

Nov. 23, 1943.

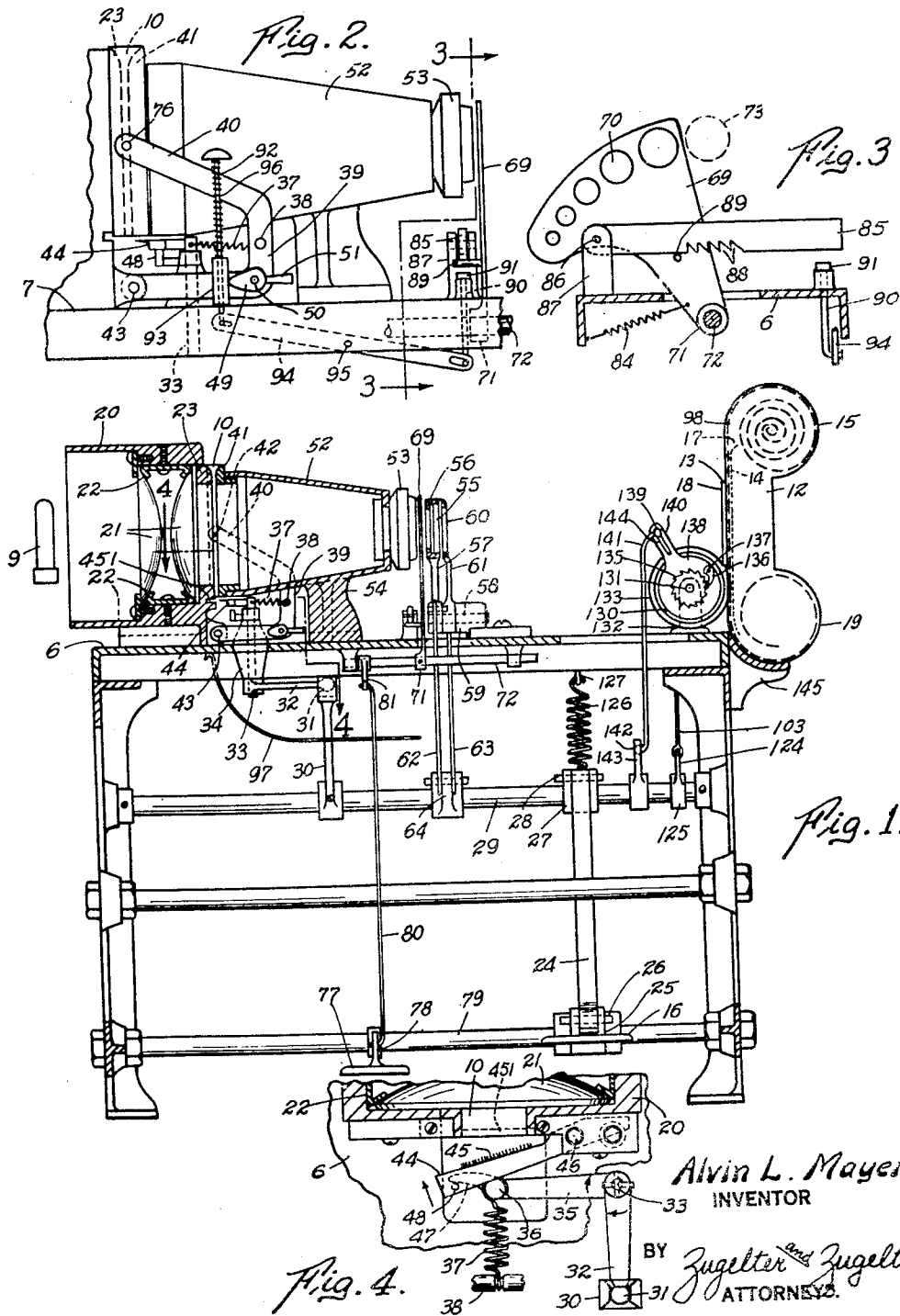
A. L. MAYER

2,335,189

PHOTOGRAPH PRINTER

Filed Nov. 14, 1940

2 Sheets-Sheet 1



Nov. 23, 1943.

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PHOTOGRAPH PRINTER

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2 Sheets-Sheet 2

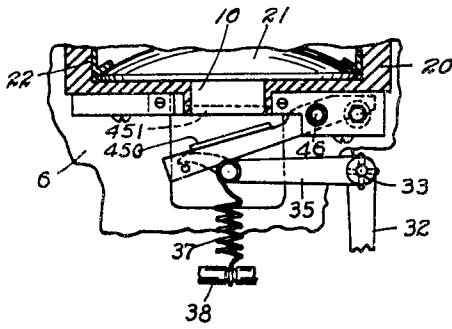


Fig. 5.

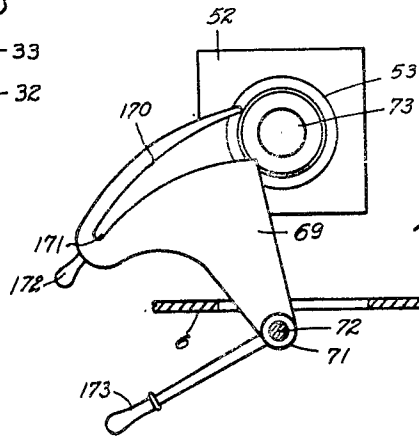


Fig. 6.

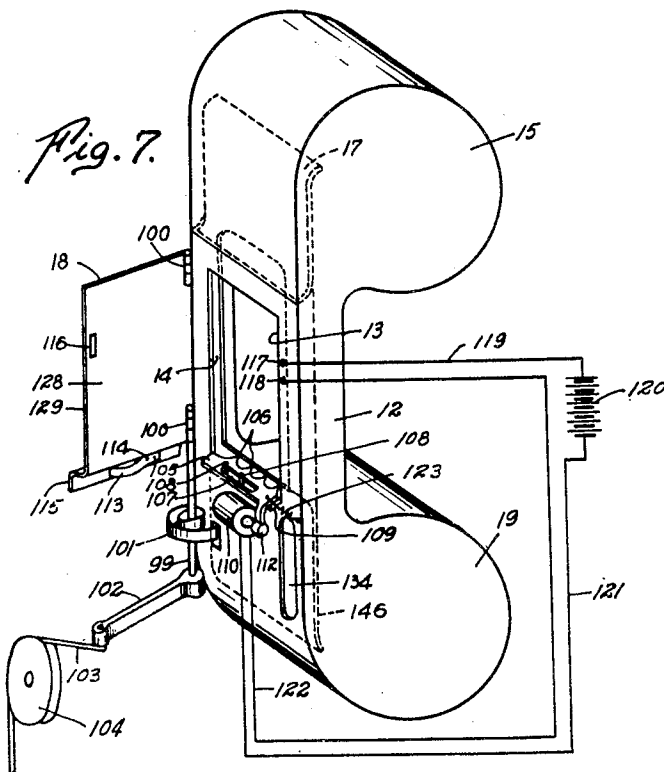


Fig. 7.

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## UNITED STATES PATENT OFFICE

2,335,189

## PHOTOGRAPH PRINTER

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Application November 14, 1940, Serial No. 365,676

13 Claims. (Cl. 88—24)

This invention relates to a machine for printing photographic negatives, and enlarging the prints if desired. The improvements to be disclosed herein may be considered applicable to various types of photograph printing apparatus, although in the interests of convenience and clarity of disclosure, it is deemed expedient to explain the present invention in connection with the machine disclosed in my issued Patent No. 2,107,867, granted to me on February 8, 1938.

Among the objects of the present invention, are those of providing a photograph printing machine including means for enhancing the quality of the work and increasing the speed and accuracy with which such a machine may be operated, on the quantity production basis.

Another object is to provide a machine of the character stated, which includes means designed to facilitate the production of reprints from individual negatives, when required, with increased assurance of true uniformity in the prints when a series of duplicates is ordered.

Another object of the invention is to provide a photograph printing machine with means for automatically marking off exposed sections of a roll of printing paper, at approximately the time of exposure, so as to facilitate and expedite the work of separating the roll into individual prints subsequently to the printing operation.

A further object is to provide improved means for the expeditious handling of negatives as well as positives in strip or roll form, so as to simplify the entire procedure of printing, checking, packaging, and shipping or mailing the individual packages, whereby to attain speed and dependability in filling the orders of customers in great numbers.

Additional objects of the invention are: to provide means whereby the negative to be printed may be viewed prior to the printing exposure; to provide for easy insertion and clamping of the negative in exposure position, and automatic release after exposure, to provide for maintaining an orderly arrangement of negative and positive prints throughout the process of printing, developing, assorting, and packaging the photographs and their negatives for delivery to customers; and to coordinate the various operations of the machine in the interests of simplicity, high production speed, ease of operation, and reliability of proper function.

A further object of the invention is the provision of a photograph printer including novel means for control of the projector beam.

Another object is to furnish means in connection

with a machine of the general character referred to, for facilitating and expediting the feeding and handling of photographic printing paper automatically and at high speed in a production method of photograph printing.

The foregoing and other objects are attained by the means described herein and disclosed in the accompanying drawings, in which:

Fig. 1 is a vertical cross-sectional view taken through the longitudinal center line of the machine.

Fig. 2 is a fragmental side elevational view of the left end of the machine illustrated in Fig. 1.

Fig. 3 is a cross sectional view taken on line 3—3 of Fig. 2.

Fig. 4 is a fragmental cross-sectional view taken on line 4—4 of Fig. 1.

Fig. 5 is a view similar to Fig. 4, illustrating a slight modification.

Fig. 6 is a cross-sectional view showing a modification of the structure illustrated by Fig. 3.

Fig. 7 is a perspective view of a printing paper magazine, feed, and marker, and which illustrates in detail the mechanism shown rather generally at the right end of Fig. 1.

With reference to the drawings, Figs. 1, 2 and 4, the character 6 indicates the bed or frame of the machine, which may be supported upon leg standards 7 and 8 at or near its opposite ends. At the left end of the bed is a projector including an electric lamp or other light source 9 for projecting the images of photographic negatives placed laterally within the film gate slot 10.

At the right of the bed there is provided means for supporting the sensitized photographic printing paper onto which the image of the negative is to be projected in making the photographic print. The supporting means referred to embodies various elements and features which will be disclosed in detail hereinafter. For the present it is necessary only to observe that the supporting means for the printing paper includes a stationary magazine unit 12 having a rectangular opening or paper frame 13 formed therein (Fig. 7), of the size and shape of that portion of the paper which is to be exposed for printing. Behind the frame member 12 is a stationary guide member or plate 14 adapted to cooperate with member 12 for the purpose of holding in exposure position the printing paper fed from magazine 15 into the gate 17 from above. The plate 14 is spaced from the rear or inner face of the frame member 13 a distance slightly greater than the thickness of the printing paper. As is best shown at the right of Fig. 1, the strip

of printing paper 98 is coiled up in the feed magazine 15, extends downwardly between plates 13 and 14, and is received and wound up in the receiving magazine 19 of the unit 12 automatically, as will be explained. A previewing screen 18, mounted upon vertical hinges 148, is adapted to be swung from its normal position upon the frame aperture 13 each time that a treadle 16 is depressed, in order that light from the projector may reach the sensitized printing paper for a period of time determined by the depressing of said treadle.

The projector of the machine, of course will include a lamp house for the source of light 9, which may abut the condenser lens housing 20 that contains the lenses 21 held by the rings 22. The forward portion 23 of the housing is stationary, whereas the gate plate or presser element 10 is movable horizontally for enlarging and constricting the width of the gate opening 10, to selectively release or clamp a strip negative placed therein transversely of the projector beam. This movement of the plate or presser element preferably is effected by actuating the treadle 16 which, by means of an upright connecting rod 24 that is pivoted to the laterally extending treadle arm 25 at 26, and to a laterally extending lever 27 at 28, rocks the main shaft 29. This rocking of the main shaft 29, is translated into a reciprocating motion of the presser plate or element 10, through the agency of suitable linkage which may be designed as follows:

The main shaft 29 may have fixed thereto an upright lever 30 having a ball socket at its upper end for embracing the ball end 31 of a horizontal swing lever 32, the opposite end of which lever 32 is fixedly mounted upon the lower end of an upright rock shaft 33 journaled in a bearing 34. As is most clearly illustrated in Fig. 4, the rock shaft may carry another fixed lever 35 having a stud 36 on its free end, this stud furnishing an anchorage for one end of a resilient connector, for example, a spring 37, whose opposite end is fixed to the crossbar 38 of a yoke 39 (Fig. 1), whose arms 40 are pivoted to the shiftable presser plate or element 41 that defines the film gate 10. The pivotal connection is indicated at 42, Fig. 1. Since the base or body of the yoke is pivoted to a stationary part of the machine at 43, the spring 37 when stretched will yieldingly urge the yoke 39 about its pivots 43 in counter-clockwise direction of rotation, to yieldingly advance the presser plate 41 toward the frame part 23 and against a film negative that may be lodged within the film gate 10. By this means, the film will be held against accidental shifting preparatory to exposure, whenever the treadle 16 is depressed. Upon permitting the treadle to resume its normal elevated position, the clamping force is released as will be understood.

As the film in strip form generally comprises a series of negative pictures, successive exposures of different portions of the film strip are made by advancing the strip intermittently through the gate 10. The film strip, therefore, emerges from the lower end of the gate, where it may be severed into separate negatives, or, as preferred by me, perforated or scored transversely between adjacent pictures in order that the film readily may be folded repeatedly upon itself with reverse folds, to form a flat package. The perforating or scoring, and folding of the film strip negative as stated, is an innovation which greatly simplifies and facilitates the checking process resorted to for ensuring that the proper negatives are

grouped and shipped with their corresponding positive prints. By reason of the fact that the several negatives of a strip are maintained in a connected condition, rather than separated by severance, the checking process may be relaxed and speeded to a great extent, without danger of mistakes and confusion. This plan also facilitates the work of lodging the strip negatives in envelopes or other containers for shipment or delivery to the customer, and the customer will experience no difficulty in tearing the film along the perforation lines or score lines in the event that separation of the negative is desired.

The particular means employed for perforating or scoring the film strip is of secondary importance. The perforating operation may be performed satisfactorily by means of a bar or plate 44 (Fig. 4) provided along one of its edges with a series of pins or points 45 arranged in a line. This perforating bar or element may be pivoted upon a stationary part of the machine at 46, for movement laterally toward and from the film gate. A claw 47 on the stud 36 is adapted to engage a pin or other abutment 48 on the perforating bar, for pulling the latter to the retracted position of Fig. 5 when the tension on spring 37 is relaxed, whereas a swinging movement of lever 35 causes its stud 36 to contact and advance the bar toward the film gate upon each depression of the treadle 16, as previously explained. Other forms of means for the same purpose obviously might be substituted, within the skill of any mechanic, wherefore it is intended that any such substitute means shall be embraced within the language of the claims appended hereto, in the absence of express limitations to the contrary. A rotary perforator or one of the reciprocating type might readily be substituted for the swinging bar type perforator illustrated.

Should it be desired to score the negative transversely, rather than perforate it, the row of pins 45 of Fig. 4 may be replaced by a scoring blade or bar 450 as illustrated by Fig. 5. A shallow groove 451 may be provided in the material of the gate to accommodate the scoring blade or bar.

Means are provided pursuant to the instant invention, for latching or otherwise holding the movable gate member 41 (Fig. 1) in the advanced or film-clamping position, independently of the treadle operation. The purpose of this is to enable an operator to make successive exposures of one negative in the printing of duplicate positives, without liability of having the negative to shift within the film gate and thereby impair the uniformity of the positives. An acceptable form of means for this purpose is illustrated in Fig. 2 of the drawings, wherein the character 49 indicates a pivoted eccentric mounted for rotation upon the yoke 39 at 50, preferably by means of a handle or finger piece 51. The toe of the eccentric is at a proper distance from the pivot, so as to bear against the machine bed or upon any other stationary part, and exert a lifting force upon the yoke for effecting the clamping action as stated. When the eccentric is at rest in the normally inoperative position of Fig. 2, the clamping action of the presser element is under the automatic control of the treadle and is influenced thereby. If desired, the pivot 50 may be in the form of a rotatable shaft spanning the yoke, with an eccentric 49 fixed to each of its ends and operating in unison.

Light from the illuminator 9, after passing through the condensing lenses and the gate aperture that supports the film negative, enters a

tapered housing or barrel 52 which at its forward end carries a projection lens assembly 53. This lens is continuously open during operating periods of the machine. The tapered housing or barrel may be carried by a standard 54 on the machine bed, and its rear end is telescopically associated with an extension of the presser plate 41, as shown, to permit the presser plate movement previously explained.

Mounted immediately in front of the lens 53 is a mask or filter 55 of such nature as to block all light coming through the lens of a nature capable of having a fogging effect on the photographic printing paper employed. The filter 55 is mounted on a shutter element 56 formed on a bell crank 57 pivotally mounted upon a shaft 58 carried by a bracket 59 secured to the machine bed. A second, cooperating shutter element 60 is carried by a bell crank 61 similarly pivoted on shaft 58. Links 62 and 63 connect the free arms of the bell cranks to a laterally extending arm 64 fixed to the rock shaft 29. As a result of these connections, the action of rock shaft 29, when rotated, pulls down on the links 62 and 63, moving the shutter elements 55 and 60 toward and across each other, and thereby removing the filter from in front of the lens and at the same time obstructing the passage of light from the lens by the overlapped portions of the shutter. As the shutter elements continue to move past each other, they leave the axis of the projection beam and allow the beam to pass. When this occurs, light passing through the film negative is projected onto the printing paper held within the gate 13, after the swinging screen 18 has been shifted by the action of the treadle as was explained previously. The shutters are so timed in their operation as to bar passage of light to the printing paper until the screen 18 has been fully removed from in front of the paper. While the screen covers the paper, and before the treadle is depressed, the image of the negative is projected onto the screen, where the operator may view it and determine the exposure period required for printing, as determined by the density and other characteristics of the particular negative undergoing printing. Then as the operator depresses the treadle to swing the screen from the print obstructing position, the shutters intercept the beam until the screen is fully displaced to expose the printing paper. Upon expiration of the printing period, the operator removes his foot from the treadle and the parts return to the initial positions, at which a subsequent negative may be advanced into the gate 10 and have its image projected upon the white exposed face of the screen 18, in readiness for an exposure.

In the event that the shutter structure 55-60 requires further elaboration, it may be seen in greater detail in the issued Mayer Patent No. 2,107,867, dated February 8, 1938.

At a location between the lens 53 and the shutter structure 55-60, there is supported a diaphragm plate or light control element 69 (Fig. 3) having formed therein a series of different sized openings or apertures, one of which is indicated at 70. The plate may be fan shaped, or substantially so, carrying at one of its corners a bored hub 71 whereby it may be fixedly secured onto a rock shaft 72 which extends lengthwise of the machine bed. The several apertures of the series are formed in the plate with their centers equidistant from the hub, so that rocking of the shaft may dispose any one of the apertures such as 70

into the path of the projector beam. It will be noted that the apertures are made progressively smaller toward one end of the series, so that the size of the beam (indicated at 73 of Fig. 3) may be progressively reduced as the plate is moved across it from left to right. As is well known, such partial obstructions of the beam will definitely affect the printing of the photograph, due to variations in the amount of light thereby made available for the printing operation.

The operator, by observation and practice determines which plate aperture 70 should be placed in the path of the projection beam in order to properly print from the particular negative undergoing projection. To shift the diaphragm plate as required, it is considered satisfactory to provide a foot pedal or treadle 77 on the end of a laterally extended lever 78 pivoted to one of the tie rods 79 for the leg castings, and to connect this lever by means of a connecting rod 80 to a laterally extending lever 81 which is fast to the diaphragm plate rock shaft 72.

A spring 84 (Fig. 3) may be furnished for yieldingly urging the diaphragm plate 69 and the treadle 77 to the inoperative or initial positions of Figs. 1 and 3.

In order that alignment of the plate apertures 70 with the beam may be rendered automatic and precise without waste of time and effort, a ratchet bar 85 may be pivoted at 86 to a bracket 87 on the bed, this ratchet bar being provided with spaced notches or teeth 88 to engage a stud or projection 89 carried by plate 69. The swinging movement of the diaphragm plate serves to dispose the stud to engaging relationship with one or another of the notches 88. The ratchet bar may be gravity operated toward the stud. Thus, the operator by depressing the treadle 77 through different distances, may cause the ratchet mechanism to hold the diaphragm plate in any one of the five notch positions. The notches are carefully spaced for establishing an aligned relationship of each plate aperture with the beam. It will be understood, of course, that the plate apertures and the corresponding notches at 88, may be greater or less than five, if desired.

Since the ratchet bar herein disclosed is gravity operated, it is necessary to provide a release therefor operative to restore the initial position of the aperture plate 69. Said release may be of the character illustrated in Fig. 2, wherein the character 90 indicates a vertically reciprocable plunger having a head 91 to be elevated for striking the ratchet bar 85 near its free end and rocking it about its pivot to disassociate the notches from the plate stud 89. For elevating and lowering the plunger, a hand piece may be furnished in the form of an upstanding rod or bar 92 which is reciprocable within a stationary sleeve or bearing 93, and which by means of a lever 94 pivoted at 95 upon the machine bed, transmits its vertical motions to the plunger. The rod or bar 92 of the ratchet release device may be maintained normally in an elevated position by the use of any suitable means, herein shown as a spring 96. The rod or bar may be provided with a head at its upper end, which may be cushioned if desired, to preclude injury to the operator's hand when depressing it. The connections between the lever 94 and the lower ends of parts 90 and 92 may include elongated slots as shown, to preclude binding. The release preferably is located adjacent to the film gate 10 or elsewhere within easy reach of the operator. Beneath the film gate 10, a suitable chute, table

or other receiver 97 for the strip negative may be furnished. The receiver might alternatively be in the form of an envelope or other container, if desired.

To swing the door or screen 18 for exposing the printing paper to the projected image, a rotatable shaft 99 may be fixed to the hinges 100 of the door or screen, so that rotation of the shaft in opposite directions will result in swinging of the door or screen. If desired, any suitable form of spring or yielding means 101 may be furnished for swinging the door or screen in one direction. The coiled spring shown at 101 yieldingly urges the door or screen 18 always toward the closed position. By means of an arm 102 fixed to the shaft 99, the shaft may be rocked in opposition to the force of spring 101 for opening the door. The end of said arm may be connected to the treadle 16 or to any moving part of the treadle assembly, by means of a cable 103 or an equivalent motion translating medium. By providing a pulley such as 104, the manner of associating the arm 102 with the treadle 16 of Fig. 1 is easily understood. Each treadle depression swings the door or screen 18 to the open position, where it may be held stationary for the period of time necessary to completion of an exposure or printing operation.

Means may be provided for the application of dividing lines to the printing paper strip between successive exposures, of the purpose of facilitating and expediting severance of the strip into individual photographs. Said means may consist of a scribe or other marking implement 105, which is capable of being moved transversely across the emulsion-bearing face of the printing paper strip to remove so much of the emulsion as will result in forming a line when the strip is developed and printed. This may be accomplished in a number of different ways, one of which is illustrated by way of example.

As disclosed by way of example, the scribe or marking implement 105 comprises a plate having formed along its inner edge a series of points or projections 106 directed into the gate of the magazine unit and toward the printing paper that rests within the guideway at 14. The scribe plate may be furnished with an oversized longitudinal slot 107 through which extend guide means for the plate, which guide means may be in the form of a pair of small upstanding pins 108. The pins 108 may be supported upon a ledge 109 that may be made integral with the front lower edge of the magazine aperture, and this ledge preferably slopes outwardly and downwardly from the aperture so that the scribe plate will tend normally to gravitate in the outward and downward direction to normally dispose the points 106 at a slight distance from the printing paper. Since the slot 107 of plate 105 is made wider than the diameter of pins 108, the plate is afforded a limited lateral movement. Accordingly, any force applied to the outer or the forward edge of plate 105 will advance the plate toward the magazine aperture 13, and cause the points 106 to contact the printing paper held within the aperture.

From the foregoing it will be understood that plate 105 when advanced laterally toward the magazine aperture as above stated, may be subsequently shifted longitudinally while the points 106 are in contact with the emulsion face of the printing paper, for applying a transverse line or mark upon said paper. The means for longitudinally shifting the scribe plate 105 might take

various forms, however, a simple form or means for the purpose may consist of an electromagnet 110 fixedly mounted upon the magazine unit beneath plate 105 and ledge 109, said electromagnet being so located that its core will be aligned substantially with an iron armature 112 carried by an extending arm on plate 105 as shown. Whenever the electromagnet 110 is energized by the closing of an electric switch in its circuit, the armature 112 will be attracted to the magnet core, thereby resulting in longitudinally shifting of scribe plate 105 toward the left, as viewed in Fig. 7. It will be seen that slot 107 is long enough to permit the limited longitudinal shifting of the scribe plate.

Since in order to effect a marking of the printing paper by the several points 106 of the multiple scribe plate, it is necessary that the plate be urged laterally toward the paper, suitable means are to be furnished for yieldingly urging the multiple scribe plate towards the printing paper. Said means in its simplest form, may consist of a yielding element or spring 113 fixed as at 114 to the innerface of the door 18. This spring is so located upon the door that when the door closes, the spring will strike the forward edge of scribe plate 105 and yieldingly advance it laterally toward the magazine opening so that its points 106 will contact the adjacent face of the printing paper. The scribe plate upon being advanced laterally as stated, may then be shifted longitudinally for drawing the points 106 across the emulsion face of the printing paper, being accomplished by means of the electromagnet as previously explained. Due to the fact that the scribe plate extends forwardly of the magazine unit, it may be necessary to offset the spring 113 forwardly of the plane of door 18 by mounting it upon a forwardly extended flange or door extension 115. From the foregoing, it should be understood that the points of the scribe plate will be advanced against the printing paper only when the door 18 is substantially closed.

When door 18 reaches the full closed position, for covering the magazine aperture 13, a contact plate 116 carried by the door bridges a pair of electric contacts 117 and 118 for completing an electrical circuit which comprises the conductor 119, the source of electric 120, the conductor 121, the winding of electromagnet 110, and conductor 122. The closing of this electrical circuit whenever the door is fully closed results in energization of the electromagnet, which in turn effects an attraction of armature 112 and a corresponding longitudinal movement of scribe plate 105 with its points 106 yieldingly held against the printing paper. By this means, a transverse marking is applied to the printing paper each time that the door 18 is closed, and accordingly when the printing paper in strip form is developed to produce a succession of photographs, the strip will be plainly marked for subsequent severance thereof into individual photographs. Since the negative strip from which said photographs are printed is likewise in strip form when it emerges from the projector plate, considerable time is saved in packaging negatives with the proper corresponding photographic prints because of the fact that their sequence is preserved throughout the operation and the possibility of errors is accordingly minimized.

With further reference to Fig. 7, it will be observed that a spring 123 of one form or another may be employed for yieldingly returning the scribe plate to the starting position of Fig. 7 as

soon as the operator depresses the treadle 16 for opening the door 18. Fig. 1 illustrated the cable or cord 103 utilized in moving the door to the open position, and it may be observed that the free end of the cable or cord is attached to a lever 124 which has its hub 125 fixed upon rock shaft 29. A rather heavy spring 126 may serve to hold the treadle 16 always in an elevated position, the spring having opposite ends attached to the lateral extending lever 27, and to the bed of the machine as at 127.

At this point in the description, it is desirable to point out that in Fig. 7 the character 128 indicates the rear face of door 18, whereas 129 indicates the front or forward face thereof. The front or forward face of the door is treated, by coating it with a light reflective point or an equivalent reflecting substance, in order that the front or forward face of the door will serve as a previewing screen. From this it should be understood that the door when closed presents a surface upon which the image of a negative may be projected, thereby enabling the machine operator to observe the image and judge the duration of the exposure period required for producing a satisfactory print. In judging the characteristics of the negative as projected upon the previewing screen, the operator may determine that the projection beam should be reduced in intensity, and accordingly he will depress the treadle 77 so as to actuate the diaphragm plate 69 as previously explained, to dispose one or another of its apertures 70 in the path of beam projection.

In accordance with the present invention, the printing paper magazine shown at the right end of Fig. 1 is provided with means for automatically fitting successive sections of printing paper into exposure position upon each depression of the treadle 16. One form of means for this purpose may comprise a friction wheel 130 mounted for rotation upon a shaft 131 which is supported by a bracket 132 fixed to the bed of the machine. The friction wheel may have on its periphery a tire 133 of rubber or other suitable friction material to engage a margin of the printing paper supported in the magazine. The friction edge of the wheel may enter the magazine through a slot 134 (Fig. 7) formed in the forward face of the magazine. The wheel is always in frictional contact upon a margin of the printing paper strip, so that rotation of the wheel in a clockwise direction will advance the printing paper from the feed magazine 15 to the receiving magazine 19 of the magazine unit.

Referring back to Fig. 1, the character 135 indicates a ratchet wheel which rotates always with the friction wheel, and 136 indicates a pivoted pawl engaging the teeth of the ratchet wheel. The pawl is pivoted at 137 upon a plate 138 which may be oscillated upon shaft 131 whenever the treadle 16 is depressed. To oscillate the plate, a connection 139 is made between the plate arm 140 and a connecting link 141, which link has its lower end pivoted at 142 upon a lever 143 which is fixed to the rock shaft 29. The connection at 142 may be a ball and socket connection, while the connection at 129 preferably is a sliding connection, that is the pivot at 139 may ride lengthwise in a slot 144 of part 140 to produce a lost motion linkage.

From the foregoing, it should be understood that depression of treadle 16 will cause lever 143 to lower the link 141, which link after a slight delay resulting from the lost motion action 139, will rotate the plate 138 which carries pawl 136.

Due to the disposition of the pawl as shown, the pawl will ride over the teeth of the ratchet wheel without imparting rotational movement to the friction wheel 130. However, when the treadle 16 is released for movement to its elevated position, the link 141 will rise and thereby rotate the plate 138 in clockwise direction, and the pawl will take hold upon the teeth of the ratchet wheel for compelling rotation of the friction wheel and effecting the paper advancement.

The lost-motion connection at 139 serves to establish a delay period for advancement of the printing paper, thereby affording the door 18 an opportunity to intercept the projection beam before the printing paper advancement is initiated. This is a necessary consideration, for to permit any movement of the printing paper while the image is being projected thereon, will ordinarily blur the resulting photograph. It should be understood, therefore, that while the swinging door 18 and the printing paper advancing means are operated from the same shaft 29, provision is made for a time lag in the relative motions of these elements in order to start the paper advancement no earlier than the completion of the exposure period. The paper advancement occurs only during the upward or releasing movement of treadle 16, and is initiated shortly after the beginning of said upward treadle movement at a time when the door 18 is sufficiently closed to intercept the projection beam.

The character 145 indicates a bracket on the machine bed and to which the magazine unit is fixed. Access may be had to the magazine unit for recharging it with sensitized paper, by removing one or the other of its said plates, or by the provision of other acceptable means. It may be stated that the backing plate 14 can be solid rather than open where the exposure aperture is formed in the magazine unit, but in either event it is considered desirable to permit the backing plate to provide a surface against which the points 106 of the marking scribe may exert pressure during the marking of the printing paper interposed therebetween. The backing plate may include a depending apron 146 for guiding the exposed sections of the printing paper strip into the receiving magazine 19, where the strip will spirally align itself into roll formation as the strip is advanced.

The structure illustrated by Fig. 6 represents a modification of the diaphragm structure shown in Fig. 3. The difference between these forms of diaphragm plates is that the plate of Fig. 6 has a continuous opening 170 instead of the series of individual openings that characterizes the Fig. 3 form. The opening 170 is cut upon a circle arc having as its shutter the axis of shaft 72. The mouth of the opening 170 is substantially the same width as the beam emanating at 73 of the projector, and it narrows down to a base point 171 which is constricted in width to permit the passage of the smallest possible projector beam that might serve in practice to properly print an image upon the printing paper. The diaphragm plate of Fig. 6 might be connected with a treadle and the ratchet stop arrangement of Fig. 3, if desired, or alternatively the shaft 72 or plate 69 may have a handle affixed thereto whereby the operator by direct application of the force of his hand may shift the diaphragm plate various distances across the projector beam. Such handles are indicated by the characters 172 and 173 of Fig. 6. When handles are employed for establishing the various adjusted positions of the diaphragm plate, it is de-

sirable to provide a holding means equivalent to the ratchet arrangement 88-89 of Fig. 3 which holding means may consist of merely a tight bearing for the shaft 72, furnishing sufficient friction to maintain any adjusted positions of the diaphragm plate effected by means of the handles.

It is possible, of course, to locate the shaft 72 of Fig. 6 to one side or the other of the housing 52, in which event the diaphragm plate 69 will have an up and down movement, rather than a movement from side to side, and either disposition of the diaphragm plate will be equally effective for projection beam limiting purposes.

The mechanical means herein disclosed are to be considered representative only, since a number of equivalents readily become manifest following an appreciation of the mode of operation of the composite machine. Accordingly it is to be understood that various modifications and changes in the structural details of the machine may be effected, within the scope of the appended claims, without departing from the spirit of the invention.

What is claimed is:

1. In a device of the class described, the combination which comprises an illuminator and a projection lens spaced apart, an intermediate housing for confining the beam of the illuminator, a normally closed shutter for intercepting the beam of the illuminator, a film gate including a clamping and releasing means for a film placed within the gate in position to project its image, means operative unitarily to line-weaken the film transversely, to clamp the film against shifting, and to open the shutter, all by means of a single manipulation of an operator of the device, and means within reach of the operator for clamping and releasing the film independently of said unitary movements.

2. In a device of the class described, the combination which comprises an illuminator and a projection lens spaced apart, and an intermediate housing for confining the beam of the illuminator, a normally closed shutter for intercepting the beam of the illuminator, a film gate including a clamping and releasing means for a film placed within the gate in position to project its image, means operative unitarily to clamp the film against shifting, and to open the shutter, all by means of a single manipulation of an operator of the device, and means within reach of the operator to actuate the clamp means for selectively and instantaneously clamping the film and maintaining a clamped condition thereof, independently of said unitary movements.

3. A photographic device combining a film gate, a presser for temporarily fixing a strip film relative to the gate, a film mutilating device adapted to form a transverse weakening line in the film at intervals along the film strip as the latter is advanced intermittently through the gate, a photographic paper support, a lens positioned between said gate and said paper support, a shutter for said lens, and means controlled by a single manipulation of an operator for operating the presser to film fixing position, for operating said film mutilating device, and for thereafter opening said shutter.

4. A photographic device combining a film gate, a presser for temporarily fixing a strip film relative to the gate, a film mutilating device adapted to form a transverse weakening line in the film at intervals along the film strip as the latter is advanced intermittently through the gate, a photographic paper support, a lens positioned be-

tween said gate and said paper support, a shutter for said lens, and means controlled by a single manipulation of an operator for operating the presser to film fixing position, for operating said film mutilating device, and for thereafter opening said shutter, and means subject to a separate manipulation for fixing and releasing the presser independently of the operations mentioned, for maintaining a fixed position of the presser in exposing a given section of the film repeatedly for production of duplicate prints.

5. A photographic device combining a film frame, a presser plate therefor, a paper support, a mutilating device associated with said film frame for establishing lines of fold transversely at intervals as the film in strip form is advanced past the frame, a marking device associated with the paper frame for applying a line of severance to a sheet of photographic paper supported therein, a lens positioned between said film frame and said support, a shutter therefor, means for bringing said presser plate into engagement with said film frame, means for operating said marking device, means for operating said film mutilating device, means for operating said shutter and an element operable by a single manipulation of an operator for effecting operation of all of said means.

6. A photographic device combining means to support a film negative for projection purposes, a light source and means for projecting the image of the negative, means for supporting a photographic paper strip in the line of projection of the light source beam, an interceptor movable selectively into and from the path of beam projection, and a scribe operative to scratch the strip from substantially one side edge thereof to the other upon movement of the interceptor to beam intercepting position, for marking division lines along the length of the strip and advancing an exposed portion of the strip to a location out of the projection line of the beam.

7. A photographic printing device comprising in combination: means to support a photographic negative carrying an image, a light source located behind the negative including means for projecting the image thereof, a support for photographic printing paper in strip form, said paper support including a feeding magazine and a receiving magazine for the strip, guide means for establishing and maintaining a flattened condition of the strip intermediate said magazines and in the projection line of the light source beam, an opaque interceptor element and means for shifting same into and from an intercepting relationship to the beam, and means operative to traverse the strip upon shifting the interceptor to the beam intercepting position, for scratching a transverse line upon the paper strip to indicate one of the dimensional limits of a portion of the strip previously exposed to the beam.

8. A photographic printing device comprising in combination: means to support a photographic negative carrying an image, a light source located behind the negative including means for projecting the image thereof, a support for photographic printing paper in strip form, said paper support including a feeding magazine and a receiving magazine for the strip, guide means for establishing and maintaining a flattened condition of the strip intermediate said magazines and in the projection line of the light source beam, an opaque interceptor element and means for shifting same into and from an intercepting relationship to the beam, and means operative

upon shifting the interceptor to the beam intercepting position, for advancing a previously exposed portion of the paper strip toward the receiving magazine while feeding a like portion of unexposed paper strip from the feeding magazine to the printing position, and means operating subsequently to the strip advancement aforesaid for scratching the emulsion-bearing face of the printing paper strip along a transverse line to mark a dimensional limit of a section of the strip between successive exposures.

9. In a photographic printing device, the combination of a film support, a sensitized printing paper support, projection means including a light source to project toward the printing paper supported by said paper support the image of a film held by the film support, a previewing screen normally covering the printing paper and precluding impingement of the projection beam thereon, means movable selectively into the path of the projection beam for constricting to various extents the amount of light passing to the previewing screen, and means operative upon return of the previewing screen to the normal position, for dislodging the exposed paper from printing position and replacing it with fresh paper to be subsequently exposed.

10. In a magazine structure for photographic paper in strip form, the combination which comprises; an apertured housing for the paper strip, means for intermittently advancing successive areas of the strip into picture printing position within the limits of the housing aperture, a scribe mounted in such relationship to the aperture and the paper strip as to scratch the strip between successive picture areas, and means interconnecting the scribe with the strip advancing means, to actuate the scribe for scratching the paper strip while the strip is in a static condition between successive advancing movements.

11. In an exposure apparatus for photographic paper in strip form, the combination which comprises; a support having an area through which the paper strip is exposed for printing, means for intermittently advancing successive areas of the strip into picture printing position, a scribe

mounted in such relationship to the exposure area and the paper strip as to scratch the strip transversely between successive picture areas, and means interconnecting the scribe with the strip advancing means to actuate the scribe for scratching the paper strip while the strip is in a static condition between successive advancing movements.

12. In an exposure apparatus for photographic paper in strip form, the combination which comprises; a support having an aperture through which the paper strip is exposed for printing, a previewing screen movable to covering and uncovering positions relative to the aperture, means for intermittently advancing successive areas of the strip into picture printing position at the aperture, a scribe mounted in such relationship to the aperture and the paper strip as to scratch the strip transversely between successive picture areas, and means interconnecting the scribe with the previewing screen, for actuating the scribe to scratch the paper strip when the previewing screen is in substantial covering relationship with the exposure aperture.

13. Apparatus of the class described, comprising in combination: a support having an aperture through which photographic paper in strip form is exposed for printing, a previewing screen movable to covering and uncovering positions relative to the aperture, actuating means under the control of an operator for moving the previewing screen to and from the stated positions, means interconnected with said actuating means, to intermittently advance successive areas of the strip into picture printing position at the aperture while the screen is in substantial covering relationship with the aperture, a scribe mounted in such relationship to the aperture and the paper strip as to scratch the strip between successive picture areas, and means interconnecting the scribe with the actuating means aforesaid, to produce movement of the scribe transversely across the paper strip upon each covering movement of the previewing screen over the exposure aperture.

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