

No. 886,428.

PATENTED MAY 5, 1908.

J. SHOUREK.

DUPLEX AIR PUMP.

APPLICATION FILED JAN. 8, 1907.

5 SHEETS—SHEET 1.

Fig. 2.

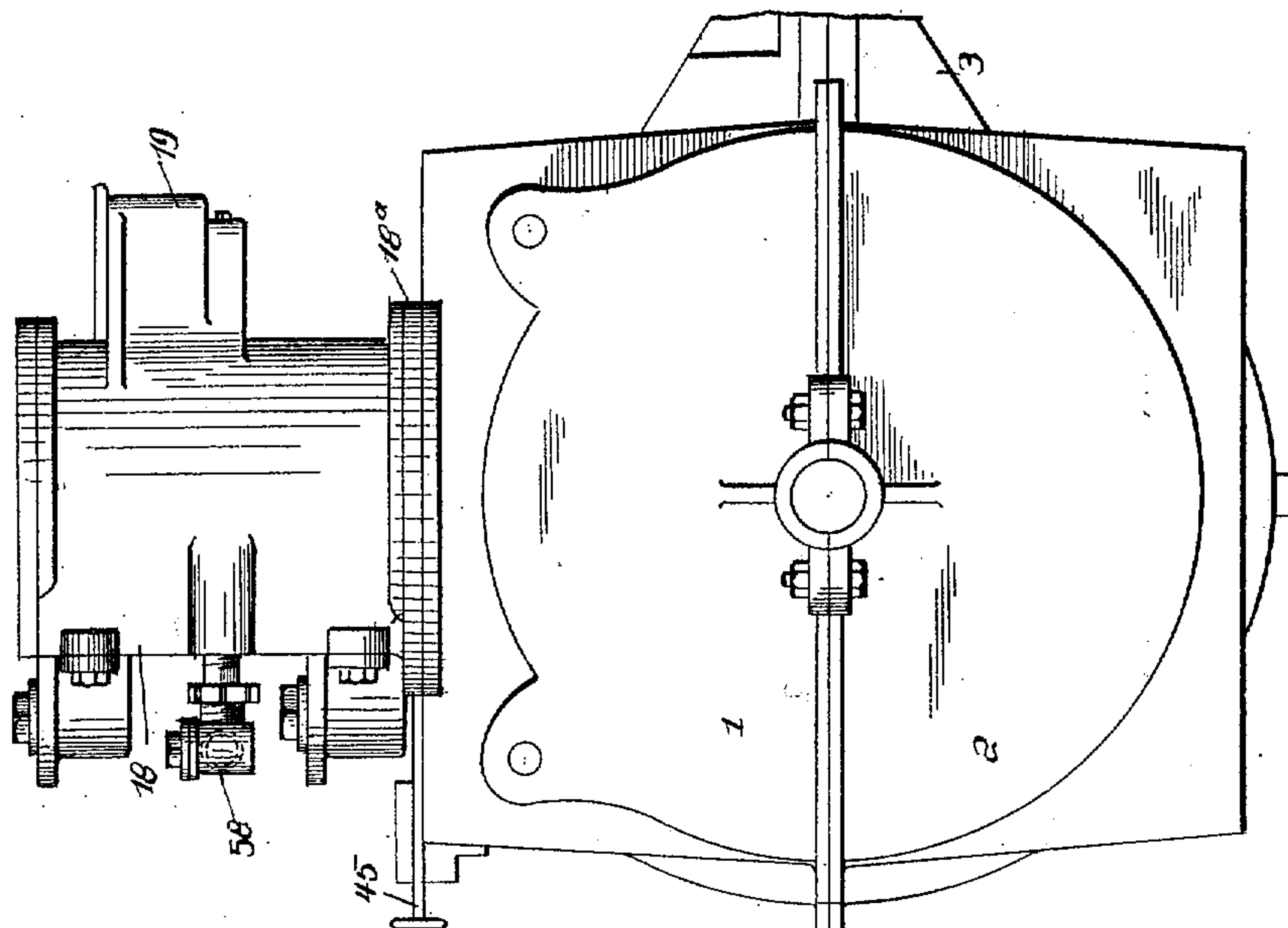
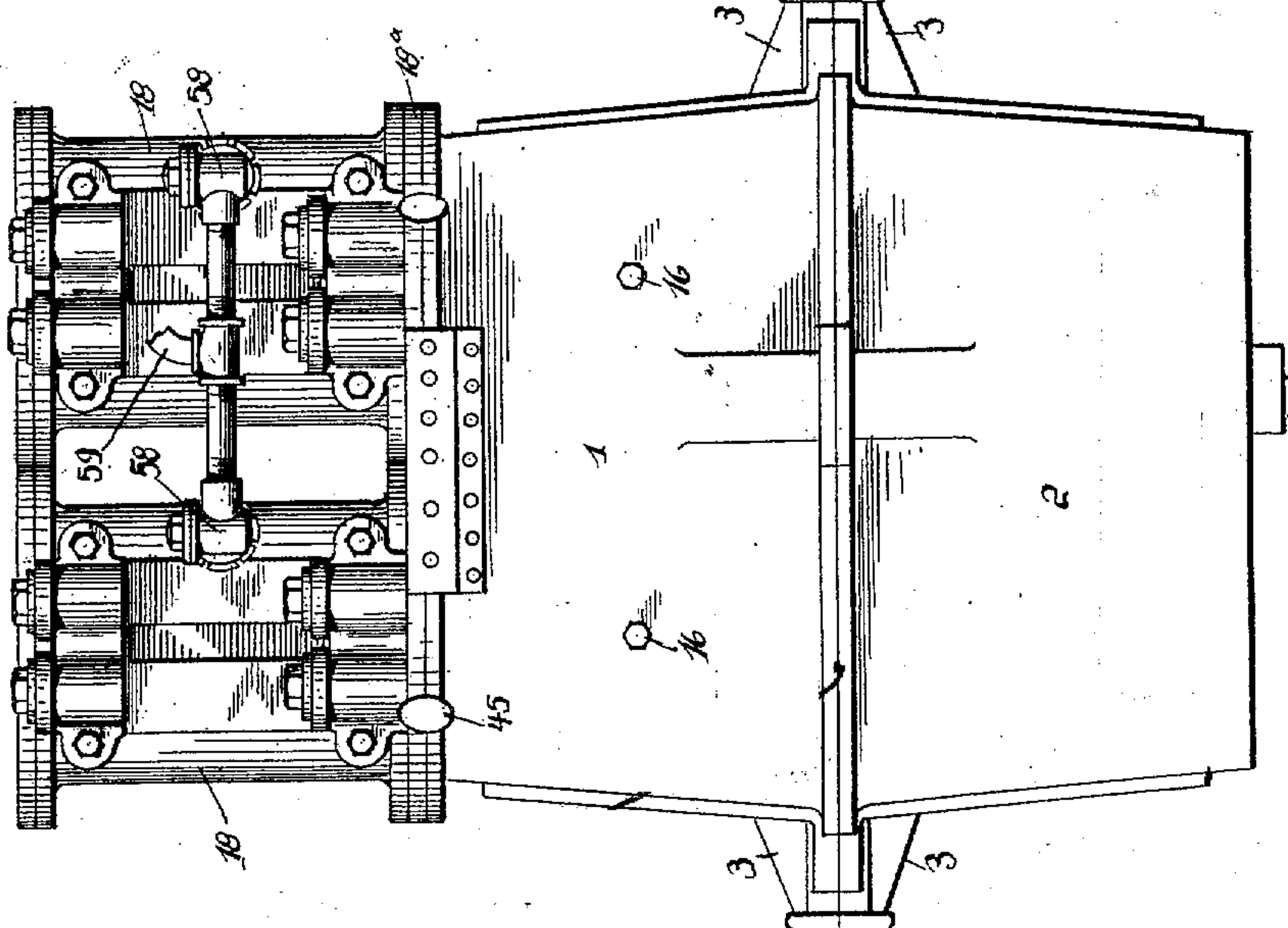


Fig. 1.



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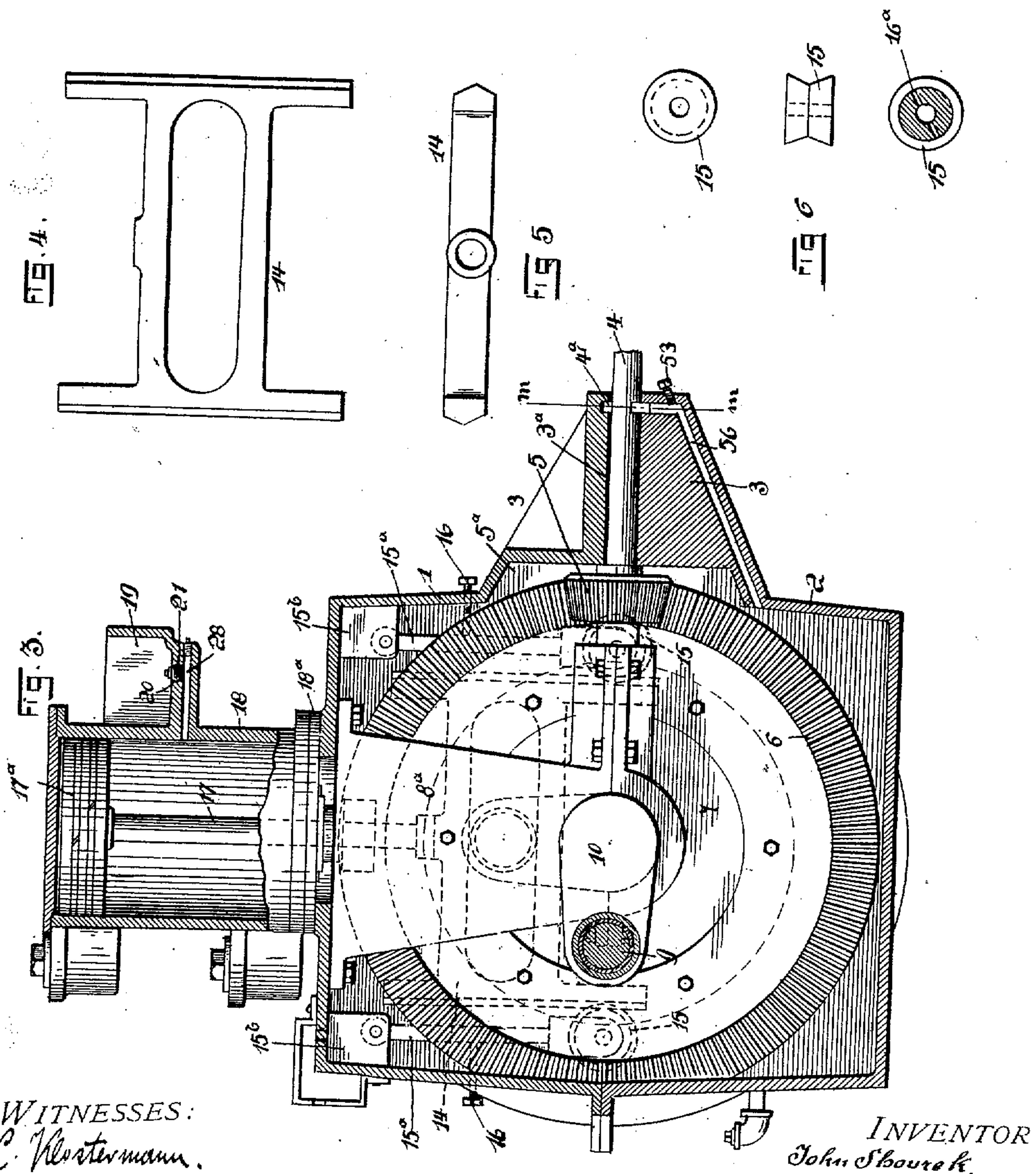
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5 SHEETS—SHEET 2.



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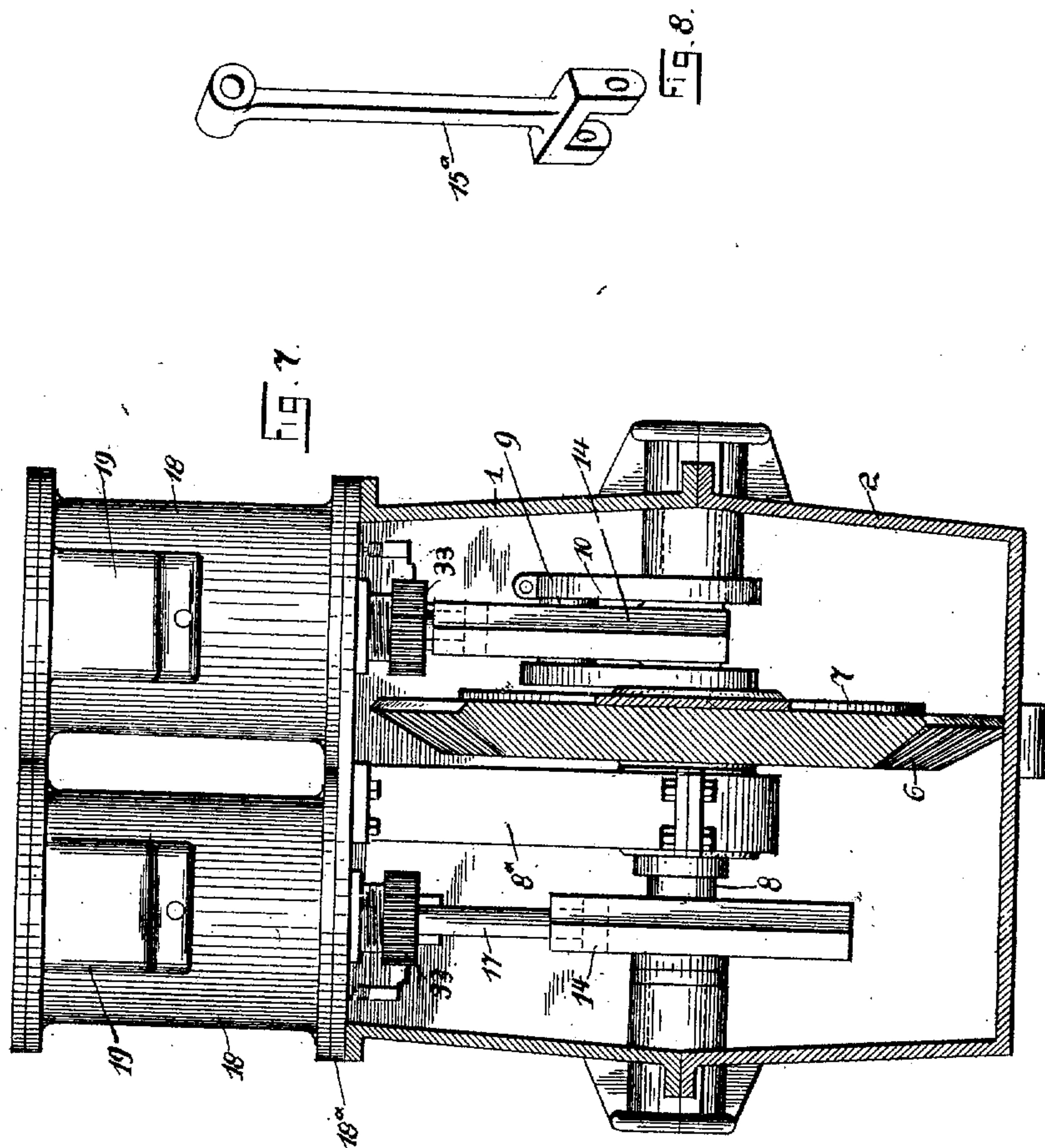
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5 SHEETS—SHEET 3.



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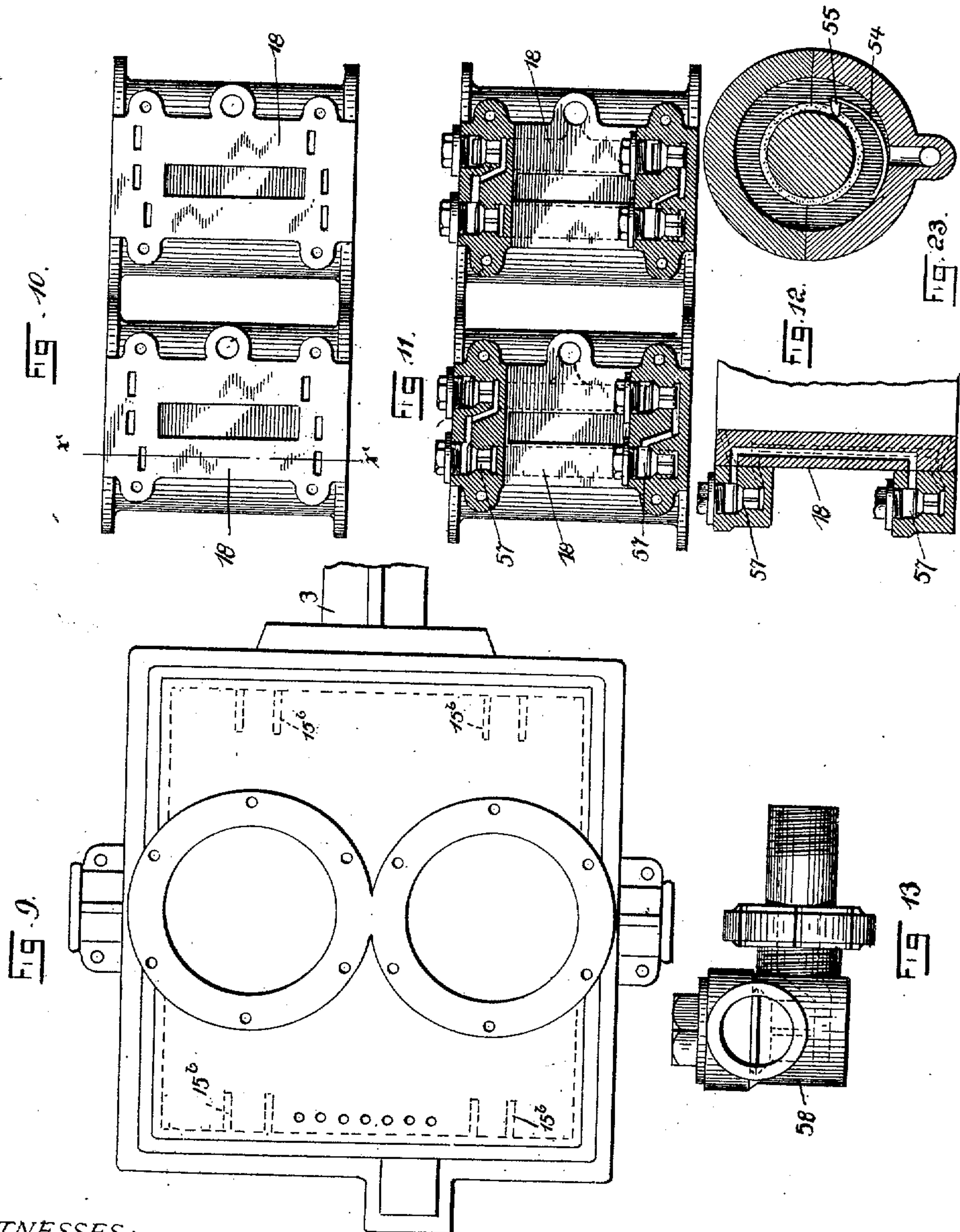
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6 SHEETS—SHEET 4.



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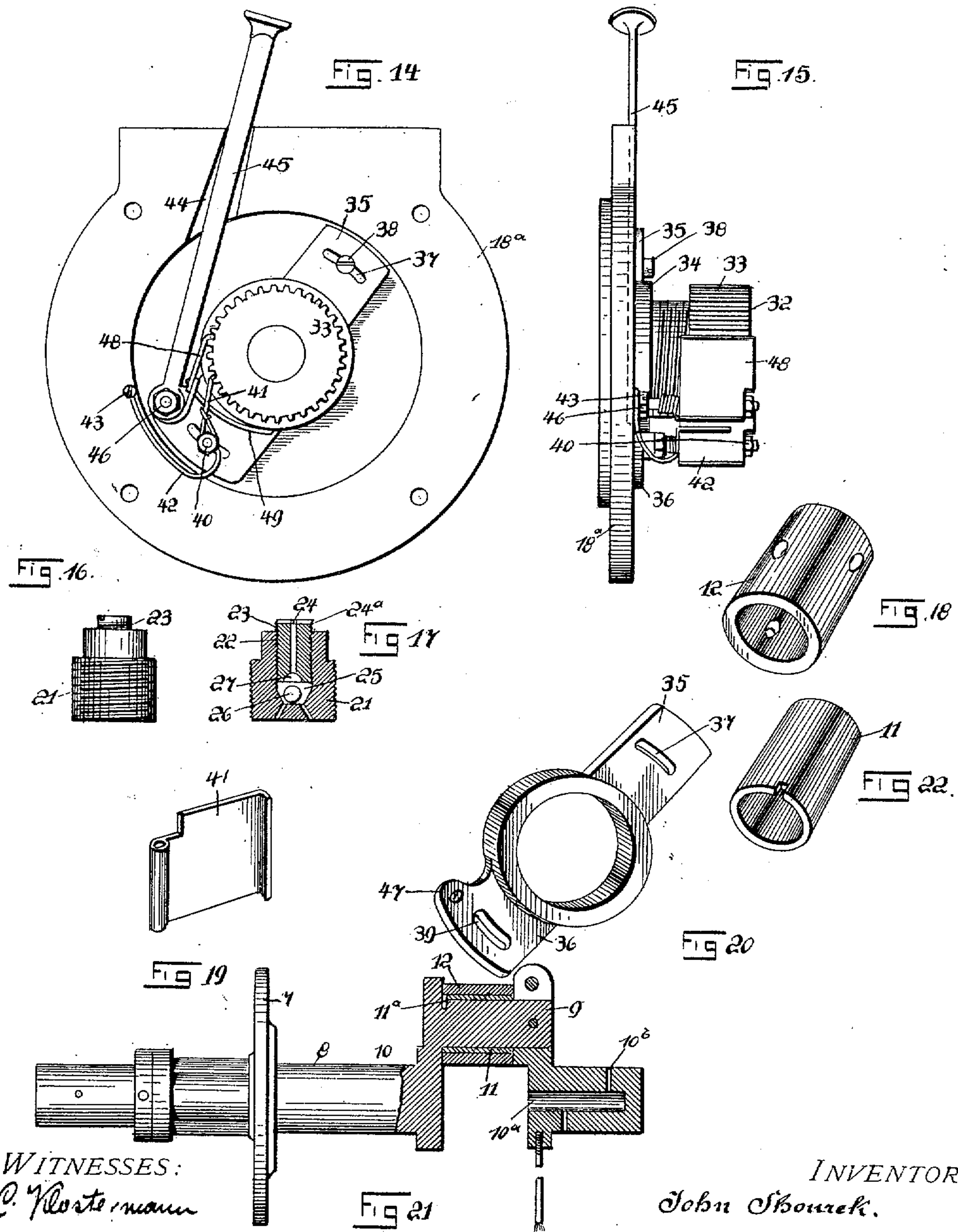
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6 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

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DUPLEX AIR-PUMP.

No. 886,428.

Specification of Letters Patent.

Patented May 5, 1908.

Application filed January 9, 1907. Serial No. 351,490.

To all whom it may concern:

Be it known that I, JOHN SHOUREK, a citizen of the United States of America, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Duplex Air-Pumps, of which the following is a specification, reference being had therein to the accompanying drawing.

10 This invention relates to duplex air pumps, and more particularly to a pump of this type adapted especially for use in connection with air brakes on street cars or the like.

15 My invention contemplates the construction of a pump of this type wherein the stroke of the pistons will be uniform, the friction of the cross heads greatly reduced, and a free and easy movement of the working parts of the pump obtained.

20 A further object of the invention is to provide a novel form of stuffing box wherein the packing may be easily tightened from the outside of the pump casing, thus obviating the necessity of removing any part of the casing or the mechanism in order to adjust the packing.

25 A still further object of the invention is to provide novel means for lubricating the working parts of the mechanism to insure the easy operation of the parts.

30 With the above and other objects in view, the invention consists in the novel construction, combination and arrangement of parts to be hereinafter more fully described and specifically pointed out in the claims.

35 In describing the invention in detail, reference is had to the accompanying drawings, forming a part of this specification, in which:—

40 Figure 1 is a front elevation of a duplex pump embodying the invention, Fig. 2 is a side elevation of the same, Fig. 3 is a central longitudinal vertical sectional view, Fig. 4 is an elevation of one of the cross-heads employed, Fig. 5 is a top plan of the cross head, Fig. 6 illustrates one of the grooved rollers for supporting the cross-head, the same being shown in side elevation, in plan and in central vertical section respectively, Fig. 7 is a vertical section of the pump with the piston cylinders in elevation, Fig. 8 is a view in perspective of one of the yokes for supporting

the cross-head rollers, Fig. 9 is a top plan view of the casing with the cylinders removed, Fig. 10 is a front elevation of the piston cylinders with the valve casings removed therefrom, Fig. 11 is a similar view with the valves and valve casings shown in section, Fig. 12 is a vertical section on the line $x-x$ of Fig. 10, Fig. 13 is an elevation on an enlarged scale of one of the discharge valve casings, Fig. 14 is a rear elevation of one of the cylinder heads showing the improved means for adjusting the packing, Fig. 15 is a side elevation of the same, Fig. 16 is a side elevation of one of the oil feeding valves carried by the cylinders, Fig. 17 is a central vertical section of the same, Fig. 18 is a detail perspective of the sleeve which surrounds the crank shaft pin, Fig. 19 is a detail perspective of one of the pawls employed in connection with the packing adjusting mechanism, Fig. 20 is a perspective view of the collar and plate forming a part of the packing adjusting mechanism, Fig. 21 is a side elevation partly in section of the crank shaft, Fig. 22 is a perspective view of the inner sleeve surrounding the crank shaft, and Fig. 23 is a section on the line $m-m$ of Fig. 3.

75 The operating mechanism of my improved pump is inclosed in a casing which is made in two sections, the upper section 1, and the lower section 2, the latter forming a lubricant receptacle as well as acting as a part of the casing for the pump mechanism. Each of these sections 1 and 2, carries an extension 3, which extensions, like the casings, are flanged on their meeting edges and securely bolted together. These extensions 3, form a bearing for the drive shaft 4, and this bearing is preferably provided with such filling as Babbitt-metal or the like as indicated at 3^a. The bearing is also provided near its outer end with an annular chamber 4^a, forming the oil receptacle which will be hereinafter more specifically referred to.

85 The drive shaft 4 carries a beveled pinion 5, which rotates within the recess 5^a in the one end of the extension 3, and meshes with the drive cog 6, which is bolted or otherwise rigidly affixed to the disk 7, that is in turn rigidly mounted upon the crank shaft 8. This crank shaft 8 is mounted in a hanger 8^a depending from the top of the casing 1 and

the crank shaft is provided with wrist pins 9, 9. To each of the wrist pins 9 is rigidly secured a crank arm 10, the journal portions of which are provided with a longitudinal bore or openings 10^a and with transverse feed ports 10^b whereby the oil or other lubricant may be fed through the central bore 10^a and through the ports 10^b to the exterior of the crank shafts and their bearings. To this end, the stuffing boxes which are arranged in the plate 18^a extend within the casing and having a packing arranged therein and held by means of a gland. This gland extends into the stuffing box, and is surrounded by the interiorly screw-threaded cap 32, which threads onto the stuffing box. This interiorly screw threaded cap 32 is provided with exterior teeth whereby the cap is made to act as a ratchet wheel 33. The collar 34 is mounted in the unthreaded portion of each stuffing box, and this collar (see Fig. 15) is provided with extensions 35 36, projecting from opposite sides thereof. These extensions form guides and to this end are provided with slots 37, 39 respectively, the former receiving the screw 38 which acts as a stop to limit the movement of the collar at each operation, and the latter receiving the pin 40 secured to the exterior of the cylinder head. On this pin or bolt 40 is mounted a pawl 41, which engages with the teeth of the ratchet wheel 33, and the function of which is to prevent any backward movement being imparted to said wheel 33. This pawl is held in constant engagement with the ratchet wheel 33 by means of a spring 42, one end of which is engaged back of the pawl 41, carried around the pin 40, and its other end fastened to the pin 43, carried by the cylinder head. The plate 18^a is provided with a notch or recess 44, the walls of which are slightly inclined so that the notch is wider at its lower than at its upper end. Through this notch or recess is extended an operating lever 45 for actuating the wheel 33. This lever is pivotally mounted at its lower end to the pin 46, secured in the extending lug 47 of the guide extensions 36. This lever carries a pawl 48 for engagement with the ratchet wheel 33, said pawl being normally held in engagement with said ratchet wheel by means of a spring 49; one end of which is passed through the pawl and bent over, the said spring being wrapped upon the pin 46, with its other end rigidly affixed to the lever 45 or other convenient point.

As stated, one of the objects of my invention is to effectually and automatically lubricate the working parts of the mechanism, and to this end a series of brushes 50 are secured upon the crank arms 10, these brushes dipping in the lubricant to be contained in the bottom of the casing, and carrying the same to the different parts of the mechanism

during the revolution thereof. The oil carried by these brushes drips down into the passages 10^a and 10^b , effectually lubricating the crank arms 10.

The oil which is carried along by the drive shaft into the chamber or reservoir 4^a , is removed by means of a scraper 55, carried on the spring 54, secured in one of the extensions forming the bearing 3. As the scraper removes the oil from the drive shaft 4, oil drops down the passage ways 56 into the lower extension forming the casing.

In order to supply the lubricant to the casing without opening the same, I preferably provide a port in the end of the extension which is normally closed by means of the screw 53. The suction valves 57 are connected to the front faces of the cylinders 18 and are provided with suitable inlet and exhaust ports controlled by suitably arranged valves, and the discharge valves arranged in casings 58 connect with a flexible pipe 59.

In operation, power is applied to the drive shaft 4, and through the latter rotary movement is imparted to the drive cog 6, rotating the crank shaft 8 and communicating movement to the cross heads 14, which reciprocate on the rollers in the casing and impart a vertical reciprocatory movement to the pistons in the cylinders.

Attention is called to the fact that the crank pins of the crank shaft are set at an angle of 90 degrees, and consequently the piston heads will pass each other near the forward end of the stroke, instead of passing each other at or near the center of their travel as would be the case where the crank pins are set at an angle of 180 degrees. By this means I am enabled to obtain more power with a much shorter stroke of the pistons. Should the packing become loose the same may be tightened by forcing inwardly on the lever 45, which will operate the pawl 48, and cause the collar 34, to partially rotate, movement being limited by the ends of the slots 37, 39, engaging stops 38 and 40. The lever 45 is then pulled outwardly, and the pull will impart a partial rotary movement to the wheel 33, causing the latter to force the gland, inwardly and compress the packing, the wheel 33 being effectually held against any backward movement during the operation of the lever 45, by means of the spring pressed pawl 41, which is in engagement with said ratchet wheel at all times.

It is preferable that the bearings for the crank shaft be closed at the ends by plates, so that the lubricant will not be discharged at the ends of the crank shaft.

An air compartment A is secured to the front of the casing communicating with the interior of the casing and perforated along its front wall for the admission of air. Thus the air is supplied to the casing and is drawn

therefrom into the cylinders by the movement of the pistons.

While I have herein shown and described my invention in detail, as the same is used in practice, yet it will be observed that in the construction, various changes may be made without departing from the general spirit of my invention.

What I claim and desire to secure by Letters Patent, is:—

1. In a duplex air pump, the combination with a casing, of a crank shaft therein, means for revolving said shaft, vertically disposed cylinders supported on said casing, pistons within the cylinders, piston rods connected to said pistons, cross-heads connected to said piston-rods, and lubricating devices for said cylinders each comprising a lubricant chamber having an oil passage leading to the cylinder, a threaded sleeve formed with an oil chamber and oil discharge ports, a hollow plug within said sleeve formed with a valve seat, and a ball valve within said oil chamber and adapted to fit said seat.

2. In a duplex air pump, the combination with a casing, of a crank shaft mounted therein, a plurality of cranks on said shaft, vertically disposed cylinders above the casing, pistons in said cylinders, piston rods connected at their upper ends to said cylinders, cross heads connected to the lower ends of the piston rods and each provided with an opening, wrist pins connected to the crank shaft sleeves carried by the wrist pins and engaging in the openings of the cross heads for reciprocating them, means suspended within the casing for guiding the cross heads, means for automatically lubricating said crank shafts and pistons, and means for adjusting the packing of the piston rods.

3. In a duplex air pump, the combination with a casing, of a crank shaft mounted therein, a plurality of cranks on said shaft, vertically disposed cylinders above the casing, pistons in said cylinders, piston rods connected at their upper ends to said cylinders, cross heads connected to the lower ends of the piston rods and each provided with an opening, wrist pins connected to the crank shaft, sleeves carried by the wrist pins and engaging in the openings of the cross heads for reciprocating them, means suspended within the casing for guiding the cross heads, means for automatically lubricating said crank shafts and pistons, and means for adjusting the packing of the pistons rods and means for adjusting the cross head guides.

4. An air pump, comprising a cylinder, a piston operating therein, a piston rod connected to the piston, a crank shaft, a reciprocatory cross head connected to the piston rods adapted to impart movement thereof when the cross head is operated, suspended

guides for said ~~cross head~~, means for adjusting and limiting the movement of the guides in one direction, and means carried by the crank shaft and engaging in the cross head for reciprocating it.

5. An air pump comprising a cylinder, means carried by the cylinder for automatically supplying a lubricant thereto, a piston operating in said cylinder, a piston rod connected thereto, a reciprocatory cross head engaging the piston rod for operating it, a pair of pivoted yoke arms, one arranged at each side of the cross head, rollers carried by said arms and engaging the cross head for guiding it, a crank shaft, means carried by the crank shaft and engaging in the cross head for reciprocating it.

6. An air pump comprising a cylinder, means carried by the cylinder for automatically supplying a lubricant thereto, a piston operating in said cylinder, a piston rod connected thereto, a reciprocatory cross head engaging the piston rod for operating it, a pair of pivoted yoke arms, one arranged at each side of the cross head, rollers carried by said arms and engaging the cross head for guiding it, a crank shaft, means carried by the crank shaft and engaging in the cross head for reciprocating it, and means for adjusting the packing for the piston rod.

7. An air pump comprising a cylinder, means carried by the cylinder for automatically supplying a lubricant thereto, a piston operating in said cylinder, a piston rod connected thereto, a reciprocatory cross head engaging the piston rod for operating it, a pair of pivoted yoke arms, one arranged at each side of the cross head, rollers carried by said arms and engaging the cross head for guiding it, a crank shaft, means carried by the crank shaft and engaging in the cross head for reciprocating it, means for adjusting the packing for the piston rod, and means for supplying a lubricant to the crank shaft of the cross head.

8. An air pump comprising a casing, a crank shaft arranged therein, means for driving the crank shaft, an automatic lubricating means for the crank shaft and driving means, a reciprocatory cross head, guides suspended in said casing for the cross head, means carried by the crank shaft and engaging in the cross head for reciprocating it, a pump cylinder, means for automatically supplying a lubricant to the interior thereof, a piston operating in the cylinder, and a piston rod attached thereto and to the cross head.

9. An air pump comprising a casing, a crank shaft arranged therein, means for driving the crank shaft, an automatic lubricating means for the crank shaft and driving means, a reciprocatory cross head, guides suspended in said casing for the cross head, means car-

ried by the crank shaft and engaging in the
cross head for reciprocating it, a pump cylin-
der, means for automatically supplying a lu-
bricant to the interior thereof, a piston oper-
5 ating in the cylinder, a piston rod attached
thereto and to the cross head, and means for
adjusting the packing of the piston rod.

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

JOHN SHOUREK.

Witnesses:

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