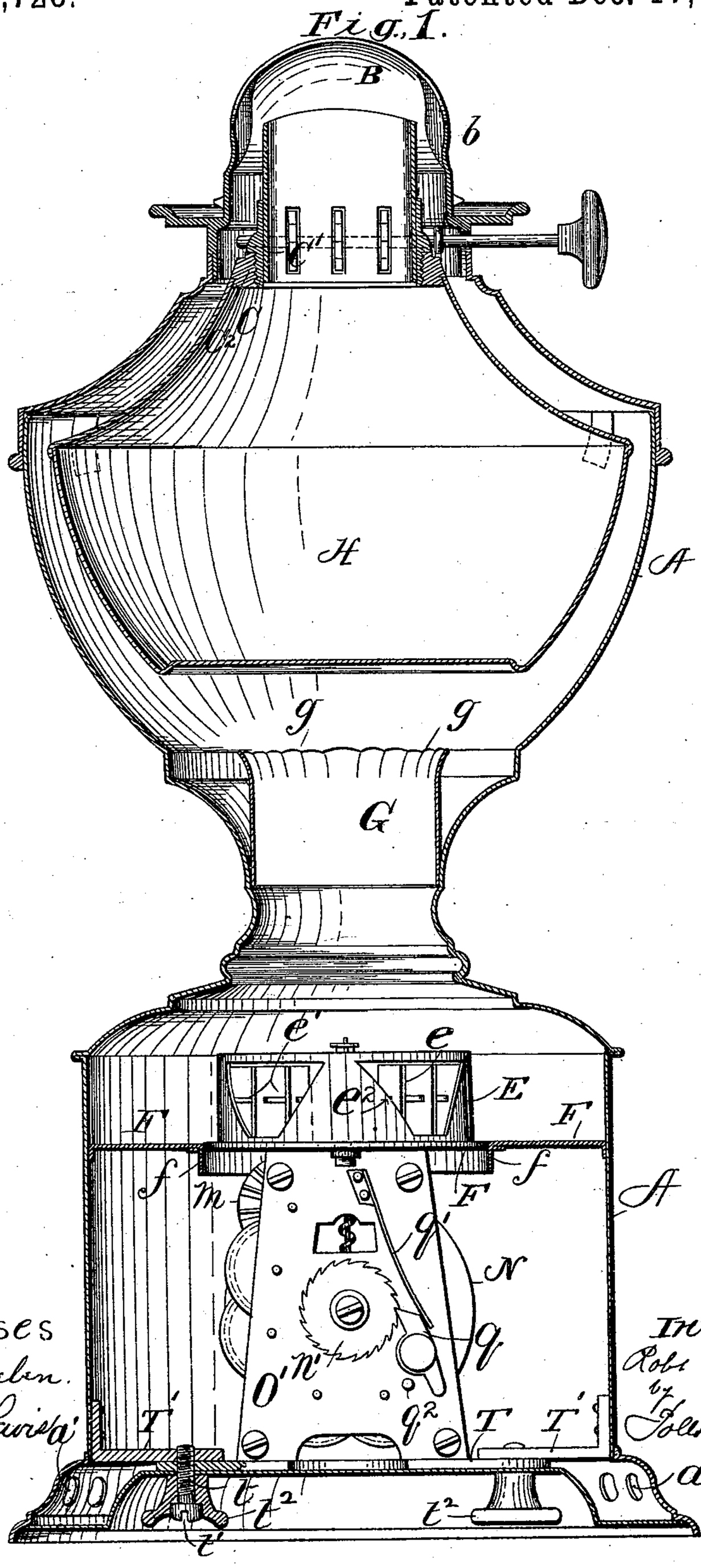
(No Model.) 3 Sheets—Sheet 1.

R. HITCHCOCK.

FORCED DRAFT LAMP.

No. 551,728. Patented Dec. 17, 1895.

Fig. 1.



Witnesses
W. Rees Edelen.
Peter Lewis Jr.

Inventor.
Robt Hitchcock
by Edwd Munro.
his atty.

(No Model.) 3 Sheets—Sheet 2.

R. HITCHCOCK.

FORCED DRAFT LAMP.

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Fig. 10.

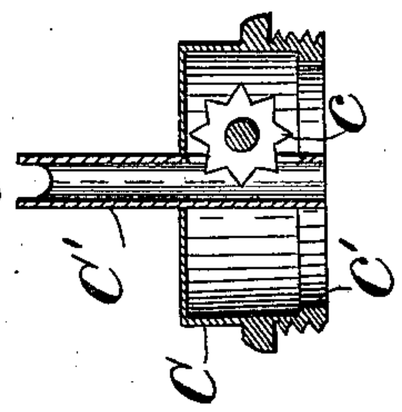


Fig. 12.

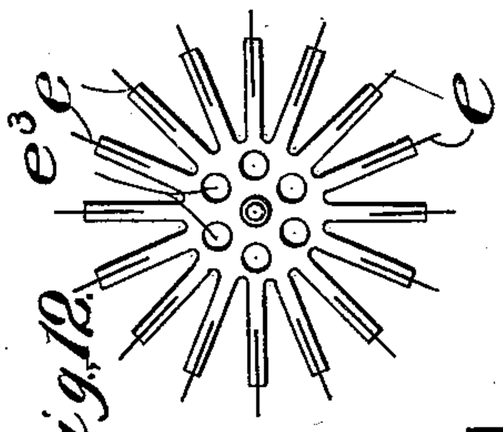


Fig. 14.

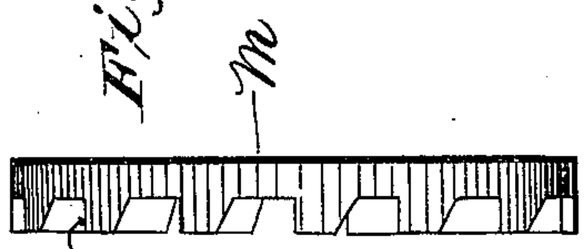


Fig. 9.

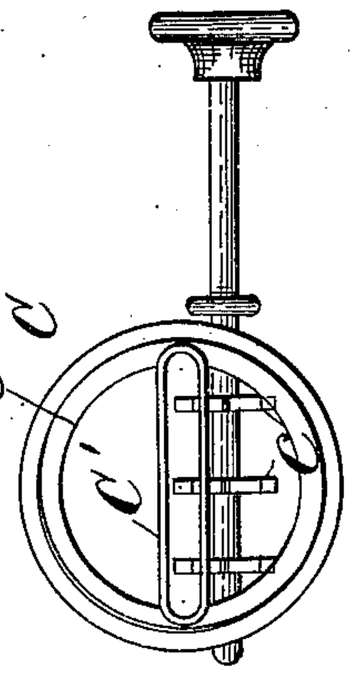


Fig. 11.

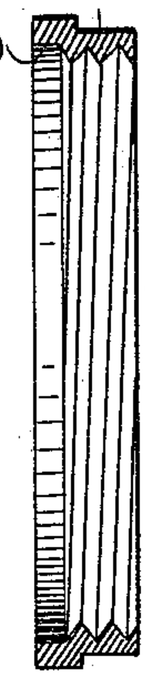


Fig. 13.

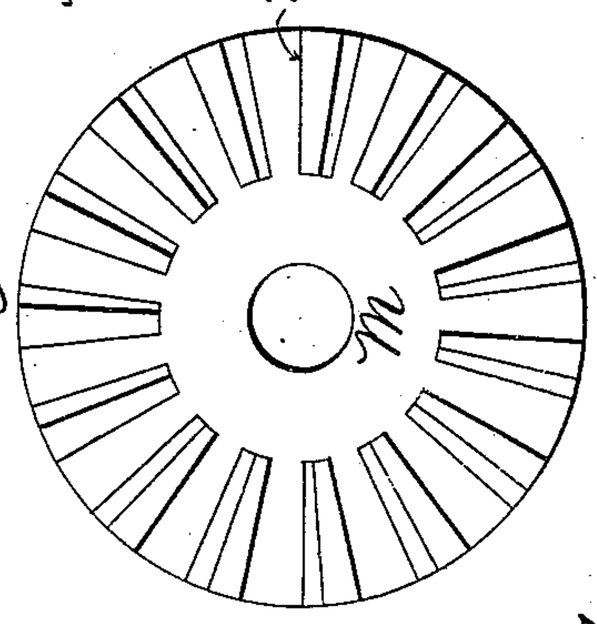
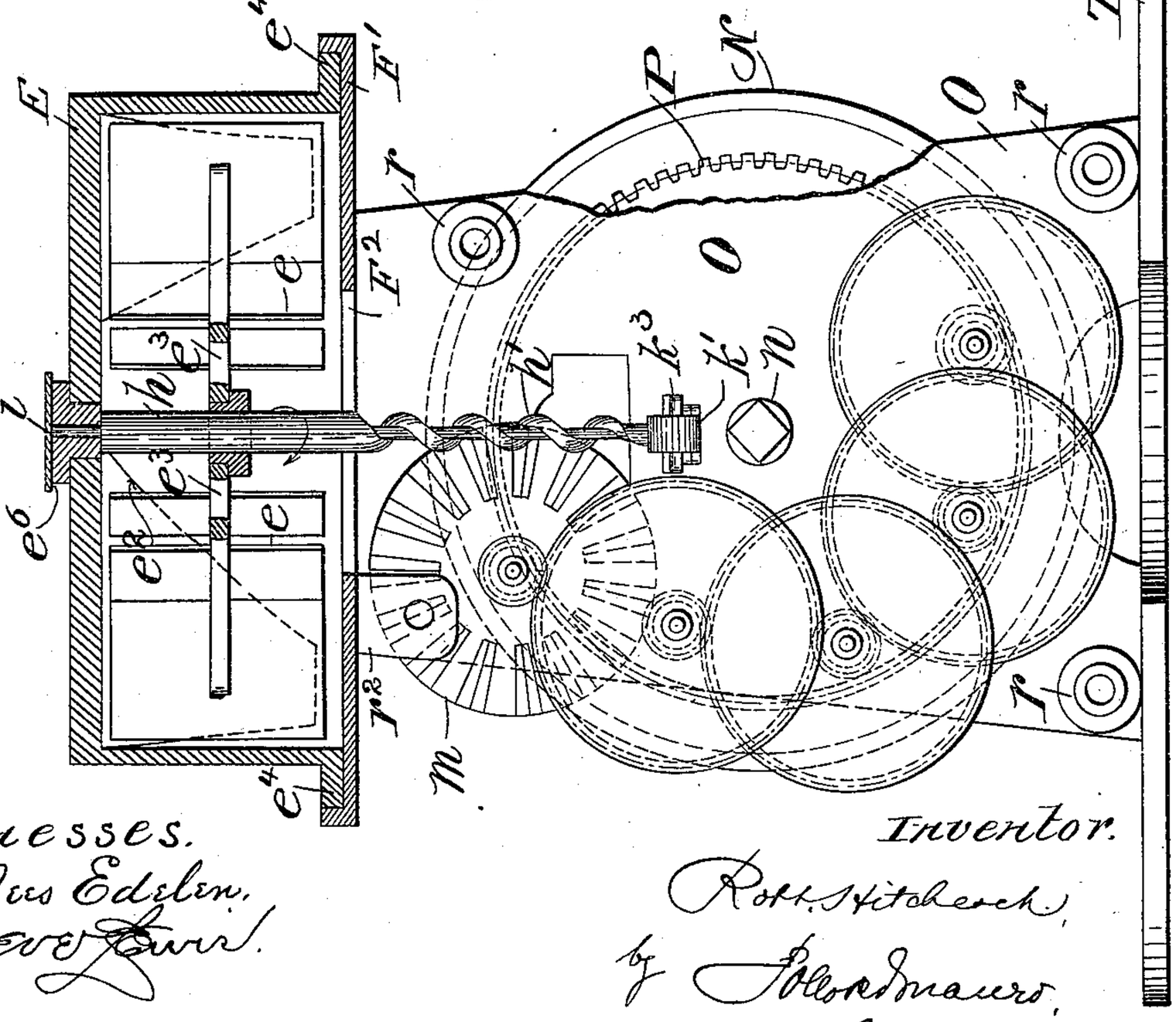


Fig. 2.



Witnesses.
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(No Model.)

3 Sheets—Sheet 3.

R. HITCHCOCK.

FORCED DRAFT LAMP.

No. 551,728. Patented Dec. 17, 1895.

Fig. 5.

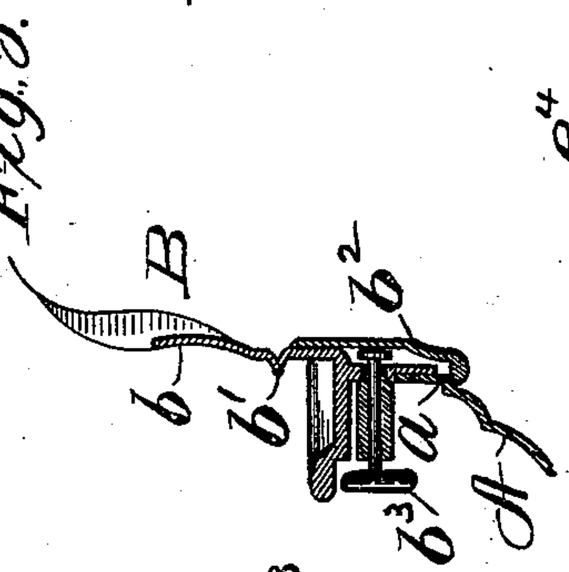

Fig. 4.

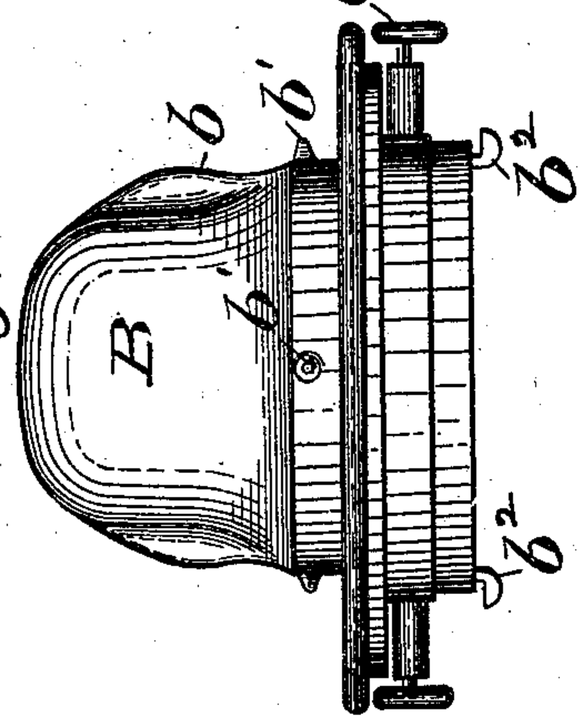

Fig. 6.

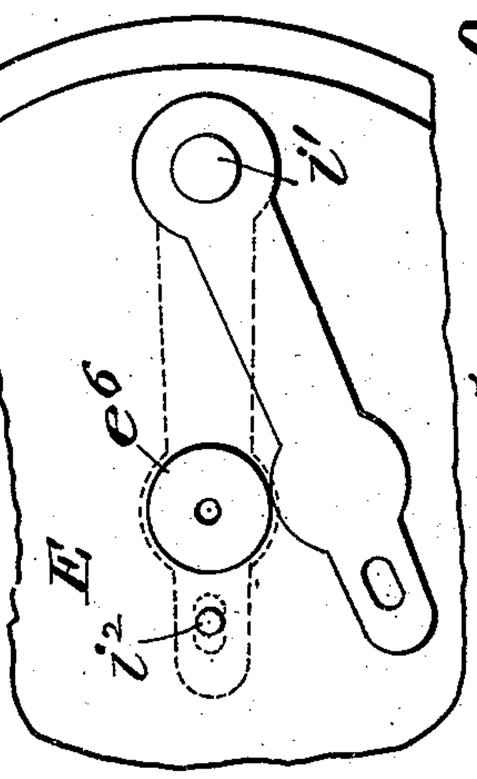

Fig. 7.

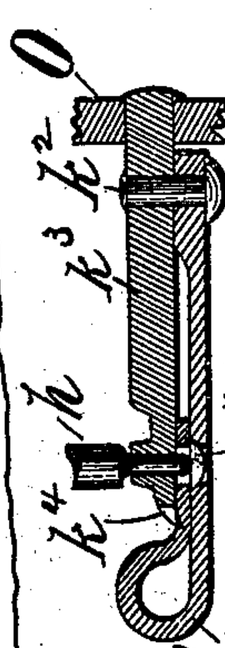

Fig. 8.

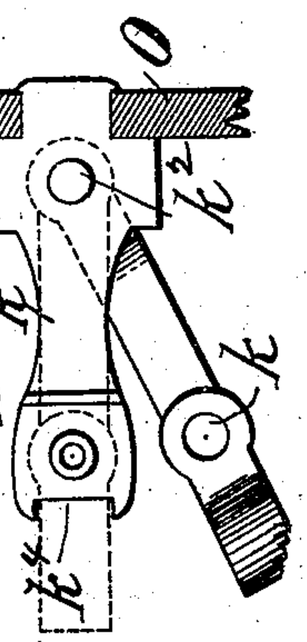

Fig. 3.

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Robt. Hitchcock.
by Foster Brown.
his attorneys.

UNITED STATES PATENT OFFICE.

ROBERT HITCHCOCK, OF WATERTOWN, NEW YORK.

FORCED-DRAFT LAMP.

SPECIFICATION forming part of Letters Patent No. 551,728, dated December 17, 1895.

Application filed July 15, 1895. Serial No. 556,067. (No model.)

To all whom it may concern:

Be it known that I, ROBERT HITCHCOCK, of Watertown, Jefferson county, New York, have invented a new and useful Improvement in Forced-Draft Lamps, which improvements are fully set forth in the following specification.

This invention relates to what are known as "mechanical" or "forced-draft" lamps, such as are described in many Letters Patent of the United States heretofore granted to me.

The present invention has for its objects to cheapen and strengthen the movement, to lighten and reduce cost of construction of the entire lamp, to facilitate separation and assembling of parts for cleaning or repairs, to obtain a more abundant and more uniform and efficient blast of air with smaller spring-power, to improve the light in point of brilliancy and steadiness, to diminish the noise made in running, producing practically a silent movement, to produce a lamp that will run a greater number of hours than heretofore with one winding, and generally to improve the lamp in point of construction and operation.

The several points of improvement whereby the above objects are attained can best be explained in connection with the accompanying drawings which form part of this specification, and in which—

Figure 1 is a vertical section, partly in elevation, of a lamp constructed in accordance with my invention. Fig. 2 is a side elevation, partly in section, of the blower and air-blast mechanism. Fig. 3 is an elevation of the same at right angles to Fig. 2 and partly in section. Figs. 4 and 5 are details in elevation and section of the dome. Fig. 6 is a partial plan of the drum. Figs. 7 and 8 are details of the step-bearing of the worm-spindle. Figs. 9 and 10 are details in bottom plan and section of the burner. Fig. 11 is a detail in section of the burner-socket. Fig. 12 is a plan view of the blower. Figs. 13 and 14 are face and edge views respectively of the worm-wheel, enlarged.

A represents the shell of the lamp, which may be of any suitable or convenient shape, according to the use for which the lamp is designed. The lamp illustrated in the drawings is that designed for household purposes. It is found desirable to increase the width of the wick, but in enlarging the dome B it is found that the air is less concentrated upon the flame and a poorer light results. The dome B, therefore, is provided with ribs or extensions *b* at the ends of the wick-slot which is extended into these ribs.

The dome B is provided with projections or spurs *b'*, Figs. 4 and 5, pressed out at the side over which the ring of an ordinary lamp-shade support may be sprung, and which prevents the shade from slipping off. It is also provided with means for locking it to the shell A. Heretofore the dome when detachable from the burner has been simply pushed into place, reliance being had upon a close fit to retain it in position. As shown it now has two internal spring-catches b^2, whose hooked ends catch under an annular shoulder inside the shell of the lamp, and automatically snap into place. Each of these catches is provided with a push-pin b^3 extending through the dome. To remove the latter the pins are pushed in, disengaging the catches b^2 from the shoulder *a* and permitting removal of the dome. The detachable dome must be so placed that its slot is in alignment with the flat-wick tube, and as the position of the latter is variable with different burners (according to the way the screw-threads happen to be cut) the dome cannot have a fixed or definite position. It will be seen, therefore, that the construction of the locking-catches is such that they will operate in whatever position the dome may be placed.

Heretofore the burner C, which is also the support of the flat-wick tube C', has been provided with a bottom plate for attachment of the lower end of said tube. The wick-wheels *c* were therefore inclosed and inaccessible for adjustment, or to remove threads which become entangled in them. As shown the bottom plate is now cut away, or rather is omitted, leaving the space within the support entirely open. A ring *c'*, Fig. 9, is set around the bottom of the burner, and notches are formed at diametrically opposite points, into which notches the edges of the flat-wick tube are set.

Heretofore, in screwing in the burner, difficulty has always been met in making the thread on the burner engage properly that in

the socket C^2. To obviate this difficulty the socket is provided with an annular unthreaded flange c^2 above the threaded portion of the socket, constituting a recess or seat of uniform depth, Fig. 11, so that the burner is set squarely in this seat, and turned until its thread engages that of the socket. This construction facilitates the replacement of the burner when removed for filling the reservoir, or for other purposes.

Heretofore mechanical lamps have generally employed blowers with inclined blades or vanes, constructed on the principle of the screw-propeller, taking in a current of air from beneath, and delivering it from the top face of the wheel. Owing to the reaction or back-pressure, and the peculiar operation of these blowers, there was considerable slip, requiring the use of a comparatively large wheel, introducing greater friction and necessitating a strong spring to furnish the requisite power.

In the present invention the wind-wheel is composed of blades or vanes *e*, whose sides form right lines with the axis of the wheel, the latter being surrounded by a drum E, which is closed at the top, but provided with outlet-openings *e'* at the periphery. In fan-blowers which have a single exit tangential to the periphery of the casing there is a regular pulsation in the current of the air which, in a lamp, is very objectionable. It is one of the objects of this invention to produce in the air-chamber beneath the oil-reservoir a steady uniform pressure and thoroughly to diffuse the air therein. This result is attained in part by forming several openings in the periphery of the drum E, this periphery or band having heretofore been made continuous. At the same time sufficient of the band is left to cut off the space within the drum from the pressure of the air in the surrounding space or air-chamber.

Preferably the openings have an oblique edge e^2, so that the blades, as they pass these openings, are cut off gradually. An abrupt cut-off tends to produce pulsations. By these means pressure is maintained in the air-chamber above diaphragm F and in all the space leading to the burner, this pressure being distinguished and different in its effects from a mere current of air as produced by the air-blast mechanism heretofore employed.

The thimble G in the neck or contracted part of the shell serves, as heretofore, to arrest oil-drippings or bits of wick. Instead, however, of having straight sides it has, as shown, a flaring mouth, through which the air passes, and in this flaring mouth are vertical corrugations *g*. The effect of the latter is to give a vertical movement to the air or to straighten the air-currents, in case the latter have received a spiral or oblique direction. This device, in connection with the blower described and shown, has been found very effective for the purpose specified.

The vertical corrugations may be placed at any point in the air-passage where they will act effectively on the air-currents; but it has been found most convenient to place them on the thimble.

The web of the fan-wheel has perforations e^3, Fig. 12, constituting passages for air to the space above the web and inside the vanes *e*.

The drum E rests upon diaphragm-plate F', which also constitutes a permanent part of the frame of the movement. This diaphragm-plate fits in an opening of corresponding shape in diaphragm F, and with the latter constitutes a continuous horizontal partition across the shell of the lamp, the only opening through this partition being that in the center of plate F', Fig. 2, through which air is drawn by the blower. To insure a tight fit, the collar *f* is placed around the opening in which plate F' sets. This air-chamber or pressure-chamber, formed by the continuous horizontal diaphragm and containing the blower, is a feature of the invention which conduces greatly to the steadiness and brilliancy of the flame. Heretofore the blower has been set directly in or in close proximity to the neck or contracted portion of the shell.

The diaphragm-plate is provided with an annular recess, and drum E has a horizontal flange e^4, Fig. 2, which closely fits in this recess, and the drum is thereby accurately centered. This feature is of special importance because the drum contains the upper bearing of the worm-spindle *h* on which the fan is carried, and the centering of the drum insures the proper adjustment of the worm *h'* with reference to the gearing of the spring-motor. Furthermore, the removal of the drum leaves the fan and its spindle entirely free, so that they can be instantly taken out. This construction, moreover, enables me to dispense with the jewel heretofore employed for the upper end bearing of the worm-spindle *h*. In the construction shown the drum has a raised boss e^6, Fig. 6, which is perforated to form a bearing for the end of spindle *h*. This hole is covered by a spring-arm *i* pivoted at *i'* so that it can be swung aside to oil the bearing, and normally held in place by a catch-pin i^2. This spring covers the hole in the drum, protecting the bearing, and also prevents the spindle from slipping out of place when the lamp is tilted in handling or transportation.

Heretofore annoyance has been occasioned by the jewel, forming the lower step-bearing of the worm-spindle, falling out of place and being lost, when the mechanism is dismembered. To prevent this the jewel *k* is held in a support *k'* formed by a clamp-spring, Figs. 7 and 8, bent upon itself to clamp the stone between its ends, the lower member of the clamp being slightly recessed, as shown, to receive the stone. The upper member of the clamp has a hole so that the end of the spindle may rest upon the stone. This support is preferably pivoted at its end k^2, so that it can be swung aside, and an arm or bracket k^3

is provided, forked or notched at its end k^4 into which the spring-support k' snaps when swung into place.

As described in my Patent No. 74,914, the worm is driven by a rubber worm-wheel having slender exposed teeth on its periphery. On account of the brittleness of hard rubber and the exposure of the teeth, breakage sometimes occurs, and this is particularly annoying in remote localities where it is difficult to replace parts and have repairs made. One of the prominent objects of this invention is to produce a lamp which is not likely to be injured in all the ordinary conditions, and which can be handled, dismembered and assembled by persons without mechanical skill, and without the use of tools. I have overcome the liability of breakage of the rubber worm-wheel m by constructing it, as shown, Figs. 3, 13 and 14, in the form of a crown (or it may be a bevel) gear—that is to say, with teeth radially disposed on the face instead of on the periphery. The acting sides m' of these teeth are nearly perpendicular to the face of the wheel. The construction gives a comparatively-long contact between the worm and each tooth of the worm-gear. Furthermore, there is by the construction shown a relative gain of power in driving the worm, and the diameter of the worm-wheel is reduced. These advantages are all of importance, but the most important new effect gained by this construction is the silent movement, it being found that the slight clicking noise heretofore produced by the impact of the successive teeth upon the worm and which was quite audible is entirely eliminated.

Heretofore I have combined a main-spring barrel with an internal gear, forming part thereof, and combined with the different pinions and wheels of the train in such manner as to secure a gain in compactness, reduction of size, number and weight of parts, &c. In such case the barrel was set on a vertical arbor and inclosed in a cylindrical jacket. This construction is now modified to gain further advantages without sacrificing those indicated above. The main-spring barrel N is now placed in a horizontal arbor n and is outside the supporting-plates O O′ of the frame, the arbor being extended so as to pass through both plates. On the end remote from the barrel, arbor n carries a ratchet-wheel n', which is slipped over the squared end of the arbor and held in place by the wing-screw n^2. The barrel is now accessible, and being entirely clear of the frame and train of gears, its size can be increased or diminished without altering the internal gear P which is carried by it or making alteration in any other parts. Variations of size of the main spring are desirable, according to the particular use to be made of the lamp. Furthermore, to remove the barrel and its arbor, it is only necessary to unscrew the thumb-screw n^2, which can be done with the finger, when these parts are free. The pawl or click q, which is pivoted on the back plate O′ and provided with a spring q', engages the ratchet n' when the spring is wound up. The location of the barrel on the outside of one plate and the pawl and ratchet outside the other plate is of special convenience in letting out the power of the spring, in doing which the manipulator has to exercise great care in order to unwind the spring gradually. By the construction shown he can hold the barrel with one hand and with the other manipulate the pawl, throwing it into and out of engagement with the ratchet. When out of engagement with the ratchet the spring q' presses on the end of the pawl and holds it in that position, the movement of the pawl away from the ratchet being limited by a stop-pin q^2, Fig. 1.

As already indicated, the entire mechanism is constructed with a special view to its being quickly taken apart and put together accurately by persons not possessing special mechanical skill and without the use of tools. As these lamps are often sent to places remote from cities, the advantage of these provisions will be readily appreciated. Some of the features of construction adopted with this end in view have already been described; but others have yet to be indicated.

The front plate O of the frame is permanently attached to the diaphragm-plate or top plate F′ by the pillar r and studs r' and by lug r^2 riveted to plate O, and the support k' of the lower bearing k of worm h' is also permanently attached to plate O. Since the drum E, which contains the upper bearing of the worm-spindle, centers itself in the recessed diaphragm-plate, as already explained, and is fastened thereto by thumb-screws or wing-screws f^2, (and no tools are required,) no skill is necessary in adjusting and assembling these parts. Furthermore, the back plate O′ is detachably secured to the pillars r (which are permanently attached to the front plate) by means of screws s, provided each with a wing s', Fig. 3, instead of an ordinary nick, so that they can be manipulated by the fingers. Upon removing these screws plate O′ and all the train of gears, whose arbors have bearings in the two plates O O′, can be detached for cleaning or other purposes.

It will be observed that the detachment of the removable back plate O′ does not involve any change in the adjustment of the bearings of the worm-spindle.

Plates O O′ are attached to a bottom plate T, which are attached to ears T′ on the shell by means of screws t, Fig. 1. These screws have the ordinary nick t' for engagement of a screwdriver, and also a milled head t^2 permanently fastened thereto for turning by hand.

The internal gear P engages a pinion p, Fig. 3, whose arbor has one bearing in plate O′ and the other in a bracket p' attached to plate O. In other respects the train of gearing presents no peculiarities not already sufficiently described.

In operation the air enters by holes a' in the base of the shell into the chamber beneath the diaphragm F. Thence it is drawn by the blower into drum E through the opening F^2, Fig. 2, in the diaphragm-plate F'. The blower delivers the air through the side openings in drum E into the air-chamber above diaphragm F and beneath the oil-reservoir H. In this chamber, as well as in the annular space between the shell and reservoir and in the dome around the burner, the air is in a state of compression, the pressure upon the flame being practically steady and uniform. The latter is not subject, therefore, to puffs or gusts, or wavering currents of air, and the resulting light is steady and brilliant.

Obviously the details of construction may be much modified, and some of the described improvements may be omitted, without departing from the spirit of the invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a forced-draft lamp, and in combination with the burner and with air-forcing mechanism, a dome provided with a wick-slot, and having extensions at the end of said slot into which the latter extends, substantially as described.

2. The combination with the shell of a mechanical lamp, the oil-reservoir, and the burner having a screw-connection with said reservoir, of a detachable dome provided with internal spring-catches for locking it to the shell, said dome being adjustable axially, and means for disengaging said catches to permit removal of the dome, substantially as described.

3. The combination with the shell having an internal annular shoulder or projection near its top, and the burner of a detachable dome having internal spring-catches with hooked ends for engagement with the shoulder or projection, so that the dome can be adjusted to position with reference to the burner and a push-pin for each catch, extending through the wall of the dome and adapted when pushed in to disengage its catch, substantially as described.

4. The combination with the burner comprising a shell with open bottom, and a ring reinforcing the lower edge of said shell, and notched at opposite sides, of a flat wick-tube, set in said notches, and a wick-spindle and wick-wheels inside said shell, substantially as described.

5. The combination with the shell of a mechanical lamp, of a horizontal diaphragm extending across the shell forming the bottom of an air-chamber, and a blower in said air chamber, inclosed by a drum having an imperforate top and lateral openings communicating with said chamber, the latter being entirely closed beneath except for an opening within said drum substantially as described.

6. The combination with the shell having a contracted portion or neck, of a diaphragm extending across said shelf beneath the neck and forming an air-chamber, a blower and spring-motor mechanism for operating the same, the frame of said mechanism being provided with a top-plate which fits, and closes an opening in said diaphragm, so that the blower is supported in said chamber, and a drum separating said blower from said chamber and provided with openings communicating therewith substantially as described.

7. The combination with the shell having a neck, of a diaphragm extending across the shell beneath the neck, and provided with a single opening, a drum covering said opening and provided with air-passages, a blower and its operating mechanism comprising a frame, a main-spring and a train of gears for driving said blower, said frame having a top-plate perforated for the passage of air to said blower and fitting the opening in said diaphragm, substantially as described.

8. The combination with the shell and burner of a mechanical lamp, of a blower consisting of blades or vanes whose sides form right lines with the vertical axis of the blower, a drum having a solid top covering said blower and outlet openings through the peripheral band, and operating mechanism for driving said blower, substantially as described.

9. In a mechanical lamp, a blower having rectangular vanes, combined with an inclosing drum having a continuous imperforate top and a series of openings through its peripheral band, and with driving mechanism for said blower, substantially as described.

10. In a mechanical lamp, the combination with the shell having a contracted neck, and a diaphragm extending across the shell beneath said neck, forming an air-chamber, of a blower in said chamber, a drum inclosing said blower and having a solid top and openings in the sides, and mechanism for driving said blower, substantially as described.

11. In a mechanical lamp, the combination with the shell having a contracted neck, and a diaphragm extending across the shell beneath said neck and having a single opening, of a removable clock-work mechanism, comprising side frames and a top-plate the latter fitting the opening in said diaphragm, and a spring and driving gears, a blower above said top-plate driven by said spring and gears and a drum seated upon said top-plate and having outlet openings, substantially as described.

12. In a mechanical lamp, the combination with a blower having vanes delivering the air laterally, and with driving mechanism therefor, of an inclosing drum, having a solid top, and a series of openings in its peripheral band, the edges of said openings being inclined to cut off the vanes gradually, substantially as described.

13. In a mechanical lamp, the combination with the shell having a contracted neck, of a

thimble set in said neck and projecting upwardly therefrom, said thimble being provided with a flaring mouth, and air-forcing mechanism in the shell beneath said thimble, substantially as described.

14. The combination with the shell having a contracted neck, and the oil-reservoir set in the shell above said neck, of a thimble set in said neck and projecting upwardly therefrom, said thimble terminating in a corrugated edge beneath the reservoir, and air-forcing mechanism in the shell beneath said thimble, substantially as described.

15. The combination with the shell having a contracted neck, of a thimble set in said neck and having a corrugated upper edge, a diaphragm extending across the shell beneath said thimble, forming an air-chamber, and means for compressing air in said chamber, substantially as described.

16. In a mechanical lamp, the combination with the blower, its spindle, and its actuating mechanism, of a recessed-plate forming part of the frame work of said mechanism, and an inclosing drum for said blower having one of the bearings of said spindle and provided with a flange fitting the recess in said plate so that the drum is self-centering, substantially as described.

17. The combination with the blower and its vertical spindle, and with the frame work carrying the lower bearing for said spindle and having a recessed top-plate, of the detachable drum fitting closely in said recess, and having the upper-bearing for said spindle, substantially as described.

18. The combination with the frame work and with the blower and its vertical spindle, of a step-bearing for the lower end of said spindle, comprising a jewel and a support formed by a metal strip, recessed to receive said jewel and bent upon itself to clamp the latter between the two ends of the strip, said strip being pivotally attached to said frame-work, substantially as described.

19. The combination with the frame-work, and with the blower and its vertical spindle, of a swinging arm pivoted to said frame-work and consisting of a metal strip bent upon itself and clamping between its two ends a jewel forming the step-bearing for said spindle, and a catch or lock-plate for holding said swinging arm in its normal position, substantially as described.

20. In an air-blast mechanism for mechanical lamps the combination with the frame-work comprising upright side-plates in which the arbors of the clock-work train are journaled, of the main-spring, its barrel provided with an internal gear, said barrel being outside one of said plates, and a horizontal arbor for said main-spring extending through both said plates said spring and barrel being outside the bearings of said arbor, so as to be readily detachable, substantially as described.

21. The combination with the upright side-plates, of a main-spring barrel outside one of said plates, an arbor therefor extending through both plates, a ratchet on said arbor outside the other plate, and a pawl for engaging said ratchet said spring and barrel being outside the bearings of said arbor, so as to be readily detachable, substantially as described.

22. The combination with the upright side plates and means for detachably fastening the same together, of a main-spring barrel outside one of said plates, an arbor therefor extending through both said plates and having a squared end, and a ratchet wheel detachably secured to the squared end of said arbor said spring and barrel being outside the bearings of said arbor, so as to be readily detachable, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ROBERT HITCHCOCK.

Witnesses:
DAVID E. MOORE,
PHILIP MAURO.