

J. HUTCHINGS.  
DIRECT ACTING PUMPING ENGINE.  
APPLICATION FILED OCT. 3, 1908.

934,312.

Patented Sept. 14, 1909.  
2 SHEETS—SHEET 1.

FIG. 1.

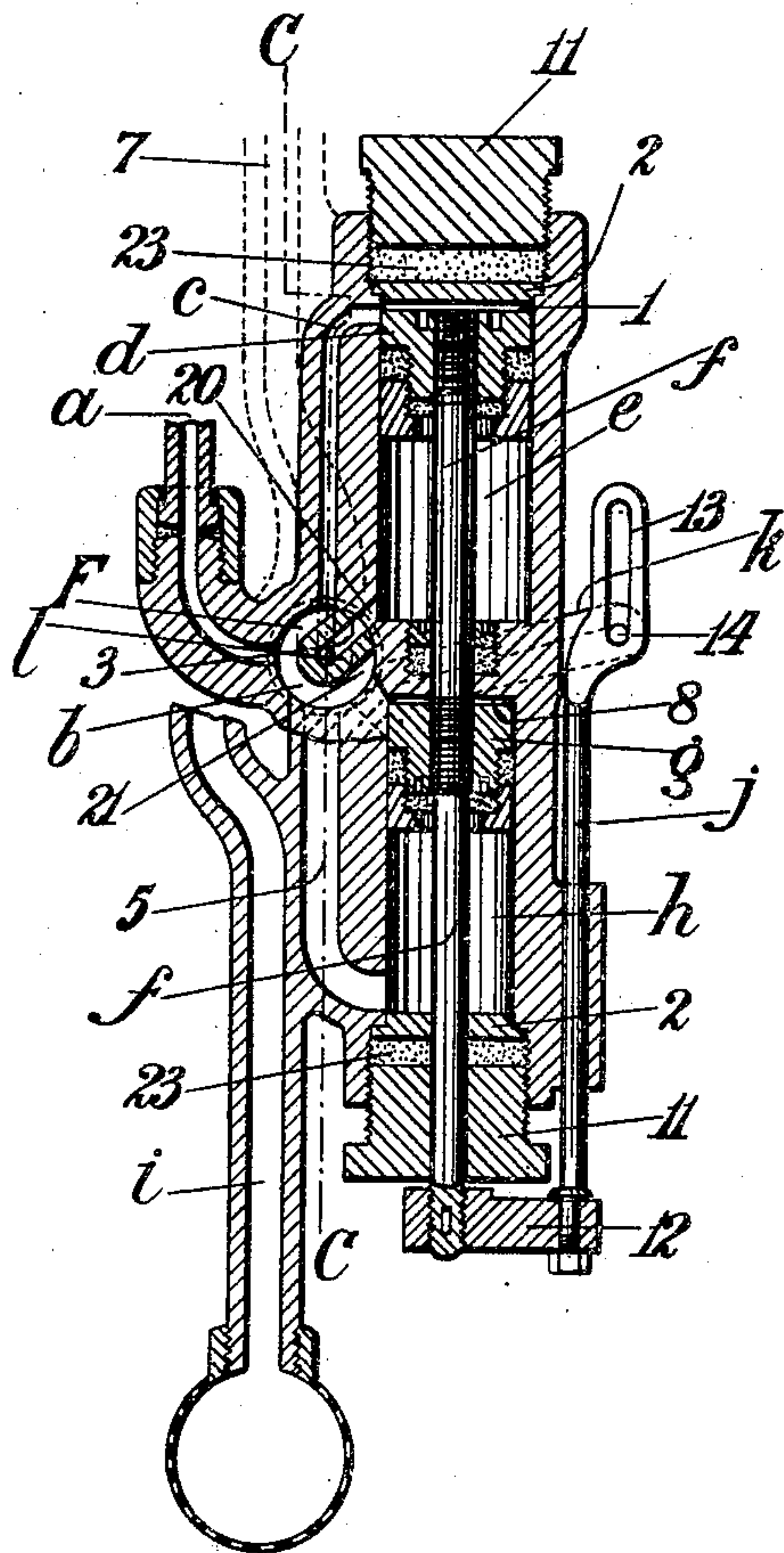
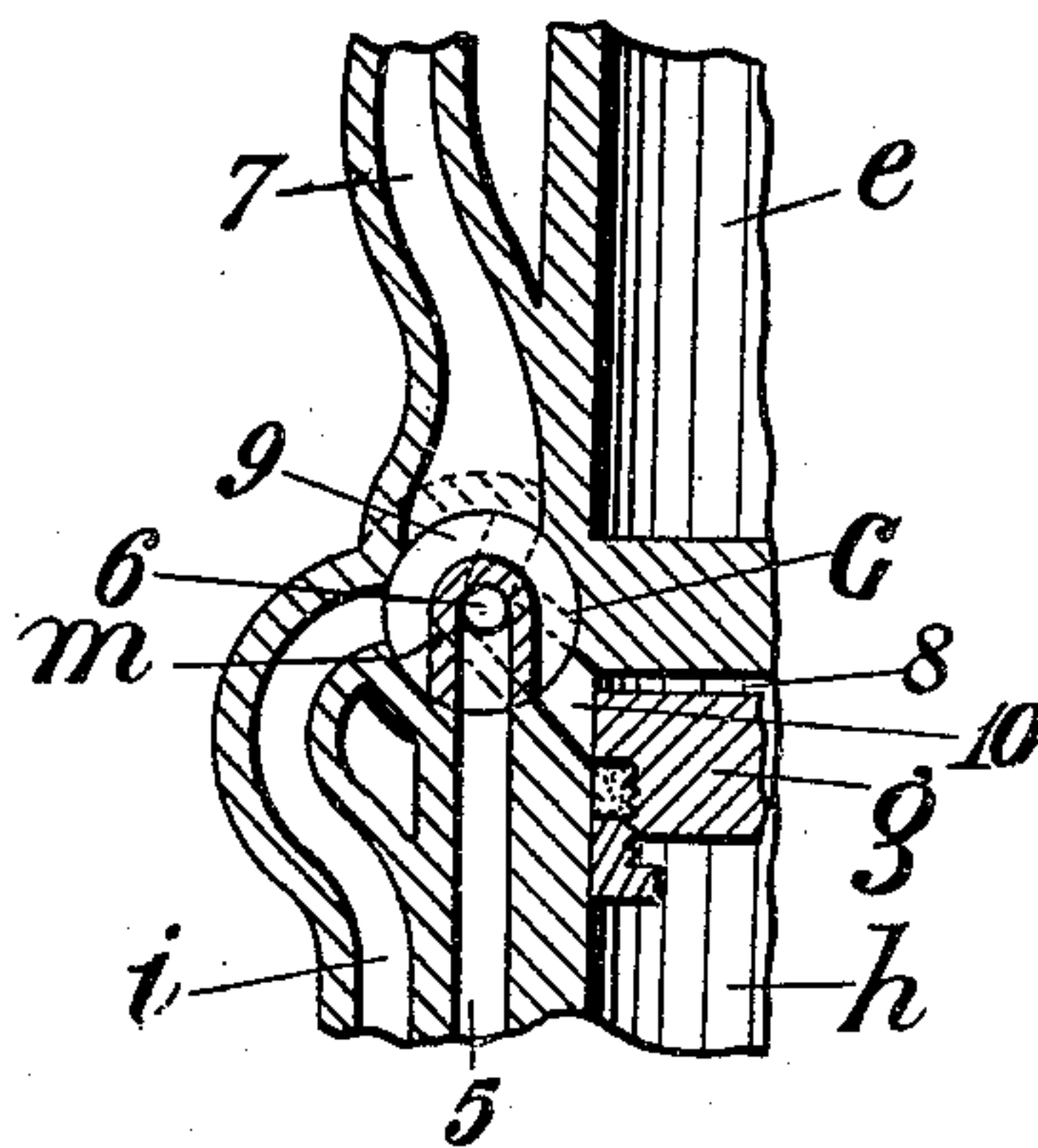


FIG. 2.



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FIG. 3.

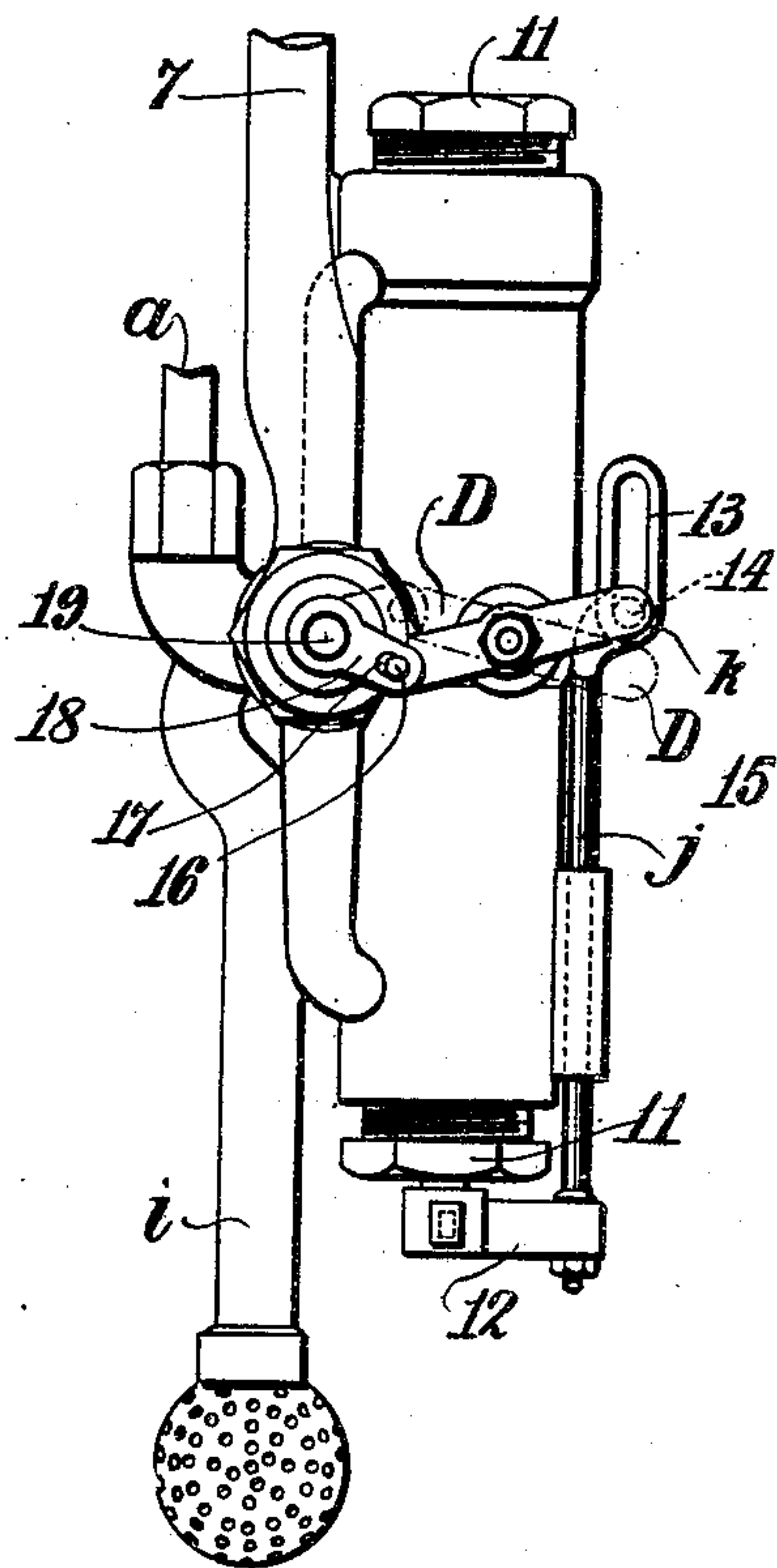
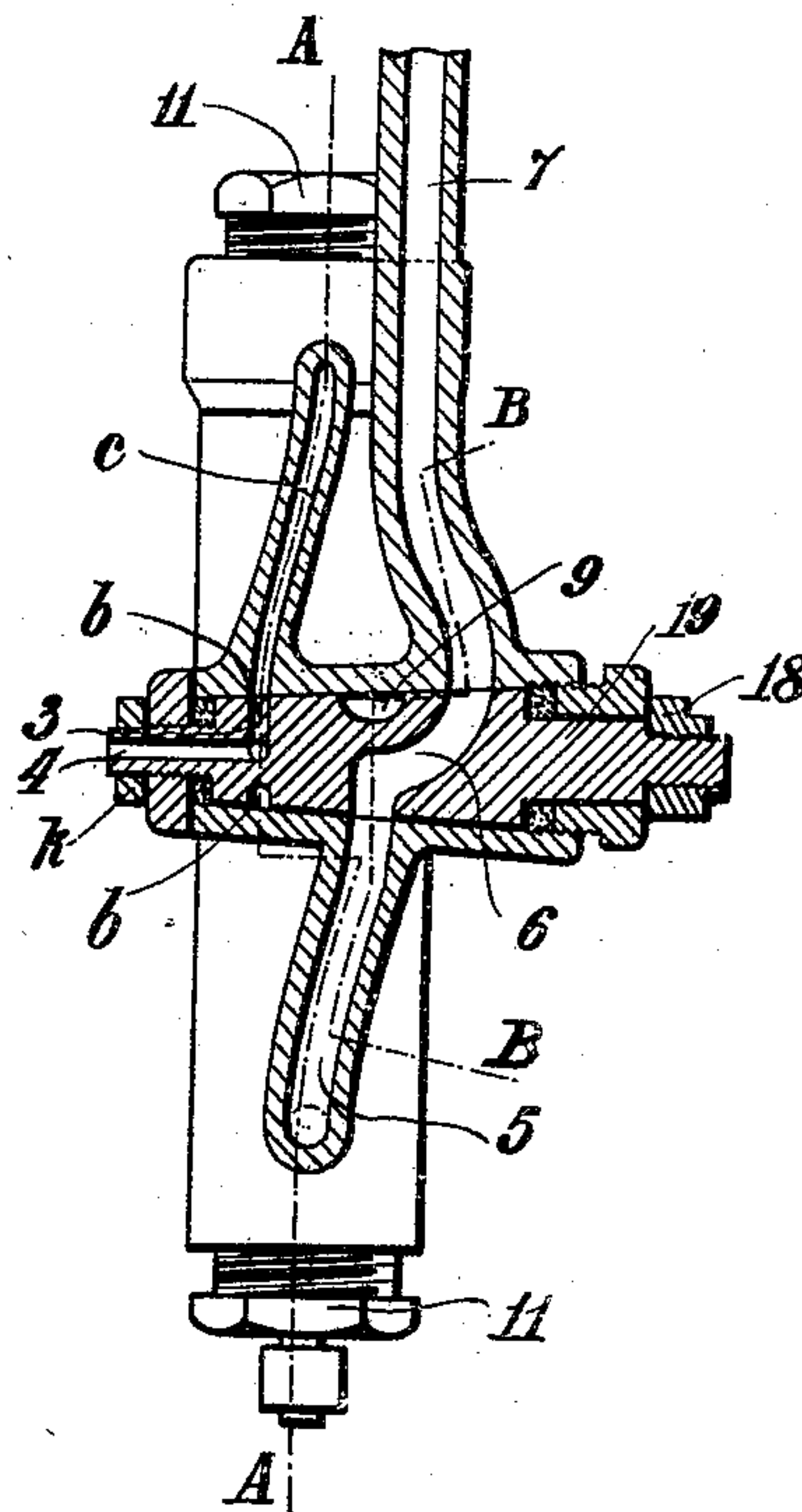


FIG. 4.



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# UNITED STATES PATENT OFFICE.

JOHN HUTCHINGS, OF LONDON, ENGLAND.

DIRECT-ACTING PUMPING-ENGINE.

934,312.

Specification of Letters Patent. Patented Sept. 14, 1909.

Application filed October 3, 1908. Serial No. 456,079.

To all whom it may concern:

Be it known that I, JOHN HUTCHINGS, a subject of the King of Great Britain, residing at Capel House, 62 New Broad street, in the city of London, England, have invented certain new and useful Improvements in and Relating to Direct-Acting Pumping-Engines, of which the following is a specification.

This invention relates to water, oil, or other fluid pumping engines actuated directly by compressed air, steam, or other elastic fluid.

The improved pumping engine is driven by a fluid pressure admitted into a cylinder through a double acting conical plug valve, having cavities and passages cut or formed therein so as to leave a metallic U-shaped wall forming a web or connection between the solid parts of the valve and by means of this U-shaped part both the driving fluid, and in turn the fluid to be driven are simultaneously directed into their respective channels, cylinders and pipes for movement or propulsion forward as desired. This improved apparatus constitutes a pumping engine of great power, compactness of design and high efficiency readily applied with the minimum of fixing parts merely requiring to be lowered into water, petroleum or other liquid to be drawn or forced and to be suspended at the ends of its air pipe *a* and delivery pipe 7 both of which may be strengthened and supported by a common inclosing protecting covering pipe or casing.

The pumping engine is adapted to be lowered into old or disused mines, shafts, stopes, drives or in new shafts, or used to pump flooded mines dry. It is also adapted to pump against a head of a few feet or against a head of many feet, or to be used in situations in warships or other vessels where leakage occurs and where pumps cannot readily be fixed, or in most awkward situations where pumping engines have hitherto not been available.

Referring to the drawings, Figure 1 is a vertical longitudinal section, on the line A, A of Fig. 4, of the double acting driving engine and directly driven pumping mechanism. Fig. 2 is a vertical section through the intake and discharge valve cavities and passages on line B, B of Fig. 4. Fig. 3 is a side elevation of the combined pump and engine showing the levers, pins and connecting rods which actuate the double six-way

valve. Fig. 4 is a vertical section on the line C, C, of Fig. 1, taken at right angles to the section in that figure and looking to the right regarding it.

The working of the apparatus is attained by means of motive air, gas or steam under pressure being led through pipe *a* (Fig. 1) to the U-shaped passage *b* which directs it into the channel *c* and thence to the space 1 formed between the end plate 2 of the engine cylinder and the top surface of the piston *d* which forces the said piston downward while the air in the cylinder *e* below the piston *d* is during this movement exhausted into the atmosphere through the channels 3 and 4, Figs. 1 and 4. During this movement the rod *f* being firmly fixed to the pump piston *g* is forced downward and by this movement any fluid or water in the pump cylinder *h* is forced out into the channel 5 thence (see Figs. 2 and 4) into the valve delivery channel 6 and thence into the delivery pipe 7, meanwhile fluid or water is being drawn into the space 8 formed between the top of the pump cylinder *h* and the top of the piston *g* through suction intake pipe *i* thence through U-shaped valve channel 9 and inlet port 10 into the said space above piston *g*. The rod *f* extends through the cylinder *h* and packed gland 11 connected to the arm 12 which arm in turn is connected to and controls the loop ended sliding rod *j*.

In the position of the valve parts shown in Figs. 1, 2 and 3 the lower end of the loop 13 has just engaged the pin 14 and thereby moved the lever *k* which is centered on the pin 15 from the position indicated by the dotted lines D, Fig. 3 to the position shown in full lines in this figure and by reason of the pin 16 engaging the slot 17 the slot ended valve lever 18 actuates the plug 19 and consequently the valve *l* from the dotted line position F where it registered with the then exhaust channel or port *c* to the position in the solid lines where it is shown to register with the now exhaust port 20 and this movement has also cut off the inlet of motive fluid from entering cylinder *e* from the right side 21 of the U-shaped passage *b* but at the same time opened communication between this passage *b* and passage *c* for the inlet of motive fluid to the space above and to actuate the piston *d*. During this same movement, by reason of both valve passages *l* and *m* being on the same tapered plug or



stem, the valve *m* will have been moved from its dotted line position *G* to the full line position. In the dotted position this valve opened communication for delivery of water from the cylinder *h* through outlet port 10, passage 6 and delivery pipe 7 and also for inlet of water by way of pipes *i*, 5 into the cylinder *h* below the piston *g*, but in the position of the solid lines as shown in Fig. 2 the valve opening 9 forms a connection between the suction intake pipe *i* and the space 8 of cylinder *h* for water to be drawn into the space 8 above the piston *g*.

The ends of the engine and pump cylinders are removable to allow of ready access to their pistons and cylinders at first perfectly closely fitted by means of the cylinder end plates 2, 2 against which the packing 23, 23 is compressed by the glands to insure perfect air and water tight joints and the whole construction being simple with nothing to get out of order. Thus it will be seen that by the described arrangement of parts and the means for securing coöperation between the air actuated piston *d*, rod *f*, piston *g*, arm 12, rod *j*, pin 14, lever *k*, valve plug 19, and the valve passages and pipes *b*, 3, *c*, 5, *i*, 6, 7, 9 and *a*, a simple, powerful and economical forcing or exhausting pump is attained.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. Direct acting pumping machinery comprising a casing, a double-acting driving piston and a double-acting driven piston mounted in the casing, a piston rod connecting said pistons, a rotary plug valve capable of simultaneously controlling the flow of motive and driven fluids respectively, said valve being provided with ports for the admission and exhaust respectively of said motive fluid and also having ports for the passage of fluid to be forced, the casing being provided with passages to communicate with the ports in said valve and serving to con-

duct the motive and driven fluids to and from said pistons, and means operated by said piston whereby said rotary plug valve may be adjusted in accordance with the desired direction of the flow of the respective fluids.

2. Direct acting pumping machinery comprising a casing, double-acting driving and driven pistons mounted in the casing, a piston rod connecting said pistons, a rotary plug valve having a passage extending partially circumferentially thereof, a passage extending partially laterally and partially axially of the valve for the admission and exhaust respectively of motive fluid, said valve also having a partially circumferential passage and a lateral passage for conducting the fluid to be forced, an operating lever attached to said valve, and means actuated by said piston and operatively connected to said lever for adjusting the valve in accordance with the desired direction of flow of the respective fluids.

3. Direct acting pumping machinery comprising a casing, double-acting driving and driven pistons mounted therein, a piston rod connecting said pistons, a rotary plug valve having a partially circumferential passage and also a partially lateral and partially axial passage for the admission and exhaust respectively of motive fluid, said valve also having a partially circumferential passage and a lateral passage for conducting the fluid to be forced, an operating lever attached to said valve, a loop-ended sliding rod attached to and adapted to reciprocate with said piston rod, and a pivoted lever operatively connecting said operating lever and said sliding rod.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN HUTCHINGS.

Witnesses:

ALFRED GEORGE BROOKES,  
FREDERICK RIPPON REYNOLDS.