threaded onto the latter is a hand-controlled valve G, to which latter is connected the nipple H. Connected to the nipple H is the L-fitting I, from which extends the pipe J, the latter communicating with a compressed air reservoir or the like (not shown).

The letter K denotes the inner supply-pipe, having its upper end threaded into the fitting D, or into the center of the cap C with the fitting D threaded thereon, as desired. The pipe K extends down through the hydrant or T-fitting B and into the well-tubing A to a point some distance below the water-line inside the well-casing.

On the lower end of the pipe K is threaded the L-fitting L, into the horizontal portion of which is secured the nipple M.

The above described parts may be variously changed and modified as desired in order to meet varying condition.

I will now describe the parts which are more essentially new and which form the essential elements of my invention: The numeral 1 denotes an elongated hollow jacket or cylinder closed at its lower end, the upper portion being formed conical and flaring in order to increase the upper diameter thereof,

for the purpose presently appearing. The lower end of said jacket or cylinder is formed comparatively heavy, and disposed vertically therethrough is a threaded aperture, for the purpose hereinafter set forth.

Extending out at right angles from the lower portion of the jacket or cylinder, immediately above said closed end, is an interiorly threaded lip 1' into which may be secured one end of said nipple M as shown.

The numeral 2 denotes a head which is round in cross section, the upper end being flat with its periphery of slightly less diameter than is the inside diameter of the upper end of the jacket or cylinder 1. Said head extends downwardly convergently inside the jacket or cylinder and it merges into the stem 2' formed integral therewith. The lower end of said stem is threaded and adapted to fit in the said threaded aperture in the lower end of the jacket or cylinder. By the above it is apparent that the upper end of the head 2 may be adjusted up or down, with relation to the upper end of the jacket or cylinder 1, and when adjusted as desired it may be secured by the nut 3 which is threaded on the protruding lower end of the stem 2' and contacts with the lower end of the jacket or cylinder 1 as shown.

The indice 1'' designates a boss extending out horizontally from the upper end of the jacket or cylinder 1, being oppositely disposed to the lip 1'. The interior of said boss is threaded out and threaded thereinto is the brace or support 4 which is of a length such that its free end may touch the inside of the casing A. The support 4 does not communicate with the interior of the jacket or cylinder 1, but is provided solely to assist in retaining the jacket or cylinder 1 in operative position, the fitting L acting as the opposite support.

It is to be understood that the lower broken-away portion shown in Fig. 1 is located a considerable distance below the surface of the ground, and that the jacket or cylinder will be located below the surface of the water in the well. By experience I have found that a 33° submergence of the jacket or cylinder over the lifting capacity of the air gives the most satisfactory results.

The air pressure having attained the desired pressure, and the parts of the invention being arranged substantially as set forth, it is manifest that by opening the valve G the air pressure will be admitted, passing down the pipe K and thence into the lower part of the jacket or cylinder 1, and thence upward through the mouth of the jacket or cylinder.

The compressed air of course will pass up through the jacket or cylinder and will discharge through the circular space between the upper end of the jacket or cylinder and the periphery of the head in a thin conical sheet, radiating outwardly against the wall

of the well-casing, forming a central suction which constantly moves upward.

As shown the surface of the conical head 2 has a greater flare than the conical mouth of the jacket 1, and said head upon adjustment may terminate flush with the end of said jacket or somewhat above or below the same, according to the requirements of any particular case, depending, for instance, upon the diameter of the well tubing A, the height to which the water must be lifted, the available force, etc. When the head is adjusted with respect to the mouth of the jacket 1, not only will the cross-sectional area of the space between the members be varied, as is true in certain prior devices in this art with which I am familiar, but by virtue of the peculiar relative flare of said members, I provide a variation in the angle at which the jet of air leaves the device and impinges against the wall of the member A. Thus it will be seen that if the head terminates below the upper end of the jacket the direction of the jet will approximate the cone determined by the jacket, while on the other hand if the head extends above the jacket the jet cone will approximate that determined by the flatter cone of the head, and whereby the jet will impinge the wall of the tubing A in a circle lower down than in the other position of adjustment of the head. Intermediate adjustments of the head will effect corresponding variations in the angle of the jet.

It is evident that the pressure may only pass upward, forcing ahead of it the water thereabove and same time drawing or sucking the water upward from below to take the place of that last acted upon. The commingled water and air, of course, discharging from the nozzle b in a solid or unbroken stream, the size of which depends more or less on the amount of the air pressure.

By reason of the distribution of the air as it is discharged from the mouth of the jacket or cylinder I am enabled to obtain a high degree of efficiency, and at same time employing a comparatively small air conduction pipe in connection with a comparatively large well, or well tubing, and thereby I am enabled to lift a large amount of water with a comparatively small amount of air.

By loosening the nut 3 and then turning the head 2 it is evident that the head may be raised or lowered in order to change the capacity of the space Z and the inclination of the discharging air.

Having now fully shown and described my invention and the best means for its construction and operation to me known at this time, what I claim and desire to secure by Letters Patent of the United States, is—

1. In a pump of the class described, the combination with a well casing adapted to project within the water, a hollow jacket located below the water line and having a cy-

lindrical lower portion the lower end of which is interiorly screw threaded and a flaring conical upper portion, the upper end of which is open, a head located within said jacket the upper end of which head is conical and slightly smaller in diameter than the open end of the jacket, the cone of the head having a greater flare than the cone of the jacket and extending downwardly, means connected with said head whereby the same may be secured adjustably in the said threaded end of the jacket whereby the annular space between the head and the open end of the jacket may be varied in area, and means for supporting said jacket centrally within the well casing and supplying compressed air thereto.

2. In combination, a cylindrical casing adapted to extend into the water in a well, a hollow jacket located beneath the water line and within the casing, said jacket comprising a cylindrical lower portion and a conical flaring upper portion having an open mouth at its upper end, said jacket being provided

with a lateral inlet in its cylindrical portion, a member within said jacket comprising a stem secured adjustably in the lower end of the said jacket and having at its upper end an upwardly and outwardly flaring head, the upper end of which is slightly less in diameter than the open mouth of the jacket aforesaid and the flare of which is greater than that of the conical portion of the jacket, means connected with the jacket at its lateral opening aforesaid to admit compressed air thereto and serving to prevent lateral movement of the jacket in one direction, and a brace secured to the conical portion of the jacket to prevent lateral movement thereof in the opposite direction, substantially as set forth.

In testimony whereof I have hereunto subscribed my name to this specification in the presence of two subscribing witnesses.

WILLIAM F. SPANGLER.

Witnesses:

ALFRED H. ROTTMAN,
OSCAR O. BEVER.