M. C. SHARPNECK.

AIR COMPRESSOR AND DRIVING MEANS THEREFOR.

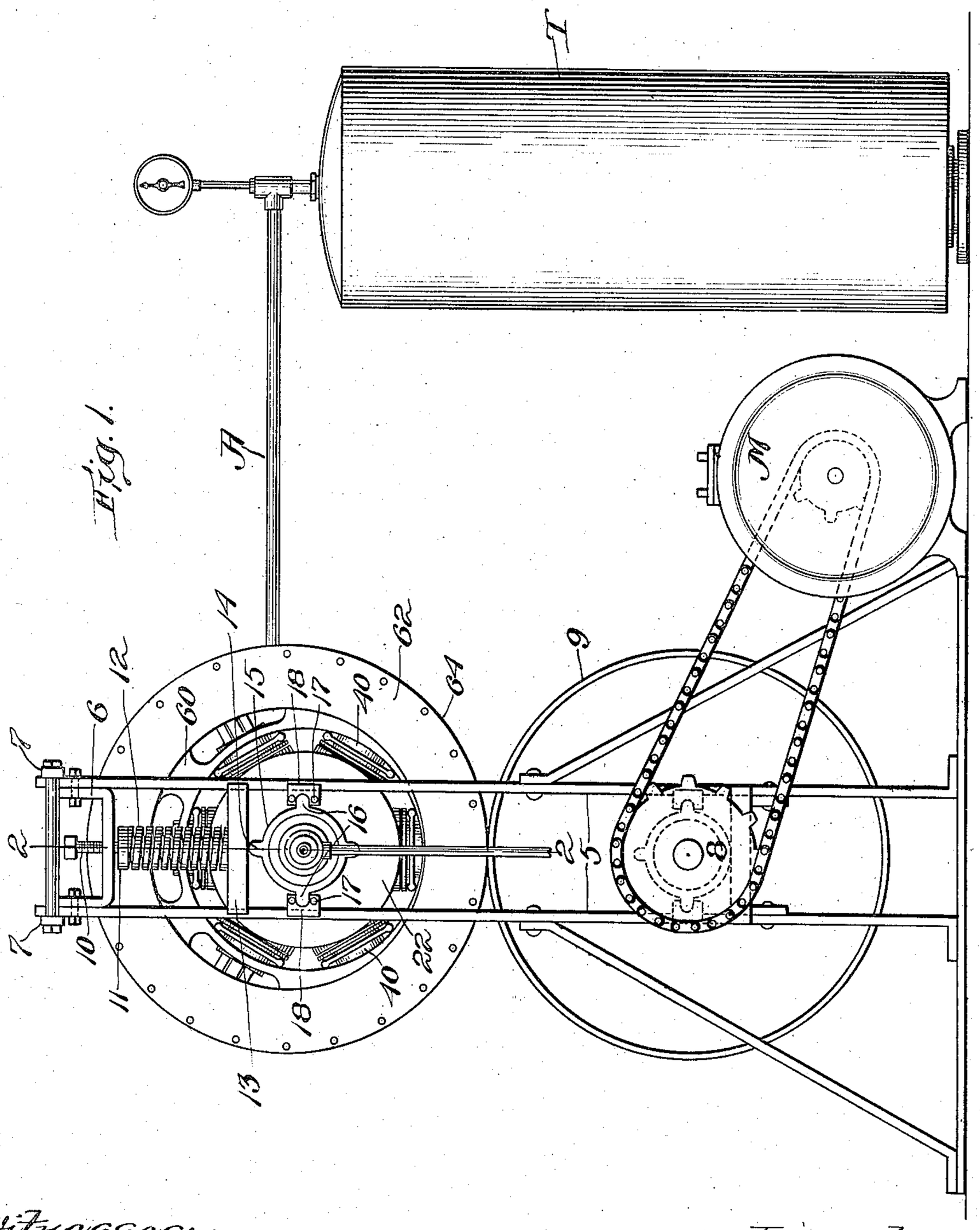
APPLICATION FILED JULY 29, 1908.

924,280.

Patented June 8, 1909.

3 SHEETS—SHEET 1.

Fig. 1.



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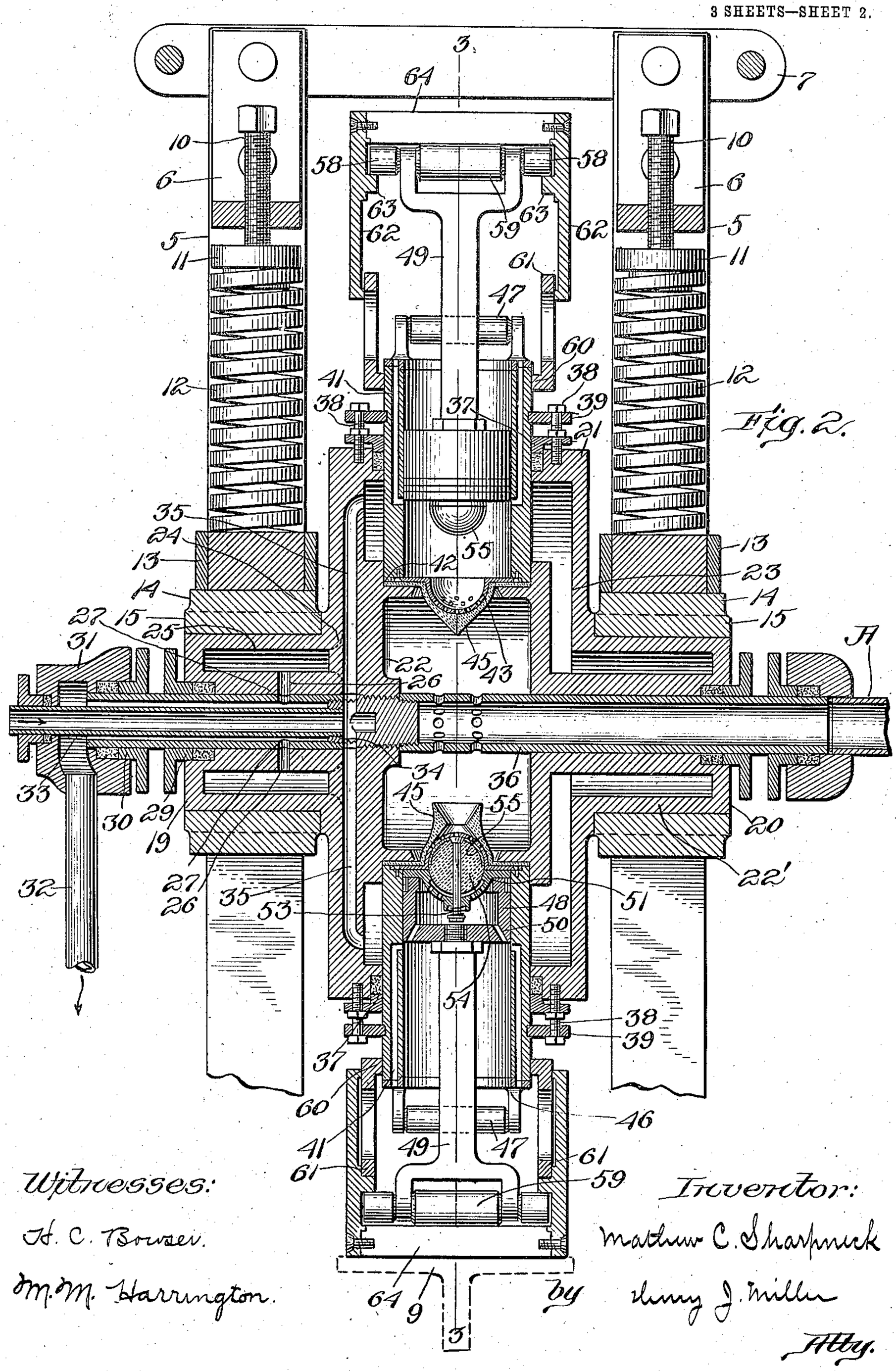

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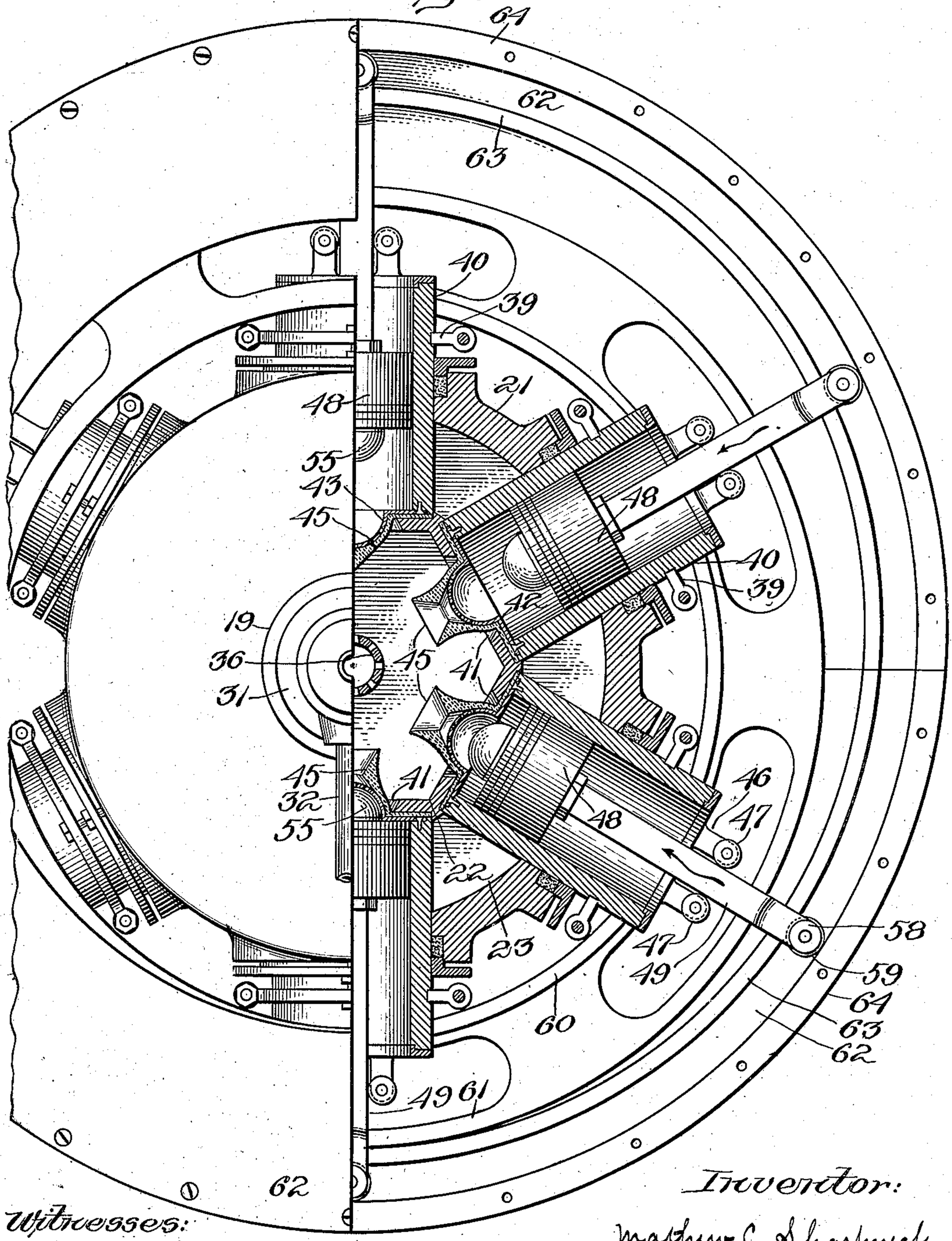
3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

MATTHEW C. SHARPNECK, OF BOSTON, MASSACHUSETTS.

AIR-COMPRESSOR AND DRIVING MEANS THEREFOR.

No. 924,280. Specification of Letters Patent. Patented June 8, 1909.

Application filed July 29, 1908. Serial No. 445,931.

To all whom it may concern:

Be it known that I, MATTHEW C. SHARPNECK, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Air-Compressors and Driving Means Therefor, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

This invention relates to improvements in air compressors having a series of air compressing pistons working in cylinders and driven by an eccentrically disposed rotatable member and in the means for driving said member.

One object of the invention is to improve the construction of air compressors of this general class.

Another object of the invention is to so construct a traction wheel air compressor that its annular actuating member may be driven from a traction way movable with relation to said annular member.

Other objects of the invention will appear from the following description of the machine and its manner of operation.

The invention consists in the combination with a traction wheel of a traction element movable with relation to such wheel.

The invention also consists in the combination with an air compressor having a series of pistons and an annular eccentrically disposed actuating member, of a pulley rotatably mounted and having its periphery in driving relation to such annular member.

The invention also consists in such other novel features of construction and combination of parts as shall hereinafter be more fully described and pointed out in the claims.

Figure 1, represents a side elevation of the improved air compressor and its driving means shown in relation to an air storage tank. Fig. 2, represents an enlarged sectional view of parts of the same taken on line 2—2 Fig. 1. Fig. 3, represents an enlarged detail view of parts of the traction wheel compressor shown partially in section as on line 3—3 Fig. 2.

Similar characters of reference designate corresponding parts throughout.

As shown in the drawings in its preferred form the traction wheel air compressor is mounted in a frame of suitable construction having pairs of vertical members 5—5 connected at their upper end portions by the plates 6—6, said pairs being braced by the cross rods 7—7. In bearings carried by the vertical members 5—5 is journaled the shaft 8 of a suitable pulley having the annular rim 9; provision being made for driving said pulley from any usual source of power, as by the motor M herein indicated.

Adjustably mounted in perforations of the plates 6—6 are screws 10—10 which bear against plates 11—11 at the upper ends of the springs 12—12 located between said plates 11—11 and the blocks 13—13 slidably mounted between the vertical frame members 5—5 and resting on the studs 14—14 of the bearing collars 15—15. which collars are furnished with the diametrically extending studs 16—16 engaged between pins 17—17 of the slides 18—18 free to move on the guides formed by the frame members 5—5.

Journaled in the collars 15—15 are the respective shafts or hubs 19 and 20 of the hub 21 having the hexagonal air chamber 22 embraced by the water chamber 23 which communicates by a series of channels 24—24 with the annular chamber 25 in hub 19 the inner wall of which has a series of channels 26—26 in registration with the perforations 27—27 of the water outlet pipe 28 located in the bore of said hub and having suitable stuffing boxes 29 and 30 the latter of which is mounted in the box 31, to which the outlet pipe 28 extends, which box is furnished with the waste pipe 32. Secured within pipe 28 is the water inlet pipe 33 at the inner end of which is mounted the plug 34 having branch channels which register with the radial channels 35—35 formed in the wall of the hub 21 and communicating with the water chamber 23 which chamber extends into the hub 20 to embrace the sleeve 22′ extending from the air chamber 22 and integral with said chamber and with said hub. Secured to the plug 34 is the axially disposed air delivery pipe 36 which is perforated at that portion within air chamber 22 and, at its outer end is journaled in a suitable stuffing box designed to be connected by a pipe F with the air tank T shown in Fig. 1.

The peripheral wall of the hub 21 is furnished with a series of openings, preferably six in number, having stuffing boxes 37—37 furnished with drawing bolts 38—38 which carry clamping rings 39—39 fitting peripheral grooves in the compression cylinders 40—40 having air channels 40′—40′ which cylinders are thus removably secured in said

openings in the wall of hub 21 and extend inward to seats in the wall of the air chamber 22 which seats communicate with the interior of said chamber 22 by flared openings 41—41. To the inner ends of said cylinders 40—40 are secured metallic plates 42—42 having centrally disposed perforated projections 43—43, approximately hemispherical in shape. Between said plates 42—42 and the wall of the chamber 22 are located sheets of rubber 44—44 furnished with cup shaped sleeves 45—45 which embrace the hemispherical projections or supports 43—43 and are retracted toward such supports by reason of their shape and material whereby the lips of these sleeves tend to close together when not distended by air under pressure passing inward through said sleeves.

At the outer ends of the cylinders 40—40 are mounted the frames 46—46 carrying guide rolls 47—47. Slidably mounted in the cylinders 40—40 are hollow pistons 48—48 having piston rods 49—49 and furnished with channels 50—50 while at their inner ends these pistons have concave perforated pockets 51—51 in the walls of which are slidably mounted rods as 52 furnished with retraction springs 53 and carrying the balls 54—54 having metallic caps 55—55 secured to said rods as shown in Fig. 2. At the outer ends of the piston rods 49—49 are rotatably mounted the rolls 58—58 and 59 of which the latter is of greater diameter.

Mounted on the cylinders 40—40 is the annular member 60 having side flanges 61—61 circular in shape and located between the side plates 62—62 furnished with the annular ways 63—63 which register with the flanges 61—61 and form guides for the rolls 58—58 while the rolls 59 ride on the inner surface of the annular traction member 64 formed of segmental sections removably secured between the side plates 62—62.

The traction member is designed to bear against the rim 9 of the drive pulley and to be driven by frictional contact therewith, and the weight of the hub and its related parts is sufficient to press the member 60 downward until the periphery of its flanges 61—61 bear on the ways 63—63 of the side plates 62—62 in which position the axis of the hub 22 is eccentric to the traction member 64 and said ways 63—63. If now the drive pulley is rotated the traction member 64 will be driven by its frictional contact with the flange 9 of said pulley and such motion will be frictionally transmitted from the ways 63—63 to those portions of the flanges 61—61 with which said ways are in contact so that the member 60 will be constantly rotated about an axis which is eccentric to the axis about which the traction member 64 rotates and the ways 63—63 will thus form eccentric paths for the rolls 59—59 of the plunger rods and hence said rods and their pistons will be forced inward as they travel below the longitudinal line of the axis around which the cylinders are driven and will be drawn outward as they travel in the arc above said line. When under said rotative movement of the traction wheel, the pistons 48—48 move inward they force the air in the cylinders 40—40 through the perforations in the hemispherical supports 43—43 and through the elastic valves 45—45 and as said pistons are retracted the valves 45—45 close. During the initial portion of such retraction the vacuum will tend to hold balls 54—54 seated in said hemispherical plates 43—43 and the pistons are free to move with respect to said balls until the concave seats 51—51 of said balls move slightly away and air is admitted between the balls and their seats to break the vacuum.

As the air is compressed in chamber 22 it is forced through the perforations in the delivery pipe 36 and thence through stuffing box 37 to pipe A through which it passes to a reservoir or to some point at which it may be used.

In order to prevent overheating of the parts and to cool the compressed air, water is forced through the inlet pipe 33 and passes from said pipe into the channels 35—35 from whence it circulates through the water chamber 23 and around the sleeve 22′ and back through the channels 24—24 into the compartment 25 of hub 19, through the perforations 26 and 27 and out through pipe 28.

It is of course evident that should the pressure in the air chamber 22 become greater than the pressure exerted by the weight of the compressing means combined with the pressure of springs 12—12 or their equivalent loading means the action of the pistons as they approach the lowest point in their rotation will tend to lift the air chamber and its attached parts including the member 60 and, in such case, the traction between the ways 63—63 and the flanges 61—61 of said member will be reduced somewhat. In such cases adjustment of the screws 10—10 will be sufficient to load the hubs 19 and 20 to a degree to again bring the flanges 61—61 into frictional contact with the ways 63—63.

If it becomes necessary to repair the cylinders, pistons or their valves the securing devices which fasten any particular segmental sections of the members 64 to the side plates 62 are withdrawn and such sections are removed. The bolts 38—38 may now be unscrewed and the clamping rings 39—39 may be released from the cylinders 40—40 whereupon said cylinders with their pistons may be withdrawn for examination or repair and access may be had to the rubber valves 45.

Actual practice demonstrates great economy in the operation of the rotary air compressor by frictional contact with a moving driving member as distinguished from a rail

over which traction wheels have heretofore been driven, which is herein shown as a rotatable pulley but I do not wish to restrict myself as to the specific construction of such moving driving member as I am aware that two or more traction wheels having traction members similar to that marked 64, in frictional contact, may be utilized in place of said pulley; the hub of one of said wheels being driven in any ordinary manner.

Having thus described my invention I claim as new and desire to secure by Letters Patent.

1. The combination with a hub rotatably mounted in a stationary support and carrying slidably mounted operating members, and a circular member embracing said hub and adapted to be frictionally driven, of an annular rim rotatable independently of said hub and eccentric thereto and having a way engaged with said operating members and adapted to frictionally engage said circular member, and means for driving said rim.

2. The combination with a rotary driving element, of a rotary air compressor having an annular rim, in frictional contact with the periphery of said driving element, a hub within said rim and furnished with a circular member adapted to be frictionally driven by said rim.

3. A rotary air compressor comprising a hub rotatably mounted, and having an air chamber and a water chamber partially embracing said air chamber, a series of air compressing devices extending radially through said water chamber and communicating with said air chamber, and means for operating said compressing devices during the rotation of said hub.

4. A rotary air compressor comprising a hub having an air chamber and a water chamber having inlet and outlet channels, an axially disposed air delivery pipe communicating with said air chamber, an axially disposed water supply pipe communicating with the inlet channels of said water chamber, and a waste water pipe communicating with the outlet channels of said water chamber.

5. A rotary air compressor comprising a hub having an air chamber and a water chamber embracing said air chamber, a series of radially extending cylinders removably secured in the wall of the water chamber and having their inner ends seated in the wall of the air chamber, pistons slidable in said cylinders, and an annular traction member in operative relation to said pistons and having a rim formed of a series of segmental sections removably secured between side plates.

6. A rotary air compressor comprising a hub having an air chamber, a series of radially extending cylinders communicating with said air chamber, valves at the inner ends of said cylinders, pistons slidable in said cylinders and having roller bearings at their outer ends, a circular member mounted on said cylinders, and a rim having side plates furnished with annular ways and forming guides for the roller bearings of the pistons, and a traction rim secured between said side plates.

7. The combination with a frame, a pulley rotatably mounted in said frame and having a peripheral tread, and means for driving said pulley, of bearing blocks slidably mounted in said frame with respect to said pulley, and a rotary air compressor journaled in said bearing blocks and furnished with an annular traction member having a rim in frictional contact with the tread of said pulley and designed to be normally supported thereby eccentrically to the axis of said compressor, and a circular member mounted on said air compressor and adapted to be frictionally driven by said traction member, substantially as and for the purpose described.

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