No. 815,301. PATENTED MAR. 13, 1906.

C. W. MANZEL.

FORCE FEED LUBRICATOR.

APPLICATION FILED MAR. 16, 1904.

2 SHEETS—SHEET 1.

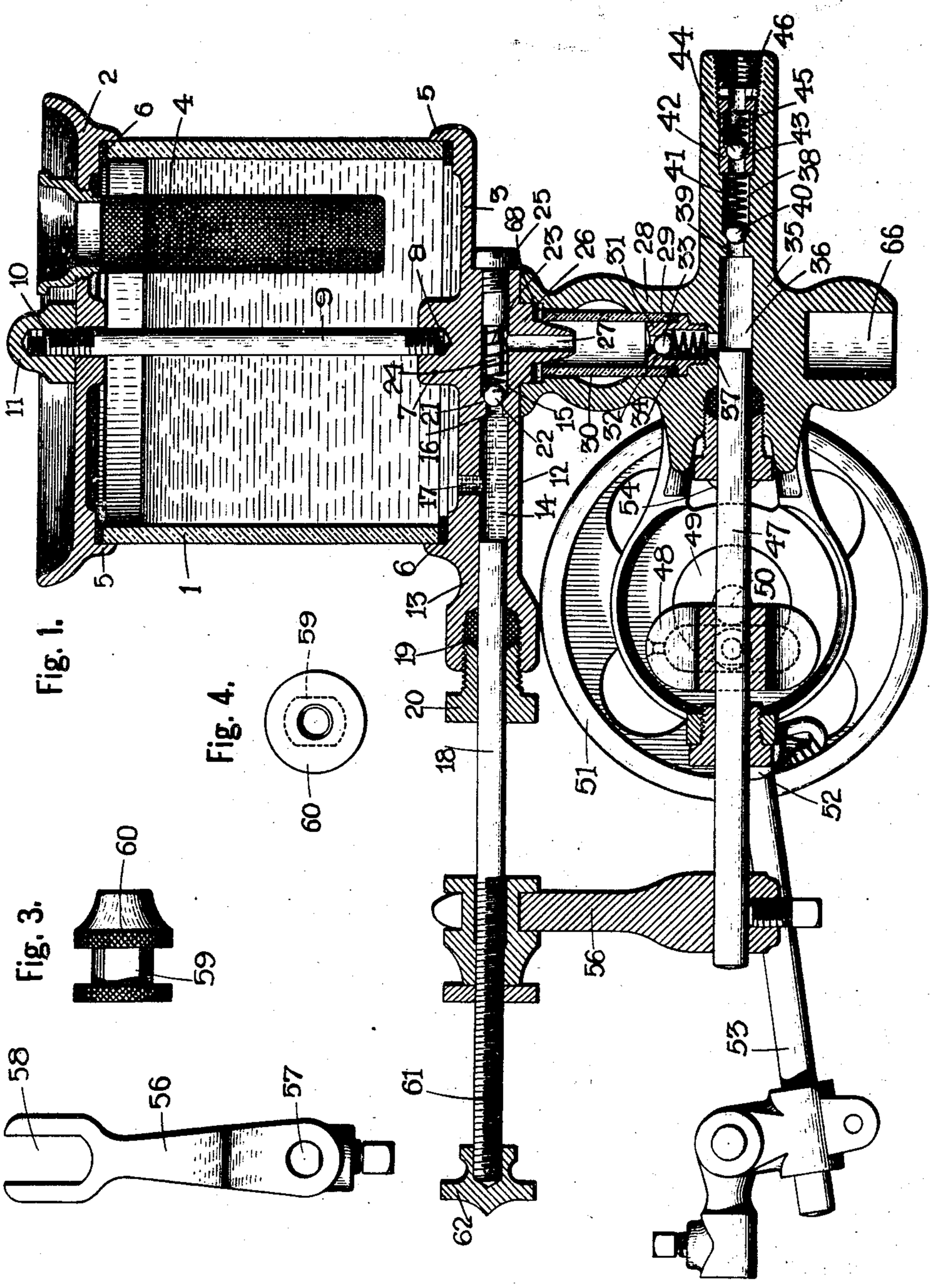

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Witnesses.

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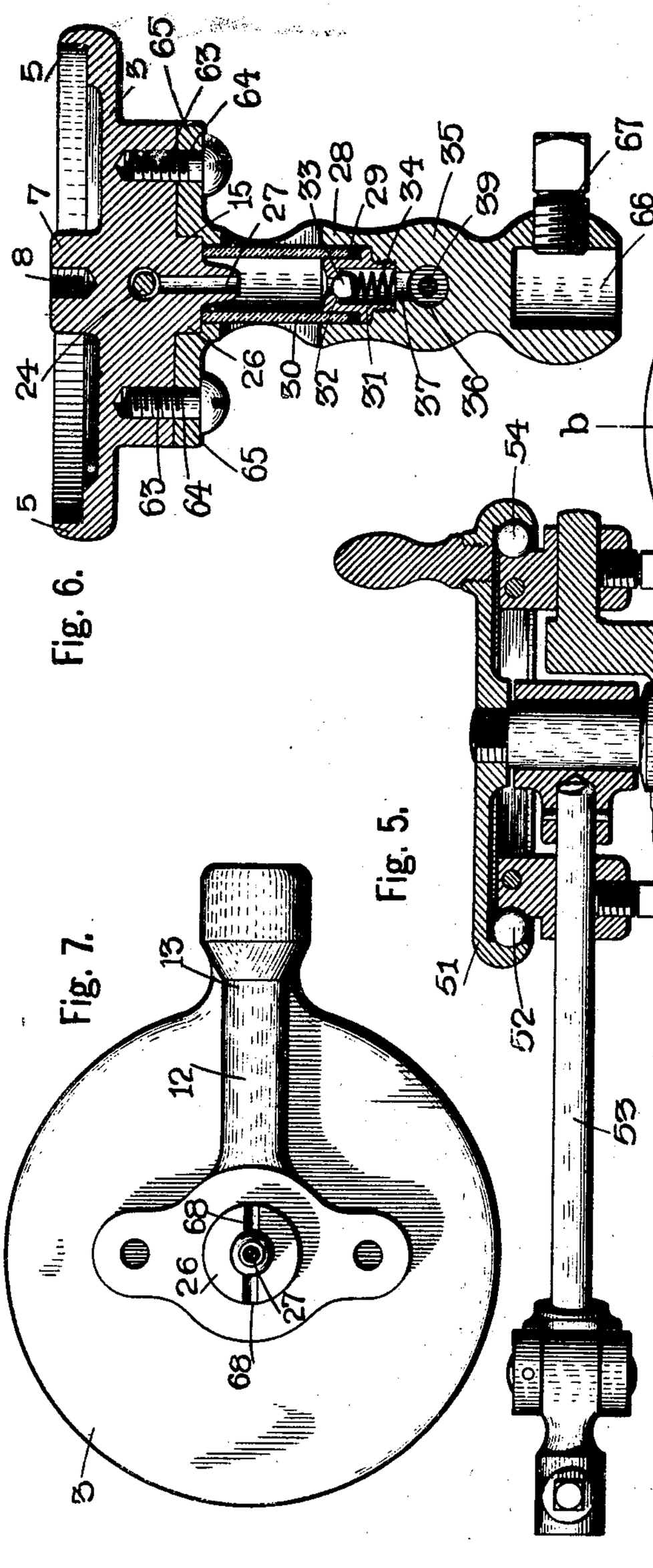

Fig. 6.

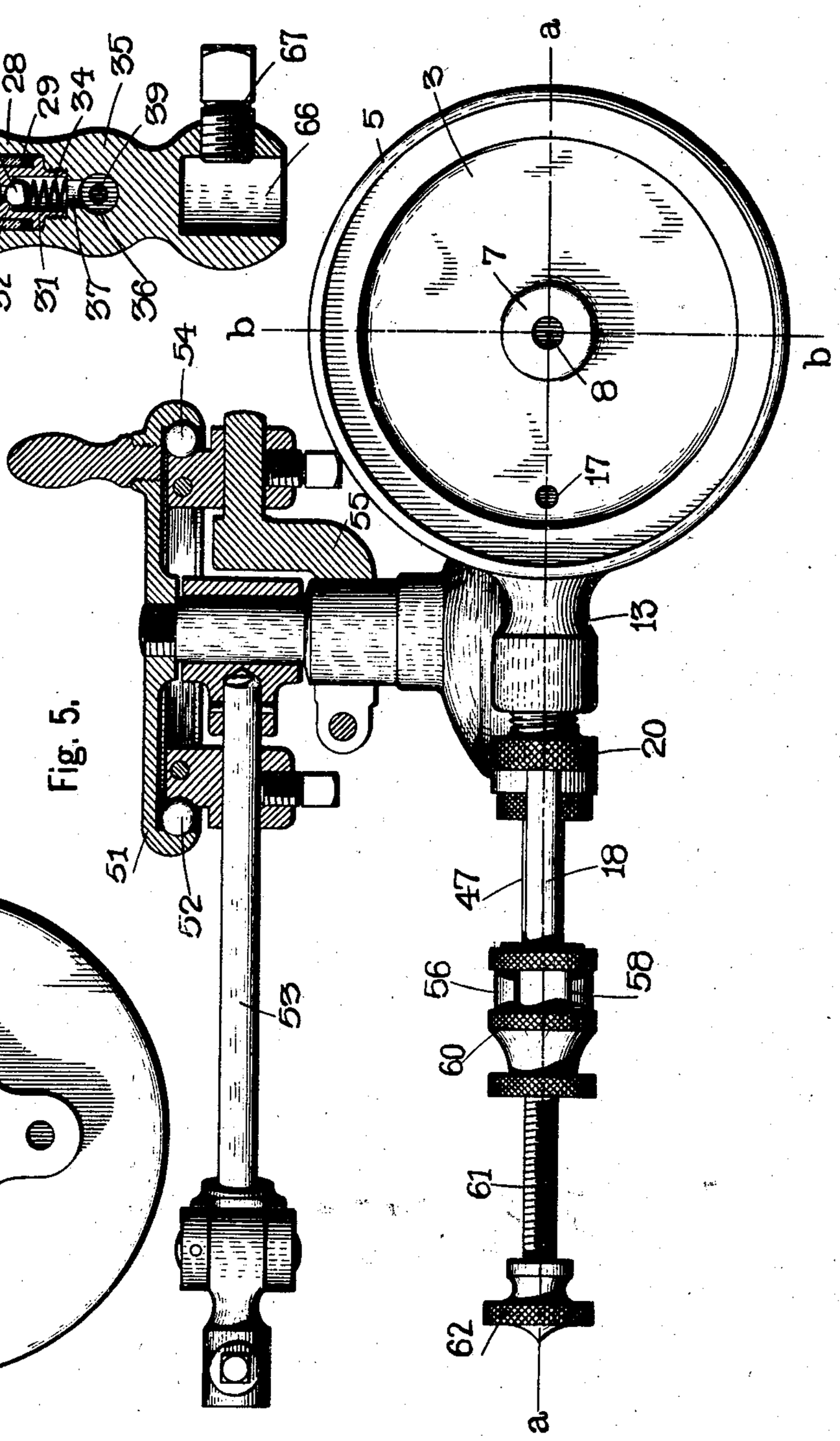

Fig. 5.

Fig. 7.

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UNITED STATES PATENT OFFICE.

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FORCE-FEED LUBRICATOR.

No. 815,301. Specification of Letters Patent. Patented March 13, 1906.

Application filed March 16, 1904. Serial No. 198,405.

To all whom it may concern:

Be it known that I, CHARLES W. MANZEL, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Force-Feed Lubricators, of which the following is a specification.

This invention relates to an improved oil-lubricator in which a positive force-feed is produced.

One of the features relates to a feed mechanism arranged between the oil-cup and the sight-glass which draws the oil from the oil-cup and forces it positively into the sight-glass. This feed mechanism may, if desired, be provided with a means for adjustment to regulate the feed of the oil into the sight-glass.

The invention also relates to an automatic valve mechanism arranged between the sight-glass and the oil-cup which is closed automatically and absolutely prevents the involuntary flow of oil from the oil-cup into the sight-glass.

The main objects are to positively feed the oil into the sight-glass and to prevent the oil flowing into and filling the sight-glass.

The invention also relates to certain details of construction, all of which will be fully and clearly hereinafter described and claimed, reference being had to the accompanying drawings, in which a preferred adaptation of the invention is shown.

Figure 1 is a longitudinal central section through the improved oil-pump on or about line *a a*, Fig. 5. Fig. 2 is a detached side elevation of the vertical cross-arm. Fig. 3 is a detached side view of the knurled screw-nut. Fig. 4 is a detached end elevation of the nut shown in Fig. 3. Fig. 5 is a plan view of the oil-pump with the oil-cup removed and a section taken through the rotating disk, the operating-clutch, and the brake-clutch. Fig. 6 is a central vertical section through the pump on line *b b*, Fig. 5. Fig. 7 is a detached bottom view of the lower plate of the oil-cup.

In referring to the accompanying drawings in the following explanation in detail of the adaptation of my invention shown therein like numerals designate like parts.

In this invention a positive force-feed mechanism is arranged between the oil-cup and the sight-glass, which serves to positively force the oil into the sight-glass in definite predetermined quantities and under all conditions. An automatic valve is also located between the oil-cup and sight-feed, which serves to prevent oil flowing involuntarily into and filling the sight-glass.

The oil-cup proper is composed of a cylinder of glass 1, a top cover or plate 2, and a bottom plate 3. The top has a central opening and a screw-threaded opening at one side of said central opening in which the top ring of a wire-gauze oil-strainer 4 is screwed. The top and bottom plates 2 and 3 are provided with flanges 5, which fit around the margins of the ends of the cylinder, and a packing 6 is interposed between each of the plates and the edges of the cylinder. (See Fig. 1.) The bottom plate has a central projecting portion 7, which is provided with a vertical depression or recess 8, which is interiorly screw-threaded. The component parts of the oil-cup proper are secured together by a rod 9, the lower end of which screws into the screw-threaded depression 8 in the bottom plate 3 and the upper portion of which passes through the central opening in the top plate 2 and is screw-threaded at its projecting end, as shown at 10 in Fig. 1, to receive the lock-cap 11, which screws upon said end 10.

The bottom plate 3 has a tubular member which may be formed or cast integral with it, as shown in the accompanying drawings, or formed separate and attached thereto in any well-known way. This tubular member has an opening which is divided into a feeding-chamber and a valve-chamber, said chambers being separated by an opening of lesser or reduced diameter. In the adaptation shown in the accompanying drawings the tubular member is cast integral with the bottom plate and forms an enlargement 12, projecting from the bottom of the plate, and said enlargement is extended laterally from one side of the bottom plate to provide a horizontally-projecting continuation 13 of the tubular member. The horizontal opening which extends through the tubular member of the bottom plate is divided into a feeding-chamber 14, a valve-chamber 15, and a short opening 16 of reduced diameter intermediate the feeding-chamber and the valve-chamber. A vertical opening 17 extends through the

wall of the bottom plate and forms a passage-way for oil from the oil-cup into the feeding-chamber and is sufficiently large to permit the oil to flow freely, as shown in Fig. 1. A feeding piston-rod 18 is slidably arranged in the feeding-chamber and projects through the continuation 13 of the tubular member, being reciprocated in a manner hereinafter set forth. The opening in the outer extremity of the horizontal extension is enlarged to form a packing-chamber, in which a packing 19 of suitable material is placed and compressed by a screw-nut 20. (See Fig. 1.)

The valve arranged in the valve-chamber 15 is automatic in action and is preferably of the ball type, as shown in Fig. 1. In this form the adjacent annular wall 21, formed by the reduction of the valve-chamber 15 into the intermediate chamber or opening 16, is curved to constitute a valve-seat for a ball 22, which is located in the valve-chamber 15 and is normally held in contact with said seat by a spiral spring 23. The greater portion of the spring 23 loosely encircles a reduced portion 24 of a screw 25, which screws into the inner extremity of the tubular member. The tension of the spring can be regulated by longitudinal adjustment of the screw, and the reduced portion 24 constitutes a stop to limit the movement of the ball 22 and prevent excessive compression of the spring 23. (See Fig. 1.)

The tubular member is provided with a downwardly-extending part 26, which has a vertical opening 27 extending therethrough and communicating with the valve-chamber 15.

The oil-cup and its feeding mechanism are mounted upon a frame, which is provided with a sight-glass into which the oil is forced by the feeding mechanism and a second feeding mechanism for drawing oil from the sight-glass and forcing it to the point desired. Hereinafter the oil-feeding mechanism arranged between the oil-cup and sight-glass will be designated as the "upper" feeding mechanism, its piston-rod 18 the "upper" piston-rod, and the automatic valve located in the valve-chamber 15 the "upper" valve to distinguish them from other and substantially similar mechanisms to be hereinafter described. The frame upon which the oil-cup is supported is formed substantially like the frame shown in my Patent No. 635,694, granted October 24, 1899, and has a vertical portion or member 28, provided with a vertical opening 29, in which the sight-glass 30 is supported. The lower portion of the opening is reduced in size, as shown in Fig. 1, and a ball-valve device is vertically arranged therein. This ball-valve device, which I will hereinafter designate as the "intermediate" valve, is composed of a valve-casing 31, having an annular valve-seat 32 near its upper end, a ball 33, arranged in the casing and adapted to engage with the seat 32 to close the passage, and a spiral spring 34, arranged to normally maintain the ball in contact with the seat with a spring tension. Below the vertical portion or member 28 is a horizontal tubular portion or member 35, which has a horizontal opening extending through it and divided in communicating chambers. One of these chambers 36 is directly below the vertical intermediate valve, with which it is connected by a short vertical opening 37 and constitutes an oil-feeding chamber for a lower feeding mechanism. To the right of the chamber 36 is located a valve-chamber 38, which is connected to the feeding-chamber by a short communicating opening or chamber 39 of reduced diameter. This valve-chamber is divided into a plurality of successively-enlarging sections, in each of which a valve device is arranged. The valve device in the first section comprises simply a ball 40 and a tension-spring 41 and that in the second section a valve-casing 42, which has an annular valve-seat 43, a ball 44, and a spring 45. The spring 45 is secured in place by a tubular nut 46, which screws in the end of the horizontal portion 35. A piston-rod 47 has one end slidably mounted in the oil-feed chamber 36 and is reciprocated substantially as shown in my Patent No. 635,694 by means of a cam-block 48, in which a pin (shown in dotted lines in Fig. 1) extending from a disk 49 projects. The disk 49 is mounted at one end of a shaft 50, which is journaled in a projecting portion 51 of the frame, and a flanged disk is mounted at or near the opposite end of the shaft, which is intermittently rotated by a ball-clutch 52, mounted on a vibratile arm or rod 53, and which in turn is vibrated by any well-known source of power—such, for instance, as a connecting-rod extending from an operating portion of an engine. The disk 49 is rotated in only one direction by the clutch 52, being held stationary during the return movement of said clutch by a brake-clutch 54, which is similar in construction to the clutch 52 and mounted upon an arm 55, clamped around the projecting portion 51 of the frame. (See Fig. 5.)

The piston-rod 47, which I term the "lower" piston-rod, is connected to the upper piston-rod 18 by a vertical cross-arm 56, so that the two piston-rods are simultaneously reciprocated. This cross-arm is formed substantially as shown in Fig. 2, having an opening 57 near its lower end, through which the outer portion of the lower piston-rod 47 is fitted, and an upper bifurcated or forked extremity 58, the members of which straddle the reduced portion 59 of a knurled screw-nut 60, which screws upon the outer screw-threaded portion 61 of the upper piston-rod.

The object of this is to provide for longitudinal adjustment of the upper piston-rod to regulate the oil-feed, the upper piston-rod being rotated by its enlarged knurled end 62 to screw it forward or back in the nut 60.

The object of the intermediate vertical valve between the lower feed-chamber 36 and the sight-glass is to prevent the oil charge in the lower feed-chamber 36 backing up into the sight-glass during the earlier portion of the feeding movement of the lower piston-rod. rod.

The bottom plate of the oil-cup is preferably fastened to the frame upon which it is mounted by screws 63, which pass through the openings 64 in opposed lateral extensions 65 and screw into the bottom plate, as shown in Fig. 6. The frame may be provided with a socket 66 for attachment to a suitable support, being secured to said support by a set-screw 67, as shown in Fig. 6.

The operation of this improved force-feed lubricator is as follows: The device being attached to a suitable mechanism or the like requiring lubrication and the vibratile arm connected to an operating device, oil is poured into the oil-cup through the strainer 4. The outward reciprocating movement of the upper piston-rod 18 withdrawing said piston into the position shown in Fig. 1 creates a partial vacuum in the feed-chamber 14, so that atmospheric pressure combined with gravity forces a charge of oil from the oil-cup through the vertical opening 17 into the feed-chamber 14. The inward movement of the upper piston-rod 18 now forces the oil charge in the feed-chamber through the upper automatic valve and the vertical opening 27 into the sight-glass 30. Another outward movement of the two pistons brings another charge into the upper feed-chamber 14, and the sight-glass 30 being loosely set in the member 28, so that air has a chance to enter, the lower piston creates a partial vacuum in the lower feed-chamber 36, so that atmospheric pressure will force a charge of oil in the sight-glass through the intermediate vertical valve into the lower feed-chamber 36. The air enters the sight-glass through the semicircular depressions 68, which are forced in the bottom surface of the portion 26. (See Figs. 1 and 7.) The next inward movement of the two pistons forces the charge of oil in the upper feed-chamber into the sight-glass in the manner before described and the charge of oil in the lower feed-chamber to any desired lubricating-point. The amount of volume of the charge of oil is regulated positively by the longitudinal adjustment of the upper piston.

The great advantage of this construction is that the oil is fed positively at all temperatures, it being impossible to clog the device with heavy oil or oil thickened by exposure to low temperature owing to the double force feeding mechanisms and the positive force-feed into the sight-glass.

In this construction the upper feed-chamber is made smaller than the lower feed-chamber, so that the lower feed mechanism will have a greater feed capacity than the upper feed mechanism to prevent filling the sight-glass.

I claim as my invention—

1. In a device of the class described, a cup to contain lubricant, a sight-glass, a plurality of feed mechanisms including a plurality of pistons, one of said feed mechanisms being arranged between the cup and sight-glass to draw the lubricant from the cup and force it into the sight-glass, and another being arranged between the sight-glass and the element to be lubricated to draw the lubricant from the sight-glass and force it to said element.

2. In a device of the class described, an oil-cup, a sight-glass, a plurality of feed mechanisms including a plurality of pistons connected to reciprocate simultaneously and one of said oil-feed mechanisms being arranged between the oil-cup and sight-glass and another between the sight-glass and the part to be lubricated.

3. In a device of the class described, an oil-cup, a sight-glass, two horizontal feed mechanisms arranged one above the other, and one located between the oil-cup and sight-glass and another between the sight-glass and the part to be lubricated and means for operating said feed mechanisms.

4. In a device of the class described, an oil-cup, a frame upon which said oil-cup is mounted, a sight-glass in said frame beneath the oil-cup and a plurality of force-feed mechanisms, one being arranged between the oil-cup and sight-glass to feed oil from the oil-cup to the sight-glass and another beneath the sight-glass to feed oil from the sight-glass to the part requiring lubrication.

5. In a device of the class described, an oil-cup, a frame upon which the oil-cup is mounted, a sight-glass in said frame beneath the oil-cup and a plurality of force-feed mechanisms, one being arranged between the oil-cup and sight-glass, and another beneath the sight-glass; said feed mechanisms having differing feeding capacity.

6. In a device of the class described, an oil-cup, a frame upon which the oil-cup is mounted, a sight-glass in said frame beneath the oil-cup and a plurality of force-feed mechanisms, one being arranged between the oil-cup and sight-glass, and another beneath the sight-glass; the lower feed mechanism having a greater feeding capacity than the upper feed mechanism.

7. In a device of the class described, an oil-cup, a sight-glass, a plurality of feed mechanisms, one arranged between the oil-cup and

sight-glass and another arranged beneath the sight-glass and a plurality of valves, one being located between the upper feed mechanism and the sight-glass and another between the sight-glass and lower feed mechanism.

8. In a device of the class described, a cup to contain lubricant, a sight-glass and a plurality of force-feed mechanisms, one being arranged between the cup and sight-glass, and another between the sight-glass and the part to be lubricated; said mechanisms having differing feeding capacity.

9. In a device of the class described, a cup to contain lubricant, a sight-glass, and a plurality of force-feed mechanisms, one being arranged between the cup and sight-glass, and another between the sight-glass and the part to be lubricated and having a greater feeding capacity than the first-mentioned feed mechanism.

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