

No. 687,III.

Patented Nov. 19, 1901.

A. J. BLACKFORD.
OIL BURNER.

(Application filed Dec. 16, 1896.)

(No Model.)

3 Sheets—Sheet 1.

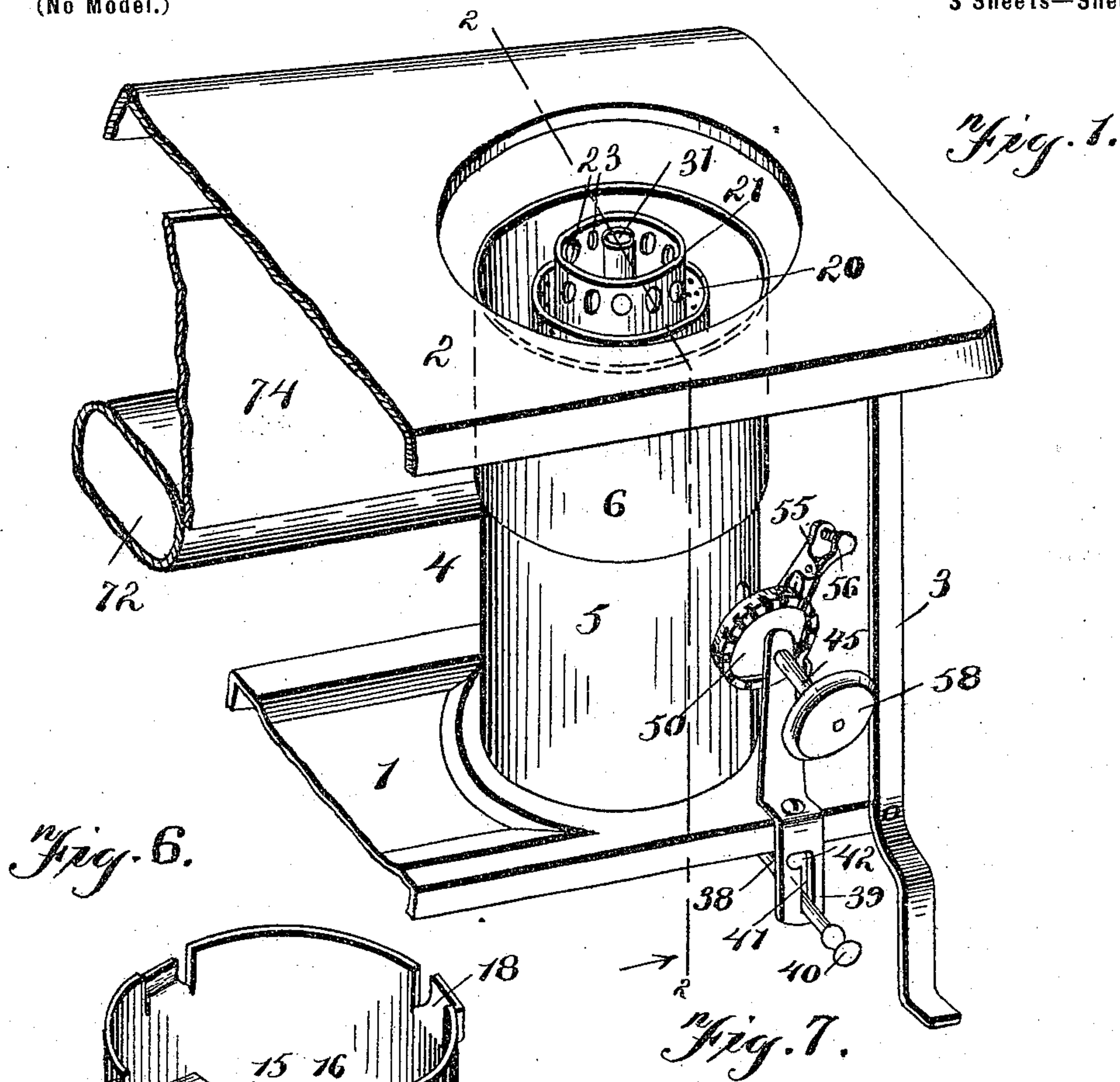
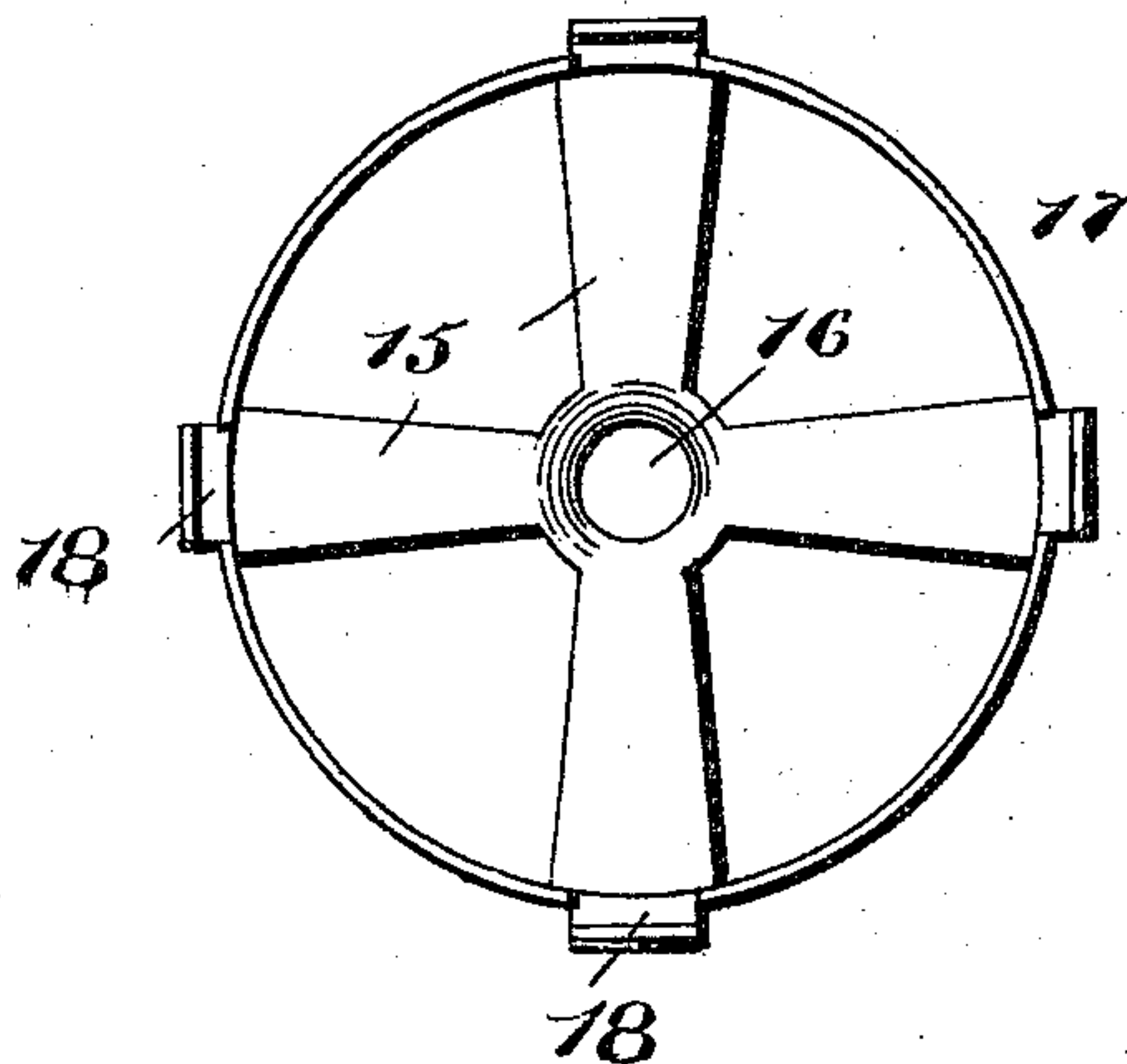
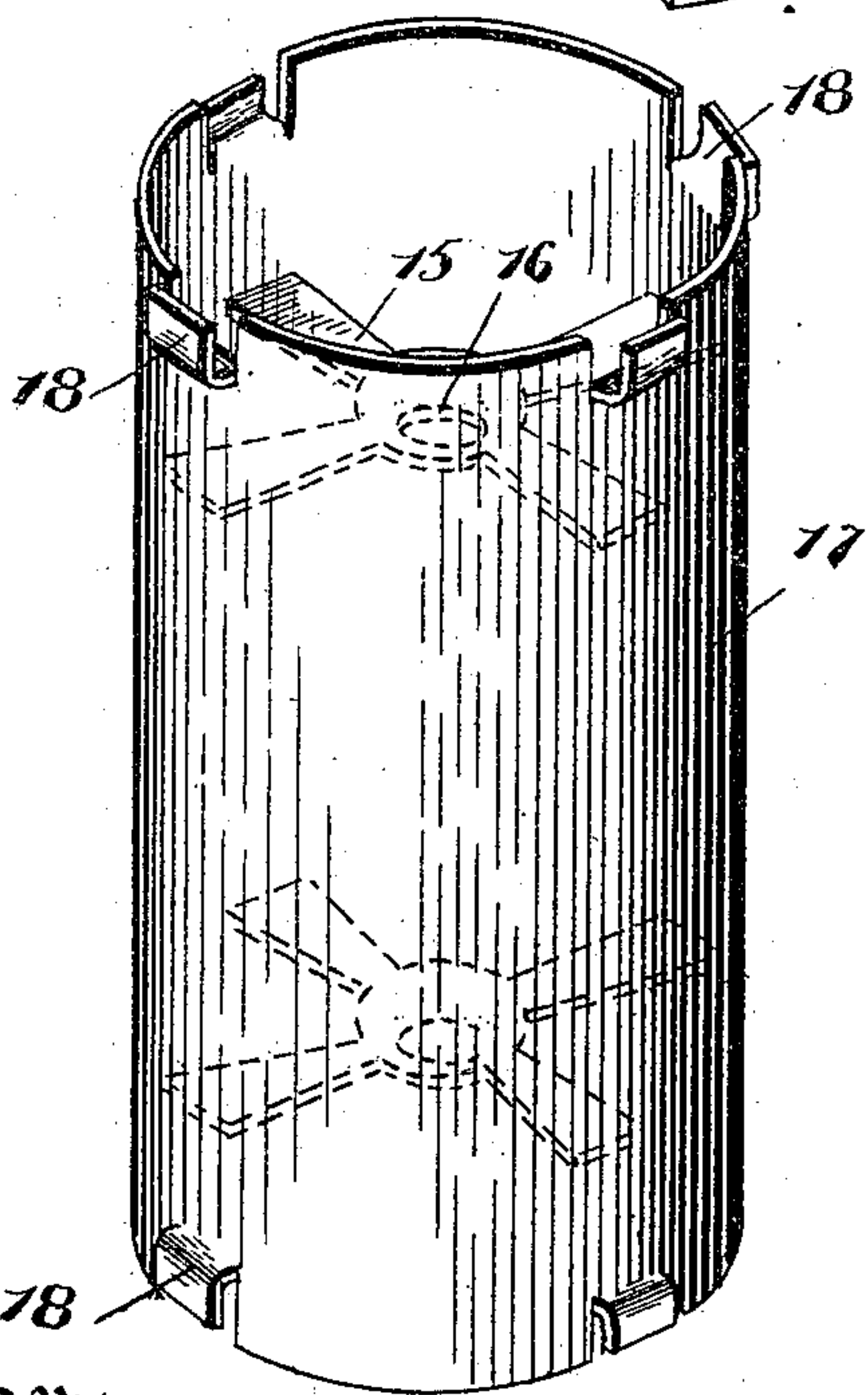


Fig. 6.



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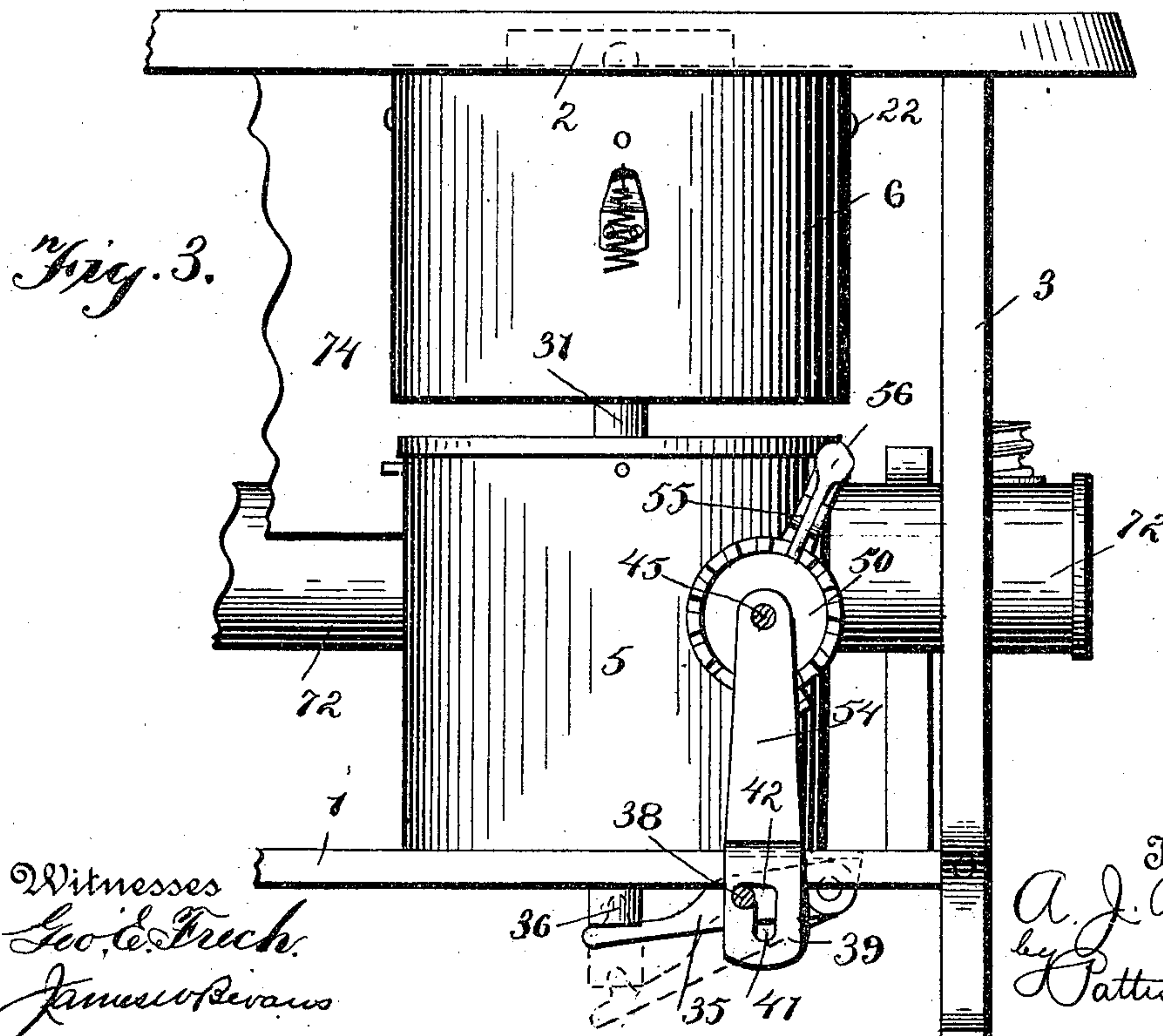
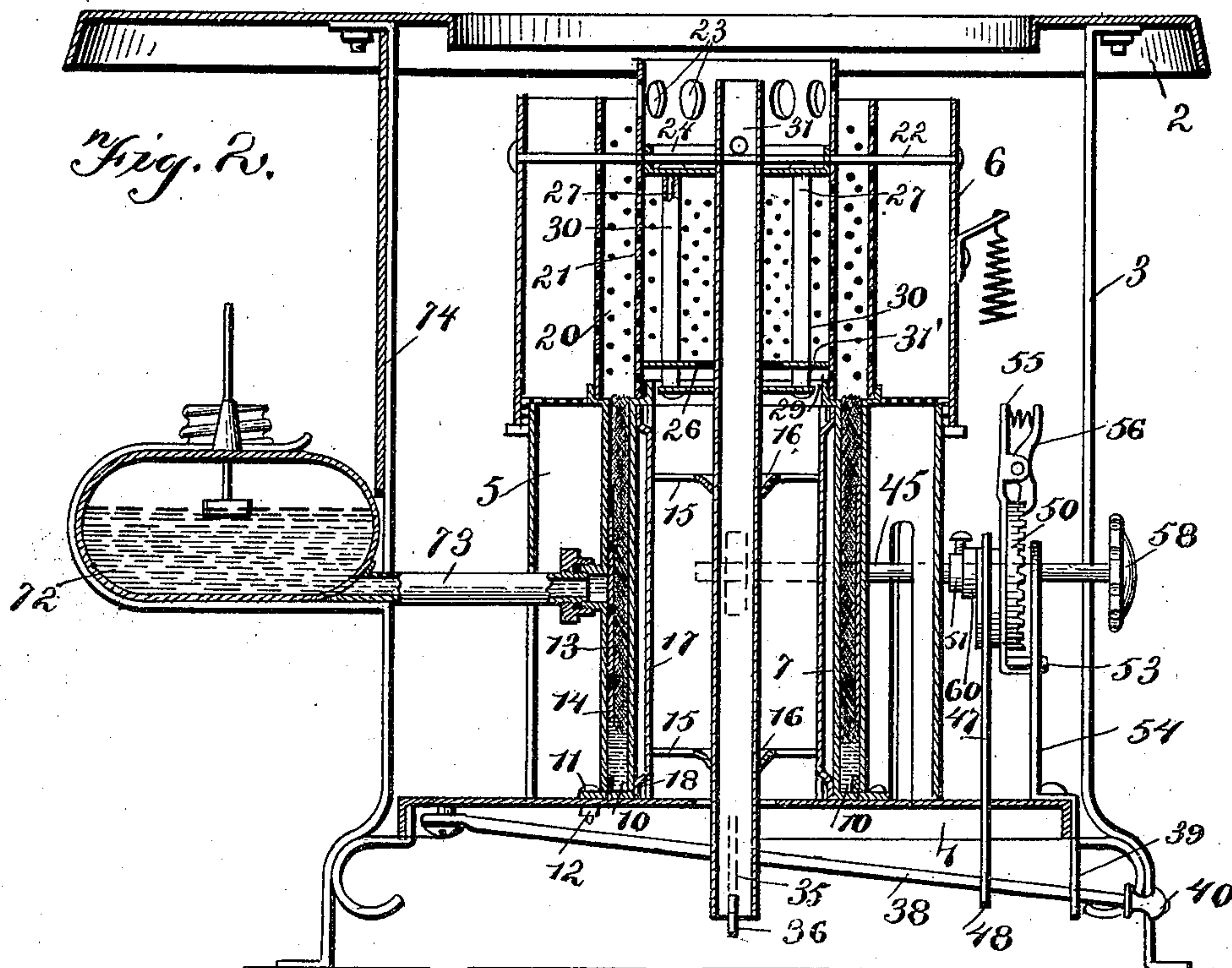
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3 Sheets—Sheet 2.



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3 Sheets—Sheet 3.

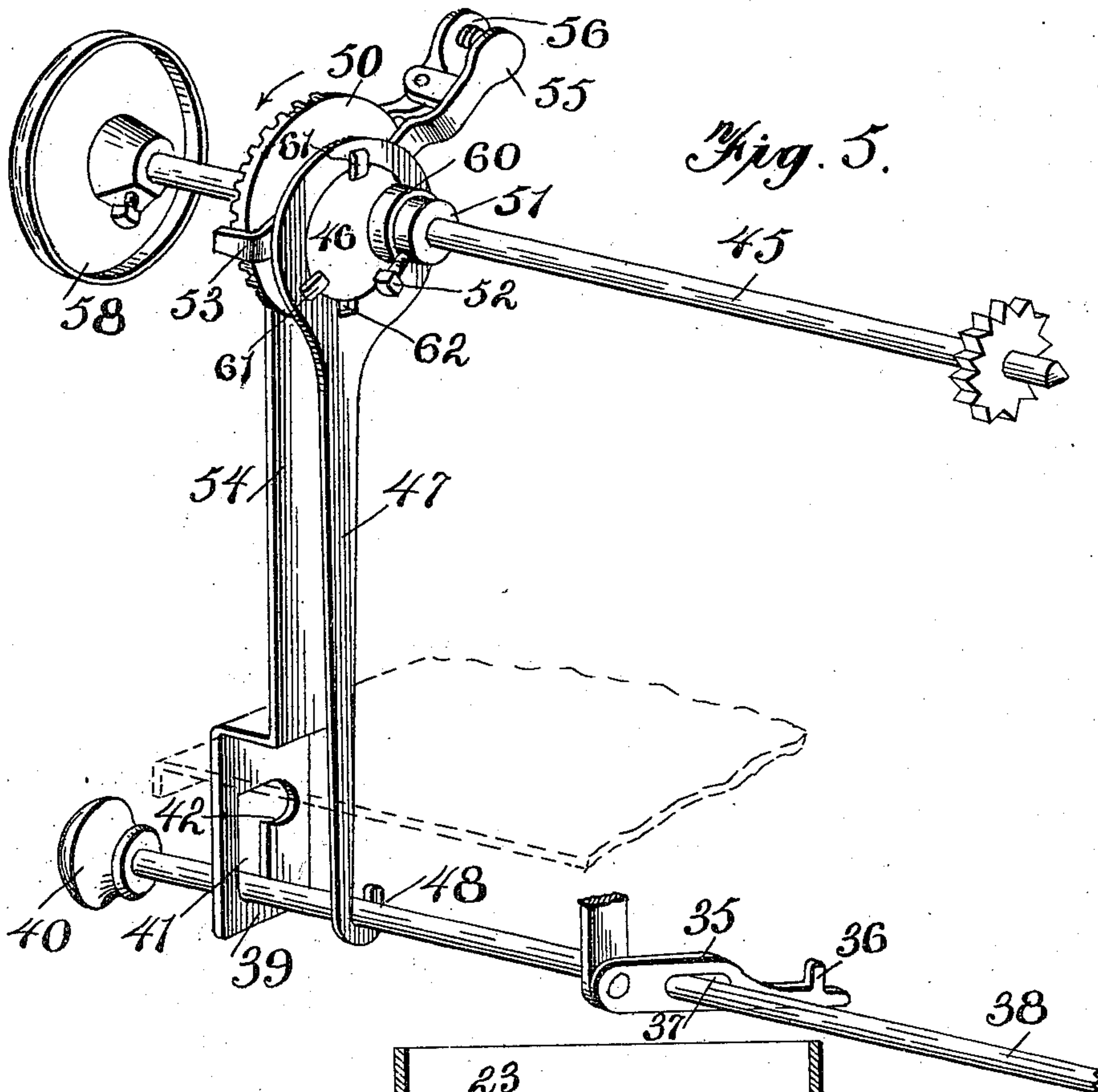
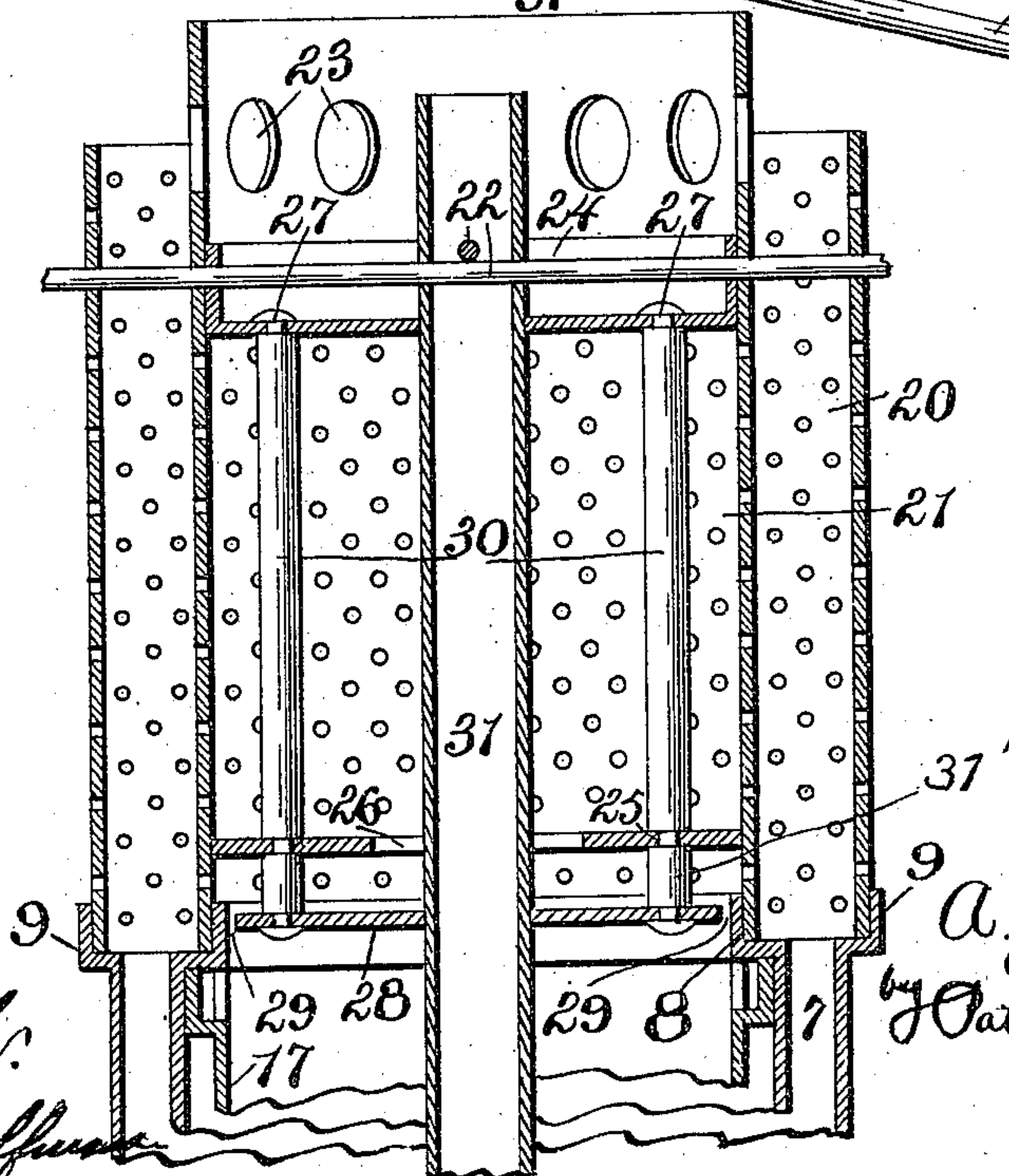


Fig. 4.



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UNITED STATES PATENT OFFICE.

ATWELL J. BLACKFORD, OF CLEVELAND, OHIO, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE UNITED BLUE FLAME OIL STOVE COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

OIL-BURNER.

SPECIFICATION forming part of Letters Patent No. 687,111, dated November 19, 1901.

Application filed December 16, 1896. Serial No. 615,880. (No model.)

To all whom it may concern:

Be it known that I, ATWELL J. BLACKFORD, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Oil-Burners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements in oil-burners which are adapted more especially for use in cooking-stoves.

In the accompanying drawings, Figure 1 is a perspective view of a burner embodying my invention shown in position in a frame, the latter shown in section. Fig. 2 is a vertical central section through the burner, taken on the dotted line 22, Fig. 1, looking in the direction indicated by the arrow. Fig. 3 is a front view of the burner, showing the combustion-section elevated for lighting by lifting the elevating-lever. Fig. 4 is an enlarged vertical central sectional view of the combustion-section. Fig. 5 is an enlarged detached perspective view of the wick and combustion section raising mechanism. Figs. 6 and 7 are detached views of the spider-tube.

Referring now to the drawings, 1 represents the lower or bottom portion, and 2 the upper or top portion, of an ordinary oil or gasoline stove frame, connected and supported by the end legs 3 in the usual or other desired manner. The burner 4, constituting my present invention, is here shown as supported by the bottom 1 of the frame and between it and the top, the latter serving to support the object heated in the usual or any preferred style. It should be understood, however, that my burner may be supported upon a suitable base without any surrounding supporting-frame-work and without affecting in any manner or departing in the slightest degree from the spirit of my invention.

The burner proper is of the Argand type and comprises, as here shown, a lower or wick section 5, supported by the base portion 1 of the framework, and an upper or combustion

section 6, which is supported by the wick-section when the burner is in operation. This wick-section consists of an open-ended annular wick-tube 7 to contain a wick, the upper end of the inner wall of the wick-tube being bent inward and upward in L form, as shown at 8, and the upper end of the outer wall thereof bent outward and upward in corresponding form, as shown at 9, the two L-shaped bends constituting a circular channel, and when the upper end of the wick is raised in said channel inner and outer vaporizing-channels are provided, respectively, at the inner and outer sides of the protruding end of the wick, as will be readily understood. An oil-tight bottom is formed for the wick-tube by turning outward and upward the lower end of the inner wall of the wick-tube in essentially L form, as illustrated at 10, and soldered in position, thus serving also to unite the lower end of the two walls of the tube, and the tube itself is detachably held to the base 1 by the bolts 12, which pass through an outturned flange 11 of the outer wall of said wick-tube, all of which is clearly exhibited in Fig. 2.

Situated within the wick-tube and against the outer wall thereof is a wick-raising tube or section 13, with which the wick-raising spur will engage in the usual manner for raising and lowering the wick, the said wick-raising section 13 being united to the wick through the medium of upwardly-projecting spurs 14, formed upon the said wick-section, all of which is of the usual form.

Supported within the inner wall of the wick-tube are the spiders 15, situated, respectively, adjacent the upper and lower ends thereof, the said spiders being provided with central openings 16, which form supports and guides for the elevating extension of the combustion-section, to be described hereinafter. These spiders may be connected directly to the inner wall of the wick-tube; but I prefer to connect them to a separate tube 17, which is placed within the wick-chamber, as clearly shown in Fig. 2, and of a diameter corresponding to the interior diameter formed by the L-shaped upper end of the inner wall of the wick-tube. The upper and lower ends of

this spider-tube 17 are provided with a plurality of outwardly and upwardly extending essentially L-shaped lips 18, which rest against the inner side of the inner wall of the wick-tube, the upper L-shaped lip serving to support the upper end in alinement with the L-shaped flange of the wick-tube and the lower lip serving to hold the lower end of the tube in a corresponding alinement. By this arrangement when the wick-section is detached from the base 2 the spider tube or section can be withdrawn therefrom, thus facilitating and enabling a thorough cleaning of that section of the burner. The specific construction of the spider tube or section is clearly illustrated in Figs. 6 and 7.

Referring now to the combustion or upper section of the burner, it consists of two concentric transversely-perforated combustion-tubes 20 and 21, which are united at their upper ends through the medium of the rods 22, which extend therethrough at right angles to each other. The inner tube 21 extends above the outer tube and near its upper end is provided with a series of large openings 23.

My present improvement upon the combustion-section relates to the manner of supporting the diaphragms within the inner tube thereof, to a depending extension, by means of which the section is elevated, and to an air-tube, which conveys a current of air to the center of the flame independent of the air which is conveyed to the outer portion of the said section, whereby a central flame is established independent of the circular flame formed by the concentric combustion-tubes. This central flame strikes the center of the object being heated and very materially adds to the effectiveness of the burner.

The upper diaphragm 24, situated in the upper portion of the inner combustion-tube 21, is imperforate and made in cup form, as shown in Fig. 4. The rods 22, which unite the combustion-tube, pass through the peripheral flange of the diaphragm and serve to support it firmly within the tube. A diaphragm 25 is situated at the lower portion and within the inner combustion-tube and is provided with a central opening 26, through which air is permitted to ascend within the said tube thereabove and allowed to pass through the perforations of said tube to the vaporized oil or gases between said tubes, serving to oxygenate them and produce a blue flame at the top of the combustion-tube. The inner combustion-tube is perforated below the diaphragm 25, and said diaphragm being imperforate near the wall of said tube serves to retard the outflowing air and cause it to pass through said perforations and commingle with the vaporized fluid at the point of vaporization.

In burners of this character it is advantageous, if not essential, to provide a diaphragm spanning the upper end of the wick-chamber for retarding the upward flow of air within said chamber at a point below the

lower diaphragm 25, situated within the inner combustion-tube. This diaphragm has heretofore been supported by and connected with the wick-tube, so that after the detachment of the combustion-section the said diaphragm remained in position in the upper end of the wick-tube and prevented access within the wick-chamber for cleaning it, and in this respect is objectionable. So, also, said diaphragm at the upper end of the wick-tube has either been provided with a central perforation or a plurality of small perforations throughout its entire surface. Such constructions have in the one case permitted a free upward flow of air at the center of the wick-section and in the other case an equal flow of air throughout the entire surface of the diaphragm. It is highly advantageous to cause as much as possible of this upflowing air to be deflected through the inner combustion-tube at a point below the lower diaphragm 25 and at the vaporizing-point, and it is one of the objects of my present invention to accomplish this result. I produce this result in a highly satisfactory manner by constructing the diaphragm at the upper end of the wick-chamber so that air is only permitted to pass around its periphery or edge adjacent the inner wall and to impinge against the imperforate portion of the diaphragm 25, thus serving to force a large proportion of the upflowing air through the inner combustion-tube below the diaphragm 25 and adjacent to or at the vaporizing-point. Instead of having the wick-tube carry said diaphragm I attach it to the said combustion-section and support the diaphragm in a manner which I will now describe.

The upper diaphragm 24 being firmly supported, as before described, supporting-bolts 27 depend therefrom and extend to approximately the lower end of the combustion-tube, their lower ends supporting the diaphragm 28, which is the wick tube or chamber diaphragm above referred to. This diaphragm 28 is therefore supported by the upper diaphragm 24 through the medium of said bolts, and, as clearly shown in Fig. 4, is smaller in diameter than the inner diameter of the inner combustion-tube, thus constituting a circular air-passage at a point adjacent the perforations of the lower end of the inner tube and below the imperforate portion of the diaphragm 25, which effects the result heretofore referred to of forcing the air through the inner combustion-tube at the point of vaporization. This form of diaphragm 28 will cause considerable more air to be forced between the combustion-tubes at the vaporizing-point even if used in connection with a diaphragm 25 which instead of having only a central perforation is provided with a plurality of small perforations throughout its entire surface or even throughout its outer edge. The only essential provision is that the passage 29 shall be of greater area than the air passage or passages in the diaphragm thereabove at a point

immediately above the passages 29. This is so for the reason that when a larger volume of air is moving through the passage 29 than can pass through the perforations or passages in the diaphragm immediately thereabove within a given time it will cause a crowding or forcing of the air through the perforations below the diaphragm 25 into the vaporizing-point in proportion to the relative areas of the registering passages of the two diaphragms, as will be readily understood.

The diaphragm 25 is supported by sleeves 31', surrounding the bolts 27 between said diaphragm and the diaphragm 28, and the diaphragm 25 is held against upward movement through the medium of the sleeves 30 upon the bolts 27 between said diaphragm 25 and the upper diaphragm 24. This construction, as will be seen, unites all the diaphragms to the combustion-section, so that when the combustion-section is removed it permits ready access to the interior of the wick-chamber for cleaning purposes, which in many instances is very desirable.

Although I have shown and described what is usually the wick-chamber diaphragm 28 carried by the combustion-section, I wish it to be understood that the said diaphragm may be connected to the wick-tube and constructed with only peripheral passages of greater diameter or area than the passages in the diaphragm at the point or points thereabove without deviating from that portion of my invention which causes a larger proportion of the upflowing air to be deflected through the lower end of the inner combustion-tube at the point of vaporization.

I provide a central blue flame independent of the usual circular flame at the upper end of the combustion-tubes by conveying a current of fresh air at a central point of the upper end of the inner combustion-tube, preferably in the following manner: A tube 31 is centrally supported within the inner combustion-tube through the medium of the diaphragms therein and the supporting-rod 22. This central tube 31 has its upper end open and preferably at a point slightly below the upper end of the inner combustion-tube, though the exact point at which the upper end of the tube may be situated can be varied so long as it is above the upper diaphragm 24; but I find that by having it just below the upper end of the inner combustion-tube the best results are obtained. The main function of the tube is to establish a central flame independent of the circular flame by an independent current of air, and the specific manner of providing this independent current may be varied, as will be readily understood by those skilled in the art, without affecting the fundamental principle of this part of my present improvement. Preferably the tube 31 is extended straight through the combustion-chamber and extends through the wick-chamber, thus furnishing an elongated tube, causing an in-

creased draft, and thereby a proportionate better result. In this instance the said tube 31 is extended below the wick-chamber and through the base of the flame sufficiently to serve as an extension for elevating the combustion-section when lighting the burner and after the burner is extinguished to prevent a deposit of fluid upon the combustion-tubes by capillary attraction through the medium of an operating connection with the wick-raiser, said connection being such that it is automatically elevated by the lowering of the wick.

As before stated, the tube 31 serves the purpose of an extension by means of which the combustion-section is elevated, and this is accomplished through the medium of a lever 35, pivotally supported at one end in any suitable manner to the base 1 and having its opposite free end engage the lower end of the tube 31, said free end of the lever being preferably provided with a projection 36, adapted to enter the open lower end of the tube 31, which serves to hold the free end of the lever in positive engagement with the tube. This lever 36 is provided intermediate its ends with a longitudinal elongated opening 37, through which an operating rod or lever 38 freely passes, the inner end of the lever or rod 38 being connected in any suitable manner to the base 1 and its opposite end extending through a combined guiding and supporting plate 39, the projecting end 40 of the rod 38 serving as a handle by means of which it is raised or lowered. The plate 39 is provided with a vertical slot 41, permitting the rod an up-and-down movement for elevating and lowering the combustion-section, the upper end of the slot 41 having a deflection or notch 42, adapted to receive the rod when it is elevated and to support it in this position for holding the combustion-section in its elevated position, as illustrated in Fig. 3, to enable the burner to be lighted.

In this class of burners it is desirable to elevate the combustion-section, and thus carry the combustion-tubes out of contact with the vaporizing-channels when the burner is extinguished, for otherwise there will be an accumulation upon the combustion-tube of the fluid from the wick, and when the burner is started there will be smoke and an unpleasant odor. I here provide means for accomplishing this automatically when the wick is lowered for extinguishing the burner, and thus avoid the necessity of depending upon the recollection of the operator to elevate the combustion-tube after the wick has been lowered. This arrangement consists in providing an operative connection between the wick-raiser and the elevating mechanism, and it consists, essentially, in providing the wick-raising shaft with a crank or cam which is connected through a lug or pitman with the elevating-rod. The form which I here show for effecting this automatic operation is the one I prefer, and it consists in providing the

wick-raising shaft 45 with a cam 46, surrounded by the upper end of the pitman or link 47, the lower end of the pitman being provided with a hook 48 below and receiving the elevating-rod 38. This arrangement permits the independent operation of the rod 38 for raising the combustion-section to permit the lighting of the burner, while at the same time it automatically lifts the rod 38 when the shaft 45 is turned for lowering the wick. I also provide means for limiting the distance the wick shall be elevated, said means being capable of adjustment as the wick is consumed. This means consists in providing the wick-raising shaft 45 with an indexed or notched disk 50, the notches being preferably upon the outer face of the disk, as clearly shown. The disk is provided with an elongated collar 51, surrounding the shaft 45 and extending inward, the inner end of the disk collar being provided with a clamping-screw 52, by means of which the disk is made fast to the shaft. The cam 46 is placed loosely upon the collar 51 and is provided with a stop-cam 53, said arm being essentially L-shaped, as shown, so that when the cam has been rotated in the direction indicated by arrow in Fig. 5 for lowering the wick the said arm 53 will engage an extension 54, said extension here shown as being a part of the slotted plate 39. This extension 54, in addition to serving as a stop for the arm 53, also serves as a support for the extended end of the shaft 45. The cam 46 is also provided with an arm 55, carrying a spring-catch 56, the lower end of the catch adapted to engage the notches upon the dial-plate 50, thus serving to unite the cam to the disk, whereby when the shaft 45 is rotated the cam is rotated therewith. In operation the wick is adjusted at the proper height for giving the best results, and then by pressing the upper end of the catch 56 to release its lower end from the dial-plate the cam is rotated until the arm 53 abuts against the extension 54, when by releasing the catch it will engage the dial-plate, and thus lock the cam thereto. In this way, the wick being adjusted, the operator turns the shaft 45 by the handle 58 until the arm 53 stops the rotation thereof by engagement with the extension or standard 54. The rod 38 is then lifted, carrying with it, as before described, the combustion-section, then moved laterally into the deflection 42, which serves to hold it elevated while the burner is being lighted. Under ordinary uses the wick will not need adjustment for several weeks. When, however, it becomes necessary to further raise the wick on account of it being consumed, the cam is released from the dial-plate through the medium of the catch, as before explained, when the shaft 45 can be rotated independently of the cam sufficiently to make the proper adjustment. The proper adjustment being made, the arm 53 is carried in contact with the standard 54, and the burner is again ready for several additional weeks' use with-

out further adjustment. This arrangement not only always insures the wick being turned to the proper point without any attention on the part of the operator, but also insures the automatic locking of the cam (which carries the stop) to the dial-plate after the adjustment has been made. This is a great advantage over a device for locking the stop 53, which requires a separate operation, or, in other words, a lock which is not automatic, for otherwise the operator may forget to effect the locking of the stop after the adjustment has been made, which will permit the free and independent movement of the wick-receiving shaft and the loss of time and trouble necessary to make the adjustment, in addition to the probability of carrying the wick too high and causing a smoking of the burner. In addition to this, should the servant fail to set the non-automatic lock heretofore used there is danger of inexperienced persons turning the wick so high as to produce an alarmingly high flame and even to turn the wick-rack out of contact with the rack-wheel, so that it cannot be again lowered without downward pressure upon the rack. Under this very condition of affairs with the non-automatic locks the wick soon becomes fired its entire length, making a tremendous flame difficult to extinguish, and it has been necessary to remove the stove bodily from the house under that condition. With an automatic lock this cannot occur, for as soon as released it locks with the notch-dial and prevents the wick being turned so high as to carry the rack out of contact with the rack-wheel and the wick can be lowered at will. The catch 56 serves as a stop when the shaft is rotated in the direction for lowering the wick by engagement of its lower end with the standard 54.

While I here show the stop 53 as being carried by the cam for effecting the raising of the combustion-section when the wick is lowered, it will be understood that the stop may be used independent of the cam and serve its purpose. In other words, the use of a notch-plate and a stop carrying a means for interlocking with the plate may be used upon a burner without the other mechanism for effecting the raising of the combustion-section; so also the mechanism for effecting the raising of the combustion-section may be used independent of the stop. In the present instance I have shown a simple way of combining the two results, although, as above stated, they may be independently used.

A sleeve or washer 60 is placed between the clamping-screw 52 and the cam for holding it in contact with the inner face of the dial-plate, by means of which when the screw 52 is removed the parts may be separated. The means for holding the pitman upon the cam consists of providing the cam with a plurality of projecting lugs 61, the strap of the pitman being between the lugs and the arms 52 and 55 of the cam. The wall of the strap of the

pitman is provided with a notch 62, sufficiently large to permit one of the lugs to pass therethrough and which enables the strap to be placed upon and removed from the cam.

5 At the opposite or inner end of the shaft 45 is provided a notched wheel 64, which engages the wick tube or section 13 in the usual manner.

The burner or burners (as the case may be) 10 are supplied with fluid from a tank 72, situated at the back of the stove-frame and supported in any desired manner, the same having communication with the wick-tube through the connecting-pipe 73. The reservoir, as 15 shown, is placed below the upper end of the wick, so that there will be no overflowing of the fluid in seeking its own level. A plate or apron 74 is provided just in front of the reservoir and protects it to a considerable extent from the heat of the burner. 20

I do not claim in this application the mechanism herein shown and described for automatically lifting the combustion-section when the wick is lowered for extinguishing the 25 flame, for this invention is the subject-matter of my Patent No. 620,840, granted March 7, 1899, and which was carved out of and made a division of this application.

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

1. A burner comprising concentric combustion-tubes, a vaporizing-channel between and at the base of the combustion-tubes, a perforated diaphragm spanning the lower portion 35 of the inner tube, the inner tube being perforated below the said diaphragm at a point above but adjacent the vaporizing-point, and a diaphragm situated below said diaphragm, 40 and an air-passage formed between the last-said diaphragm and the inner combustion-tube.

2. A burner comprising concentric combustion-tubes, a vaporizing-channel situated at 45 the base of the combustion-tubes, a centrally-perforated diaphragm spanning the inner tube at a point above but adjacent said channel, the inner tube having perforations below the said diaphragm, a diaphragm situated 50 below the aforesaid diaphragm, and an air-passage formed at the periphery of the last-named diaphragm.

3. A burner comprising a wick-section, a combustion-section situated thereabove and 55 vertically movable in relation thereto, the combustion-section carrying a wick-section diaphragm at its lower end which spans the upper end of the wick-section, whereby the wick-section diaphragm is moved with and 60 carried by the combustion-section.

4. A burner comprising an annular combustion-section, a plurality of diaphragms spanning the interior of said section, one of 65 said diaphragms being united to said section, and a support between said diaphragm and the other diaphragm or diaphragms.

5. A burner comprising an annular com-

bustion-section, a plurality of diaphragms spanning the interior of said section, one of 70 said diaphragms being attached to said section, the other diaphragm having its periphery out of contact with the interior wall of the section, and a support connecting said diaphragm.

6. A burner comprising an annular combustion-section, a cup-shaped diaphragm 75 spanning said section, a tube passing through said diaphragm, and connections passing transversely through said sections, the flange of said diaphragm and the tube, thus uniting 80 the several parts.

7. A burner comprising an annular combustion-section, a plurality of diaphragms spanning the interior thereof, one of said diaphragms connected with the section, connections uniting the diaphragms, and spacing- 85 sleeves surrounding said connections.

8. A burner comprising an annular combustion-section, a plurality of diaphragms spanning the interior thereof, the upper diaphragm connected to said section, supports de- 90 pending from said upper section and passing through the diaphragm below and supporting the lowermost diaphragm, and spacing members carried by said support and engaging 95 said diaphragm.

9. A burner comprising vertically-separable wick and combustion sections, the latter having a depending lifting extension passing 100 within the former, and a tube situated within the wick-section, said tube provided with guides or supports for said extension.

10. A burner comprising vertically-separable wick and combustion sections, the latter having a depending lifting extension passing 105 into and through said wick-chamber, a lever having its free end engaging said extension and having a longitudinal opening, a second lever extending at right angles to the aforesaid lever, passing through said longitudinal 110 opening and having its free end forming a handle, and a laterally-extending support for said second lever when it is raised.

11. A burner comprising an Argand wick-tube, an annular combustion-section at the 115 upper end of the wick-tube, the combustion-section depending within the wick-tube and carrying a diaphragm for the said wick-tube.

12. A burner comprising concentric combustion-tubes, a vaporizing-channel between 120 and at the base of the combustion-tubes, a perforated diaphragm spanning the lower portion of the inner tube, the inner tube being perforated below said diaphragm and at a point above but adjacent the vaporizing- 125 point, a diaphragm situated below said diaphragm, and an air-passage formed between the last-said diaphragm and the inner combustion-tube.

13. A burner comprising an annular combustion-section producing an annular flame 130 at its upper end, an air-tube passing through the combustion-section and having open upper and lower ends, the open upper end situ-

ated at the upper end of the combustion-section, the combustion-section having a diaphragm below the upper end thereof to entrain the gases within the upper end of the
5 section to the open upper end of the tube, the lower end of the tube adapted to receive and the upper end to deliver air to the said gases for producing an auxiliary central flame.
10 14. A burner comprising an annular combustion-section having a plurality of openings through the upper ends of the inner tubes, an open-ended tube passing through the said combustion-section with its open up-
15 per end about in a horizontal line with the said

openings of the combustion-section, a diaphragm in the upper end of the combustion-section below the openings therein and below the upper end of the tube, said diaphragm adapted to cause a partial vacuum within the
20 upper end of the combustion-section to entrain the escaping gases to the open upper end of the said tube for the purpose of producing an auxiliary central flame.

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

ATWELL J. BLACKFORD.

Witnesses:

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