(No Model.) 3 Sheets—Sheet 1.

J. F. RADERS.

AUTOMATIC PHOTOGRAPHING MACHINE.

No. 581,998. Patented May 4, 1897.

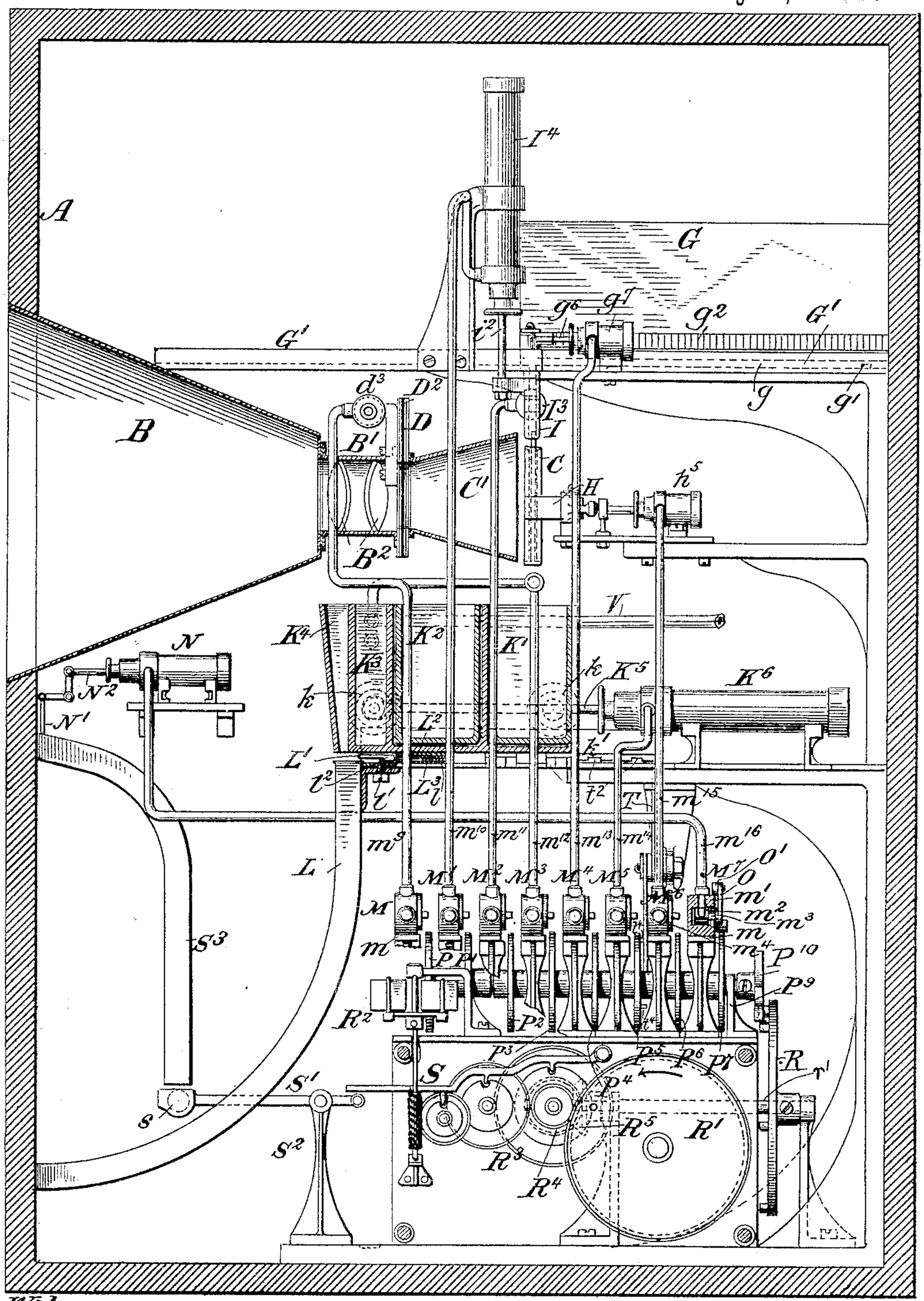


Fig. 1.

Witnesses:-
D. F. Hayward
Pierson & Fells

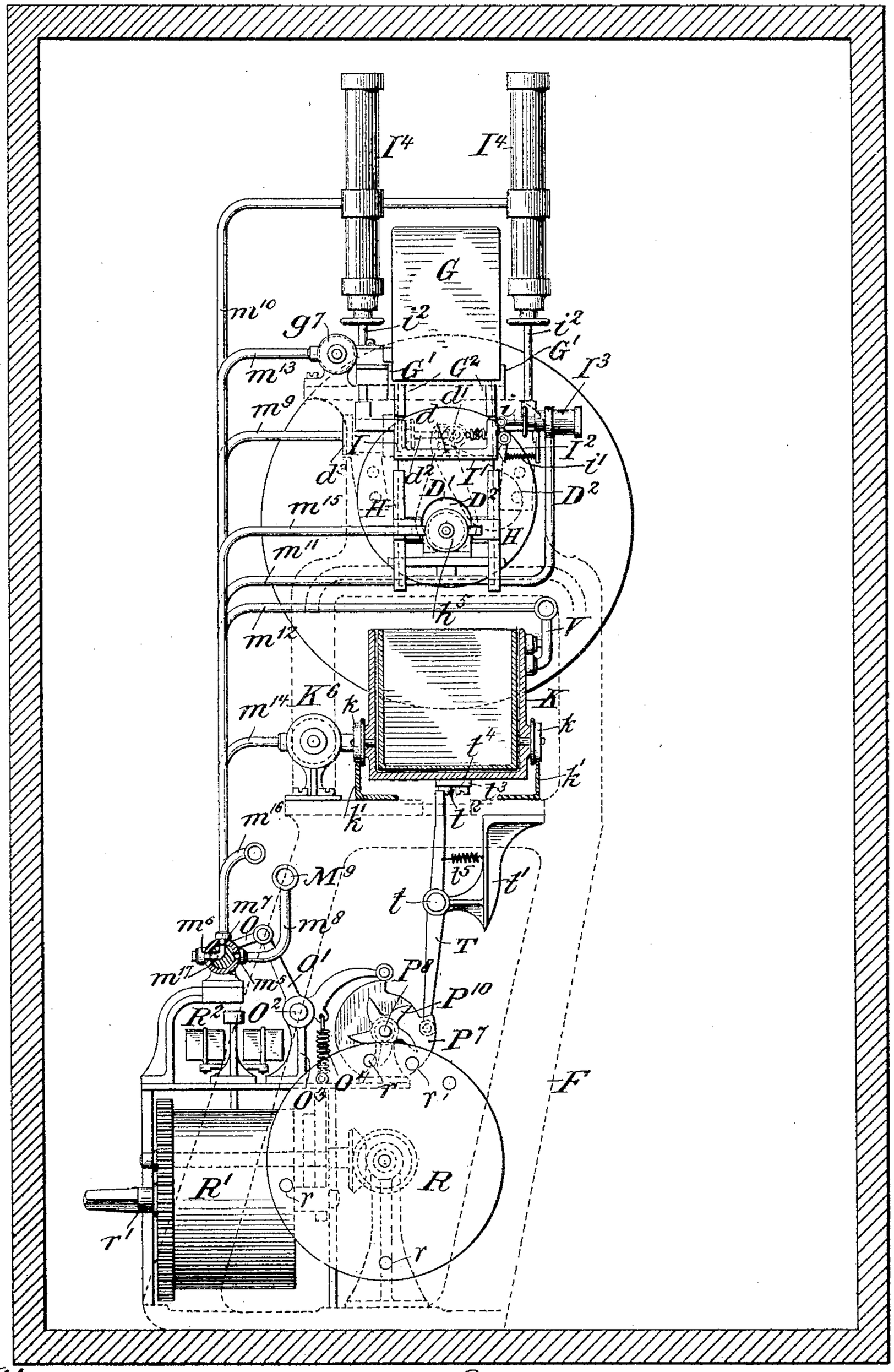
Inventor:- Joseph F. Raders,
by his attorney, Edwin H. Brown

(No Model.) 3 Sheets—Sheet 2.

J. F. RADERS.

AUTOMATIC PHOTOGRAPHING MACHINE.

No. 581,998. Patented May 4, 1897.



Witnesses:-
D. N. Fayrora
Pierson L. Wells

Fig. 2,

Inventor: Joseph F. Raders,
by his attorney, Edwin H. Brown

(No Model.) 3 Sheets—Sheet 3.

J. F. RADERS.

AUTOMATIC PHOTOGRAPHING MACHINE.

No. 581,998. Patented May 4, 1897.

Fig. 5.

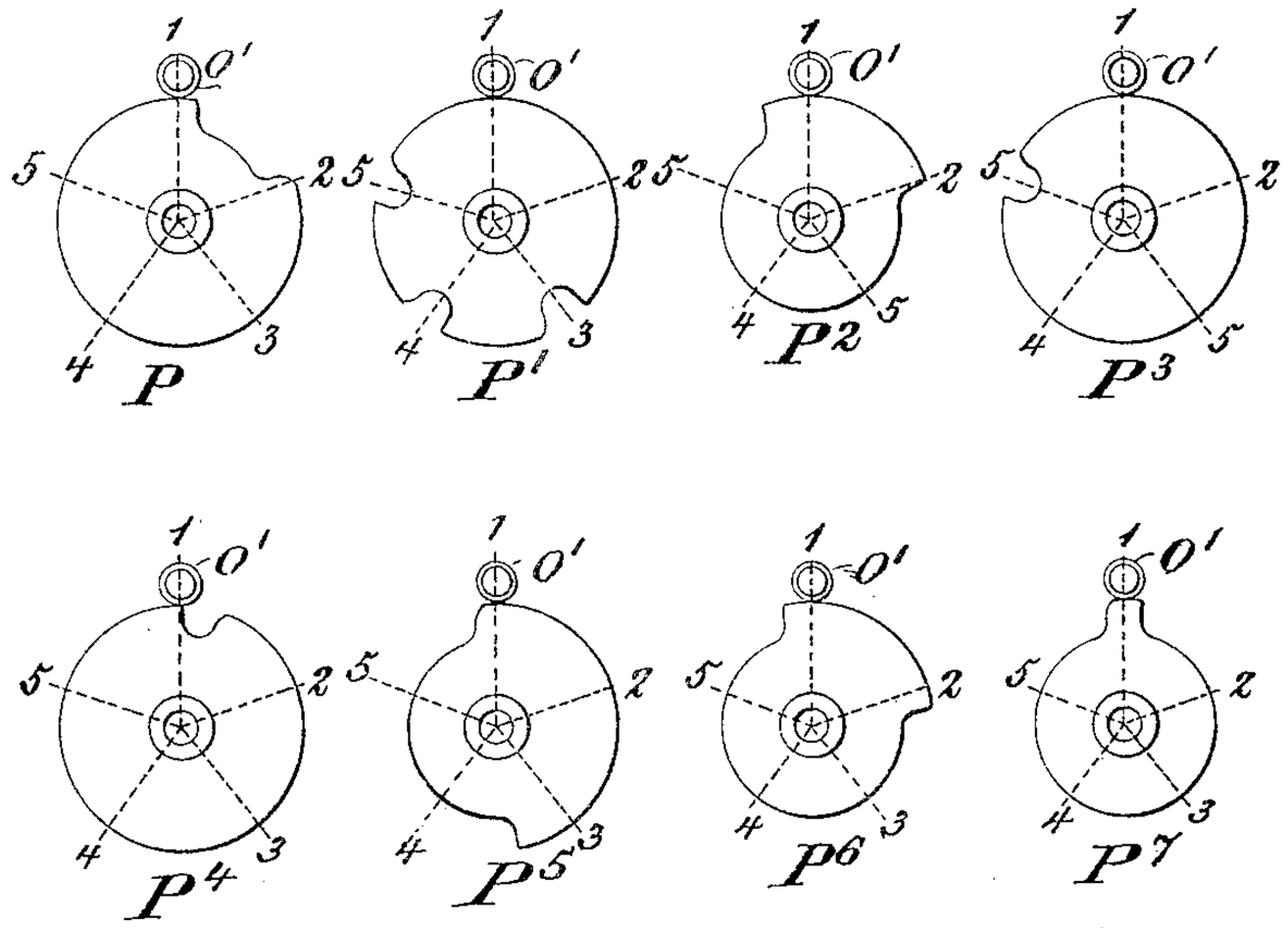


Fig. 3.

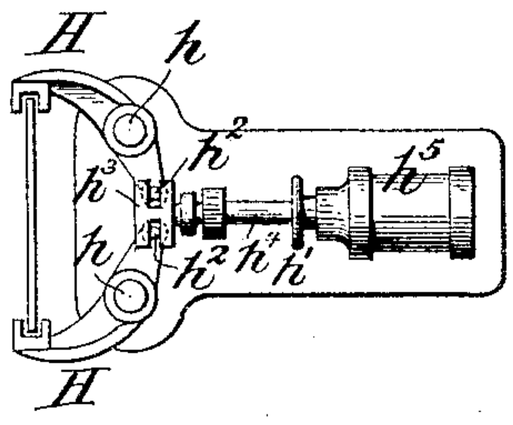


Fig. 6.

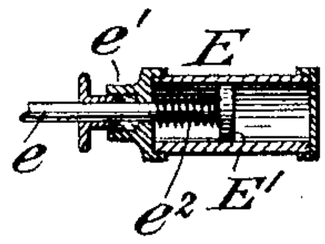
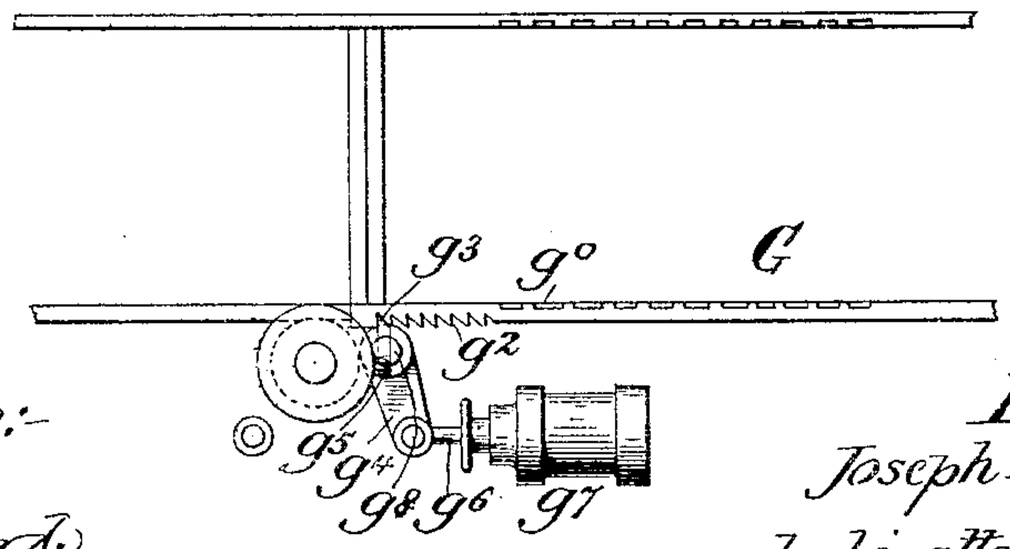


Fig. 4.



Witnesses:-

D. F. Naymond

Pierson L. Wells.

Inventor:-

Joseph F. Raders,

by his attorney,

Edwin H. Brown

UNITED STATES PATENT OFFICE.

JOSEPH F. RADERS, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE AUTOMATIC PHOTOGRAPHIC MACHINE COMPANY, OF WEST VIRGINIA.

AUTOMATIC PHOTOGRAPHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 581,998, dated May 4, 1897.

Application filed January 5, 1895. Serial No. 533,926. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH F. RADERS, of the city, county, and State of New York, have invented a certain new and useful Improvement in Automatic Photographing-Machines, of which the following is a specification.

My invention has for its object the production of an automatic photographing-machine in which the action of the various operative mechanisms are in part controlled by a suitable fluid under pressure as distinguished from rigid connections.

The invention further provides, in combination with the foregoing, a motor of any suitable construction which is adapted to so control and regulate the flow of the fluid under pressure to the various operative parts that the latter shall perform their several functions in their proper sequence. Means are also provided by which the operative parts of the machine are set in motion by the insertion of a coin of proper value.

I will describe an automatic photographing-machine embodying my improvement, and then point out the novel features in the claims.

In the accompanying drawings, Figure 1 is a sectional elevation taken on a plane parallel to the side of the machine. Portions, however, are in this figure shown in full side view. Fig. 2 is a rear view of the machine, the rear wall of the inclosing case being removed and some parts being shown in section. Fig. 3 is a plan view of a plate-holder comprising a pair of jaws and means for operating the same comprised in the improvement. Fig. 4 is a plan view showing an approved method of imparting to the plate magazine or box a step-by-step forward movement. Fig. 5 is an outline view of a series of cams and their coacting parts. Fig. 6 is a longitudinal section showing the construction of an engine which may be utilized for actuating any of the mechanisms comprised in the machine.

Similar letters of reference designate corresponding parts in all the figures.

As my invention is directed toward the production of various mechanisms and devices which are necessary for the purpose of carrying a sensitized plate through the various operations and movements incident to the production of a completed photograph and its delivery to the outer portion of the machine and the adaptation of these parts as well to enable them to be operated in part by a suitable fluid under pressure I have shown such parts as are essential to my invention in detail. Other parts to which my invention does not relate are not so shown or are omitted altogether.

A is the inclosing box or chamber, within which the mechanisms and devices constituting the improvement are contained. It may be of any suitable shape or material and is provided in one of its walls with an inwardly-convergent tube or light shaft B. A lens-tube B′ may be secured to the inner or smaller end of the light-shaft B and carries a suitable lens or arrangement of lenses B^2. The light-shaft B is preferably convergent inward or cone-shaped, as this form will assist in the concentration of the light upon the lens B^2 and permit of a considerable variation in the height of the subject posing in front of its outer orifice.

A plate-holder C is arranged at the rear of the lens B^2 at such a distance therefrom that the image of the subject situated at a convenient distance in front of the orifice of the light-shaft B will be properly formed upon the sensitized plate contained within the plate-holder. A divergent tube C′ may be secured at the rear of lens-tube B′ and extended rearward to the vicinity of the plate-holder C.

D is a shallow box placed immediately at the rear of the lens-tube B′. It may be secured to the lens-tube, while the divergent tube C′ may be attached to its opposite face. The box D is provided with an opening D′ in the extension of the focal-axis of the lens B^2, the opening being controlled by a suitable shutter D^2, here shown as being sector-like in form and pivoted at its end portion within the box D by a pin *d*. The shutter D^2 is provided with an arm *d′*, extending on the side of the pin *d* opposite to that on which the main body of the shutter is situated and suitably connected with the piston-rod d^2 of an engine d^3, supported on one of the walls of the box D.

In the present instance for controlling the movements of the operative mechanisms I have shown engines which are provided with reciprocating pistons whose piston-rods are in direct engagement with the moving part or parts of the various mechanisms. These cylinders may be of the general construction represented in Fig. 6, in which E is a cylinder, E′ the reciprocating piston, *e* the piston-rod, attached to the piston and passing outward through a suitable stuffing-box *e′* at the end of the cylinder. A spring e^2 may be utilized to return the piston to one end of its stroke. It is designed that the piston shall be moved in the direction opposite to that in which it is forced by the spring by a suitable fluid under pressure admitted to the cylinder, which after performing its function in moving the piston to the end of its stroke will be exhausted through a suitable duct or passage.

I do not wish to be limited to the use of a spring as a retractive device, however, as other means or equivalents may be employed. For instance, a weight may be attached to the moving part by a cord running over suitable pulleys, or the spring may be placed outside the cylinder.

Any suitable fluid under pressure may be utilized for moving the pistons—for instance, air or water, but I prefer air, making the machine thereby throughout pneumatically operated.

A convenient framework or standard F is supplied for carrying and supporting the various parts of the machine.

G is a plate magazine or box carrying the supply of sensitized plates. It may consist of an oblong box whose interior transverse dimensions correspond with the dimensions of the plates. The plates may be fitted in grooves g^0, provided in the sides of the box to maintain them in an upright position.

G′ G′ are guideways or tracks on which the magazine G may slide to and fro.

G^2 is a chute secured below the magazine G, but independent therefrom and serving to direct the downwardly-moving plate from the magazine G to its proper position relatively to the lens B^2, where it is held by the plate-holder C, presently to be described.

For the delivery of the plates from the magazine G one after another I contemplate in the present instance giving to the magazine a step-by-step movement, the distance the magazine is carried at each step corresponding to the distance between the plates in the magazine. The magazine G is provided with an independent bottom plate *g*, which is prevented from moving with the magazine G by a stop *g′*, and consequently as the magazine is moved forward the plates will be delivered to the chute G^2 in succession, descending through the latter to the plate-holder C.

I have shown a convenient way of imparting to the magazine G a step-by-step movement. Its outer surface is provided with a series of ratchet-teeth g^2, (see Fig. 4 more especially,) with which engages a finger g^3, fitted into a suitable opening in a pivoted lever g^4 and thrust into engagement with the teeth g^2 by a spring g^5. The piston-rod g^6 of a cylinder g^7 is adapted to swing the lever g^4 about its pivot or fulcrum point g^8. It is evident that a reciprocation of the piston-rod g^6 will impart to the magazine G an intermittent or step-by-step forward motion.

II II are retaining-jaws forming the plate-holder C and serving to grasp the plate as it descends through the chute G^2 and hold the same at the rear of the lens B^2. The jaws are pivoted by pins *h h* to a supporting-plate *h′*, which is itself carried by a suitable appurtenance of the supporting-framework F. The inner ends of the pivoted jaws II II may be provided with pins h^2 h^2 to engage with a notched plate h^3, carried at the extremity of the piston-rod h^4 of cylinder h^5. An outward movement of the piston of the cylinder h^5 will effect a disengagement of and an inward movement of the same will effect an engagement with a plate interposed between the jaws H II.

I is a carrier, whose purpose is to depress and to withdraw the exposed plate into and out of the several solutions necessary for its development, fixing and washing, and finally to deliver the plate to a delivery-chute. It will be seen to comprise a slotted frame I′, through which the plate may move, and a holding-dog I^2, which is pivoted to the side of the frame and may be swung into and out of the slot to pinch the edges of the plate against the frame holding the plate or disengaging it from the plate entirely.

I^3 is a cylinder carried by the frame I′, whose piston-rod *i* engages with an arm of the pivoted holding-dog I^2 to swing the dog into and out of the slot of the frame I′. A spring *i′* may be used to insure the withdrawal of the dog I^2 from the slot.

I^4 I^4 are upright cylinders attached to a stationary bracket and having piston-rods i^2 i^2, which engage with and give the carrier I a vertically-reciprocating motion.

The movements of the jaws II II, the frame I′ and the holding-dog I^2 are so timed that the dog will have forced the edges of the plate against the sides of the slot of frame I′ before the jaws II II have relinquished their hold upon the sides of the plate.

K is the movable bath or vessel for holding the various fluids to develop, fix, and wash the exposed plate. It is shown in the form of a box comprising four compartments K′ K^2 K^3 K^4. The developing and fixing solutions may be placed directly in compartments K′ and K^2, respectively, but I prefer to use separate cells for containing the solutions and insert the cells in the compartments.

The movable bath K is provided with suitable rollers *k k k k*, which travel upon a suitable track which may consist of the upturned leg of angle-irons *k′ k′*. The piston-rod K^5

of cylinder K^6 serves as a convenient means for causing the reciprocation of the bath K. The compartment K^3 contains the washing-water, while the last compartment K^4 receives the washed and finished plate, from whence it passes to the delivery-chute L. The compartment K^4 is provided with a slide L′, forming the bottom of the compartment, which may be moved to one side, permitting the developed and washed plate to fall through. This displacement of the slide L′ takes place when the compartment K^4 is directly above the mouth of chute L. The slide L′ is provided with a tongue L^2, which enters a recess in a block L^3, secured to the under surface of the bath K. A spring l continually presses the tongue L^2 outward, tending to close the opening through the bottom of the compartment K^4. A stop l' is interposed in the path of a shoulder l^2, provided on the slide L′.

The impetus of the bath K as it moves forward with the finished plate in compartment K^4 under the influence of the spring of cylinder K^6 or other retractive device is sufficient as the stop l' and shoulder l^3 engage to compress the spring l, carrying the slide L′, from under the compartment K^4, when the plate passes downward to the delivery-chute L and thence outward.

I have shown a series of valves M M′ M^2 M^3 M^4 M^5 M^6 M^7 for controlling the flow of the motive fluid to and from the several cylinders for actuating the various mechanisms comprised in the machine. In the present instance I have shown a separate valve for each cylinder. Each valve may be carried on a bracket m, supported in any suitable manner. Each valve comprises a chambered block m', within which is fitted a rotary plug m^2, provided with a stem m^3. A cover-plate m^4 may be provided to inclose the plug m^2 within the block m'. Each valve-block m' is provided with three ports m^5 m^6 m^7, one, (see Fig. 2,) in the present instance m^7, being at the top, while the remaining two, m^5 m^6, are at opposite sides of the block. The port m^5 at the inner side of the valve-block m' of each of valves except valve M^3 is continued through a suitable conduit m^8 to a supply-chamber M^9, containing the motive fluid under pressure. The port m^6 at the opposite side forms the exhaust, while the port m^7 at the upper portion of the block is continued upward through a suitable conduit to the corresponding cylinder.

As illustrated, port m^7 of valve M is continued through a conduit m^9 to the cylinder d^3, whose piston actuates the shutter D^2. Port m^7 of valve M′ is continued through a conduit m^{10}, which branches at its upper end and enters cylinders I^4 I^4, whose pistons actuate the carrier I. Port m^7 of valve M^2 is continued through a conduit m^{11} to the cylinder I^3, whose piston actuates the dog I^2. Part of this conduit will consist of flexible tubing to permit of the vertically-reciprocating movement of the cylinder I^3 as it moves to and fro with the carrier I. Port m^7 of valve M^3 is continued through a conduit m^{12} to the water-compartment K^3 of the bath K. A portion of this conduit will also preferably consist of a flexible tubing to permit of the reciprocation of the bath. Port m^7 of valve M^4 is continued through a conduit m^{13} to the cylinder g^7, whose piston actuates the plate-magazine G. Port m^7 of valve M^5 is continued through a conduit m^{14} to the cylinder K^6, whose piston actuates the bath K. Port m^7 of valve M^6 is continued through a conduit m^{15} to the cylinder h^5, whose piston actuates the jaws H H. Port m^7 of valve M^7 is continued through a conduit m^{16} to a cylinder N, whose piston may be utilized to actuate a slide N′ to control the slot or opening for the insertion of a coin. This slide may consist of a swinging arm, to which the piston-rod N^2 of the piston with which the cylinder N is supplied engages to shift the slide across the slot-opening to prevent the insertion of a second coin while the machine is in process of finishing an exposed plate. After the plate has been delivered the slide N′ will be swung to one side away from the slot-opening.

The rotary plug m^2 comprised in each valve is provided with an angular passage m^{17} extending through it, which at one end of the movement of the plug will throw the ports m^6 and m^7 into communication and at the other end of its movement will throw the ports m^7 and m^5 into communication. Hence when the plug m^2 of either of the valves M M′ M^2 M^3 M^4 M^5 M^6 M^7 is moved to one end of the movement pressure will be admitted to the corresponding cylinder, while at the opposite end of its movement the motive fluid will be exhausted from the cylinders, the piston of which will be returned to its normal position under the influence of the spring or other retractive device.

For the purpose of operating the plugs m^2 of the various valves I have supplied the stem m^3 of each plug with a lever-arm O, whose free end is pivoted to one arm of an elbow-lever O′. There are as many of these elbow-levers O′ and lever-arms O as there are stems m^3; but for the sake of clearness in Fig. 1 I have shown but one, but it will be understood that there is one for operating each plug m^2. These elbow-levers O′ are fulcrumed to a shaft O^2, carried in suitable brackets O^3 O^3, supported by the machine. The outer end of the free arms of each elbow-lever O′ is brought into engagement with the periphery of a suitable peripheral cam by a spring O^4. I have shown eight of these cams, one for actuating each elbow-lever O′ and consequently each plug m^2. Cam P operates the plug m^2 of valve M, cam P′ that of valve M′, cam P^2 that of valve M^2, cam P^3 that of valve M^3, cam P^4 that of valve M^4, cam P^5 that of valve M^5, cam P^6 that of valve M^6, and cam P^7 that of valve M^7.

P^8 is the cam-shaft to which the several cams are affixed. It rotates in suitable bear-

ings P^9 P^9 and is given an intermittent forward motion through the medium of a star-wheel P^{10}, attached at its extremity.

As the proper operation of the mechanisms comprised in the present invention will necessitate five distinct periods of rest, including that in which the parts have assumed their normal positions, comprising the exposure, the retention in the developing solution, the retention in the fixing solution, the washing and the return to the normal position assumed after the final deposition in the receiving-compartment of the bath K, and the movement of the bath forward depositing the finished plate into the delivery-chute L, I have divided the complete rotation of the cam-shaft P^8 into five separate steps, separated by periods of rest. Consequently the star-wheel P^{10} will comprise five fingers or arms.

R is a disk provided with a series of pins *r*, in the present instance comprising five, projecting from the inner radial face, the pins being adapted to contact with and impart to the star-wheel P^{10} an intermittent motion as the disk is rotated. These pins may be made adjustable, if desired, whereby ready means are offered for regulating the length of the periods of rest of the cam-shaft P^8.

I have shown a suitable motor for rotating the disk R. It is seen to comprise a drum R′, within which may be coiled a spring (not shown) in the usual manner, a regulator R^2, a train of intermediate gearing R^3, and a pair of bevel-wheels R^4 R^5, for transmitting motion to the shaft *r*′ of the disk R. I have shown this form merely for illustration, but I do not wish to be confined to its use, as other forms and arrangements of driving mechanisms or motors may be advantageously utilized without departing from the spirit of my invention.

S is a detent fitting into a notch or into notches of one or more of the moving parts of the motor, and when so engaged locking the same from movement. It may consist of a pivoted bar with one or more teeth. At its free end it extends immediately above one arm of a double-armed lever S′, pivoted to a standard S^2. The opposite arm of the double-armed lever S′ is provided with a pocket *s*, which is placed immediately below the lower end of the coin-chute S^3. Normally the lever S′ is in a horizontal position, but when a coin is received through the chute S^3 and drops into the pocket *s* the lever S′ becomes overbalanced, the end carrying the coin descends, the opposite end ascends, raises the detent-lever S, disengages the motor, which thereupon rotates the disk R and actuates the cam-shaft P^8. When the teeth of the detent-lever S are again in alinement with the notches provided for them, they reënter the same, locking the motor from further movement. The coin has in the meantime descended until the floor of the pocket *s* has assumed a horizontal or slightly-inclined position, when the coin rolls out through the open end of the pocket *s* and drops into the casing A. The lever S′ then assumes its normal position.

T is a vibrating lever forming a latch fulcrumed at *t* to a pin carried by a bracket *t*′, attached to the framework F. Its upper end is adapted to enter and withdraw from notches t^2, provided in a plate t^3, secured to the under side of the bath K. Its lower end contacts with pins or studs t^4 t^4, provided on the cam P^5, which operates to throw the upper end of the lever T out of engagement with the slots of plate t^3, while a spring t^5 is applied to withdraw it into engagement with the slots.

I have shown in Fig. 5 the several cams removed from their shaft and have also divided the angle subtended by the arc traced by any point on the cam during a complete revolution of the latter—namely, three hundred and sixty degrees—into five equal parts, representing the five successive movements during the intermittent movement of the cam-shaft. Thus 1 2 represent the movement during the first fifth of the full rotation; 2 3, that during the second fifth; 3 4, that during the third fifth; 4 5, that during the fourth fifth, and 5 1 that during the last fifth. I have also shown the free end of each elbow-lever O′ in the position which it assumes in the machine relatively to its respective cam.

With the assistance of the figure the operation and sequence of movement may be described as follows: Assuming that a coin has been deposited in the coin-slot, has descended the chute S^3, and passed into the pocket *s*, thus disengaging the motor in the manner already described, the disk R revolved, and the first pin *r* of the same contacts with one of the fingers of the star-wheel P^{10}. Before any movement has taken place the cams and ends of elbow-levers O′ are in the relative positions shown in Fig. 5. During the first fifth of the complete rotation of the cam-shaft P^8—namely, from 1 to 2—which terminates after the first pin has passed out of contact with the first finger of the star-wheel, cam P operates to rotate the plug m^2 of valve M to open communication between the ports m^5 and m^7 of said valve. This movement takes place owing to the fact that cam P is reduced in diameter for a portion of its circumference, the free end of the elbow-lever dropping into the recess produced by this reduced portion and shifting the plug of the valve in a manner evident from the foregoing description. By this movement the motive fluid is admitted to cylinder d^3, and the shutter D^2 is opened and held open for a space of time almost equal to a fifth of the revolution of the cam. Just before the cam reaches the end of its first movement the elbow-lever O′ is shifted back to its original position, thereby throwing ports m^6 and m^7 in communication, when the motive fluid is exhausted from cylinder d^3, and the shutter D^2 is moved back to its normal position, closing the opening for the exposure of the plate. It is evi-

dent that during this portion of the movement no function is performed by cams P′, P², P⁵, and P⁶. Cam P⁴, however, is provided with a notch in its periphery between points 1 2. Consequently during this movement plug m^2 of valve M⁴ will be operated to admit the motive fluid to and exhaust it from cylinder g^7. This will operate in the manner already explained to carry the plate-magazine forward and deliver a plate to the carrier C. On comparison of cams P and P⁴, as represented in Fig. 5, it is evident that cam P⁴ will operate before cam P. Hence before the shutter D² is moved to one side a plate will have descended into the holder C. Immediately after the operating-motor of the machine has been set in motion by the insertion of a coin cam P⁷ will operate to admit the motor fluid to cylinder N, shifting the slide N′ across the coin-slot and closing the same. It will preferably remain closed during the entire operation of the machine. The several cams will now remain in the same position where the free ends of the elbow-levers O² are at the point 2 until the second pin of disk R will have contacted with the second finger of star-wheel P¹⁰. During the movement 2 3 cams P P³ P⁴ P⁵ are inoperative. Cam P² will be the first to operate during this movement. It will operate the plug m^2 of valve M² to admit the motive fluid to cylinder I³, thrusting in dog I² to grasp the plate in carrier I by its upper edges. It will be thus held during the succeeding manipulations of the plate. Cam P⁶ will be the next to operate, shifting the plug m^2 of valve M⁶ to admit the motive fluid to cylinder h^5, releasing the grip of the jaws H H upon the plate. Lastly, just before the cam-shaft comes to rest, due to the passing of the second pin on disk R out of engagement with the second finger of star-wheel P¹⁰, cam P′ will operate to shift the plug m^2 of valve M′, admitting the motive fluid to cylinders I⁴ I⁴, which move the carrier I downward and thrusts the plate into the developing solution carried in compartment K′. The various cams have now reached position 3, and the plate is held suspended in the developing solution until the third pin of disk R has contacted with the third finger of the star-wheel P¹⁰. Immediately upon the commencement of the movement 3 4 pressure is released from the cylinders I⁴ I⁴ and the carrier I is drawn upward by the spring within the cylinder or other retractive device, and the operation of cam P⁵ soon follows to shift the plug m^2 of valve M⁵ to admit the motive fluid to cylinder K⁶ to move the bath K backward from the position shown in Fig. 1, so that the fixing solution carried in compartment K² shall be immediately below the plate-carrier I. To permit of this backward movement of the bath, it must be unlocked from latch T. To this end the pins t^4 t^4, extending from cam P⁵, are so arranged that one of them has oscillated the latch on its pivot-pin to throw it out from engagement with a slot t^3 in the plate t^3, affixed to the bath K, but has left it free to be withdrawn into the next slot by the spring t^5. Pressure may be kept upon the piston of cylinder K⁶ during the remainder of the operation of the machine and its movement controlled by the latch T. The cams have now completed the third fifth of their movement and the carrier I has descended with the plate into the fixing solution carried by compartment I², in which it is held suspended until the fourth pin of disk R has moved into engagement with the fourth finger of star-wheel P¹⁰. The movement represented by 4 5 now takes place. Bath K is released, shifted backward a step to bring the water compartment under the carrier by the oscillation of latch T by a second pin on cam P⁵, as already described. At the completion of this movement the carrier I and the plate held therein descends into the washing-water in compartment K³, as is evident from the construction of cam P′, and is there held until the fifth pin of disk R has moved into engagement with the fifth finger of the star-wheel P¹⁰. At the completion of the fourth fifth of the movement cam P³ also becomes operative, as it is provided with a notch on the radial line 5. It operates to shift the plug m^2 of valve M³, admitting water to the compartment.

It is not essential that there should be a separate cylinder for controlling the cock for the inflow of water. If water is used as the motive fluid for the cylinders, port m^6 of the valve M³ will be permanently closed and the construction of the plug and the valve may be otherwise the same as the other plugs and valve-blocks. If air is used, the port m^5 may be permanently closed and a water-supply connected with port m^6, or port m^6 may be closed and water-supply connected with the port m^5. Of course the various parts connected to the plug m^2 of this valve will be properly related to open and close the valve at the proper time. A flexible tube V carries off the overflow from chamber K³. Further movement of the motor carries the fifth pin of disk R into contact with fifth finger of the star-wheel P¹⁰ and the cam-shaft has commenced the movement 5 1. Cam P′ operates to withdraw the plate from the compartment K³, cam P³ to shut off the flow of water, and the latch T is withdrawn to permit the backward movement of the bath to its farthest backward position, in which compartment K⁴ of the bath is directly under the plate. The dog I³ is now released by the action of cam P², the suspended plate drops into compartment, and the jaws H H come together to receive and support the next plate through the action of cam P⁶, which operates to release the pressure from cylinder h^5, the piston of the same being thus forced outward in a manner well understood. Further rotation of the cam-shaft P⁸ releases the pressure from cylinder K⁶ through the means of cam P⁵ and intermediate mechanism. The bath K is carried for-

ward by the retractive device to the position shown in Fig. 1, the slide L′ is drawn aside, and the finished plate descends through the delivery-chute in a manner already described. Before the cam-shaft has completed its movement the pressure has been released from cylinder N and the slide withdrawn from the coin-slot. The parts have now returned to their original position and are ready to again be set in operation by the insertion of a new coin.

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

1. In an automatic photographing apparatus, the combination of a plate-carrier and its operating means, means for controlling the exposure of the plate, a bath for holding the liquid in which the plate is to be immersed, and means for causing a relative movement of the plate-carrier and bath, a suitable motor fluid, and automatic control devices regulating in proper order and time the flow of motor fluid to and from each of said means, substantially as described.

2. In an automatic photographing-machine, the combination of a plate-carrier, a bath for holding the liquids in which the plate is to be immersed, means for controlling the exposure of the plate, means for engaging the plate with and disengaging it from the plate-carrier, a device for causing a relative movement of the plate-carrier and the bath, actuated by a suitable motive fluid, and means for controlling the flow of the motive fluid to said device, substantially as specified.

3. The combination of a plate-carrier, a bath for holding the liquids in which the plate is to be immersed, means for controlling the exposure of the plate, a device for causing a relative movement of the plate-carrier and the bath, actuated by a suitable motive fluid, and means for controlling the flow of the motive fluid to and from said device to produce the proper sequence in the relative movements of the plate-carrier and the bath, substantially as specified.

4. The combination of a plate-magazine, a plate-holder, a plate-carrier, an engine for causing a movement of the magazine to deliver contained plates to the plate-holder, an engine for operating the jaws of the plate-holder, an engine for operating the plate-carrier, and a device for controlling the flow of motive fluid to the several engines, substantially as specified.

5. In an automatic photographing-machine, the combination of a shutter, a movable carrier, a movable bath containing the liquids in which the plate is to be immersed, engines for moving said shutter, plate-carrier and bath, a series of valves for controlling the flow of the motive fluid to the engines, a series of cams for operating the valves, and a motor for operating the cams, substantially as specified.

6. In an automatic photographing-machine, the combination of a movable plate-carrier, a movable bath containing the liquids in which the plate is to be immersed, engines for moving said carrier and said bath actuated by a suitable fluid, means for supplying a current of water to wash the plate while the plate is immersed therein, and a motor for controlling the flow of fluid to the engines, substantially as specified.

7. A movable plate-carrier for an automatic photographing-machine comprising in combination a movable frame, an engine or engines for moving the frame, an engine carried by the frame, a gripping device operated by the second engine to sustain the plate in the frame or release it therefrom and means for controlling the flow of motive fluid to and from the engines to operate the movable frame and gripping device, substantially as specified.

8. In an automatic photographing-machine, the combination of a movable carrier, an engine or engines for operating the same, a movable bath containing the liquids in which the plate is to be immersed, an engine for moving the bath, and a device for controlling the flow of motive fluid to and from said engines to successively immerse the plate in the various liquids and finally deposit it in a compartment of the bath, substantially as specified.

9. In an automatic photographing-machine, the combination of a movable carrier, an engine or engines for operating the same, a movable bath containing the liquids in which the plate is to be immersed, an engine for moving the bath and a device for controlling the flow of motive fluid to and from said engines to successively immerse the plate in the various liquids and retain them therein a period of time, substantially as specified.

10. In an automatic photographing-machine, the combination of a plate-carrier, a movable bath, containing the liquids in which the plate is to be immersed, means for controlling the exposure of the plate, engines for moving said plate-carrier and said bath operated by a suitable motive fluid, a series of valves for controlling the flow of the motive fluid to and from the engines, a shaft for controlling the movement of the valves, a motor for moving said shaft and means intermediate between the motor and the shaft for controlling the movement of the latter, substantially as specified.

11. In an automatic photographing-machine, the combination of a plate-carrier, a bath containing the liquids in which the plate is to be immersed, means for controlling the exposure of the plate, a shaft for controlling the movement of the plate-carrier, a motor for moving the shaft and means for controlling the movement of the shaft comprising a star-wheel provided with a plurality of fingers or projections, and a series of pins adapted to coact with said fingers or projections,

said star-wheel and pins being arranged intermediate of the motor and the shaft, substantially as specified.

12. In an automatic photographing-machine, the combination of a plate-carrier, a bath for holding the liquids in which the plate is to be immersed, a device for causing a relative movement of the plate-carrier and the bath, actuated by a suitable motive fluid, a rotary shaft for controlling the movement of the motive fluid to said device, a motor for actuating the shaft, and means for imparting an intermittent rotary movement to the shaft from the motor, comprising a star-wheel provided with a number of fingers or projections, and a series of pins adapted to coact with said fingers or projections, substantially as specified.

13. In an automatic photographing-machine, the combination of a rotary shaft, a motor for actuating the shaft and means for imparting an intermittent rotary movement to the shaft from the motor comprising a star-wheel provided with a number of fingers or projections, and a series of adjustable pins, adapted to coact with said fingers or projections, substantially as specified.

14. In an automatic photographing-machine, the combination of a movable carrier, an engine for moving the same, a bath containing the liquids in which the plate is to be immersed and a device for controlling the flow of motive fluid to and from said engine to successively immerse the plate in and elevate it from the liquids in said bath, substantially as specified.

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

JOSEPH F. RADERS.

Witnesses:
ANTHONY GREF,
PIERSON L. WELLS.