(No Model.) 2 Sheets—Sheet 1.

W. S. BEEMAN.

SPEED REDUCING MECHANISM FOR LUBRICATORS.

No. 406,419. Patented July 9, 1889.

Fig. 1.

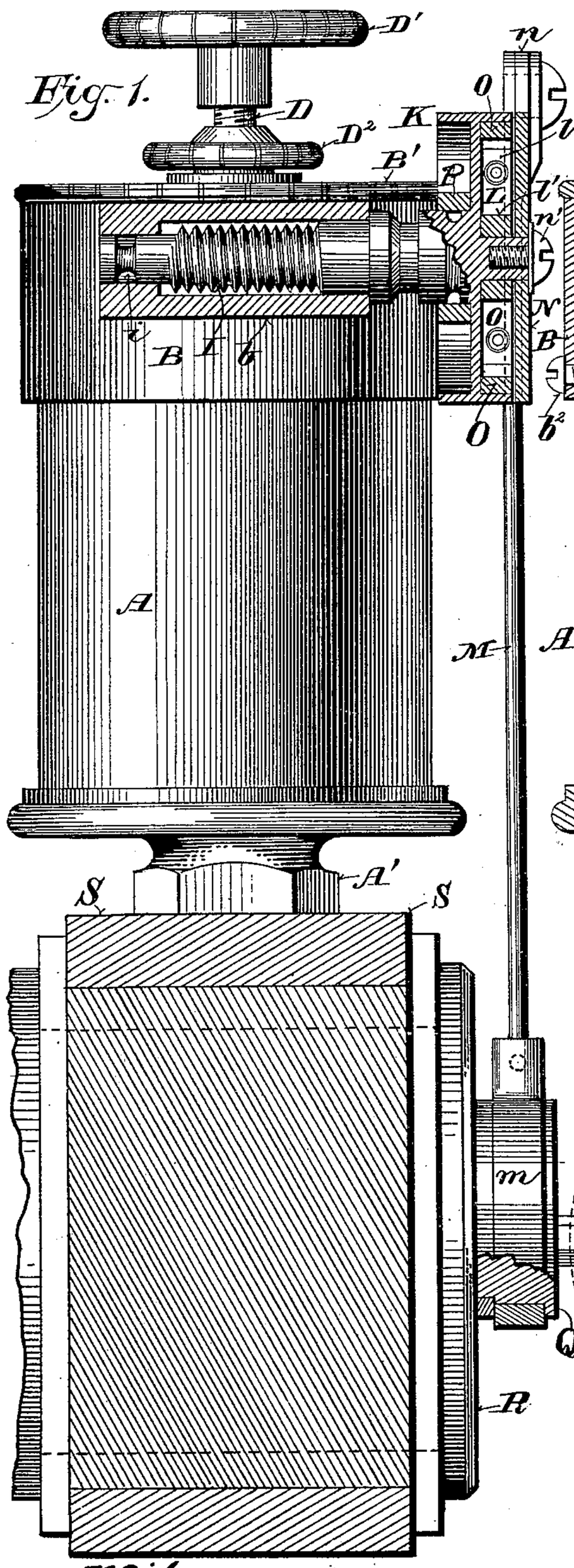
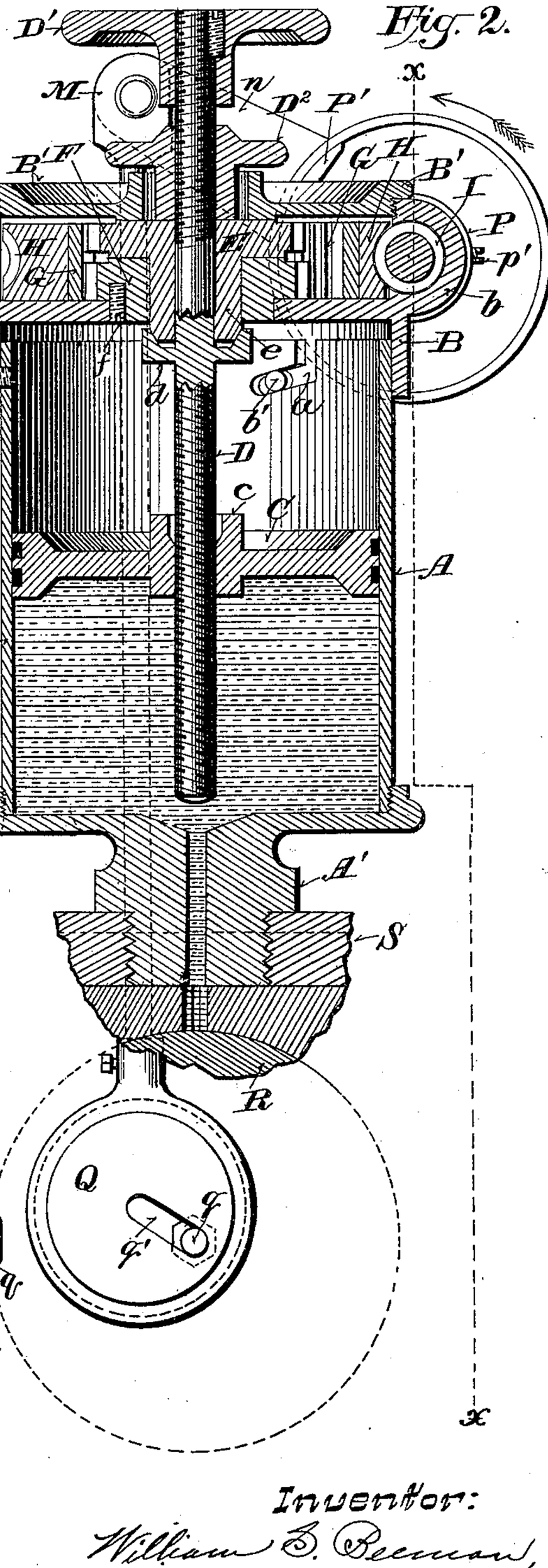


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

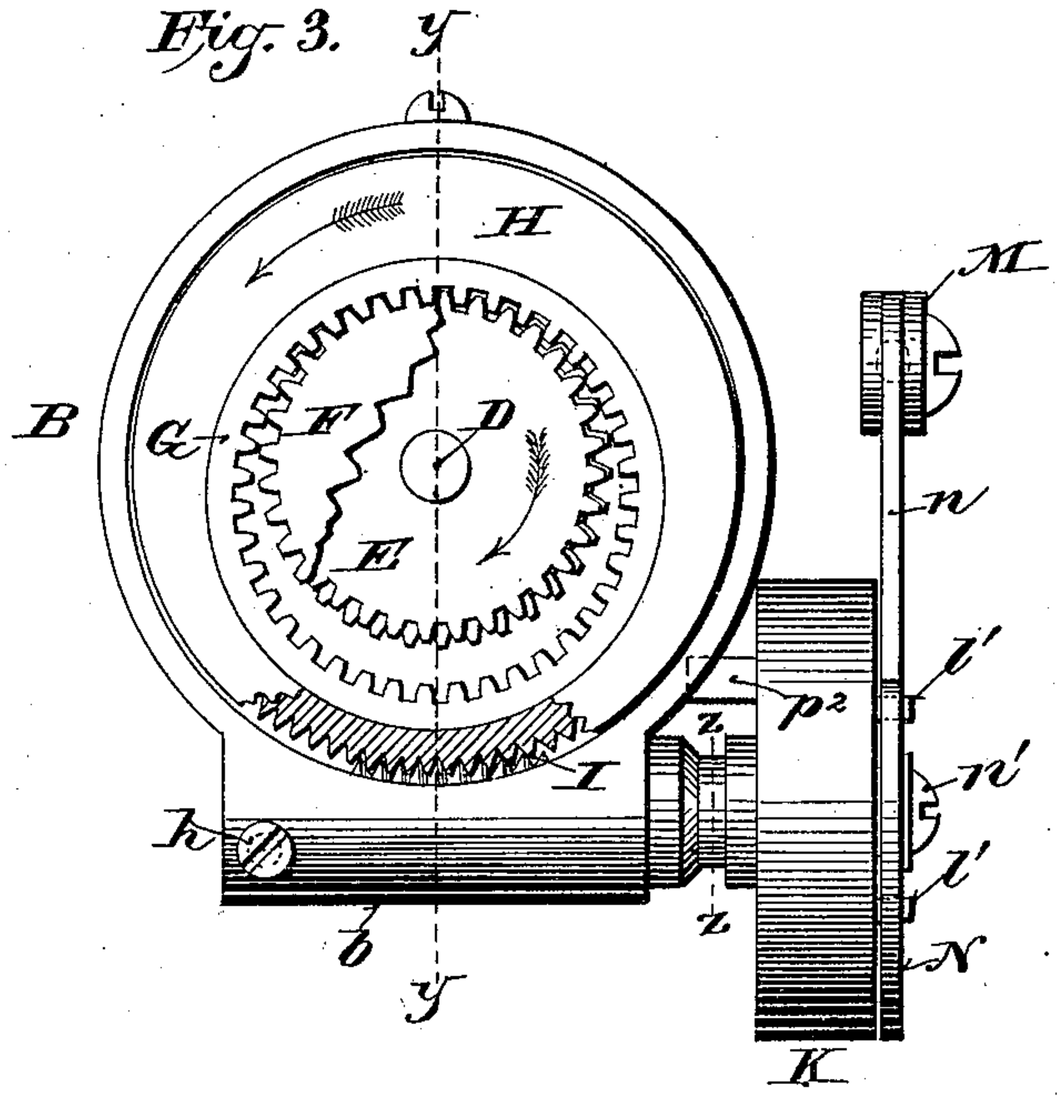


Fig. 4.

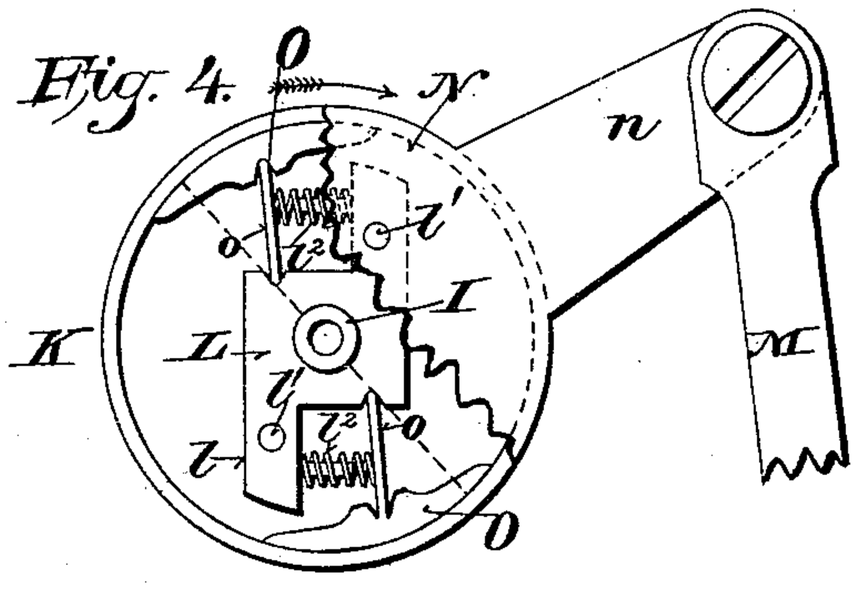
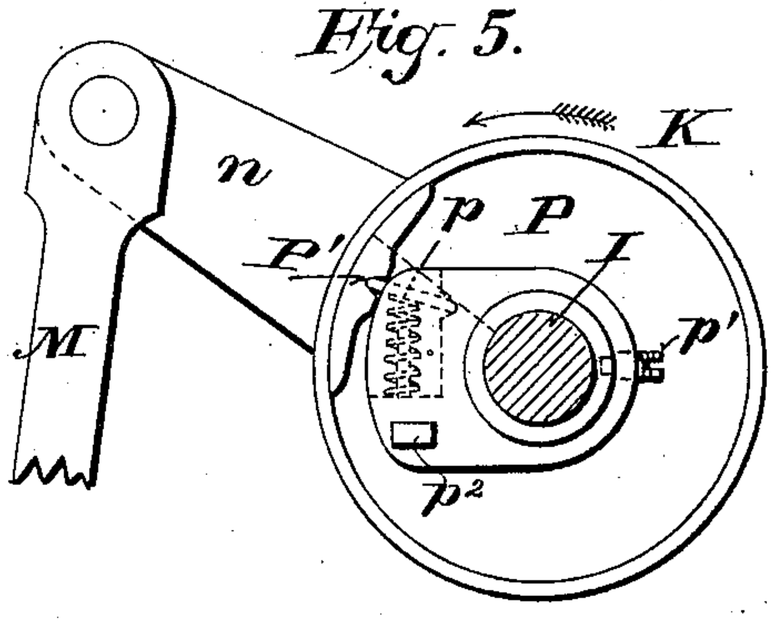


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM S. BEEMAN, OF ASHLAND, WISCONSIN.

SPEED-REDUCING MECHANISM FOR LUBRICATORS.

SPECIFICATION forming part of Letters Patent No. 406,419, dated July 9, 1889.

Application filed April 30, 1888. Serial No. 272,223. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. BEEMAN, of Ashland, in the county of Ashland and State of Wisconsin, have invented certain new and useful Improvements in Speed-Reducing Mechanism for Lubricators; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The object of my invention is to provide in a small compass a speed-reducing mechanism applicable to lubricators and other machines or devices in which a slow movement or great power is required.

It consists, essentially, of one or more inner gears, a revoluble internal eccentric, an internally-toothed ring working within said eccentric in engagement with said inner gear or gears, of oscillatory friction-clutch mechanism connecting said eccentric with a suitable source of power, and of certain peculiarities of construction and arrangement of parts hereinafter specifically set forth.

In the accompanying drawings, like letters designate the same parts in the several figures.

Figure 1 is aside elevation and partial section on the line *x x*, Fig. 2, of a lubricator to which my improved mechanism is applied. Fig. 2 is a vertical medial section of the lubricator on the line *y y*, Fig. 3. Fig. 3 is a plan view of the device; and Figs. 4 and 5 are elevations of the outer and inner sides, respectively, of the clutch mechanism, Fig. 5 being a section on the line *z z*, Fig. 3.

Although my improved speed-reducing mechanism is susceptible of various applications, for convenience of illustration I have shown it as applied to a crank-pin lubricator, in which A represents a cylindrical cup formed at the base with a screw-threaded neck A′, or other suitable connection, by which it is attached to the strap-head S or crank-pin or other bearing to be lubricated. A passage is formed in the usual way through the neck A′, which leads from the interior of the cup to the bearing to be lubricated. The cup A is also provided with a cover B, which is furnished with a cap B′, and constitutes therewith a gear-case in which the piston-actuating gearing is contained. The cover is attached to the cup by means of studs or pins *b′* and inclined slots *a*, formed in the upper edge of said cup, and is secured in place by a screw b^2, as shown in Fig. 2, or by other suitable means.

C is a piston or follower fitted to slide within said cup A, and formed at the center with a screw-threaded perforation or nut.

D is a screw-threaded stem working with the nut in said piston, and formed with a cup friction-disk *d* just below the horizontal partition in cover B.

Between the cover B and its cap B′ is interposed the worm-gear H, which fits snugly inside of the circular rim of said cover and has a circular eccentric opening, within which is fitted and works the internally-toothed ring G. Within the ring or internal gear G are placed concentrically one above the other differential gears E and F, both engaging and working therewith. The lower gear F is keyed to the cover B and prevented from turning by a screw *f*, (shown in Fig. 2,) or by other suitable means, and has a central opening to receive the hub *e* of the upper gear E, which has one less tooth than the gear F. The hub *e* of gear E, projecting through the opening in gear F, has a beveled face, which is arranged to engage with the cup friction-disk *d*. The stem D extends upwardly through the gears E and F, turning freely, when released, in the hub of the former, and is threaded and provided with a jam-nut D^2, by which the hub *e* of the gear E is forced into and held in engagement with the friction-disk *d*, and said gear prevented from turning on the stem D.

The cap B′ is formed with a central opening, through which the shoulder or hub of said nut D^2 passes to the upper side of gear E, against which it presses to produce engagement of the hub *e* with disk *d*. To the upper protruding end of the stem D is attached the head or hand-wheel D′, by means of which the follower or piston C is screwed up for the purpose of refilling the lubricator. On one side of cover B is formed a transverse cylindrical case or sleeve *b*, within which is journaled the worm I, working with the worm-gear H, as shown in Figs. 2 and 3.

The worm I is retained in place in the sleeve

b by means of a pin or screw *h*, (shown in Fig. 3,) which works in a groove *i* (shown in Fig. 1) in the worm shaft or journal. To the outer end of the worm-shaft is secured an internal friction-wheel K, which has on each side a laterally-projecting peripheral flange or rim.

Upon the worm-shaft or hub of the wheel K, outside of the latter, is loosely journaled a block L, having arms *l l*, and provided with the outwardly-projecting studs or pins *l' l'*.

O O are friction-shoes adapted to work with the inner side of the outer peripheral rim of friction-wheel K, as shown in Fig. 4. Between said shoes O O and the block L are interposed arms *o o*, which are set at an inclination to radii of the wheel K and rest at the ends in notches or seats formed therefor in said shoes and the oscillatory block L.

Springs l^2 l^2, inserted between the arms *l l* of block L and the arms *o o* on pins secured in said block L, tend to carry the latter toward the radii (shown by dotted lines, Fig. 4) of wheel K, passing through their inner ends, and thus to force the shoes outwardly against the rim of said wheel.

N is a cap-plate loosely secured to the end of the worm-shaft by a screw *n'* or other suitable means, as seen in Figs. 1 and 3, so as to cover the clutch mechanism, and perforated to receive and engage with the studs or pins *l' l'* in block L. It is formed or provided with an arm *n*, which is adjustably connected by a rod M and an eccentric Q with the crank-pin R, or the eccentric ring or gear H may be connected by other suitable means with any convenient source of power, although I prefer the construction and arrangement herein shown and described when the lubricator is employed with a crank-pin bearing.

The eccentric Q is attached to the crank-pin R by means of a screw or bolt *q* passing through a radial slot *q'* in said eccentric, and is provided with a strap-head *m*, connected with the rod M. By setting said eccentric Q farther from or nearer to the center of the crank-pin R a longer or shorter vibration is imparted to the clutch-block L.

A block P is loosely mounted on the worm-shaft or hub of wheel K, just inside of the latter, and is retained in place thereon by a screw *p'* (shown in Fig. 5) working with a circumferential groove in said shaft or hub. (Shown in Fig. 1.) A projection p^2 on said block P engages with the cover B of the lubricator, as shown in Fig. 3, and prevents the rotation of said block around or with the worm-shaft. A shoe P', similarly connected with block P by an inclined arm *p*, bears against the inside of the rim of wheel K and prevents it from being turned backward by the oscillation of the clutch mechanism or otherwise, and at the same time permits its being freely turned forward, or in the direction indicated by the arrow in Fig. 5, the arm *p* forcing the shoe P' outwardly when the wheel K is turned backward, and allowing it to recede from the rim of said wheel when it is moved forward.

Other means than those shown and described may be employed to connect the piston C and differential gears E and F with the stem, whereby the desired movement will be imparted to the piston. The eccentric ring H may be also operated by other means than those shown without affecting its mode of operation and that of the mechanism embraced within it. In short, various changes may be made in construction and arrangement of the parts of my improved lubricator without departure from the spirit of my invention.

My improved lubricator operates as follows: Each revolution of the crank-pin R in its bearing produces, through the eccentric Q and connecting-rod M, a complete vibration of the arm *n* and the clutch-head connected therewith. As the clutch-head L moves in the direction indicated by the arrow in Fig. 4, the arms *o o*, pressed by springs l^2 l^2 toward the radii, (indicated by dotted lines in the same figure,) force the shoes O O into frictional engagement with the rim of wheel K, which is thereby turned a part of a revolution. As the clutch mechanism moves in the reverse direction, the arms *o o* swing against the springs l^2 l^2 away from the radii passing through their inner ends, and permit the shoes O O to slide loosely against the rim of said wheel K, which is prevented from being turned backward by the shoe P', acting similarly to shoes O, but in the reverse direction. The length of the arc of vibration of the wheel K is changed as desired by adjusting the eccentric Q on the crank-pin R, as previously described, so as to move the center of said eccentric farther from or nearer to the center of said crank-pin. The intermittent rotation of the worm I, working with the gear H, intermittingly rotates the latter in the direction indicated by the arrow thereon in Fig. 3. As the gear H rotates, the internally-toothed ring G is moved in engagement with the differential gears E F around the same, and the gear E, having one less tooth than the gear F, is turned in the reverse direction, as indicated by the arrow, Fig. 3, the distance of one tooth to each complete revolution of the worm-gear H about the fixed gear F. The stem D, connected with the gear E by means of hub *e* and disk *d*, which are held in engagement by the jam-nut D^2, is intermittingly and very slowly turned, and working with the nut in piston C slowly moves it down upon the lubricant and forces the same through the passage in the base of the cup to the bearing. To refill the cup or receptacle A, the jam-nut D^2 is unscrewed and the hub *e* of gear E is released from engagement with the disk *d*, leaving the stem D free to be turned independently of its actuating mechanism. The piston C is then raised to the top of the receptacle by turning the stem D in the proper direction

by means of its head D′. The cover B is then unfastened and removed, taking with it the piston, stem, and their actuating mechanism.

By the construction and arrangement of the piston-actuating mechanism herein set forth the motion derived from the crank-pin or other source of power is very greatly reduced, and the mechanism is all embraced within a very small compass. The clutch mechanism hereinbefore described possesses the advantage of working positively without slipping or lost motion, of not being detrimentally affected in its operation by wear of the friction-surfaces, and of rendering the angular movement of the friction-wheel capable of very nice adjustment.

The strap-head and eccentric connection of the rod M with the crank-pin P present no projections which are liable to catch and injure the hands or fingers of the operator, and are susceptible of nice adjustment to produce a greater or less vibration of the clutch mechanism, as described.

I claim—

1. The combination of a rotary eccentric, an internal gear inserted therein, and differential gears working with said internal gear, substantially as and for the purposes set forth.

2. The combination of a rotary eccentric having a worm-gear formed on its periphery, an internal gear inserted therein, concentric differential gears working with said internal gear, and a worm working with said worm-gear and connected with a suitable source of power, substantially as and for the purposes set forth.

3. The combination of concentric differential gears, one being fixed and the other revoluble, a rotary eccentric, and an internal gear interposed between said eccentric and said differential gears and working therewith, substantially as and for the purposes set forth.

4. The combination, with a piston or follower having a rotary stem, of differential gears, one of which is fixed and the other revoluble, a clutch adapted to secure said revoluble gear to said stem, a rotary eccentric, and an internal gear inserted in said eccentric and engaging with both differential gears, substantially as and for the purposes set forth.

5. The combination, with a suitable receptacle and a piston or follower adapted to work therein, of a cover constituting a gear-case, an eccentric worm-gear revoluble in said gear-case, differential gears placed within said worm-gear concentric with its axis of rotation, an internal gear interposed between said worm-gear and said differential gears, and a revoluble stem connecting said piston with one of said gears, substantially as and for the purposes set forth.

6. The combination, with a suitable receptacle and a piston adapted to work therein, of differential gears, one fixed and the other revoluble, a screw-threaded stem working with a nut in said piston and extending throughout said gears and provided at its outer end with a head by means of which it may be turned, a friction-disk and a jam-nut placed on said stem on opposite sides of said revoluble gear, and a driving-gear working with both differential gears, substantially as and for the purposes set forth.

7. The combination of concentric differential gears, an eccentric annular worm-gear, an internally-toothed ring working within said worm-gear in engagement with said differential gears, a worm working with said worm-gear, and an oscillatory friction-clutch connected with said worm and with a suitable source of power, substantially as and for the purposes set forth.

8. The combination, with a piston or follower and a stem connected therewith, of a friction-wheel provided with a laterally-projecting annular rim, speed-reducing mechanism connecting said friction-wheel with said stem and composed of a rotary eccentric worm-gear, a worm working therewith, an internal gear inserted in said eccentric, and differential gears concentric with the axis of rotation of said eccentric and working with said internal gear, an oscillatory head, and friction-shoes working with the rim of said friction-wheel and so connected with said oscillatory head as to be moved into engagement with said rim when said head moves in one direction and moved out of engagement therewith when the head moves in the reverse direction, substantially as and for the purposes set forth.

9. The combination of a piston provided with a stem, an internal friction-wheel connected with said stem by speed-reducing gearing composed of a worm, a rotary eccentric worm-gear, an internal gear inserted therein, and differential gears concentric with the axis of rotation of said eccentric worm-gear and both working with said internal gear, and oscillatory friction-clutch mechanism working with said friction-wheel, substantially as and for the purposes set forth.

10. The combination of a piston provided with a stem, an intermittingly-rotating shaft connected with said stem by speed-reducing gearing composed of a worm, a rotary eccentric worm-gear, an internal gear inserted therein, and differential gears concentric with the axis of rotation of said eccentric worm-gear and both working with said internal gear, oscillatory clutch mechanism connected with said shaft, and an eccentric adjustably attached to the actuating crank-pin and connected with said oscillatory clutch mechanism, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

WILLIAM S. BEEMAN.

Witnesses:

HARRY H. BEASER,

PHILETUS G. COOKE.