

No. 728,933.

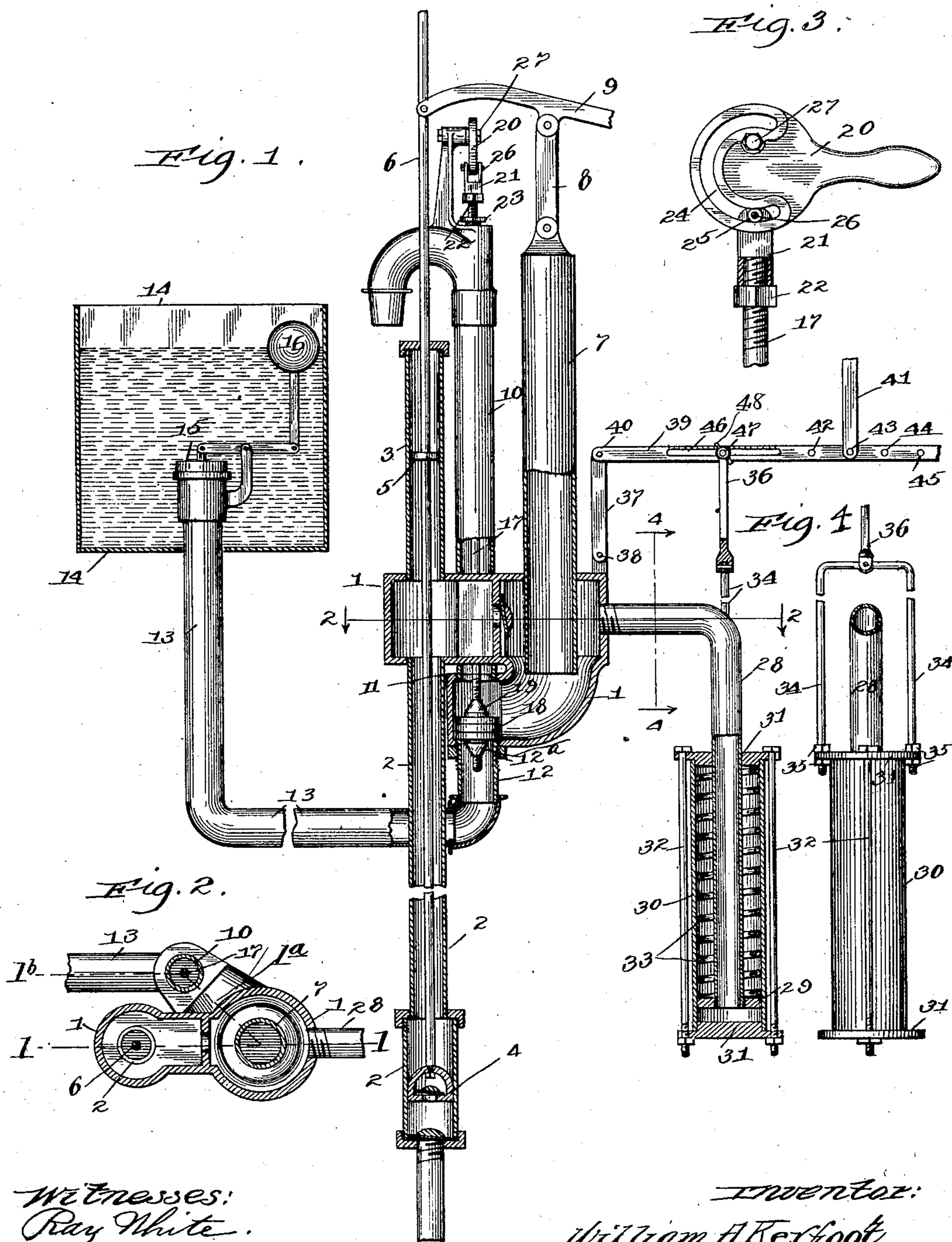
PATENTED MAY 26, 1903.

W. A. KERFOOT.
PUMP.

APPLICATION FILED SEPT. 23, 1901.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:
Ray White.
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Inventor:
William A. Kerfoot.
Jesse Davis
By Attorney:

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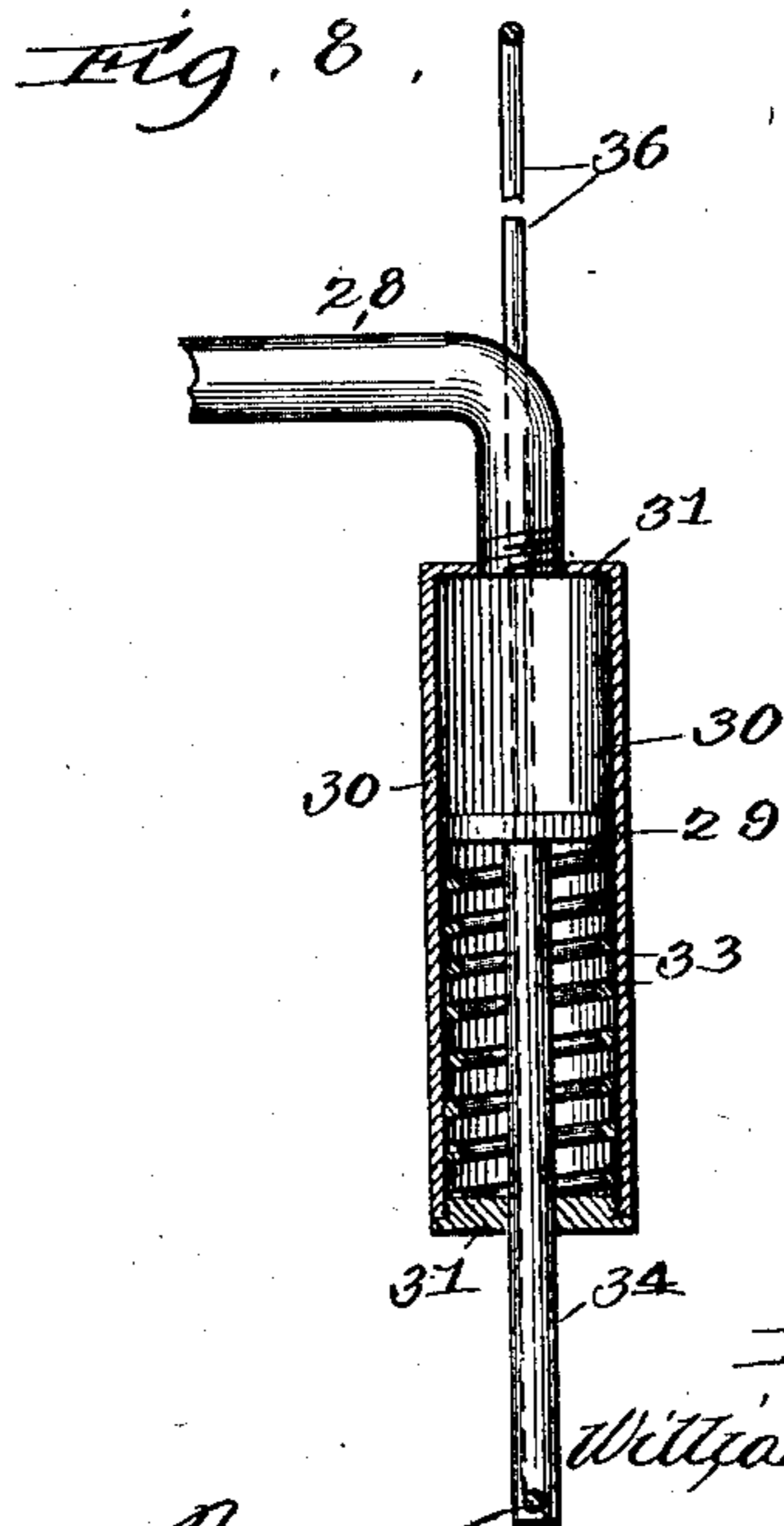
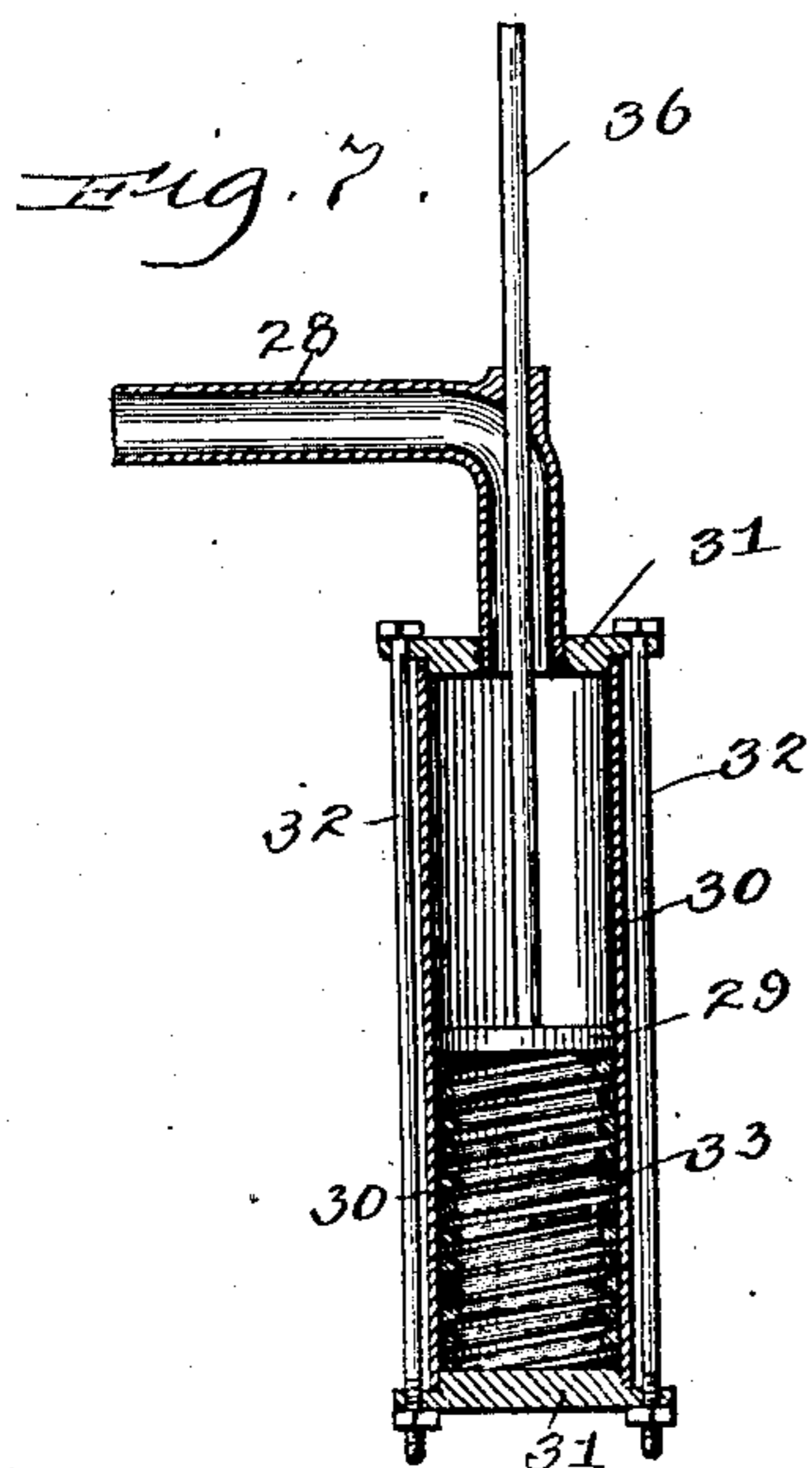
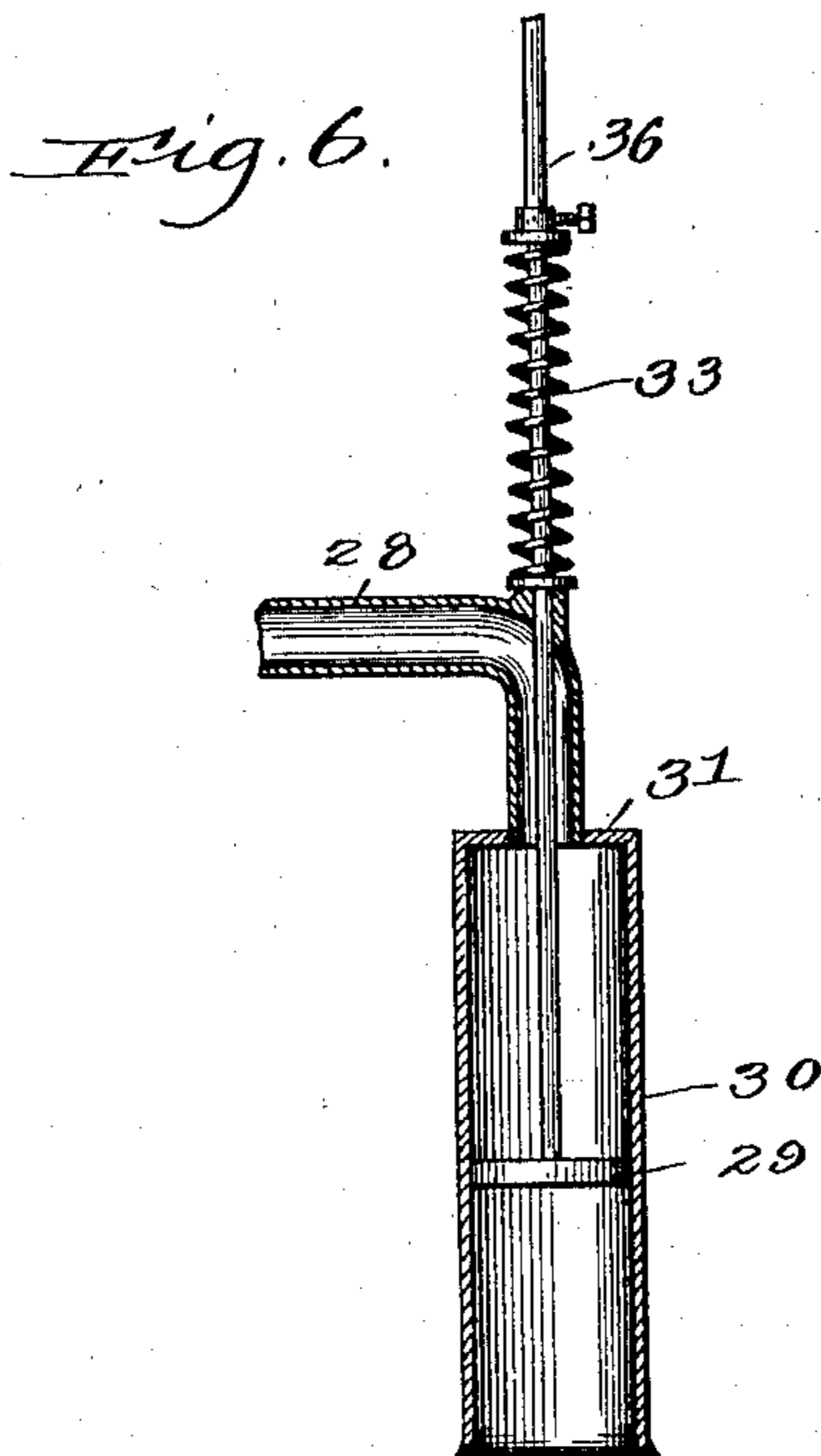
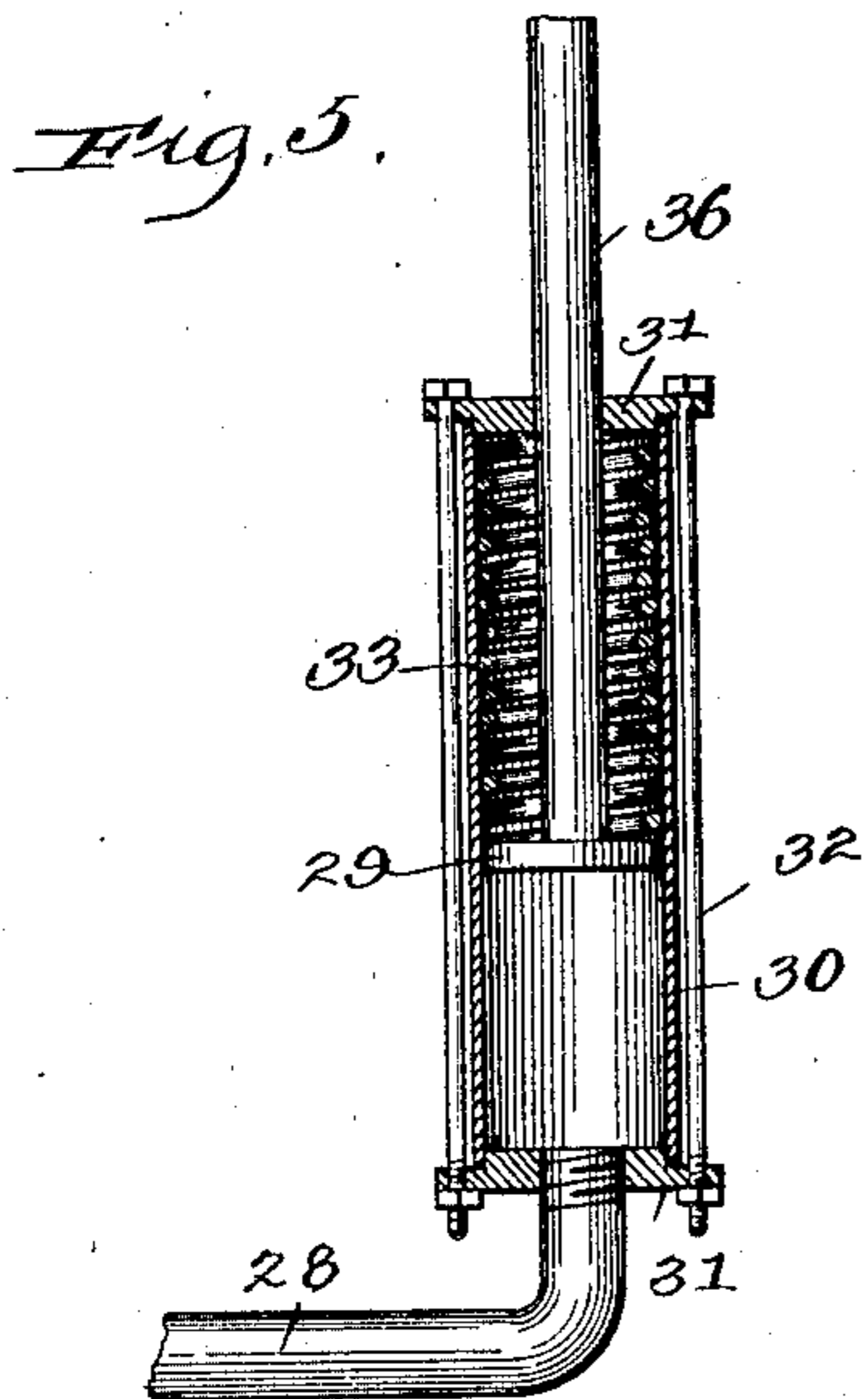
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2 SHEETS—SHEET 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM A. KERFOOT, OF EVANSTON, ILLINOIS, ASSIGNOR TO KATHERINE KERFOOT, OF EVANSTON, ILLINOIS.

PUMP.

SPECIFICATION forming part of Letters Patent No. 728,933, dated May 26, 1903.

Application filed September 23, 1901. Serial No. 76,150. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. KERFOOT, of Evanston, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pumps; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements in pumps. It has special reference to a means for controlling the motive power which is used to operate such pumps.

The object of my invention is to provide a means whereby the motive power of a pump may be automatically set into operation or thrown out of operation with reference to the pump by means of an automatically-arranged device, the function of which is brought into effect by the operation of the pump.

Whenever a pump is operated by some mechanical power to fill a receptacle, such as a water tank or reservoir, it is desirable when the said receptacle is filled to stop the motion of the apparatus that supplies the power for operating the pump either as a matter of economy or to save the wear and tear upon the said pump and the motive apparatus. My device is especially adapted to be used with pumps of this class when such pumps are provided with a source of power, such as a windmill, and it contains means whereby the movement of the windmill may be arrested with reference to the pump at predetermined times—such, for instance, as when a tank or reservoir is properly filled with water and it consequently becomes desirable to stop the operation of the windmill and pump.

In the drawings, Figure 1 is a sectional elevation, for clearness taken on several planes, the cylinder, air-chamber, and governing-cylinder being shown in section on the line 1 1 of Fig. 2, the water-chamber section in a plane corresponding to the line 1^a, intersecting the line 1, and the discharge-pipe and tank being shown in sectional elevation on the line 1^b, intersecting the line 1^a and parallel with the line 1 1. Fig. 2 is a transverse section through line 2 2 of Fig. 1. Fig. 3 is an enlarged broken-away detail of an eccentric and valve rod. Fig. 4 is a view of the regulating-cylinder,

taken on lines 4 4 of Fig. 1. Figs. 5, 6, 7, and 8 are modifications of the regulating-cylinder, spring, and piston.

In all of the views the same figures of reference indicate similar parts.

I have shown my regulating-cylinder in connection with my pump, which forms subject-matter for an application bearing Serial No. 61,828, filed May 28, 1901.

It is evident that my regulating-cylinder may be applied to any form of pump of the general type of that shown, and is therefore not especially restricted to this exact form of pump.

In the drawings, 1 is the water-chamber of the pump, to which the cylinders 2 and 3 are joined in axial line and which are provided with the usual pistons 4 and 5. A piston-rod 6 may be extended to any power-producing device—such as a windmill, water-wheel, steam-engine, or the like—by which it may be thereby reciprocated. An air-cylinder 7 is mounted on and connected with the water-chamber 1, upon the upper end of which a link 8 supports the hand-lever 9, which is connected to the vertical piston-rod 6. The discharge-pipe 10 is connected with the bottom of the water-chamber 1. At the point 11 the lower end of the pipe 10 is dressed off and forms a seat for a valve. Connected axially in line with the pipe 10 is a nipple 12, the upper surface of which forms a valve-seat. The nipple 12 is adapted to be adjustably screwed into the lower walls of the water-chamber 1 and to be fixed by the check-nut 12^a, as shown in the drawings. The lower end of nipple 12 is connected to a conduit-pipe 13, which is led off some distance to a reservoir. On the upper end of the pipe 13 a float-valve 15 is supported, which is adapted to be opened by the float-weight 16 when the water in the said reservoir is below a certain determined point and which is closed by the said float when the water rises to the point shown in the drawings. A valve-rod 17 passes axially through the discharge-pipe 10 and is provided upon its lower end with an adjustable valve 18, shown seated on the valved seat formed by the upper surface of the nipple 12. Two conical nuts 19 19, one upon the lower and one upon the upper side of the said valve, are threaded upon the

rod 17 and are the means by which the positions of the valve 18 may be governed with reference to its vertical location. The nuts are conical, so as to guide the valve into its proper position in the pipes 10 and 12. The valve 18 is shown seated upon the seat provided upon the upper surface of the nipple 12 and is held in position by means of the eccentric 20, which is shown enlarged in Fig. 3. The valve-rod 17 is threaded upon its upper end and is adapted to be inserted in a clip 21 and held in position by means of a check-nut 22. By this means the position of the valve 18 may be adjusted with reference to the eccentric 20 by lengthening or shortening the rod. When it is screwed into or out of the clip 21 and held fixed therein by means of the nut 22, the valve-rod 17 passes through a stuffing 23. The eccentric 20 is provided with an eccentric-slot 24, in which a roller 25 is located. The roller 25 turns upon a bolt 26, which passes through the clip and roller and is fixed by means of a cotter-pin or nut to retain it in position. 27 is a bearing upon which the eccentric 20 is adapted to be turned. When the eccentric is in the position shown in Fig. 3—that is, when the handle points to the right—the valve-rod 17 is depressed, and the valve 18 is thereby seated upon the end of the nipple 12, as shown in Fig. 1. When the eccentric is turned to the left or when the handle is pointing to the left, the valve-rod 17 is thereby raised and the valve 18 is seated upon the seat 11 of the discharge-pipe 10. By this means the outlet from the pump through the discharge-pipe or through the pipe 13 to the tank 14 may be closed.

A pipe 28 communicates with the water-chamber 1 and is provided upon its lower end with a piston 29. The piston fits closely in the cylinder 30. Two cylinder-heads or end plates 31 31 are held together by tie-rods 32 32. The upper cylinder-head 31 is perforated and forms a guide upon the pipe 28. Between this cylinder-head and the piston 29 an open helical compression-spring 33 is placed within the cylinder, which exerts a tension to move the cylinder into its most upward position. A loop 34 is fixed to the upper head 31 by means of the nuts 35 and is provided with an extension-rod 36 in axial line with the center of the cylinder. A vertical arm 37 is pivoted at a stationary point 38 and is also pivoted to a horizontal arm 39 at the point 40. A vertical rod 41 is attached to the power-producing device and is a means by which the operation of the said device may be stopped and started when the arm 39 is moved in the manner hereinafter described. The rod 41 is adapted to be pivoted at any of the holes 42, 43, 44, or 45 for the purpose of changing the relation of the fulcrum and the sweep of the said arm for varying the distance that the vertical rod 41 will be moved by a given compression movement of the spring 33 within the cylinder 30. The arm 39 is provided with a slot 46, in which the bolt 47

of the arm 36 is adapted to be secured at any position within the said slot by means of a thimble-nut 48 or other suitable device. This slot may be graduated, so that the location of the bolt 47, together with the vertical rod 36, may be definitely known. The position of the fulcrum 47 in the slot will determine the degree to which the spring 33 must be compressed in order to move the lever 41 a given distance.

The use and operation of my device are as follows: In the position shown in Fig. 1 when the vertical pump-rod 6 is reciprocated the water from the pump will flow out of the discharge-pipe 10, because the opening from the nipple 12 is closed by the valve 18. If now the eccentric 20 is thrown to the left, the valve-rod 17 will be raised and the valve 18 will be seated upon the seat 11 of the pipe 10, and the opening to pipe 10 will be thereby closed and the opening into the nipple 12 will be opened. If now the tank or reservoir 14 is empty, the float 16 will occupy a lower position and the valve 15 will be unseated and the pipe 13 will be opened thereby and water will be discharged into the said reservoir. The regulating-cylinder and piston will be as shown in the drawings. When the water rises in the reservoir 14, so as to raise the float 16, the valve 15 will thereby be closed, and the water, having no other exit, will enter the cylinder 30 between the lower head 31 and the piston 29, which will force the cylinder 30 downwardly against the tension of the spring 33, thereby drawing the horizontal arm 39 downwardly upon the fulcrum-points 38 and 40 and drawing down the arm 41, which is attached to the source of power and which is adapted to shut off the said power and stop the pump when drawn down in this manner. The rod 41 may be connected to a windmill for the purpose of drawing out the means by which the mill is set into motion, or it may be connected to a valve that admits steam into an engine, or it may be connected to the gate of a water-wheel, so as to shut off and entirely stop the power that operates the pump, or it may be made to shift a friction-clutch or a belt for this purpose. The farther away the reservoir 14 is removed from the pump and the smaller the pipe 13 the greater will be the friction of the water flowing through the said pipe to the said reservoir, and for this reason the tension of the spring 33 or a coacting part should be made adjustable. As it would not always be convenient for the purchaser to adjust the spring, I provide the adjustable lever, which I have just described, and by locating the pivotal point 47 at various points in the slot 46 I am enabled to operate the arm 39 the proper distance for the purpose of shutting off the source that supplies the power by the varying pressure required within the cylinder 30 in accordance with the resistance or head. Suppose I place the pivotal point 47 as near to the pivot 40 as possible.

The vertical rod 37 will move forward toward the rod 36 upon the axis 38, and the vertical rod 41 will thereby be moved a given distance with less movement of the cylinder 30; but it will require a greater pressure within the cylinder 30 to accomplish the movement. If now the pivotal point 47 be placed as near the hole 42 as possible, the vertical rod 37 will be moved in a reverse direction—that is to say, toward the air-chamber 7—and to move the vertical rod 41 a given distance the spring 33 will necessarily be compressed to a greater extent, and the cylinder 30 will be correspondingly moved; but it will take less pressure to move it than in the first example.

For the guidance of the purchaser the points along the slot 46 may be graduated and indicated as equivalent to a given weight hung upon the lever 39 for that purpose, but in lieu of the weight. The position of the rod 41 may be changed to any of the holes 42, 44, and 45 and accomplish the same result. These holes may also be indicated as being equivalent to a given weight, or a given head in the reservoir, or to the distance said reservoir is located from the pump. It will be noted that as the distance between the points 40 and 47 is varied the point 43 may be moved in or out to keep the distance between points 43 and 47 constant, whereby the links 41 and 34 may be maintained in position for most efficient application of power. The pressure required in the cylinder 30 and the tension of the spring 33 are dependent upon the friction in the pipe 13 and also upon the head or the height of the reservoir 14 above the said cylinder.

In Figs. 5, 6, 7, and 8 I have shown slight modifications of the cylinder, piston, and spring which may be substituted for that shown in Fig. 1. The advantage of the spring inside of the cylinder is of considerable value, as the spring is thereby protected from inter-

ference and it is not so liable to derangement and disorder as when a weight is used instead of a spring, and by this means an adjustment may be made to compensate for the friction in the discharge-pipe leading to the reservoir and that due to the head of the reservoir of the pressure as a result of the said head in a manner much more convenient and satisfactory than when weights are used for this purpose, as in devices that have been heretofore constructed.

In order that a greater or less pressure may be required to operate the controlling-cylinder to balance the head and friction of the reservoir and connecting-pipe, I may increase the size and strength of the spring and decrease the size of the cylinder, or vice versa. With the modification shown in Fig. 6 this may be more conveniently performed.

Having described my invention, what I claim as new and useful, and desire to secure by Letters Patent of the United States, is—

The combination with a pump, of a controlling-cylinder, a rod 36 connected to the moving element thereof, a horizontal lever-arm 39 having a slot 46 therein in which said rod 36 is pivoted, and provided with a series of perforations in one end, a pivoted link 37 to which the other end of the said lever-arm 39 is pivoted to afford a movable fulcrum 40 for said lever-arm, and a rod 41 connected to the source of power and adapted to be connected with one of the perforations in the arm 39, substantially as set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

WILLIAM A. KERFOOT.

In presence of—
FORÉE BAIN,
M. F. ALLEN.