L. CLAWSON.

ROTARY AIR MOTOR.

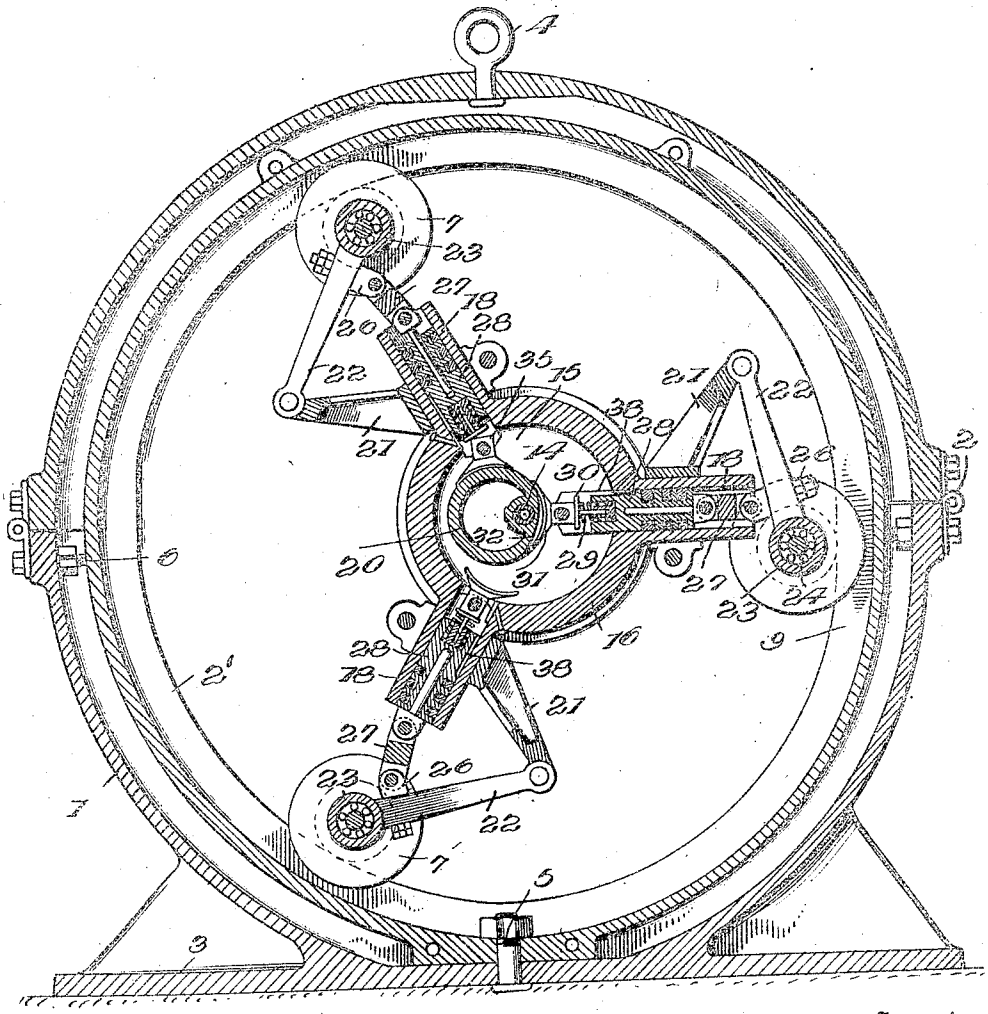
APPLICATION FILED JUNE 23, 1913.

1,115,397.

Patented Oct. 27, 1914.

3 SHEETS—SHEET 1.

FIG. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

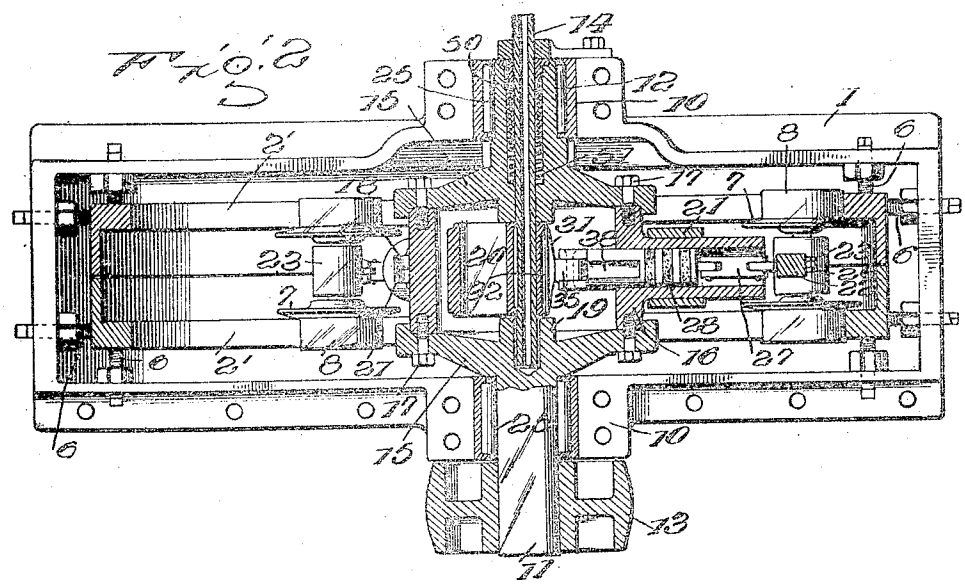


Fig. 3.

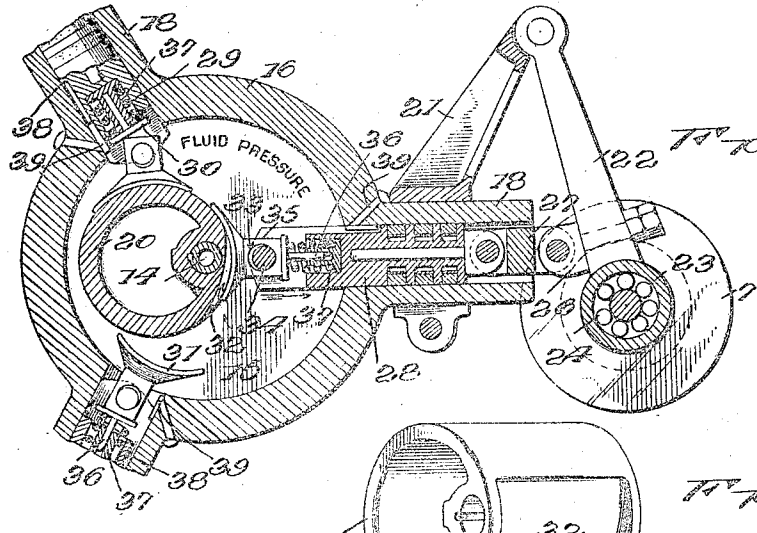


Fig. 4.

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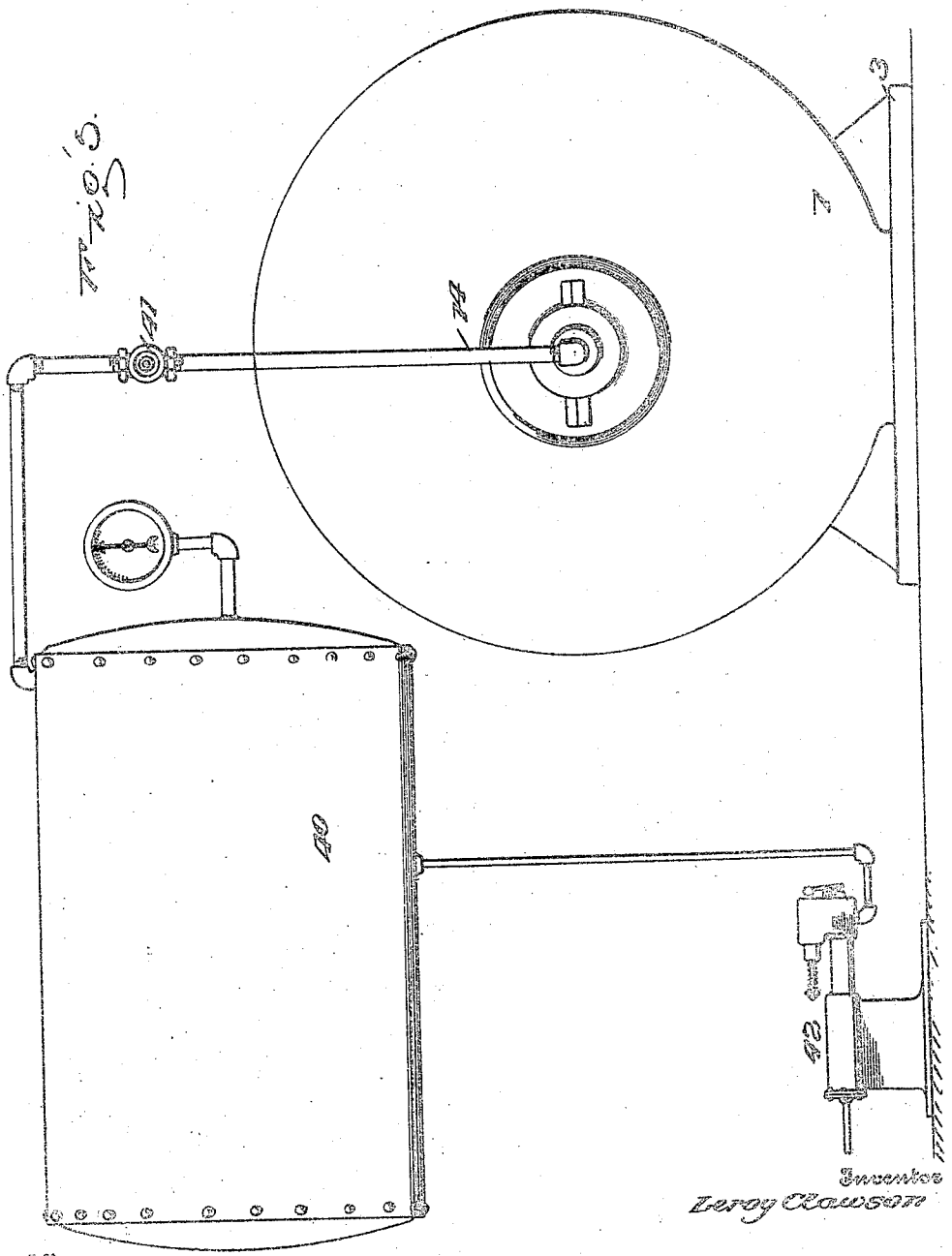
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

LEROY CLAWSON, OF HALL, MONTANA.

ROTARY AIR-MOTOR.

1,115,397. Specification of Letters Patent. Patented Oct. 27, 1914.

Application filed June 23, 1913. Serial No. 775,451.

To all whom it may concern:

Be it known that I, LEROY CLAWSON, citizen of the United States, residing at Hall, in the county of Granite and State of Montana, have invented certain new and useful Improvements in Rotary Air-Motors, of which the following is a specification.

My present invention relates to improvements in motors, and has for its object the provision of a motor of simple construction which may be efficiently operated by compressed air or similar fluid under pressure and which will be effectual for driving machinery.

The invention is illustrated in the accompanying drawings and will be hereinafter first fully described, the novel features being then subsequently particularly pointed out in the appended claims.

In the accompanying drawings: Figure 1 is a vertical longitudinal section of a motor embodying my improvements; Fig. 2 is a horizontal section through the same; Fig. 3 is an enlarged detail view; Fig. 4 is a detail perspective view of the fixed cam; Fig. 5 is a general diagrammatic view of the entire apparatus.

In carrying out my invention, I employ an outer casing or support 1 which is preferably constructed in two parts suitably secured together, as shown at 2 and which may be provided with a laterally extending web 3 to be secured to a base plate or bed and which may also be provided with an upper eye 4 to be engaged by transporting or shifting mechanism. Within this outer casing 1, I provide a track 2′ which is fixed to the outer casing by a bolt 5 and is held in its proper position within the casing by other adjusting set-screws 6 arranged at intervals around the casing and bearing upon the track so as to hold the members of the track together and in proper position to guide the traveling pistons. It will be noted more particularly upon reference to Fig. 2 that the track is composed of L-shaped bars rigidly secured together with their inner angles opposed so that the flanges 7 of the rollers 8 carried by the outer ends of the traveling pistons may engage the inner faces of the track and be thereby held against lateral movement. The lower portion of the track is elongated, relative to the upper portion, so that the section 9 of the track will permit the rollers riding thereon to have an appreciable drop and thereby permit the pressure to act freely upon the descending rollers. The said section 9 of the track is eccentric to the pressure chamber while the other lower quarter of the track is concentric thereto. The upper half of the track is eccentric to the pressure chamber and describes an arc having its center near the center of a cam hereinafter more particularly mentioned, the track section 9 describing a curve having its center at or near the lowest point in the circumference of said cam.

The casing is constructed with external bearings 10 in which are journaled the shafts 11 and 12, the shaft 11 being solid and having a band pulley 13 secured on its outer end, while the shaft 12 is hollow to permit the insertion therethrough of a pressure fluid inlet pipe 14. Upon the inner end of each of the shafts 11 and 12 is formed a head 15 of a rotary casing or chamber, which casing or chamber is completed by a ring or annular body 16 fitted between the said heads and rigidly secured thereto by bolts 17. The heads are constructed, as shown, with inwardly extending annular flanges which fit over and against the outer surface of the body and thereby relieve the securing bolts of side strain.

Radiating from the ring 16 are equidistant cylinders 18 which may be formed integral with the ring or may be otherwise rigidly connected therewith. The inlet pipe 14 extends entirely across the casing concentric with the ring 16 and has its inner end disposed within an internal boss 19 upon that side plate 15 carried by the solid shaft 11 and a small clearance space is provided between the inner surface of said boss and the outer surface of the inlet pipe to permit pressure fluid to escape into the chamber. A stuffing box 50 is formed in the hollow shaft around the inlet pipe to prevent leakage, and a spring 51 is arranged in the inner end of said stuffing box to hold the packing rings together while setting up the machine. The space around the spring will accommodate a supply of oil to maintain the packing rings in proper condition. The inlet pipe 14 and the shafts 11 and 12 are disposed eccentric to the outer casing and the track 2′ and nearer that side of the track which embodies the track section 9, while the cam which has been previously mentioned and is designated 20 is secured upon the inlet pipe between the side plates

15 and is so disposed that it extends away from that side of the track embodying the track section 9. Secured upon each of the cylinders 18 is a bracket or arm 21 to the outer end of which is pivoted a lever or swinging arm 22 provided at its free end with a journal box 23 through which the axle of a roller 8 extends, and anti-friction bearings 24 are provided between the said journal box and the axle to reduce the frictional wear, and, for the same purpose, roller bearings 25 are fitted within the journal boxes 10 around the shafts 11 and 12.

Fitted upon the swinging arm 22 near the outer end thereof is a clamp or similar securing device 26 to the inner end of which is pivoted a link 27, the inner end of said link having a stem slidably engaging a piston 28. The said piston 28 is slidably mounted within the cylinder 18 and is provided with packing rings to prevent leakage between the piston and the inner surface of the cylinder, as will be readily understood. The inner end of the piston will extend into the chamber provided by the plates 15 and the ring 16 when the piston is retracted and in the said inner end of the piston is fitted a spring 29 bearing upon a presser plate 30 which is slidably mounted in the inner end of the piston. A shoe 31 is provided adjacent the inner end of the piston and is constructed with a slot or slightly elongated opening 33 through which a pin 34 is inserted to pivotally attach the shoe to the inner end of the piston. The slot 33 is formed in an angular offset 35 of the shoe which bears against the presser plate 30, the said slot permitting the shoe to assume different angular relations to the piston, and the spring end presser plate permitting it to automatically accommodate itself to the cam at the point of contact therewith. The inner end of the piston is bifurcated and the angular stem or projection 35 is held within the bifurcation so that lateral movement of the shoe will be prevented. The presser plate is constructed with an outwardly extending guide pin or stem 36 which fits within a sleeve or hollow guide 37 inserted in the end of the body of the piston and the spring 29 is coiled around the said guide and the said stem so that when it expands it will tend to throw the presser plate outward but will yield when the shoe assumes an angular relation to the piston, as will be readily understood upon reference to the upper portions of Figs. 1 and 3.

The cam 20 is provided with a reduced portion or recess 32 on that side nearer the track section 9, as clearly shown. The cam as clearly shown, is hollow so as to avoid unnecessary weight, and the shoes 31 have smooth concave inner surfaces adapted to form a ground joint with the outer surface of the cam, the width of the shoe being greater than the extent of the recess axially of the cam.

The piston is constructed with a longitudinal groove 38 and a retainer or guide 39 is secured in the side of the ring 16 and extends through the same to engage the said groove 38 so that axial rotation of the piston within the cylinder will be prevented and the parts will be thereby held in their proper relations.

In setting up the motor for practical use a reservoir or storage tank 40 will be provided and the pipe 14 of the motor will be connected with the said storage tank and equipped with a stop cock 41 or any other convenient form of cut-off so that the pressure fluid may be admitted from the tank to the motor, as may be desired. The supply of compressed air may be maintained in the reservoir through any preferred form of air compressor, indicated conventionally at 42.

In the operation of the motor, the rollers engaging the elongated portion of the track will be in the position of a rolling body upon an inclined plane eccentric to the pressure chamber and will tend to descend the same, and, as the parts connected with the rollers are so arranged that they must travel therewith, rotary motion will be imparted to the inner casing or pressure chamber and the same will be forced to rotate around the cam 20. The compressed air admitted to the pressure chamber will act upon the pistons and tend to move the same outwardly in the respective cylinders so that, as each roller or pair of rollers approaches the elongated portion of the track, the rollers will be thrown outwardly and an increased leverage thereby obtained. The momentum acquired will carry the parts up the greater portion of the return circuit of the track concentric to the pressure chamber until a second piston and rollers connected therewith are in position to travel downwardly upon the elongated portion of the track. As each piston moves to an upper level the shoe connected with said piston will be brought closer to the cam 20 and, when it reaches that point at which the cam is closest to the cylinder, will be caused to fit against the said cam so that the pressure on the inner surface of the shoe will be relieved and the rollers then held to the track only by centrifugal force. The fluid pressure upon the convex surface of the shoe will tend to hold the same to the cam and draw the piston inwardly while traveling over the upper half of the cam, but in the continued rotation of the motor the shoe will pass over the recess or reduced portion 32 of the cam and the pressure fluid will then be admitted through the recess to the under side of the shoe so as to exert an outward force thereon and on the piston connected therewith, so

that the arm 21 will be swung outwardly and the rollers held in engagement with the elongated portion 9 of the track.

What I claim is:—

1. A motor comprising a stationary cam, a rotary pressure chamber entirely surrounding the cam in eccentric relation thereto, actuating elements carried externally by the pressure chamber, devices connected to said elements and extending into the chamber to ride on the cam, and means for admitting fluid pressure to the chamber to act on said last named devices.

2. A motor comprising a stationary vertically disposed track, a rotary pressure chamber, a cam arranged eccentrically within the pressure chamber, track-engaging members carried by the rotary pressure chamber, and members connected with the track engaging members and extending radially into the pressure chamber to bear upon the cam, the upper portion of the track being concentric with the cam and the lower portion of the track being elongated relative to the upper portion thereof, that part of the lower portion of the track upon which the track engaging members ride downwardly being eccentric to the pressure chamber and the remaining part thereof being concentric to said chamber.

3. A motor comprising an endless track, a rotary pressure chamber arranged eccentrically to said track, means for admitting pressure fluid to said chamber, a stationary cam disposed eccentrically within the pressure chamber and having a recess in its outer surface, radial cylinders carried by said pressure chamber, pistons slidably mounted in said cylinders, shoes carried by the inner ends of said pistons and adapted to bear upon the said cam to exclude pressure from their under sides and ride over the circumferential recess therein whereby pressure may be admitted to their under sides, and centrifugal rollers connected with the outer ends of the pistons and traveling upon the track.

4. A motor comprising an endless track, a rotary pressure chamber arranged eccentrically to said track, a pressure fluid supply pipe entering said chamber through one side thereof and constituting its axis of rotation, a cylindrical body fixed eccentrically upon said pipe within the pressure chamber, cylinders radiating from the said chamber, pistons mounted within the cylinders, shoes pivoted at the inner ends of the pistons and adapted to ride on said cylindrical body, means whereby the pressure in the chamber will release the shoes from the said body, and rollers connected with the outer ends of the piston to travel upon the track.

5. A motor comprising a support, an endless track arranged within the support, a pressure fluid supply pipe disposed eccentrically to the said track, a cylindrical body secured eccentrically to the said supply pipe, a pressure chamber mounted concentrically upon the said supply pipe to rotate about the same and inclosing said cylindrical body, cylinders radiating from the said pressure chamber, pistons mounted within the said cylinders, track-engaging members carried by the outer ends of the pistons, shoes having inner concaved faces adapted to bear upon the said cylindrical body and provided with outwardly extending angular stems slidably pivoted to the inner ends of the pistons, means whereby the pressure fluid may release the shoes from the cylindrical body, and yieldable devices mounted in the pistons and bearing upon the said angular stems to hold the shoes toward the said cylindrical body.

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

LEROY CLAWSON. [L. S.]

Witnesses:

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SAMUEL N. ACKER.