No. 671,936. Patented Apr. 9, 1901.

G. SCHLEICHER.

ROTARY ENGINE.

(Application filed Aug. 9, 1900.)

(No Model.) 3 Sheets—Sheet 1.

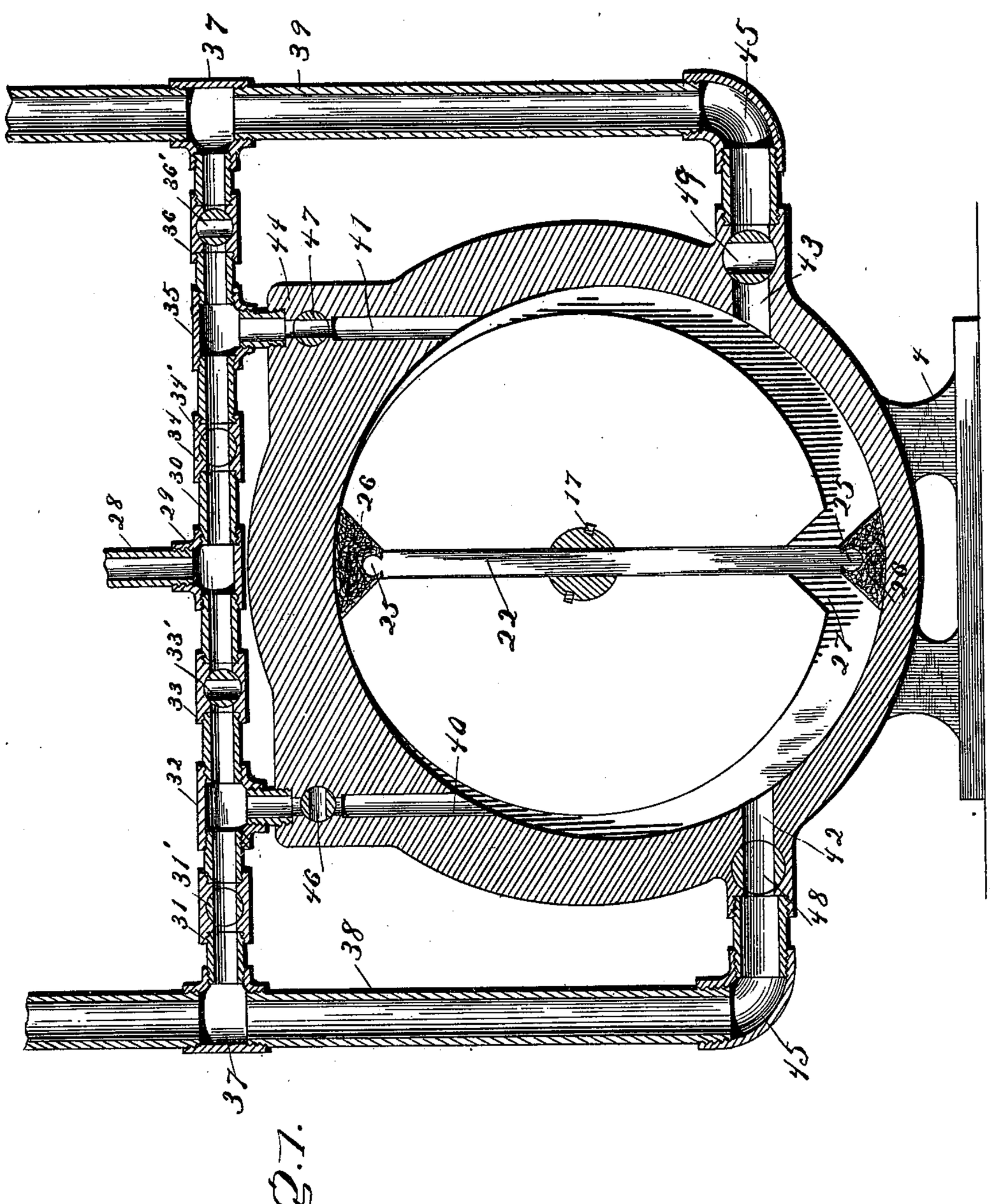

Fig. 1.

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3 Sheets—Sheet 2.

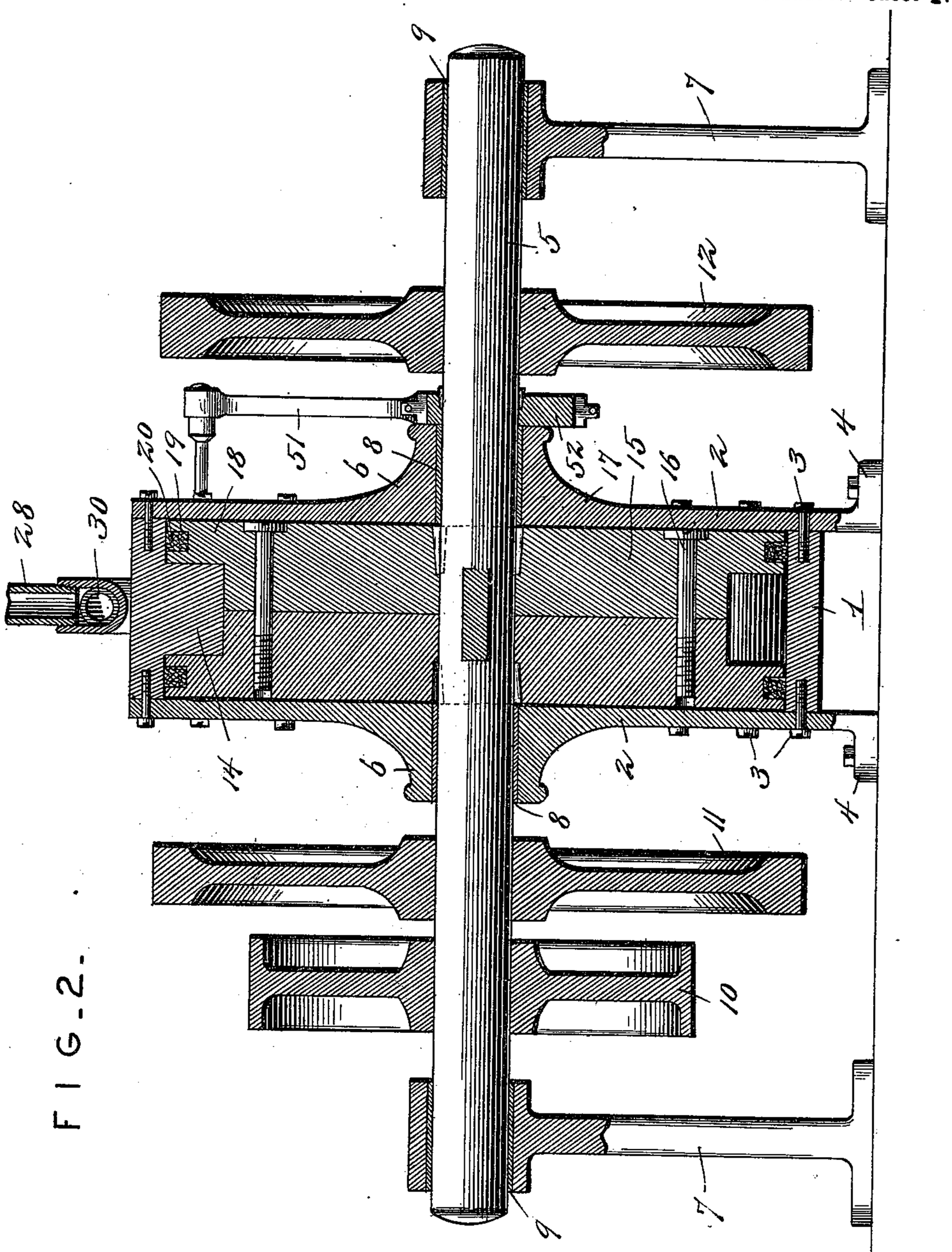

FIG. 2.

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(No Model.) 3 Sheets—Sheet 3.

FIG. 3.

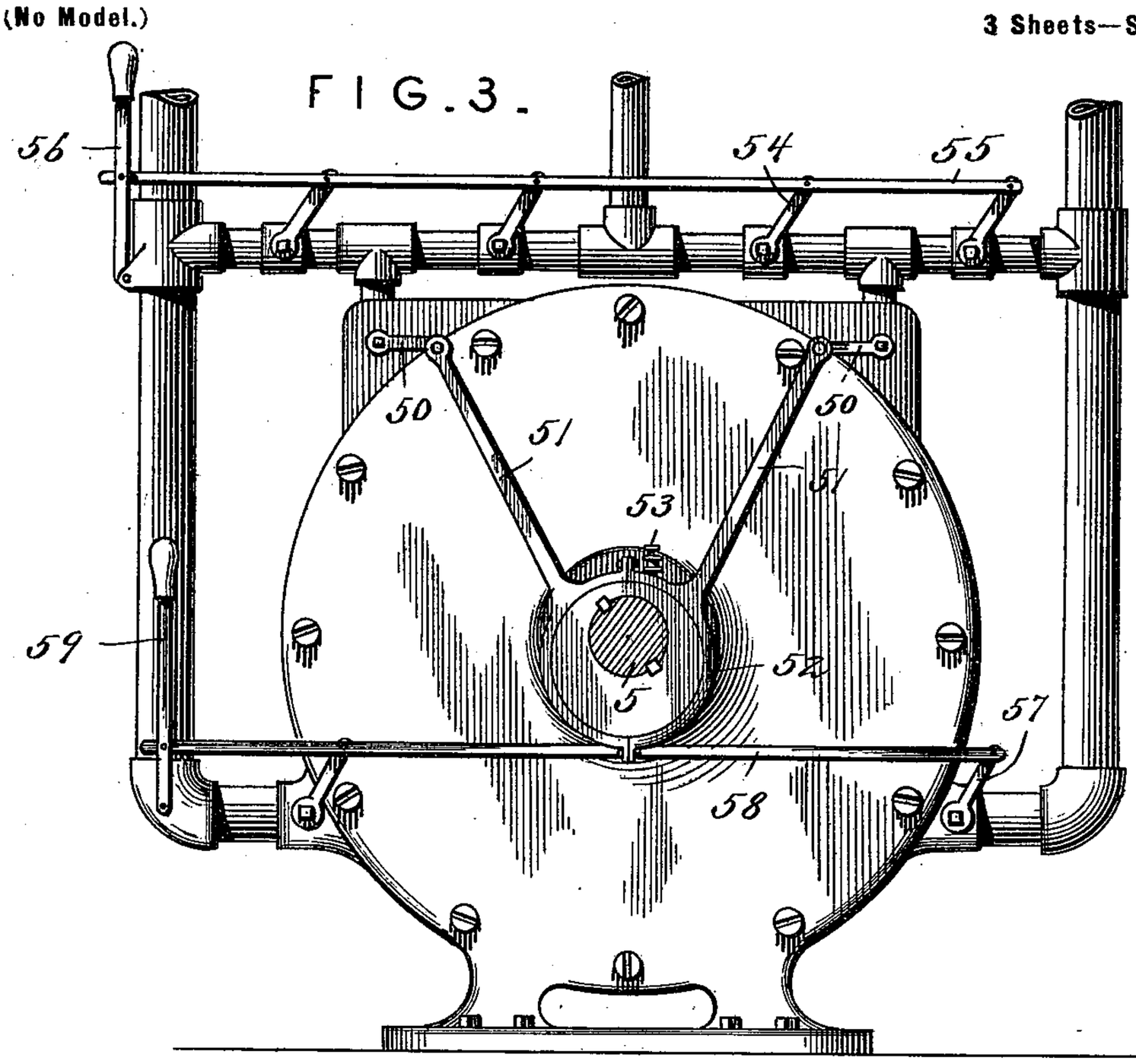


FIG. 6.

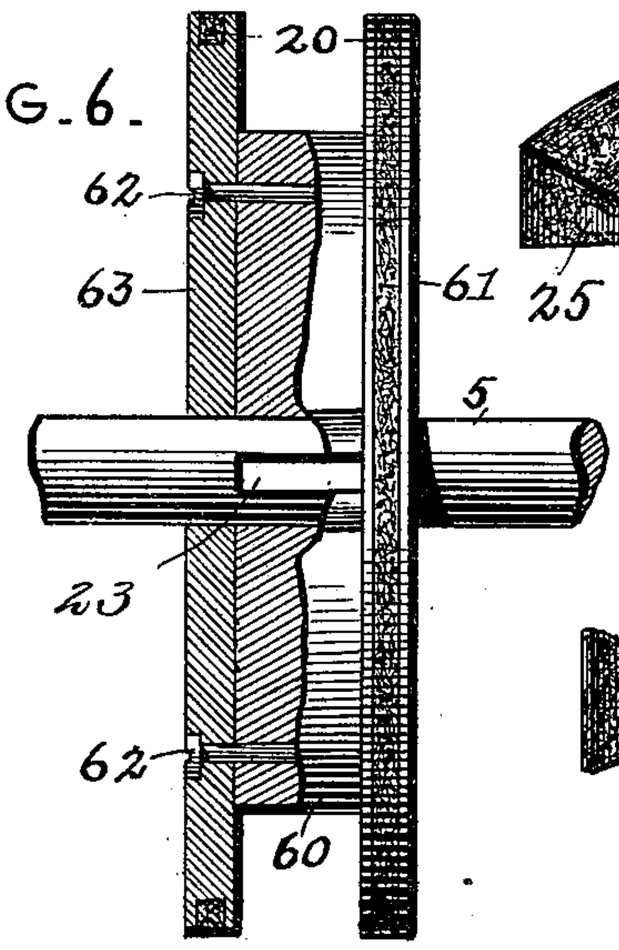


FIG. 4.

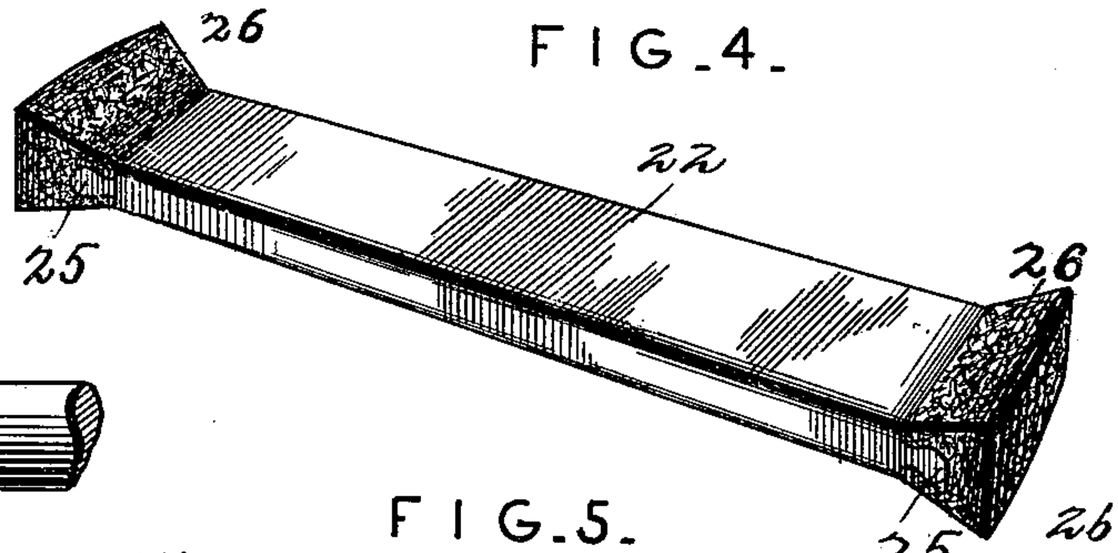
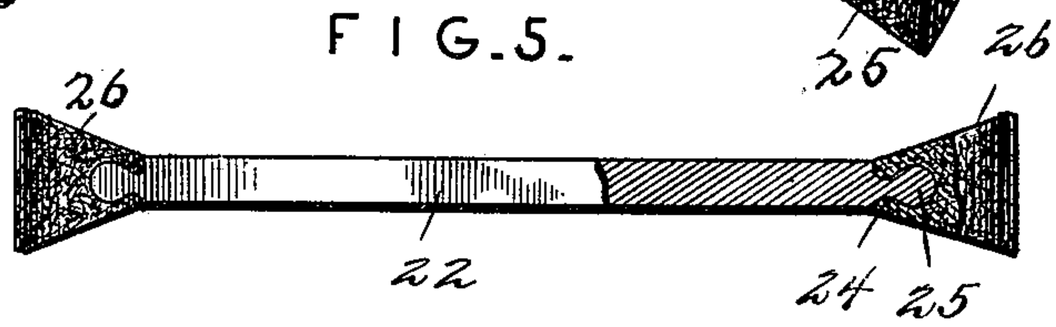


FIG. 5.



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UNITED STATES PATENT OFFICE.

GEORGE SCHLEICHER, OF SAN ANTONIO, TEXAS.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 671,936, dated April 9, 1901.

Application filed August 9, 1900. Serial No. 26,383. (No model.)

To all whom it may concern:

Be it known that I, GEORGE SCHLEICHER, a citizen of the United States of America, residing at San Antonio, in the county of Bexar and State of Texas, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in rotary engines, and relates more particularly to that class known as "eccentric rotary pistons."

One of the objects of my invention is to provide a light-running high-speed rotary engine which does not have any dead-center and to avoid back pressure from the exhaust, and the peculiar construction by which this is obtained, together with the effectiveness of the engine in general, will be hereinafter specifically described.

In describing the invention in detail reference will be had to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a transverse vertical sectional view of my improved engine. Fig. 2 is a horizontal sectional view through the center of the engine. Fig. 3 is a side elevation with the shaft or axle in section. Fig. 4 is a detail perspective view of the sliding valve or plunger. Fig. 5 is a detail side view of the same partially in section; and Fig. 6 is a detail side view, partially in section, of a modified form of rotary piston or rotator-head.

Referring now to the drawings by reference-numerals, 1 indicates the ring or annulus; 2 2, the side plates, which are securely fastened to the rim of said ring by bolts 3 or in any other suitable or desired manner and supported on the pedestal or base 4.

5 indicates the shaft or axle, which passes centrally through the side plates 2 2, the latter being preferably provided with bushings or hubs 6, carrying Babbitt metal or other suitable bearings 8 for said shaft or axle. The shaft or axle is suitably supported near each end by standards 7 7, which may, if desired, also be provided with bearings of Babbitt or like metal, as at 9, and this shaft or axle has mounted thereon the belt-pulleys or drive-wheels 10, 11, and 12, for a purpose well known in the art.

The annulus or ring 1 has on the inner face of its upper part a head-point 14—that is, the ring is of greater thickness at the upper side, the thickness decreasing from the top downward toward each side, so that the head-point is substantially segment-shaped, and, although it may be of a separate piece, it is preferably formed integral with the ring, but is of less width than the space between the two inner faces of the side plates. The inner periphery of the cylinder is therefore in the shape of a true circle at its two sides, but centrally, owing to the segment shape of the head-point, is substantially elliptical in form.

The rotary piston or rotator-head is formed of two similar disks 15, which are securely fastened together by bolts 16, as shown in Fig. 2 of the drawings, or in any other desirable manner. These disks, forming the piston, are securely fastened to the axle or shaft 5 by wedges or keys 17, as shown. They are each cut away circumferentially on their inner faces, forming thereby the two annular flanges 18 18, both of which flanges are grooved peripherally, as at 19, and have arranged in such grooves the packing-rings 20, which packing may be composed of any suitable material. This piston or rotator-head is mounted concentrically upon the axle or shaft 5, the segment-shaped head-point 14 operating in the annular groove, which is formed when the two disks comprising the piston are secured together, and the piston being concentric upon the shaft or axle is consequently eccentric to the cylinder within which it rotates, so that the steam expansion-chamber 21 is thus formed, this expansion-chamber being of greater area at the bottom of the cylinder and converging toward the top, at which latter point the periphery of the piston contacts with the under face of the head-point, while the packing-rings 20 contact with the inner face of the annulus or ring 1 to prevent the passage of steam.

In order to drive the piston, resistance must be offered to the steam. For this purpose I provide a sliding valve 22, which consists, essentially, of a bar that operates through the piston in an opening provided therefor and

through a registering opening 23 in the shaft or axle 5. This sliding valve or plunger has its ends rounded and is provided on each face, near the ends, with grooves 24, these grooves and the rounded end acting as a tenon 25, to which are secured the substantially triangular-shaped packing-blocks 26, the same being recessed or correspondingly grooved to the tenons, so as to receive the latter, and being preferably composed of a material that will permit of the outer face contacting with the periphery of the expansion-chamber. The blocks being substantially triangular in form, provision must be made for the same to be entirely seated within the piston-head when at one point of the revolution, since the valve or plunger slides within the piston and the axle or shaft as the piston revolves. For this purpose I provide the piston or rotator-head at opposite sides, where the ends of the valve or plunger emerge with V-shaped recesses 27, the one packing-block being partially or entirely seated during the time the opposite one is receding or at the farthest limit of its stroke, and both blocks at all times contacting with the bearing or head point and the inner face of the annulus or ring to prevent the passage of steam.

I will now describe the mechanism by which steam is admitted and exhausted and the controlling means for the same.

The steam-supply pipe 28 is connected by a union 29 to a horizontal pipe 30, arranged above the engine. In the drawings I have shown this pipe 30 as composed of a number of members connected together by unions, which is a practical and cheap construction, and I will so describe the same herein, the unions being numbered 31, 32, 33, 34, 35, and 36, with the ends of the pipe 30 connected by unions 37 to the pipes 38 and 39. The engine is provided with the usual four ports 40 41 and 42 42, the two former located vertically, one registering with each of the steam-chests 34 near the top of the engine, and the two latter being near the bottom of the expansion-chamber. The pipe 38 connects with port 42 by union 45, and the pipe 39 connects with port 43 by a like union. Within the steam-chests 44 are located the throttle-valves 46 47, and within the ports 42 43 are located the exhaust-valves 48 49, respectively. Short levers 50 connect with the stems of valves 46 47 and with the connecting rods or arms 51 of the eccentric-straps 52, which engage the axle or shaft 5. This eccentric 52 is of the ordinary and well-known form and is or may be provided with an oil-cup 53.

In the unions or valve-casings 31, 34, 33, and 36 are located, respectively, the valves 31′, 33′, 34′, and 36′, the stems of which are connected by short levers 54 to a connecting-rod 55, which is pivotally supported from the union 37 at the left of the engine or at any suitable point on the pipe 38. The stems of the valves 48 49 are likewise connected by short levers 57 to a connecting-rod 58, pivoted at its one end to a controlling-lever 59, that is in turn pivotally supported from the union 45 at the left hand of the engine or at any suitable point on the pipe 38.

The valve 34′ is the steam-valve and is open at all times when the engine is in operation. If the engine is reversed, the pull on the lever 59 opens valve 48 and at the same time the pull on lever 56 closes valves 31′ and 34′ and opens valves 33′ and 36′, valve 36′ exhausting and valve 33′ admitting steam to the engine. The throttle-valves 46 47 are operated by the eccentric upon the shaft or axle and admit and exhaust steam at each one-sixth revolution of the piston.

When the engine is running with the valves in the position as shown in Fig. 1, it will be observed that the steam-valve 34′ is open and the exhaust-valves 31′ and 48 are open, the exhaust-valves 36′ and 49 being closed. If the engine is reversed by operating-lever 59, exhaust-valve 48 is closed and exhaust-valve 49 is opened. At the same time lever 56 is operated to close valves 31′ and 34′ and open valves 33′ 36′, valve 36′ exhausting and valve 33′ admitting steam to the engine.

In Fig. 6 of the drawings I have shown a modified form of rotary piston comprising a disk 60, which is provided with the opening to receive the sliding valve, as in the construction just described, the opening terminating at opposite sides of the disk in the V-shaped recesses to receive the packing-blocks, the valve and blocks in this modified form being of the same construction as those described. This disk 60 has an integral flange 61, peripherally grooved to receive the packing-ring, and at its opposite side has secured thereto by bolts 62 a side plate 63, likewise peripherally grooved to receive the packing-ring, this side plate acting as the other flange. This form of piston is keyed upon the shaft or drive-axle in the same manner as aforedescribed.

It is believed the operation of my improved engine will be readily apparent to those skilled in the art when taken in connection with the accompanying drawings, together with the foregoing description, and it will be observed that throughout in the details of construction various details could be changed without departing from the general spirit of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a rotary engine, the combination, with the cylinder having inlet and exhaust ports, the drive-shaft eccentrically mounted in said cylinder and provided with an opening, the piston comprising two disks bolted together and concentrically mounted upon the drive-shaft within the cylinder, each of said disks being provided with a circumferential flange which is peripherally grooved, the packing-rings secured in said grooves said piston hav-

ing an opening extending through the same and registering with the opening in the drive-axle with said opening terminating at opposite sides of the piston in V-shaped recesses, a sliding valve operating through said opening in the piston and drive axle or shaft, and a substantially triangular-shaped packing-block secured to each end of said valve, of a pair of throttle-valves connected to an eccentric on the drive-shaft, a pair of exhaust-valves, a series of controlling-valves, means for simultaneously operating the exhaust-valves, and separate means for operating the controlling-valves, substantially as herein shown and described.

2. In a rotary engine, the combination with the concentric cylinder having the head-point and provided with inlet and exhaust ports, of the drive-axle eccentrically mounted in said cylinder and provided with an opening, the rotary piston concentrically mounted on said shaft, said piston having an opening extending through the same and registering with the opening in the shaft, concentric flanges carried by said piston and provided with peripheral grooves, a packing-ring secured in said grooves, a sliding valve operating in said opening in the piston and provided with tenoned ends, a substantially triangular-shaped packing-block secured on said ends, a pair of throttle-valves which are controlled by the eccentric on the drive-shaft, a pair of exhaust-valves, a lever for operating said exhaust-valves, connections between said lever and the stems of the exhaust-valves whereby said valves may be simultaneously controlled, a series of controlling-valves, a lever for operating said valves, and connections between said lever and the stems of the controlling-valves whereby the latter may be controlled simultaneously, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

GEORGE SCHLEICHER.

Witnesses:

E. ALLEN,

C. C. CLAMP.