

(No Model.)

3 Sheets—Sheet 1.

L. SIVERTSON.
ROTARY ENGINE.

No. 528,493.

Patented Oct. 30, 1894.

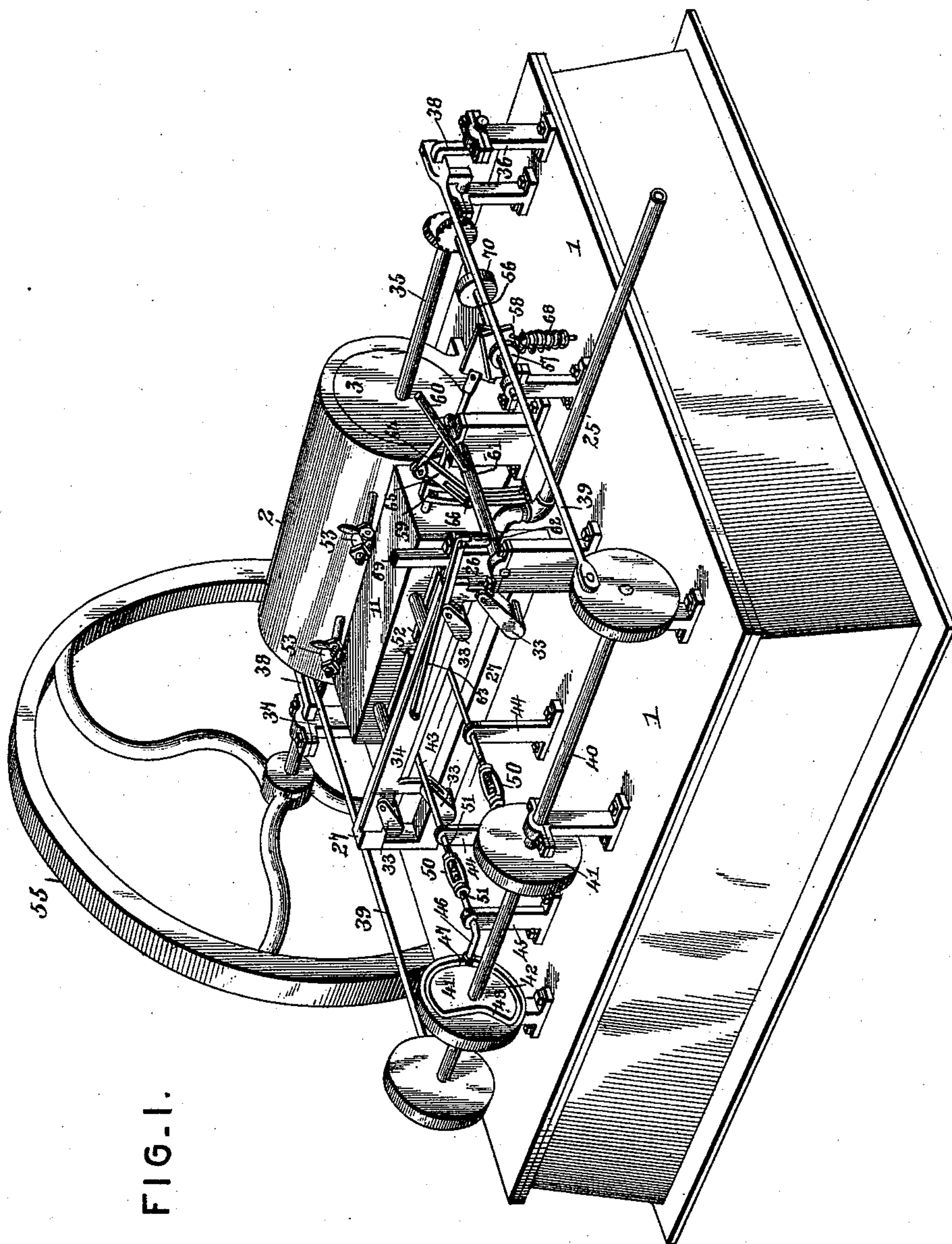


FIG. 1.

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Witnesses

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J. E. Doyle

By His Attorneys.

C. A. Snow & Co.

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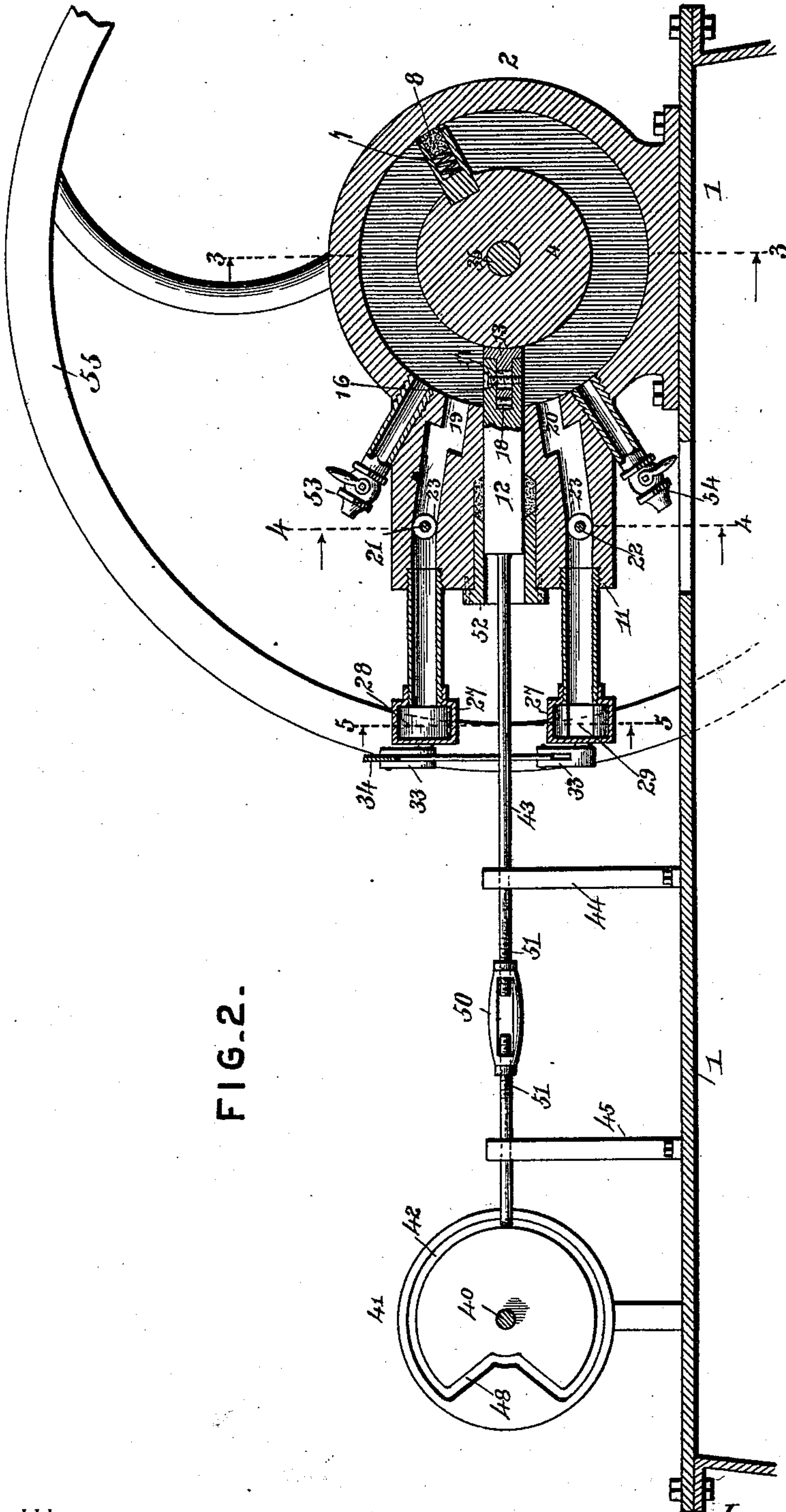
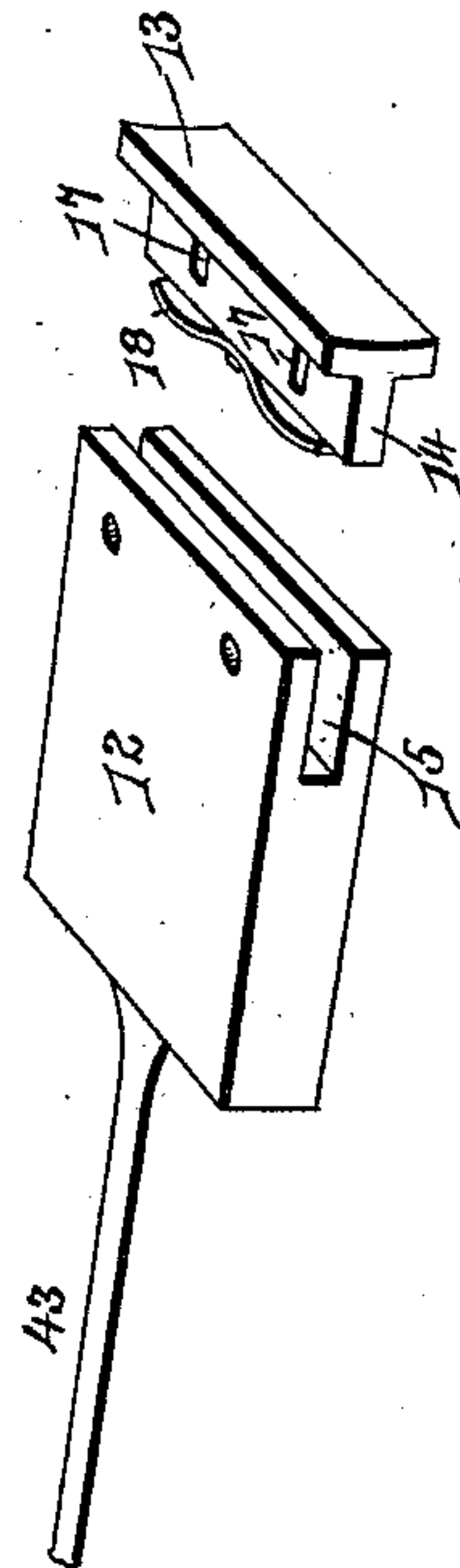


FIG. 2.

FIG. 6.



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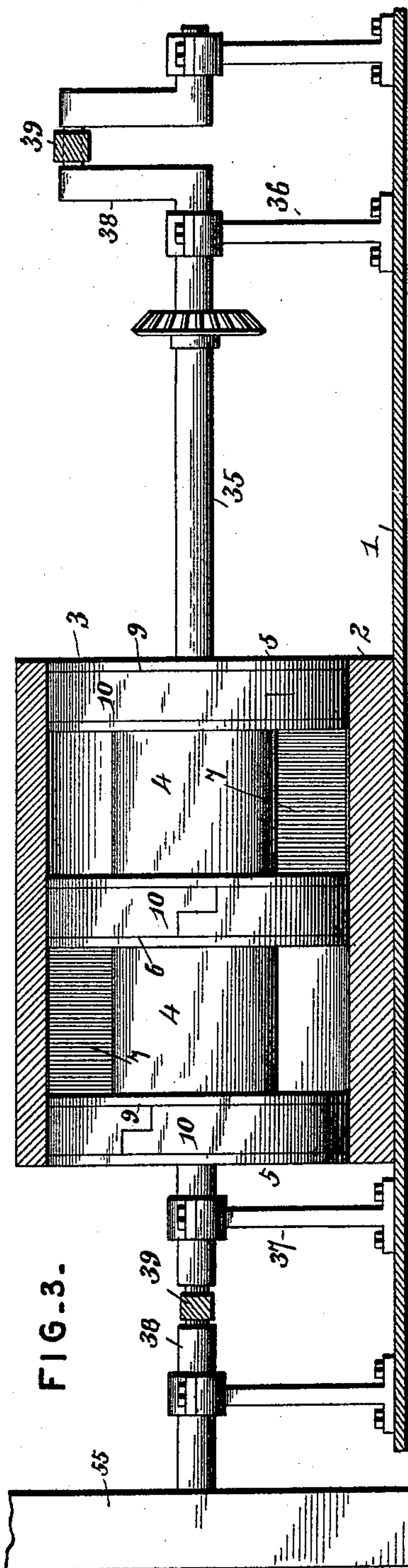


FIG. 3.

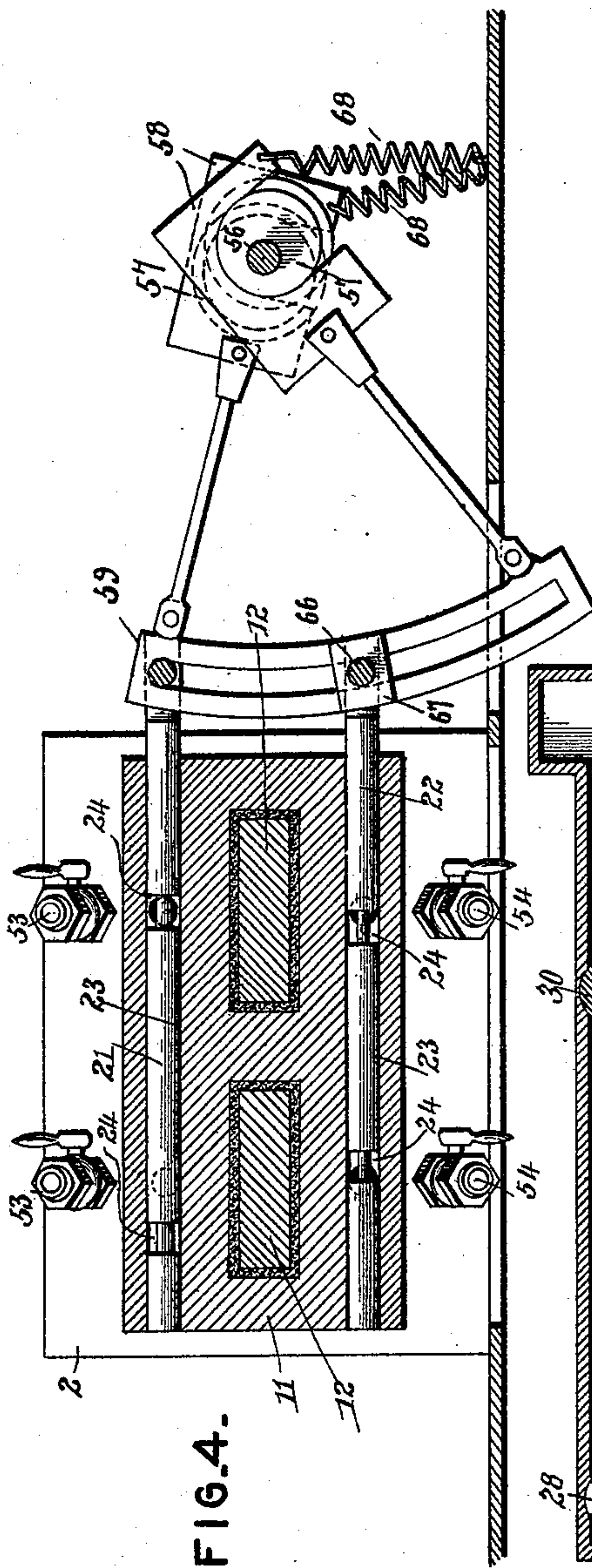


FIG. 4.

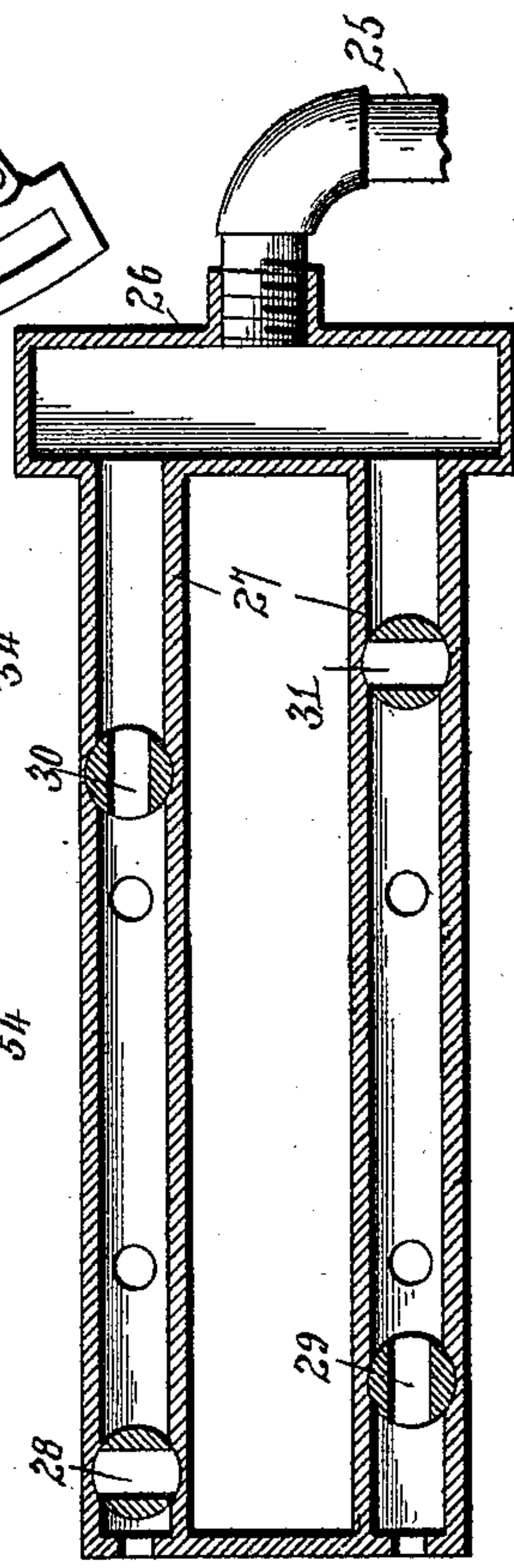


FIG. 5.

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UNITED STATES PATENT OFFICE.

LUCAS SIVERTSON, OF FORT ABERCROMBIE, NORTH DAKOTA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 528,493, dated October 30, 1894.

Application filed May 4, 1894. Serial No. 510,085. (No model.)

To all whom it may concern:

Be it known that I, LUCAS SIVERTSON, a citizen of the United States, residing at Fort Abercrombie, in the county of Richland and State of North Dakota, have invented a new and useful Rotary Engine, of which the following is a specification.

My invention relates to rotary concentric-cylinder engines; and has for its object to provide a simple and direct-acting construction to avoid dead-centers, and to provide improved means for regulating the cut-off, whereby the maximum energy of the steam may be utilized to the best effect.

Further objects and advantages of the invention will appear in the following description and the novel features thereof will be particularly pointed out in the claims.

In the drawings:—Figure 1 is a perspective view of an engine embodying my invention. Fig. 2 is a longitudinal section of the same taken parallel with the slide valves and through one of said valves. Fig. 3 is a transverse section parallel with the main shaft and through the cylinder on the line 3—3 of Fig. 2. Fig. 4 is a transverse vertical section on the line 4—4 of Fig. 2. Fig. 5 is a transverse vertical section on the line 5—5 of Fig. 2. Fig. 6 is a detail view in perspective of one of the slide valves.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

1 designates a base or foundation and 2 an open ended cylinder, within which fits the rotary piston 3. This piston consists of the concentric core 4, the end disks 5, which fit in the ends of the cylinder, an intermediate disk 6 arranged between said end disks, and diametrically opposite heads 7 arranged in the spaces between the end and intermediate disks and provided with spring actuated packing strips 8. The end and intermediate disks are provided with peripheral grooves 9, in which are fitted the expansion packing-rings 10, said packing-rings being adapted to bear firmly against the inner surface of the cylinder and remain stationary, the piston rotating independently thereof.

Arranged contiguous to the cylinder is the slide-valve casing 11, in which operate the slide-valves 12 provided at their inner ends

with concaved bearing-plates 13 to fit against the surface of the core of the piston. These bearing plates, with the body-portions of the slide-valves, are of a width equal to the spaces between the end and intermediate disks of the piston, and the bearing-plates are provided with webs 14, which fit in channels 15 in the ends of said body portions of the slide-valves and are held in place by bolts 16 fitting in elongated perforations or slots 17 in the webs, whereby said webs and bearing-plates are capable of a slight movement in the direction of the length of the slide-valve or in the direction of movement of such valve. Actuating springs 18 are disposed between the inner ends of said webs and the contiguous surfaces of the channels in the body-portions of the slide-valves to normally hold the bearing-plates extended to form a snug and steam-tight contact with the core of the piston.

Steam ports 19 and 20 are arranged respectively above and below the plane of the slide-valves to admit steam to and exhaust it from the cylinder, and in operative relation with these ports 19 and 20 are arranged the sliding cut-off valves 21 and 22 respectively, said cut-off valves being arranged in cylindrical casings 23, which intersect said ports, and the cut-off valves being cylindrical in shape and being provided at intervals with annular channels 24 which when brought in registration with the ports open the latter for the admission or escape of steam. The openings or channels in the valve 21 are spaced at a greater interval than the openings or channels in the valve 22, for the reason that in operation the cut-offs are moved in opposite directions simultaneously, and it is necessary that the openings therein should be arranged to allow simultaneous admission to and exhaust from the same cylinder at one time, and it is equally necessary that when the exhaust is cut-off the admission should be cut-off. The means whereby this operation of the cut-offs is secured will be described hereinafter.

25 represents the steam-supply pipe, which communicates with a distributing-pipe 26 with which communicates the corresponding ends of the twin parallel conductors 27. These conductors are provided near their op-

posite ends with valves, and between the said valves with tubes communicating with the above described steam ports. The ends of the conductors opposite to their connection with the distributing-pipe are open. The valves 30 and 31, which are arranged respectively in the upper and lower conductors, and between the distributing-pipe and the connecting tubes are adapted to open or cut off communication between the distributing-pipe and said conductors, and the other valves 28 and 29, which are arranged respectively in the upper and lower conductors and between said connecting-pipes and the outlet ends of the conductors are adapted to open or close the exhaust from the conductors. Hence, by opening the valves 30 and 29 and closing the valves 28 and 31 the steam which is admitted to the distributing-pipe will pass freely into the upper conductor and hence through the ports into the cylinder above the slide valves, while the exhaust from the cylinder passing out through the ports will enter the lower conductor and escape through the open end of said conductor. By reversing the above described disposition of the controlling valves the operation of the engine will be reversed. The controlling valves are provided at their outer ends with crank arms 33 which are connected for simultaneous operation to a connecting-bar 34.

The shaft 35 of the piston is extended beyond the opposite ends thereof, is mounted in suitable bearings 36 and 37 arranged respectively adjacent to the ends of the cylinder and near the side edges of the base or foundation, and is provided at points intermediate of said bearings with cranks 38 arranged at an angle of ninety degrees from each other and connected by means of rods 39 with a cam-shaft 40 which is arranged parallel with the shaft of the piston. Said rods 39 may be, and preferably are, connected directly to the cams 41, which are fixed to the said cam-shaft, and the cams preferably consist of disks arranged on the extremities of the cam-shaft and provided in their inner sides with cam-grooves 42. The slide-valve stems 43 are mounted in the guides 44 and 45 and are provided at their rear ends with lateral studs 46 bearing anti-friction rolls 47 which take in said grooves of the cam-wheels. The offsets 48 of the cam-grooves are arranged at diametrically opposite points of the cam-wheels to correspond with the disposition of the heads of the piston, which, as above described, are arranged at diametrically opposite points of the piston. The slide-valve stems are expandible to allow for adjustment to secure the necessary pressure of the slide-valves against the core of the piston, such expansion being accomplished by means of right and left threaded adjusting sleeves 50 engaging threaded shanks 51 which are arranged upon the contiguous extremities of aligned sections of each slide valve stem. Packing boxes 52

are arranged in the slide valve casing to prevent the escape of steam around said valves. The cylinder is provided above and below the plane of the slide valves with blow-off cocks 53 and 54.

The shaft of the piston carries a fly-wheel 55, and geared to the opposite end thereof is an eccentric shaft 56 carrying the oppositely disposed eccentrics 57 upon which are fitted the sleeves or strips 58 connected to opposite ends of a slotted link 59, and the stems of the sliding cut-off valves are provided with studs fitting in the slot of said link. 60 represents a reversing lever which is fixed to a rock-shaft 61 connected by means of a pin 62 and a link 63 with the above described connecting bar by which the controlling valves are operated. Said rock-shaft also carries an arm 64 which is pivotally connected to a slotted connecting-rod 65 which engages a stud 66 on a block 67 carried by the slotted link, whereby when the reversing lever is thrown from one position to the other to reverse the relative positions of the controlling valves it simultaneously reverses the relative positions of the cut-off valves by changing the fulcrum point of the slotted link. The eccentric straps are preferably constructed as shown in the drawings in which they extend over the upper sides of the eccentric and are held in place by coiled springs 68 which are connected to a stationary part of the base or foundation.

A suitable governor of any desired construction may be employed in connection with the above mechanism, the standard thereof being illustrated in the drawings, Fig. 1, and it may be driven by means of a belt from the pulley 70 which is carried by the eccentric shaft.

The operation of the above mechanism will be readily apparent from the description without a detailed explanation thereof, and it will be understood that various changes in the form, proportion and the minor details of construction may be resorted to without departing from the spirit of the invention or sacrificing any of the advantages thereof.

Reference to Fig. 4 of the drawings will show that the slotted link which forms the connection between the eccentrically operated rods and the cut-offs is disposed so as to reciprocate the upper cut-off and allow the lower cut-off to remain at rest. In this case the ports which are controlled by the lower cut-off remain half open, so that the exhaust is continuous and the reciprocation of the upper cut-off admits and cuts off the steam as required. It will be understood, furthermore, that by arranging the slotted link so that the connection of the upper cut-off with said link is at the center of the latter and the connection of the lower cut-off is at the lower end of said link, the lower cut-off will be reciprocated and the upper cut-off will remain at rest, thus reversing the engine. Moreover, inter-

mediate adjustment of the link provides for the cut-off at different intervals according to the desired speed of the mechanism.

Having described my invention, what I claim is—

1. In a rotary engine, the combination with a cylinder, a rotary piston, slide valves, means for operating the slide valves, ports arranged respectively upon opposite sides to the plane of the slide-valves, and cut-off valves controlling said ports, of a link connecting the stems of said cut-offs and adjustable thereon to arrange the point of attachment of either stem at the center of the link, and means for rocking the link by vibrating its ends in opposite directions, substantially as specified.

2. The combination with a cylinder, a rotary piston, slide valves, means for operating the slide valves, ports arranged upon opposite sides of the plane of the slide valves, and cut-off valves controlling said ports, of a link connecting the stems of said cut-offs and capable of longitudinal adjustment thereof, the distance through which said link may be adjusted being twice that of the interval between said stems, means for adjusting the link and securing it at the desired adjustment, and mechanism for rocking the link, substantially as specified.

3. The combination with a cylinder, a rotary piston, having twin steam chambers and duplicate heads, slide valves, means for operating said slide valves, and ports arranged respectively above and below the plane of the slide-valves, of parallel conductors communicating respectively with the ports above and below the slide valves, controlling valves arranged in the conductors respectively between the points of communication of the conductors with the said ports and the ends of the conductors, a distributing-pipe communicating with said conductors at one end, the same being open at the opposite end, and means for reversing the positions of said controlling valves, substantially as specified.

4. The combination with a cylinder, a rotary piston provided with diametrically opposite heads, inlet and exhaust ports communicating with the cylinder, slide valves arranged between the planes of said inlet and exhaust ports, and means for operating said slide valves, of upper and lower steam conductors communicating respectively with the ports above and below the plane of the slide valves, a distributing pipe communicating

with the conductors at one end, the conductors being open at the other end, valves arranged respectively near the extremities of the conductors and upon opposite sides of the points of communication of the conductors with said steam ports, a common connecting bar for the arms of said controlling valves, and means for operating the connecting bar to reverse the positions of the valves whereby communication may be established or cut-off between either conductor and the distributing-pipe, the conductor which is in communication with the distributing-pipe being closed at the opposite end by one of said valves, and the other conductor being open at the corresponding end to exhaust into the atmosphere, substantially as specified.

5. The combination with a cylinder, a rotary piston, slide valves, means for operating the slide valves, ports arranged respectively above and below the plane of the slide valves, and cut-off valves controlling the said ports, of steam conductors communicating respectively with the ports, controlling valves arranged in the conductors, a slotted link connecting the stems of said cut-off valves, and a reversing lever operatively connected with the controlling valves and with said slotted link, whereby the relative positions of the controlling and cut-off valves are simultaneously adjusted, substantially as specified.

6. The combination with a cylinder, a rotary piston, inlet and exhaust ports, cut-off valves controlling said ports, slide valves arranged between the planes of the inlet and exhaust ports, and means for operating the slide valves, of an eccentrically operated slotted link, slidable connections between said link and the cut-off valve stems, a reversing lever having a rock-shaft, an arm carried by said rock-shaft, and a slotted connecting rod fitted upon a lateral stud carried by said slotted link, the openings in said cut off valves being located respectively at different intervals, whereby when the cut-offs are operated in opposite directions the inlet and exhaust ports of each cylinder are simultaneously opened and closed, substantially as specified.

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

LUCAS SIVERTSON.

Witnesses:

JOHN A. FALLA,
H. G. STORDOCK.