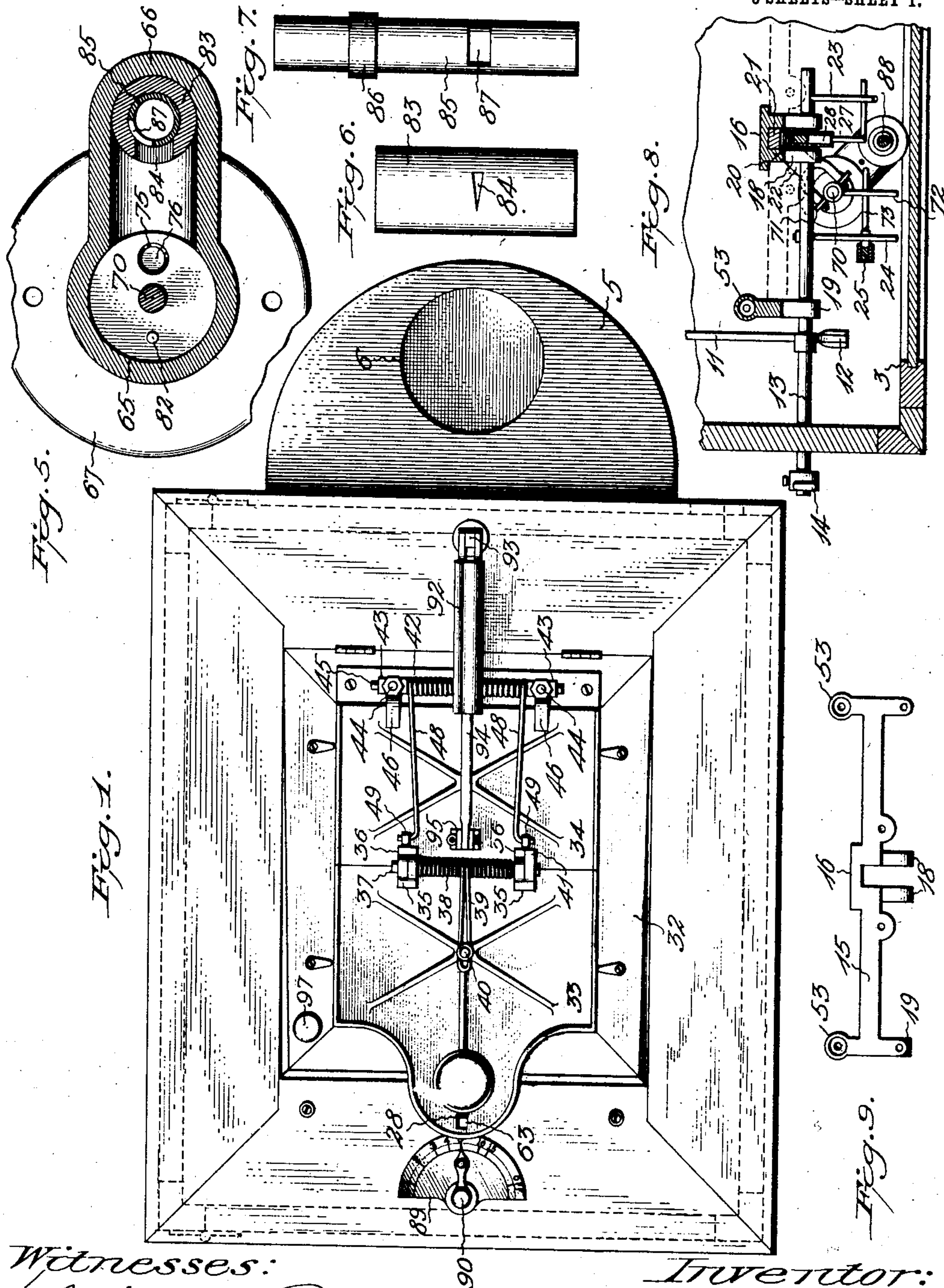


J. F. WARE.
 AUTOMATICALLY OPERATING VARIABLE TIME EXPOSURE PHOTOPRINTING CABINET.
 APPLICATION FILED MAR. 29, 1909.
 966,498. Patented Aug. 9, 1910.

3 SHEETS—SHEET 1.



Witnesses:

G. Sargent Elliott
 Adella M. Fowle

By

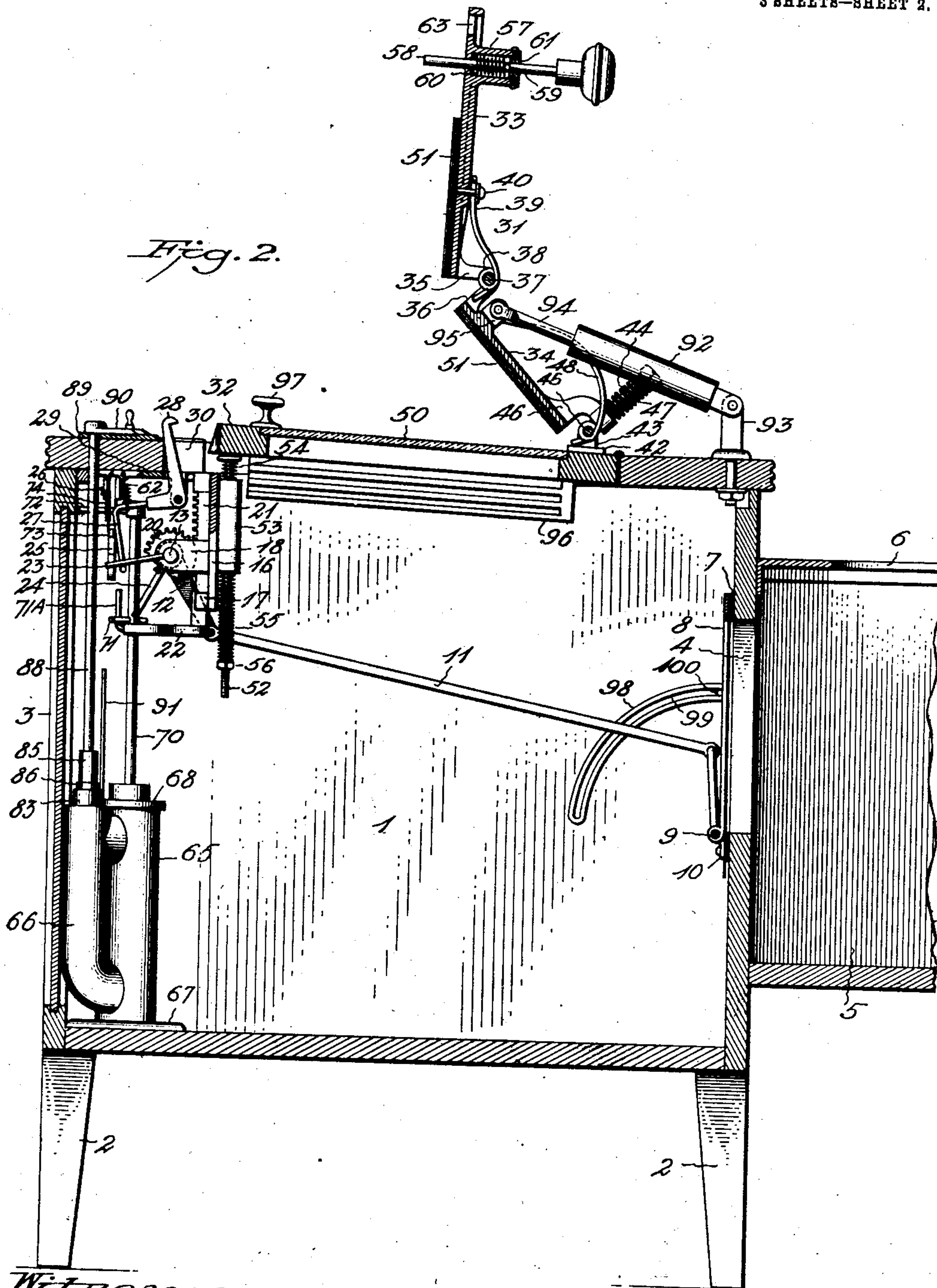
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3 SHEETS—SHEET 2.



Witnesses:

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By

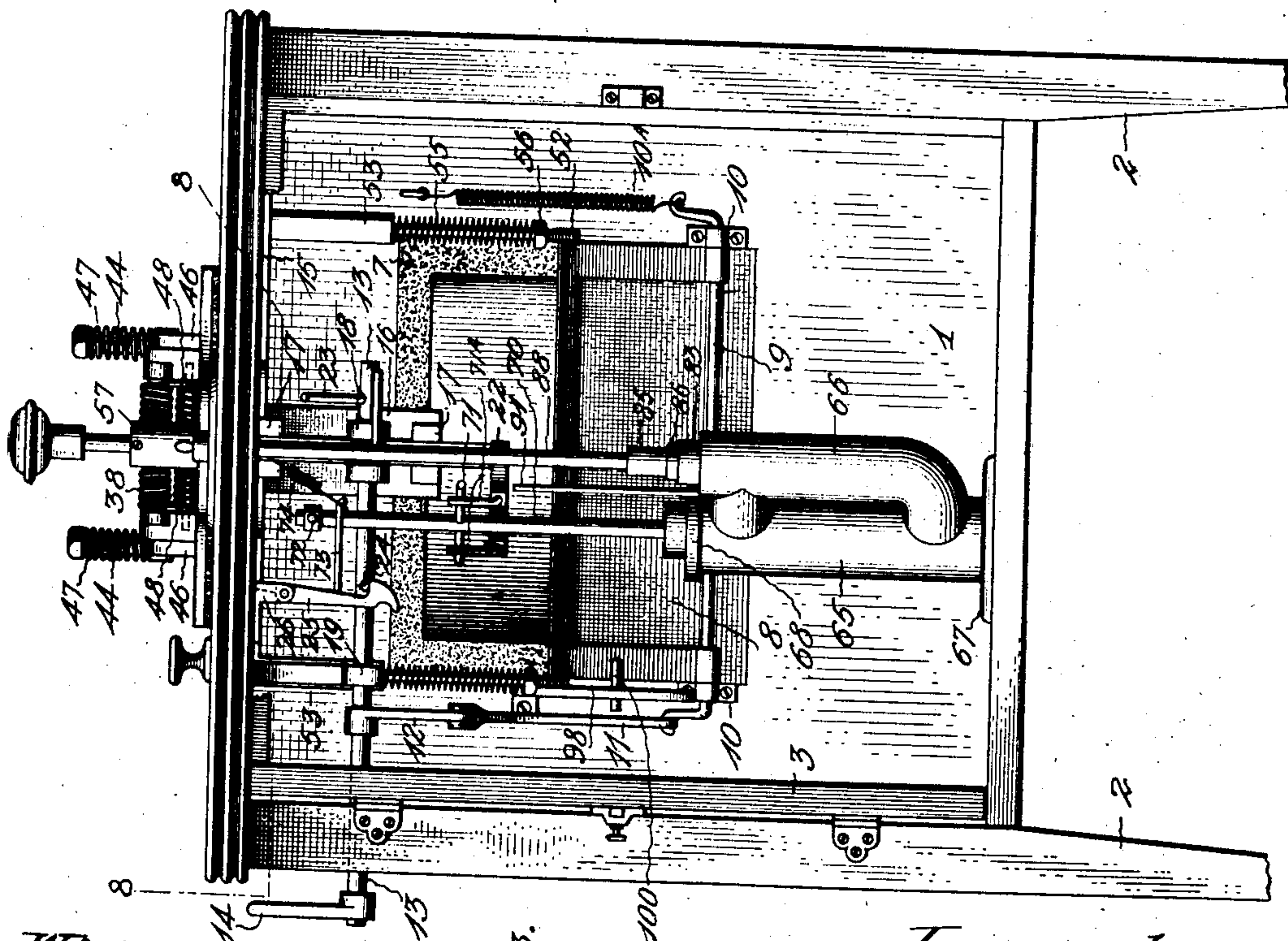
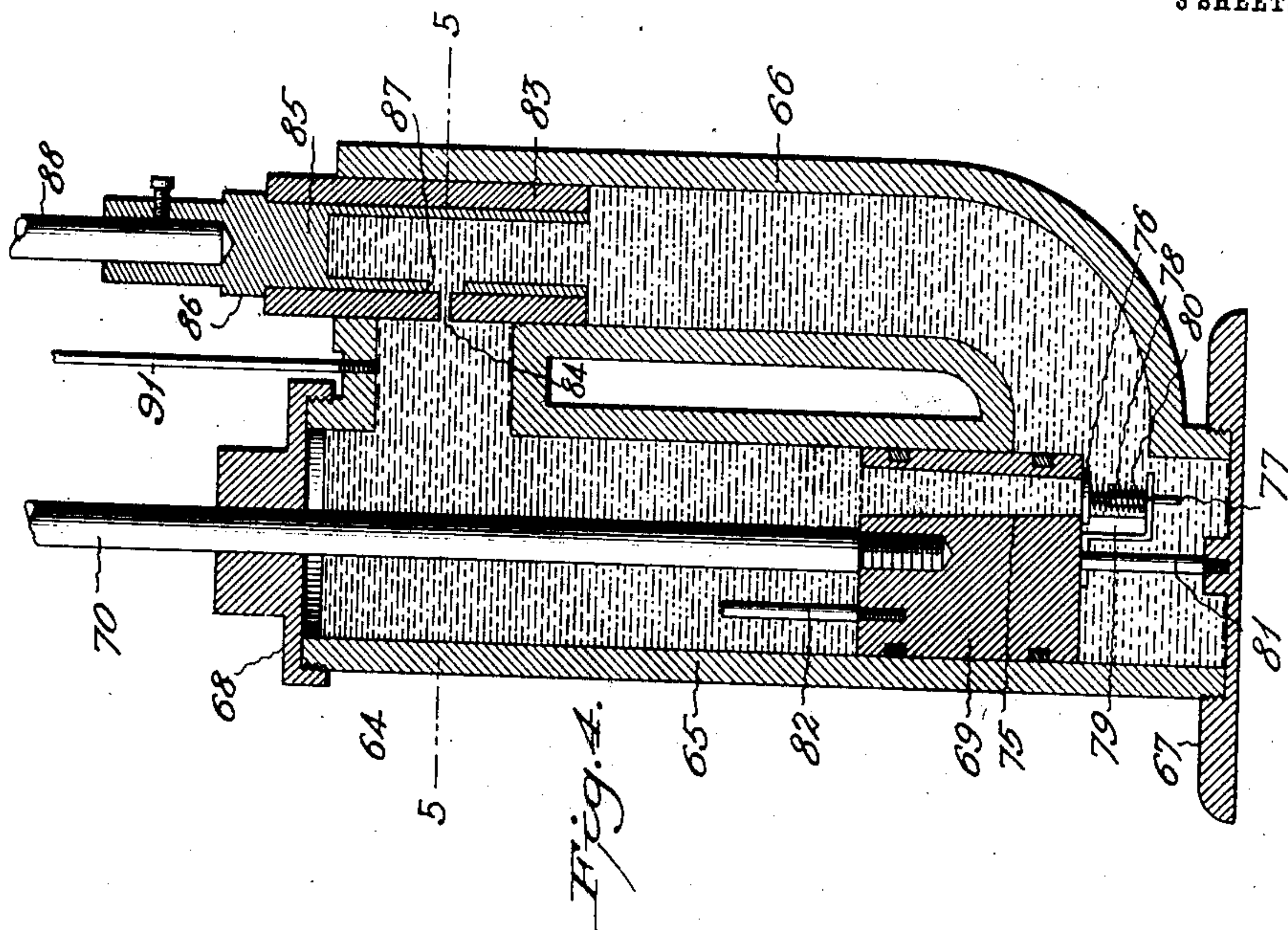
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 3 SHEETS—SHEET 3.



Witnesses:
 G. Sargent Elliott.
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Fig. 3.

By
 H. S. Bailey.

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 James F. Ware.
 Attorney

UNITED STATES PATENT OFFICE.

JAMES F. WARE, OF DENVER, COLORADO, ASSIGNOR OF ONE-HALF TO ARNOLD A. BOWHAY, OF DENVER, COLORADO.

AUTOMATICALLY-OPERATING VARIABLE-TIME-EXPOSURE PHOTOPRINTING-CABINET.

966,498.

Specification of Letters Patent.

Patented Aug. 9, 1910.

Application filed March 29, 1909. Serial No. 486,603.

To all whom it may concern:

Be it known that I, JAMES F. WARE, a citizen of the United States of America, residing in the city and county of Denver and State of Colorado, have invented a new and useful Automatically-Operating Variable-Time-Exposure Photoprinting-Cabinet, of which the following is a specification.

This invention relates to automatically operating, variable time exposure photoprinting cabinets, and is designed as an improvement over a device of this character for which Letters Patent were granted to James F. Ware and Thomas W. Rundle, No. 899,235, dated September 22, 1908.

The object of the present invention is to provide a suitable cabinet, having a printing frame and a padded two-part print-holding shutter, which is hinged to one end of the frame and which, when pressed down upon the frame, is held by a latch, automatically operating mechanism being connected with the latch, whereby the same is tripped at a predetermined time to release the shutter, means being employed for varying the time during which the latch is caused to engage and hold said shutter.

A further object of the invention is to provide in combination with a photoprinting cabinet, having a printing frame and hinged padded print-holding shutter therefor, mechanism for holding said shutter against the frame for a predetermined time, said mechanism comprising a liquid-controlled, gravity valve, and mechanism operated by said valve and connected with a latch for locking the shutter, whereby when the shutter is closed against the frame, the said latch is operated to engage the shutter and hold the same until tripped by the mechanism, which is operated by the valve on its descent; the valve being normally held in an elevated position by said mechanism.

A further object of the invention is to provide a cabinet of this character having a light chamber at one end thereof, communicating with the cabinet, said chamber being normally closed by a door of suitably colored fabric, which is opened and closed automatically through connection with the valve controlled mechanism, so as to admit light to the cabinet when printing and shut it out when the shutter is released.

These objects are accomplished by the

mechanism illustrated in the accompanying drawings, in which:

Figure 1, is a plan view of the improved cabinet, showing the shutter pressed down and latched. Fig. 2, is a central, vertical longitudinal sectional view of the cabinet, the print-holding shutter being open, and the operating mechanism being in its normal or inoperative position. Fig. 3, is a front view of the cabinet, the front door of the same being open, showing the shutter down, the mechanism set, the valve stem in the act of descending, and the shutter between the cabinet and light chamber open. Fig. 4, is a vertical sectional view of the operating valve. Fig. 5, is a horizontal sectional view thereof, on the line 5-5 of Fig. 4. Fig. 6, is a front view of the valve tube, showing the triangular port therein. Fig. 7, is a front view of the cut-off valve which fits in the tube. Fig. 8, is a fragmental, horizontal sectional view, on the line 8-8 of Fig. 3, showing the operating mechanism in plan, and Fig. 9, is a plan view of a bracket which supports a portion of the operating mechanism.

Similar characters of reference refer to similar parts throughout the several views.

Referring to the accompanying drawings, the numeral 1, indicates a rectangular casing or cabinet, which is supported upon legs 2, and which is provided at its forward end with a door 3, which gives access to the interior of the cabinet. An opening 4, of suitable dimensions, is formed in the rear end of the cabinet, which communicates with a semi-circular casing 5, which is secured upon this end of the cabinet, and this end is preferably hinged to the cabinet, as shown by dotted lines, Fig. 1. The casing 5, is preferably a metallic casing, and its upper end has an opening 6, which permits a suitable illuminating means to be placed in, and withdrawn from, the casing, and which also permits the escape of heat generated by said illuminating means.

Around the opening 4, on the inside of the cabinet, is a strip 7 of felt, and a door 8, is adapted to normally close the opening. This door or shutter comprises a frame, which is secured at its lower end upon a horizontal rod 9, pivoted at each end in bearings 10, and which is preferably covered by a sheet of suitably colored fabric. One

end of the rod 9 is bent at an angle, and is connected to a coiled contraction spring 10^A, which is attached at its opposite end to the adjacent end of the cabinet, and normally keeps the door closed. The opposite end of the rod is also bent at an angle, and is pivotally connected to one end of a connecting rod 11, the opposite end of which is pivotally attached to an arm 12, which is rigidly secured upon a shaft 13, which extends partially across the cabinet adjacent to its forward end, and through one side of the same, the projecting end of the shaft being provided with a handle 14. This shaft is journaled in bearings which form an integral part of a bracket 15, secured to the top of the cabinet. The bracket is provided centrally with a depending plate 16, having guide lugs 17 arranged in pairs at its opposite extremities, and a pair of bearing lugs 18, at a point between the guide lugs, which support the inner end of the shaft 13, while the shaft is further supported by a bearing 19, which is formed on a depending arm at the end of the bracket adjacent to that end of the shaft having the handle 14. A gear wheel 20, is rigidly mounted on the shaft, between the bearing lugs 18, and this wheel meshes with a rack bar 21, which lies between the guide lugs 17. The upper end of this rack bar is normally flush with the top of the bracket 15, and its lower end extends a suitable distance below the lower end of the plate 16, and terminates in an arm 22, which extends at right angles to the bar, and is bifurcated at its outer end.

An arm 23, extends at right angles from near the inner end of the shaft 13, and normally maintains an approximately horizontal position, and a similar arm 24, extends at right angles from about the central portion of the shaft, and this arm normally maintains a position approximately midway between a horizontal and a vertical plane. The arm 24, is adapted to be engaged by a latch 25, when the mechanism is set, as in Fig. 3, and this latch is pivotally suspended from a suitable bearing 26, secured to the top of the cabinet. The arm 23, is adapted to engage the horizontal portion of a depending arm 27, which is secured to a horizontally disposed member of a bell crank latch 28, which is pivotally mounted in a bracket 29, secured to the top of the cabinet. The latch member of this bell crank, extends up through a slot 30, in the top of the cabinet, and is adapted to engage and hold a print holding shutter 31, which is hinged to the rear end of a cushioned printing frame 32, when said shutter is pressed down upon said frame. The shutter comprises two plates 33 and 34, which are provided upon their adjoining edges with apertured lugs 35 and 36 respectively, through which passes a rod 37, which connects the two plates in

hinged relation. This rod is encircled by the oppositely coiled portions of a spring 38, the ends of which are secured in apertures in the lugs 36, while the connecting portion of the two coils is formed into a loop 39, which is secured to the forward plate 33, by a screw 40. The tension exerted by the spring 38, is sufficient to normally hold the plate 33, at an angle to the plate 34, and this angle is defined by a stop lug 41, on one of the lugs 35, which engages the adjoining lug 36.

The printing frame is rectangular in form, and lies in a correspondingly shaped opening in the top of the cabinet, and is hinged at its rear end to the top of the cabinet, as shown. Upon the rear end of the frame, is secured a metal plate 42, having a pair of apertured lugs 43, adjacent to each end. An eye bolt 44, is placed between each pair of lugs and a rod 45 is passed through the lugs and bolts. The plate 34 of the print holding shutter is provided at its rear end with lugs 46, having vertical apertures through which the eye bolts 44 pass. Coil springs 47 encircle the bolts and rest upon the lugs 46, and these springs are held under tension by nuts, which are screwed upon the ends of the bolts. Coil springs 48 encircle the rod 45, and the forward end of each spring is secured in an apertured lug 49, near the front edge of the plate, while the opposite ends of the springs engage the plate 42. The tension exerted by the springs 48, normally holds the shutter up and away from the frame, and when the shutter is pressed down upon a glass plate 50, which is supported in the frame flush with its upper face, and upon which the photographic negatives and sensitized paper are placed, its member 34 will first contact with the glass plate, and the member 33 will contact immediately afterward.

The under sides of the shutter members are provided with feet pads 51, which insure an even pressure upon the plate 50, and the springs 47 permit the shutter to adjust itself to the thickness of the material beneath it, so that the pressure on the said material is uniform throughout. The forward end of the frame 32, is normally held at a slight elevation above the top of the cabinet by headed rods 52, which pass through vertical socketed lugs 53, forming an integral part of the bracket 15. Coil springs 54, are interposed between the heads of the rods and the bottoms of the sockets, and similar springs 55 are interposed between the lower ends of the socketed lugs and nuts 56, upon the lower portion of the rods, which may be adjusted to vary or regulate the tension upon the springs, and these rods 52, form yielding or cushion supports for the forward end of the said frame, the object of which will appear later.

A socketed lug 57, is formed on the forward end of the shutter plate 33, through which passes a pusher rod 58, having a knob at its upper end. A pin 59 passes through the rod, within the socket, and a spring 60 is interposed between the said pin and the bottom of the socket, which normally holds the pin up against a cap disk 61, which is secured in the top of the socket by set screws. When the shutter 31, is pressed down upon the glass plate 50, the rod 58 enters the slot 30, and engages the top of the rack 21, which is pushed down thereby turning the gear wheel 20, and with it the shaft 13, carrying the arms 23 and 24, which are given a partial revolution. The arm 24, is engaged by the latch 25, while the arm 23 is moved an equal distance at the same time, and releases the arm 27, which is then lifted by a spring 62, thereby rocking the bell crank latch 28, which passes through an opening 63, in the shutter plate 33, when the plate is depressed, and engages the rear edge of the said opening, thereby holding the shutter down until the latch 28 is rocked to release the shutter, which operation is accomplished in the following manner: To the forward portion of the floor of the cabinet and centrally of its width, is secured an oil controlled valve 64, comprising a main vertical cylinder 65, and a branch cylinder 66, which communicates with the main cylinder near the opposite ends of the same. A base plate 67, forms a closure for the lower end of the main cylinder, and this plate is screwed upon the end of the cylinder and bolted to the floor of the cabinet. A cap 68, having a central aperture, is screwed upon the upper end of the main cylinder. A piston 69, provided with suitable packing rings, is located in the main cylinder, and a rod 70 is secured to the piston and extends through the cap 68, and up through the bifurcated end of the arm 22, at the lower end of the rack bar 21. A cross arm 71 passes through the rod 70, and this arm normally rests upon the bifurcated end of the arm 22, and the piston is thereby maintained in an elevated position. Vertical rods 71^A at the end of the bifurcated arm 22, engage the cross arm 71 and prevent the rod 70 from twisting. An arm 72 projects from the upper end of the rod 70, and when the rod descends, this arm 72 is adapted to engage an arm 73, which projects from the latch 25 into the path of the said arm 72, whereby the said latch is tripped and the arm 24 released, permitting the shaft 13 and gear 20 to be partially rotated by the spring 10^A, through the medium of the rod 9, connecting rod 11, and arm 12. A spring 74 connected at one end to the arm 73, and at the other to the top of the cabinet, normally holds the latch 25 in position to be engaged and moved to one side, by the arm 24, as it ascends, and as the said arm passes the step

portion of the latch, the latch is immediately drawn to its normal position again, by the said spring 74, and the step portion engages the said arm. The latch is limited in its movement toward the arm 24, by a suitable stop at its upper end.

The piston 69 is provided with a vertical aperture or port 75, which extends through it from top to bottom, and a disk valve 76 covers the lower end of the port. This disk valve has a stem 77, which extends down through a guide sleeve 78 projecting from the step portion of a bracket 79, which is secured to the bottom of the piston. A coil spring 80 encircles the valve stem and sleeve, and is interposed between the disk valve and the step. A pin 81, in the base plate, limits the downward movement of the piston, and a pin 82 in the upper end of the piston is designed to contact with the cylinder cap, and define the upward movement of the said piston. A valve tube 83, is sweated or otherwise rigidly secured in the upper end of the branch cylinder 66, and this tube is provided with a narrow triangular port 84, which faces the passage connecting the main and branch cylinders at their upper ends. A cut-off valve 85, is snugly but rotatably mounted in the tube 83, and an annular shoulder 86, is formed on this valve, which rests upon the end of the valve tube 83, and limits the downward movement of the cut-off valve within the tube. The lower portion of the cut-off is tubular and open to the branch cylinder, and a port 87, is formed in the said tubular portion of the cut-off, which is designed to register with the port 84 of the valve tube. A stem 88 is secured to the cut-off and this stem extends up through the top of the cabinet and through the axis of a graduated, semi-circular plate 89, and a pointer 90 is secured upon the end of the stem and is provided with a knob or handle by which the pointer may be turned to any one of the graduations on the plate, which are numbered from 1 to 15, and indicate a corresponding number of seconds. The valve is filled with oil, as shown in Fig. 4, and when the piston is raised, the oil is forced through its port 75, and the instant the piston ceases to move upward, the disk valve 76 is thrown by its spring 80, to close the port 75, and when the piston is permitted to descend it forces the oil up through the branch cylinder and cut-off, whence it passes through the ports 87 and 84 of the cut-off and valve tube respectively, and into the upper end of the main cylinder valve. The time occupied by the descent of the piston is governed by the position of the cut-off port 87, relatively to the port 84. When the two ports exactly register, the piston drops in the shortest period of time indicated on the graduated plate, and as the cut-off is turned so that

the rear edge of its port 87, approaches nearer and nearer to the narrow end of the triangular port 84; the area of the exit formed by the two ports is gradually contracted, the oil passes more slowly from the branch cylinder into the main cylinder, and consequently the piston descends at a corresponding ratio. A vent tube 91, is screwed in the upper end of the valve where the main cylinder and branch cylinder communicate.

In the practical operation of the device, the casing or chamber 5 is provided with a suitable lighting medium, such as an electric or acetylene lamp, and before actual printing is commenced, experimental tests are made to ascertain the light power, and the probable length of exposure required for the character of work in hand, and this is accomplished by placing the negative on the glass plate of the printing frame, and operating the handle 14, which turns the shaft 13, and gear wheel 20, which causes the arm 24 to engage the latch 25, and lowers the rack bar 21, with its arm 22, which supports the cross arm 71 and holds the rod 70 and piston 69 in an elevated position. At the same time the arm 12, draws upon the connecting rod 11, which opens the door 8, and permits the light from the chamber 5 to shine into the cabinet, and upon the negative, the tone of which determines the probable length of exposure necessary for the best results. Meanwhile, the piston descends, until the arm 72 engages the arm 73, by which the latch 25 is tripped, and the parts of the mechanism and the piston are restored to their normal position, and the door 8, is closed to shut out the light from the cabinet, this being accomplished by the spring 10^A acting upon the hinge rod 9, connecting rod 11 and arm 12. In this test work the print holding shutter 31 is left open so that the operator may look through the glass plate 50, but when the probable length of time has been ascertained, and the pointer 90 set accordingly, the negative or negatives with the sensitized paper are placed upon the glass plate 50, and the shutter 31 is pressed down upon them, and in doing this the operation above mentioned is repeated, only it is now effected by the engagement of the end of the pusher rod 58, with the rack bar 21, which partially rotates the gear wheel 20 and shaft 21, locking the arm 24 to the latch 25, and lifting the arm 23 from the arm 27, which is immediately lifted by the spring 62, whereby the latch 28 is rocked to engage the plate 33 of the print holder, but not until after the said latch has passed through the opening 63 in the said plate. The door 8, opens in the manner above stated, and stands at such an angle as to throw the light from the chamber 5 directly up against the glass

plate 50, and at the expiration of the time indicated by the pointer 90, the piston reaches the limit of its downward movement, the latch 25 is tripped by the arm 72, as above described, and arm 23 engages arm 27, which rocks the latch 28 and releases the print holder.

When the print holder or shutter is pressed down, it also depresses the forward end of the printing frame 32, upon the cushioning rods 52, and as the said frame is under tension, it insures perfect contact of the same with the print holder and consequently of the negatives with the sensitized paper; and as the said shutter is released and flies up under the action of its springs 38 and 48, the frame 32 under the upward pressure of its springs 54 will follow it, thus keeping the negatives and sensitized paper firmly pressed together until after the light has been cut off by the closing of the door 8. The spring 55, modifies the action of the springs 54 upon the cushioning rods 52, and when the shutter 31 is thrown open by the action of its springs 38 and 48, it is retarded in its upward movement, and brought gradually to a stop, by means of an ordinary pneumatic cushioning cylinder 92, which is pivoted at one end to a post 93, secured to the top of the cabinet, while its piston rod 94 is pivotally attached to a bifurcated lug 95, near the forward end of the shutter plate 34. A strip 96, having slideway grooves, is secured upon each side of the bottom of the printing frame 32, in which the vignetting sheets are slipped and supported, and the frame may be lifted for this purpose by a knob 97. A segmental arm 98 is also secured adjacent to one side of the door 8, and this arm is provided with a segmental slot 99, in which a guide pin 100, secured to the door 8, travels, and serves to steady the movement of the door as it opens and closes. The said door being covered with fabric, is light and easily operated, and the felt strip 7, surrounding the opening 4, not only serves to exclude the light when the door is closed, but also cushions the impact of the door and deadens the sound which would otherwise be caused thereby.

The device herein described, provides for accurate, variable, time exposure printing from photo-negatives and the like, and insures a uniform exposure for any desired number of prints for any desired period of time for which the operating valve is set.

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

1. In a photo-printing machine as specified, the combination with a cabinet; a printing frame in the top of the cabinet, and hinged at its rear end to said cabinet; resilient supports for the front end of said frame, and a two-part print holding shutter hinged

to the rear end of said frame; of a spring operated latch for said shutter; a shaft; an arm carried by said shaft which normally holds said latch in an inoperative position; means for turning the shaft when the shutter is closed, whereby the said arm releases the latch, which immediately engages and holds the shutter; a second arm on said shaft; a latch in the path of said arm, which engages the same when the shaft is turned; an automatically operating gravity device for tripping said second latch at a predetermined time; a spring for reversing the shaft, whereby the shutter latch is moved to release the shutter; springs for throwing the shutter up; and means for cushioning its movement.

2. In a photo-printing machine as specified, the combination with a cabinet having a hinged printing frame in its top, and a print holder hinged to said frame; of a spring-operated latch adapted to engage the forward end of said print holder; a shaft; a gear wheel on the shaft; a rack bar in mesh with the gear wheel; an arm carried by said shaft which normally holds the latch in an inoperative position; a second arm on the shaft; means for depressing the rack bar, when the print holder is closed, whereby the shaft is turned and the said print holder is engaged by its latch; a latch in the path of the second arm which engages the same when the shaft is turned; a gravity device for automatically tripping said latch at a predetermined time; a spring for reversing the shaft and rack bar whereby the print holder is released; and springs for throwing up the said holder.

3. In a photo-printing machine as specified, the combination with a cabinet, having a hinged printing frame in its top, and a print holder hinged to said frame; of a spring operated latch adapted to engage said print holder; means for normally holding said latch in an inoperative position; means operated by the print holder when closed, for releasing said holding means, whereby the latch engages the print holder, and for operating said holding means for moving said latch at a predetermined time to release the print holder; and means for throwing the print holder up, when released from the latch.

4. In a photo-printing machine as specified, the combination with a cabinet having at its top a hinged printing frame, resiliently supported at its free end; a print holding shutter hinged to said frame, and springs for normally holding said shutter up; of a spring-operated latch for said shutter; a shaft; a gear wheel on the shaft; a rack bar in engagement with the gear wheel; a hand-operated pusher rod on said shutter which depresses said rack bar, when the shutter is closed, and partially rotates the

shaft; an arm carried by the shaft, which normally holds the latch in an inoperative position but releases the same to engage the shutter when the shaft is turned; a second arm carried by the shaft; a spring controlled latch in the path of said second arm; a gravity valve having a piston rod; an arm carried by the rack bar for normally holding said piston rod elevated; an arm carried by said piston rod for tripping said last mentioned latch, when said rod descends; a spring for restoring the shaft to its normal position, whereby the shutter is released and flies back; and means for retarding or accelerating the movement of the piston rod.

5. In a photo-printing machine as specified, the combination with a cabinet, of a printing frame in an opening in the top of said cabinet, and hinged at its rear end to said cabinet; resilient supports for the front end of said printing frame, which normally hold said frame at an inclination to a horizontal plane; a two-part padded shutter hinged upon the rear end of said frame; springs for normally holding the shutter open; a spring operated latch for engaging said shutter when closed; and means for automatically tripping said latch to release the shutter at a predetermined time.

6. In a photo-printing machine as specified, the combination with a cabinet, of a printing frame hinged at its rear end in an opening in the top of said cabinet; spring-supported rods beneath the forward end of said printing frame, which normally elevate said forward end; a print-holding shutter hinged to the rear end of said frame; springs for normally holding said shutter open; a spring operated latch for engaging said shutter when closed; and means for automatically tripping said latch to release the shutter at a predetermined time.

7. In a photo-printing machine as specified, a cabinet; a light receiving chamber on the rear end of said cabinet; a spring-operated door which normally closes communication between the cabinet and light chamber; a printing frame hinged at its rear end in an opening in the top of the cabinet; resilient supports beneath the front end of the frame, which normally hold the same at an elevation; a print-holding shutter hinged to the rear end of the frame; springs for normally holding said shutter up and away from the frame; a spring operated latch for holding the shutter when closed against the frame; means for automatically tripping the latch to release the shutter at a predetermined time; and means for opening the door of the light chamber simultaneously with the latching of the shutter.

8. In a device as specified, the combination with a cabinet; a hinged printing frame in the top of the cabinet; resilient supports for the forward end of the frame; a print

holding shutter hinged at its rear end to said frame, and springs for normally holding said shutter up and away from the frame; of a spring controlled latch for holding the shutter in contact with the frame; means for tripping the latch; a gravity device for operating the tripping means; and means for retarding or accelerating the movement of the gravity device.

9. In a device as specified, the combination with a cabinet; a hinged printing frame in the top of the cabinet; resilient supports for the forward end of the frame; a print holding shutter hinged to the rear end of the frame; a latch for holding the shutter against the frame and springs for exerting an upward pull upon the shutter; of means for tripping the latch comprising a revoluble member; an arm carried by said member; means for partially revolving said member, simultaneously with the latching of the shutter; a latch for engaging said member when thus revolved; means for tripping the latter latch at a predetermined time; and a spring for restoring the revoluble member to its normal position, whereby the arm carried thereby trips the shutter holding latch.

10. In a device as specified, the combination with a cabinet; a printing frame in the top of the cabinet hinged at its rear end; resilient supports for the front end of said frame; a print holding shutter hinged at its rear end to said frame; springs for normally holding said shutter up and away from the frame; a spring controlled latch for holding said shutter against the frame; a light receiving casing communicating with the cabinet; and a spring-controlled door for normally closing said casing; of means for tripping the shutter latch, comprising a shaft; an arm carried by the shaft, which normally holds the shutter latch inoperative; means for turning the said shaft to lift the arm and free the latch simultaneously with the closing of the shutter; a second arm on the shaft; a latch for engaging said second arm when the shaft is turned; a connecting rod attached to the door of the light chamber and to a crank on said shaft; a gravity valve for automatically tripping the latter latch at a predetermined time, whereby the shaft is reversed by the spring of the light chamber door, and the shutter latch thrown to release the shutter; and means for accelerating or retarding the movement of the gravity valve.

11. The combination with a cabinet as specified; a printing frame in the top of the cabinet; a print holding shutter hinged to the said frame; springs for normally exerting an upward lifting tension on the shutter; and a spring controlled latch for engaging the shutter when closed; of mechanism for freeing the latch at a predetermined time, comprising a shaft; a gear wheel on

the shaft; a rack bar in mesh with the gear wheel; a radially disposed arm carried by the shaft in normal contact with the shutter latch to hold it out of operative position; a manually operated push rod on the shutter for depressing the rack bar to turn the shaft and free the shutter latch; a second arm carried by the shaft; a latch to engage said second arm when the shaft is turned; a gravity device for tripping the latter latch, comprising a pair of communicating cylinders containing a suitable liquid; a piston in one of said cylinders, having a vertical port; a valve for closing the lower end of said port; a piston rod extending up from said piston; an arm carried by the rack bar for engaging said piston rod and normally holding the piston elevated, and which frees the piston when the rack-bar is depressed; an arm at the upper end of the piston rod for tripping the said latter latch when the piston descends; a cut-off in the opposite cylinder for regulating the flow of the circulating liquid as the valve descends; a rod connected with the cut-off and extending above the top of the cabinet; a graduated plate on said cabinet; a pointer on the rod, above the graduated plate; and a spring for restoring the shaft to its normal position when the latter latch is tripped.

12. In a photo-printing cabinet as specified, the combination with a hinged print holding shutter; springs for normally holding said shutter open and a spring operated latch for holding the shutter when closed; of a releasing mechanism for the latch, comprising a shaft; a gear wheel on the shaft; a rack bar in engagement with the gear wheel; an arm at the lower end of the rack bar; an arm on the shaft for engaging the latch; a second arm on the shaft; a latch for engaging the second arm; means for tripping the latter latch, comprising a liquid-controlled gravity valve having a piston and piston rod, said rod being in position to engage and trip the said latch on its descent, and being normally supported by the rack bar arm; means for retarding or accelerating the movement of the valve; means for depressing the rack bar simultaneously with the closing of the shutter, whereby the shaft is partially rotated and held by the engagement of the last mentioned latch with the said second arm of the shaft, and the piston is released; and a spring for restoring the shaft to its normal position, whereby the shutter latch is operated to release the shutter.

13. In a photo-printing cabinet, the combination with a spring operated print holding shutter; a latch for said shutter; and means for tripping said latch; of means for operating said tripping means at a predetermined time, comprising a liquid controlled gravity valve having a piston and

a piston rod in coöperative relation to said tripping means; means for normally supporting the piston and rod in an elevated position, and for releasing the piston simultaneously with the closing of the shutter; means for elevating the piston simultaneously with the release of the said shutter; and means for retarding or for accelerating the movement of said piston.

10 14. In a photo-printing cabinet as specified, the combination with a printing frame hinged at its rear end; of resilient supports for the front end of said frame; parallel slide-ways on the under side of the frame;
15 a hinged spring-operated print holding shutter in coöperative relation to said frame; a latch for holding said frame when closed; and means for tripping the latch at a predetermined time to release the shutter.

20 15. The combination with a photo-printing cabinet, having a hinged printing frame; of a print-holding shutter comprising a pair of plates united by a hinge connection; a yielding hinge connection between the rear
25 end of the rear plate, and the rear end of said frame; springs for lifting said shutter; springs for swinging the forward plate of the shutter upon the rear plate; a latch for holding said shutter down upon the frame;
30 resilient supports for the front end of the frame; and means for releasing the latch at a predetermined time.

35 16. The combination with a photo-printing cabinet, having a hinged printing frame; of a print-holding shutter comprising a pair of plates united by a hinge connection; a spring for lifting the forward plate relatively to the rear plate; apertured lugs on

the rear plate; eye bolts pivotally attached to the rear end of the frame, which pass 40 through said apertured lugs; adjusting nuts on the ends of the bolts; springs on said bolts interposed between said apertured lugs, and the nuts, and a spring for raising said shutter; a latch for holding the shutter in contact with the frame; resilient supports for the front end of the frame; parallel slide-ways on the under side thereof; and means for releasing said latch at a predetermined 50 time.

17. In a photo-printing machine as specified, the combination of a suitable supporting cabinet provided with a hinged print-holding shutter; tension springs attached to said shutter and arranged to hold said shutter normally in an opened position; and a spring-operated bell-crank latch attached to said cabinet in the closing path of said shutter and arranged to connect to said shutter 55 and to releasably hold said shutter against the resilient tension of its tension springs, with a rotatable arm for normally engaging the latch and holding it out of operative position; means for moving said arm and releasing the latch simultaneously with the 60 closing of the shutter; means for holding the arm when the shutter is latched; and means for automatically releasing the arm at a predetermined time. 65

In testimony whereof I affix my signature 70 in presence of two witnesses.

JAMES F. WARE.

Witnesses:

G. SARGENT ELLIOTT,
ADELLA M. FOWLE.