

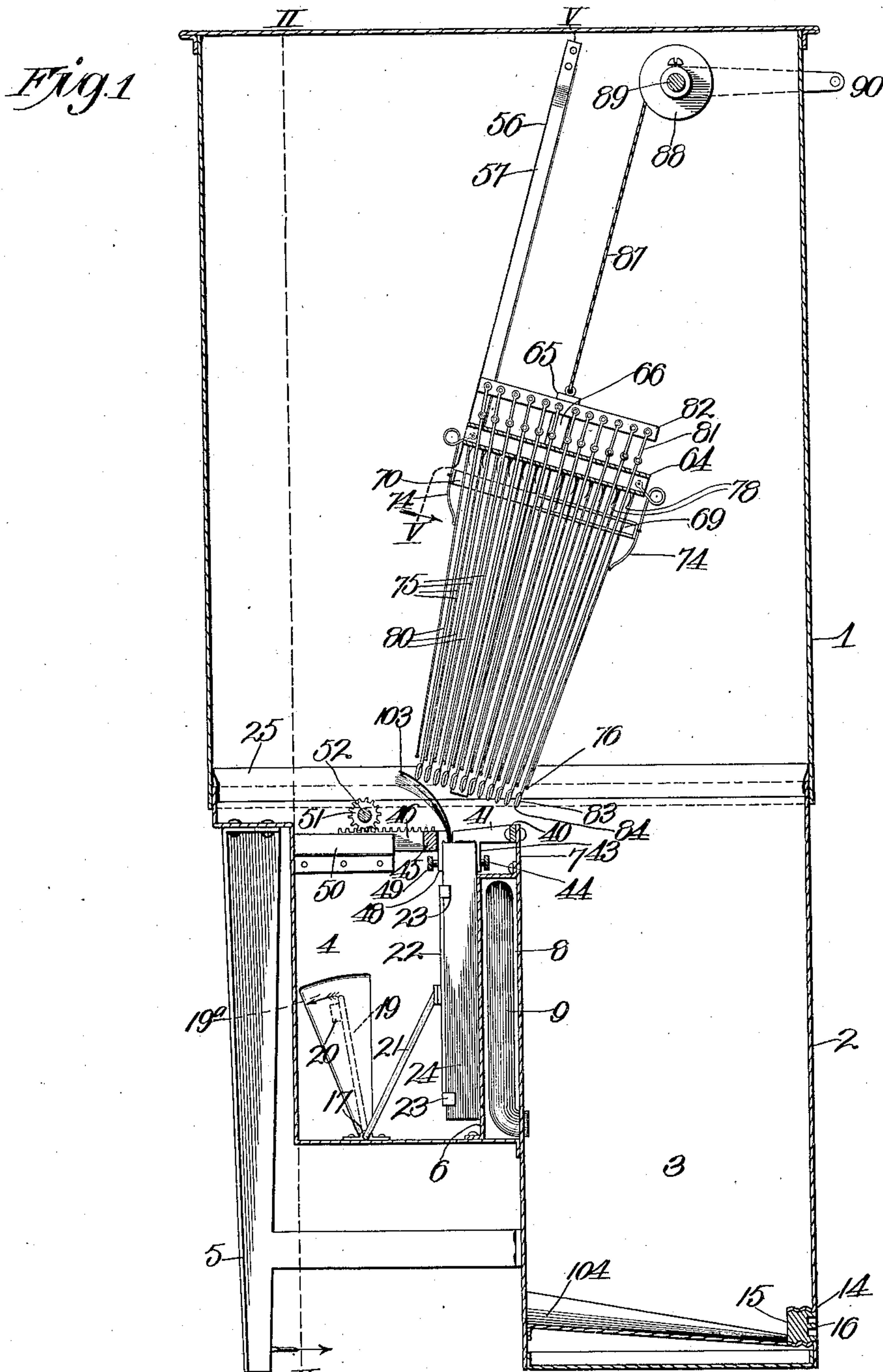
No. 897,090.

PATENTED AUG. 25, 1908.

T. S. GRAVES.
PHOTOGRAPHIC DEVELOPING MACHINE.

APPLICATION FILED NOV. 4, 1907.

4 SHEETS—SHEET 1.



Witnesses
Frank R. Glavin
H. C. Rodgers

Inventor
T. S. Graves
By George S. Phelps atty.

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4 SHEETS—SHEET 2.

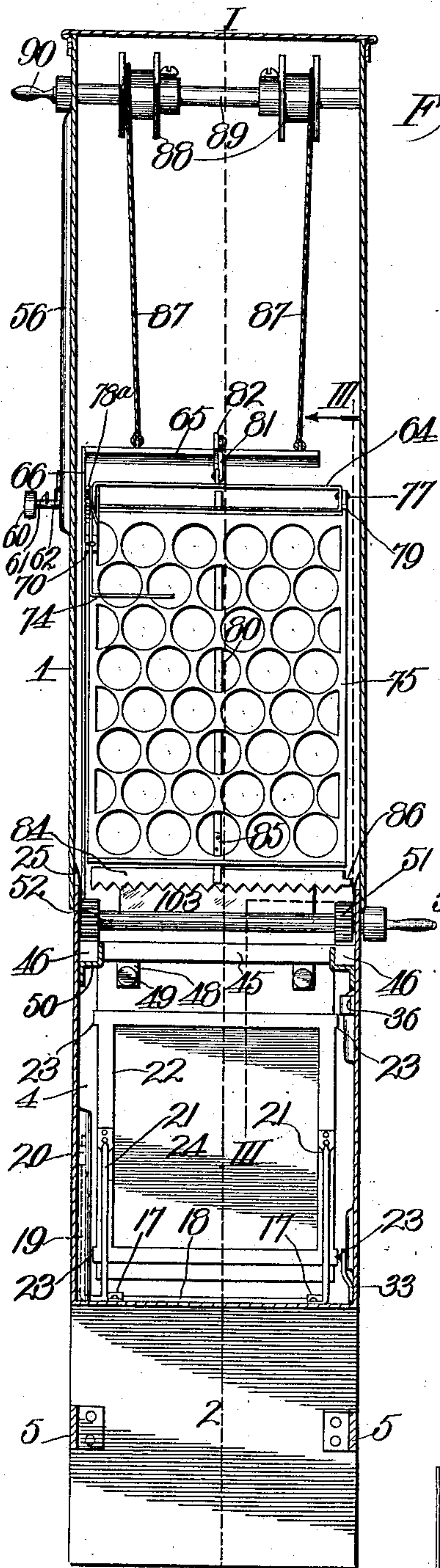


Fig. 2.

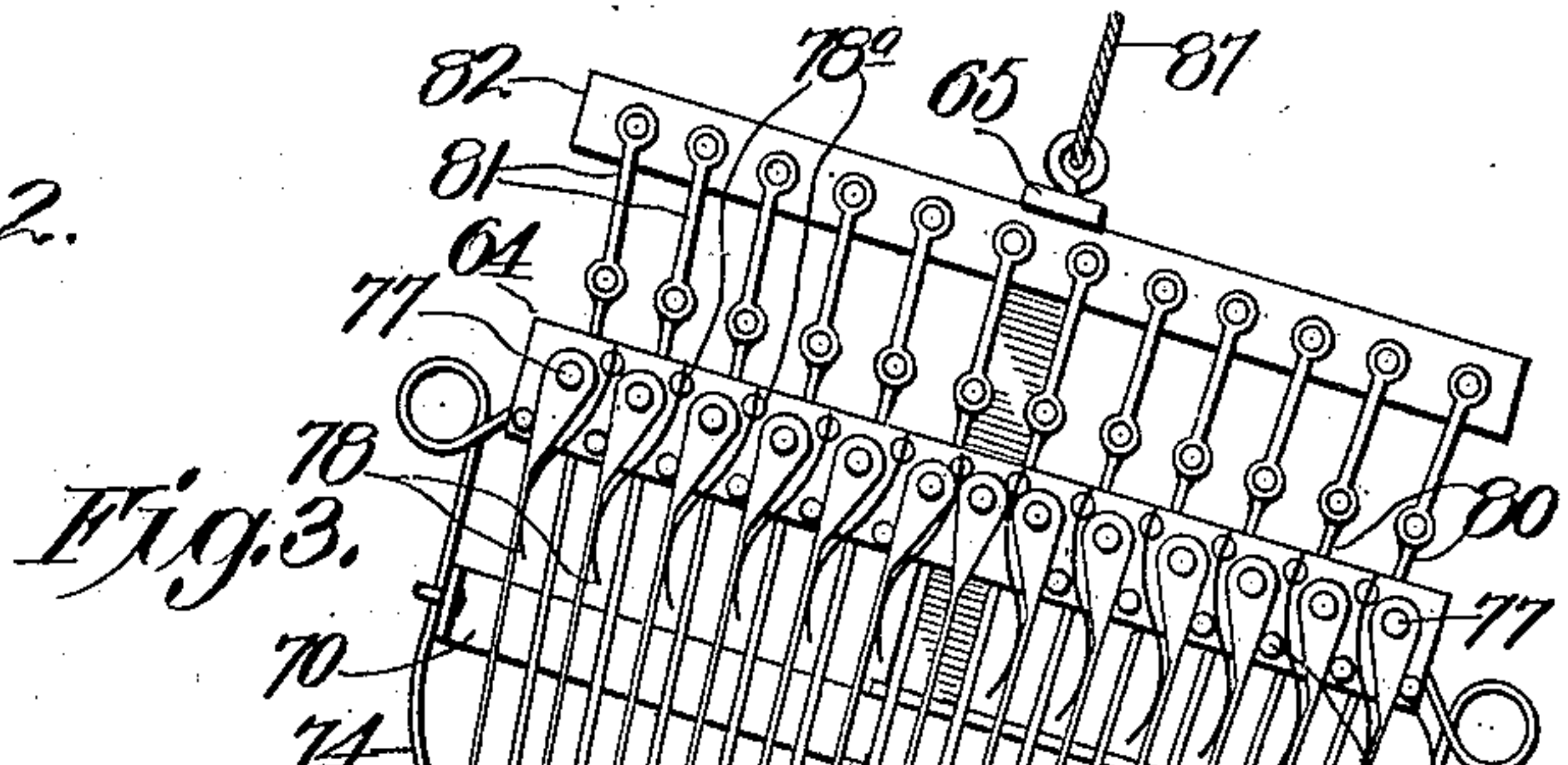


Fig. 3.

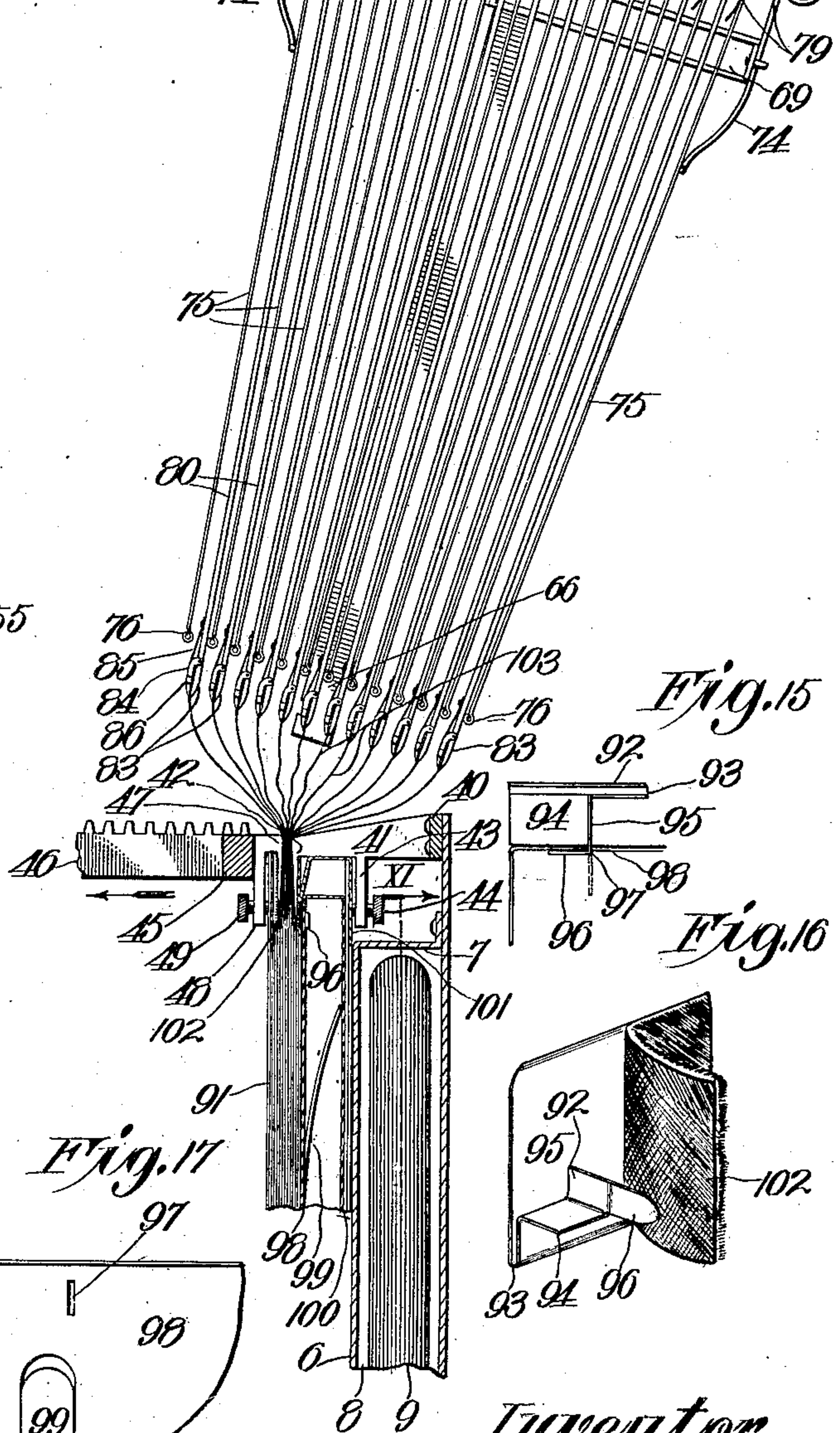


Fig. 15.

Fig. 16.

Fig. 17.

Witnesses
Frank R. Moore.
H. C. Rodgers.

Inventor
T. S. Graves
By George H. Hoops Atty.

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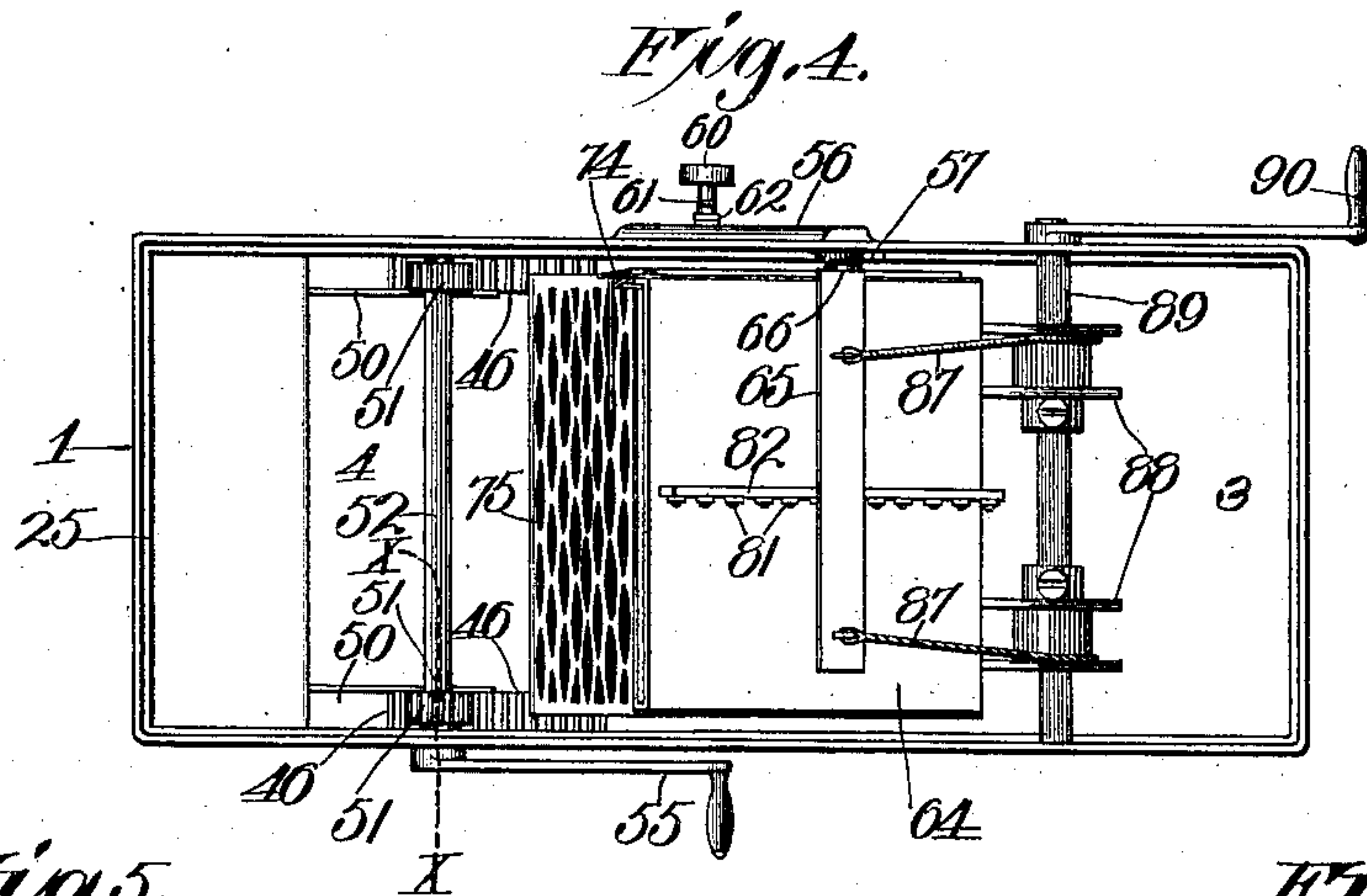


Fig. 5.

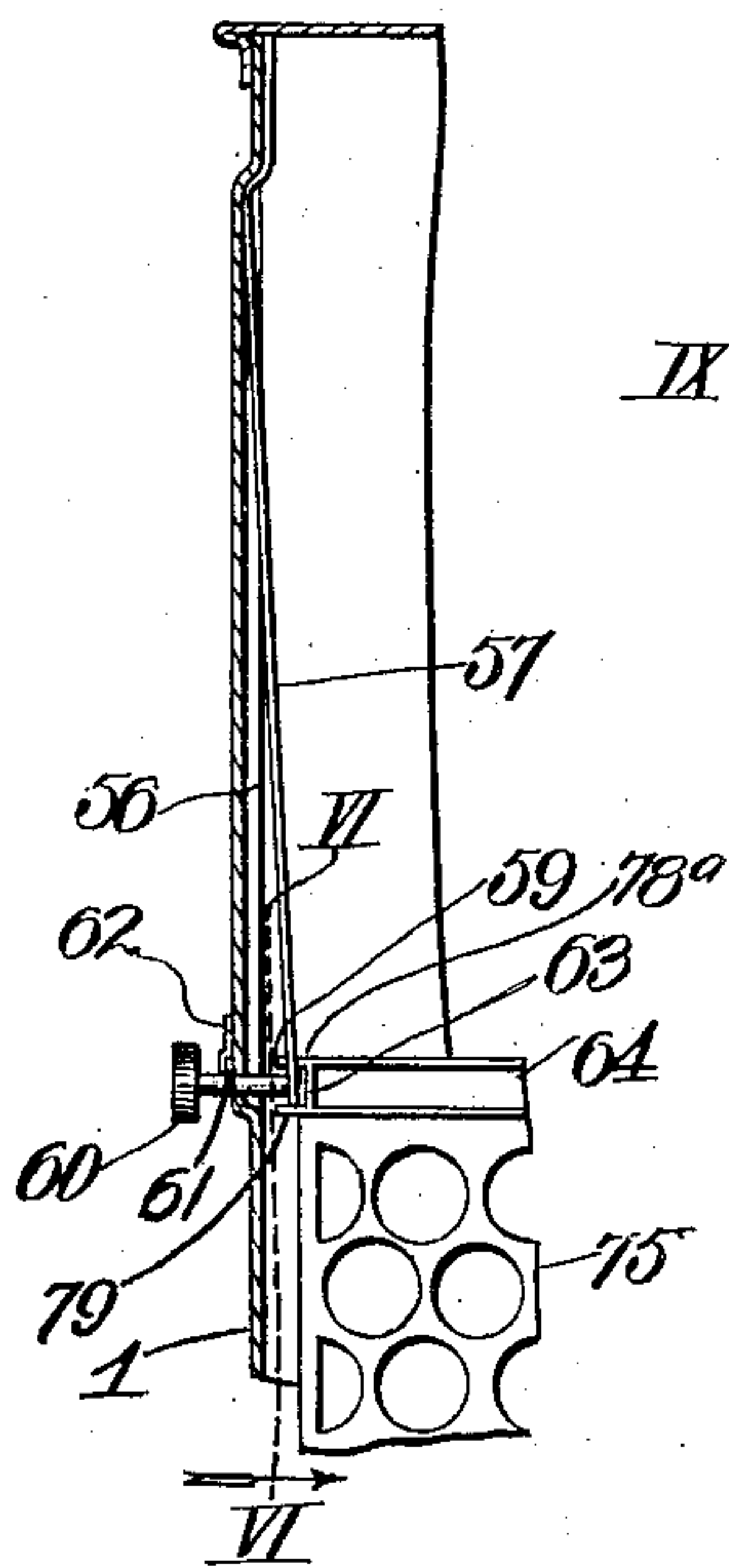


Fig. 7.

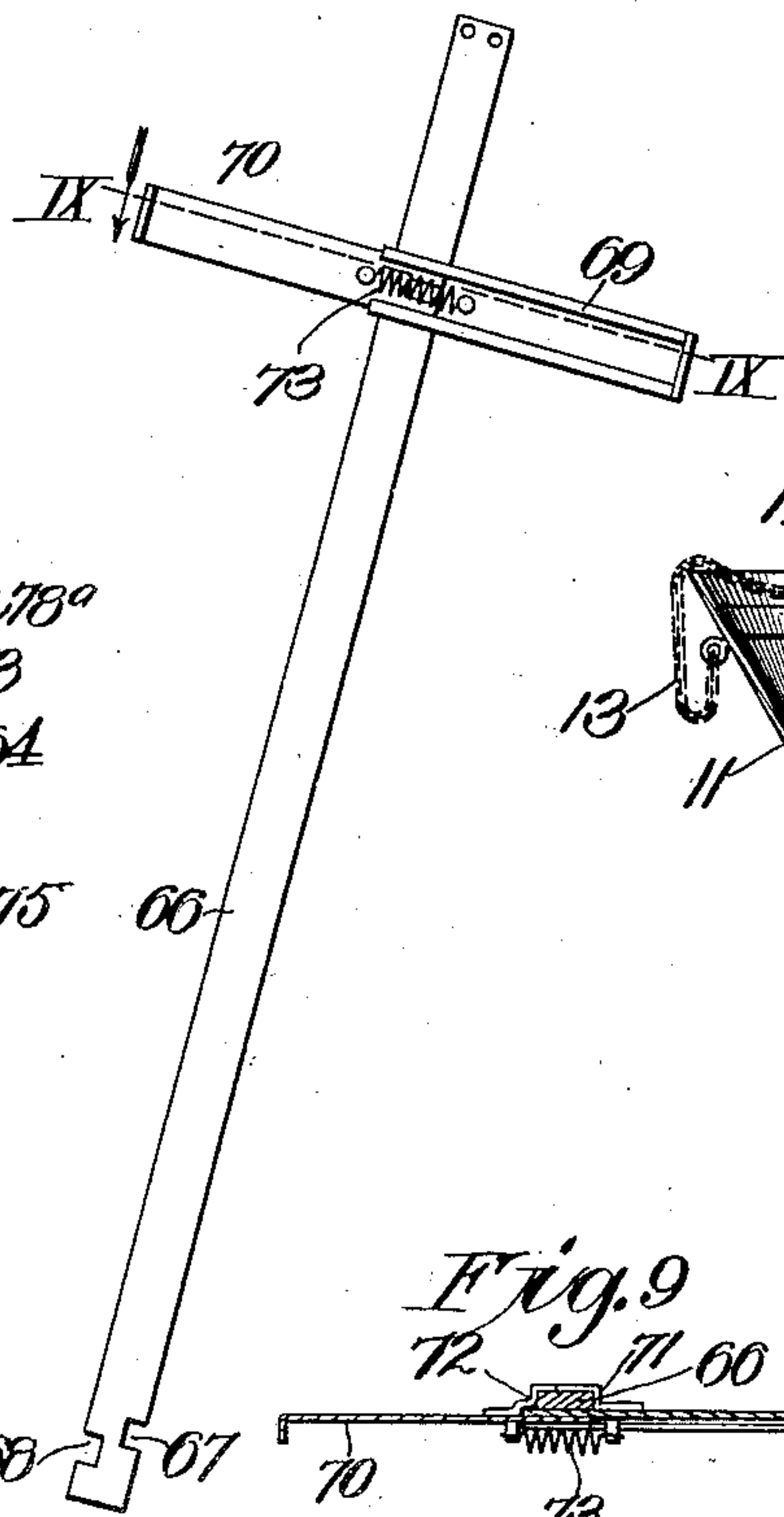


Fig. 10.

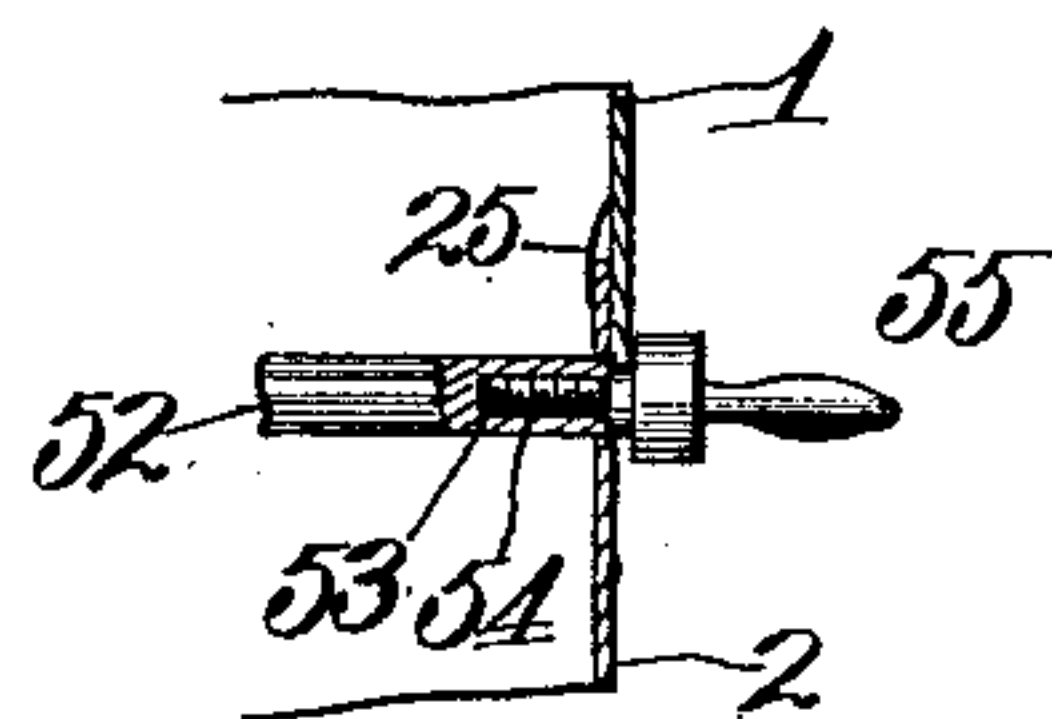


Fig. 11.

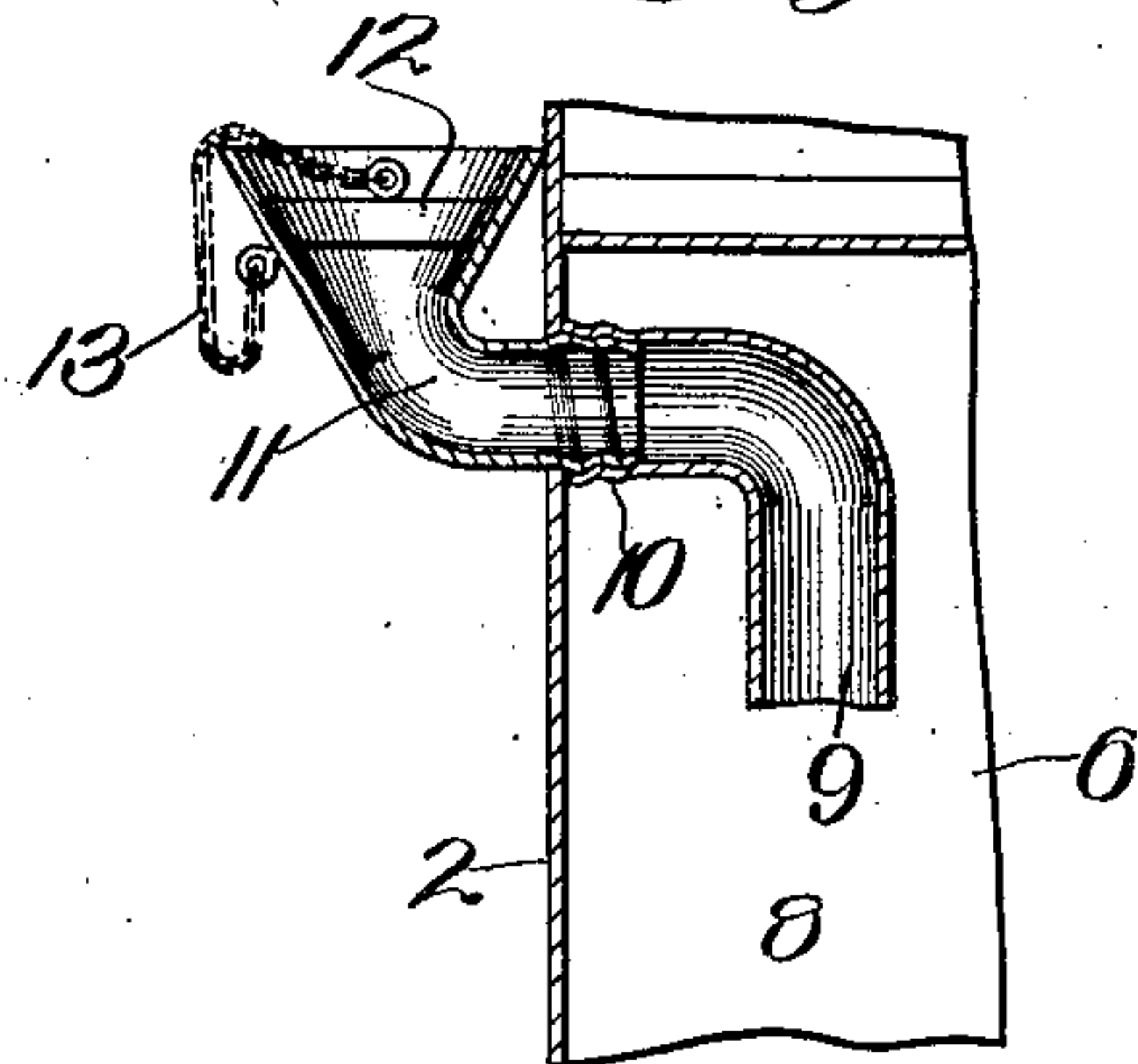
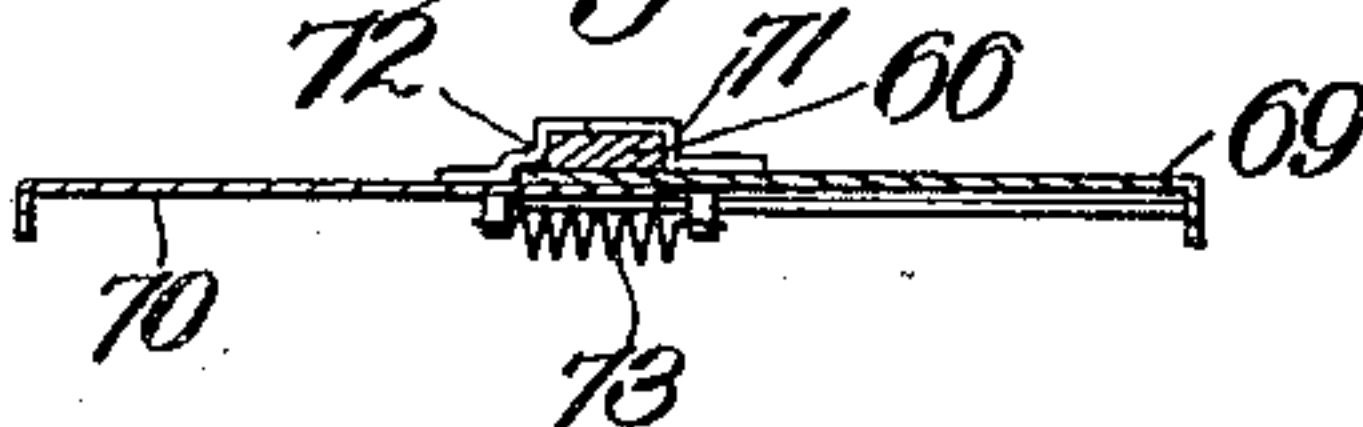


Fig. 9.



Witnesses
George R. Glover
H. C. Rodgers.

Inventor
T. S. Graves
By George R. Glover Atty

No. 897,090.

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4 SHEETS—SHEET 4.

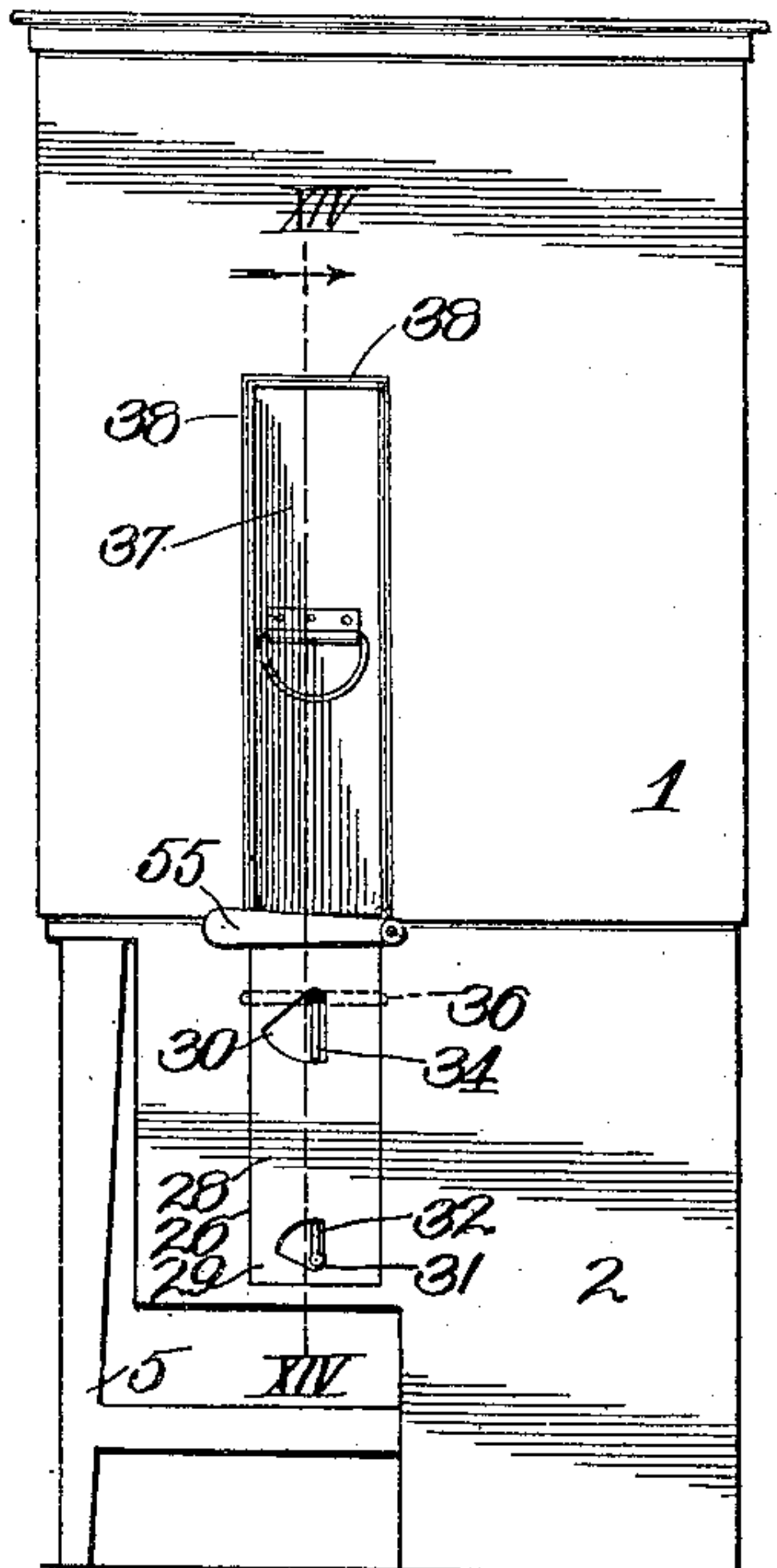


Fig. 12

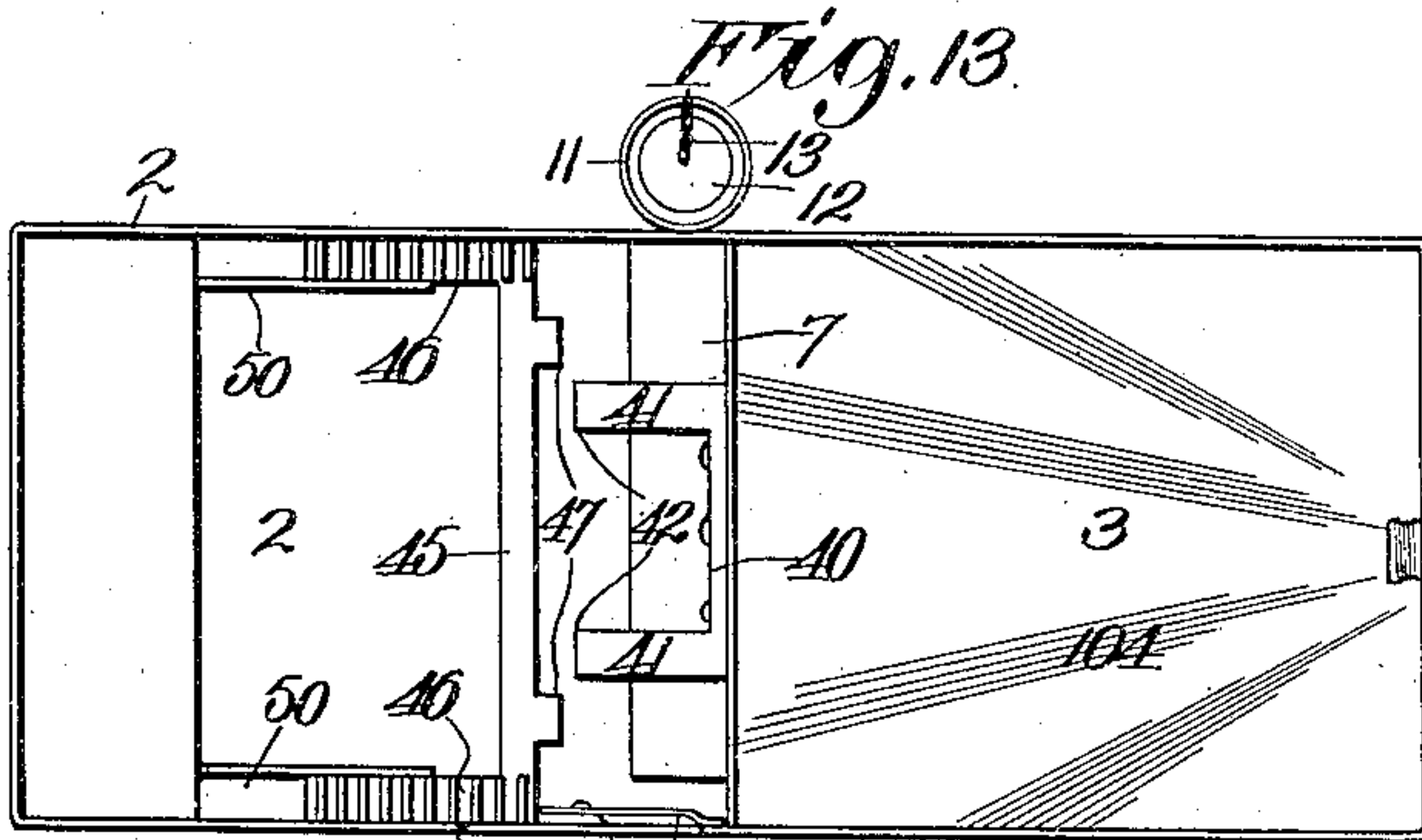


Fig. 13

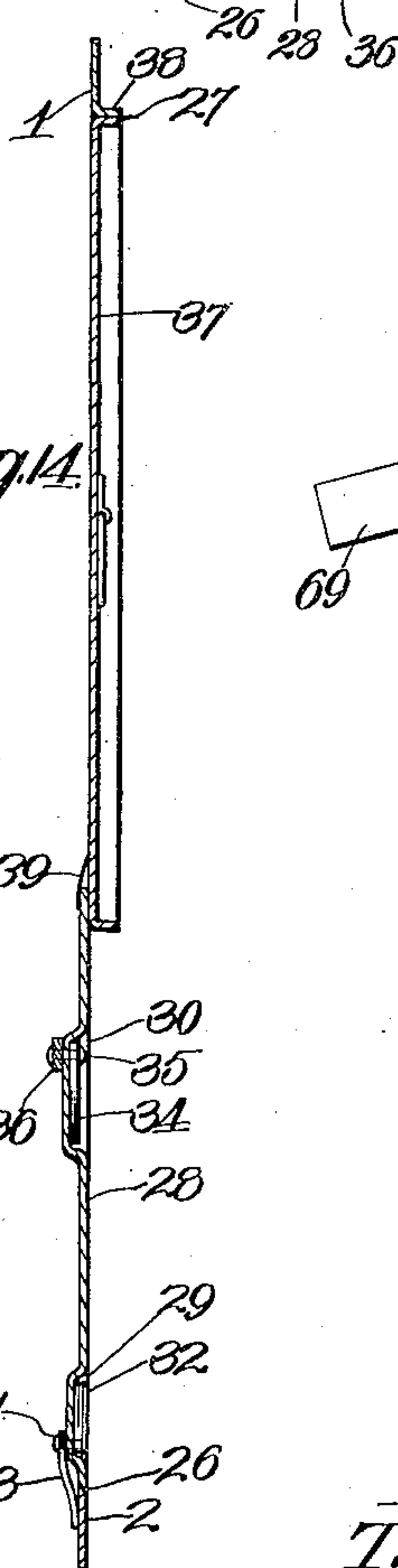


Fig. 14

Fig. 8.

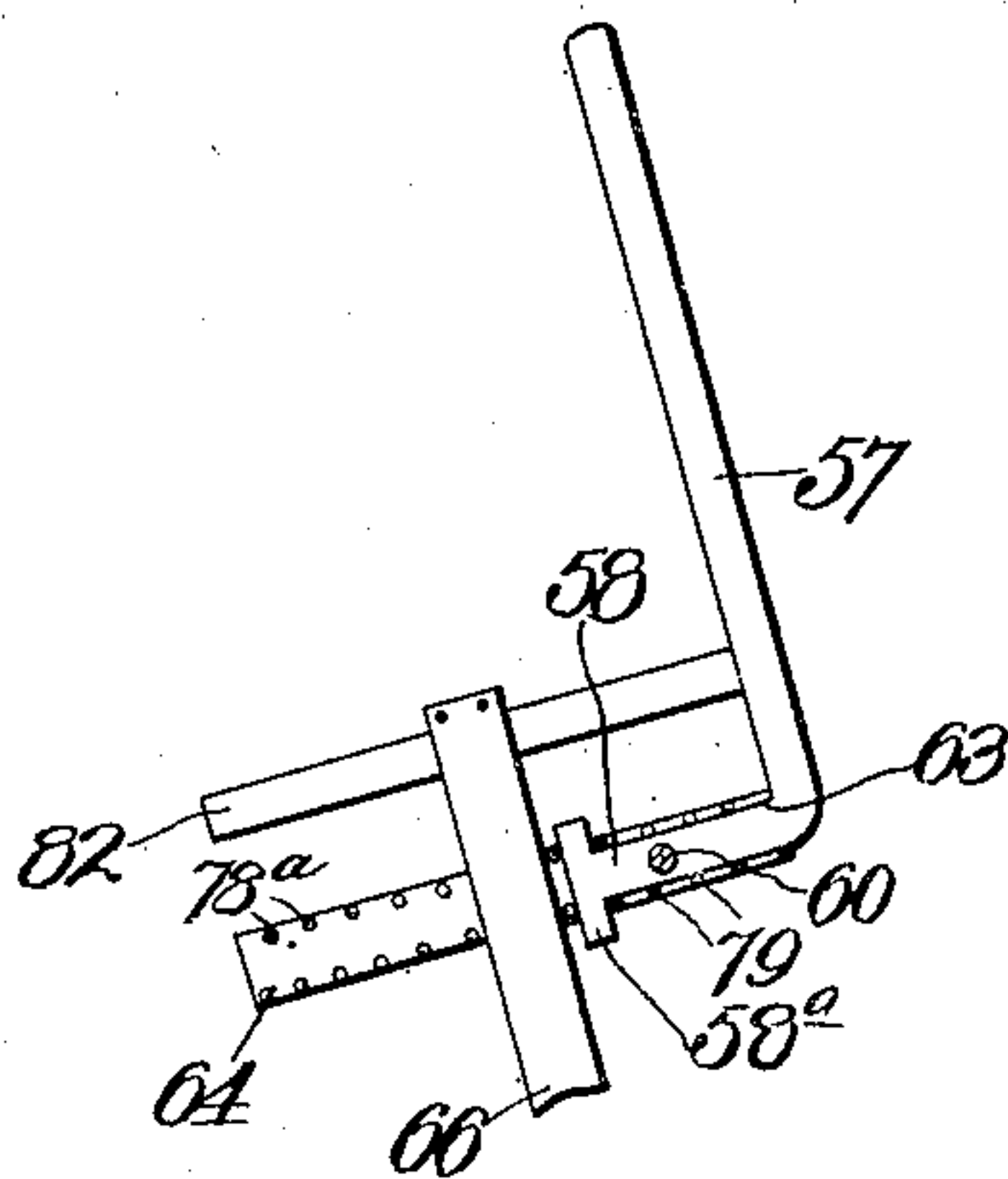
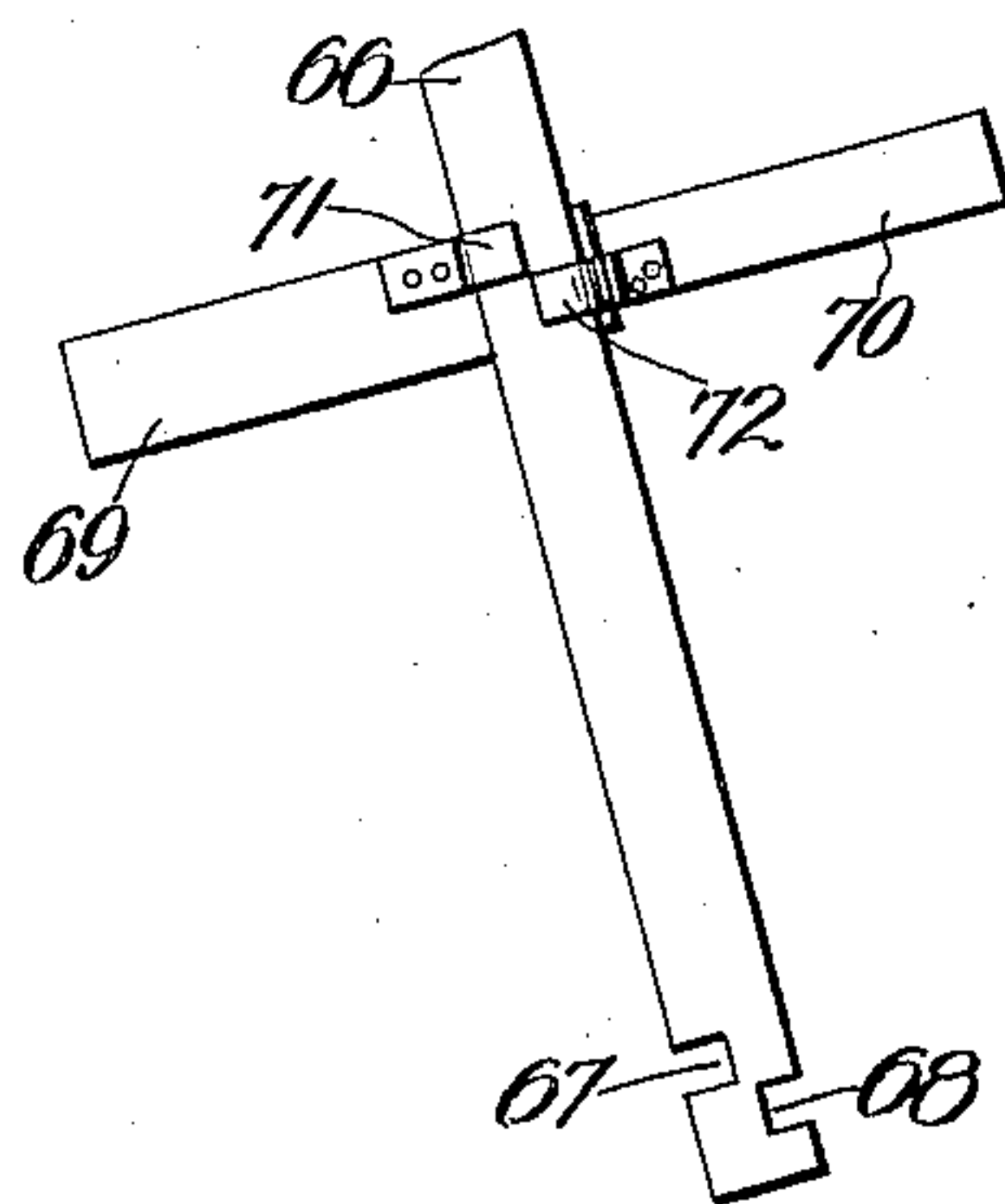


Fig. 6

Witnesses
Frank R. Glorie.
H. C. Rodgers.

Inventor
T. S. Graves
By George Y. Thorpe atty.

UNITED STATES PATENT OFFICE.

THOMAS S. GRAVES, OF WESTON, MISSOURI.

PHOTOGRAPHIC DEVELOPING-MACHINE.

No. 897,090.

Specification of Letters Patent.

Patented Aug. 25, 1908.

Application filed November 4, 1907. Serial No. 400,560.

To all whom it may concern:

Be it known that I, THOMAS S. GRAVES, citizen of the United States, residing at Weston, in the county of Platt and State of Missouri, have invented certain new and useful Improvements in Photographic Developing-Machines, of which the following is a specification.

This invention relates to photographic developing machines, and my object is to produce a machine for developing film pack negatives.

A further object is to produce a machine by which the film pack negatives may be developed in daylight without the use of a dark room.

A further object is to produce a machine by which the films are mechanically removed from the pack and developed without being touched by the hands of the operator in charge.

A still further object is to produce a machine whereby film pack negatives may be developed with a minimum quantity of developing solution.

With these and other objects in view as hereinafter appear, the invention consists in certain novel and peculiar features of construction and organization as hereinafter described and claimed; and in order that it may be fully understood reference is to be had to the accompanying drawings, in which—

Figure 1, is a vertical section of a film pack developing machine embodying my invention, the section being taken on the line I—I of Fig. 2. Fig. 2, is a section taken on the line II—II of Fig. 1. Fig. 3, is an enlarged section taken on the line III—III of Fig. 2. Fig. 4, is a top plan view of the machine with the top plate omitted. Fig. 5 is a vertical section on the line V—V of Fig. 1. Fig. 6, is a section on the line VI—VI of Fig. 5. Fig. 7, is an inner side view of a slidable bar and a telescopic frame mounted thereon. Fig. 8, is a view of the outer side of said bar and frame. Fig. 9, is a section on the line IX—IX of Fig. 7. Fig. 10, is a section on the line X—X of Fig. 4, with the pinion, rack bar, and track rail shown in Fig. 1 omitted, and with the removable handle for shaft 52 in position. Fig. 11, is a vertical section on the dotted line XI of Fig. 3. Fig. 12, is a side view of the machine on a reduced scale. Fig. 13, is a top view of the lower or inner member of the machine with certain parts omitted. Fig.

14, is a section on the line XIV—XIV of Fig. 12. Fig. 15, is an enlarged plan view of one of the upper corners of the film pack with the films and opaque sheets omitted. Fig. 16, is a detail perspective view of a portion of a plate forming part of the upper end of the film pack with the fabric strip bent back to more clearly expose the construction. Fig. 17, is a face view of a part of the upper end of the flanged metal plate forming a part of the film pack.

In the said drawings, a box or casing is shown as composed of an upper or outer section or member 1, and a lower or inner section or member 2 fitting telescopically together, the lower section comprising a chamber or tank 3 to contain any suitable developer or solution and a preferably shallow chamber 4, both chambers being open at their upper ends and to insure stability of the device, a leg-frame 5 underlies the shallow chamber and is adapted like the bottom of the tank to rest upon any suitable support.

An angular partition consisting of the upright arm 6 and the horizontal arm 7 separates chamber 4, hereinafter termed the loading chamber, from a chamber 8 in which is disposed the tube 9 communicating at its lower end with the tank and provided at its upper end with a threaded portion 10 fitted in one of the side walls of the lower or inner member of the casing, and screwed into said threaded portion 10, is a funnel-shaped filling tube 11 normally closed by an opaque plug 12 attached by preference to the filling tube by a small chain 13.

The tank at its lower end is provided with a threaded opening 14 to receive a screw plug 15 having an angular socket 16 to receive a correspondingly shaped key, not shown, for screwing the plug into or out of the threaded opening 14, it being noticed by reference to Fig. 1 that the outer end of the plug is in the plane of the face of the tank in order that the upper or outer member of the telescopic casing may be slid vertically downward until it rests upon the table or support.

17 indicates a pair of bearings secured upon the bottom of the loading chamber and journaled therein is a shaft 18 which at one end projects through the side of chamber 4 and at such end is bent to form or otherwise provided with a handle or crank arm 19, said side of said chamber being stamped in-

wardly to provide a recess 19^a of sufficient depth to receive said handle or arm in order that the same shall not interfere with the telescopic action of the members of the casing, a lug 20 projecting outward from the said side in order to retain said handle or arm in operative position as shown in Fig. 1, the handle or arm being preferably of spring metal so that it can be sprung outward past said lug when it is desired to return it to normal position, in the direction indicated by the arrow Fig. 1. The shaft is provided within the loading chamber with a pair of upwardly projecting arms 21 equipped with a rectangular frame 22 provided with ears 23 projecting toward chamber 8, the said ears being spaced apart laterally a sufficient distance to snugly engage the opposite edges of a film pack 24, to be clamped by said frame against wall 6, it being noted that the film pack is so arranged that it projects slightly above the upper end of said partition or wall 6.

To insure a light-tight connection between the members of the telescopic casing, the lower or inner one is provided with a rubber strip 25 secured to its upper edge and projecting above the same and engaging the inner surface of the upper or outer member, and in order to give access to the interior of the casing for purposes which hereinafter appear, it is provided in one of the side walls with the registering openings 26 and 27, the opening 26 being in the lower or inner member and extending from a point contiguous to the bottom of the loading chamber up through the upper edge of the side wall of said member, the registering opening 27 in the upper or outer member extending down through the lower edge of said member and in order that the members shall be free to telescope, they are provided with removable doors, the door 28 of the lower member being adapted to fit snugly in and completely fill opening 26, it being noticed that the edges of the opening and door are beveled so that the latter cannot pass through the opening. To secure said door in said opening with its inner and outer faces flush with the corresponding faces of said member, the former is stamped to provide recesses 29 and 30 in its outer face and extending through and journaled in said stamped portion 29 is a pin 31, provided with a handle 32 at its outer end occupying recess 29 and with a spring crank arm 33 at its inner end and of length to project below the lower margin of the door so that when the handle 32 is swung upwardly to a vertical position the free end of the crank arm will be slid frictionally downward on the inner side of the door until it clears the same and presses outwardly against the wall of the lower member, a similar handle 34 occupies recess 30 and is secured on a similar pin 35 journaled in the recessed portion of

the door and equipped at its inner end with a double crank arm 36, which is of sufficient length when disposed horizontally to press outwardly against the wall of the lower member at opposite sides of opening 26. The door thus equipped with fastening devices of the type described, obviously offers no interference to the free telescopic action of the members.

37 indicates the door for closing the opening 27, of the upper or outer member of the casing, this door corresponding in general construction to the sunken lids or heads used on paint cans though in this case the door is of rectangular form and to receive said door, the opening is provided with outwardly projecting marginal flanges 38 at its upper end and sides, the lower end of said opening extending through the lower edge of this member as hereinbefore explained, and in this connection it is to be noted that the rubber strip 25 terminates coincidentally with the side edges of said registering openings, a corresponding strip 39 secured to door 28 and projecting upwardly above the same engaging the inner face of the countersunk door 37 and forming practically a continuation of strip 25 when the members occupy their normal position as shown in Fig. 1. When both doors are removed it will be seen by reference to Fig. 1 that one wall of the telescopic casing is provided with an elongated vertical opening through which the operator can easily and quickly insert the film pack and place it in proper relation to the frame 22—hereinafter termed the clamp-frame—and partition 6 against which said frame is adapted to clamp said pack.

A bracket secured by preference to the upper end of what may be termed the front wall of the tank consists of a bar 40 having a pair of forwardly projecting arms 41 equipped with depending knife-edged ears 42 at their front ends and with ears 43 rearward of ears 42 and provided with clamping screws 44.

An adjustable frame is constructed as follows: 45 indicates a cross bar equipped at its ends with parallel rack bars 46 and inward of its ends and at its rear side with depending knife-edged ears 47 and ears 48, the latter disposed forward of the former and equipped with clamping screws 49, it being noted that the ears 47 and 48 of the adjustable frame are disposed outwardly of the corresponding ears of the bracket hereinbefore described. The frame is supported and guided to move horizontally by the engagement of its rack bars 46 with parallel grooved or L-shaped tracks 50, resting on the bottoms of said tracks and held snugly between the upwardly projecting arms of the tracks and the adjacent sides of member 2. To impart movement to said frame the rack bars are engaged by a pair of pinions 51 secured to a corresponding cross shaft 52 journaled in the side

walls of member 2 and terminating flush with the outer sides of the same and to turn the shaft it is provided at one end with a threaded socket 53 to receive the threaded stem 54 of a crank handle 55, the crank handle being removed after the frame is adjusted to the required position (see Fig. 10).

56 indicates a long narrow recess formed by stamping outwardly the wall of member 1 opposite to that occupied by its door 37, this recess extending from a point about midway the height of said member in the vertical plane, by preference, of the film pack, upwardly and rearwardly, and secured to said member and held by its own resiliency normally within the recess for the greater part of its length, is a spring bar 57 terminating at its lower end in a downwardly and rearwardly extending foot 58 normally occupying the foot-shaped portion 59 of the recess, the said spring bar pressing outward against a headed pin 60 extending through the wall of the member and having an outwardly projecting lug 61 to be disposed by turning the pin, under a clip 62 secured to said wall for the purpose of holding the pin reliably in the position shown in Fig. 5, that is with the foot portion of the spring bar in engagement with the channel 63 formed at one side of a rectangular tube 64, the opposite side of said tube when thus engaged by the spring bar being pressed against the opposite wall of said member, and to prevent the tube sliding rearward off said foot portion 58, the latter is provided at its rear end with a head 58^a at the rear end of the pins hereinbefore mentioned forming the channel 63 of the tube (see Fig. 6).

65 indicates a transverse bar above tube 64 and provided with a rigidly depending bar 66 having staggered notches 67 and 68, in its edges and near its lower end. Slidingly mounted on bar 66 is a frame consisting of a longitudinally grooved member 69 and a member 70, the members being disposed at the inner side of the bar and provided with angular tongues 71 and 72 respectively, which form conjointly a clip through which bar 66 slidingly extends, the tongue 71 overlying the tongue 72 so that when the bar is slid upward a sufficient distance the first-named tongue may engage notch 67 and the other tongue the notch 68, the two members being connected by a retractile spring 73 whereby they may be drawn together automatically when their tongues register with said notches. Each member is also equipped with a spring 74 secured at its upper end to tube 64 the two springs pressing toward each other at their lower ends, so as to press together the lower beaded ends 76 of a series of preferably foraminous plates 75 pivoted at their upper ends as at 77 to opposite sides of tube 64.

78 indicates a series of springs carried by

pins 78^a of tube 64 and pressing against all of the foraminous plates except the central one for the purpose of holding their upper ends against the stop pins 79 projecting from the tube 64 and limiting the movement imparted to the plates by the springs and cooperating with the latter to space their beaded lower ends apart, it being understood that springs 74 are more powerful than springs 78 to force said beaded ends together at a certain time. It will be noticed in this connection that the drawing discloses thirteen of the foraminous plates 75 as ordinarily a film pack contains twelve films and it is desirable that there shall be a foraminous plate between each pair of films one forward and one rearward of the package of films. In this connection it will be noted that certain of the pins 78^a and 79 at one side of the tube 64 are longer than at the other so as to project beyond the adjacent portions of the plates 75 and form outward thereof the channel hereinbefore described.

80 indicates twelve bars, in this instance, of rectangular form in cross section, extending slidingly through the tube 64 and disposed between the foraminous plates, said bars converging downwardly and having their upper ends pivotally connected by links 81 to bar 82 secured to cross bar 65 and extending at right angles thereto. At their lower ends bars 80 are equipped with transverse stationary jaws 83 corresponding in width approximately to the foraminous plates and normally disposed below the latter and pivoted to said jaws are movable jaws 84 preferably toothed at their lower edge and at such edge held yieldingly against jaws 83 by springs 85, the hinged or pivoted jaws 84 being preferably provided with projections 86 for convenience in forcing them away from the stationary jaws.

87 indicates a pair of cables attached to bar 65 at their lower ends and to drums 88 at their upper ends, the said drums being secured on a transverse shaft 89 journaled in member 1 and provided with a crank handle 90, by which it may be turned.

The film pack illustrated in connection with this invention is of well known construction, that is to say is of that type shown by U. S. patent issued Dec. 25, 1906, to the Rochester Optical Co., No. 839,107, which comprises a pasteboard carton 91 reinforced at the upper end of one of its sides with a metal plate 92 bent to form a groove 93. At each end of the groove it is provided with a horizontal shelf 94 terminating at its inner end in an upwardly projecting flange 95 provided with a tongue 96, these tongues extending through openings 97 in the flanged metal plate 98 and being bent back upon said plates as shown in Fig. 15. The flanged plate 98 has spring tongues 99 stamped out of it which press against the opposing wall of

the carton for the purpose of clamping between said plate and the other wall of the carton the alternately arranged films and opaque sheets. After each film is exposed in the camera, the operator grasps the usual tab not shown and draws it upward so as to draw the film and the opaque sheet to which it is attached from one side of the flanged metal plate to the opposite side, that is to the side shown in Fig. 3, the said sheet and film being drawn down under the lower end of said flanged plate, which as it forms no part of the present invention is not fully illustrated and described.

In practice after each film and opaque sheet have been thus disposed, the latter, or the tab of the same is torn off at the upper edge of the film pack. When the film pack is to be developed in a machine forming the subject of this application the tabs should be torn off an inch and a half or thereabouts above the upper edge of the film pack so that after all of the films have been exposed there will be a corresponding number of comparatively long tabs projecting from the upper end of the pack. After removing the pack from the camera the operator slips a knife blade or other sharp instrument between the cardboard pack piece 100 of the film pack and the cardboard cap 101 and pries the tongues 96 from the position shown in full lines to the position shown in dotted lines Fig. 15, the upper end of the back piece 100 bending under the pressure of the knife blade. The film pack is then slipped into the machine through the opening and against wall 6 and is slid upward until it is disposed between the depending ears 43 and 48, with the sharpened ears 42 fitting between the bunch of tabs and the cap 101 and the sharpened ears 47 between the bunch of tabs and the fabric lining 102 secured to the inner side of plate 92, as shown clearly in Fig. 3. As soon as the pack is thus disposed the clamp frame 22 is brought to bear upon it to hold it reliably in such position. The bunch of upwardly projecting tabs 103 (see Fig. 1) are then separated as shown in Fig. 3 and secured between the jaws of the clamps hereinbefore described and shown in the last-named figure. The operator now secures crank handle 55 to shaft 52, and turns said crank handle so as to move the slidable frame provided with the depending ears away from the similarly equipped bracket, the result of this operation disrupting the upper part of the film pack, that is to say breaking the pasteboard carton and pulling plate 92 away from the cap 101 until the tongues 96 are withdrawn from the slots 97. After this operation is accomplished and it is effected easily and quickly because the tongues 96 were previously straightened and therefore offer no material resistance, the operator grasps handle 90 and turns the same

so as to draw bar 65 upwardly, bar 66 sliding upward through the clip formed by the angle tongues 71 and 72, see Fig. 8, it being further noted that the foot portion of spring bar 57 holds the guide tube 64 rigidly in place so that the bars 80 as they are drawn upward because of their connection with bar 82, shall move substantially endwise with respect to the film pack and thus draw the films upwardly out of the carton, this action continuing until the lower ends of the films are above the headed ends 76 of the foraminous plates. As this disposition of the films is effected the notches 67 and 68 of bar 66 register with the clip tongues 71, 72, and thus permit the cooperating springs 73 and 74 to press the foraminous plates together until their headed lower ends meet at the lower ends of the films which are thus, with the opaque sheets to which they are glued, incased loosely between said foraminous plates. The pin 60 is then turned to withdraw lug 61 from engagement with clip 62 to permit spring bar 57 to spring outward into recess 56 so as to release tube 64 and permit the same with the connected parts to swing back on the supporting cables 87 until suspended vertically from the drums 88 which it will be noticed are vertically over the tank 3 containing the developer solution introduced through the funnel. The handle 90 is then turned backward to permit the cable to unwind therefrom and lower the multiple film holder into the solution where it is left for a sufficient length of time to properly develop the negatives, it being apparent that the solution has access to all the films not only by passing between the foraminous plates but also through the same.

After the films have been properly developed the operation of the crank handle 90 is reversed to raise them out of the solution. The plug 15 is then withdrawn to permit the solution to be drawn out of the tank, the latter preferably having a sloping false bottom 104 to permit all of the solution to be discharged. The plug is then resecured in position and water is introduced through the funnel. The film holder is then again lowered to immerse the films in the water and the washing of the films is performed more thoroughly by rocking handle 90 so as to raise and lower the films in the water. After the films have been properly washed the holder is again raised and the plug is removed to withdraw the water. The plug is then resecured in position and a fixing solution is introduced through the funnel into the tank and then the holder again lowered to immerse the films in the fixing solution. The holder is then again reelevated to permit the fixing solution to be drawn off and the tank again charged with water, the holder being then again lowered to finally wash the films. After this operation the outer or upper

member of the casing is lifted off the lower or inner member. The members 69 and 70 of the frame mounted on bar 66 are then grasped by hand and slid apart until their angle tongues forming the clip are withdrawn from the notches 67 and 68, this action permitting springs 78 to force the beaded lower ends of the foraminous plates apart. When this is done the films will drop out in the event that the glue securing them has become dissolved during their submersion in either of the solutions or the water, as is usually the case. If such detachment should not automatically occur it will be necessary to slide bar 66 downward or rather have it descend by gravity so as to restore the clamps to their original positions, that is below the beaded ends of the foraminous plates. The movable jaws of the various clamps are then swung apart to permit the tabs carrying the films to be withdrawn and then the films are detached therefrom. In the event that the films have become previously detached as suggested the same operation is necessary to withdraw the tabs so that the machine will be ready to receive a second film pack, it being understood of course that the crank handle 19 is sprung outward past lug 20 to withdraw clamping frame 22 to permit the disrupted carton to be removed.

When the machine is not in use the film holder is permitted to hang pendently from the drums so as to occupy the tank 3 when the outer or upper member is slid downward onto the lower or inner member, the telescopic construction of the device being desirable in order that the machine when not in use shall occupy as small a space as possible and thus be more conveniently portable.

From the above description it will be apparent that I have produced a photographic developing machine possessing the features of advantage enumerated as desirable and I wish it to be understood that I do not desire to be restricted to the exact details of construction shown and described as obvious modifications will suggest themselves to one skilled in the art.

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

1. In a photographic developing machine, a casing having a loading chamber, means for securing a film pack therein, and means for disrupting the pack.

2. In a photographic developing machine, a light-tight casing having a loading chamber, a movable clamp frame to secure a film pack in said chamber, and means to disrupt the pack while occupying said chamber and held by said clamp frame.

3. In a photographic developing machine, a light-tight casing having a loading cham-

ber open at one end, means to disrupt a film pack while occupying said chamber, and means to effect opposite relative movement between the films and carton of the pack to separate the former from the latter.

4. In a photographic developing machine, a light-tight casing having a loading chamber open at one end, means to disrupt a film pack while occupying said chamber, means to effect opposite relative movement between the films and carton of the pack to separate the former from the latter, and yieldingly actuated means to meet below the films when separated from the carton.

5. In a photographic developing machine, a light-tight casing having a loading chamber open at one end, means to disrupt a film pack while occupying said chamber, a tank within the casing adapted to contain a liquid, and means to effect opposite relative movement between the films and carton of the pack to separate the former from the latter and also effect the immersion of the former in the liquid of said tank.

6. In a photographic developing machine, a light-tight casing having a loading chamber open at one end, means to disrupt a film pack while occupying said chamber, means to effect opposite relative movement between the films and carton of the pack to separate the former from the latter and to hold the films, a tank, a shaft above the tank, and a flexible connection between the shaft and the means for holding the films when withdrawn from the carton.

7. In a photographic developing machine, a casing having a loading chamber to receive a film pack, a pair of depending ears rigid with the casing, one of them externally engaging the pack at one side and the other projecting into the pack at one side of the bunch of films, a second pair of ears, one engaging the opposite side of the pack externally and the other projecting into the pack at the side of the bunch of films opposite to the other internally-disposed ear, and means to move the ears at one side of the bunch of films to disrupt the carton of the pack to permit the films to be drawn upward therefrom.

8. In a photographic developing machine, a casing having a loading chamber to receive a film pack, a pair of depending ears rigid with the casing, one of them externally engaging the pack at one side and the other projecting into the pack at one side of the bunch of films, a second pair of ears one engaging the opposite side of the pack externally and the other projecting into the pack at the side of the bunch of films opposite to the other internally-disposed ear, a rack bar rigid with the pair of ears at one side of the bunch of films, a pinion engaging the same, and means to turn the pinion.

9. In a photographic developing machine, a casing having a loading chamber to receive

a film pack, a pair of ears rigid with the casing, one of them engaging the film pack externally at one side and the other projecting into the pack, means to clamp the pack to said ears, a second pair of ears, one engaging the opposite side of the pack externally and the other projecting into the pack at the opposite side of the bunch of films from the first-named internally-disposed ear, and means to move the last-named pair of ears away from the first-named pair of ears to disrupt the pack.

10. In a photographic developing machine, a casing having a loading chamber, a clamp frame therein to clamp a film pack against a wall of the chamber, a pair of ears depending into the upper end of the pack at opposite sides of the bunch of films therein, and means to impart relative opposite movement to said ears to disrupt the carton of the pack.

11. In a photographic developing machine, a casing having a loading chamber to receive a film pack, and a tank to receive the films after they are removed from the carton of the pack, means in the loading chamber for disrupting the pack at its upper end, a multiple film holder for engagement with the upper ends of the tabs attached to the films, prior to the disruption of the pack, and means to draw said film holder upward to withdraw the films from the pack after it is disrupted and then lower said holder containing the films into a solution in the tank.

12. In a photographic developing machine, a telescopic casing, comprising a lower or inner member formed with a tank and a loading chamber, and an upper or outer member engaging and slidable on the lower or inner member, means in the loading chamber to effect the disruption of a film pack therein, means in the upper or outer member of the casing for engagement with the tabs projecting upward from the films of the pack, and means to draw said film holder upward to withdraw the films from the pack

after it is disrupted and then lower said holder containing the films into a solution in the tank.

13. In a photographic developing machine, a casing having a loading chamber and a tank in its lower portion, a multiple film holder in the upper portion and sloping downward from a point above the tank to a point above the loading chamber and consisting of a plurality of slidable rods equipped with clamps at their lower ends, guiding means for said rods, and means to hold the guiding means so that the rods when slid upward or downward in said guiding means shall substantially maintain their angular relation with the loading chamber.

14. In a photographic developing machine, a casing having a loading chamber and a tank in its lower portion, a multiple film holder in the upper portion and sloping downward from a point above the tank to a point above the loading chamber and consisting of a plurality of slidable rods equipped with clamps at their lower ends, guiding means for said rods, means to hold the guiding means so that the rods when slid upward or downward in said guiding means shall substantially maintain their angular relation with the loading chamber, and means whereby the withdrawal of the holding means from the guiding means shall be effected.

15. In a photographic developing machine, a casing having a loading chamber in its lower portion, a door to give access to the interior of the casing and said chamber, means to disrupt a film pack while occupying such chamber, and means above the film pack to engage and draw the films upward out of the carton of the pack.

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

THOMAS S. GRAVES.

Witnesses:

JAS. W. MURDOCK,
W. C. POLK.