No. 890,616. PATENTED JUNE 16, 1908.

F. M. DAVIS.

LUBRICATOR.

APPLICATION FILED SEPT. 10, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

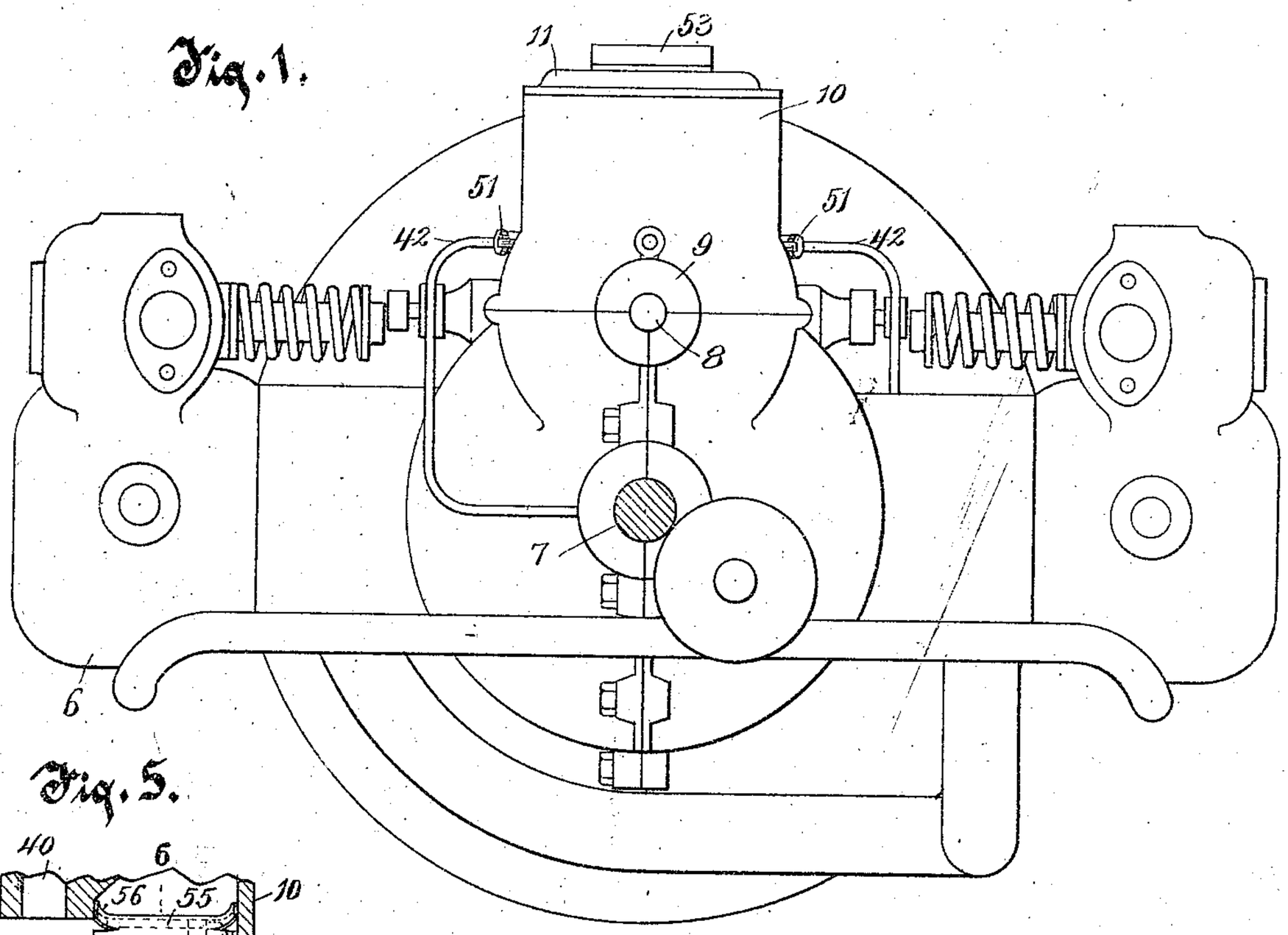


Fig. 5.

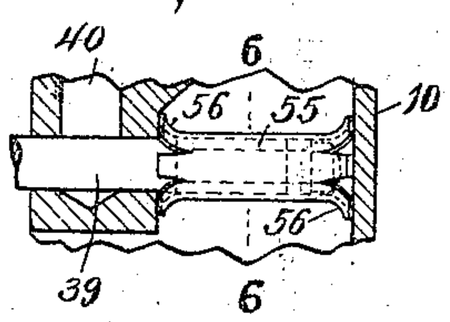


Fig. 6.

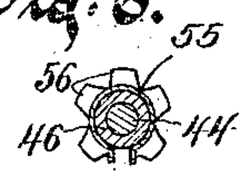
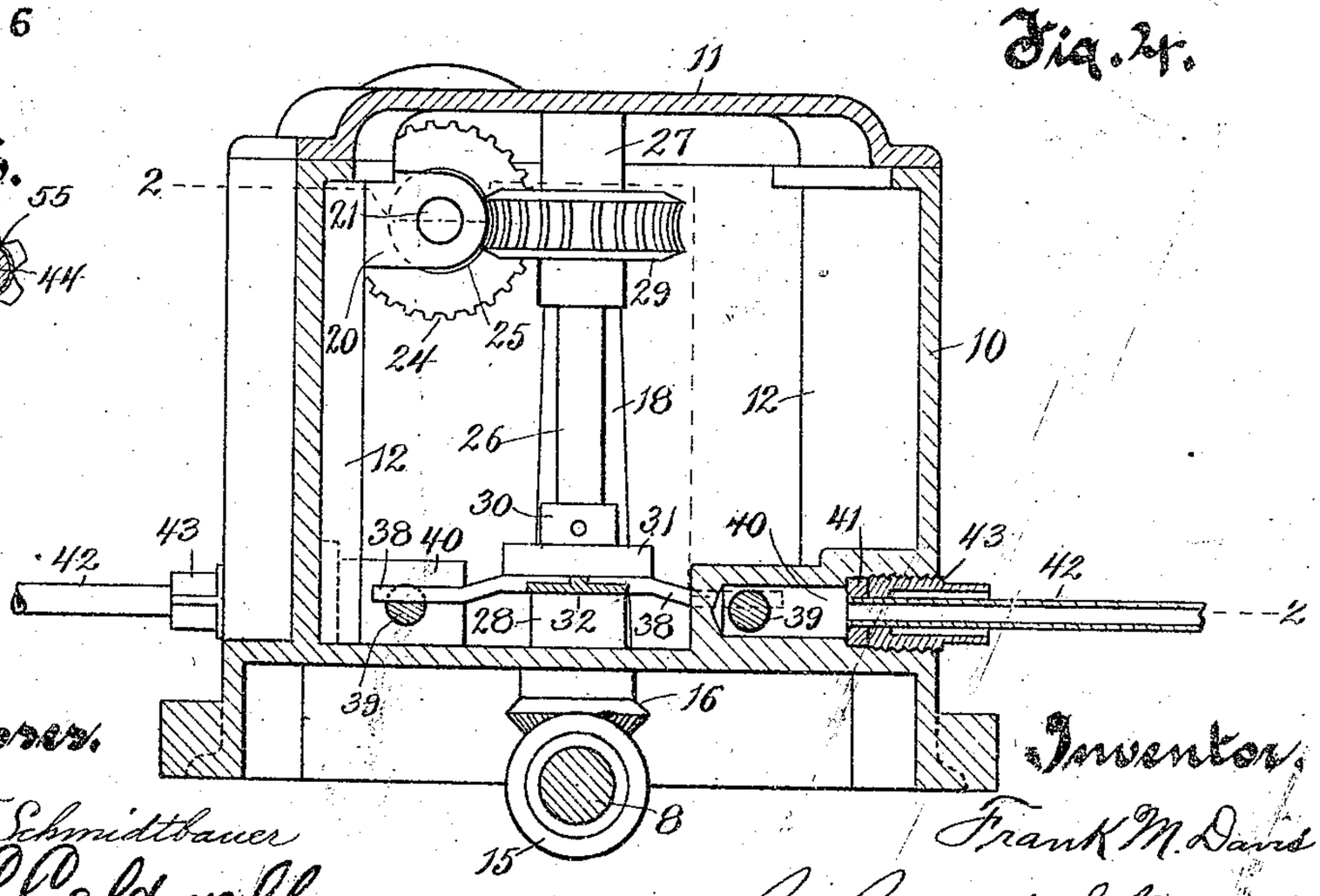


Fig. 4.



Witnesses.

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2 SHEETS—SHEET 2.

Fig. 2.

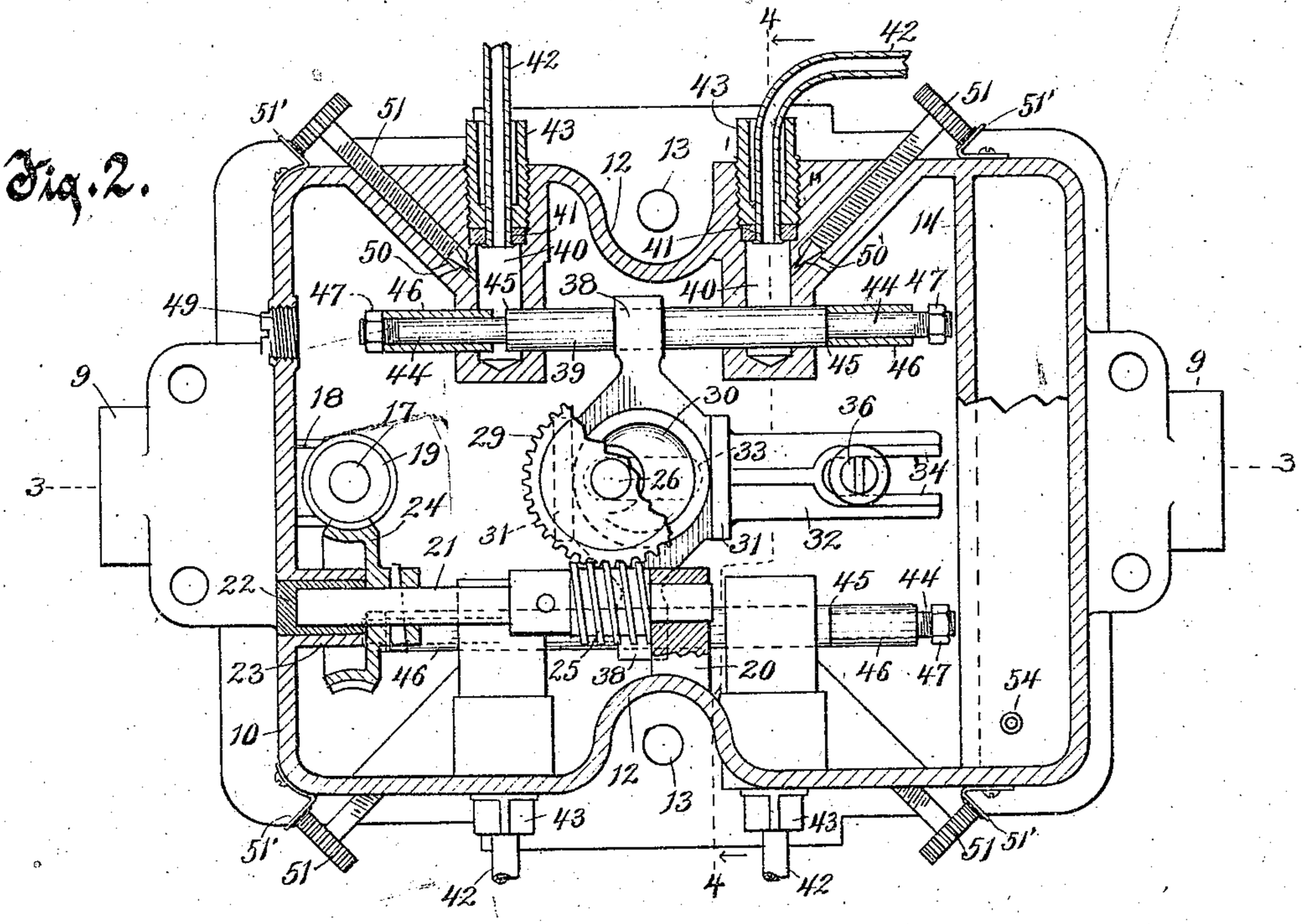
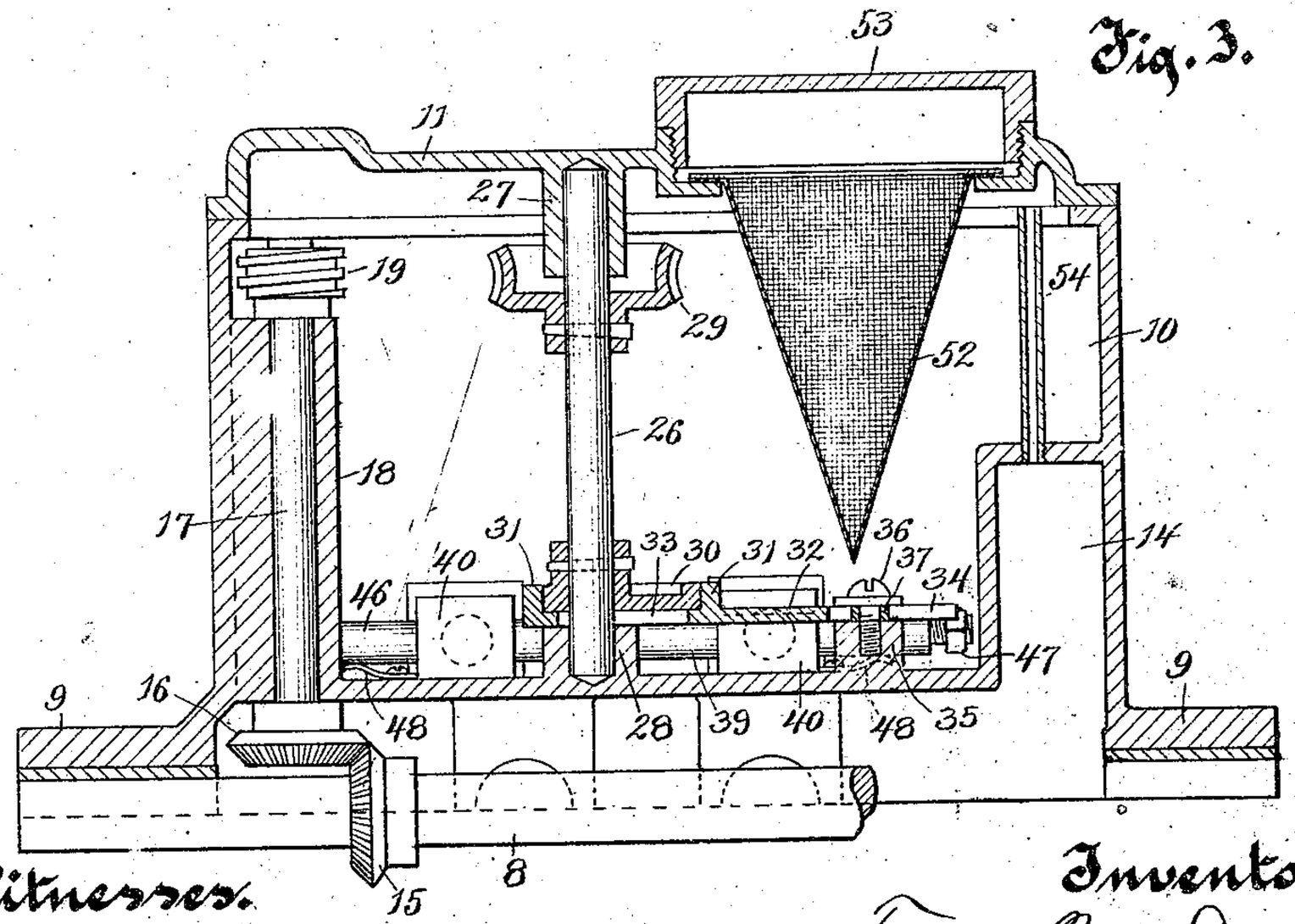


Fig. 3.



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UNITED STATES PATENT OFFICE.

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LUBRICATOR.

No. 890,616. Specification of Letters Patent. Patented June 16, 1908.

Application filed September 10, 1906. Serial No. 333,872.

To all whom it may concern:

Be it known that I, FRANK M. DAVIS, residing in Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Lubricators, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention relates to lubricators and especially to lubricators for feeding lubricant in measured quantities and during the operation of the lubricated mechanism only.

The invention is particularly adapted for use with explosive engines of the motor-vehicle type.

An object of the invention is to so design the structure of such a lubricator as to embody essential parts of an existing type of engine construction and thereby become an intimate member of the engine construction.

Another object of the invention is to provide a novel means for feeding and measuring liquid in a lubricator or the like.

Another object of this invention is to perfect details of construction of such devices.

With the above and other objects in view the invention consists in the device herein described, its parts and combinations of parts and all equivalents.

Referring to the accompanying drawings in which like characters of reference indicate the same parts in the several views:—Figure 1 is an end elevation of a double cylinder opposed piston explosive engine having a lubricator of this invention embodied therein; Fig. 2 is a sectional plan view of the lubricator exemplifying this invention, with parts sectioned on different horizontal planes; Fig. 3 is a central vertical sectional view thereof, taken on the line 3—3 of Fig. 2; Fig. 4 is a transverse sectional view of the same, taken on the line 4—4 of Fig. 2, the line 2—2 thereof indicating the sectional planes of Fig. 2; Fig. 5 is a sectional plan of one portion, showing a modified form of detaining means for the slidable sleeves; and, Fig. 6 is a transverse sectional view on the line 6—6 thereof.

In these drawings 6 represents a double cylinder explosive engine of an existing type, whose crank shaft 7 is suitably geared to the cam shaft 8 in the usual manner, both shafts being properly journaled in the engine casing. The journal bearings in the engine casing for the cam shaft 8 are completed by the bearing sections 9, carried at opposite ends of a lubricator casing 10, which serves as a cover for the open upper end of the engine casing. The lubricator casing 10 is in the nature of a rectangular lubricant receptacle or reservoir, with a removable cover 11 forming a tight closure therefor and secured thereto in any desirable manner. The opposite side walls of the lubricator casing 10 have their middle portions curved inwardly to form channels or grooves 12 to accommodate suitable connecting bolts, not shown, for passing through openings 13 in the base of the lubricator casing and securely connecting said lubricator casing with the engine casing. The bottom of the reservoir portion of the lubricator casing is so shaped as to form a gear casing 14 at one end of the lubricator casing, within which a gear wheel on the cam shaft 8 is housed, said gear wheel constituting one member of the means for gearing the cam shaft 8 with the crank shaft 7 and being omitted from the drawings.

It will be understood that the cam shaft 8 is adapted to perform the usual functions of operating the valves of the engine, though the cams and connections thereof have not been shown.

A beveled pinion 15 on the cam shaft 8 meshes with a similar pinion 16 carried on the lower end of a vertical shaft 17, which passes upwardly through an upright rib or projection 18 formed in the interior of the reservoir portion of the lubricator casing. The rib 18 is preferably integral with the end and bottom walls of the reservoir as shown, whereby the entrance of shaft 17 to the interior of the oil reservoir is accomplished without providing a passage through which oil might discharge. The upper end of the vertical shaft 17 carries a worm 19 bearing on the upper end of the rib 18.

A lug 20 projects from the inwardly extending portion 12 of one of the sides of the lubricator casing and forms a bearing for one end of a horizontal shaft 21, whose other end is journaled in a bushing 22 which is located in a hollow boss 23 on an end wall of the oil reservoir with its opening passing through said end wall so that the shaft 21 may be passed therethrough from the outside when assembling the parts. There is no outlet for oil through the bushing 23, as it is of a cup-shape inclosing the end of shaft 21. At one

end the shaft 21 has a worm wheel 24 secured thereto, which meshes with the worm 19 before mentioned, and bears upon the end of the hollow boss 23. At its other end said shaft 21 has secured to it a worm 25 which bears upon the bearing lug 20 before mentioned.

At about the central portion of the oil reservoir a vertical shaft 26 is journaled, with its upper end fitting in a depending socket bearing 27 on the cover 11, and its lower end seated in an upstanding socket bearing 28 in the bottom of the oil reservoir. Near its upper end the shaft 26 has secured to it a worm wheel 29 meshing with the worm 25, while near its lower end it has secured to it an eccentric disk 30, which bears upon and rides between a pair of upwardly extending parallel bearing flanges 31 on a yoke or slide member 32. The flat enlarged head of the yoke or slide 32 rides upon the upper surface of the socket bearing 28, beneath the eccentric 30, and has a longitudinal slot 33 through which shaft 26 passes, forming a guide for said slide during its movements. Beyond the flat head portion, the slide or yoke 32 has a slotted or bifurcated guide extension 34, which rests upon a lug 35 in the bottom of the oil reservoir. There is a guide screw 36 threaded in said lug with a roller or sleeve 37 mounted thereon and riding in the slot or bifurcation of said guide extension 34, to freely permit of longitudinal movement of the slide or yoke but prevent its displacement. This guiding engagement of the slide or yoke, coöperating with the engagement of the longitudinal slot 30 with shaft 26, prevents said slide or yoke moving out of its proper alinement while the rotation of the eccentric 30 reciprocates it by riding between and bearing upon the transverse parallel upstanding flanges 31. The slide or yoke 32 has opposite side extensions or engaging arms 38 on its flattened head portion which are let into recesses formed in the upper parts of cylindrical rods 39, which are longitudinally slidable, so as to move with said slide or yoke member.

On both sides of the reservoir, the cylindrical rods 39 and their associated parts are identical in construction, and therefore it will be sufficient to describe such mechanism on one side of the oil reservoir only. A pair of chambers 40 are formed on the bottom of the oil reservoir, one on each side of the channel or depression 12, and have their outer ends sealed by means of washers 41 carrying oil feed tubes 42 of brass or other flexible material leading therefrom. The washers are seated upon shoulders in the bore of the opening of the chambers and held in position by means of screw plugs 43 threaded in said bore through the side of the oil reservoir. The screw plugs 43 are hollow to near their bearing ends, to enable the feed tubes 42 to be bent as shown in Fig. 2, without having a sharp bend which might injure or restrict them and interfere with the passage of lubricant therethrough. The ends of the rods 39 pass entirely through both opposite walls of the chambers 40 with a close working fit therein, and have reduced end extensions 44 forming shoulders 45. Sleeves 46 are mounted to slide on said end extensions between the shoulders 45 and stop nuts 47, which are adjustably threaded on the extremities of said end extensions. The adjustment of these nuts serves to vary the play or longitudinal sliding movement of the sleeves 46 on the end extensions 44. The sleeves 46, being of the same diameter as the cylindrical rod 39, are adapted to follow it through the walls of the chambers 40, and suitable means are provided for detaining them and causing them to slide upon the end extensions 44 whenever the direction of movement of said rod 39 is changed, so as to require them to be engaged alternately by the shoulders 45 and the nuts 47, to be moved thereby and overcome the effect of said means. As here shown the means for retarding the movement of the sleeves 46 comprise springs 48, (shown in Fig. 3), secured to the bottom of the oil reservoir and passing upwardly against said sleeves. The frictional engagement between the retarding springs 48 and the sleeves 46 holds them still, at the beginning of the stroke in each direction of the rod 39, until the play or lost motion of said sleeves on the end extensions 44 of said rod is taken up, thus alternately producing spaces between the sleeve and shoulder 45 and between the sleeve and the nut 47.

During the stroke in one direction the rod 39 passes through both walls of the chamber 40 and its shoulder 45 is carried a short distance beyond the farther wall with the sleeve bearing thereon. At the beginning of the return stroke, the sleeve being held stationary by its detaining spring 48, is left by the shoulder 45 and is engaged at the other end by the nut 47. The space thus formed between the sleeve and the shoulder 45 is occupied by lubricant contained in the reservoir, and as the rod 39 continues its movement and the sleeve 46 is drawn through the wall of the chamber 40, the lubricant contained in said space is carried into the interior of the outlet chamber. When, however, the rod 39 begins its stroke in the other direction again, the sleeve 46 being again detained by its spring 48, the shoulder 45 moves toward the end of the sleeve, forcing the oil out of the space therebetween and into the chamber, until they engage and move on through the wall of the chamber to repeat the operation just described. The amount of oil fed to the interior of the chamber 40 by each reciprocation of the rod 39 depends upon the size of the space left between the end of the sleeve

and the shoulder 45, which may be varied by adjusting the position of nut 47, so that the supply of oil to the parts with which the oil tubes 42 connect may be increased or diminished to suit the requirements.

In order to facilitate the assembling of the parts, a removable screw plug 49 is provided in the end wall of the oil reservoir, in alinement with the rod 39, through the opening for which said rod with its parts may be passed.

To facilitate the charging of the feed tubes 42 on starting the engine, each chamber 40 is provided with a by-pass 50 connecting it with the interior of the reservoir and controlled by a needle valve 51, which is normally locked closed by means of a spring-catch 51′ on the casing engaging the notched edges thereof. A conical strainer 52 of brass gauze or other suitable material is suspended within the oil reservoir at the filling opening in the cover 11, and a screw cap 53 tightly closes said opening. The interior of the oil reservoir is vented by means of a vent tube 54, which rises from the gear casing 14 in the bottom of the reservoir to near the cover of said reservoir, and thus pressure which may be present in the engine casing will be transferred to the lubricator casing so that the pumps will not have to operate against a great back pressure.

In Figs. 5 and 6 a modified form of detaining spring for the sleeves 46 is shown. It consists in a split cylindrical shell 55 of spring sheet metal surrounding the sleeve 46 and firmly clasping it, with outwardly bent separated fingers 56 at its ends to bear against the end of the lubricator casing and the wall of the chamber 40 respectively. The operation of this form of spring is the same as the other and does not interfere with the passage of the lubricant into the spaces between the sleeves 46 and shoulders 45 for the lubricant is free to pass between the fingers 56.

The operation of the rods 39 and their associated parts, in forcing or pumping oil into the chambers 40, to be led therefrom by the feed tubes 42 to the cylinder and bearings or other parts of the engine with which the lubricator is connected, has been fully set forth, and the means for giving motion to the rods 39 may be traced as follows: The rotation of the cam shaft 8 in the usual manner causes the rotation of vertical shaft 17 by the intermeshing beveled pinions 15 and 16, and thereby turns the worm 19. The worm wheel 24 is turned at a reduced speed by the worm 19, and the worm 25 on the same shaft therewith serves in turn to rotate the vertical shaft 26 at a more reduced speed by driving the worm wheel 29 thereof. Thus the eccentric 30 carried by the shaft 26 is caused to rotate slowly and move over the flattened head portion of the slide 32, between the upstanding flanges 31 thereof, and by engaging these flanges alternately with a cam action, the said slide is caused to reciprocate regularly, being guided by its bearing on the sides of the shaft 26 and by the guide screw 36, with its side arms 38 engaged with the rods 39 to give them the reciprocation necessary for supplying the oil as before stated.

What I claim as my invention is:

1. In a lubricator, an oil reservoir, an outlet chamber leading therefrom, a rod passing through the wall of the outlet chamber and having a shouldered reduced portion, a stop on the rod, a sleeve slidable on the reduced portion of the rod between the stop and the shoulder, a cylindrical shell of spring metal surrounding and clasping the sleeve and having spring fingers at its ends for engaging the wall of the outlet chamber to prevent longitudinal movement thereof, and means for reciprocating the rod.

2. In a lubricator, an oil reservoir, an outlet chamber leading therefrom, a rod passing through the wall of the outlet chamber and having a shouldered reduced portion, a stop on the rod, a sleeve slidable on the reduced portion of the rod between the stop and the shoulder, a split cylindrical shell of spring metal surrounding and clasping the sleeve and having spring fingers at its ends for engaging the wall of the outlet chamber and the wall of the oil reservoir for preventing longitudinal movement thereof, and means for reciprocating the rod.

3. In a lubricator, an oil reservoir having outlet chambers leading therefrom, a shouldered rod passing through the outlet chambers, sleeves slidably mounted on the rod to move toward or away from the shoulders thereof, stops carried by the rod for engaging the sleeves, means for retarding the movement of the sleeves, a shaft journaled in the oil reservoir, an eccentric carried by the shaft, a slide having connection with the rod, shoulders on the slide engaged by the eccentric, and means for turning the shaft.

4. In a lubricator, an oil reservoir having outlet chambers leading therefrom, a pair of shouldered rods passing through the walls of the outlet chambers, sleeves slidably mounted on the rods, stops on the rods for engaging the sleeves, means for retarding the movement of the sleeves, a shaft journaled in the oil reservoir, a slide having a longitudinal slot through which the shaft passes, arms on the slide engaging the rods, an eccentric on the shaft, shoulders on the slide engaged by the eccentric, and means for turning the shaft.

5. In a lubricator, an oil reservoir having outlet chambers leading therefrom, a pair of shouldered rods passing through the walls of the outlet chambers, sleeves slidably mounted on the rods, stops on the rods for engaging the sleeves, means for retarding the movement of the sleeves, a shaft journaled in the oil reservoir, a slide having a longitudinal slot through which the shaft passes, a slotted

guide on the slide, a guide post in the oil reservoir with which said guide engages, arms on the slide engaging the rods, an eccentric on the shaft, shoulders on the slide engaged by the eccentric, and means for turning the shaft.

6. In a lubricator, an oil reservoir having outlet chambers leading therefrom, a pair of shouldered rods passing through the walls of the outlet chambers, sleeves slidably mounted on the rods, stops on the rods for engaging the sleeves, means for retarding the movement of the sleeves, a cover for the oil reservoir, socket bearings in the bottom of the reservoir and on the cover, a shaft journaled in the socket bearings, a slide resting on the socket bearing in the bottom of the reservoir and having a longitudinal slot through which the shaft passes, upstanding flanges on the slide, an eccentric on the shaft bearing on the flanges, a guide extension on the slide, a guide lug in the bottom of the reservoir on which the guide extension bears, a guide roller mounted on the guide lug and located in a slot in the guide extension, oppositely extending arms on the slide entering recesses in the rods, and means for turning the shaft.

7. In a lubricator, an oil reservoir having an outlet chamber leading therefrom, a shouldered rod passing through the wall of the outlet chamber, a sleeve slidable on the rod to move toward and away from the shoulder, a stop on the rod for engaging the sleeve, means for reciprocating the rod, and a valved by-pass between the interior of the oil reservoir and the outlet chamber.

8. A lubricator for explosive engines, comprising an oil reservoir forming a closure for the engine casing and carrying box sections for the journal bearings of the cam shaft of the engine, a vertical shaft journaled through an integral rib on one wall of the oil reservoir, intermeshing beveled pinions on said shaft and the cam shaft of the engine, a worm carried by the vertical shaft, a tubular boss on the wall of the oil reservoir, a lug projecting from a wall of the reservoir, a cup-shaped bushing in the tubular boss, a horizontal shaft journaled in the cup-shaped bushing and in the said lug, a worm wheel carried by said horizontal shaft and bearing on the end of the tubular boss, a worm mounted on the horizontal shaft, a cover for the oil reservoir, socket bearings in the bottom of the oil reservoir and in the cover, a shaft journaled in the socket bearings, a worm wheel on said shaft meshing with the worm on the horizontal shaft, and oil feeding mechanism operated by the last named vertical shaft.

9. A lubricator for explosive engines, comprising an oil reservoir forming a closure for the engine casing, said oil reservoir having an outlet chamber leading therefrom, a tube connecting the outlet chamber with a part of the engine to be lubricated, a shouldered rod passing through the wall of the outlet chamber, a sleeve slidable on the rod, a stop on the rod to engage the sleeve, means for detaining the sleeve, means for reciprocating the rod, a cover tightly closing the oil reservoir, and a vent tube leading from the bottom of the reservoir to the interior thereof, whereby the pressure within the engine casing is transferred to the oil reservoir to overcome back pressure on the oil feeding mechanism.

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

FRANK M. DAVIS

Witnesses:
J. E. Reuter,
Wm. A. Kahn.