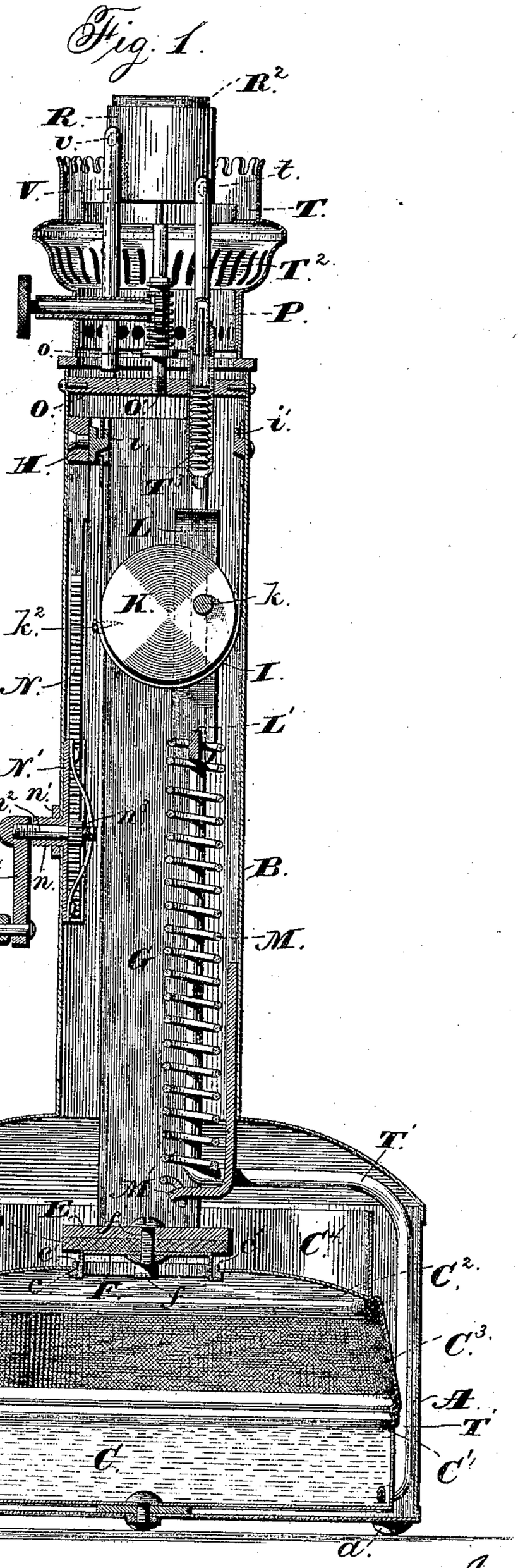
(No Model.) 3 Sheets—Sheet 1.

W. E. A. HARTMANN.

PETROLEUM LAMP.

No. 369,598. Patented Sept. 6, 1887.

Fig. 1.



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his Attorneys

(No Model.)

3 Sheets—Sheet 2.

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Fig. 2.

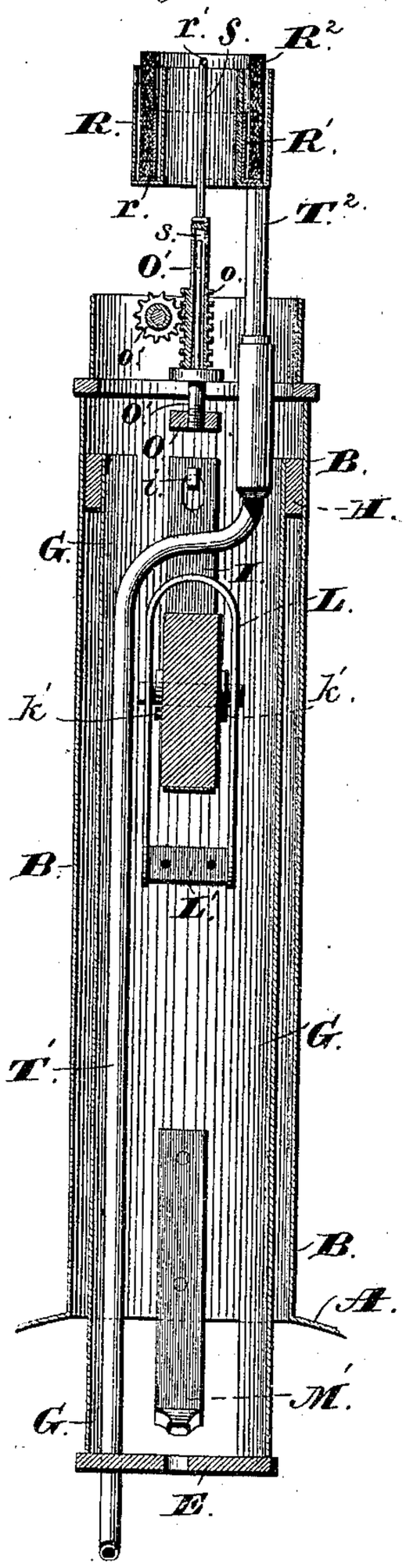

Fig. 3.

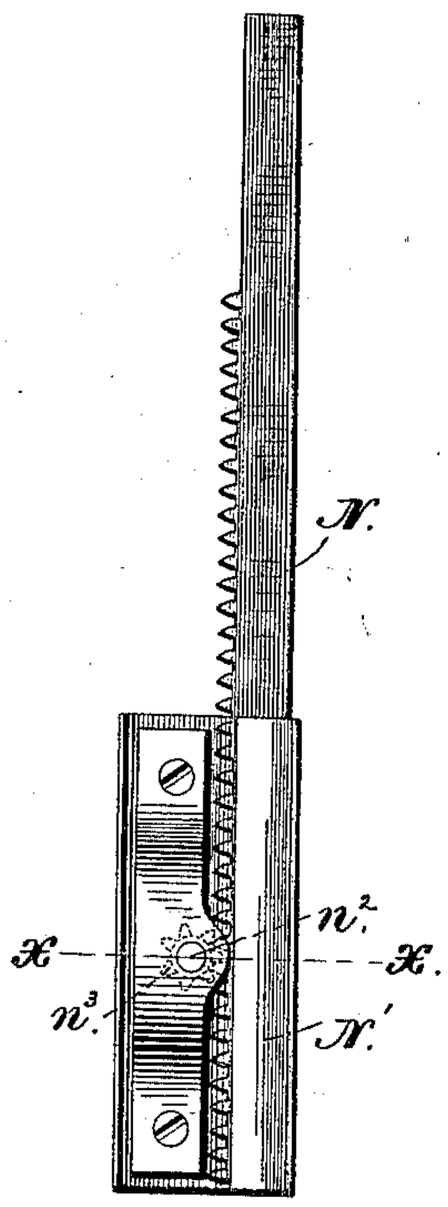

Fig. 4.

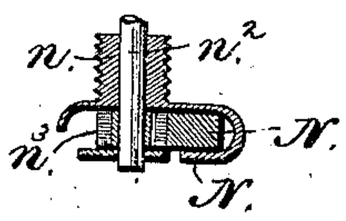

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Fig. 5.

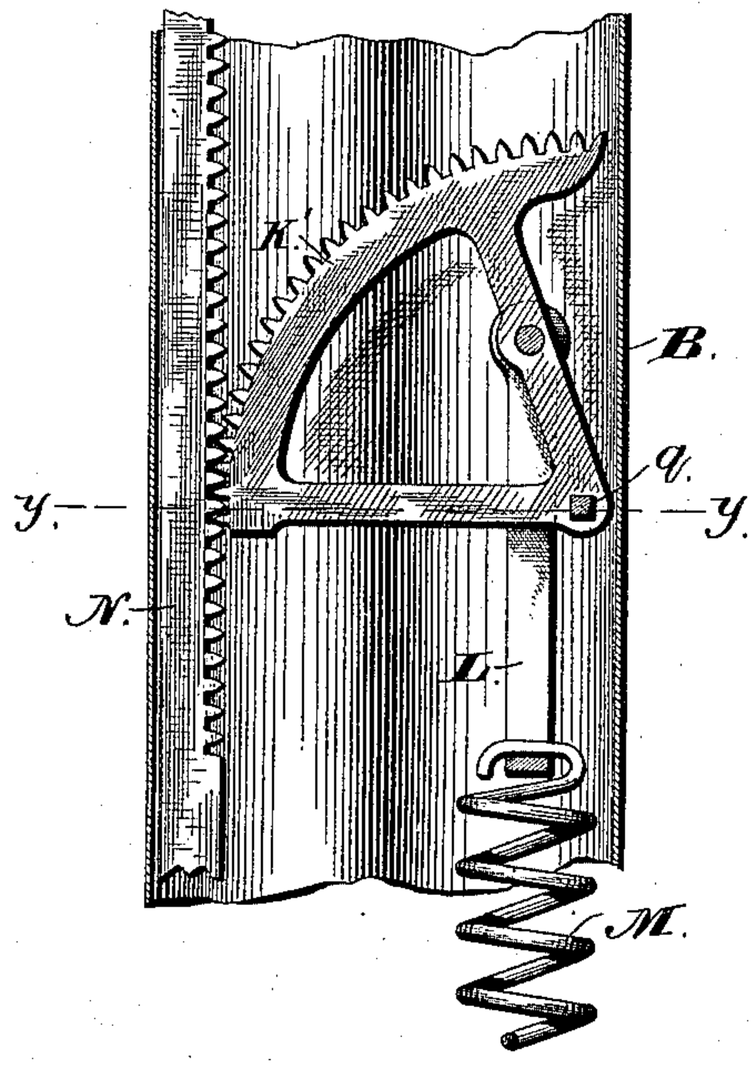


Fig. 6.

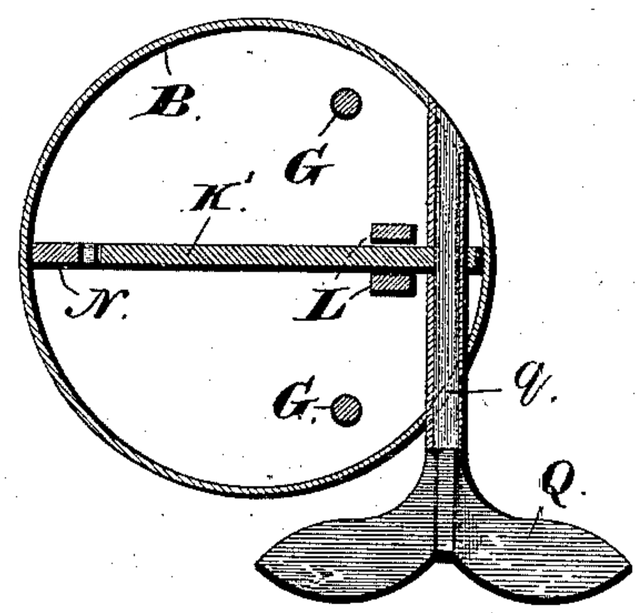
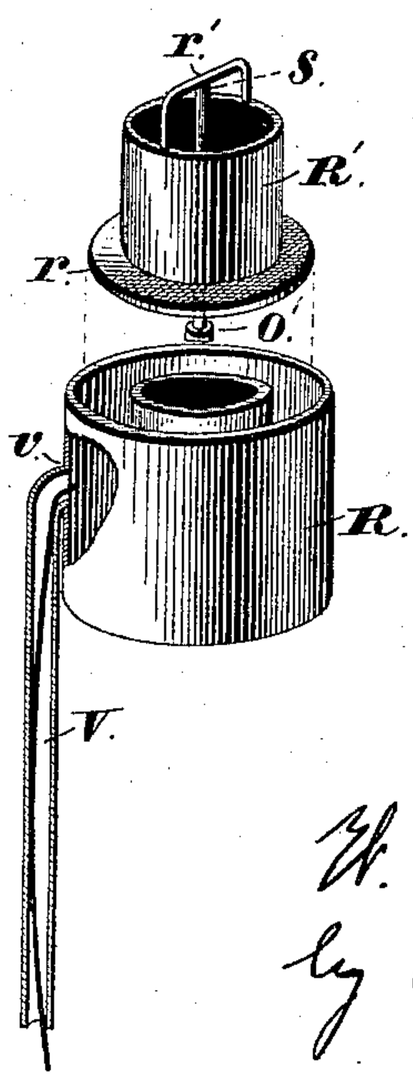


Fig. 7.



Witnesses:
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UNITED STATES PATENT OFFICE.

WILHELM E. A. HARTMANN, OF BELLEVILLE, ILLINOIS.

PETROLEUM-LAMP.

SPECIFICATION forming part of Letters Patent No. 369,598, dated September 6, 1887.

Application filed March 18, 1886. Serial No. 195,700. (No model.)

To all whom it may concern:

Be it known that I, WILHELM E. A. HARTMANN, of Belleville, in the county of St. Clair, and in the State of Illinois, have invented certain new and useful Improvements in Petroleum-Lamps; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 shows a vertical sectional view of my improved lamp; Fig 2, a similar section of a portion of the same on a plane at right angles to that of the section shown in Fig. 1, the burner-crown being removed; Fig. 3, a detail view in elevation showing the rack, pinion, and guide for the rack; Fig. 4, a detail sectional view of the guide on line *x x* of Fig. 3; Fig. 5, a detail sectional view of a different form of spring mechanism for operating the collapsible reservoir; Fig. 6, a detail sectional view of the same on line *y y* of Fig. 5. and Fig. 7 a detail sectional view showing the wick-cup and overflow-pipe with its contained wire.

Letters of like name and kind refer to like parts in each of the figures.

The object of my invention is to provide an improved lamp which shall not be liable to be upset, from which the oil will not escape when it is upset, which has an improved burner and improved means for furnishing a regular supply of oil to the burner; and to this end my invention consists in the lamp and the construction, arrangement, and combination of parts, as hereinafter specified.

In the drawings, A designates the base of the lamp, which, as shown, consists of a casing, preferably of sheet metal, supported, if desired, upon several feet, *a a*. The shape or material of this base can be varied as desired. As shown in the drawings, the main portion of it is cylindrical and the top dome-shaped. To the top of the base is attached the lower end of the cylindrical upright standard B, of any desired height, to support the burner proper, as hereinafter described.

Within the base A, and fastened to its bottom, as shown, is the oil-reservoir C, consisting of the lower cylindrical portion, C′, the top C^2, and the intermediate part, C^3, connecting the top and the bottom portion. This intermediate part, C^3, is made of flexible material, preferably woven fabric or leather, made impervious to petroleum by being soaked in a solution of glue which has been made elastic by the addition of glycerine, sugar, or sirup. Fabric so prepared I have found behaves in petroleum much as rubber sheeting does in water, and retains its elasticity, flexibility, and impermeability indefinitely. Instead of woven fabric or leather so prepared, I contemplate using, when desired, animal bladder or gut.

The flexible intermediate portion, C^3, is in the shape of the frustum of a cone of slight taper. At its lower edge the membrane forming it is attached to the upper edge of the lower portion, C′, of the reservoir. Its upper edge is turned inward and downward and then attached to the lower edge of top C^2. With this construction the opposite faces of the membrane are in contact with the outer faces of the two parts C′ and C^2. Upon the top C^2 is the cylinder C^4, attached thereto at its outer edge, as shown.

With the flexible membrane attached, as described, to the top and bottom parts, C′ and C^2, of the oil-reservoir, if the top be raised or lowered said membrane will have a rolling movement up and down the cylinder C^4, and will not be subjected to any folding, which would impair or decrease its durability.

At the center of top C^2 is a valve-opening, *c*, provided around its edge with a valve-seat, *c′*. Above this opening and valve-seat is the valve, composed of the disk D, preferably of leather soaked in flexible glue such as is described hereinbefore, attached to the metal plate E. Attached to the under side of the valve so formed is the stop or guard F, to prevent the valve from rising too high from its seat. Such guard has the lugs or flanges *f f* projecting under the valve-seat, as shown, and so situated as to allow a certain amount of movement of the valve independent of the valve-seat and the top C^2 of the oil-reservoir. With this construction the valve can rise a short distance from its seat, so as to open the valve-opening; but any further raising of the valve will cause the reservoir-top to rise also, being supported by the lugs or ears *f f*.

The valve-disk D, plate E, and stop or guard

F are shown as all fastened together by the single bolt *f''*, but can of course be fastened in any other way or by other means.

Extending upward from plate E are the rigid straps, rods, or wires G G, attached at their upper ends to the curved bar H within the upper portion of the cylindrical standard B, such curved bar being in the form of a portion of a ring, fitting loosely within the standard, so as to be guided and steadied thereby as it slides up and down in it. Attached to this curved bar forming the sliding head is one end of the metallic ribbon I, the other end of which is attached to the opposite side of standard B. For such attachment of the ribbon ends I prefer to provide the hooks *i* and *i'* on the head and standard, respectively, adapted to engage slots or holes in the ribbon ends. Said ribbon passes down around the sheave or pulley K, which is journaled eccentrically in the yoke L, preferably formed of an inverted-U-shaped piece of metal having its legs, at or near its lower end, joined by the cross-bar L'. The pulley is journaled in this yoke by means of the pivot-shaft *k*, passing through it on one side of its center and the sides or legs of the yoke. Suitable washers, *k' k'*, can also be placed on the shaft to steady the pulley in the yoke.

At the point at which the ribbon in passing from hook *i* to hook *i'* touches the pulley when the head is in its highest position the pulley and ribbon are united by a screw or pin, k^2, for the purpose of preventing the ribbon slipping on the pulley; or, instead of this, the ribbon and pulley may be replaced by a chain and chain-wheel, the latter having projections which enter the links of said chain.

To the cross-bar L' of yoke L is attached the upper end of the spiral spring M, which at its lower end is attached to or engaged by the hook M' on the standard-casing. This spring draws downward upon the yoke and pulley, and so on the band or ribbon. Through the latter such downward pull is transmitted to the sliding curved head H. The point at which the power of spring M is exerted upon the pulley or sheave through its pivot-shaft is then farthest from a vertical line through the point of attachment of the band to the head and nearest the side on which the band is attached to the standard B. A rack, N, which engages head H with its upper end, slides vertically within the standard, being guided in the guide N'. Such guide has a hollow screw-threaded stem, *n*, extending out through an opening in the standard-casing, and on this stem is a nut, *n'*, which is screwed up against the outer side of the standard-casing, so as to fasten the guide most strongly and firmly in place, or it may be attached by rivets or by solder. Extending through and journaled in the stem *n* is the shaft n^2, carrying the pinion n^3 for engaging the rack, and provided on its outer end with a crank, n^4, whereby it can be turned to rotate the pinion and raise or lower the rack.

As shown, the point of engagement of the rack end with the head H is preferably just below the point of attachment of the band I to the head, as the rack has to raise the head against the downward pull of the band, caused by the stress of the spring M.

Within the standard B, near its upper end, is the cross-bar O, into which is tapped the lower end of the upright pin O'. Said pin I make serve as a fastening for the burner P by providing it with a collar or annular flange, *o*, which engages the bottom of the burner and holds and seats the same firmly down upon the upper end of the standard.

In the upper end of the burner is the short annular wick-cup R, in which slides the cylinder R', having on its lower edge the outwardly-turned flange *r*, adapted to support the lower end of the cylindrical wick R^2. By means of the cross-bar *r'* and wires or small rods extending downward within the wick-cup the rod S is connected with the flanged cylinder R', so that the latter can be raised or lowered by moving said rod. The lower portion of this rod is formed with the central socket, *s*, to receive the pin O', and its exterior is provided with rack-teeth *o'*, to be engaged by the wick raising and lowering pinion O'. Other means than pinion and rack can be employed, as desired, to raise and lower rod S.

The wick, with its cup, is of course surrounded by the usual fittings for conducting air to the flame, for holding the glass chimney, &c., just as in the case of an ordinary burner.

At T is shown the usual crown for holding the chimney and regulating the supply of air to the wick and flame.

The oil-reservoir, already described herein, is connected with the wick-cup R by a small feed-pipe, T' T^2, at its lower end, opening into the reservoir at or near its bottom and at its upper end opening into the wick-cup at *t*. The portion T' of this pipe extends up inside the base A and standard B and through the bottom of the burner, the upper end of it being preferably enlarged, as shown, to admit a regulating piece or plug, T^3. The upper portion, T^2, of the feed-pipe is connected with the lower portion, T', by means of a cork or screw union.

The regulating-piece T^3 is to either fill the pipe, when it will be provided with a screw-thread or spiral groove cut around it, through which any oil flowing up the pipe must pass, or it may fit loosely within the pipe and be provided with circumferential grooves instead of a spiral one, so that the oil passing over the grooves and ribs formed thereby will be thrown into eddies, and thus retarded.

The operation of the mechanism of my lamp, as described and shown, is as follows: The oil-reservor, constructed as described, being empty and collapsed, and the valve being down, resting upon the valve-seat C', and consequently the head H being down at its lowest point, oil is now poured into the base A through the opening J, which may be provided with a screen of fine wire, so as to retain any dirt or foreign

particles contained in the oil. The oil so poured in fills the base A and surrounds the collapsible reservoir. If the pinion n^3 be now turned by crank n^4 so as to raise the rack N and head H, the valve will also be raised off of its seat, so that the oil will flow through opening *c* into the reservoir. After the valve has risen off its seat, the guard F on its lower side will, as indicated hereinbefore, raise the reservoir-top to expand the reservoir upon continued raising of the valve, so that the surrounding oil will flow freely down into the reservoir. By this raising of head H to lift the valve and expand the reservoir the spring M is, through the band I, sheave or pulley K, and yoke L, stretched or put under tension. Upon now releasing the crank the head will, by the pull of the spring acting through the yoke, pulley, and band, be drawn down, so that the valve will close the valve-opening, and then press the top of the reservoir down, putting the oil within the reservoir under pressure and forcing it up in feed-pipe T' T² past the regulator and into the wick-cup. To prevent the rack offering any resistance to the descent of the head, it is now run down by turning the crank and pinion. As it is desirable to keep the oil under constant and equal pressure, and as the stress of the spring M of course lessens as the head H descends and the spring shortens, I have journaled the pulley K eccentrically within the yoke and attached the band or ribbon to it, as already herein fully described. With this arrangement, when the head is raised to the highest point of its movement, and the spring is consequently put under the greatest tension, the point of application of the power of the spring to the sheave or pulley, and consequently to the band, is at the side on which the band end is attached to the standard B and the least proportion of the entire stress of the spring is exerted upon the head. As, however, the head descends and the spring shortens and becomes of less power, the pulley or sheave revolves so as to bring its pivot-shaft, or the point of application of the power of the spring to it, nearer and nearer to the side on which the ribbon or band is attached to the head. A greater and greater proportion of the entire stress of the spring will thus be brought to bear upon the head to force it down, as such entire stress of the spring grows less and less. The power exerted by the spring upon the head and valve, and consequently upon the reservoir, will therefore always be substantially the same, independent of the changes in the pull of the spring under variations in its extension.

Instead of making the spring M act on the head H through a sheave and ribbon, as described, the arrangement may be adopted which is shown in Figs. 5 and 6. In such construction or arrangement the spring M, attached to the yoke L, tends to pull downward the toothed sector K, to which the yoke is journaled at *k*. This sector gears into the rack N, which in this instance is firmly connected to the head H by pin or rivets, and below to the disk E, Fig. 1, which latter is further supported by the two rods G G, which are also firmly attached to both head H and disk E. In this construction the point of application of the pull of spring M also approaches nearer and nearer to the rack N as the spring contracts and its pull becomes smaller. The stretching of the spring may here be effected either by a key-handle, Q, on the shaft *q* which passes through sector K, and which is journaled in standard B, as shown, or else by a pinion, n^3, also journaled in B, but so that it has an axial motion sufficient to be thrown in and out of gear with rack N, and provided on outside of B with a crank-handle, just as is the pinion in Fig. 1. When in the latter case the stretching or extension of the spring is completed, the pinion n^3 is pushed toward the observer, Fig. 5, sufficient to throw it out of gear, and thus the springs act as above described.

To prevent the oil fed up through the feed-pipe from rising above a certain height in the wick-cup, I provide an overflow pipe or tube, V, communicating with the interior of the cup at *v*, and adapted to conduct any oil flowing through it downward and discharge it back into the cylinder on top of the reservoir.

In order to prevent the descending oil forming a liquid piston in tube V, which would produce a difference of air-pressure in the lamp-casing and cause the overflow to act irregularly, a wire, *v'*, is inserted in this tube, slightly bent, as shown, which conducts the oil to one side of tube, leaving a free passage for air to escape or enter. As the oil in my lamp is raised by mechanical means, there is no need of a wick capable of raising to any considerable height the oil needed by the flame. Instead, therefore, of using the ordinary cotton wick, I use one made of any porous or fibrous mineral substance—such, for instance, as pumice-stone, asbestus, plaster-of-paris, or oxychloride of magnesium. The cylindrical wick, made of either of these materials, is very short, and is dropped into the annular wick-cup, which it fits loosely. The means for raising and lowering this wick has already been described fully herein. The flow of oil forced from the reservoir up through the feed-pipe into the wick-cup is regulated by the regulating device described so as to be slightly in excess of the quantity required to keep up the flame. The excess is carried back, as indicated, by the overflow-pipe V, to be taken into the reservoir again upon the next expansion of the same.

The short mineral wick used by me does not require trimming, as it does not consume away, produces at all times an even, well-proportioned flame, and if, after long-continued use, it should become foul or choked up by impurities in the oil it can most easily and quickly be removed and replaced by a new one.

Obviously the winding gear or means for raising the valve and extending the reservoir can be variously modified without departure

from my invention. It is only necessary that care should be taken that no openings be made or left in the lamp-case through which oil can escape. As in my lamp only just enough oil is contained in the wick-cup at any time to supply the short wick, no appreciable amount of oil can be spilled by upsetting the lamp.

None of the oil in the reservoir or of the overflow oil carried back by pipe V can escape from or through the casing.

Instead of employing a metallic ribbon, a flat chain or a band of any suitable material may be used, and instead of the curved bar H a complete ring may be employed for the sliding head; but in that case this ring should have in its circumference, on the side nearest the hook *i'*, a depression or offset sufficient to fully clear the ribbon or chain.

Having thus described my invention, what I claim is—

1. In a collapsible reservoir, in combination with the stationary bottom, the removable rigid top, and the flexible intermediate portion between the top and bottom, slightly conical in shape, and having its upper edge turned over inward and downward and attached to the rigid top portion, substantially as and for the purpose shown.

2. In a collapsible reservoir, in combination with the cup-shaped lower portion and the top made smaller in diameter than such lower portion, the intermediate portion, slightly conical in shape, made of flexible material, having the inner face of its lower edge attached to the lower portion of the reservoir, and the opposite face of its upper edge attached to the reservoir-top, substantially as and for the purpose set forth.

3. The collapsible reservoir having the flexible portion and the rigid upper portion provided with an opening to which the upper edge of the flexible portion is attached, provided with an upright cylinder on its top, substantially as and for the purpose described.

4. The collapsible reservoir having a suitable bottom, a rigid upper portion, and an intermediate flexible portion, made conical and attached at its upper edge to the edge of the rigid upper portion, and the upright cylinder on top of such portion, substantially as and for the purpose set forth.

5. In combination with the collapsible oil-reservoir provided with a valve-opening in its top, the valve for closing the same, and means for raising and lowering the valve and top, substantially as and for the purpose set forth.

6. In combination with the collapsible oil-reservoir having a valve-opening in its top, the valve, the guard or stop on the valve, and means for raising the valve, and means for forcing it down against the reservoir-top to close the valve-opening and press the top downward, substantially as and for the purpose described.

7. In combination with the collapsible oil-reservoir having a valve-opening in its top, the valve above such opening, spring mechanism independent of the reservoir-top for forcing such valve down, and a connection which allows the valve to close before the reservoir-top is depressed, substantially as and for the purpose described.

8. In combination with the collapsible oil-reservoir having the valve-opening in its top, the valve above such opening, the eduction-passage leading from the lower part of the reservoir, the sliding head rigidly connected with such valve, and spring mechanism for forcing the head downward, substantially as and for the purpose shown.

9. In combination with the collapsible reservoir having a valve-opening in its top, the valve above such opening, the disk or plate to which the valve is attached, the rigid straps extending upward from such plate, the head attached to such straps, and spring mechanism for drawing said head downward, substantially as and for the purpose set forth.

10. In combination with the collapsible reservoir and the sliding head suitably connected with the collapsible reservoir, a stationary support, the band or ribbon attached at one end to the head and at the other to the stationary support, the yoke, the sheave or pulley resting on and attached to the band and eccentrically pivoted in the yoke, and a spring acting upon the yoke, substantially as and for the purpose shown.

11. In combination with the collapsible reservoir and the sliding head, connections between the head and the reservoir-top, whereby the top is depressed as the head is moved down, a fixed support, the band attached at one end to the head and at the other to the fixed support, a movable yoke, the pulley eccentrically journaled in such yoke and resting on the band, and the spring drawing the yoke downward, substantially as and for the purpose described.

12. In combination with a movable piece and a stationary support, the band attached at one end to the piece and at the other to the support, the movable yoke, the pulley or sheave journaled eccentrically in the yoke, a screw or pin fastening the band to the sheave at the point at which the band passing from the movable piece first touches the pulley when the latter is nearest the piece, and a spring attached to and drawing upon the yoke, substantially as and for the purpose specified.

13. In combination with a movable head and a fixed support, the band attached at one end to the head and at the other to the fixed support, the movable yoke, the sheave or pulley, the pivot-shaft of the pulley upon which the pulley is eccentrically journaled, a screw or pin fastening the band to the pulley at a point diametrically opposite to the pulley-shaft and on the side of the pulley toward the point of attachment of the band to the movable head, the spiral spring connected at its upper end with the yoke, and the stationary lug to which the lower end of the spring is

attached, substantially as and for the purpose shown.

14. In combination with the lamp-standard casing, the rack, the guides on the casing for the rack, the hollow threaded stud on the guide projecting out through the casing, a nut on the stud, the shaft journaled in the stud, the pinion on the shaft meshing with the rack, means for turning the shaft from the outside of the casing, and the movable head of the oil-forcing devices within the casing connected with the rack, substantially as and for the purpose set forth.

15. In combination with the oil-feed pipe, the regulator consisting of a cylindrical body placed in the pipe and provided with circumferential annular grooves in its periphery, substantially as and for the purpose described.

16. In combination with the wick-cup and means for feeding oil into the same, the overflow-pipe and the wire within the same, with its upper end at the upper end of the pipe, substantially as and for the purpose described.

17. In combination with the wick-cup and the oil-supply tube or pipe connected therewith, the overflow-pipe connected with the interior of the cup, and the bent wire in such pipe, having its upper end projecting into the opening from the wick-cup into the pipe, substantially as and for the purpose described.

In testimony that I claim the foregoing I have hereunto set my hand this 1st day of February, 1886.

W. E. A. HARTMANN.

Witnesses:
FRED. P. PHILLIPS,
GEORGE C. REBHAN.