

No. 685,640.

Patented Oct. 29, 1901.

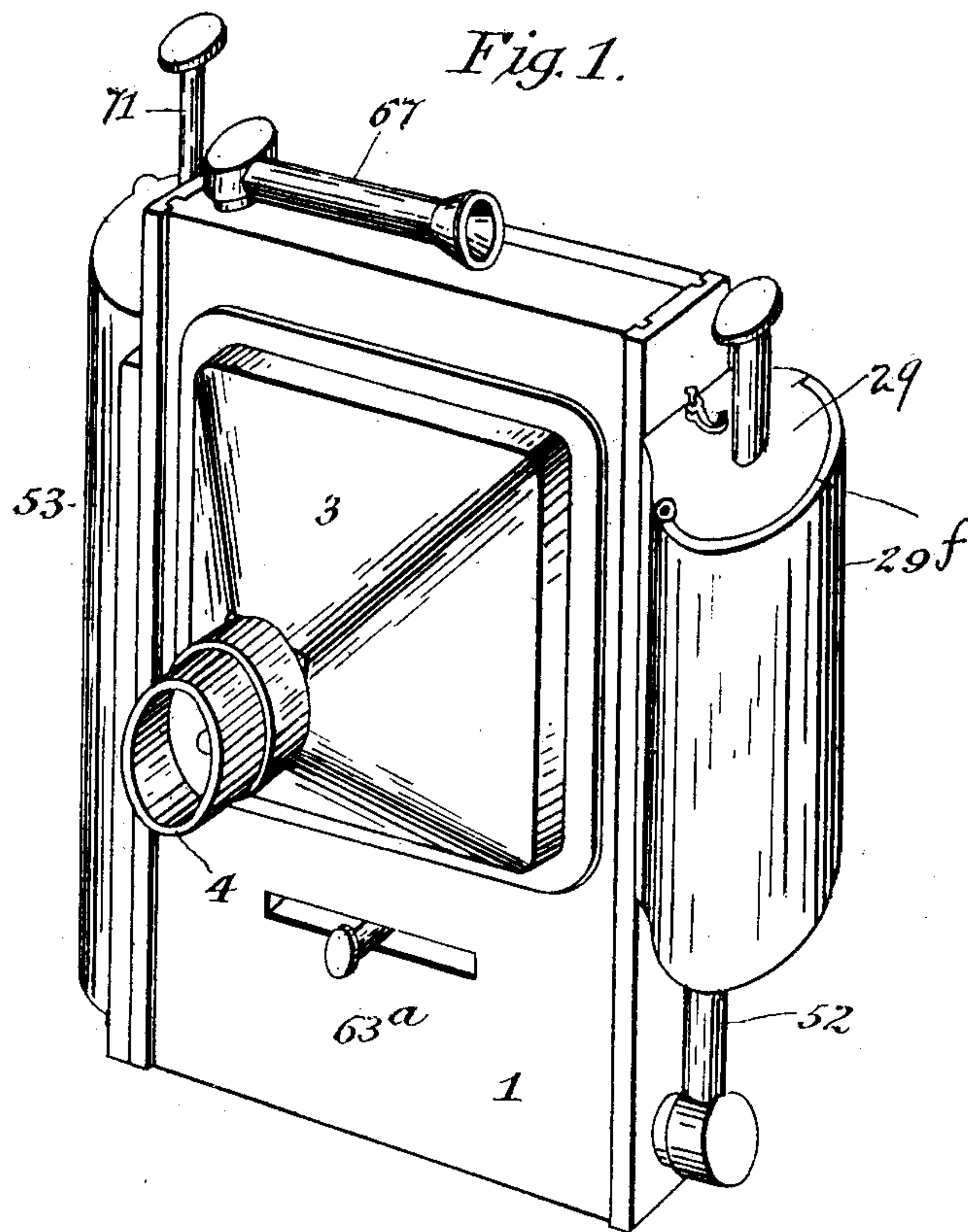
S. QUINCEY.

APPARATUS FOR DEVELOPING PHOTOGRAPHS.

(Application filed Apr. 30, 1901.)

(No Model.)

5 Sheets—Sheet 1.



Witnesses:

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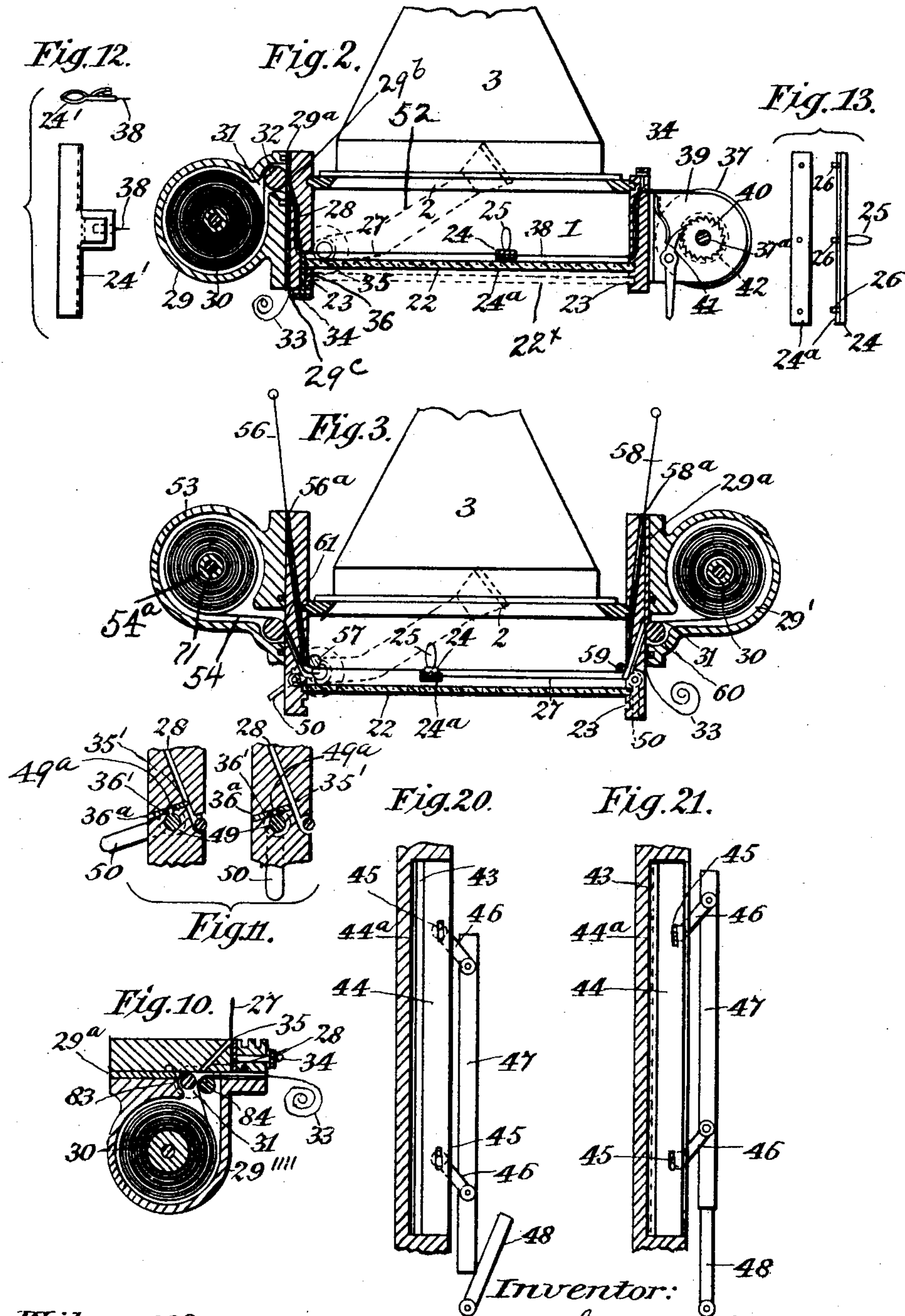
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5 Sheets—Sheet 2.



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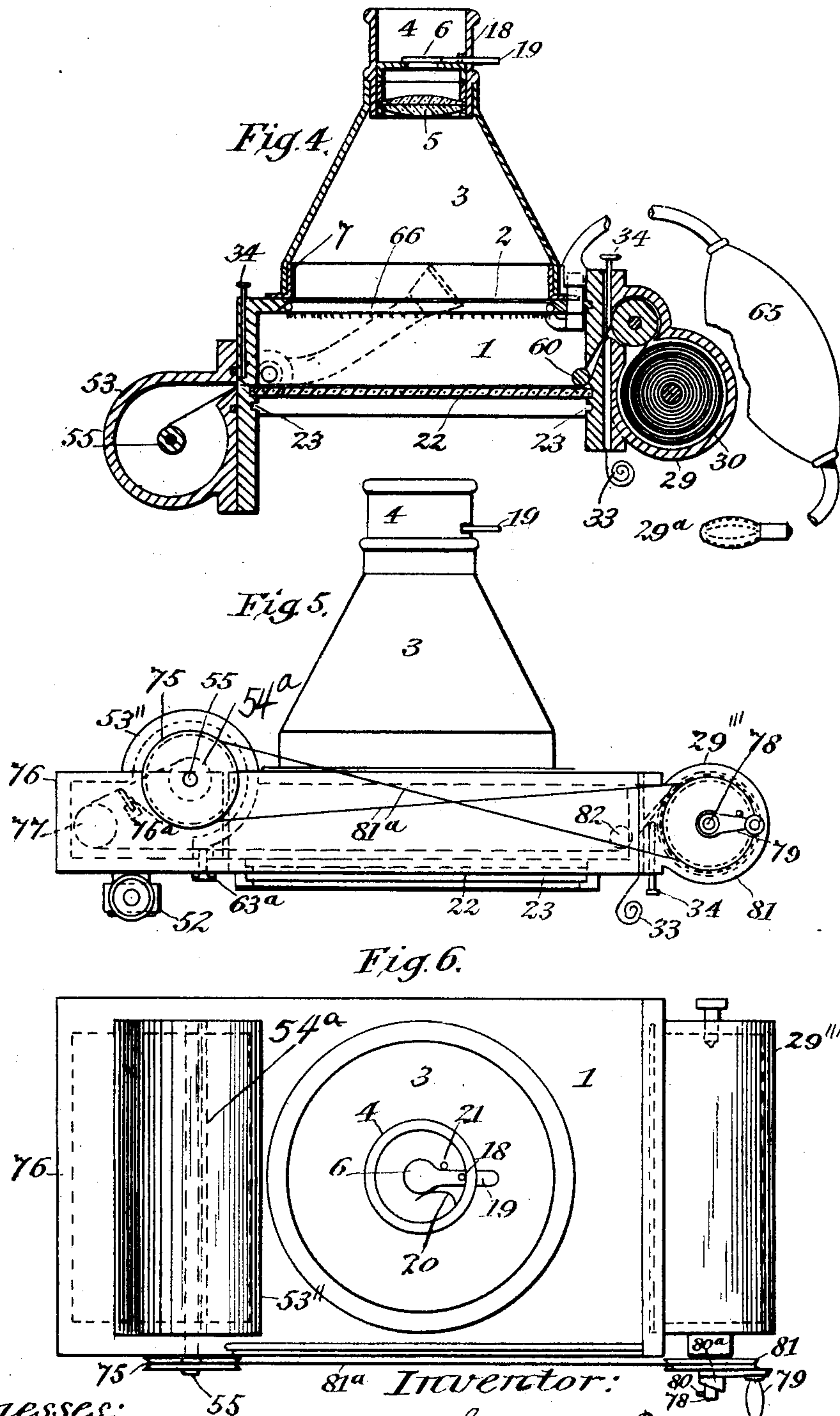
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5 Sheets—Sheet 3.



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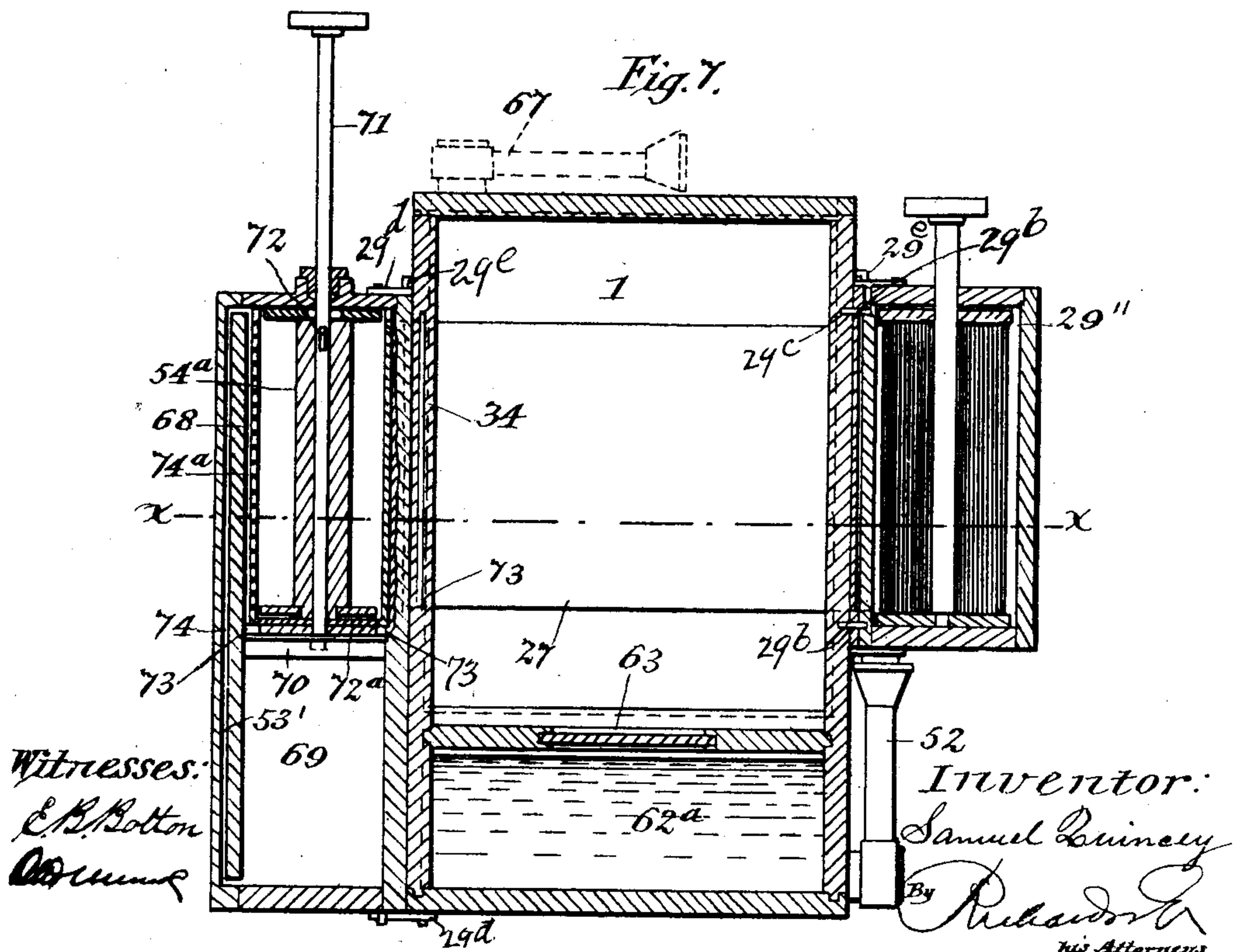
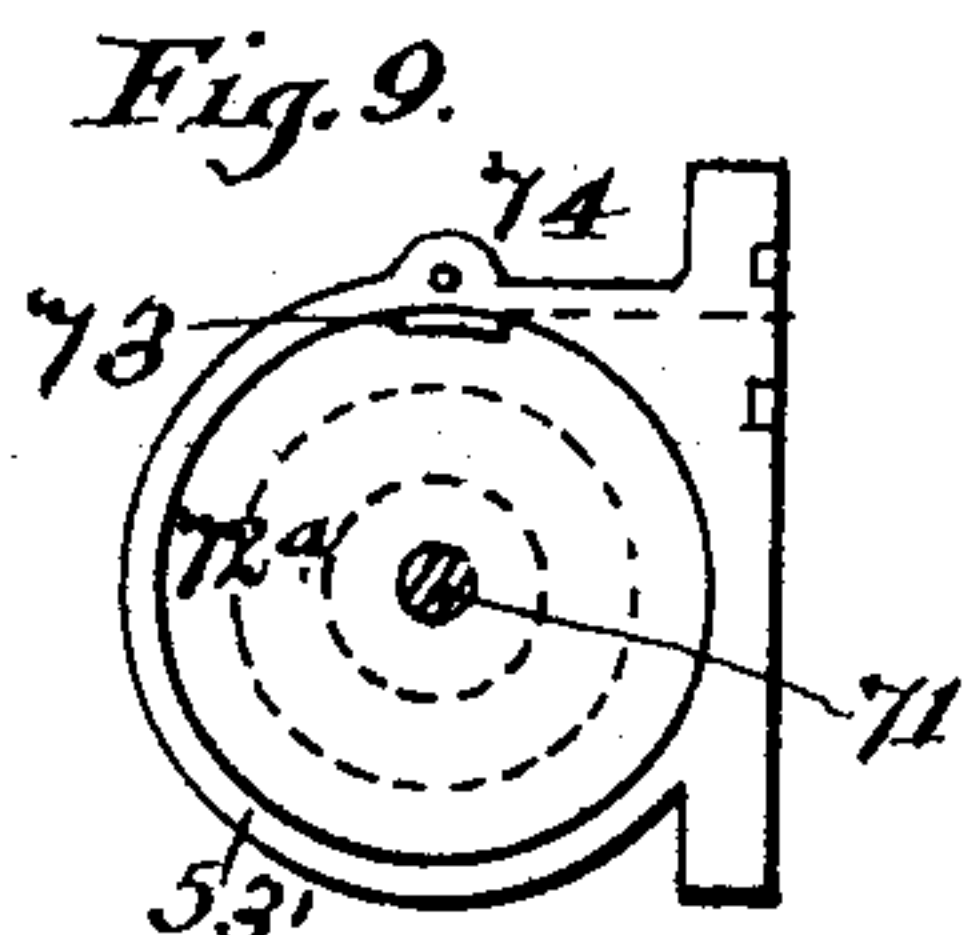
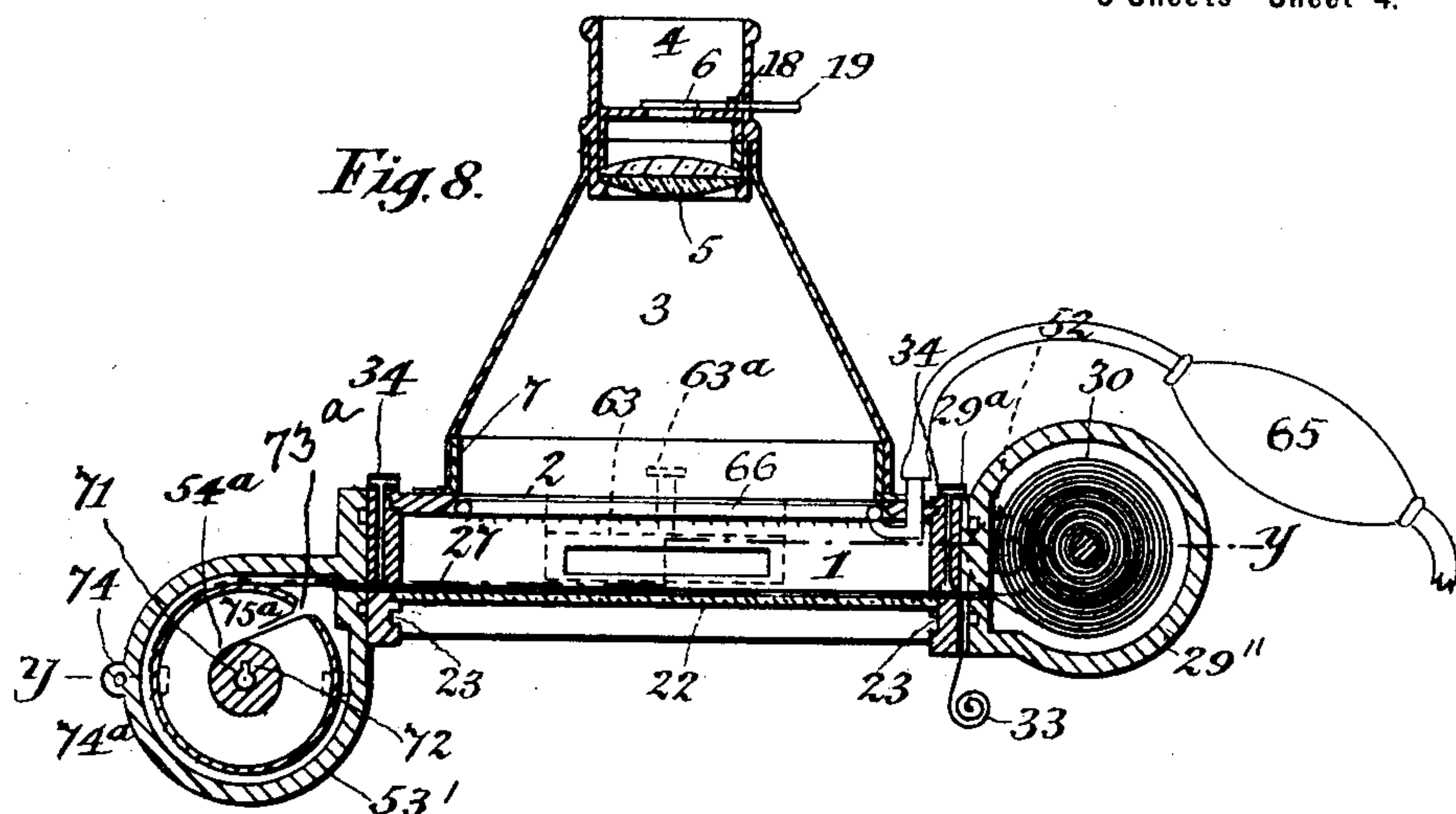
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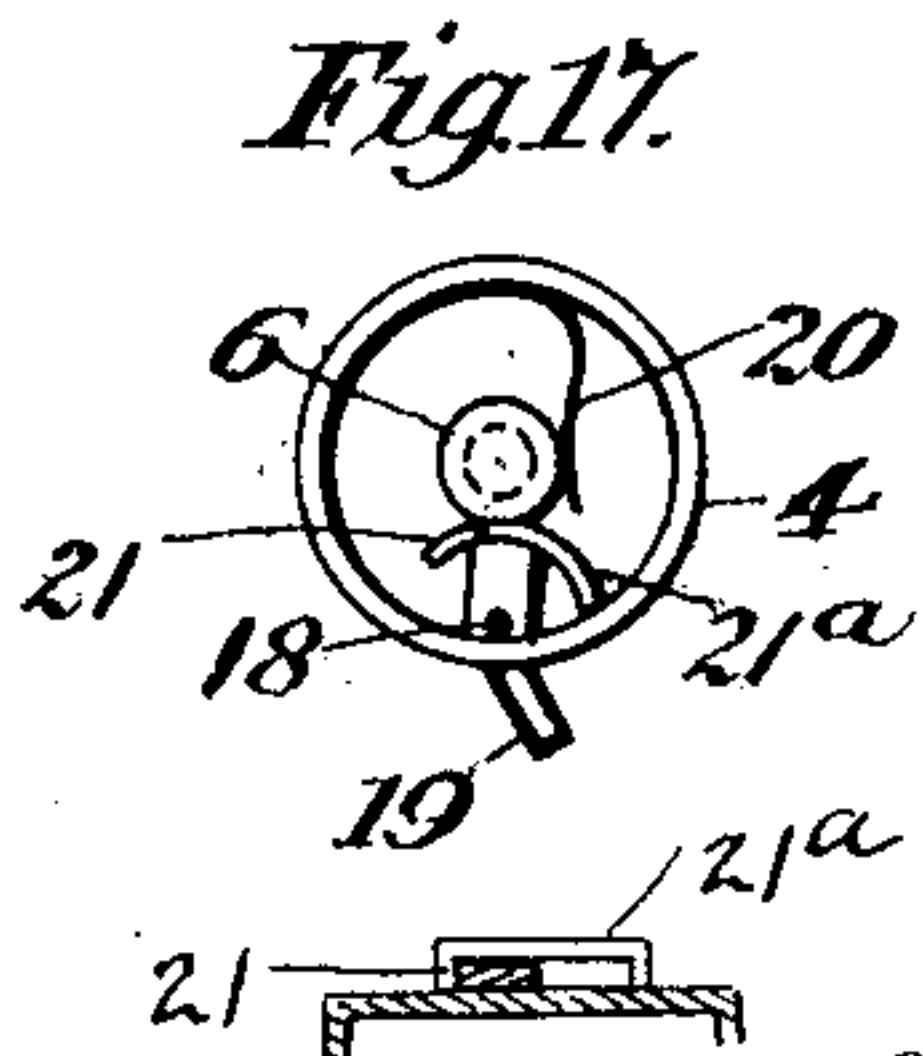
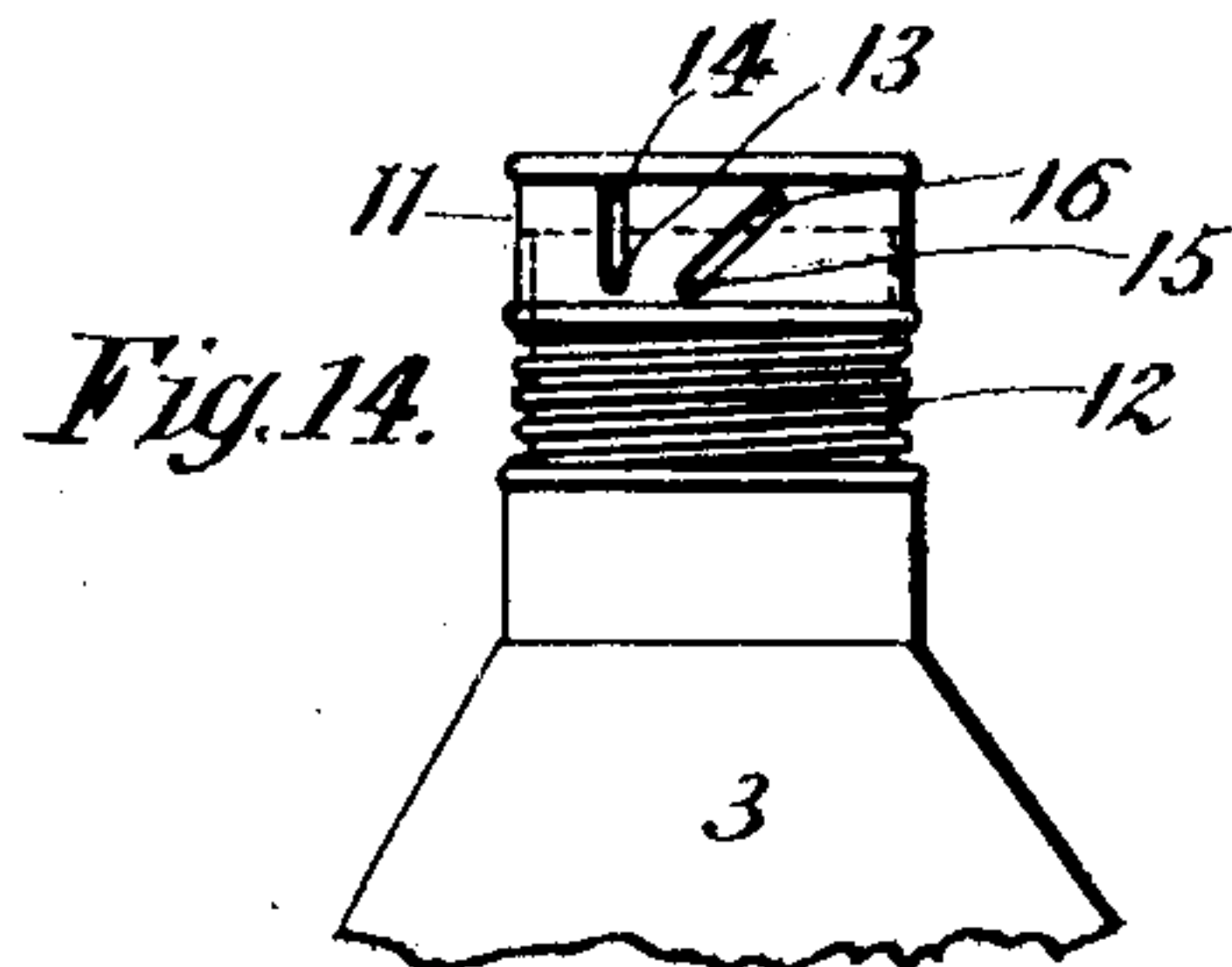
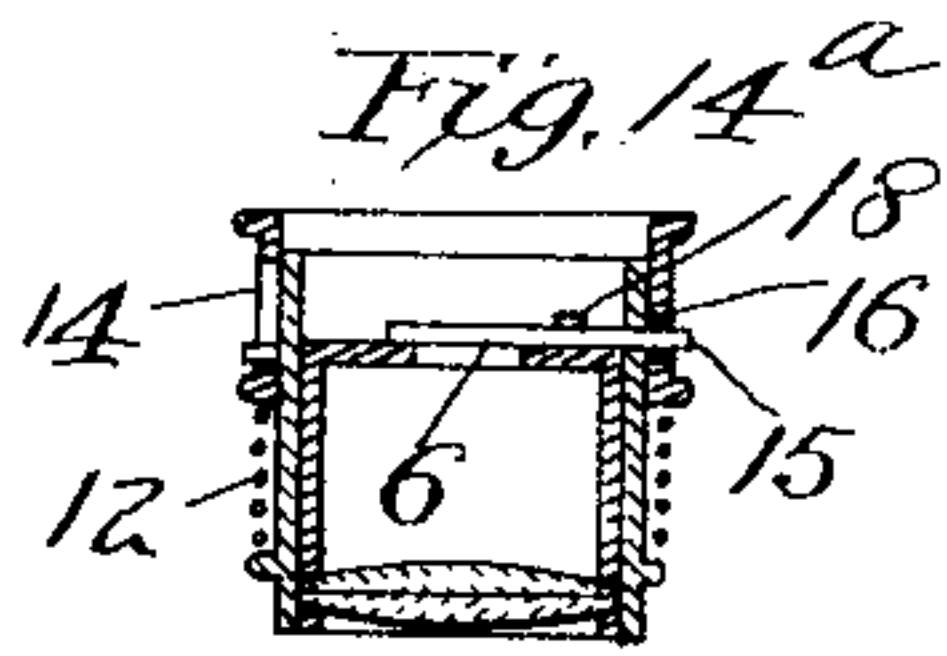


Fig. 17a

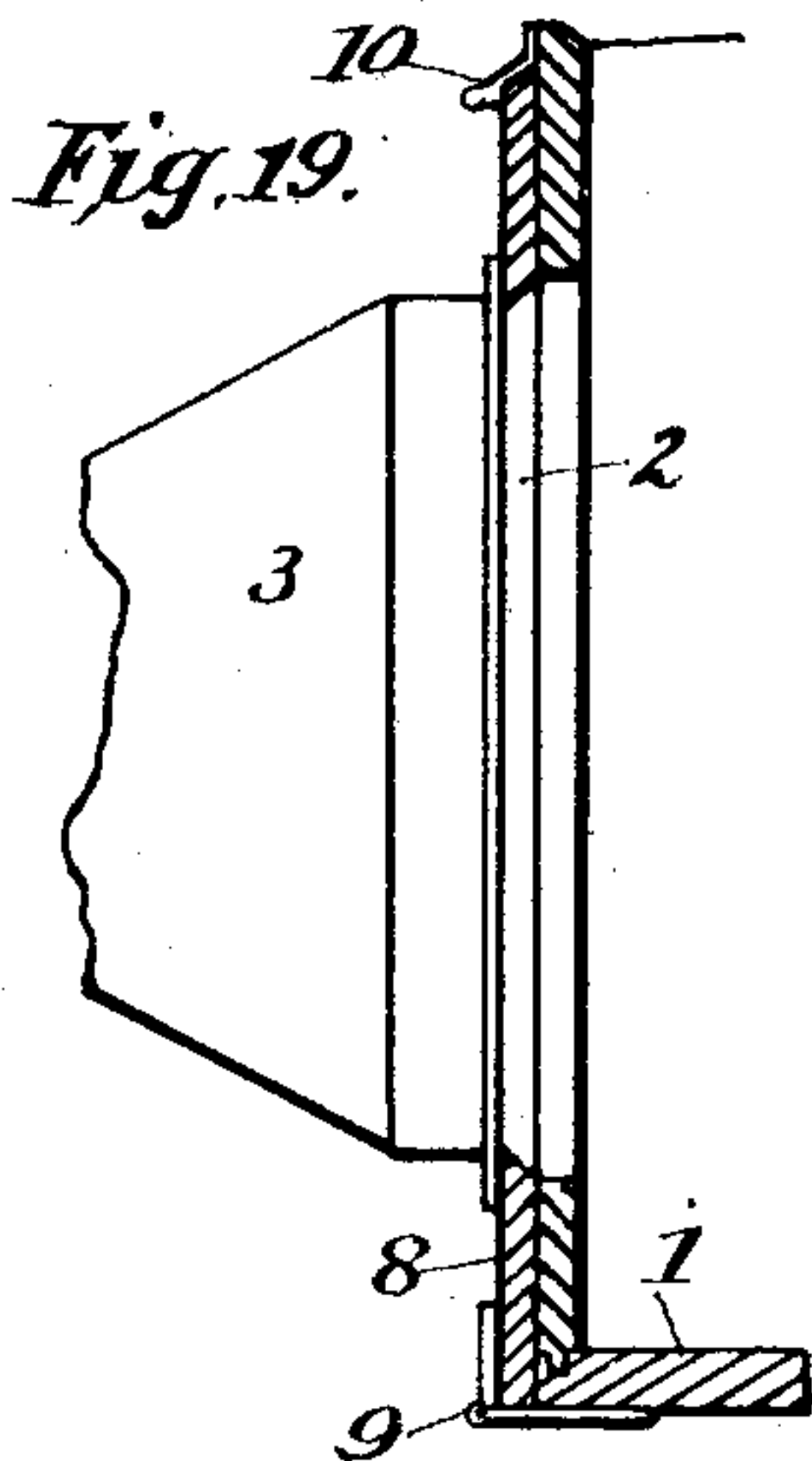
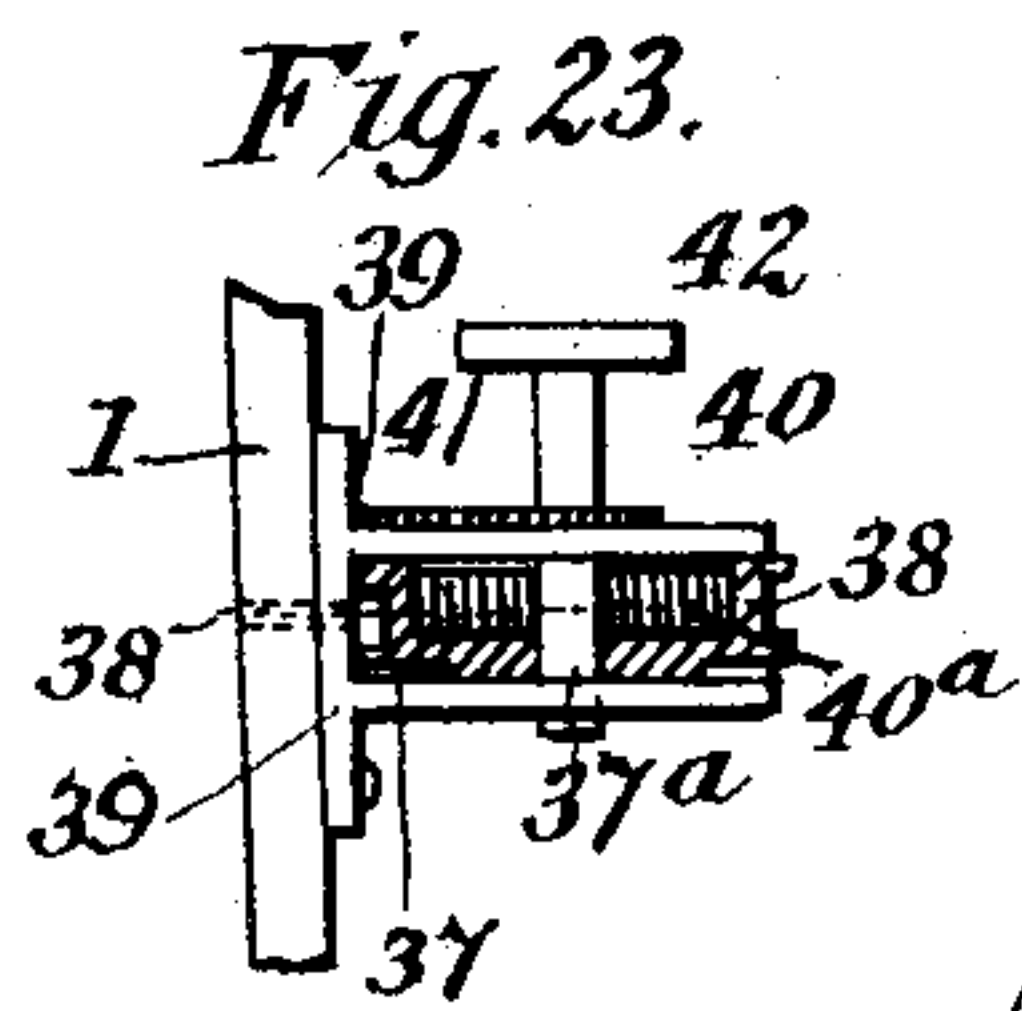


Fig. 18.

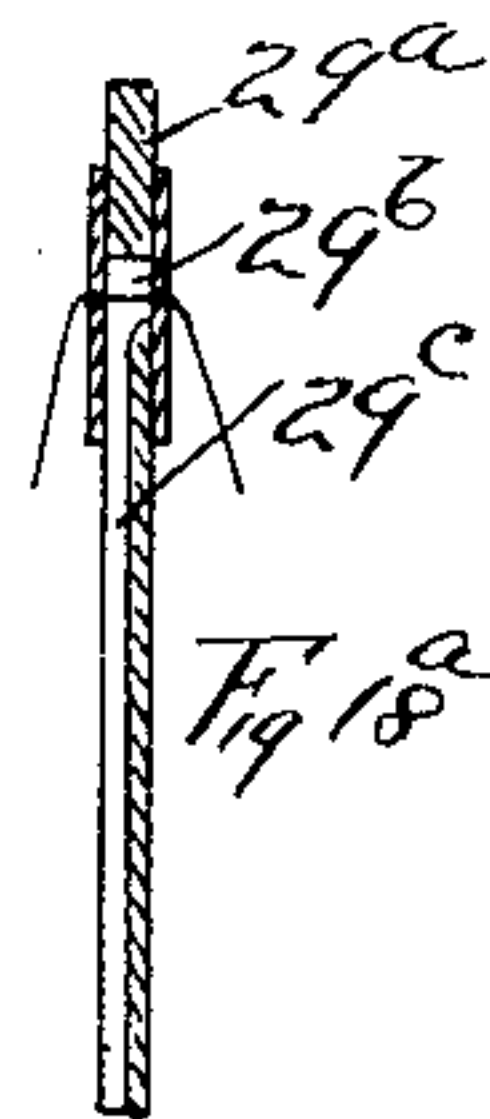
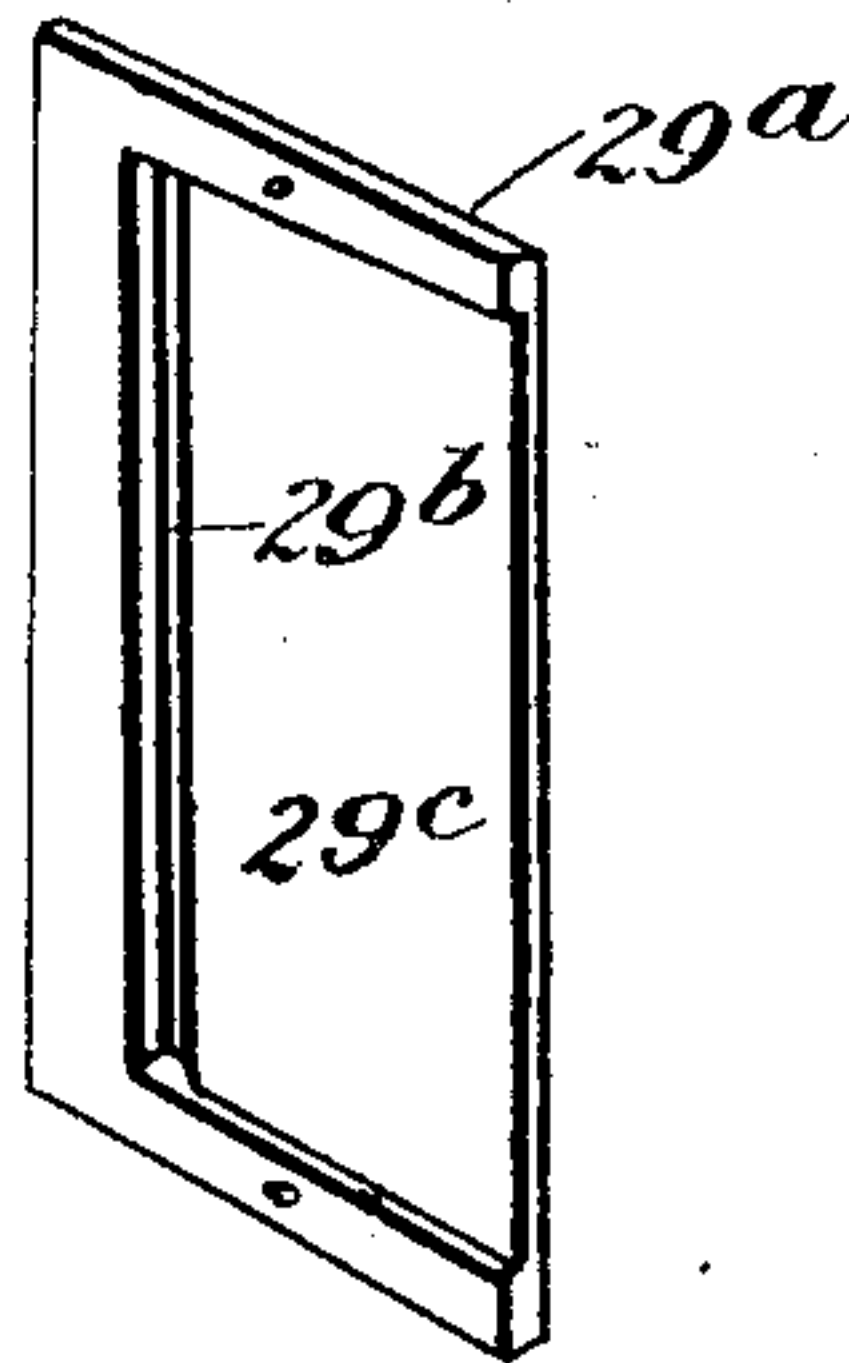
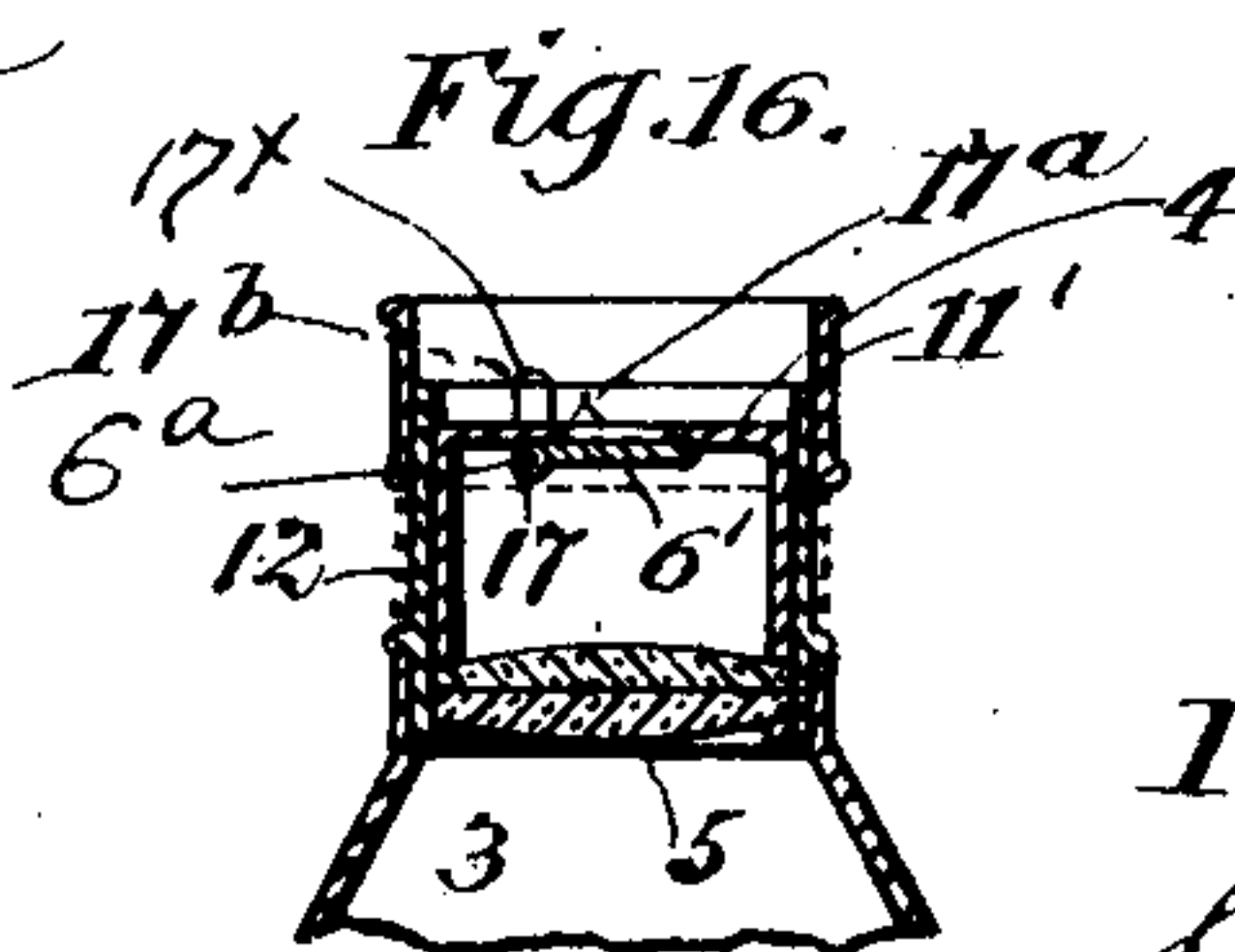
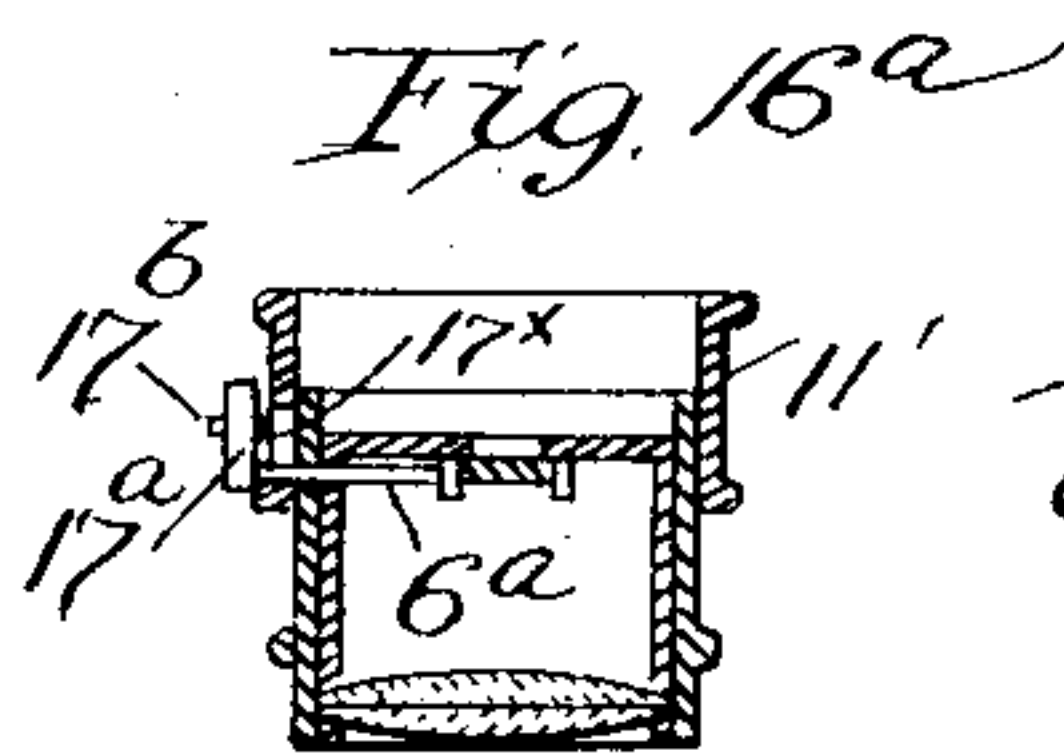
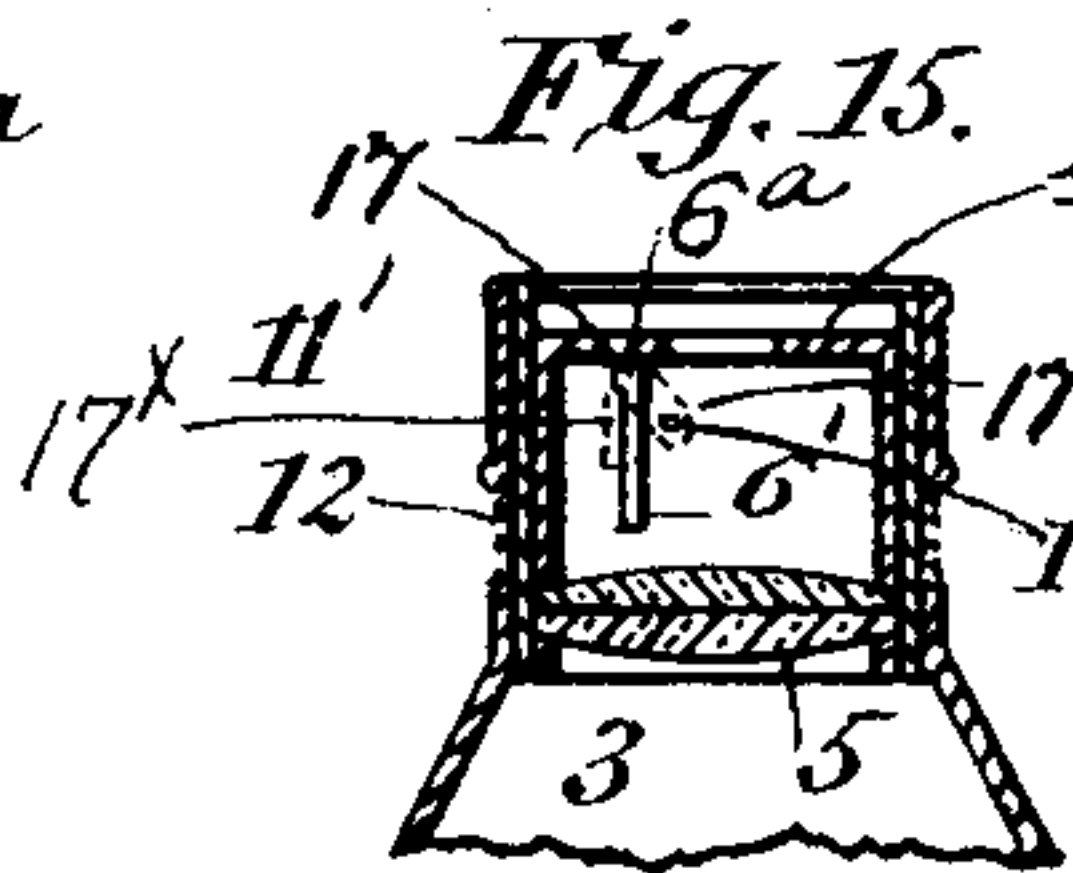
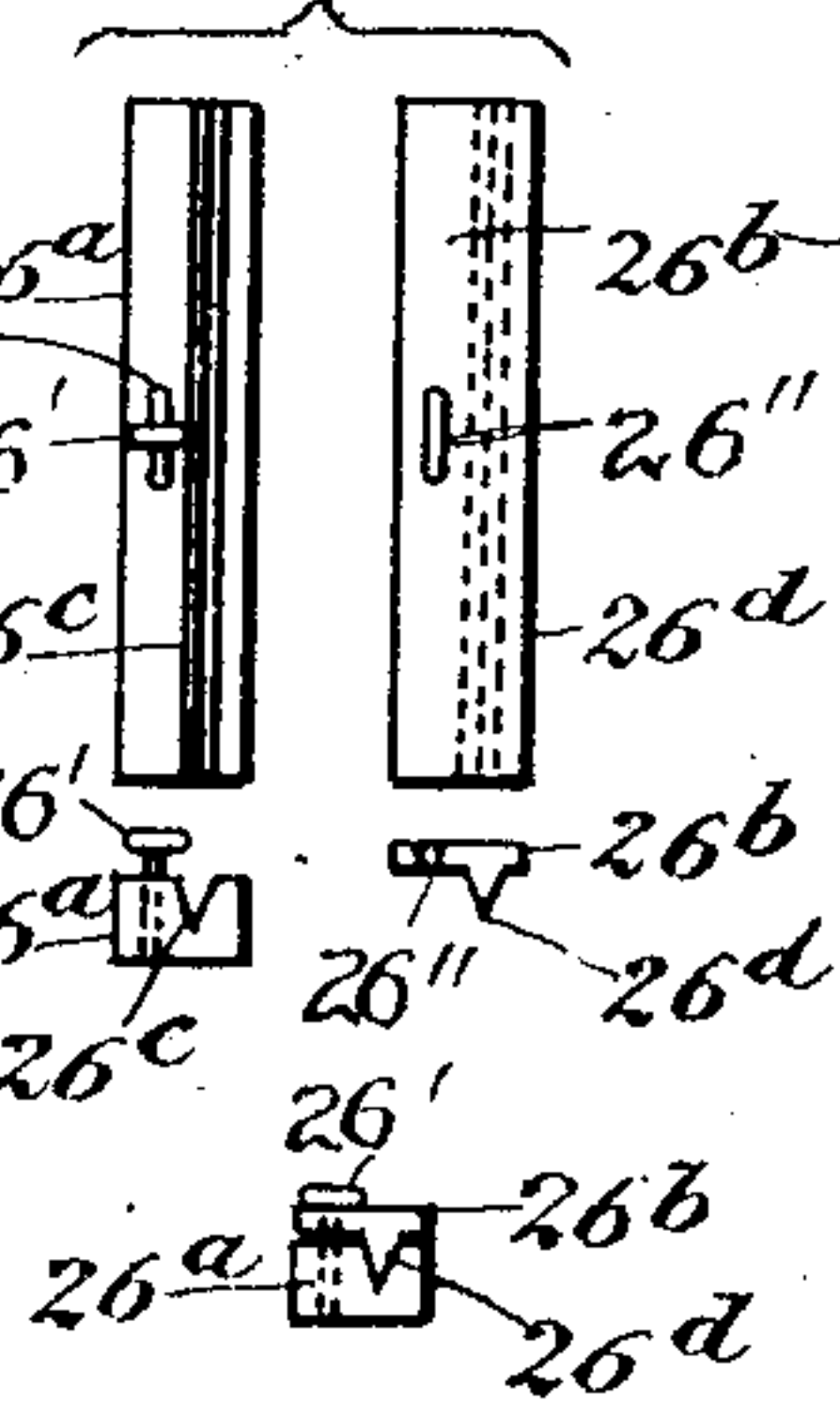


Fig. 22.



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UNITED STATES PATENT OFFICE.

SAMUEL QUINCEY, OF LONDON, ENGLAND.

APPARATUS FOR DEVELOPING PHOTOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 685,640, dated October 29, 1901.

Application filed April 30, 1901. Serial No. 58,140. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL QUINCEY, civil engineer, of 25 Montpelier road, Kentish Town, London, England, have invented certain new and useful Improvements in Apparatus for Developing Photographs; and I hereby declare the following to be a full, clear, and exact specification of the same.

My invention relates to improvements in apparatus and means intended more especially for developing photographic films, papers, and the like, but which may also be adapted for the development of glass plates and which enables the various stages of treatment—viz., developing, washing, hardening, and fixing, or any of them—of these films after exposure to be carried out on the spot or in any convenient or desired place and in daylight or artificial light and without the necessity of resorting to a dark room, as has heretofore been usual.

Prominent objects of my invention are to provide an apparatus that shall be sufficiently solid and which at the same time will be light, so as to be readily portable, and which without being cumbersome or requiring much space in transportation or manipulation affords means for doing the work in an effective and easy manner. Apparatus for this purpose according to this invention comprises a delivery-chamber for containing the reels of exposed film; a developing-chamber where the film may be developed, fixed, washed, and hardened; means for drawing a desired portion of the film from the delivery-chamber across the developing-chamber and for holding the film while it is being treated; a receiving-chamber for containing the film after it has been developed; sluice-gates forming liquid-tight joints between the developing and the delivery and receiving chambers; means for inspecting the film during development, so that the latter may be arrested at the proper moment; means for introducing the developing, fixing, washing, and hardening fluids into and for withdrawing the same from the apparatus; means for stripping the enveloping paper from the film as the latter leaves the delivery-chamber; a device for cleansing the film of air-bells, dust, and other impurities; means for spraying the developing or other liquids upon the film, if desired,

during the treatment of the same; also, means for fixing, hardening, or washing the film in the receiving-chamber after development and for flowing the fixing, hardening, or washing liquid into the said chamber and for withdrawing the same therefrom. The invention also further comprises a grid for receiving the film and exposing the same to the action of the washing, fixing, and hardening fluids; special forms of automatic lens-carriers and shutters for the same; a special construction of the cone carrying the eyepiece, lens, and shutter, whereby non-actinic light may be admitted to facilitate the inspection of the film during development, and special grips for grasping the film and devices for manipulating the film.

To the attainment of the foregoing and other desirable ends my invention involves certain novel features of construction and combination and arrangement of parts hereinafter fully described, and shown in the accompanying drawings, and then particularly pointed out in the claims hereunto annexed.

In the drawings which form part of this specification, and in which similar numerals of reference denote similar parts throughout the various views, Figure 1 is a perspective view of one of my improved apparatus. Fig. 2 is a partial vertical section of the apparatus, the viewing-lens and a portion of its carrier being broken away. Fig. 3 is a partial vertical section of a slightly-modified form of apparatus, the lens and part of the carrier being broken away. Fig. 4 is a vertical section of another form of apparatus provided with means for spraying developing or other fluid upon the film. Figs. 5 and 6 are a side elevation and a plan, respectively, of apparatus provided with externally-operated means for withdrawing the film from the reel in the delivery-chamber and for winding the same upon a reel in a receiving-chamber. Fig. 7 is a horizontal section taken on the line *y y* of Fig. 8 of a further modified form of apparatus which is provided with a special receiving-chamber fitted with means for fixing, washing, and hardening the film. Fig. 8 is a vertical section taken on the line *x x* of Fig. 7. Fig. 9 is a view of a detail. Fig. 10 is a cross-section of a delivery-chamber and its connected parts. Fig. 11 shows enlarged de-

tail views of one of the sluice-gates shown in Fig. 3 and its open and closed position, respectively. Fig. 12 is a detail view of a gripping device for the film. Fig. 13 is a detail view of another form of gripping device. Figs. 14, 14^a, 15, 16, 16^a, and 17 are detailed views of various forms of lens-carriers, eyepieces, and shutters. Fig. 17^a is a detail view of a part of Fig. 17. Fig. 18 is a perspective view of the partition-plate of the delivery-chamber. Fig. 18^a is a detail view of the partition-plate shown in Fig. 18. Fig. 19 is a detail view showing a modified method of securing the lens-carrier to the body of the apparatus. Figs. 20 and 21 are detail views of another form of sluice-gate in its open and closed positions, respectively. Fig. 22 is a detail view of a modified form of film-gripping device. Fig. 23 is a detail view, partly in section, of the spring-drum and parts connected therewith.

The apparatus consists of a box 1 of convenient shape, preferably as shown, and of any appropriate material—such, for example, as ebonite, celluloid, or the like—that will not be affected by the chemicals employed for the various processes to be carried out within the said box. In the top of the box 1 is provided a suitable opening 2, covered by a carrier 3, of opaque or transparent non-actinic material, such as suitably-colored celluloid, fitted with an eyepiece 4, with a viewing-lens 5, protected by a shutter 6 or equivalent means, whereby the sight-aperture for the viewing-lens 5 in the eyepiece can be opened when required for inspection of the film, the said shutter being normally closed.

I prefer to secure the carrier 3 removably to the box 1 either by fixing an angular rim 7 around the edge of the opening 2 and then shaping the lower end of the carrier to fit snugly over the same, as shown in Figs. 4 and 8, or I may, according to Fig. 19, hinge the base-plate 8 of the carrier by hinges 9 to the box 1 and secure it in its fastened position by a catch 10 or its equivalent means. The joints between the carrier and the box may be rendered light-tight in any usual way.

The opaque or transparent non-actinic eyepiece-carrier may advantageously be of truncated pyramidal or conical shape, as shown.

The eyepiece 4 may be fitted with a sliding sleeve 11, adapted to be pressed downward by the operator against the pressure of a helical spring 12, (see Fig. 14,) and the depression of the sliding sleeve 11 may be utilized for automatically opening the shutter 6, Fig. 14^a, pivoted at 18. In the eyepiece shown in Fig. 14 I provide a guide-pin 13, mounted in the lens-carrier and projecting through a straight slot 14 in the sleeve 11, so as to guide this latter and retain it from being ejected by the spring 12. The shutter is furnished with a short pin 15, engaging in an inclined slot 16 in the sleeve 11 in such a manner that the downward movement of the said sleeve will cause the shutter 6 to open. It will be

understood that the shutter is opened by a pivotal movement, as in Fig. 14^a, being pivoted as at 18 in said figure, and it will be clear from an inspection of Figs. 14 and 14^a that a depression of the sleeve will give the shutter a swinging movement by means of the inclined slot 16, acting on the pin 15, which is attached to the shutter. This Fig. 14^a is shown slightly distorted for convenience of illustration, the slots 14 and 16 being somewhat displaced from their relation shown in Fig. 14.

To the open back of the box 1 is fitted a pane 22, of colored non-actinic glass or other appropriate medium, in such a manner as to form liquid-tight joints with the box, the purpose being to provide the necessary light for inspecting the film. Two of the side pieces of the box 1 may advantageously be prolonged rearward and leave grooves 23 to receive, if desired, another pane of suitably-colored glass (not shown in the drawings) to be slid behind the glass 22 for the purpose of increasing the density of the non-actinic medium, or in lieu of the second glass plate an opaque plate may be inserted in the grooves 23 when examination is made by reflected light through the cone or side of the box, when these are made of transparent non-actinic material, such as suitably-colored celluloid or the like, as hereinbefore mentioned, or when, as described in a previous patent, (English Patent No. 12,371 of 1899,) a small incandescent electric light is mounted in the cone or side of the box. This second glass, whether opaque or transparent non-actinic, is represented at 22^x, Fig. 2, in dotted lines.

Referring to the form of apparatus shown in Fig. 2, the box 1 is provided in its interior with a traveling grip 24 24^a, (shown in Fig. 13,) advantageously fitted with a handle 25, and the said grip or holder is secured to the end of the roller-film 27 and is then moved across the box by the means hereinafter described. The holder 24 24^a is formed of two strips of ebonite or the like, one furnished with pins or teeth 26 and the other with corresponding holes to receive the said teeth, which pass through the edge of the film.

In one of the side walls of the box 1 is a passage 28, the inner end of which communicates with the interior of the box near the back thereof and the outer end of which terminates in the outer surface of the said side wall. Over the outer end of the passage 28 and extending the entire width of the wall is secured, preferably in a removable manner, a cylindrical delivery-chamber 29, adapted to hold a reel 30, with the exposed photographic film 27 rolled thereon, together with a ribbon of paper rolled around the film and enveloping the same, as well understood, the said chamber having an aperture 31 arranged opposite the aperture in the adjacent side wall of the box. A partition-plate 29^a is interposed between the box 1 and the delivery-chamber

29. The aperture 31 may be of a convenient size to hold a guide-roller 32, so that the film 27 can pass from such delivery-chamber over the said roller 32 through a slit 29^b, Figs. 2 and 18, in the partition-plate 29^a into the film-passage 28, and thence into the box 1, while the strip of projecting paper 33 is being stripped off after it has passed over the roller 32 and passes out between the wall of the delivery-chamber 29 and the partition-plate 29^a through the paper-exit passage 29^c, as is shown in Figs. 2, 3, 10, and 18.

The film 27 on entering the interior of the box passes over the edge of the film-inlet passage 28, which is adapted to be closed in a liquid-tight manner by a sluice-gate 34, consisting of a strip of soft rubber 35, carried by a plate-like holder 36, which works in a slot 36^a, formed in the wall of the box, so that it can be pressed against the film and against the wall of the film-passage 28, so as to seal the latter liquid-tight and so that when the plate-like holder 36 and rubber 35 are withdrawn the film will be released and free to move in the film-passage.

On the exterior of the opposite side wall of the box 1 is mounted a spring-drum 37, containing a spindle 37^a and a spring 40^a, such as shown in Fig. 23, the spring-drum being connected to a cord 38, that extends through a passage in the adjacent wall of the box 1 and is fastened to the aforementioned grip or holder 24 or 24^a, which is adapted to be secured to the end of the film, as previously described. The roller-spindle 37^a is mounted in a bracket 39 and is fitted with a ratchet-wheel 40, retained by a spring-controlled pawl 41, and a small hand-wheel or button 42 for rotating it. Tension being put upon the spring by turning the button 42, the cord 38 is wound around the drum. When it is desired to pull a length of film across the box 1, the grip 24 24^a is pulled across the box and secured to the end of the films. The operator then pulls the paper 33, and as this is done the spring 40^a pulls the grip and the film smoothly and evenly across the box. While this is done the sluice-gate should be open.

The mode of using the apparatus is as follows: The cone 3, with the lens-carrier, is first removed, and the outer ends of the strip of paper 33 and exposed film 27 from the reel 30 in the delivery-chamber 29 are then caused to pass, respectively, through the paper-exit passage and film-passage 28 until a portion of the exposed film projects a short distance into the box. The sluice-gate is then closed, and the gripping device 24 is then moved toward the film by pulling it against the tension of the spring 40^a in the drum 37. The grip 24 24^a being attached to the end of the film 27 and the cone 3 being replaced, the sluice-gate is then opened and the paper 33 is slowly pulled out by the hand, when the spring 40^a, acting upon the cord 38 and grip 24 24^a, will pull the film 27 across the box 1

and hold it there firmly and smoothly during the operation of developing, which then may be proceeded with as soon as the sluice-gate is again closed. Developing fluid is then poured into the box 1 through a tubular admission nozzle or pipe 52, which, being made of some rigid material, such as ebonite, and held by frictional contact in an aperture made therefor in the side of the box 1 near the bottom thereof may be turned upwardly when it is desired to pour fluid into the box and downwardly when the fluid is to be withdrawn, so that the pipe 52 serves both as an inlet and outlet pipe. After this the box is rocked or tilted backward and forward, so as to cause the developing liquid to rapidly flow over the portion of film within the box for a suitable time. The treated film can be examined through the eyepiece 4 as often as desired, and so the development may be arrested at precisely the proper moment. When the negative has been properly developed, the developing-bath is withdrawn through the pipe 52 by turning the latter downward in its socket in the side of the box 1, and afterward water for washing the film may be introduced through the said pipe. After thoroughly washing the film the water is run out and the cone 3 and lens-carrier are removed. The portion of film so treated is severed from the remainder, but so as to leave a portion of the latter projecting into the box, and the severed film is then detached from the gripping device 24 24^a, which is again moved forward and engaged with the said projecting portion of film 27. The cone and lens-carrier are replaced in position, the sluice-gate opened, and a new length of film is moved across the box in the manner hereinbefore described, and the development and washing of the film may be proceeded with in this manner until all of the film upon the reel 30 has been treated. The developed portions of the film may also be each fixed and hardened in the box by means of proper fixing and hardening liquids admitted thereto before or after the withdrawal of the washing-water, or they may be fixed or hardened after removal from the box in any suitable receptacle in ordinary daylight.

In Fig. 3 I show another construction, whereby any one of the series of exposed portions of the film 27 can be developed at will. The box 1, constructed as hereinbefore described, is provided at one side with the cylindrical delivery-chamber 29' and at the opposite side with a similar film-receiving chamber 53, each side of the box being provided with a film passage and aperture controlled by suitable sluice-gates, such as one or other of those hereinbefore described. By causing the end of the film in the delivery-chamber 29' to project into the box 1 and securing it by suitable means to a leading strip or ribbon 54, attached to the reel 54^a in the receiving-chamber 53, or directly to the reel itself the film can after closing the box, opening

the sluice-gates, and by rotating the said reel 54^a by a suitable spindle or key 71, as shown in Fig. 7, be drawn from the delivery-chamber 29, so as to bring any desired exposed portion of the film into the box 1 for development and washing without the necessity of first developing the preceding portion, the strip of paper being simultaneously withdrawn through the paper-exit passage, as hereinbefore described. To admit of the apparatus being used in the same way as the apparatus hereinbefore described, the box may be provided with a gripping device 24 24^a, connected by a cord fixed midway to the grip, one end 56 of which passes over a roller 57, having bearings in the walls of the box 1, and through the slot 56^a in the side wall of the box 1 out at the side of the receiving-chamber 53, while the other end 58 passes over a roller 59, having suitable bearings therefor in the walls of the box, and through a slot 58^a in the opposite side wall of the box out at the side of the delivery-chamber 29'. By pulling either the end 56 or the end 58 of the cord the grip 24^a will be pulled to the one side or the other of the box, carrying the film with it when the latter is attached thereto.

Guide-rollers 60 and 61 are provided at either side of the box 1 in the openings into the film delivery and receiving chambers, so that the film may be more easily manipulated and to prevent any injury to the film by reason of the more or less sharp edges of the film-apertures.

The delivery-chamber 29', Fig. 3, is provided with a reel for the film and a winding-spindle, as 30, and with a partition-plate 29^a, having a suitable slit 29^b or opening through which the film 27 can be drawn into the box over a guide-roller 60, which is so arranged therein, as shown in Fig. 3, that the film will not bear closely against the back or bottom of the box, the said slit or opening in the partition-plate being so arranged that when the box is held horizontally with the eyepiece held uppermost for developing the film the developing liquid will not enter the delivery-chamber 29. The receiving-chamber 53 is provided with a film-aperture through which the film passes and with the spindle 55, by turning which the film can be drawn from the delivery-chamber 29, and after being developed in the box can be wound up in the receiving-chamber, which is or may be provided with a cylindrical guide-roller 61, over which the film is drawn. Each of the film-apertures in the delivery and receiving chambers is provided with a sluice-gate, hereinbefore described, whereby the said apertures can be closed in a fluid-tight manner to prevent the passage of the developing liquid into the said chambers when the box is held horizontally.

In another construction of apparatus according to this invention suitable for developing and washing a film of the kind described the developing-box 1, constructed with a liquid-receptacle at its bottom, as 62^a,

Fig. 7, with an inlet and outlet pipe 52 for the liquids, suitable sluice-gates for closing the film-passages liquid-tightly, such as 34, and a removable cone-lens carrier and eyepiece, is provided at one side with a delivery-chamber 29' and paper-exit passage and at the opposite side with a receiving-chamber 53', such chambers being detachable or not, as may be desired. When made detachable, the film-chambers 29' and 53' may have suitable recesses 29^b, Fig. 7, in their side next to the box 1 for engagement with pins 29^c, projecting from the sides of the box, (only the pins for the right-hand chamber being shown,) and may be provided with catches 29^d at their top and bottom for engagement with pins 29^c or the like at the top and bottom of the box.

In the modified construction, Figs. 7 and 8, the liquid-receptacle 62^a in the bottom of the box is separated from the developing portion of the box proper by a diaphragm 62, closed by a valve or gate 63, having a handle 63^a, extending to the outside of the box, by which it may be operated, (see Fig. 8,) and the said receptacle is provided with a pipe 52 for the introduction and discharge of developing or other liquid and which is or may be jointed to the box, so that it can at will be turned into a position in which the liquid will be retained in the receptacle or in which it can be drained away. The upper part of the box is or may be provided with a pipe 67 for draining away the washing-water or other liquid. To admit of the film being hardened, fixed, or washed after being developed, the receiving-chamber 53 is here divided by a transverse partition 72^a into two parts 68 69. The upper part 68 when the box is held vertically contains the reel 54^a for winding up the film, and the lower part 69 serves as a receptacle for the hardening, fixing, or washing liquid and is fitted with a piston 70, fixed to a rod 71, that extends through the diaphragm 72^a and reel 54^a to the exterior of the chamber 53, and is connected to the reel 54^a by a feather-and-slot connection 72, so that it can be turned for rotating the reel and can also be moved endwise in the reel to operate the piston. The diaphragm or partition 72^a is formed with a notch or opening 73 at one part of its periphery for the passage of liquid from one side thereof to the other, and an airway 74 is provided in the wall of the chamber 53' for placing the part 68 thereof above the partition 72^a in communication with the part 69 thereof below the piston 70. The arrangement is such that when the sluice-gates between the box and the delivery and receiving chambers, respectively, are closed and the box is placed horizontally to allow of the development of the portion of the film within the box the hardening, fixing, or washing liquid that was within the lower part 69 of the receiving-chamber containing the developed portion of the film 27 by raising the piston 70 by means of the rod 71, the said liquid flowing through the opening 73 in the partition 72^a and so on into

the upper part 68 of the chamber containing the developed film, after which the box can be placed vertically, whereupon when the gate or valve 63 is opened by means of the handle 63^a the developing liquid will pass into the lower portion of the box 1 below the diaphragm 62 and may be retained there by closing the valve or gate 63 until a fresh section of film is moved into the box 1. When the portion of developed film in the upper portion 68 of the receiving-chamber 53' has been hardened, fixed, or washed as desired, the liquid can be caused to again pass into the part 69 of the chamber 53 by pushing the rod 71 inwardly, thus lowering the piston 70 and causing the liquid to pass downwardly through the opening 73 in the partition 72^a. In Figs. 7 and 8 I also show a special grid for exposing the developed film to the action of the hardening, fixing, or washing liquids. This grid 74^a is in the form of a perforated cylinder having numerous apertures or perforations admitting of the free passage of the washing or other liquid thereto, so that all the parts of the film and both sides thereof may be simultaneously exposed to the action of the liquid. The grid 74^a is provided with a longitudinal opening 73^a, Fig. 8, through which the film 27 may pass on its way to the reel 54^a, upon which it is wound.

In another modified construction, Figs. 5 and 6, in which it is intended to provide for the entire film to be drawn forward and backward through the developing medium, so that the entire strip of film may be developed at a single operation, the receiving-chamber 53'' is formed in that portion of the box which is the lower portion when the box is held vertically with the eyepiece horizontal and is fitted with a rotary reel or roller 54^a, which is adapted to hold the film after the same has been developed and is provided external to the box with a pulley or wheel 75. Below the receiving-chamber the box is provided with a receptacle 76 for developing liquid, with means for admitting and withdrawing such liquids, such as the pipe 52, and with a guide-roller 77, around the bottom of which the film is led downward and then upward, so as to pass through the developing fluid. A squeegee 76^a is or may be arranged upon a suitable holder, so that its soft-rubber end will abut against the face of the film as it leaves the roller 77, so as to remove all dust, air-bells, and other impurities that might injure the negatives. The delivery-chamber 29''' is located at the top of the box 1 when said box is held in a vertical position and is adapted to receive the reel upon which the exposed film is wound. Extending through one end of this chamber 29''' is a driving-spindle 78, that is attached to the inner film-reel in any suitable manner—as, for instance, a key on the driving-spindle engaging with a slot in the end of the film-reel—and is provided with a driving-pin 80. Upon the driving-spindle 78 is loosely mounted a sleeve 80^a, to which

sleeve is fixed a crank-handle 79 and on which spindle is loosely mounted a pulley or wheel 81, that is connected with the pulley or wheel 75, fast on the spindle 55 of the receiving-chamber, by a crossed strap 81^a or by suitable gearing. The end of the sleeve 80^a adjacent to the driving-pin 80 is so shaped that when the sleeve 80^a is rotated by the handle 79 in one direction it will be moved endwise by the driving-pin 80 and cause the crank-handle 79 to engage the adjacent pulley 81 and rotate the same, and at the same time through the crossed strap 81^a will rotate the pulley or wheel 75 of the spindle 55 in the receiving-chamber in a direction to draw the film from the delivery-chamber and through the developing liquid and wind the same upon the reel in the receiving-chamber. Upon rotating the sleeve 80^a in the opposite direction it will engage the pin 80 and drive the spindle 78 in a direction to pull the film backward through the developing liquid for further treatment thereby when this may be necessary, leaving the pulley loose. The upper end of the box is provided with a guide-roller 82 for guiding the film from the delivery-chamber, and it may be provided with a pair of pressing blocks or rollers of simple material—for example, soft rubber—between which the developed film is drawn and which serve to remove adherent developing liquid from the film. The communication between the box and delivery-chamber may, as before, be in the form of a slit adapted to be closed by a suitable sluice-gate, as before.

To facilitate ready insertion of the film-carrying reels within and removal from the delivery and receiving chambers, whether these be made detachable from the box or not, one or both of such chambers may be provided with hinged or pivoted detachable parts, such as the tops or covers, as at 29^b, Fig. 1.

According to the construction shown in Fig. 10 the delivery-chamber 29'''' is or may be provided with a pair of feed-rollers 83 84 to facilitate the passage of the film therefrom into the developing-box 1. When the said chamber is made detachable from the said box, so that it can be used with a camera for holding a film for exposure and be afterward removed from the camera and attached to the developing-box for development, the film-aperture therein through which the film is passed is closed in a light-tight manner when detached from the box or camera by the sluice-gate.

In some cases it may be desired to spray the developing, washing, or other liquid upon the film 27 when the latter is in the box 1. In Figs. 4 and 8 I show a construction by which this may be accomplished and in which the developing or other liquid is introduced into the box 1 by a syringe 65, having a collapsible bulb and a tube connecting with a pipe 66, located within the upper part of the box 1 and formed with a number of suitably-

arranged apertures through which the liquid may be sprayed onto the film under treatment.

In Fig. 18 I show a form of partition-plate which may be used between the film-chambers and the development-box. As here shown, the plate consists of a thin frame 29^a, provided with a slot 29^b, through which the film may pass, the said plate being slightly cut away upon one side to form a paper-exit 29^c, as I find that the paper may be readily stripped from the film and carried to the outside between the partition-plate and the delivery-chamber. I cover the side of the partition-plate next to the development-box (and, if desired, both sides thereof may be so covered) with a strip of fabric 29^d, Fig. 18^a—such, for example, as black velvet—and the film passes through the slot 29^b in the partition and a slit in the fabric, the fabric fitting snugly around the film and excluding light from the delivery-chamber. The partition-plates are provided with suitable apertures through which the pins on the sides of the box and to which the chambers are attached may pass. The slot 29^b is or may be also so constructed as to receive and afford bearings for the film-guide rollers 32. It should also be noted that by simply removing the delivery and receiving chambers the developing-box may be used for the development of glass plates and the like. In this case the negatives after exposure may be transferred to the developing-box in any of the ordinary and well-known changing-bags.

Referring now to several modifications of the eyepiece and shutter, it will be seen that in Figs. 15, 16, and 16^a a sliding sleeve 11' is adapted to be pressed downwardly against a helical spring 12. The shutter 6' is of the form known as a "flap-shutter," being pivoted at 17 to the bottom side of the end of the eyepiece 4, normally covering the said aperture. A link 17^a, carried by the shutter, is adapted to engage with a pin 17^b on the sleeve, so that as the sleeve 11 is pressed downwardly the link 17^a, acting upon the pin 17^b, causes the shutter to open, while as soon as the sleeve 11' is released the spring 12, causing the sleeve to move upwardly with relation to the eyepiece 4, closes the shutter. From Fig. 16^a, which is a view a one-fourth turn from Fig. 16, it will be seen that the link 17^a is fixed upon the spindle 6^a of the flap-shutter, said spindle passing out through a slot 17^x in the sleeve and having the link 17^a on the outer end thereof. The shutter 6 (shown in Fig. 17) is, like that shown in Figs. 4, 5, 6, and 8, mounted on a pivoted pin 18 and is furnished with a handle 19, which projects through a peripheral slot in the eyepiece 4, so as to enable the shutter to be opened by hand from the exterior. Normally a leaf-spring 20 keeps the shutter closed by forcing it against a stop 21, which latter may, as in Fig. 17, be connected with a guide 21^a. (See

Fig. 17^a.) In Fig. 6 this stop consists of a pin, (marked 21^x.)

Referring now to the modifications of the grip, it will be seen that in Fig. 12 the grip 24' is in the form of a clip formed of two members hinged together. The grip shown in Fig. 22 also consists of two members 26^a 26^b, the member 26^a being provided with a longitudinal groove 26^c, while the member 26^b has a longitudinal knife-edged rib 26^d. The film is carried over the groove 26^c and pressed down into the said groove by the rib 26^d on member 26^b, which is placed over the member 26^a and pressed down thereupon. The two members may be secured together in any desired way, as by a button 26' on one piece, which when pressed through a slot 26'' on the other piece and then turned at right angles thereto will hold the parts together.

Referring now to modifications of the film-passage and sluice-gate, it may be noted that the film-passage 28 may incline from the back toward the front of the box, and its inner end may be closed by a strip of soft india-rubber 43, Figs. 20 and 21, carried by a strip-like holder 44, of vulcanite or other suitable material, arranged in a chamber 44^a, into which the film-passage extends. The holder 44 is adapted to be moved parallel to itself by eccentrically-arranged projections or pins 45, that are journaled in the side walls of the box I and extend to the exterior thereof and are provided with lever-arms 46, which are jointed to a bar 47, so that upon moving the bar 47 endwise in one direction or the other the closing device will be caused to open or close the inner end of the said chamber, forming the film-aperture in a liquid-tight manner. The holder 44 may be held in closed position by a pivoted arm 48, arranged to bear against one end of the said bar, as shown in Figs. 20 and 21.

In another arrangement, Fig. 11, the holder 36', provided with the strip of soft rubber 35' and mounted just as described, is adapted to be moved to and fro by pins 49^a on a rod 49, mounted to rock in the side of the wall of the box and provided at one end with a handle 50.

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

1. Apparatus for developing photographs consisting of a developing-chamber, film delivery and receiving chambers in communication therewith, means for carrying the film through the developing-chamber and exposing portions of the same therein to the action of a developing medium, and means for introducing the developing medium into and withdrawing the same from the developing-chamber, substantially as shown and described.

2. Apparatus for developing photographs consisting of a developing-chamber, film delivery and receiving chambers in communication therewith, means for carrying the film

through the developing-chamber and exposing portions of the same therein to the action of a developing medium, and means for viewing the negative under treatment during development, substantially as shown and described.

3. Apparatus for developing photographs consisting of a developing-chamber, film-chambers connected therewith, divisional walls having film-apertures therein between the developing-chamber and the film-chambers, sluice-gates for closing the film-apertures liquid-tight, means for conveying the film from the film-delivery chamber to the developing-chamber for treatment and after treatment to the film-receiving chamber, said box having a liquid inlet and outlet, and means for viewing the film during development, substantially as shown and described.

4. In apparatus for developing photographs, the combination with the box having film-apertures, of sluice-gates adapted to be opened and closed, and when closed to prevent the passage of liquid through the film-apertures, substantially as set forth.

5. In apparatus for treating photographs after exposure, a developing-box for developing the negative, said box being formed with an extension for collecting the developing or other liquid, and having a reversible inlet and outlet pipe, a film-delivery chamber at one side, and film-operating mechanism at the opposite side, a colored non-actinic plate at the back of the box and forming a liquid-tight joint with the latter, extensions in rear of said colored plate formed with grooves for the reception of a removable plate, and a viewing-lens and carrier at the front of the box, substantially as and for the purpose set forth.

6. In an apparatus for treating photographs after exposure, a developing-box, a viewing-lens and its carrier, a film-delivery chamber at one side of the box, said film-delivery chamber being formed with a film-aperture arranged to coincide with a passage in the side of the developing-box for the introduction of the film into the developing-box, a film-receiving chamber at the opposite side of the latter, the adjacent walls of said developing-box and film-chamber being provided with coincident passages, and means for forming liquid-tight joints between the film and the walls of the box, substantially as shown and described.

7. In apparatus for treating photographs after exposure, a developing-box fitted with a viewing-lens and its carrier, a film-delivery chamber, means for operating the film, and a film-receiving chamber fitted with an internally-disposed perforated partition, and with a pump-piston adapted to move in an extension of such receiving-chamber, and means for manually operating such piston from the exterior, substantially as shown and described.

8. In apparatus for treating photographs

after exposure, a developing-box fitted with a viewing-lens and its carrier, a film-delivery chamber, a film-receiving chamber, a perforated partition, a pump-piston in such receiving-chamber, and a closed compartment within the developing-box for the reception of liquids, fitted with a sluice-gate adapted to be operated from the exterior, substantially as shown and described.

9. In combination in a developing apparatus for photographs, a developing-chamber, a receiving-chamber, means for passing the film from the developing-chamber to the receiving-chamber and a perforated grid in the receiving-chamber for holding the negative for the action of a washing liquid, substantially as described.

10. In apparatus for developing photographs after exposure, a developing-chamber, film-chambers connected therewith, the adjacent walls of said chambers having film-apertures connecting the developing and film chambers, sluice-gates controlling the film-apertures, means for operating the film, and a receptacle connected with the developing-chamber and provided with a sluice-gate, and means for viewing the film during development, substantially as shown and described.

11. In apparatus for developing photographs after exposure, a receiving-chamber provided with a partition dividing said chamber into two compartments, one of said compartments being adapted to receive the negatives after development and the other of the said compartments being provided with a piston and a piston-rod, means for operating the piston from the outside of the chamber, the said partition being provided with an aperture for the passage of liquids, and the said receiving-chamber having an air-vent between its two compartments, substantially as shown and described.

12. In apparatus for developing films, a developing-box, a separate chamber connected therewith for containing the main portion of the film and keeping it free from the developing liquid in the developing-chamber, means for moving successive portions of the film from said separate chamber into an immersed position in the developing-chamber, whereby only the portion so moved is subjected to the developing fluid, and means for viewing the film while immersed in the developer in said developing-chamber, substantially as described.

13. In apparatus for developing photographs, a developing-box, having a sluice-gate for the passage of the film, means for moving portions of the film into the box and for holding the same therein in position for development, and means for viewing the film by reflected light during the process of development, said box having a liquid inlet and outlet, substantially as shown and described.

14. In combination, a developing-chamber, a film-chamber in communication therewith

and bearing a fixed relation thereto, and a sluice-gate between the two chambers, said sluice-gate acting to keep the liquid in the developing-chamber while the film is passing
5 from the film-chamber into the developing-chamber, substantially as described.

15. An apparatus for developing photographic negatives comprising a developing-chamber, an eyepiece through which the de-
10 veloping-chamber may be viewed, a delivery-chamber, a wall separating the delivery-chamber from the developing-chamber and provided with a film-passage therethrough, and means for drawing the negative from the
15 delivery-chamber through said passage into and directly across the developing-chamber, one end of the film being held at one side of the box at the delivery-chamber and the other end of the film being held at the side of
20 the box opposite the delivery-chamber, whereby the film will extend in flat form across the line of vision through the eyepiece, substantially as described.

16. In combination in an apparatus for de-
25 veloping photographic negatives, a developing-chamber, a delivery-chamber at one side thereof and communicating therewith, a receiving-chamber at the other side of the box, and means in said chamber for drawing the
30 film from the delivery-chamber across the developing-chamber and into said receiving-chamber, substantially as described.

17. In combination in an apparatus for de-
35 veloping photographic negatives, a developing-chamber having an eyepiece, a delivery-chamber connected therewith, a sluice-gate between the delivery-chamber and the de-
40 veloping-chamber, and means for drawing the film from the delivery-chamber into the de-
45 veloping-chamber, substantially as described.

18. In combination in apparatus for devel-
45 oping negatives, a developing-chamber, a delivery-chamber for the film connected to the developing-chamber, a sluice-gate between the delivery-chamber and the developing-
50 chamber, a chamber connected with the developing-chamber for containing liquid, means for permitting or preventing communication between the said liquid-containing
55 chamber and the developing-chamber, and means for operating the film, substantially as described.

19. In combination in apparatus for treat-
ing films, a developing-chamber, a film-deliv-

ery chamber, a film-receiving chamber, means 55
for operating the film, and a liquid-chamber connected to the film-receiving chamber, and means for causing the liquid to pass from
60 said liquid-containing chamber to the receiving-chamber or the reverse, substantially as described.

20. In combination in apparatus for treat-
ing films, a developing-chamber, a film-deliv- 65
ery chamber, a film-receiving chamber, means for operating the film, a liquid-chamber connected to the film-receiving chamber, and means for causing the liquid to pass from
70 said liquid-containing chamber to the receiving-chamber or the reverse, said means including a pump-piston, substantially as described.

21. In combination, a developing-box, a film-delivery chamber and a partition separating said chambers, said partition being
75 provided with a passage for the film connecting said box and chamber, and with a paper-exit passage.

22. In combination, a developing-box, a film-delivery chamber, and a partition separating said chambers, said partition being 80
provided with a passage for the film connecting said box and chamber, and with a paper-exit passage, said partition having a slitted fabric thereon through which the film passes, substantially as described. 85

23. In apparatus for developing photo-
graphs, a receiving-chamber provided with a partition dividing said chamber into two compartments, one of said compartments being
90 adapted to receive the negatives after development, and the other of the said compartments being provided with a piston and a piston-rod, means for operating the piston from the out-
95 side of the chamber, said partition being provided with an aperture for the passage of liquids, and said receiving-chamber having an air-vent between its two compartments, said piston-rod and film-reel in the receiving-chamber being also constructed with a feather-and-
100 slot connection, so that the piston-rod may also serve for winding up the film in the receiving-chamber, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

SAMUEL QUINCEY.

Witnesses:

JOSEPH LAKE,
W. M. HARRIS.