No. 705,457. Patented July 22, 1902.

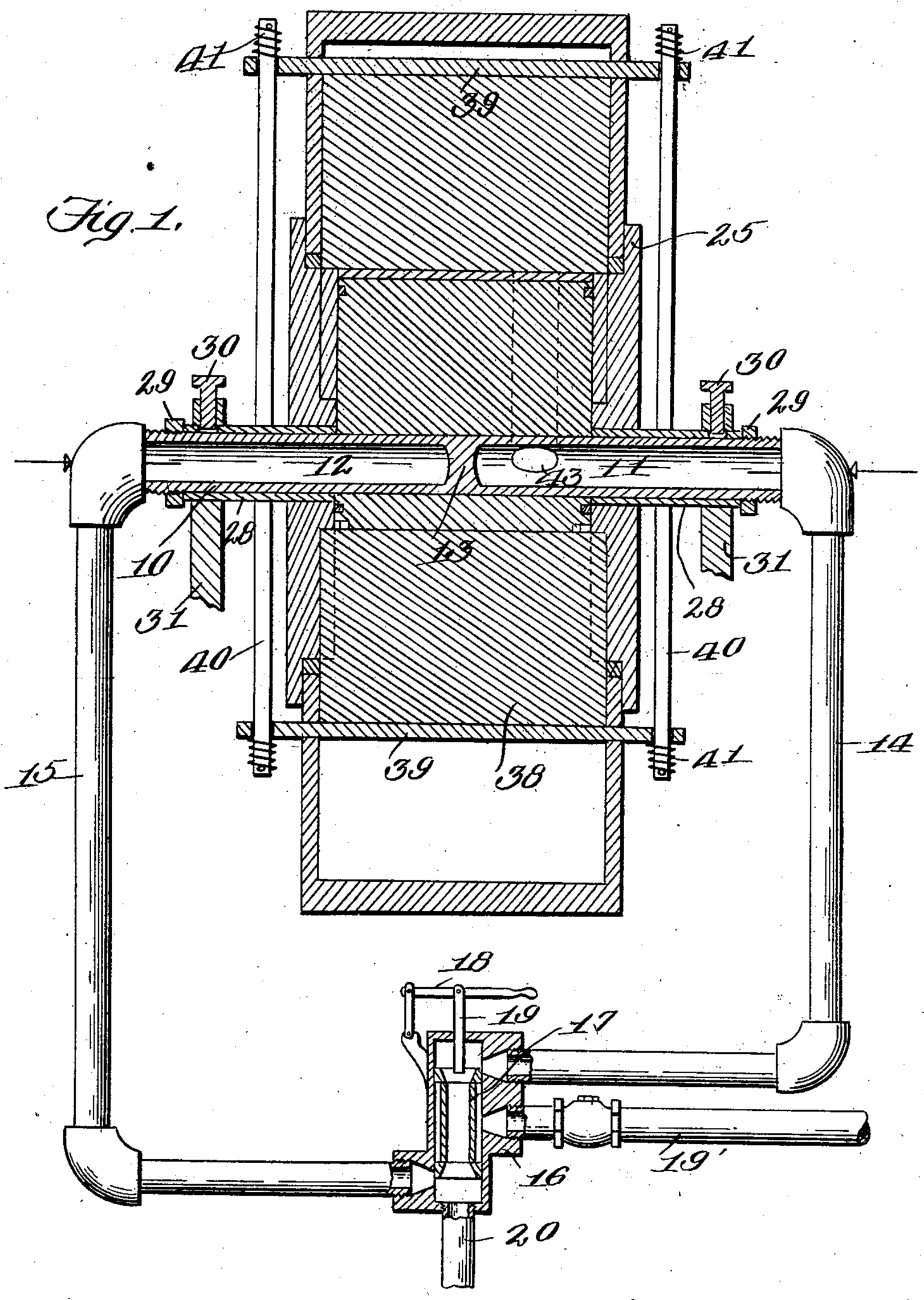
C. J. SKOWEN.

ROTARY MOTOR.

(Application filed Mar. 20, 1902.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

Fig. 5.

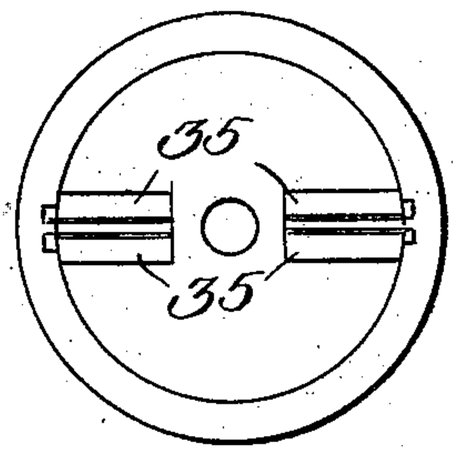


Fig. 4.

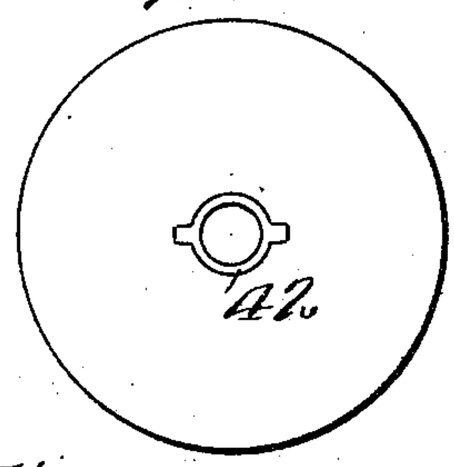


Fig. 3.

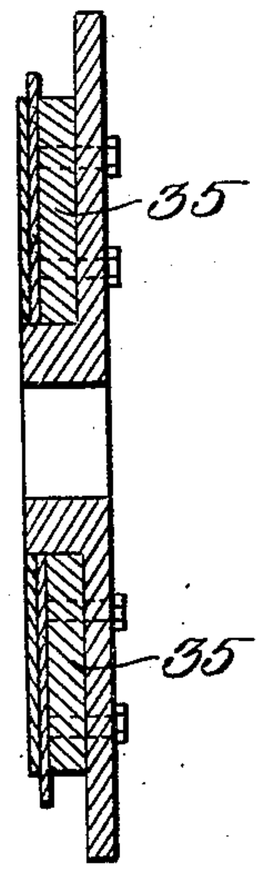
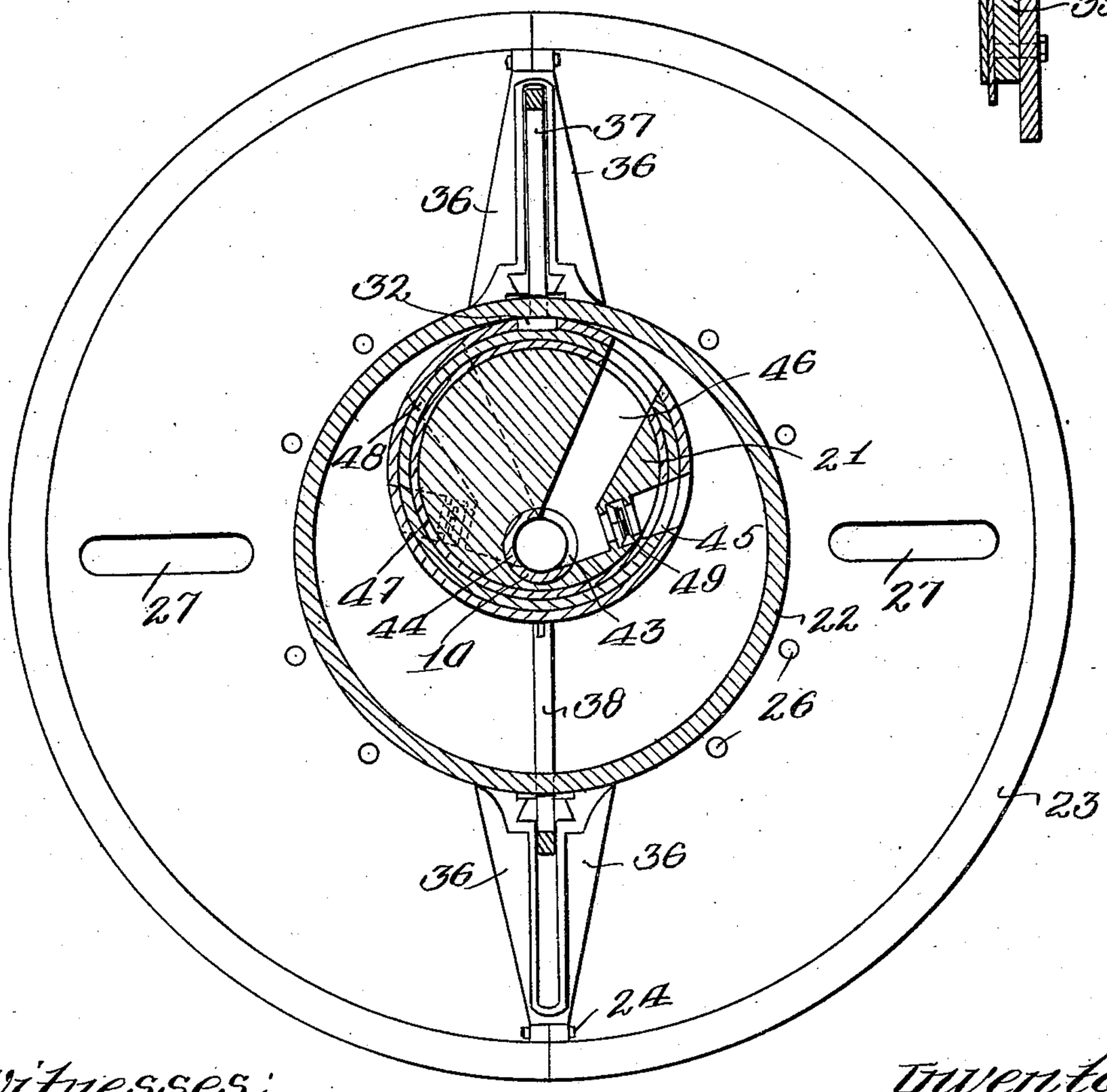


Fig. 2.



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No. 705,457. Patented July 22, 1902.

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ROTARY MOTOR.

(Application filed Mar. 20, 1902.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 7.

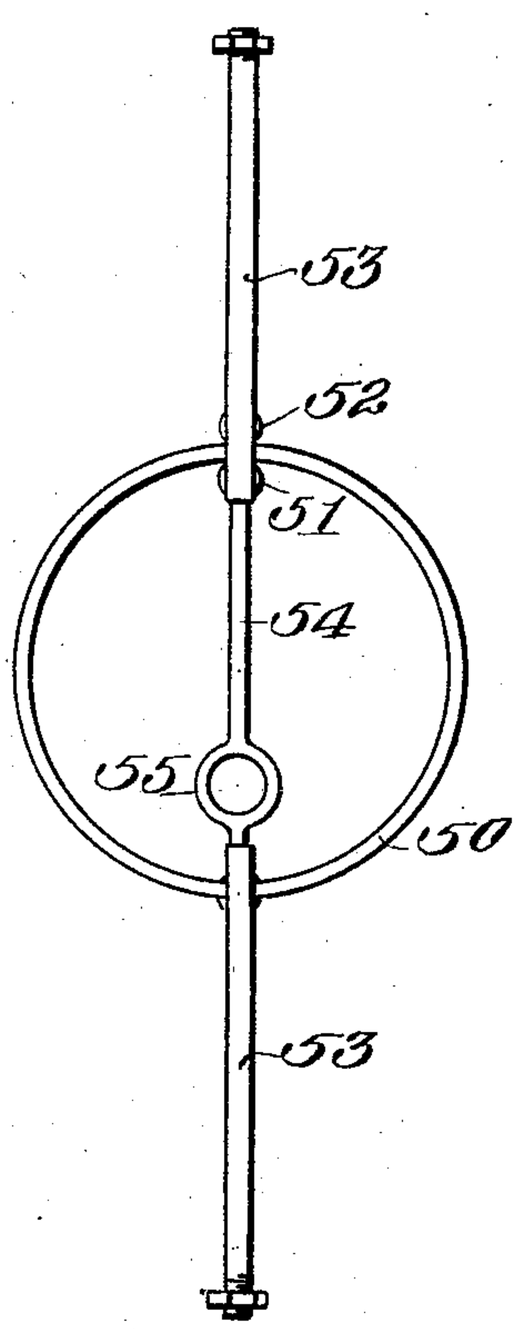


Fig. 8

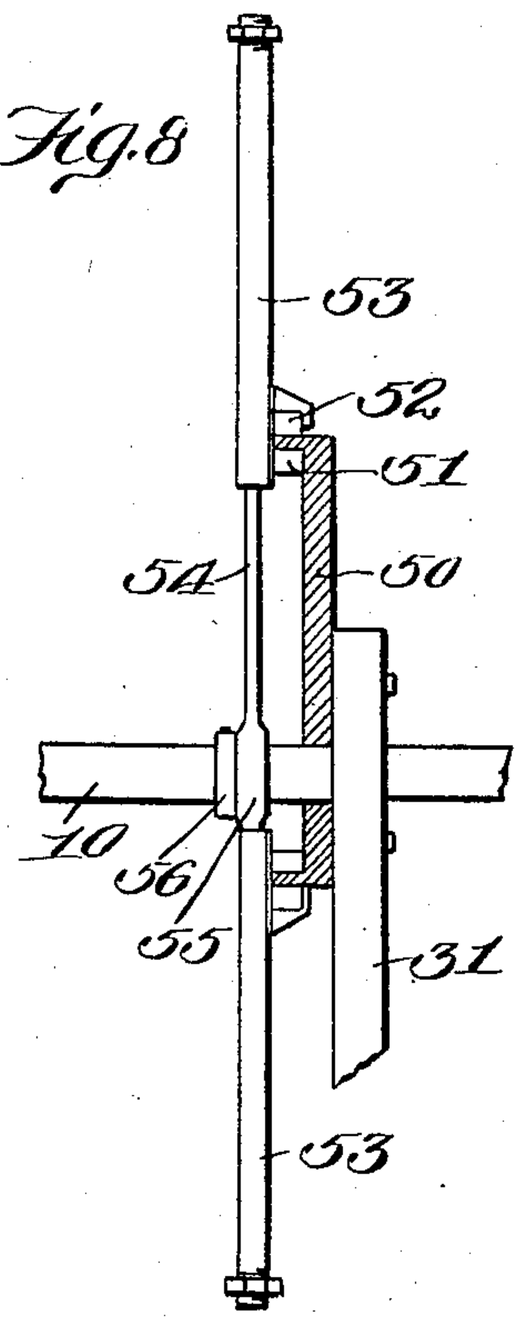
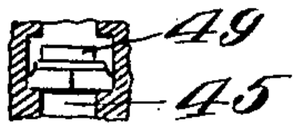


Fig. 6.



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UNITED STATES PATENT OFFICE.

CARL J. SKOWEN, OF NELSONVILLE, WISCONSIN.

ROTARY MOTOR.

SPECIFICATION forming part of Letters Patent No. 705,457, dated July 22, 1902.

Application filed March 20, 1902. Serial No. 99,211. (No model.)

To all whom it may concern:

Be it known that I, CARL J. SKOWEN, a citizen of the United States, residing at Nelsonville, in the county of Portage and State of Wisconsin, have invented new and useful Improvements in Rotary Motors, of which the following is a specification.

This invention relates to what I shall for convenience term a "rotary motor," and although I shall hereinafter describe the same as operated by steam it will be obvious that other motive agents can be employed for the same purpose—for example, compressed air—and the construction is such that I am enabled to secure the highest effect of the actuating fluid and rapid reversals of the rotation of the pistons.

The improved motor comprises a cylinder, a drum in said cylinder, and the periphery of the drum being in contact with the inner surface of the cylinder at one point, so as to provide a space in which the pistons can operate, a shaft passing through the drum and having independent compartments, and ports in the drum arranged in series in communication with said compartments, and one port in each case having a check-valve, such construction providing for the proper expansive effect of the actuating fluid and the exhaust of the same. By causing the said fluid to enter initially one or the other of the independent ports I am enabled to secure reverses, and the primary admission of such fluid is controlled by a manually-operated throttle-valve. In the present case the drum is in the form of a true cylinder, although this is not essential, and it is fixed to the hereinbefore-mentioned shaft and is eccentric relatively thereto, while the cylinder is rotative around a fixed drum, the pistons rotating with the cylinder and being adapted to project through circumferential slots in the cylinder and to be held against the drum by suitable means.

The objects and advantages of the invention will be set forth at length in the following description, while the novelty thereof will be embraced by the claims appended to such description, and said invention is clearly represented in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a vertical central sectional front elevation of a motor including my improvements. Fig. 2 is a transverse sectional elevation of the drum, cylinder, and fly-wheel, showing them assembled and, like the preceding view, omitting the check-valves hereinafter described. Fig. 3 is a cross-section of one of the heads of the cylinder. Figs. 4 and 5 are outside and inside views of said head, both on a reduced scale. Fig. 6 is a detail view of the check-valve operative in connection with the auxiliary ports. Fig. 7 is an inside face view showing a modified form of mechanism for holding the pistons in contact with the drum, and Fig. 8 is a sectional front elevation of the same.

Like characters refer to like parts in all figures of the drawings.

I desire at this point to state that the invention is not limited to the exact parts nor to the arrangement thereof hereinafter specified, for many changes as to these points may be made within the scope of my claims.

The motor includes in its construction a hollow shaft 10, divided into independent compartments 11 and 12 by the wall 13. The ends of the shaft 10 are connected with piping 14 and 15, connected in turn with the casing 16 of a throttle-valve 17. The valve-17 is operated by a lever 18, connected thereto by the link 19. The valve 17 is of the tubular kind and has heads at its opposite ends adapted to control the piping 14 and 15 where the same is connected with the casing 16. In Fig. 1 the valve is shown as occupying its normal position. The supply-pipe 19′ for the live steam is connected with the casing 16, and by raising or lowering the throttle-valve live steam or other motive agent can be admitted into one or the other of the pipes 14 and 15 and will pass from the latter into one or the other of the compartments 11 and 12 of the hollow shaft 10. If the supply initially enters the pipe 14, the exhaust will be discharged through the pipe 15 and will escape to the atmosphere through the exhaust-pipe 20, and vice versa.

A drum 21 is keyed or otherwise secured to the hollow shaft 10, and while said drum is shown as being a cylinder this is not essential, for it may be otherwise shaped. The drum 21 is shown in Fig. 2 as being disposed eccentrically to the shaft 10, and it is inclosed by the cylinder 22, capable of rotating around the fixed drum, and the sides of the drum are shown as being in contact with the

inner faces of the heads of the cylinder, and the periphery of said drum is in contact with the inner surface of the rim or body of the cylinder, by reason of which latter feature the water of condensation can flow by gravity from the motor. The cylinder 22 is surrounded in turn by the fly-wheel 23, consisting of complemental sections bolted together, as at 24, and the side webs of the fly-wheel can be bolted or otherwise secured to the annular flanges 25 of the heads of the cylinder 22, the bolts passing through bolt-holes 26, Fig. 2, formed in annular order in said webs. The said webs are further provided with elongated slots 27, which provide for the proper ventilation of the interior of the fly-wheel. The cylinder 22 turns upon bushings 28, extending through the heads of said cylinder and held against lateral displacement by nuts 29 on the hollow shaft 10 and prevented from moving vertically by the set-screws 30, tapped into the standards 31 and fitting in perforations near the outer ends of said bushings. The standards 31 serve as a suitable means for sustaining the parts. At the point where the periphery of the drum 21 is in contact with the inner surface of the body of the cylinder 22 I provide a packing, as 32, and other packings are also provided, as is customary in this class of apparatus, to provide against the escape of the motive fluid, and in some cases the packings can be held in place by springs, although I have not deemed it necessary to show the same. The inner faces of the heads of the cylinder 22 are provided with ribs 35, arranged in parallelism and adapted to coöperate with ribs, as 36, arranged upon the webs of the fly-wheel 23, the several ribs coöperating to form guideways for the pistons 37 and 38, respectively, it being understood that two ribs on each web of the fly-wheel are in radial alinement with the ribs 35 upon the heads of the piston, so as to form a continuous guideway for the pistons 37 and 38. I have shown two pistons, although this number may be varied, and they are represented as being diametrically opposite each other and as capable of playing through diametrically opposite slots in the body of the cylinder 22. The inner ends of the pistons 37 and 38, which are shown as consisting of flat plates, are held in contact with the periphery of the drum 21 as they revolve around the same, and in the form of the invention shown fully in Figs. 1 and 2 I provide springs for securing this result. Cross-bars, as 39, are secured suitably to the outer edges of the pistons 37 and 38 and project beyond the same, the outer ends of the cross-bars being perforated to receive the rods 40. The outer ends of said rods are encircled by coiled springs 41, bearing against stops on said rods and also against the outer ends of the cross-bars, and as said springs are of the protracting kind they act through the intermediate parts to hold the inner edges of the pistons against the periphery of the fixed drum 21 during the rotation of the cylinder 22 and pistons, respectively, it being understood that the pistons extend at all times through the slots in the body of the cylinder, so that as said pistons are operated by the impact of the fluid thereagainst they carry the cylinder 22, and hence the fly-wheel 23, therewith, and although I have shown no means for accomplishing the function the power from the motor may be taken from any of the rotating parts in some suitable manner. Stuffing-boxes, as 42, (see Fig. 4,) can be fitted against the outer faces of the heads of the cylinder 22 and can be secured in place in some suitable manner.

The stationary hollow shaft is provided with ports 43 and 44, respectively, situated in proximity to and at opposite sides of the dividing-wall 13, which, it will be remembered, separates the said shaft into independent compartments 11 and 12, respectively. The port 43 is adapted to register with the inner merging ends of ports 45 and 46, while the port 44 likewise coacts with similar ports 47 and 48, it being seen that the ports 45 and 46, 47 and 48 diverge away from each other outwardly and that the ports 46 and 48 are situated in proximity to and at opposite sides of the point of contact between the periphery of the drum 21 and the inner surface of the cylinder 22. The ports 46 and 48 are main ones, while the ports 45 and 47 are auxiliary thereto, said ports 45 and 47 being provided with check-valves, as 49, which are of a kind that will be closed outwardly by the pressure of steam acting thereagainst. The check-valves are not shown in Fig. 2, but one of them is represented in detail in Fig. 6, and said valves may be operated by hand or automatically through a governor, although I have shown no mechanism for accomplishing these results. The space in which the pistons 37 and 38 operate is substantially of crescent form, and one or the other, or both, of said pistons bridge at all times such space, so as to secure the proper action of the pistons, and the supply and discharge of the steam or analogous motive agent. The operation of the check-valves is such that when steam is being admitted into one or the other of the main ports 46 or 48 the check-valve of the adjacent auxiliary port 45 or 47 will be closed, so that the exhaust-steam can pass through both of the other ports. For example, when the steam is initially admitted through the port 46 the check-valve will be closed by such steam; but the exhaust can take place through both the ports 47 and 48, such exhaust in this case passing into the compartment 12 to the atmosphere through the pipe 15, valve-casing 16, and exhaust-pipe 20. To reverse the engine, the throttle-valve 17 will be operated to admit the steam primarily through the pipe 15 into the compartment 12, from which it passes through the port 48 into the interior of the cylinder 22. Assuming the pistons 37 and 38 to be rotating in the direction of the

arrow, the live steam will enter the piston-space through the port 46, and the moment that the piston 37 passes said port 46 there will be between said pistons 37 and 38 a body of steam which acts by expansion against the piston 38 so as to revolve the same, and this action will continue until both pistons have equal areas exposed to the steam-pressure. Beyond this point the live steam will advance the piston 37, and as the piston 38 passes the point at which the expansive effect of the steam is reached the exhaust will take place through the ports 47 and 48, and as there is a relatively considerable area exposed to the exhaust the latter can take place without any back pressure. On the reversal of the throttle-valve 17 the steam will enter initially through the port 48 and will result in the reversal of the movement of the pistons, the exhaust then taking place through the ports 45 and 46 and the exhaust in each case following the paths hereinbefore pointed out.

In Figs. 7 and 8 I have shown a modification of the means for securing the contact between the pistons 37 and 38 and the periphery of the drum 21, the shaft and standard being denoted, respectively, by 10 and 31, as in the case hereinbefore described. A cam 50 is shown as fastened to the standard 31, and it is eccentric, its diameter being the same as that of the drum 21, while the same applies with respect to the eccentricity of said cam. The cam 50 is provided with an inwardly-disposed flange 51 at its outer edge, adapted to fit between projections 52 upon the rods 53. The projections 52 are shown as being in the form of antifriction-rollers, and they are arranged in pairs, and one or both in each case may be adjustable. The rods 53 are socketed to receive the arms 54, projecting from the ring 55 upon the hollow shaft 10, the ring 55 being loose on said shaft and being held against inward movement by the stop-collar 56 on said shaft. The rods 53 are intended to extend through the perforations in the outer end of the cross-bars 39. The mechanism just described is located at opposite sides of the machine, and the cam 50 being fixed serves, through the intermediate parts as the cylinder 22 rotates, to hold the inner edges of the pistons 37 and 38 against the periphery of the fixed drum 21.

The fly-wheel may be of such a construction as to prevent undue heating of the rim thereof, although I have not shown it so constructed.

The machine hereinbefore described can be constructed at a low figure. All parts subject to wear can be replaced at small cost. It is simple and durable in construction. No base is required, as the machine may be supported by the standards or brackets hereinbefore described, and such a machine, capable of developing ten to twelve horse power, can easily be transported.

In some cases I may employ a single piston or may employ more than two, and in these cases the means for holding the piston or pistons in their effective positions will require to be slightly modified. If one piston is used, the ring 55 will have one arm 54; but if three pistons are employed a corresponding number of arms 54 will be necessary. These arms 54 are firmly secured to the ring, or they may be made integral.

The apparatus may be employed as a fluid-pump, the power to actuate the same being transmitted thereto in some convenient manner, or the fly-wheel may be used to transmit power, its periphery in this case being made of wood or other suitable material.

Having described the invention, what I claim is—

1. A motor having a cylinder, a drum in said cylinder, and the periphery of the drum being in contact with the inner surface of the cylinder, and the drum having ports in communication with the interior of the cylinder, pistons adapted to project through slots in the cylinder, cross-bars connected with the pistons and having their outer ends perforated, rods passing through the perforations of said cross-bars, and springs carried by the rods and bearing against the cross-bars.

2. A motor of the class described having a cylinder, a drum in said cylinder and the periphery of the drum being in contact with the inner surface of the cylinder, a stationary shaft passing through said drum and having independent compartments, ports arranged in series and the respective series communicating with said compartments, bushings fitted in the ends of the cylinder and surrounding said shaft, pistons extending through slots in the periphery of the cylinder, a fly-wheel surrounding the piston and having guides for said pistons and means for holding the inner ends of the pistons in contact with the periphery of said drum.

3. A motor of the class described having a cylinder, a drum in said cylinder and the periphery of the drum being in contact with the inner surface of the cylinder, a fixed shaft passing through the drum and having independent compartments, ports arranged in series and the respective series being in communication with the said compartments, bushings fitted in the ends of the cylinder and surrounding said shaft, a two-part fly-wheel surrounding the cylinder and provided with ribs mating with each other and having guideways, pistons slidable in said guideways and adapted to project through slots in the cylinder and means rotative with the fly-wheel for holding the inner ends of the pistons in contact with the periphery of the drum.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CARL J. SKOWEN.

Witnesses:
WM. T. WALLER,
N. J. LOBERG.