

No. 627,315.

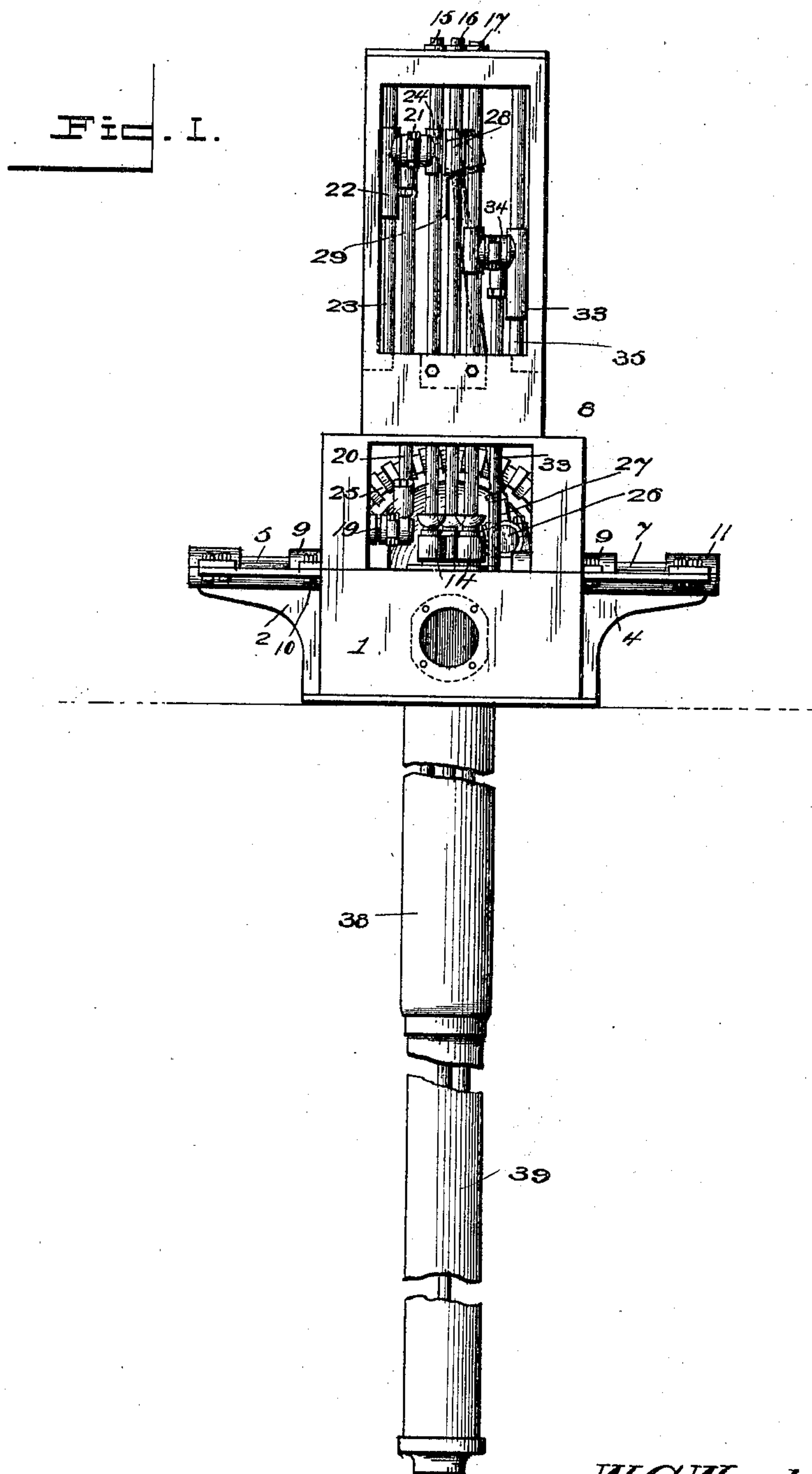
Patented June 20, 1899.

W. C. WOODWARD.  
TRIPLE PISTON DEEP WELL PUMP.

(Application filed Aug. 22, 1898.)

(No Model.)

8 Sheets—Sheet 1.



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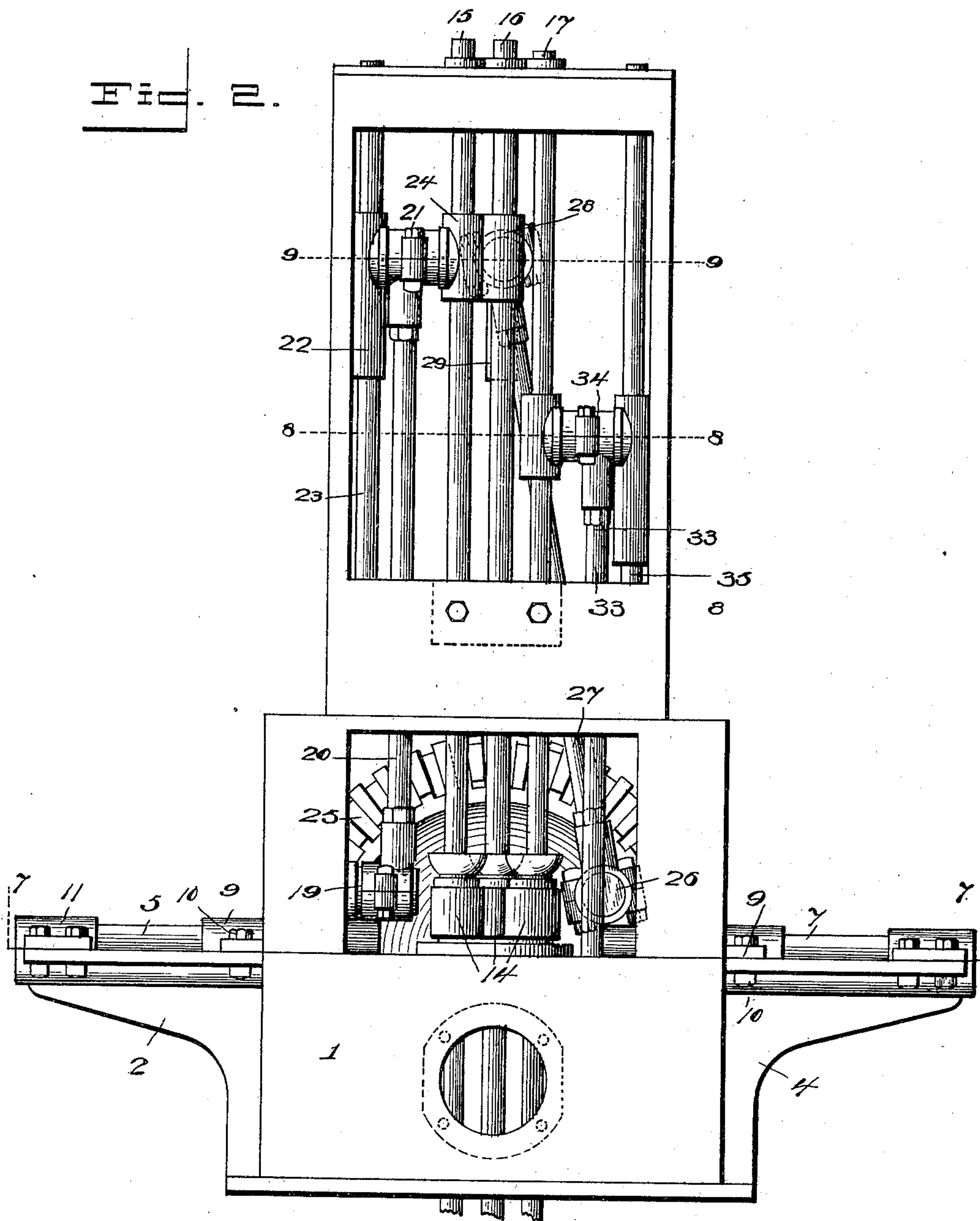
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8 Sheets—Sheet 2.



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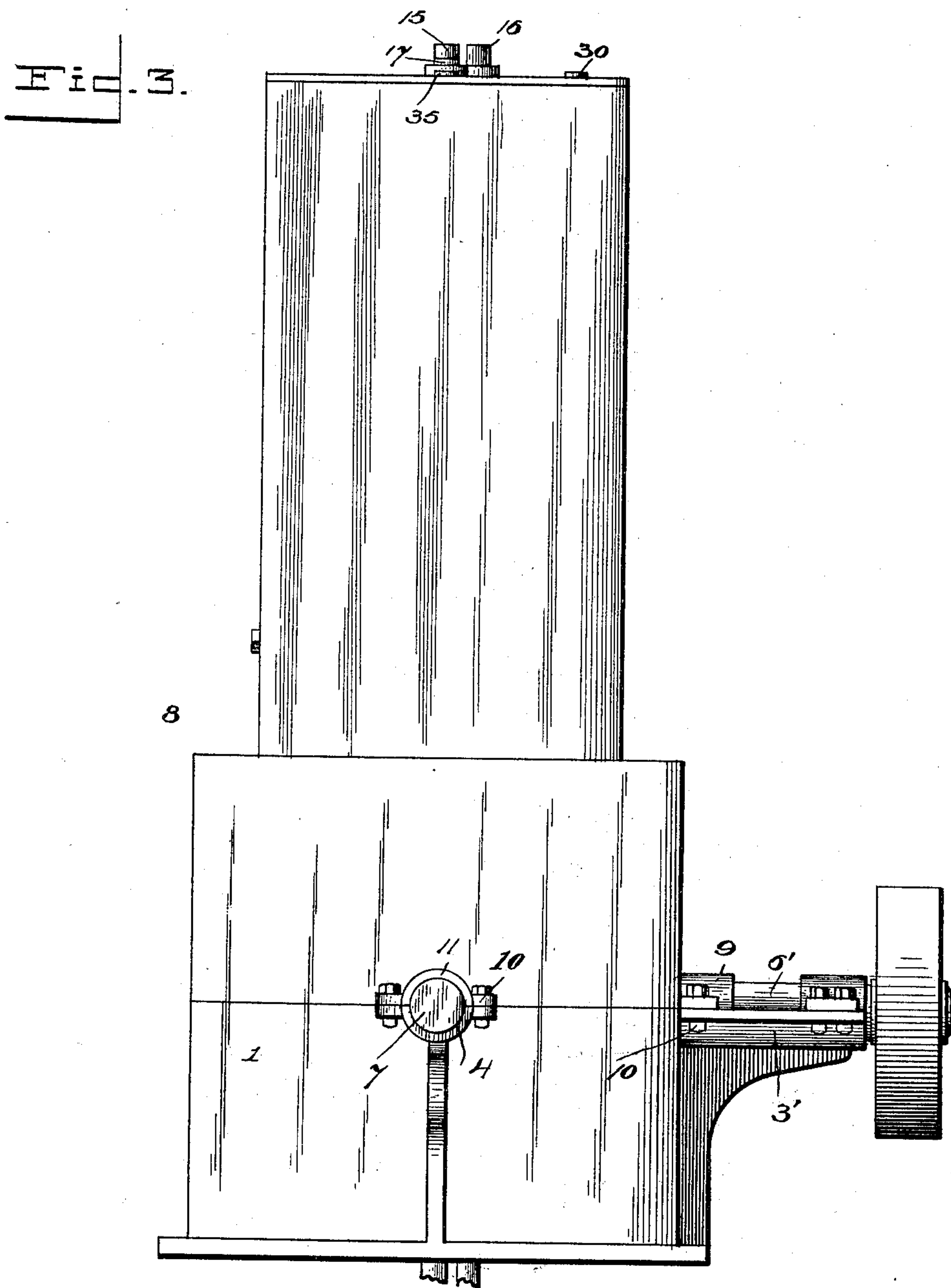
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8 Sheets—Sheet 3.



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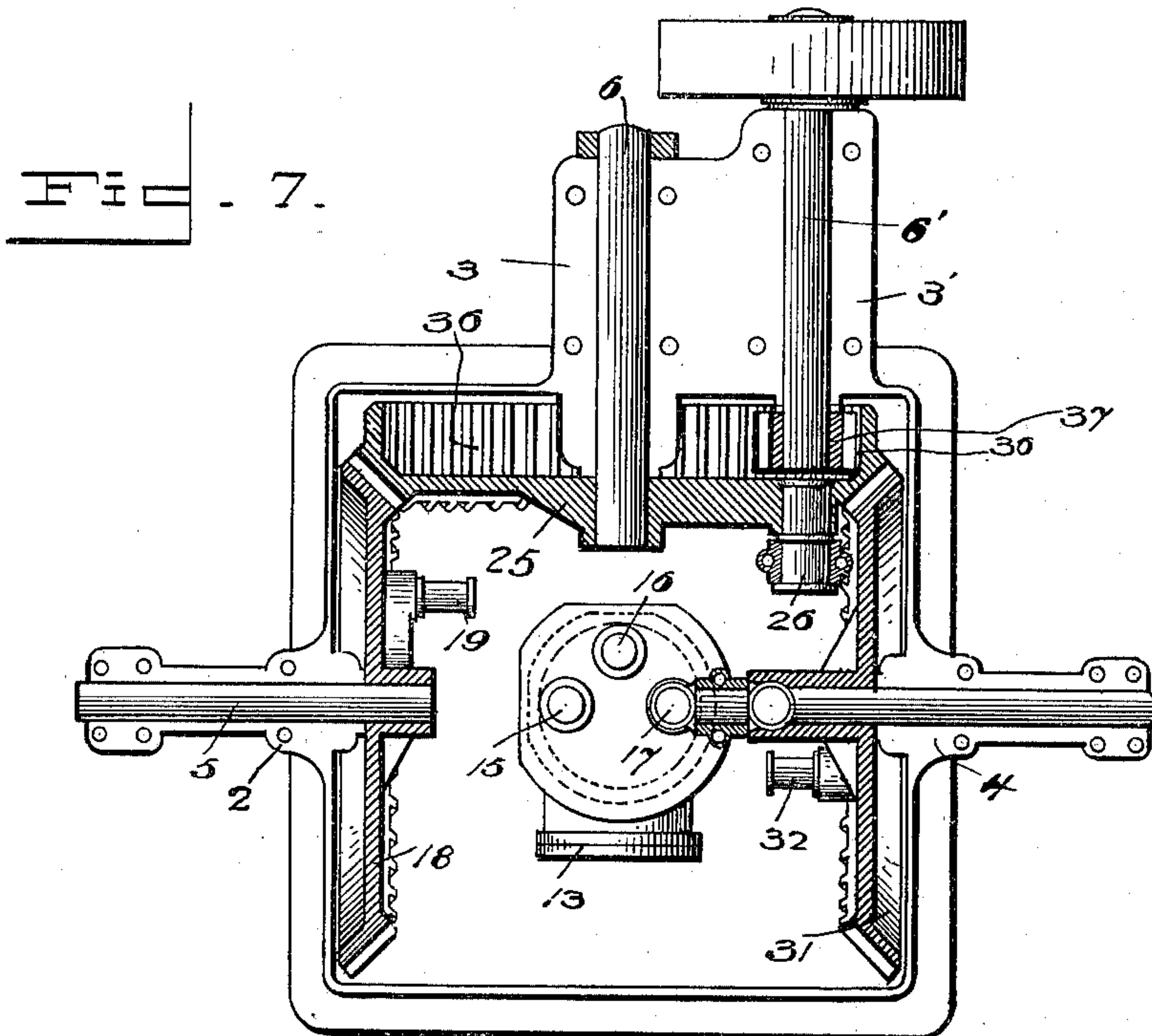
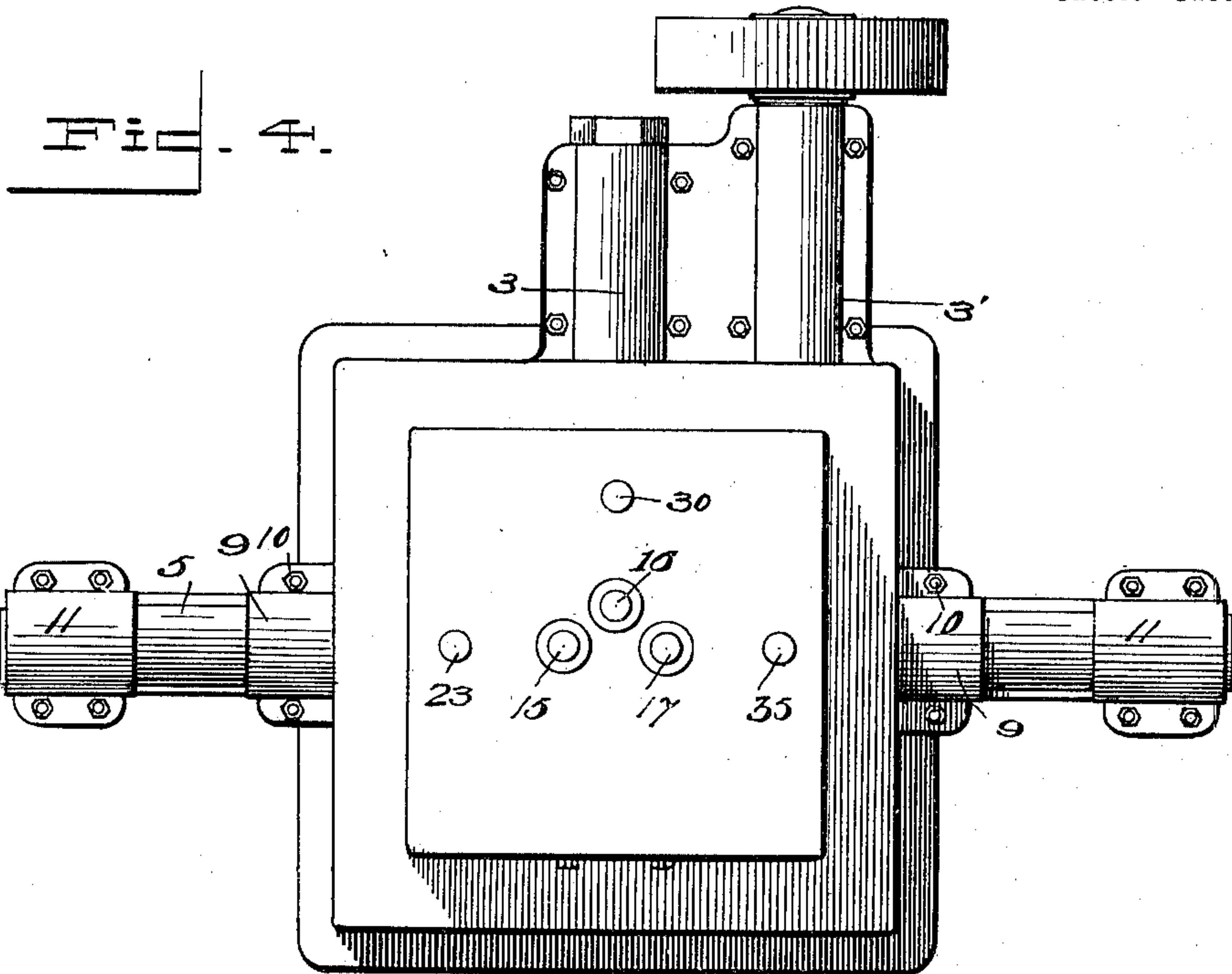
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(No Model.)

8 Sheets—Sheet 4.



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No. 627,315.

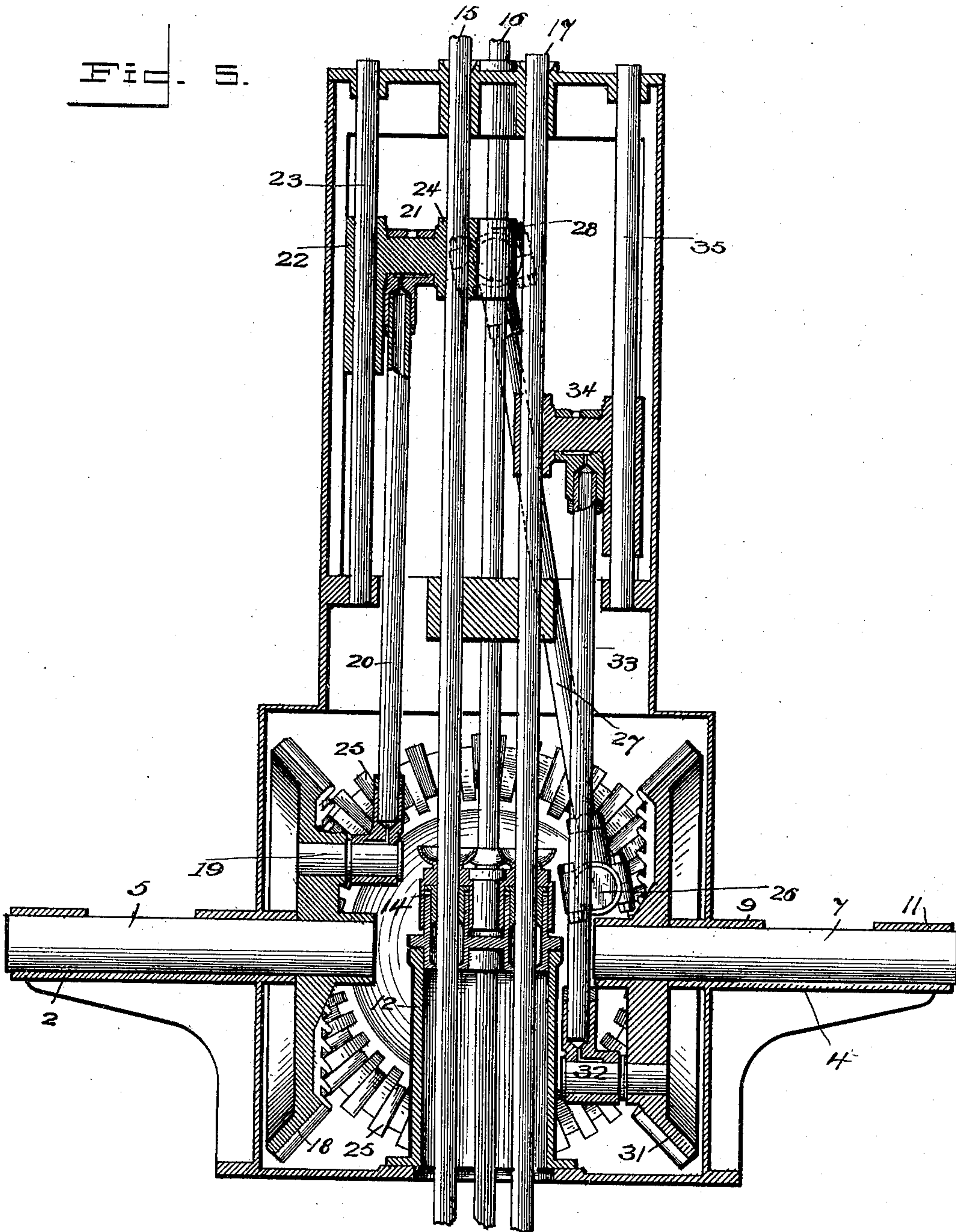
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(Application filed Aug. 22, 1898.)

(No Model.)

8 Sheets—Sheet 5.



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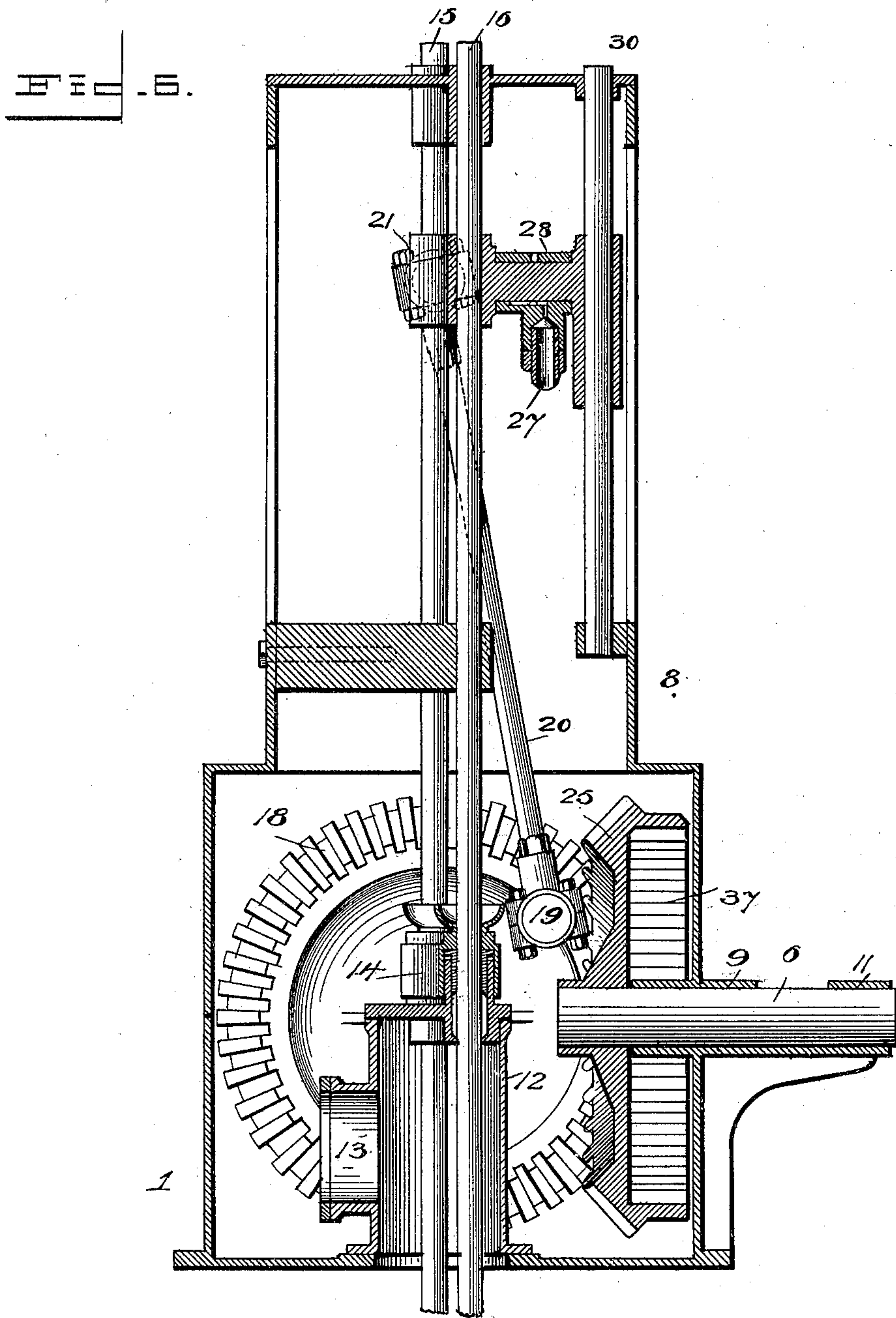
Patented June 20, 1899.

W. C. WOODWARD.  
TRIPLE PISTON DEEP WELL PUMP.

(Application filed Aug. 22, 1898.)

(No Model.)

8 Sheets—Sheet 6.



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No. 627,315.

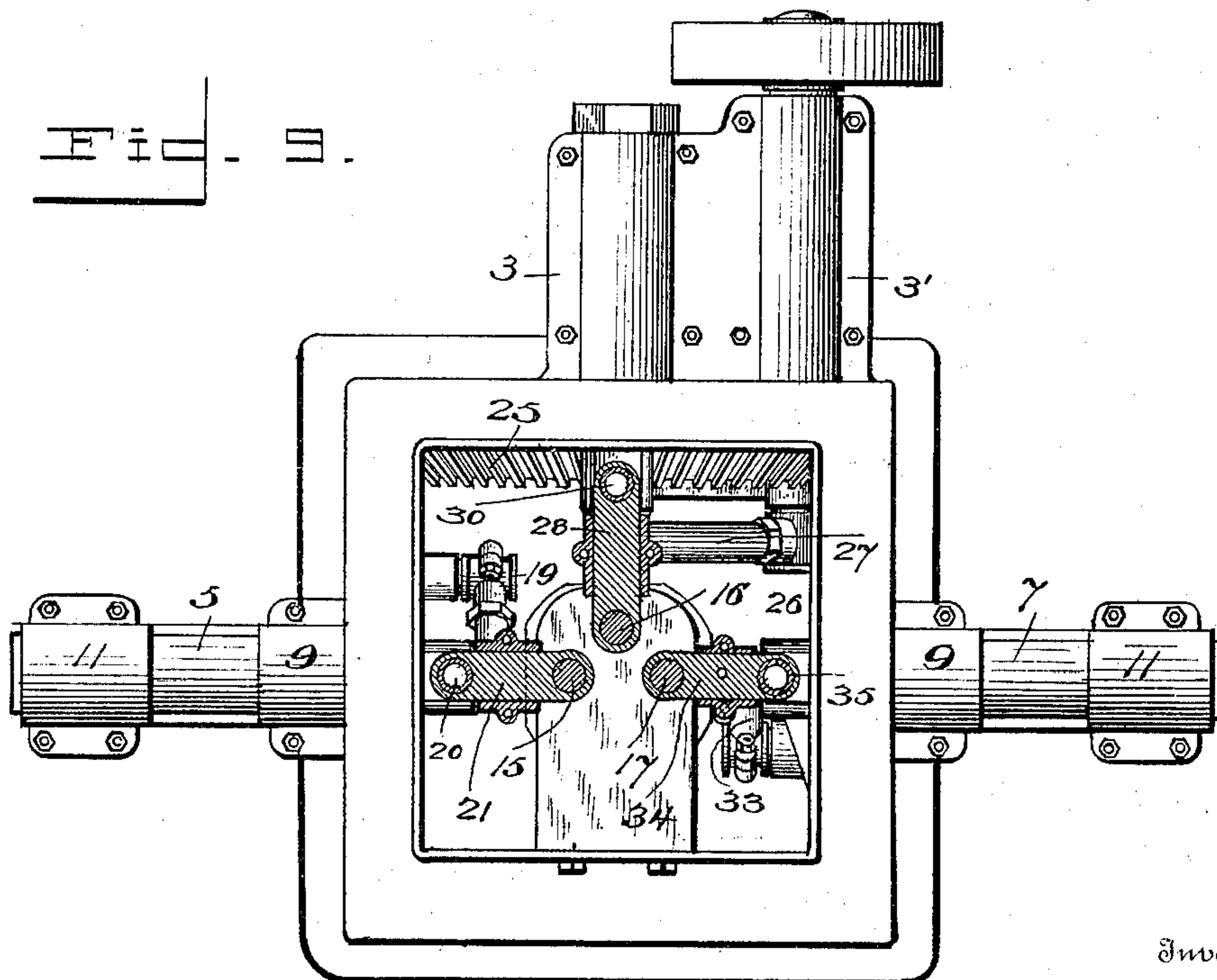
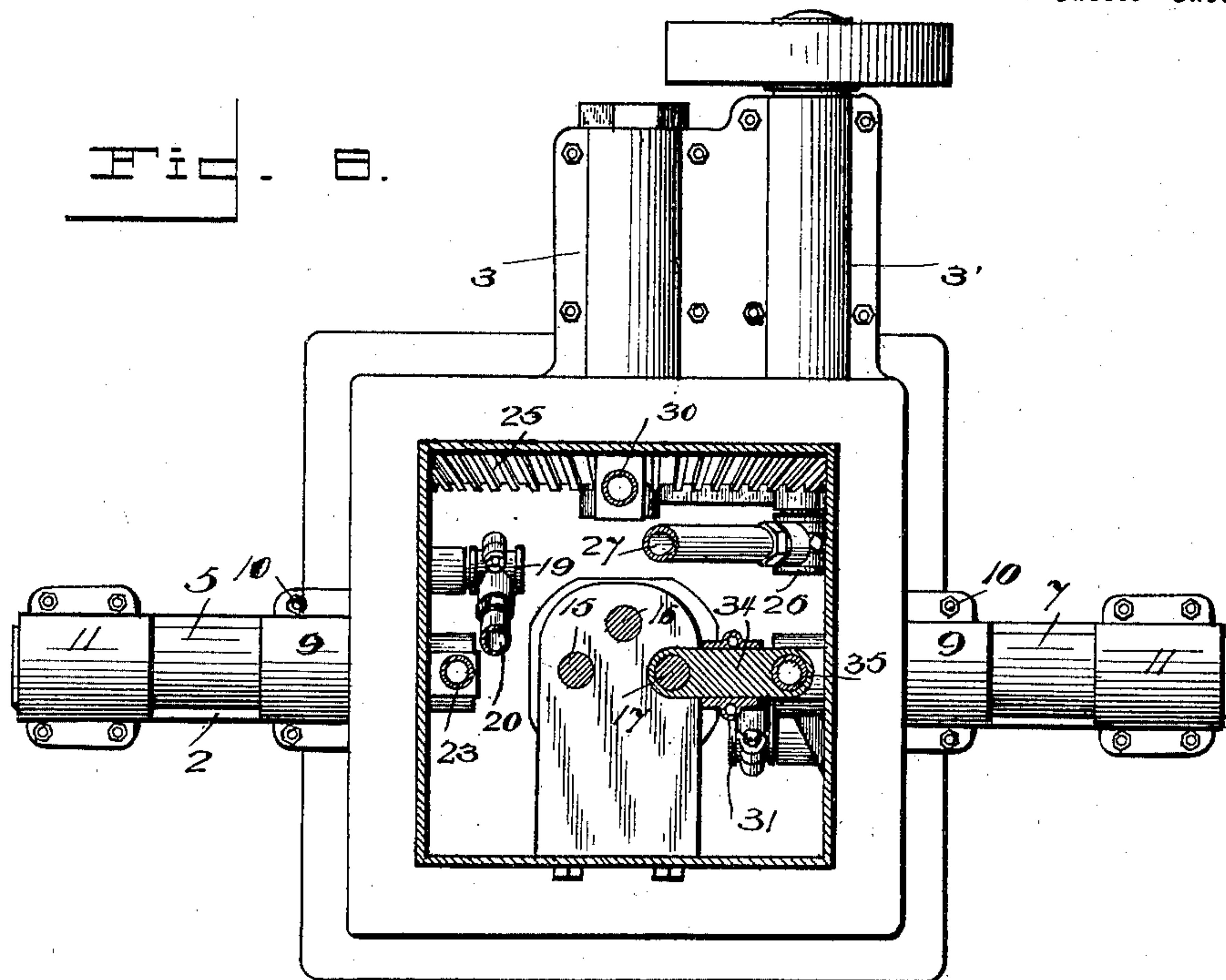
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W. C. WOODWARD.  
TRIPLE PISTON DEEP WELL PUMP.

(Application filed Aug. 22, 1898.)

(No Model.)

8 Sheets—Sheet 7.



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No. 627,315.

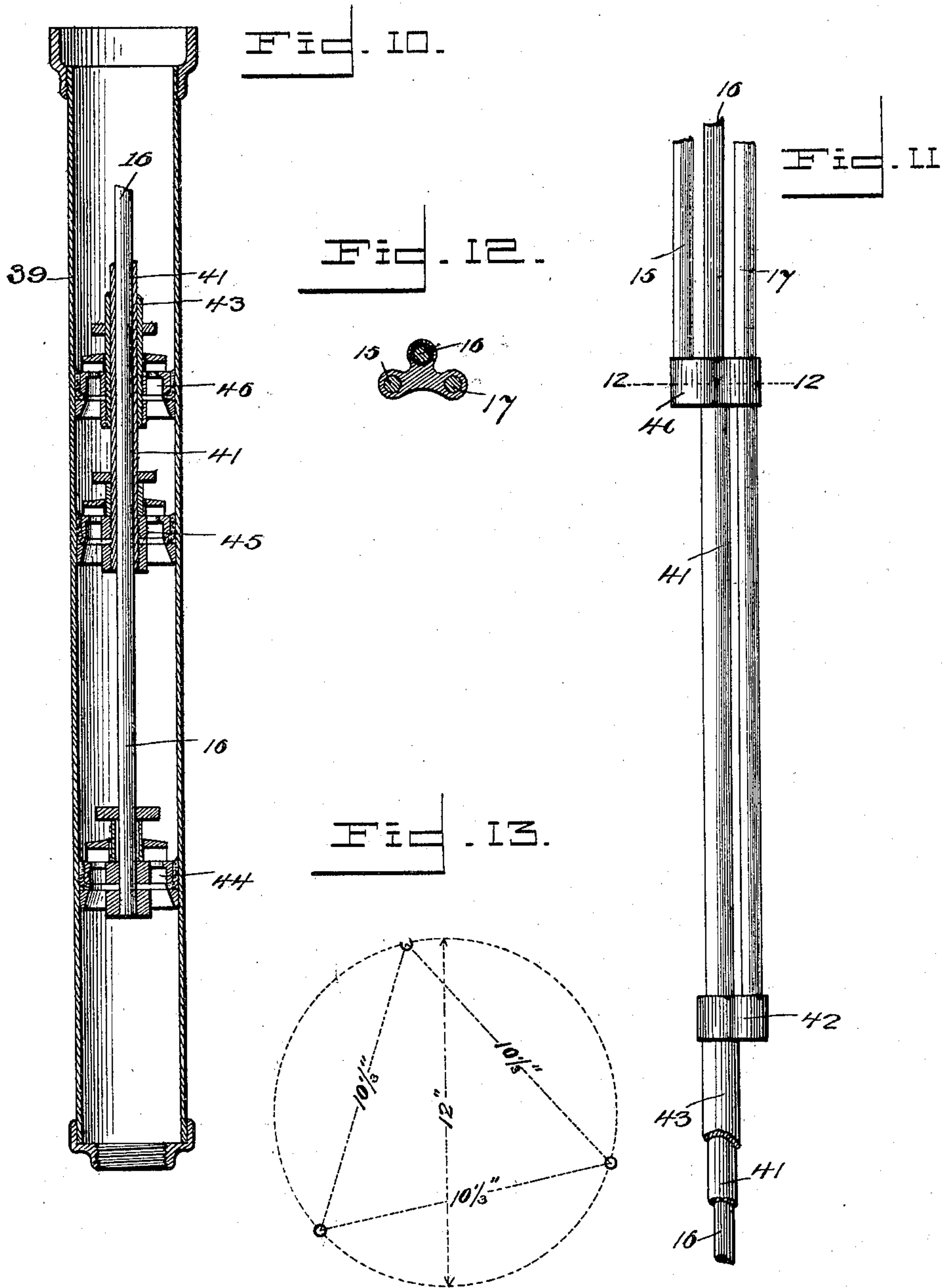
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(Application filed Aug. 22, 1898.)

(No Model.)

8 Sheets—Sheet 8.



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# UNITED STATES PATENT OFFICE.

WILLIAM CALVIN WOODWARD, OF LOS ANGELES, CALIFORNIA.

## TRIPLE-PISTON DEEP-WELL PUMP.

SPECIFICATION forming part of Letters Patent No. 627,315, dated June 20, 1899.

Application filed August 22, 1898. Serial No. 689,261. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM CALVIN WOODWARD, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Triple-Piston Deep-Well Pumps; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved triple-piston pump for deep wells; and the object is to provide a pump of this character whereby by my improved construction the efficiency will be increased by dividing the load in such a manner that with the same expenditure of power a greater water capacity will be attained in a given period of time than has heretofore been the case in pumps employed for this purpose.

To this end the novelty consists in the construction, combination, and arrangement of the device, as will be hereinafter more fully described, and particularly pointed out in the claims.

The accompanying drawings show my invention in the best form now known to me; but many changes in the details might be made within the skill of a good mechanic without departing from the spirit of my invention as set forth in the claims at the end of this specification.

The same reference characters indicate the same parts of the invention.

Figure 1 is a front elevation of my improved pump. Fig. 2 is an enlarged side elevation of the pump-head. Fig. 3 is a similar view of the same, taken at a right angle to that shown in Fig. 2. Fig. 4 is a top plan view of the pump-head. Fig. 5 is an enlarged vertical section of the same. Fig. 6 is a similar view taken at a right angle to that shown in Fig. 5. Fig. 7 is a horizontal section on the line 7 7 of Fig. 2. Fig. 8 is a similar view taken on the line 8 8 of Fig. 2. Fig. 9 is a similar view taken on the line 9 9 of the same figure. Fig. 10 is an enlarged vertical section of the pump barrel or cylinder. Fig. 11 is a similar view of the triple-piston rods. Fig. 12 is a cross-section on the line 12 12 of Fig. 11.

Fig. 13 is a diagrammatic view illustrating the relative positions of the triple pistons.

1 represents the pump-head, which is rectangular in form and is provided on three sides with the horizontal radiating bearing-brackets 2, 3, 3', and 4, in which are journaled the shafts 5, 6, 6', and 7.

8 denotes the hood or cover for the head, and it is formed with the integral bearing-caps 9 9 9, by means of which it is removably secured to the aligned bearing-brackets on the head by the bolts 10 10. Independent bearing-caps 11 11 are also secured to the outer ends of the bearing-arms to afford the proper protection for the radial shafts journaled therein.

12 represents the upper section of the well casing or tube, and it is provided with the lateral outlet or discharge pipe 13 and with the stuffing-boxes 14 14 14, through which the piston-rods 15, 16, and 17 pass.

18 denotes a miter-gear fixed on the inner end of the shaft 5, and its face carries a wrist-pin 19, from which a connecting-rod 20 extends upwardly to a cross-head 21, one end of which is formed with a guide-sleeve 22, which encompasses a vertical guide-rod 23, fixed in the hood 8, while its other end is formed with a collar 24, which encompasses the piston-rod 15, to which it is adjustably secured in any suitable manner, and of course it will be understood that a rotary motion of the gear 18 will impart a vertical reciprocating movement to the piston-rod 15. A similar miter-gear 25 is fixed to the inner end of the shaft 6 and meshes with the gear 18, and it is provided with a wrist-pin 26, from which a connecting-rod 27 extends to a similar cross-head 28, one end of which carries a guide-sleeve 29, encompassing the guide-rod 30, while its opposite end is fixed to the piston-rod 16, as in the first instance. A corresponding miter-gear 31 is fixed to the inner end of the shaft 7 and meshes with the gear 25, and from its wrist-pin 32 a connecting-rod 33 extends to the cross-head 34, which, as in the previous instances, has one end encompassing the guide-rod 35 and its other end secured to the piston-rod 7.

The back face of the miter-gear 25 is formed with an annular internal spur-gear 36, which



meshes with a pinion 37 on the shaft 6', jour-  
naled in the bearing-bracket 3' and by means  
of which the three miter-gears 18, 25, and 31  
are driven to simultaneously reciprocate the  
5 piston-rods 15, 16, and 17. These piston-rods  
extend in the order shown in Fig. 12 through  
the well-tubing 38, holding an approximately  
triangular position with relation to each other,  
but are brought together on a common axis  
10 at the pump-cylinder 39 in a manner to be  
now explained.

The lower end of the piston-rod 15 termi-  
nates in a guide-yoke 40, to which is fixed a  
depending sleeve 41, through which the pis-  
15 ton-rod 16 passes, and also with a parallel  
guide-orifice, through which the piston-rod 17  
extends. The lower end of the piston-rod 17  
terminates in a guide-yoke 42, to which is  
fixed a depending sleeve 43, which encom-  
20 passes the sleeve 41 and the piston-rod 16,  
and to the lower end of the rod 16 the piston  
44 is fixed, while the piston 45 is fixed to the  
end of the sleeve 41, which is a continuation  
of the piston-rod 15, and the piston 46 is fixed  
25 to the end of the sleeve 43, which is a con-  
tinuation of the piston-rod 17. These pistons  
44, 45, and 46 are all similar in construction,  
and each is provided with a suitable valve,  
which lifts as the piston descends and falls  
30 as the piston rises in the manner common to  
this class of pump-pistons.

By referring to the diagram Fig. 13 the  
relative course of travel of the pistons will  
be understood. The circumference of the cir-  
35 cle represents the travel of the wrist pins or  
cranks, which are set at one hundred and  
twenty degrees apart, which would be about  
ten and one-third ( $10\frac{1}{3}$ ) inches from center to  
center on a twelve (12) inch stroke.

40 With a single-piston pump of the same  
stroke the column of water will be raised

twelve (12) inches each revolution, and with  
a double-piston pump the column of water  
will be raised twenty-four (24) inches, and  
which is the present raising limit; but by my 45  
arrangement of the triple pistons one revolu-  
tion will raise the column of water a height  
equivalent to three (3) times the distance be-  
tween the centers of the crank-pins, ( $10\frac{1}{3} \times 3 =$   
31,) which is thirty-one (31) inches, a gain of 50  
seven inches in the lift at each revolution  
over the best effective work of the double-  
piston pump under the same conditions.

Having thus described my invention, what  
I claim as new and useful, and desire to secure 55  
by Letters Patent of the United States, is—

1. In a lifting-pump, the combination with  
a single pump-cylinder, a triple set of valved  
pistons axially mounted within said cylinder,  
of a triple set of intermeshing miter-gears, 60  
means for operating said gears and a series  
of piston and connecting rods independently  
connecting each gear with its respective pis-  
ton, substantially as and for the purpose set  
forth.

2. In a lifting-pump, the combination of a  
single pump-cylinder, a triple set of valved  
pistons axially mounted within said cylinder  
and a corresponding triple set of intermesh-  
ing gear-wheels, independently connected to 70  
their respective pistons, and means for si-  
multaneously rotating said gear-wheels, so as  
to independently reciprocate said pistons, sub-  
stantially as and for the purpose set forth.

In testimony whereof I have hereunto set 75  
my hand in presence of two subscribing wit-  
nesses.

WILLIAM CALVIN WOODWARD.

Witnesses:

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