

H. F. STORY.

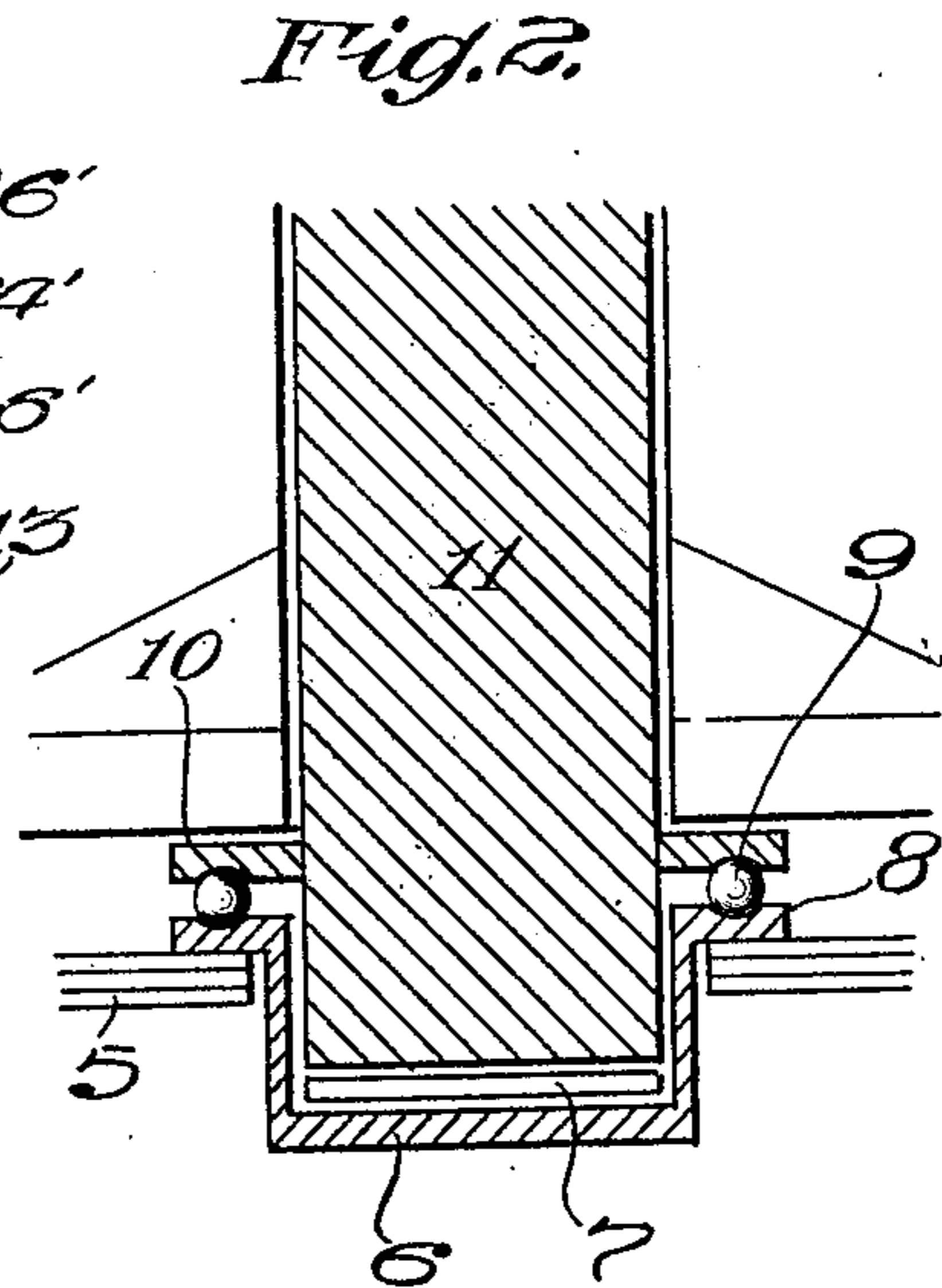
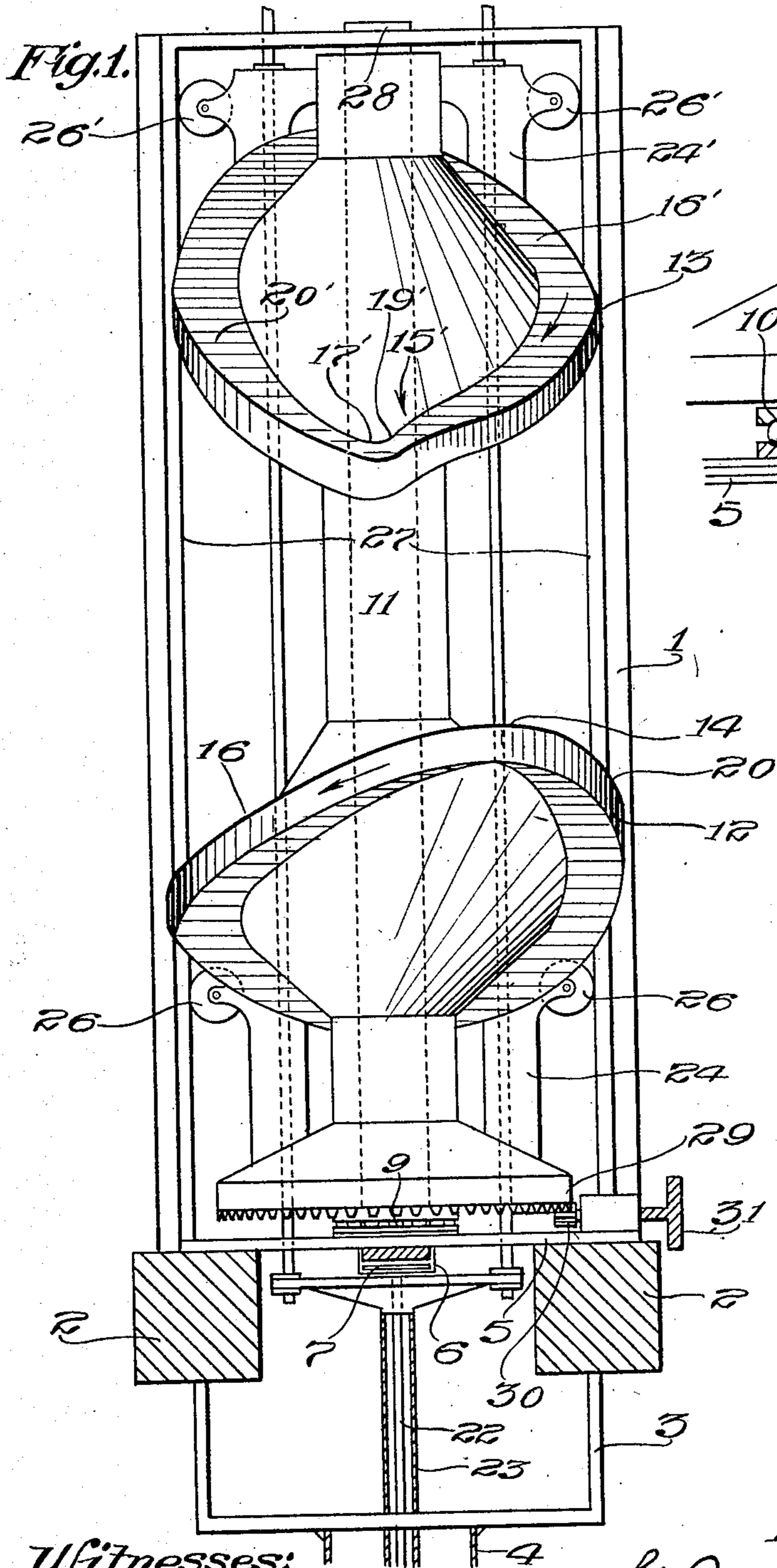
PUMP HEAD.

APPLICATION FILED MAR. 6, 1906.

Patented Feb. 16, 1909.

2 SHEETS—SHEET 1.

912,984.



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2 SHEETS—SHEET 2.

Fig. 3.

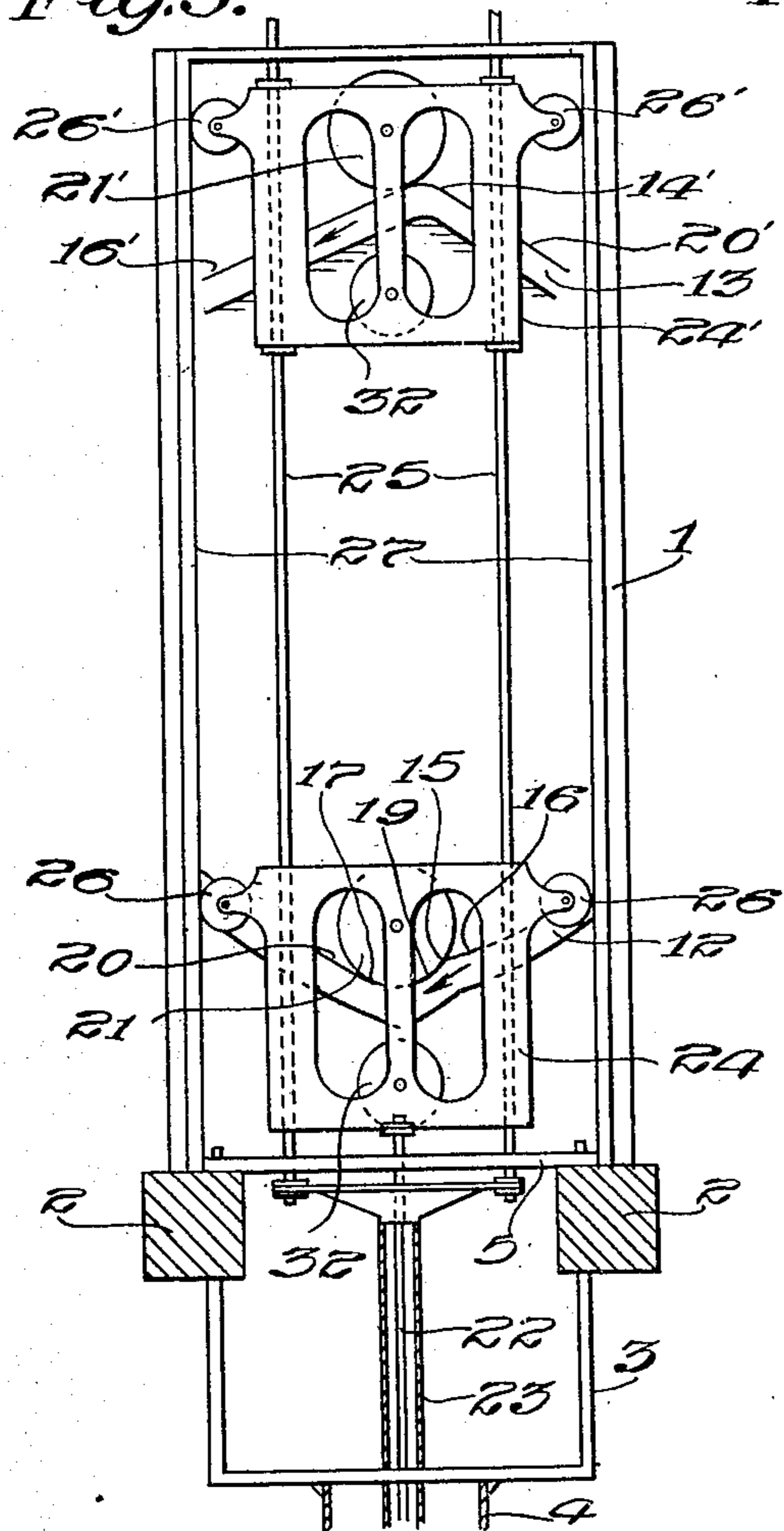


Fig. 4.

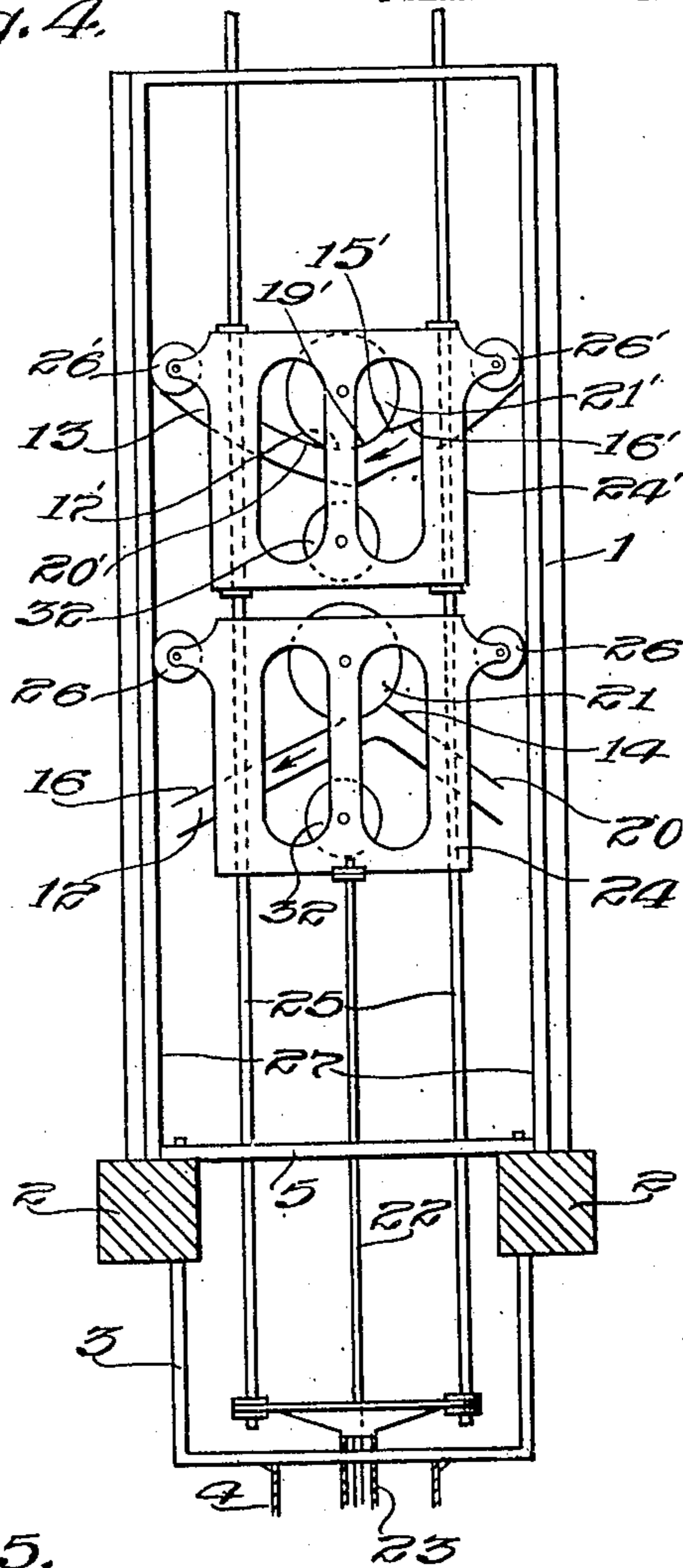
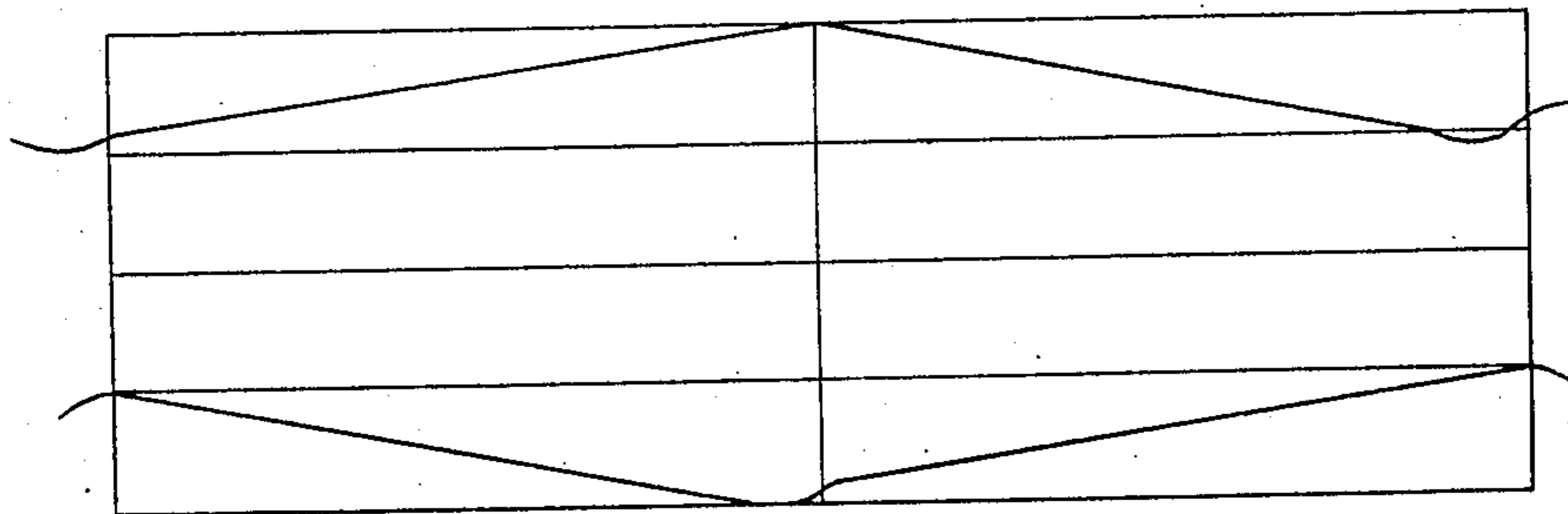


Fig. 5.



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UNITED STATES PATENT OFFICE.

HUDSON F. STORY, OF HIGHLAND, CALIFORNIA.

PUMP-HEAD.

No. 912,984.

Specification of Letters Patent.

Patented Feb. 16, 1909.

Application filed March 6, 1906. Serial No. 304,486.

To all whom it may concern:

Be it known that I, HUDSON F. STORY, a citizen of the United States, residing at Highland, in the county of San Bernardino and State of California, have invented new and useful Improvements in Pump-Heads, of which the following is a specification.

This invention relates to that class of pump heads designed to cause a continuous upward movement of the column of water in the pump-stock, and is adapted to operate two superposed pistons in the pump.

An object of this invention is to provide novel means whereby the lifting movement of each piston may be made effective to take the load from the other piston smoothly and without jar while the load is moving upwardly, and without any pulsation or variation in the force of the stream that issues at the top of the pump.

Another object is to provide a pump-head of this character in which the lifting strains upon the pump-rods and wheels which carry the same, will be in a common vertical line at all times when such strains occur.

An object is to so construct the apparatus that each pump or sucker-rod will have a momentary period of rest at the end of each downward stroke before the up-stroke begins, thus to allow the molecules of the rod to recover themselves or assume a quiescent condition before the reverse strain occurs, thus to avoid crystallization of the rod which is otherwise a frequent cause of breakage.

In order to carry out this invention I provide an annular cam having variable faces thereon for lifting, returning, resting, and picking up the sucker-rod. Two cams of similar construction are arranged reversely on a common shaft to operate on two sucker-rods, as will hereinafter be more fully set forth.

The accompanying drawings illustrate the invention.

Figure 1 is a side elevation of apparatus embodying this invention. Fig. 2 is an axial section of the lower end of the cam-shaft. Fig. 3 is a diagrammatic elevation of the apparatus from the side opposite that shown in Fig. 1. The upper frame that carries one of the sucker-rods is shown approaching the end of its upward stroke, and the lower frame

which carries the other sucker-rod is shown at its quiescent position ready to begin its upward stroke. Fig. 4 is a diagrammatic elevation from the same side as Fig. 3 except that the cam-shaft is rotated half-way around from the position shown in Figs. 1 and 3, the lower rod-carrying frame being shown approaching the end of its upward stroke, and the upper rod-carrying frame being shown in its quiescent position. Fig. 5 is a diagram showing a developed elevation of the two cam surfaces.

1 designates the main frame of the pumping head resting on sills 2 and provided with a downwardly-projecting stirrup 3 to carry the pump casing or stock 4.

5 is the base plate of the frame 1, and 6 a step carried by the base-plate 5 and provided with an oil-cup 7 and a grooved flange 8, in the groove of which bearing-balls 9 are mounted to carry a collar 10 that supports a cam-shaft 11 which is provided with two annular variable cams 12, 13, having a common and constant radius, and having a reverse and variable extension lengthwise of the shaft 11.

14 and 14' designate the apexes of the superior cusps of the lower and upper cams 12 and 13, and the same are located on opposite sides of the axis of the shaft 11 and are bisected by a common plane in which the axis of the shaft lies.

15 and 15' designate inferior cusps of the lower and upper cams respectively, and the same are likewise bisected by said common plane so that the inferior cusp 15 of one cam is vertically beneath the superior cusp 14' of the other cam, and the superior cusp 14 of the first-mentioned cam is vertically beneath the inferior cusp 15' of the upper cam. Each of the cams is provided with a lifting face extending from the inferior cusp to the superior cusp; that of the lower cam is marked 16, and that of the upper cam, 16'.

17 designates a rest face on the cam 12, and 17' a corresponding rest face on the cam 13.

20 and 20' designate the return faces of the cams between the superior cusps 14 and 14' of the cams respectively, and the resting faces 17 and 17' thereof.

19 designates the accelerating or overtak-

ing face of the cam 12 located between the resting face 17 and the inferior cusp 15.

19' designates a like face on the cam 13. The resting faces 17 and 17' lie on the opposite sides of the axis of the shaft 11 and are bisected by a plane in which said axis lies.

20 designates the returning face of the cam 12 extending from the superior cusp 14 of said cam to the resting face 17 thereof. 20' designates the returning face of the cam 13 likewise arranged between the superior cusp 14' and the resting face 17' of the cam 13.

The angles of the lifting faces 16 and 16' are equal to each other, and said faces respectively extend throughout 180° of the circle, while the other 180° of the circle covered by said cam are divided between the descending face 20, the resting face 17, and the overtaking face 19 of the cam. The same construction prevails in the cam 13.

21 designates a roller for carrying one of the sucker-rods 22, and 21' designates a roller for carrying the other sucker-rod 23.

24 and 24' designate the sucker-rod frames. The roller 21 is journaled in the frame at 24, and the sucker-rod 22 is fixed to the frame vertically beneath the center of the roller 21 and likewise beneath the midline of the track or face 16 of the cam upon which the roller 21 lies.

24' is the sucker-rod frame for the upper roller 21' and the same is connected with the sucker-rod 23 by suspending rods 25 in the plane of which the axes of the sucker-rods 22, 23, lie. The arrangement of the roller 21' corresponds to that of roller 21.

The sucker rod frames 24, 24' are provided with antifriction rollers 26, 26' that run in vertical ways 27 formed by the sides of the pump head frame 1. The upper end of the shaft 11 is journaled at 28 in the frame 1, and power may be applied through any suitable means to rotate the shaft 11. Such means are indicated by the wheel 29, pinion 30, and the pulley 31. The angles of the accelerating or overtaking faces 19 and the returning faces 20 are both sharper or steeper than that of the lifting face 16; and the faces 17, 19 and 20 occupy one-half of the circle of the cam while the lifting face 16 occupies the other half, so that at each revolution of the cam the bearing roller will be carried for half of the time by the lifting face 16 by which it will be delivered to the return face 20, by which it will be returned to the resting face 17 from which it is carried by the overtaking face 19 and delivered to the lifting face 16.

The load is only carried by the roller while said roller is on the lifting face 16; the purpose of the pick-up or overtaking face 19 being simply to move the piston quickly enough to cause the stopper or valve to be seated by the sudden upward movement of the valve seat. That is to say, in practical operation the flap or stopper of each piston

is, on the downward movement of the piston displaced from its seat by the liquid, and the pick-up face 19 is designed to give the valve-seat of one piston a sudden upward movement, while the other piston is lifting a load, and by such sudden upward movement to cause the valve-seat to close against or move into contact with the valve flap or stopper which is carried by the liquid in the pump, and to accomplish this at the moment the roller for such piston has reached the lifting face 16 or 16', and before the roller for the other piston has begun its descent on the returning face 20 or 20', as the case may be. In this way each sucker-rod has a cycle consisting in first, the lifting movement; second, the descending movement; third, a quiescent or resting condition; and fourth, a rapid pick-up movement for the purpose of overtaking the valve flap or other stopper.

The oil-cup 7 will be sufficiently filled with oil to constantly fill the groove in which the antifriction balls 9 roll, and the force of the load is sustained thereby and by the bearing at 28. The bearing at 28 prevents careening of the cam-shaft under the force of the load.

32 designates rollers to be engaged by the under face of the annular cams to positively return the sucker-rod in case of any stoppage thereof on the down-stroke.

The shaft 11 is supported in true vertical position by the ball bearings at the base, and the cams lift directly upon the rollers that carry the frames 24 and 24', and said rollers are arranged in the vertical plane in which the sucker-rods extend, so that the lift exerted is in vertical lines without any tendency to deflect therefrom at any period of the stroke.

I claim:

1. A pump-head comprising two annular cams of similar construction arranged reversely on a common shaft to rotate together, and two sucker-rods operable by said cams respectively, each of said cams having variable faces thereon for lifting, returning, resting and picking up the sucker-rod operable thereby.

2. A combination with two sucker-rods, of a shaft provided with two cams, each of said cams being provided with a superior cusp and an inferior cusp, the superior cusp of one cam being diametrically opposite the superior cusp of the other cam, and the inferior cusp of one cam being diametrically opposite the inferior cusp of the other cam; each cam being provided for 180° on one side of the shaft with a lifting face extending aslant from the inferior cusp to the superior cusp and provided on the other side of the shaft with a returning face, a resting face and an overtaking face occupying the other side of the cam, and means for rotating the shaft and its cams together.

3. A pump-head comprising two annular

cams of similar construction arranged reversely on a common shaft to rotate together, and two sucker-rods operable by said cams respectively, each of said cams having variable faces thereon for lifting, returning and overtaking the sucker-rod operable thereby, the overtaking face being adapted to move

the sucker-rod more rapidly than the lifting face, and the returning face being less than 180° in extent.

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