(No Model.) 3 Sheets—Sheet 1.

W. H. & R. THOMPSON.

LUBRICATOR.

No. 604,132. Patented May 17, 1898.

Fig. 1.

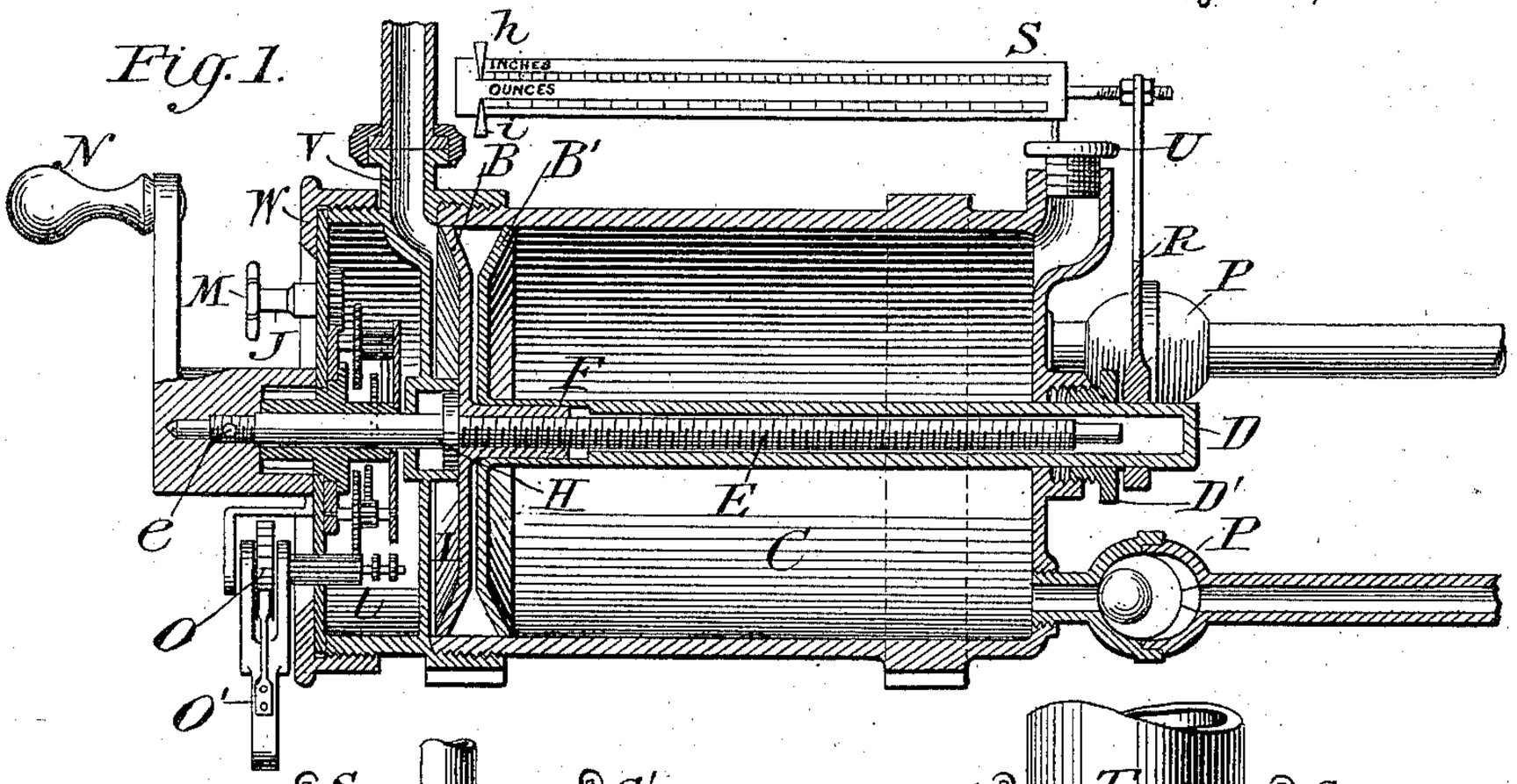

Fig. 2.

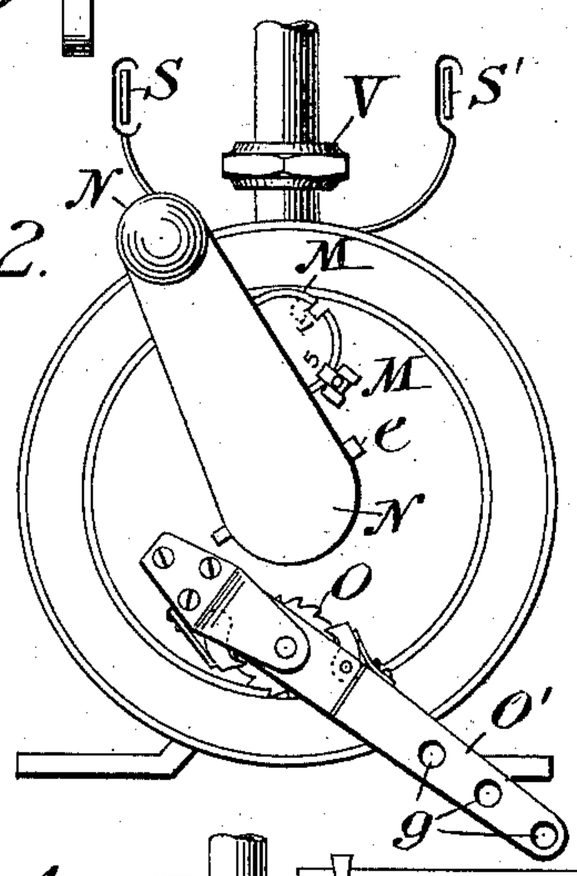

Fig. 3.

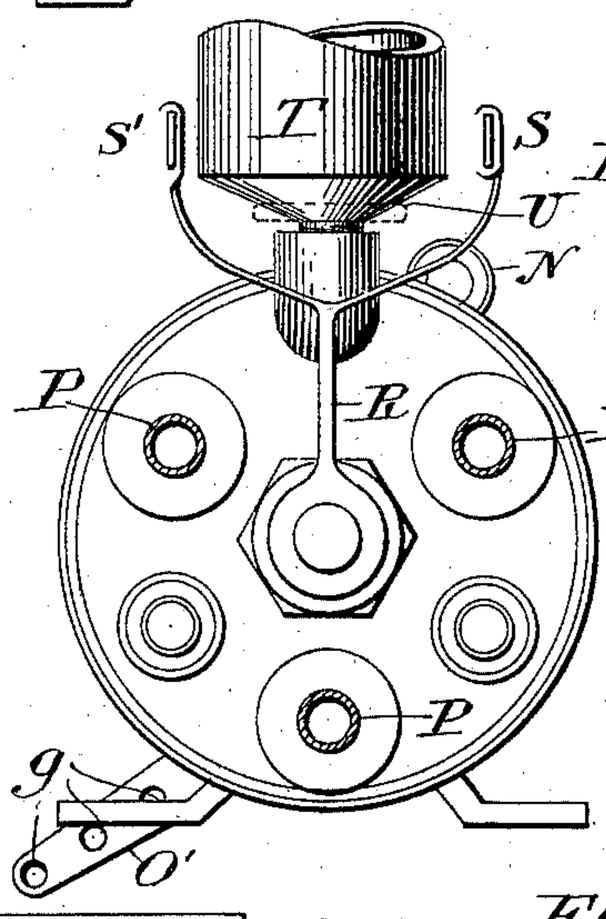

Fig. 4.

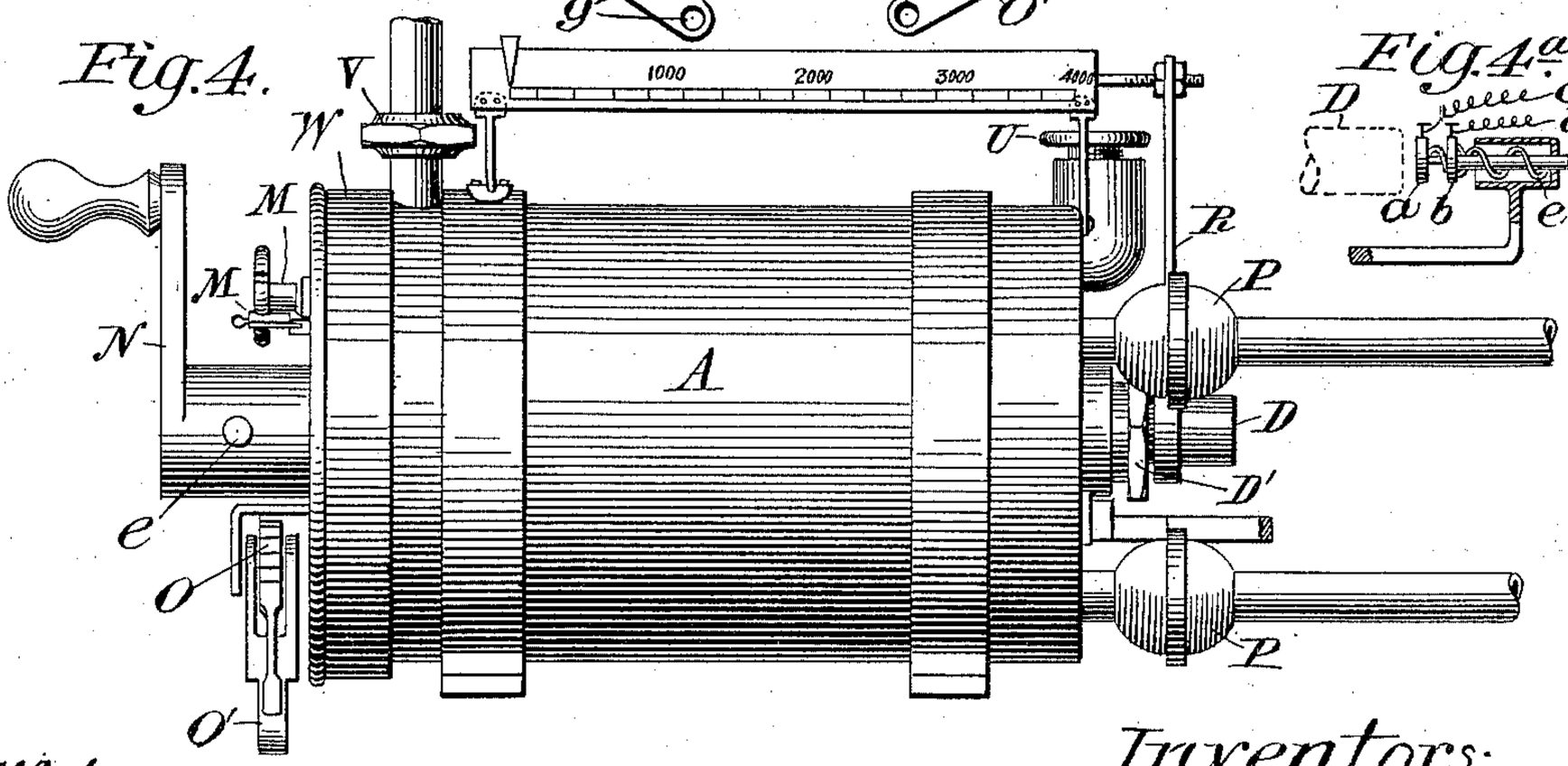

Fig. 4a.

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LUBRICATOR.

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Fig. 5.

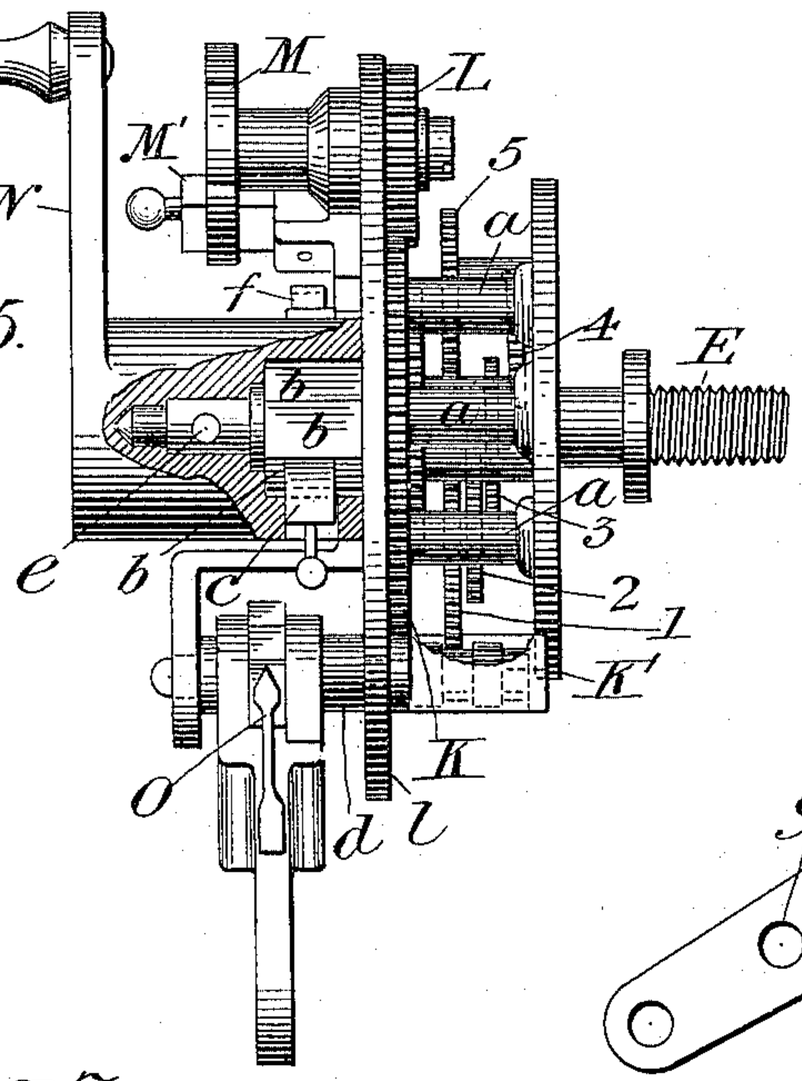

Fig. 6.

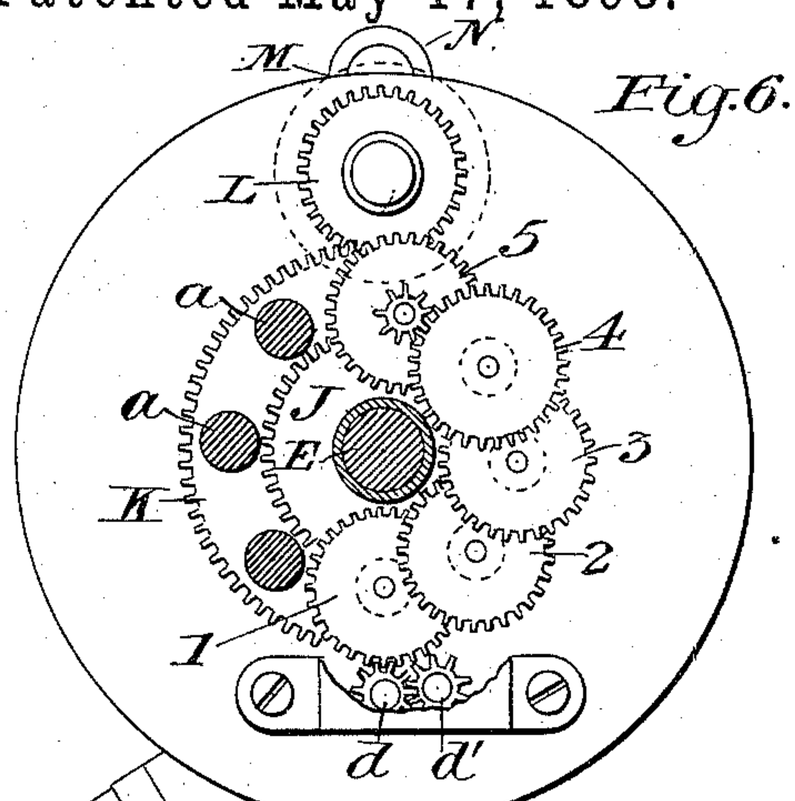

Fig. 7.

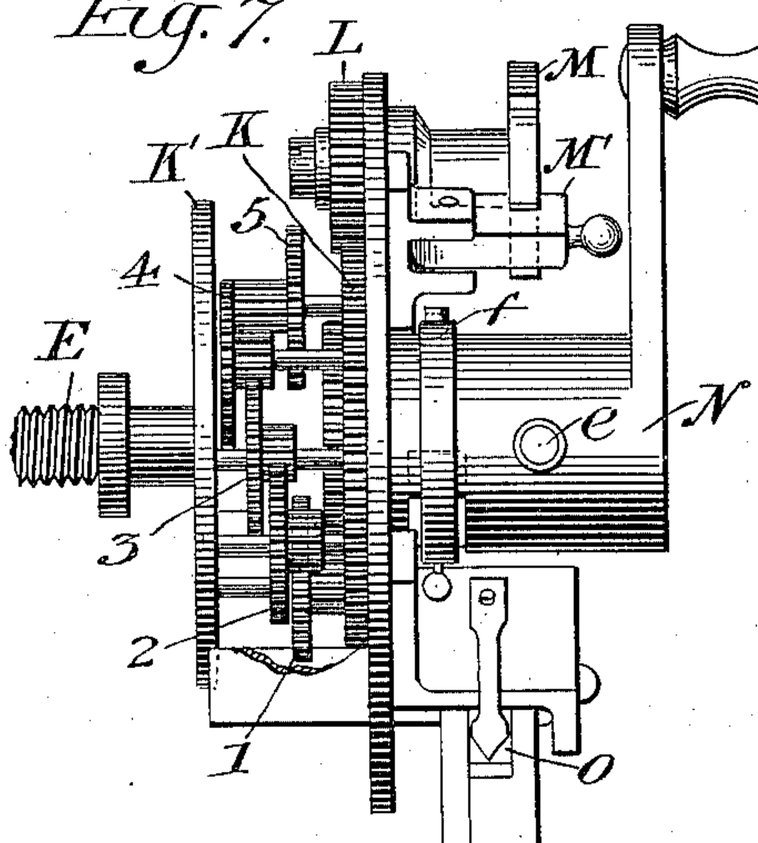

Fig. 8.

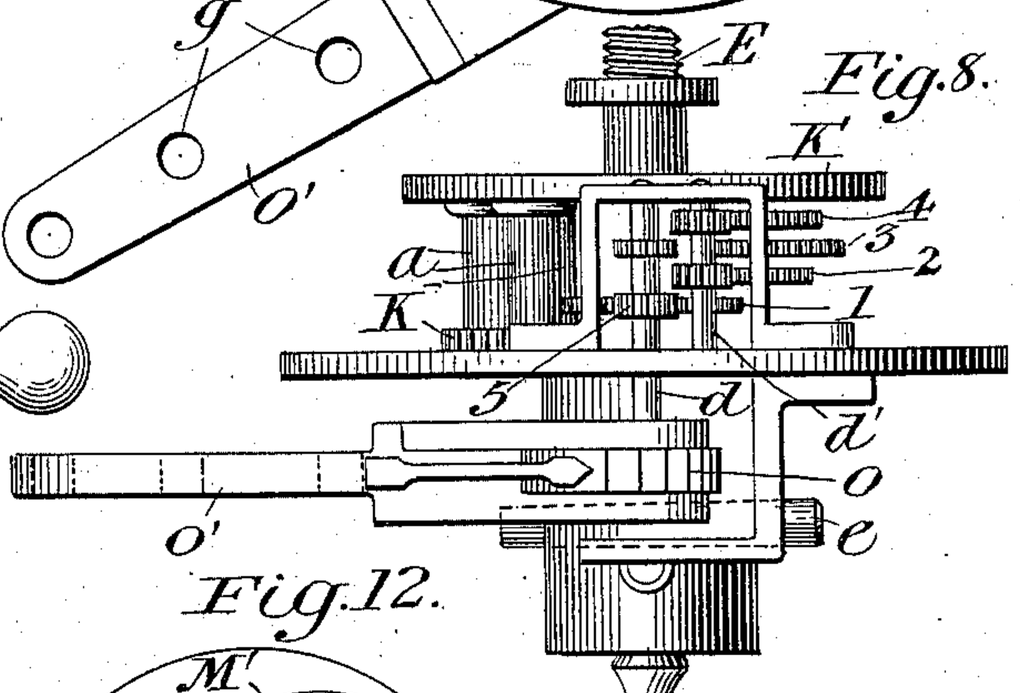

Fig. 12.

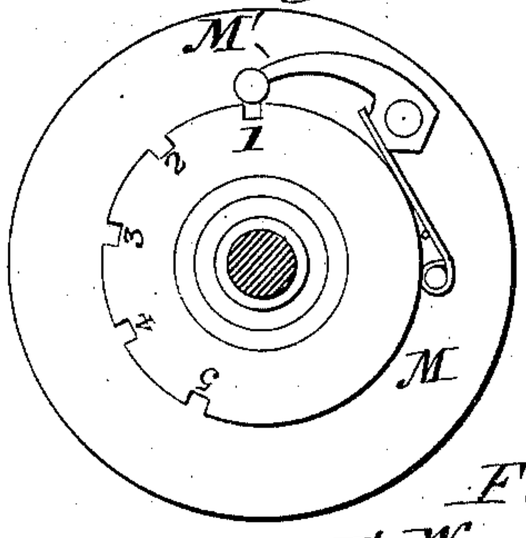

Fig. 9.

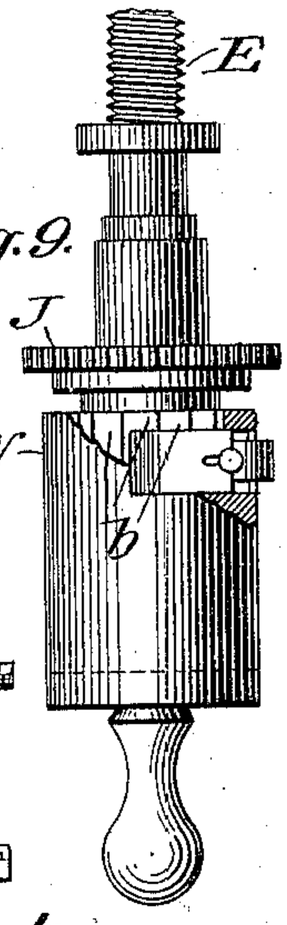

Fig. 10.

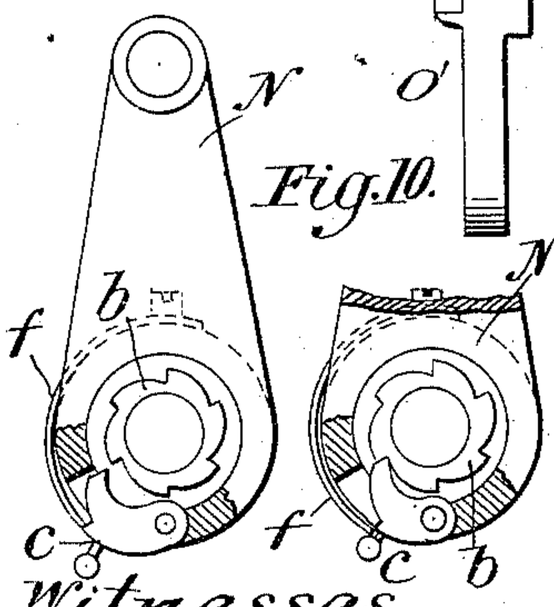

Fig. 11.

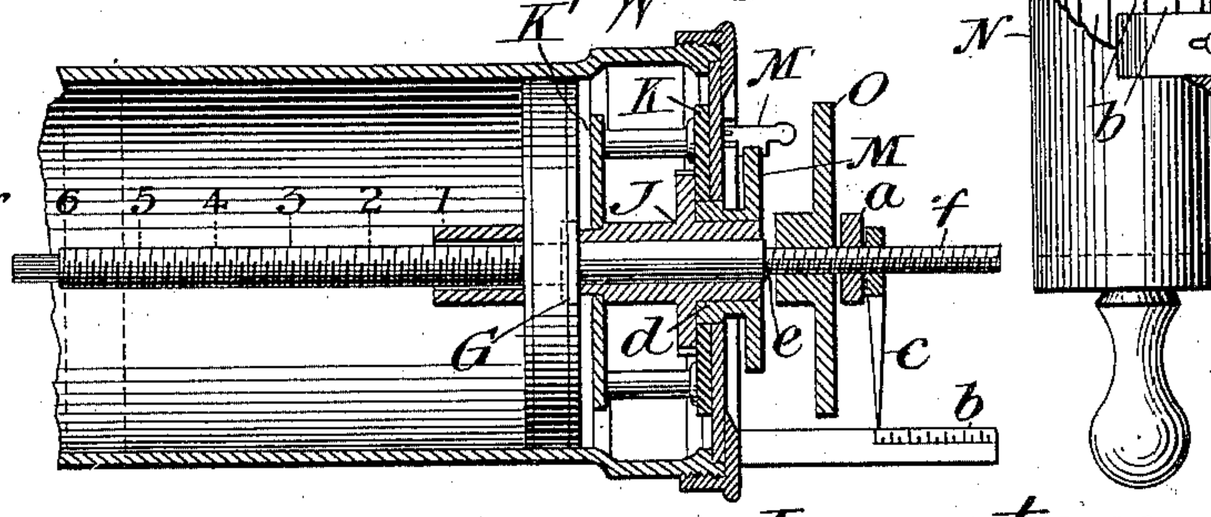

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Fig. 13.

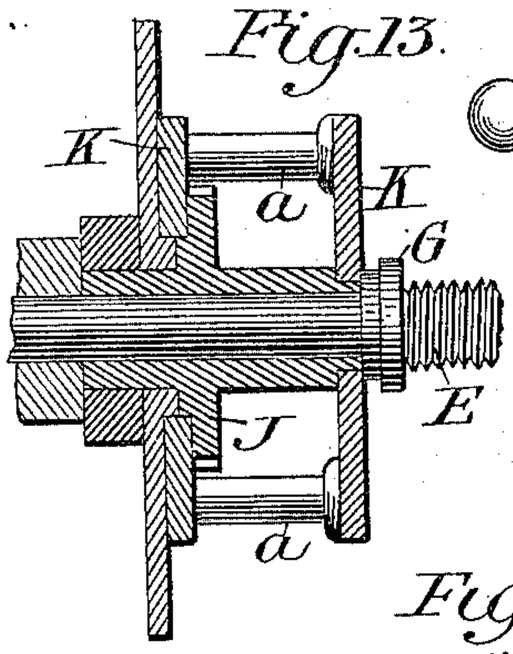


Fig. 14.

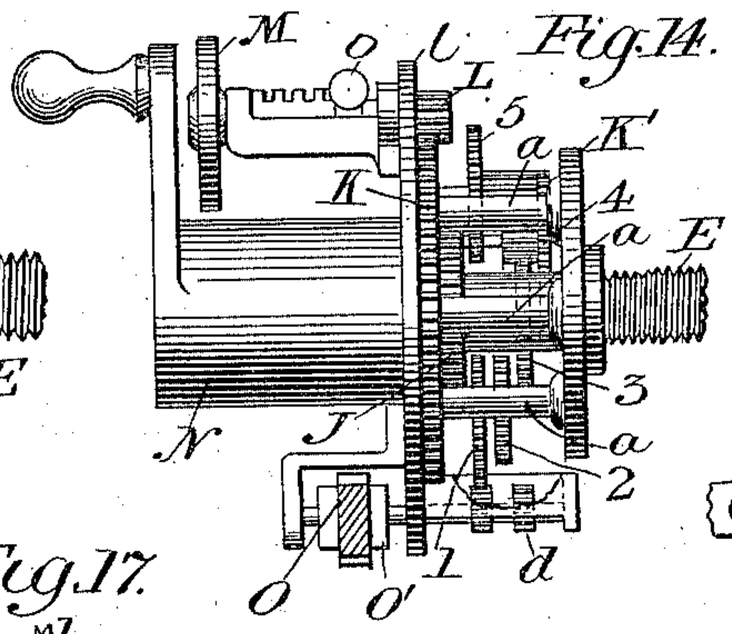


Fig. 15.

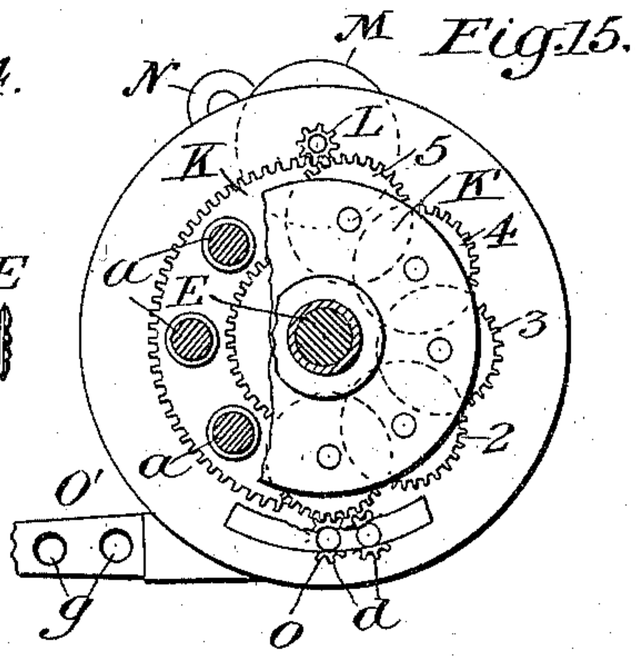


Fig. 17.

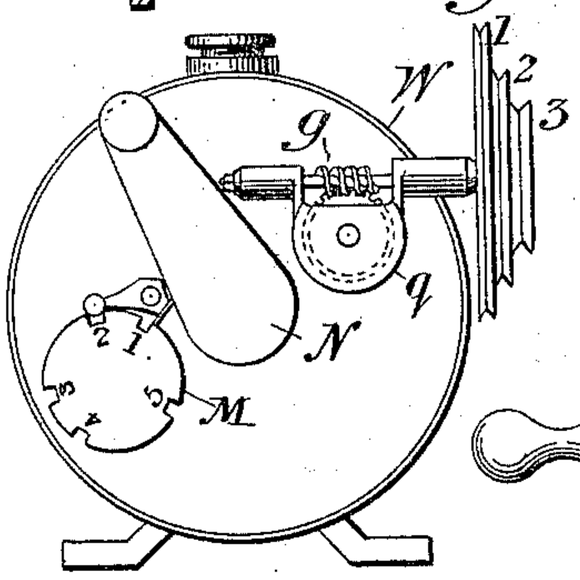


Fig. 16.

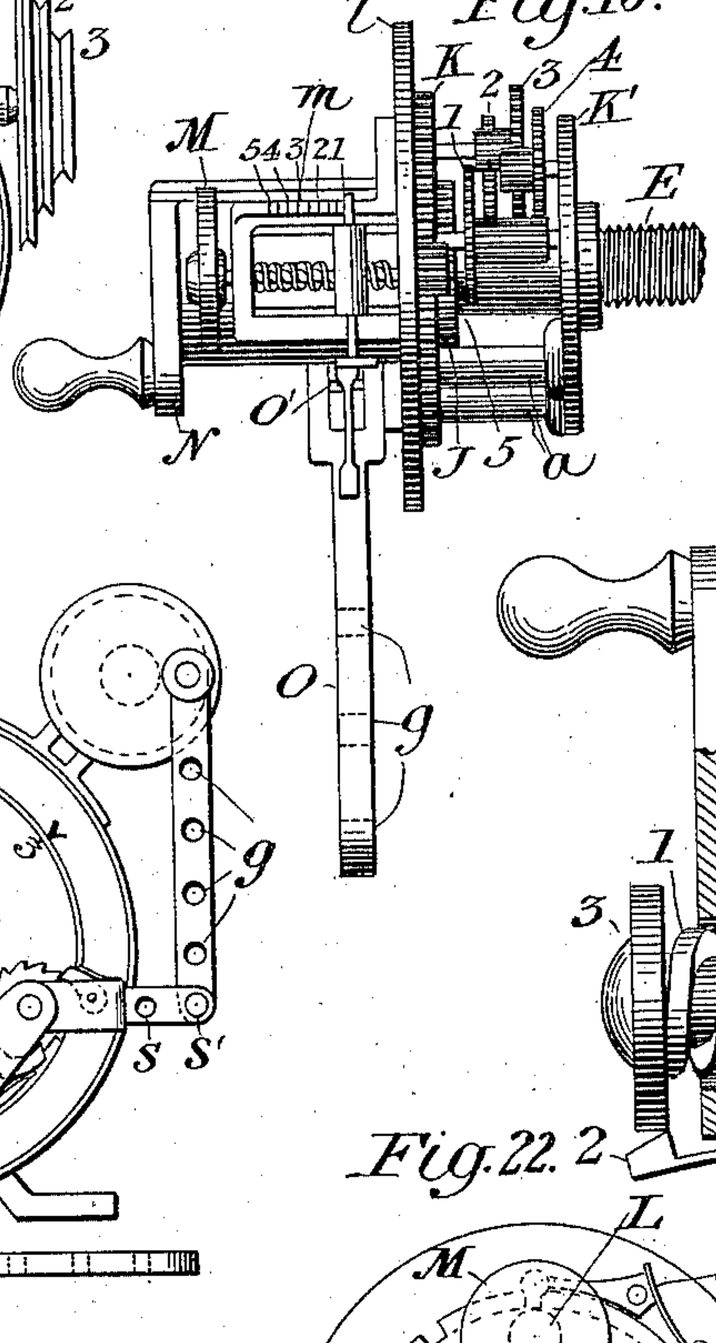


Fig. 18.

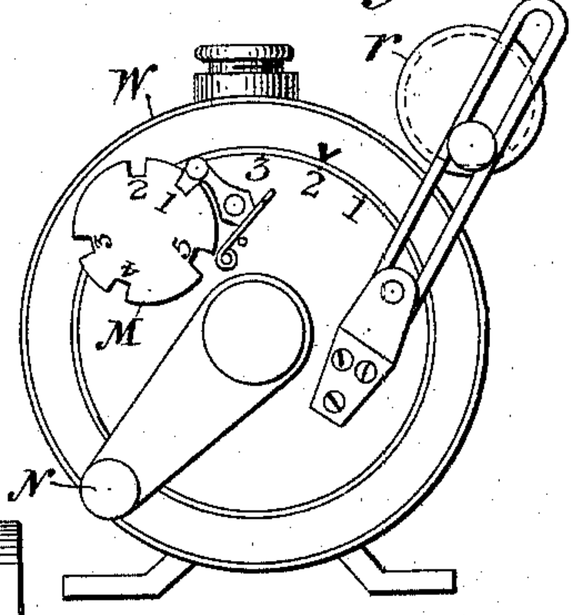


Fig. 19.

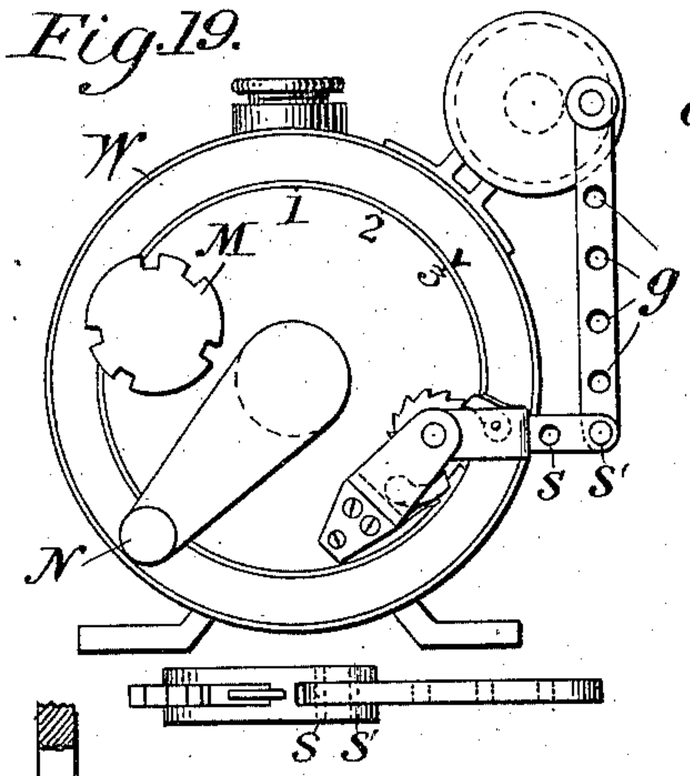


Fig. 20.

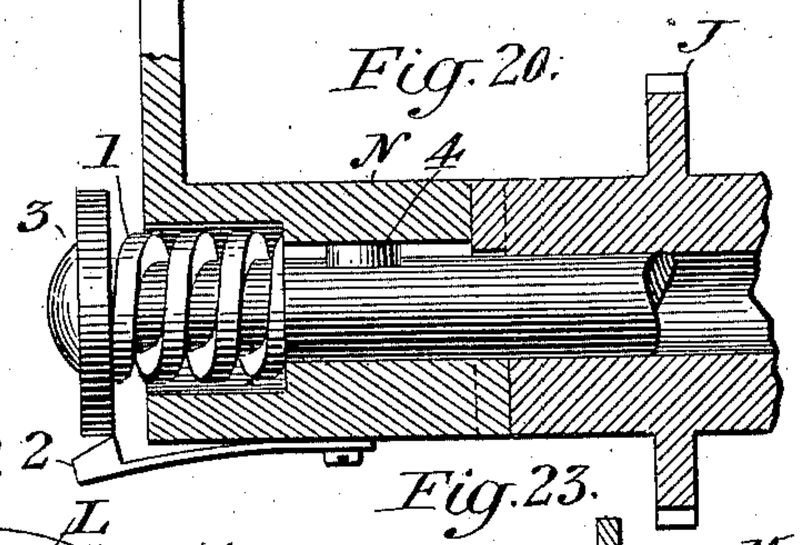


Fig. 22.

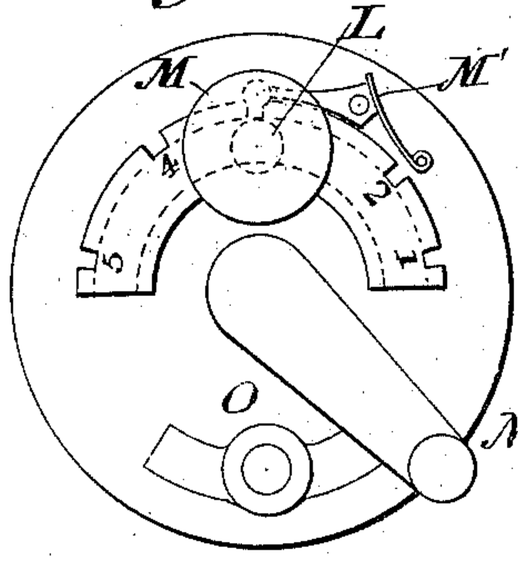


Fig. 23.

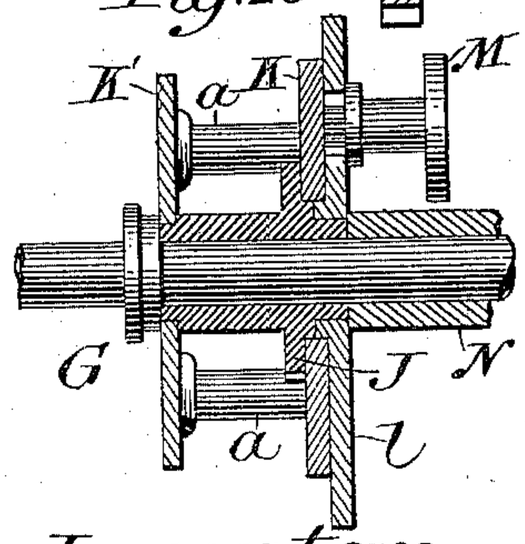
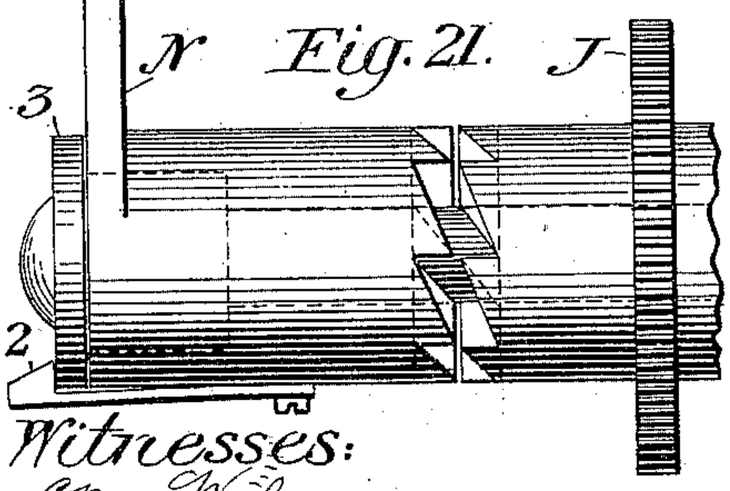


Fig. 21.



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UNITED STATES PATENT OFFICE.

WILLIAM HENRY THOMPSON AND ROBERT THOMPSON, OF LONDON, ENGLAND.

LUBRICATOR.

SPECIFICATION forming part of Letters Patent No. 604,132, dated May 17, 1898.

Application filed May 8, 1896. Serial No. 590,717. (No model.) Patented in England February 2, 1892, No. 2,044; in Germany May 28, 1892, No. 76,021; in France May 23, 1894, No. 238,743, and in Belgium May 28, 1894, No. 110,179.

To all whom it may concern:

Be it known that we, WILLIAM HENRY THOMPSON and ROBERT THOMPSON, subjects of the Queen of Great Britain, and residents of 155 Fenchurch street, London, in the county of Middlesex, England, have invented certain new and useful Improvements in Lubricators, (for which Letters Patent have been granted to us in Great Britain, No. 2,044, dated February 2, 1892; in France, No. 238,743, dated May 23, 1894; in Germany, No. 76,021, dated May 28, 1892, and in Belgium, No. 110,179, dated May 28, 1894,) of which the following is a specification.

Our invention relates to lubricators; and it consists of certain novel parts and combinations of parts particularly pointed out in the claims concluding this specification.

The accompanying drawings show our invention embodied in several forms which are at present preferred by us; but it will be understood that various modifications and changes may be made without departing from the spirit of our invention and without exceeding the scope of the concluding claims.

In the accompanying drawings, in which similar letters and numerals of reference indicate the same or corresponding parts, Figure 1 is a longitudinal section through a lubricator involving our invention. Fig. 2 is an elevation of the operating end thereof. Fig. 3 is an elevation of the delivery end thereof, and Fig. 4 a longitudinal elevation thereof. Fig. 4^a is a detailed part of Fig. 4. Figs. 5, 6, 7, 8, 9, and 10 show detail parts of the same on enlarged scale. Figs. 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, and 23 show modifications hereinafter fully described.

The following is a description of the structure shown in the accompanying drawings.

A is the body of the lubricator.

B B′ are the two parts forming the piston.

C is the space occupied by the lubricant.

D is the hollow piston-rod, containing the piston-screw E for traversing the piston by working within the internal thread F, cut in the boss, formed in the back part of the piston B.

G is a shoulder formed on the piston-screw for taking the thrust of the piston, which is utilized for making a tight joint around the neck of the piston-screw by acting on the ring or plug H, and thereby compressing the packing contained in the stuffing-box, so as to prevent the escape of the fluid under pressure acting on the back of the piston as a counterbalance.

The neck of the piston-screw passing through the stuffing-box and extending beyond the plate I is fitted with the main wheel J, which gears with the first wheel of the train of wheels numbered 1 2 3 4 5, Figs. 5, 6, 7, 8, 9, and 10, which regulate the feed of the lubricant by regulating the travel of the piston, being so carried on the plate K K′ (which with the pillars *a a a* form the combination of parts hereinafter called "wheel-carriage") that each wheel of the train may be alternately moved into gear with the ratchet-motion pinions *d d′*, each wheel being proportioned so as to cause the piston to travel four times faster or slower than the other, according to the direction from which they are brought into gear with the said pinions *d d′*, as indicated by the words "Fast" and "Slow" marked on the index-wheel M, which wheel revolves or operates the wheel-carriage by its connection with the wheel L gearing into the segmental rack formed on the plate K. The part of the boss of the main wheel extending through and beyond the operating end plate *l* is formed in the manner of a ratchet-wheel with teeth *b*, the neck of piston-screw passing through and taking its bearings in the boss of the main wheel, beyond which it extends a sufficient length to be fitted with the handle N, (by a screw and pin, as shown at *e*,) by which the screw is turned, which handle covers the ratchet-teeth and is combined with the pawl *c*, engaging in the teeth *b*, so that the main wheel J forces it and the piston-screw around together when the movements or mechanism are in action, at the same time admitting of the handle and screw being turned independently in the direction for advancing the piston, the pawl moving with the handle and passing over the teeth *b*, which again works the screw by contact with the pawl when the handle is relieved from the hand-pressure. The pawl is arranged that it

may be disengaged from the teeth and retained clear of them by the spring *f*, so that the handle N and piston-screw E may be turned by hand in the direction for returning the piston B B′ when the lubricator requires recharging, which is effected by the suction of the returning piston drawing the lubricant from a filling-tube T into the cylinder or space C. The tube is removed after the cylinder has been charged and the plug U replaced, leaving the lubricator in action. The check or ball valves P P P are provided in order to prevent the aforesaid suction of the returning piston from drawing the lubricant out of the delivery or conducting pipes leading from the lubricator to the several bearings with which it may be connected, thus insuring the passage of the lubricant in an outward direction only.

The movement or train of wheels 1 2 3 4 5, the main wheel J, the piston-screw, and piston are operated by the pinions *d d′* and the ratchet motion O O′.

The gland D′ is provided for the purpose of sealing the aperture through which the hollow piston D passes. The pressure employed for counterbalancing the piston is brought from any available source by means of a pipe, being connected to the aperture V—as, for example, if the lubricator is employed for lubricating the cylinders of pumping-engines such pipe would be connected to the pump delivery-pipe, so as to charge the cylinder at the back of the piston with water at about the same pressure as that opposing the advance of the piston, which water is drawn off when returning the piston for recharging the lubricator by providing a suitable cock or cocks for shutting off the water under pressure and allowing that in the cylinder to flow away.

The adjustment or travel of the piston is regulated by the index-wheel operating the wheel-carriage through the medium of the wheel L and segmental rack, so as to bring every other wheel of the train alternately into gear with the pinions *d d′*, increasing or diminishing the speed or travel of the piston according to the direction in which the wheel-carriage is turned, as indicated by the words "Fast" and "Slow" on the index-wheel. Each one of the wheels of the train is held into gear with the pinions *d d′* and represented by the figures or interstices on the said index-wheel. The object of having the two pinions *d d′* is that the motion imparted to the main wheel may be in one direction, which is effected by gearing No. 1 wheel with the pinion *d*, No. 2 with *d′*, No. 3 with *d*, No. 4 with *d′*, No. 5 with *d*. These wheels, as aforesaid, being proportioned at a ratio of four to one larger than their pinions, the effect of each wheel-to-wheel adjustment is to cause the piston to travel four times faster or slower. For example, in the several figures shown in the drawings the No. 1 wheel is in gear, as indicated by the index-wheel. If the index-wheel is turned around, so as to bring No. 2 interstice into such position that the spring-catch M′ engages into and locks it, No. 2 wheel will be set into gear with the pinion *d′* and the travel of the piston will be four times slower. Engaging the spring-catch into No. 3 will have the effect of bringing No. 3 wheel into gear with pinion *d*, causing the travel of the piston to be four times slower than when set at No. 2, and so on with the other numbers shown on the index-wheel. Of course turning the index-wheel in the opposite direction the speed of the piston is increased in the same ratio.

The ratchet-lever is operated by connecting it with any suitable motion of the machinery near which the lubricator is located. The connection may be by a cord attached to one of the holes (marked *g*) at one end and the aforesaid motion at the other end. The said holes are arranged so that by attaching the cord or connection at a hole nearer to the center from which the lever raidiates, so shortening the leverage, the pawl may engage in two or three teeth for the purpose of dividing the wheel-to-wheel adjustment indicated by the index-wheel. For instance, if the pawl is working on one tooth of the ratchet-wheel and the index-wheel shows that No. 1 wheel of the train is in action and feeding the lubricant in excess of what is necessary the attendant will set the index-wheel at No. 2, which, being, as hereinbefore mentioned, four times slower, may be feeding a less quantity than is required. The difference between the wheel-to-wheel adjustment may be proportionally increased by engaging the pawl with two or three teeth of the ratchet-wheel, which arrangement applies to each wheel-to-wheel adjustment made by the index-wheel.

It is necessary under some conditions, such as when the lubricator is employed for testing lubricants, to indicate the quantity of lubricant the piston has displaced. The index-plate S is provided for this purpose and marked off into spaces representing measurement and weight—for example, ounces and cubic inches—the number of which displaced by the piston is shown by the index-hands, *h* for the measurement and *i* for the weight, which index-hands move with the piston B B′ by being connected with the hollow piston-rod D by the forked arm R and the adjustment-rod *j*. Also it may be necessary or desirable to know by what number of revolutions such quantity and weight of lubricant is displaced, and for such purpose the index-plate S′ is provided, which is connected to the forked arm R and operated in the same manner as S and marked, for example, into divisions of one thirty-second of an inch, which (with a piston-screw having ten threads per inch) is the travel or displacement of the piston per one hundred revolutions when the index-wheel is set at No. 1 and the pawl working or engaging in one tooth of the ratchet-wheel O. By the word "revolution" is meant

the movements of the motion by which the lubricator or ratchet motion is operated. For instance, if it were operated by the valve-gear of an engine each movement of such gear would represent a revolution of the crank-shaft. Taking No. 1 on the index-wheel as the standard, giving one thirty-second of an inch travel or displacement of the piston per one hundred revolutions or movements, as each of the wheels in the train are four to one, as hereinbefore mentioned, when an adjustment is made to No. 2 of the index-wheel the same indication—viz., one thirty-second—would represent four hundred revolutions, and so on. Each of the adjustments the number of revolutions would have to be calculated according to the adjustment represented by the index-wheel and the number of teeth engaged by the pawl of the ratchet motion. Of course in actual operation these calculations would be tabulated in a simple form.

W is the nut by which the end plate *l* and its connections are secured to the body of the lubricator.

Fig. 13 shows a modification in which, in the absence of the counterbalancing-pressure, the partition-plate I may be dispensed with and the thrust of the pressure of the piston on the screw taken by the end plate *l*, the main wheel J coming into direct contact with the piston-screw shoulder G. This part of our improvement consists in so arranging the wheel-carriage that it may be free to turn on the main wheel and not be held by the pressure or thrust of the screw, which is effected by the wheel-carriage plate K taking its bearing and working partly on a boss or shoulder on the end plate *l* and partly on the shoulder on the main wheel and held in position so as to move freely between the faces of both, while the other part of the wheel-carriage is supported by the plate K′, taking its bearing on a shoulder formed on that end of the main wheel in contact with the screw-shoulder G, the wheel-carriage being so arranged that it may be freely turned for bringing the wheels of the wheel-train into working position.

Figs. 14, 15, and 16 show a modification of the index-wheel in which instead of the indexing-interstices being cut on the wheel M they are cut on the index-plate or stationary index *m*, and the indications shown by the spring-bolt *o* traversing the index as the wheel M is being turned to operate the wheel-carriage by the pinion L, as hereinbefore described, and more particularly shown by Figs. 5, 6, 7, 8, 9, and 10. The spindle carrying the pinion L and wheel M is formed with a screw *n*, working in a nut, combined with the spring-bolt *o* in such a manner that when the wheel M is turned the nut travels along the screw carrying the spring-bolt, so that it indicates the working of the wheel-carriage and the position of the wheels in the train, each of which is represented by the number 1 2 3 4 5. The spring-bolt being set into any one of the interstices so numbered sets the wheel of the train represented by the number of such interstices into gear with the ratchet-pinion and locks the wheel-carriage in position for its working.

Fig. 17 represents a modification, the object of which is principally to adapt the lubricator to such high speeds as are too rapid for the efficient operation of the ratchet by substituting the grooved wheel *p* and worm and worm-wheel *q*, which are driven from a convenient rotary motion by a suitable cord working, as may be required, in either of the grooves marked 1 2 3, each being proportioned so as to divide the difference of four to one in the wheels of the wheel-train, and bear the same relation to these wheels as is obtained by engaging the pawl of the ratchet motion in one, two, or three teeth of the ratchet-wheel hereinbefore mentioned.

Fig. 18 is a modification adapting the ratchet motion to conditions where it is more convenient to work it by a rotary than by a rectilinear motion. The combination consists in combining the crank-plate *r* with the lubricator and employing it for operating the ratchet motion and utilizing the movement of the end plate *l* for regulating the ratchet motion so as to engage the pawl in one, two or three teeth by turning and setting the plate to the index 1 2 3, so as to increase or diminish the leverage of the ratchet-lever to or from the crank-pin, working in the slot formed in the lever, as shown. The plate *l* is turned or adjusted by slackening the nut W, so as to free it from the body, and it is set or held at the required position or number shown by the index 1 2 3, setting up the nut W to its normal position.

Fig. 19 is a modification of Fig. 18, arranging the ratchet motion so that it can be worked either by a rectilinear or rotary motion, which is effected by dividing the ratchet-lever as shown at *s* and *s*′, where it is held together by two screws, so as to form a straight lever when employed for a rectilinear motion, and when required to be operated by a rotary motion the two screws are drawn and *s* set back to *s*′ and united by one screw, so as to form a joint and convert this part of the lever into a connecting-rod, the other end of which is connected to the pin of the crank-plate *r*, so as to be operated by it. The adjustment for engaging the pawl in one, two, or three teeth of the ratchet-wheel is the same as Fig. 18.

Figs. 20 and 21 show a modification of the piston-screw handle N in which it is made in the form of a clutch by the teeth being cut on the end of the boss of the main wheel J and counterpart teeth cut on the end of the handle N, which teeth engage into each other and are held in position by the pressure of the coil-spring 1, which allows the teeth of the handle to slip over those on the main wheel when the handle is turned in the direction necessary to force the piston forward for flushing the bearing-surfaces, and when the piston has to be run back for recharging the

lubricator, as hereinbefore described, the handle N is drawn back until the spring-catch 2 falls over the collar 3 and locks the handle clear of the main-wheel teeth while it is being turned in the direction for running back the piston. When the lubricator is charged, the spring is released and the screw-handle is again set into gear with the main wheel by the pressure of the coil-spring. The key 4 is provided to prevent the handle from turning on the neck of the piston-screw and the key-way made sufficiently long to allow the handle to slide over the key.

Figs. 22 and 23 show a modification in which the segmental rack is formed in the stationary end plate *l* instead of the wheel-carriage plate K, which plate is connected to and carries the wheel M and pinion L, so that when the wheel M is turned the wheel-carriage is operated by the pinion L, gearing into and traveling over the segmental rack, carrying with it the index-plate *m*, which is arranged with interstices and numbers representing each of the wheels of the wheel-train, any of which wheels are indicated and locked into working position by means of the spring-catch M′, as hereinbefore mentioned.

When the lubricator is working under conditions that it may be desirable to signal the arrival of the piston at any given point of its travel or to signal that it has reached a position when the lubricator should be recharged, we arrange an electric bell in such relation to the piston-rod that in its progress it comes into contact with and presses the press-button or contact or other device for completing the circuit and setting the bell in action.

Fig. 4ª shows the arrangement of the press-button contact and connecting wires of the electric signal-bell in conjunction with the hollow piston-rod D. *a* is the press-button, which is forced against the spring-contact piece *b* by the advancing piston-rod D, so as to complete the circuit and set the bell in action by the medium of the positive (*c*) and negative (*d*) wires, which are connected with the bell and battery in the usual manner. The spring *e* is so arranged as to provide an elastic pressure, keeping the press-button *a* and contact-piece *b* together after the piston-rod has forced them into contact and giving to the movement of the advancing piston-rod, so as to keep the bell in action for a prolonged period.

Fig. 11 shows the arrangement or modification by which the index-wheel M is connected directly to the wheel-carriage K K′ by fixing the plate K to the boss *d* of the said index-wheel in such a manner that the carriage moves with it when it is operated in conjunction with the spring-catch M′ for the purpose of moving around or adjusting and setting the wheel-carriage and train of wheels, as hereinbefore mentioned. Fig. 11 further shows a modification by which the wheel O is substituted for the screw-handle N, the said wheel working on the screw *e*, formed on the shank of the piston-screw in such a manner that when turned so as to traverse the screw toward the main wheel J it jams the said main wheel between itself and the shoulder G, so connecting the piston-screw main wheel and automatic mechanism by which it is operated, as heretofore described. The piston-screw is freed, so as to be worked by hand independently of the automatic mechanism, by turning the wheel O in the direction that will cause it to relinquish its grip on the main wheel and advance along the screw to the collar *a*, against which it jams, so as to cause the piston-screw to move with it in the direction it may be turned for traversing the piston by hand, as heretofore described. Fig. 11 also shows the arrangement for indicating the displacement of the lubricant or number of revolutions, as heretofore mentioned, by means of a reduced index-plate. C is an index-hand formed with a nut working in the screw *f*, formed on an extension of the shank of the piston-screw, the threads of which are pitched so much finer than the piston-screw that while it is traversing the piston along it from "1" to "6" the index-hand C shows the displacement on a reduced scale from "1" to "6" on the index-plate *b*.

Fig. 12 is an end view showing arrangement of index-wheel M and spring-catch M′.

In the foregoing specification we have referred to a few modifications which might be employed in practicing our invention; but we desire it to be understood that mention by us of a few modifications is in no way intended to exclude others not referred to, but which are within the spirit and scope of our invention, the object of this specification being to instruct persons skilled in the art to practice our invention in its present preferred form.

As we have before remarked, many of the combinations and details illustrated and above described are not essential to the several features of our invention separately and broadly considered. All this will be indicated in the concluding claims, where the omission of an element or the omission of reference to the detail features of the elements mentioned is intended to be a formal declaration of the fact that the omitted features or elements are not essential to the invention therein severally covered.

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

1. In a lubricator, the combination with the piston thereof, of a revolving screw-threaded shaft, means for transmitting the motion of said shaft to the piston to operate it, a suitable device attached to said shaft for manually operating it, automatic actuating mechanism, and means for transmitting the motion of the automatic mechanism to said shaft and for permitting said shaft to be manually rotated without disconnecting it from said automatic mechanism.

2. In a lubricator, the combination of a piston, a screw and nut device, a handle at-

tached thereto for manually operating it, an independently-moving pinion, means for automatically actuating said pinion and a pawl and ratchet device connecting said pinion and said screw and nut device.

3. In a lubricator, the combination with the piston thereof, of suitable means for actuating it, a train of speed-reducing gearing, the elements of which intermesh, interposed between the actuating mechanism and the piston, a pinion, an index attached to said pinion and a wheel-carriage carrying the elements of said train and provided with a rack meshing with said pinion whereby the actuating mechanism is applied to different elements of the train to translate a constant speed of the actuating mechanism into different speeds of the piston.

Signed at London, in the county of Middlesex, England, this 20th day of April, A. D. 1896.

WILLIAM HENRY THOMPSON.
ROBERT THOMPSON.

Witnesses:
EDWIN R. A. BENNETT,
A. COUSIN.