

C. A. ARNSBERGER.
PUMP.

APPLICATION FILED DEC. 14, 1904.

2 SHEETS—SHEET 1.

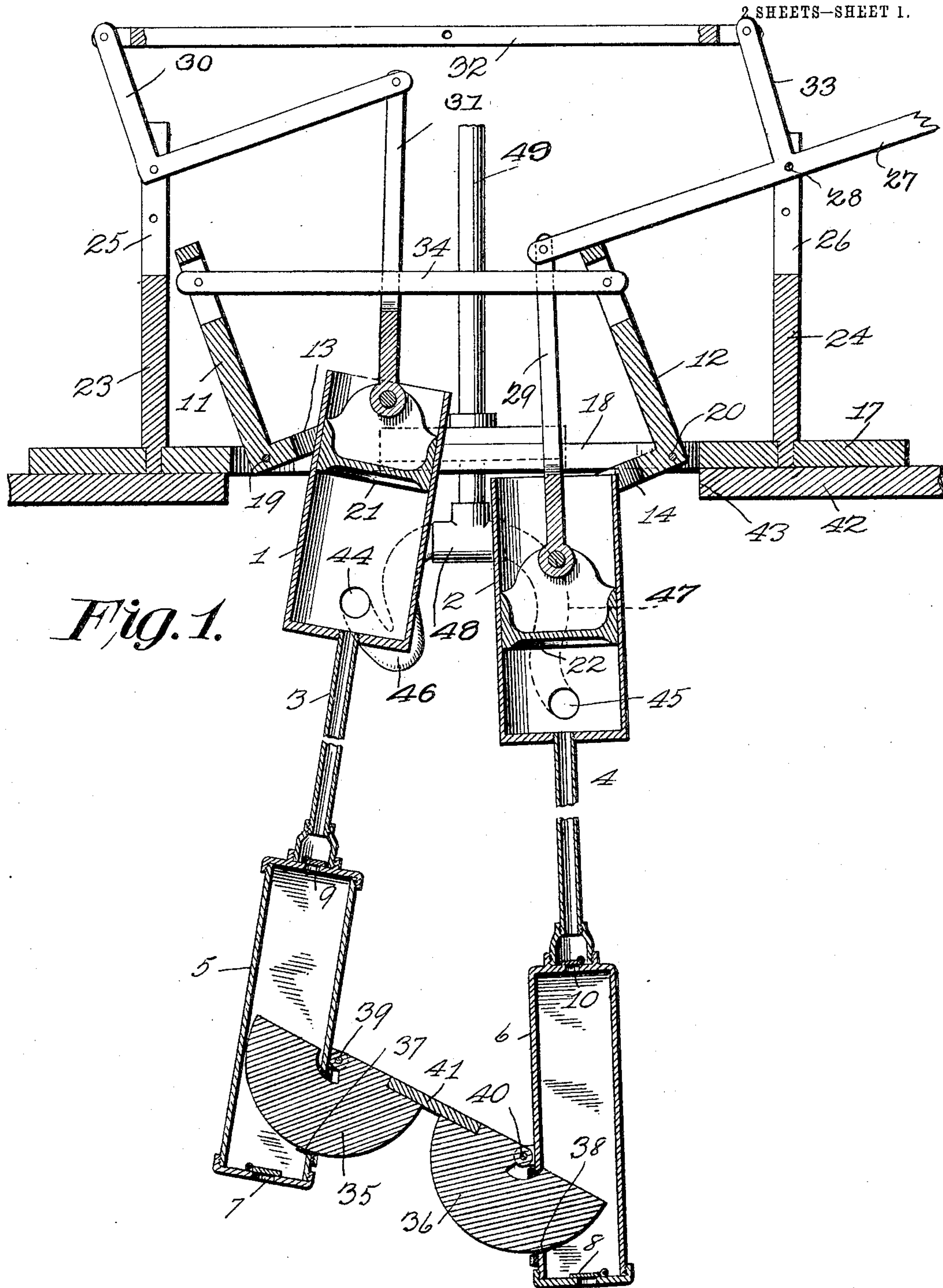


Fig. 1.

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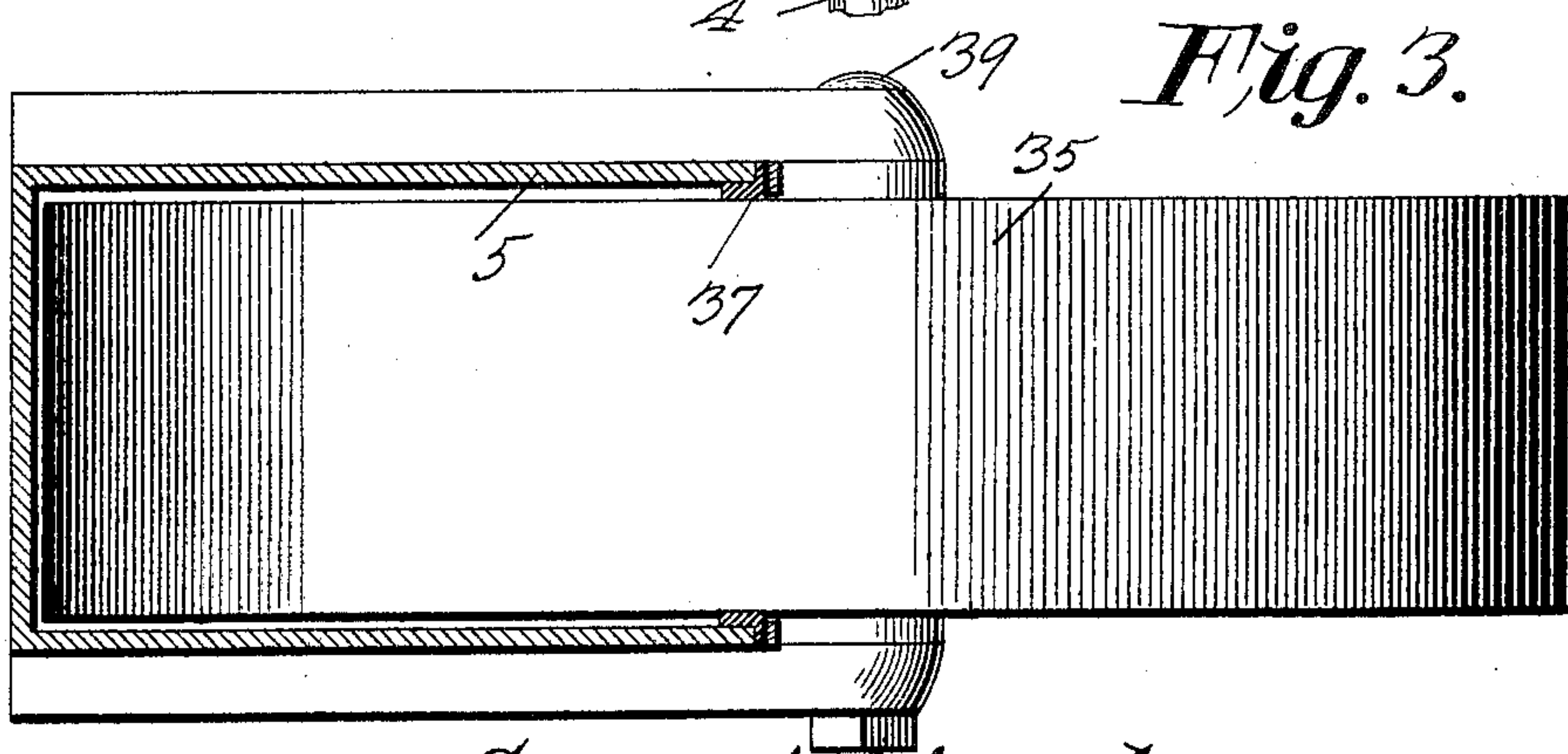
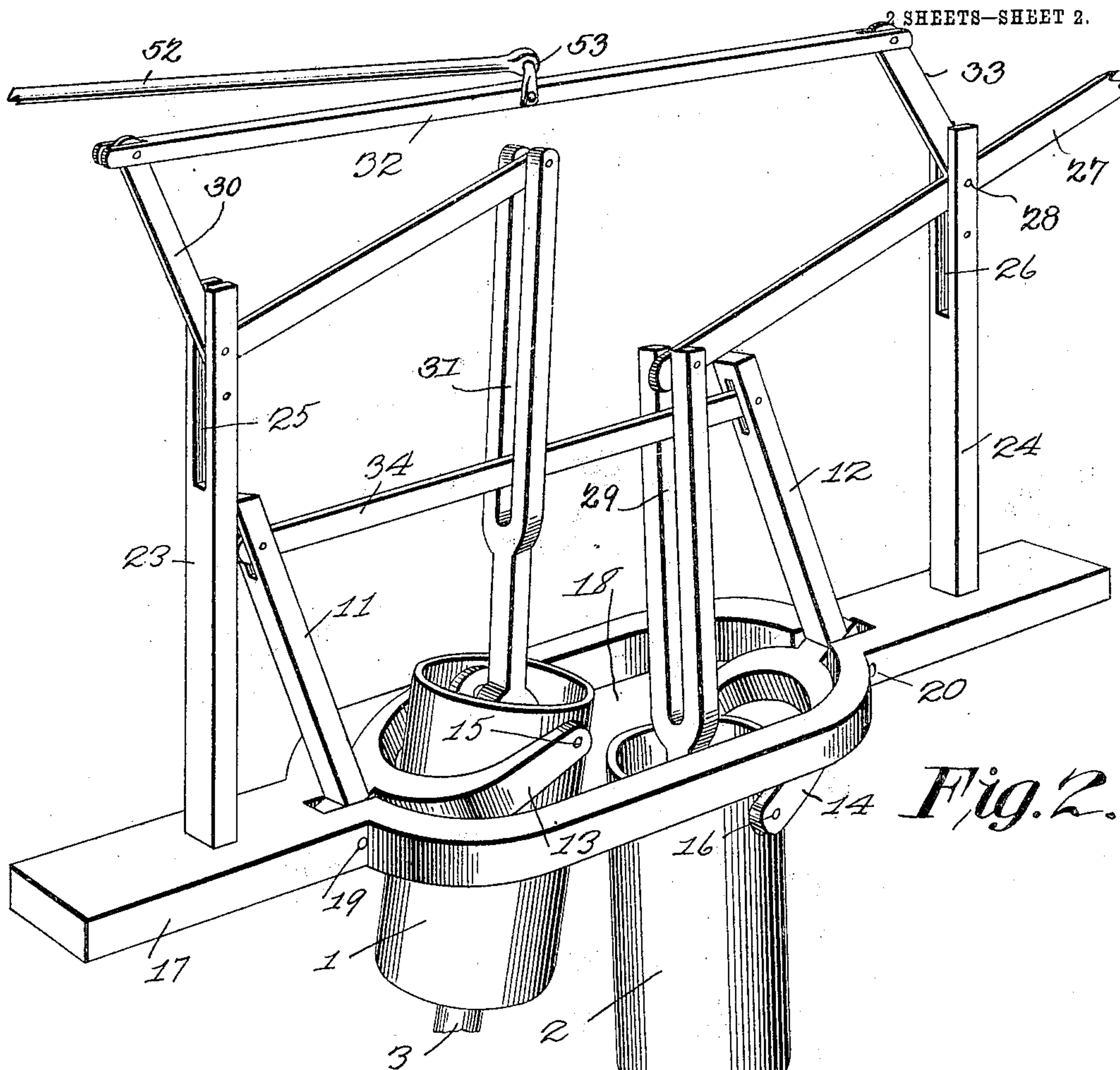
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PATENTED NOV. 14, 1905.

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2 SHEETS—SHEET 2.



Witnesses

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UNITED STATES PATENT OFFICE.

CYRUS A. ARNSBERGER, OF RUDY, IDAHO.

PUMP.

No. 804,198.

Specification of Letters Patent.

Patented Nov. 14, 1905.

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To all whom it may concern:

Be it known that I, CYRUS A. ARNSBERGER, a citizen of the United States, residing at Rudy, in the county of Fremont and State of Idaho, have invented a new and useful Pump, of which the following is a specification.

This invention relates to pumps, and has for its object to provide certain new and useful improvements whereby the several parts are so hung as to substantially counterbalance one another, and thereby to materially reduce the power required for operating the pump.

While this pump has been designed for irrigating purposes and will therefore be ordinarily power-driven, it is also capable of being operated by hand through the manipulation of a lever, the several working parts of the pump being supported independently of the lever, so as to relieve their weight therefrom, and are, furthermore, mounted so as to shift their positions during the operation of the pump without requiring additional power at any stage of the stroke.

With these and other objects in view the present invention consists in the combination and arrangement of parts, as will be hereinafter more fully described, shown in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that changes in the form, proportion, size, and minor details may be made within the scope of the claims without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of a double-acting pump embodying the features of the present invention. Fig. 2 is a fragmentary perspective view of the controlling mechanism of the pump, including two upper cylinders. Fig. 3 is an enlarged detail cross-sectional view taken through one of the supplemental cylinders and looking upwardly toward the plunger to show the manner of mounting the latter.

Like characters of reference designate corresponding parts in each and every figure of the drawings.

The present pump includes a pair of upper cylinders 1 and 2, the bottoms of which are closed and pierced by pendent pipes 3 and 4, there being lower cylinders 5 and 6 hung from the lower ends of the respective pipes and in communication therewith. At the bottoms of the lower cylinders are the respective inlet-valves 7 and 8, while suitable outlet-valves 9 and 10 are provided at the tops of the lower

cylinders. It will here be explained that the upper cylinders are of greater capacity than the lower cylinders for a purpose as will hereinafter appear.

For the support of the pairs of upper and lower cylinders there are provided angular or substantially L-shaped hangers 11 and 12, having their lower substantially horizontal members 13 and 14 extending inwardly toward one another and forked or yoke-shaped to straddle the upper end portions of the upper cylinders, which latter are pivotally supported upon the yoke-shaped members, as indicated at 15 and 16. For the support of the hangers there is a bracket or supporting-frame in the nature of a sill 17, provided with an intermediate longitudinal opening 18, in which the upper ends of the upper cylinders work, with the angular hangers fulcrumed upon the frame or sill, as at 19 and 20, at the opposite ends of the opening and at the vertexes of the respective hangers. Suitable plungers 21 and 22 work in the respective cylinders 1 and 2.

Beyond the respective ends of the opening 18 in the frame or sill 17 are upstanding posts 23 and 24, which are bifurcated at their upper ends, as at 25 and 26, and in one of the bifurcations there works an operating-lever 27, which is fulcrumed intermediate of its ends, as at 28, upon the post 24. The inner end of this lever overhangs the adjacent upper cylinder and has a plunger-rod 29 hung therefrom and pivotally connected to the adjacent plunger 22.

For the purpose of operating the plunger 21 there is a bell-crank 30, fulcrumed within the bifurcation 25 of the post 23, with a plunger-rod 31 pivotally hung from the inner end of the bell-crank and pivotally connected to the plunger 21, there being a substantially horizontal cross-bar 32 extending between the upper end of the bell-crank 30 and the upper end of the branch or arm 33, rising from the lever 27 at the fulcrum thereof. By this connection between the operating-lever 27 and the two plungers 21 and 22 the latter are simultaneously operated in opposite directions. A substantially horizontal connecting-rod 34 is pivotally connected to the upper ends of the hangers 11 and 12, whereby the hangers will simultaneously rock in opposite directions upon their fulcrums 19 and 20 during the operation of the pump for the purpose of actuating the plungers of the lower cylinders 5 and 6.

The plungers 35 and 36 for the lower cylin-

ders 5 and 6 are arcuate in shape, preferably substantially semicircular, and are located in the interval between the two cylinders, so as to work through openings 37 and 38 in the inner sides of the respective cylinders, adjacent the lower ends thereof, said plungers being pivotally supported at their centers externally upon the respective cylinders, as indicated at 39 and 40, there being a rigid connection 41 between the adjacent outer ends of the plungers. It will here be explained that when one of these plungers is forced into its cylinder the other plunger will of course be drawn out of its cylinder, whereby the two plungers work simultaneously in opposite directions.

When the present pump is set up, the frame or sill 17 is placed upon a platform or stage 42, which covers the top of a well, cistern, or the like, said platform being provided with an opening 43, through which to lower the cylinders and in which the upper cylinders work. By manipulating the lever 27 by hand or otherwise the plungers 21 and 22 will be simultaneously worked in opposite directions. When the plunger 22 is moving downwardly, the pressure upon the valve 10 will close the same, and the connected cylinders 2 and 6 will be forced downwardly, while the connected cylinders 1 and 5 will be moved upwardly, under the rocking movement of the connected brackets 12 and 11, whereby water will be forced upwardly from the cylinder 5 through the pipe 3 into the cylinder 1, while water will be taken into the cylinder 6 and discharged out of the cylinder 2 through the pipe 45. The cylinder 1 and the plunger 21 are of course moving upwardly at the same time; but the plunger works faster than the cylinder, and thereby creates a suction to relieve the plunger 35 of some of the weight thereon, the main lifting power being accomplished by the upward push of the plunger 35. In other words, the cylinders 5 and 6 and their plungers 35 and 36 produce the main lifting force for the columns of water, while the plungers 21 and 22 produce a suction to assist in the lifting operation.

The present form of pump has been particularly designed for use in deep wells where the depth is sufficient to prevent an effective lifting of a column of water by the suction of an elevated cylinder and plunger, wherefore I have provided a lower cylinder and plunger to push upwardly upon the bottom of the column of water and an upper cylinder and plunger to produce a suction upon the column of water, so as to relieve the lower plunger of some of the weight, and thereby assist in elevating the water. Moreover, the upper plunger operates during its descending movement to force the water out of the upper cylinder to a suitable point of discharge, whereby the water is first elevated into the upper cylinder and then discharged from the latter.

For the sake of convenience in controlling

the water discharged from the cylinders 1 and 2 of the pump flexible pipes 46 and 47 lead from the outlets 44 and 45 of the cylinders to a T-coupling 48, carried by the lower end of a pipe 49, which leads away from the pump.

To permit of the pump being power-driven, a suitable connecting-rod 52 is attached to the cross-bar 32, as at 53, so as to reciprocate the cross-bar, and thereby actuate the pump, the connecting-rod of course being connected to a source of power. (Not shown.)

While the lower pump-cylinders 5 and 6 have been shown rectangular in form, they may be cylindrical or other shape, as desired, and the plungers 35 and 36 may work through the sides of the cylinders at any preferred points between the tops and bottoms thereof.

Having fully described the invention, what is claimed is—

1. In a pump, upper and lower vertically-movable cylinders, a pipe connecting the cylinders for simultaneous movements, a plunger for the upper cylinder, means to work the cylinders and the plunger simultaneously in the same direction with the plunger moving faster than the cylinders, and a lower plunger supported independently of the lower cylinder and actuated by the movements of the cylinder to work upwardly therein during the upward movement of the cylinder and downwardly during the downward movement of the cylinder.

2. In a pump, the combination of two sets of cylinders, each set including upper and lower cylinders and a pipe connecting the cylinders, plungers working in the upper cylinders connected lower plungers hinged to the respective lower cylinders and working therein, and means to work each set of cylinders simultaneously in opposite directions to work the lower plungers alternately in the lower cylinders and to work the upper plungers in the same directions with their respective cylinders and at a greater rate of speed.

3. In a pump, the combination of two sets of endwise-movable cylinders, each set comprising an upper cylinder, a lower cylinder and a pipe connecting said cylinders, means for simultaneously moving the sets of cylinders in opposite directions, segmental plungers working through openings in the adjacent sides of the lower cylinders, and a connection between the plungers of the lower cylinders to actuate the same by the movements of the sets of cylinders.

4. In a pump, the combination of two sets of endwise-movable cylinders, each set including an upper cylinder having a plunger, a lower cylinder and a pipe connecting the two cylinders, means for simultaneously moving the sets of cylinders in opposite directions and for actuating the plungers in the same directions as the respective cylinders, plungers for the lower cylinders, and means connecting the lower plungers to actuate the

same by the movements of the sets of cylinders.

5 In a pump, the combination with a support, of a pair of rocking hangers mounted thereon, sets of cylinders hung from the respective hangers, each set of cylinders including an upper cylinder, a lower cylinder and a pipe connecting the two cylinders, plungers for the upper cylinders, means connecting the
10 hangers to simultaneously rock the same in opposite directions, means for working the plungers simultaneously in opposite directions, plungers for the lower cylinders, and means connecting the lower plungers to simultaneously actuate the same by the move-
15 ments of the sets of cylinders.

6. In a pump, the combination with a support, of a pair of rocking hangers mounted thereon, means connecting the hangers for simultaneous movements in opposite directions,
20 sets of cylinders loosely hung from the respective hangers, each set including an upper cylinder having an outlet, a lower cylinder having a valved inlet at its lower end and a
25 valved outlet at its upper end, and a pipe connecting the cylinders and leading from the valved outlet of the lower cylinder, plungers working in the upper cylinders, means for simultaneously working the plungers in opposite
30 site directions, segmental plungers working through adjacent sides of the lower cylinders, and means connecting the lower plungers to actuate the same by the movements of the sets of cylinders.

35 7. In a pump, the combination with a sup-

port, of a pair of substantially L-shaped hangers pivotally mounted upon the support and having their substantially horizontal members forked, means connecting the upright members of the hangers for simultaneous movement in
40 opposite directions, sets of cylinders hung from the respective hangers, each set including an upper cylinder pivotally supported within the fork of the adjacent hanger and provided with an outlet in one side thereof
45 and an inlet in its bottom, a lower cylinder having a valved inlet in its lower portion and a valved outlet in its top, a pipe connecting the two cylinders and extending between the outlet of the lower cylinder and the inlet of
50 the upper cylinder, plungers working in the respective upper cylinders, a bell-crank, a plunger-rod extending between the bell-crank and one of the plungers, another bell-crank, a plunger-rod extending between the latter bell-
55 crank and the other upper plunger, a connecting-rod extending between the two bell-cranks to simultaneously operate the plungers in opposite directions, plungers for the lower cylinders, and means connecting said plungers
60 to actuate the same by the movements of the sets of cylinders.

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

CYRUS A. ARNSBERGER.

Witnesses:

L. E. HICKS,

C. W. POOLE.