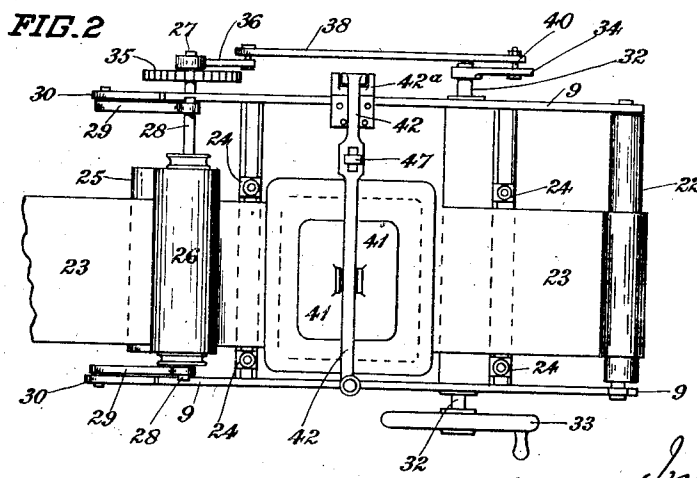
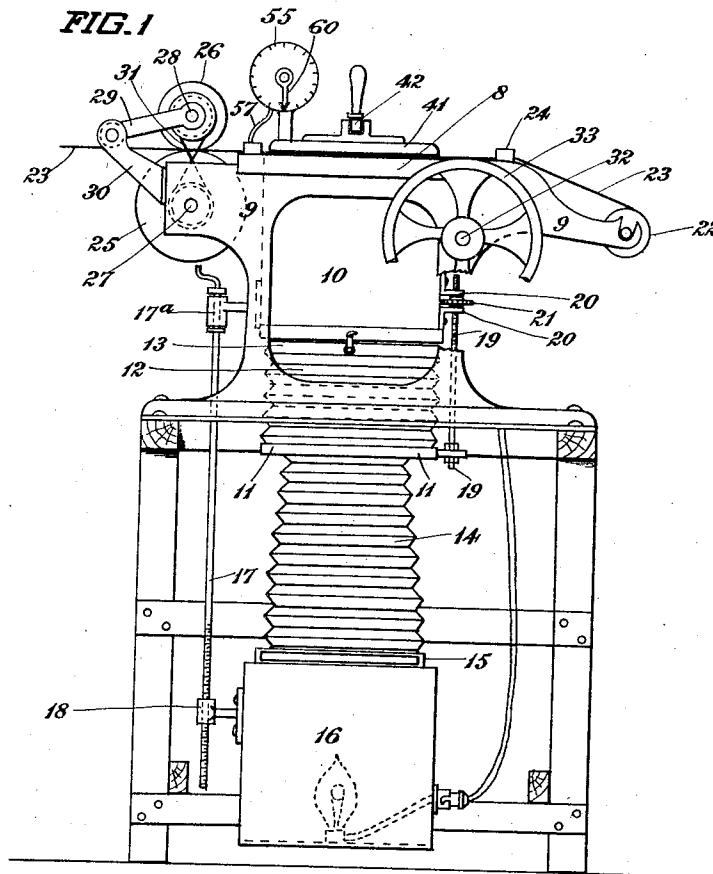


M. M. KULUS,
 PHOTOGRAPHIC REPRODUCTION APPARATUS.
 APPLICATION FILED JULY 8, 1920.

1,363,518.

Patented Dec. 28, 1920.
 2 SHEETS—SHEET 1.



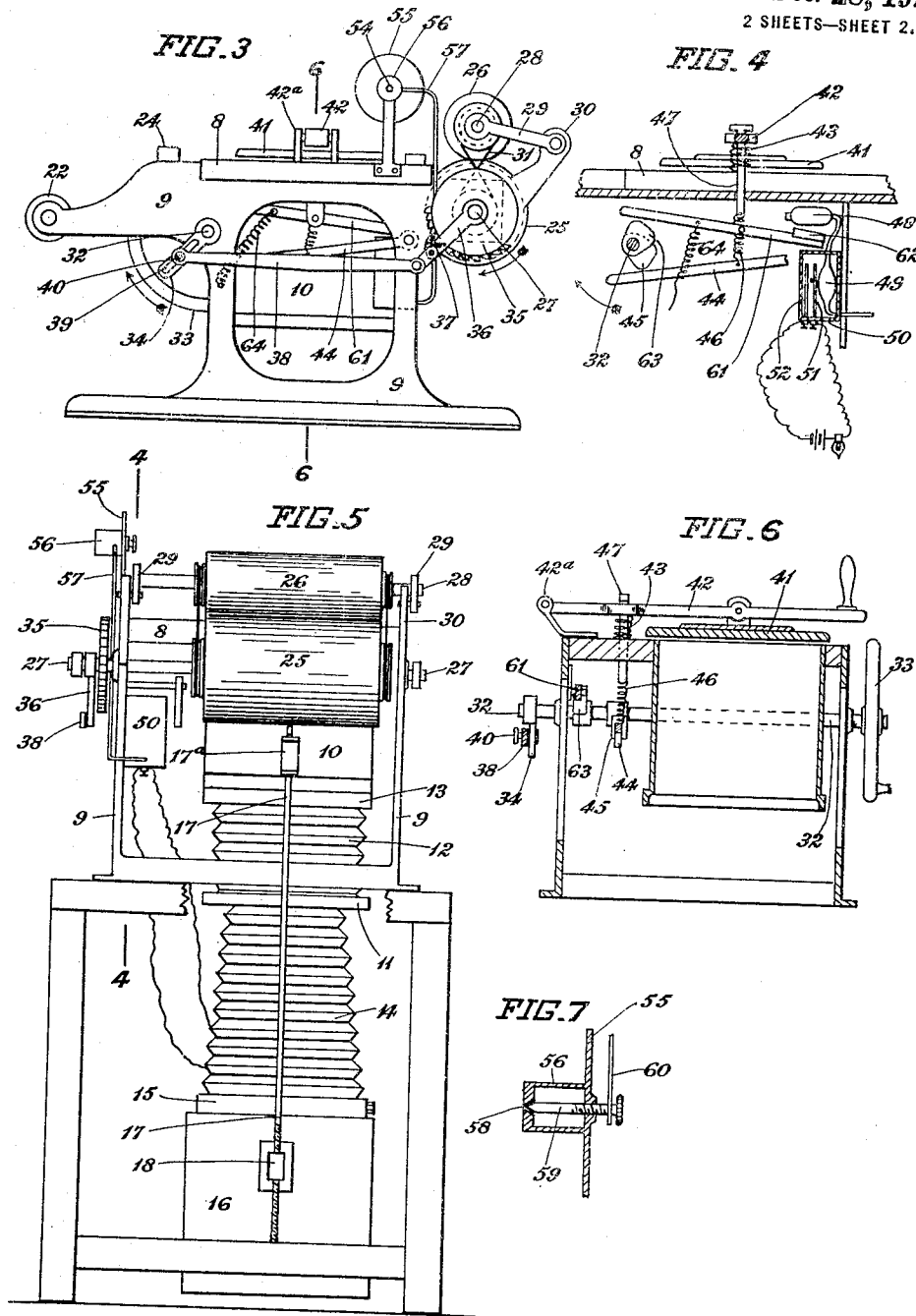
Inventor:
 Matthew Marin Kulus
 by Arthur
 A. K.

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Inventor:
 Matthew Mann Kulus—
 By *Arthur*
 atty.

UNITED STATES PATENT OFFICE.

MATTHEW MARRIN KULUS, OF AUCKLAND, NEW ZEALAND.

PHOTOGRAPHIC REPRODUCTION APPARATUS.

1,363,518.

Specification of Letters Patent. Patented Dec. 28, 1920.

Application filed July 8, 1920. Serial No. 394,611.

To all whom it may concern:

Be it known that I, MATTHEW MARRIN KULUS, a subject of the King of Great Britain, residing at Karangahape Road, Auckland, in the Dominion of New Zealand, have invented new and useful Improvements in Photographic Reproduction Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention refers to apparatus designed for the reproduction of photographs by printing from negatives and of that type of apparatus in which a continuous strip of photographic paper is fed, length by length, across the open end of a printing frame and there subjected to printing light acting through the negative so as to throw the image on to the sensitized surface of the paper in order that subsequent development treatment will produce the desired photographic print.

The invention has been devised with the object of providing an improved construction of machine for carrying out a sequence of operations consisting in feeding the paper strip across the printing frame, clamping it on to such frame and illuminating the frame, by the single rotation of an operating handle, and also to combine with such a machine an enlarger apparatus by the employment of which the photographs printed may be enlargements of the negative employed.

The invention comprises means whereby the printing light of the machine is automatically controlled to remain illuminated for any predetermined period so that when a satisfactory print of a particular negative has been obtained and the period of light exposure used to obtain it ascertained, the apparatus may be set to automatically give similar exposure to each subsequent print made from the same negative. The machine is thus adapted for work in which a large number of prints of the one subject are required and to obtain these prints by the exposure of different lengths of a roll of sensitized paper to the light of a printing frame in which the negative is positioned and subsequently passing the roll strip through developing, toning and fixing baths in the well known manner.

The machine designed and forming the

subject of this invention is illustrated in the accompanying drawings and will be fully described in relation thereto.

In such drawings:—

Figure 1 is a front elevation, partly in section, of the full machine having the enlarger apparatus combined therewith.

Fig. 2 is a plan thereof.

Fig. 3 is a back elevation of the paper feeding and printing part of the machine.

Fig. 4 is a sectional elevation of certain detail parts of the machine, the section being taken on the line 4—4 of Fig. 5.

Fig. 5 is an end elevation of the full machine shown in Fig. 1 looking at the delivery end thereof.

Fig. 6 is a cross sectional elevation taken on the line 6—6 of Fig. 3.

Fig. 7 is a detail view of the light controlling means.

According hereto, the machine is constructed with a table top 8 supported upon a framework 9 within which is fixed the printing frame formed of a box 10 opening at its top through the table top. This frame is adapted to have a negative holder placed within its open top when the machine is to be used for ordinary reproduction, and when the machine is to be used for enlargement work, to have an enlarger apparatus secured to an opened bottom end thereof, as shown in Figs. 1 and 5. This apparatus is formed by a lens frame 11 connected by bellows 12 with an upper frame 13 and by bellows 14 with a negative slide holder 15 and light box 16 beneath. The lens frame 11 and the light box with the negative holder are relatively adjustable in their distance from each other and from the top of the printing frame so as to vary the size of the image thrown by the negative through the open top of the printing frame, in a manner that is well known in the art. The means for so adjusting these positions shown in the drawings consist in a vertical rod 17 loosely journaled in a bearing 17^a on one side of the box 10 and held from longitudinal movement therein and screw threaded at its lower end and screwed into a long nut 18 fixed to the corresponding side of the light box 16. Rotation of this rod will therefore cause the light box to be raised or lowered relatively to the printing frame. The lens frame 11 is controlled by the vertical screw rod 19 fixed

at its lower end to the said frame and at its upper end passing loosely through two lugs 20 fixed to the side of the box 10 and having a thumb nut 21 screwed upon it and fitting in between these lugs. Rotation of this nut will therefore move the rod up or down and correspondingly raise or lower the lens frame.

For ordinary reproduction, the enlarger 10 is removed and the open bottom of the box 10 covered so that this box then serves as the light box to throw the printing light up through the negative positioned in the open top thereof.

The details of construction of the negative holder and lens frame are not shown in the drawings as such may be made in any of the ways well known in the art.

At one end of the frame 9 a roller 22 is loosely journaled this roller being adapted to receive the roller strip of paper 23 and to permit of the strip being led therefrom along the top of the table 8 and across the open top of the printing frame. Adjustable guide blocks 24 (Fig. 2) are arranged on the table top on each side of the printing frame in order to guide the paper across the top and to keep it true in relation to the negative within the frame. These blocks are made adjustable in their distance apart across the machine in order to adapt them for varying widths of paper.

At the other end of the machine frame are arranged the feeding rollers 25—26. The former of these 25 consists in a large roller having a bearing spindle 27 mounted in the back and front members of the frame 9 so that it is free to rotate between them. The other roller 26 is of smaller diameter and it is carried on a spindle 28 mounted in arms 29 pivoted to brackets 30 upon the front and back of the machine so that the roller rests with its weight on the periphery of the roller 25 in order thereby to effect a grip upon the paper strip placed between the rollers. The two rollers are connected by crossed belts 31, arranged one at each end, so that the rollers will work together mangle wise and thereby when rotated in the proper direction, draw the paper strip from the feed roller 22, across the table top and out through between them.

For operating the feed rollers 25 and 26, a power shaft 32 is mounted transversely across the machine frame 9 near one end thereof, and this shaft has a hand wheel 33 on its front end and a crank arm 34 secured on its back end (see Fig. 3). The spindle 27 of the roller 25, has a ratchet wheel 35 secured upon its back end and a lever arm 36 mounted loosely thereon and carrying a spring controlled pawl 37 that engages the teeth of such wheel. This lever is connected by the rod 38 with the crank arm 34 of the operating shaft so that by

the rotation of such shaft the lever will be moved reciprocally and thereby turn the feed rollers intermittently. The amount of turning movement given the rollers on each rotation will be regulated by adjusting the point of attachment of the connecting rod 38 to the crank arm and for this purpose such crank arm is made with a longitudinal slot 39 therein and the rod is fastened in the slot by a screw pin 40 which may be locked at any point in the slot.

Thus the length of paper fed across the printing frame at each printing operation may be adjusted at will, and with the facility for using varying widths of paper previously referred to, the machine may be adjusted to give prints of any desired size within the maximum area of the printing frame opening.

A plate 41 is mounted above the top of the printing frame and is adapted to cover the whole opening thereof and make light tight contact all around its edges. This plate is pivotally hung upon a lever 42 extending from back to front of the machine and at its back end hinged to a standard 42^a so that it may turn up and down thereon. The pivotal attachment of the plate to the lever provides that when the lever is pressed down the plate will engage evenly around all the edges of the printing frame. The lever is kept normally raised free of contact with the frame by means of the spring 43 in compression between it and the table top 8. Thus the paper strip may be passed beneath the plate and fed across the table when the plate is thus raised. It is however required to depress the plate on to the frame and grip the paper on to the edges thereof at each printing operation and means are provided for doing this in alternation with the feeding movements of the feed rollers 25—26.

These means are shown more particularly in Figs. 3, 4 and 6 and consist in a lever 44 that is pivoted at one of its ends to the under part of the frame 9 near one end thereof and at its other end underlies a cam 45 secured upon the operating shaft 32. About midway in its length the lever is connected through a helical spring 46 with the lower end of a rod 47 that passes vertically up through the table 8 and is connected at its upper end to the preser plate lever 42. The spring 43 keeps the cam lever 44 drawn up against the cam and the cam throw is so adjusted that the cam lever will be depressed sufficiently to draw the plate 41 hard down on to the printing frame with a springy pressure caused by the interposition of the helical spring 46 between the connecting rod 47 and the cam lever 44.

The connection of the rod 47 with the lever 42 is made in such a manner as to provide for the lever being freed therefrom

in order to permit of the lever and plate being thrown up and back on the hinge in standard 42^a to allow of the printing frame being arranged for printing. This may
 5 be effected by forming the rod with a T head and passing it up through a slot in the lever 42 as shown in Figs. 2 and 6 so that when turned across the slot it will engage the sides thereof and when turned lengthwise,
 10 the lever may be lifted clear of it. The spring 43 is kept in position by arranging it around the top end of the said rod.

This operation of the pressure plate 41 is adjusted to take place during the idle return stroke of the paper feeding mechanism and simultaneously therewith the light within the light box is designed to be illumined for the predetermined period required for the exposure.

20 The means for performing this latter operation are adaptable for use with an electric lamp, shown in dotted lines in Fig. 1, and to automatically control the normally open circuit of such lamp so as to close it
 25 for the fixed period. These means are shown in detail in Figs. 4 and 7 and in general view in the other figures and consist in a rubber air bulb 48, having a non-return air inlet valve, of well known type, con-
 30 nected by tubing with a rubber ball 49 contained within the casing 50 fixed to the frame 9. Within such casing are arranged the spring contacts 51-52 normally kept apart by their inherent tension and respec-
 35 tively connected with the two poles of the lamp circuit (as indicated by the diagram in Fig. 4). The ball 49 is positioned between the side of the casing 50 and one of the con-
 40 tacts 51 so that when expanded by the forcing of air into it, the contact 51 will be forced into contact with the contact 52 and thereby close the circuit. The air then
 45 escapes from this ball, to break the contact, through the special valve 54 shown in detail in Fig. 7. This is combined with an indi-
 50 cator dial 55 fixed to the back of the machine above the top thereof, such dial forming the front end of a small cylinder 56 into the side of which a tube connection 57 with
 55 the ball 49 enters. The back end of the cylinder has a tapered aperture 58 therein and a needle valve stem 59 screws axially through the front end of the cylinder and enters this aperture so as to close it more or
 60 less according to the position of the screw. Its outer end is provided with a pointer 60 passing around the face of the dial 55. The positioning of this pointer at different posi-
 65 tions upon the dial will therefore indicate different degrees of opening of the needle valve and consequently give an indication of the times taken in the escape of the air from the ball 49 when the needle valve is in such positions. Consequently, it becomes an
 65 easy matter to set the valve to provide for

the lamp circuit remaining closed for any period desired after the ball 49 has been inflated to close such circuit.

The rubber air bulb 48 is compressed to close the lamp circuit by means of a lever 61, 70 pivoted at about midway in its length, to the frame 9, and at one end underlying the bulb 48 and having a broad plate 62 fixed thereon to engage such bulb, and at the other end
 75 overlying a second cam 63 fixed on the operating shaft 32. This end is spring controlled by means of the spring 64 connected to it and to the frame 9 so as to keep it in close contact with the cam's periphery. The
 80 cam is so shaped and is so adjusted on the shaft that during the paper feeding portion of the shaft's rotation, the lever 61 will be moved to free the bulb 48, and during the other portion of such rotation, it will be op-
 85 erated by the spring 64 so as to engage and compress the bulb in the required manner.

Thus the one rotation of the operating shaft will feed forward a length of paper and will then grip such paper and press it over the top of the printing frame simul-
 90 taneously with the illumining of the exposure light.

An ordinary red electric light for working by, may be attached to the machine and controlled by a switch provided for that
 95 purpose. This is not shown in the drawings, as it will be of any known design.

I claim:—

1. In a photographic reproduction apparatus the combination with a printing frame, 100 a movable presser plate adapted to close the open end of the said printing frame, means for forcing the said presser plate onto the open end, and an actuating member for operating said means, of a light box for the
 105 said printing frame, an electric lamp mounted in the said light box, an electric lamp circuit, contacts therein normally open, and air-controlled means for automatically closing said contacts upon the operation of the
 110 said presser plate to close the opening of the said printing frame.

2. A photographic reproduction apparatus according to claim 1, in which the con- 115 tacts in the lamp circuit are spring contacts, an air ball being provided arranged to engage one of the said contacts and adapted when expanded to press the said contact against the other contact, an air-bulb being connected with the said air ball for expand-
 120 ing the same, a means controlled by the said actuating member for periodically compressing the said air-bulb, and means for exhausting the said air ball.

3. A photographic reproduction appara- 125 tus comprising a printing frame, a hinged presser plate adapted to close the open end of the said printing frame, means for forcing the said presser plate upon the open end, a rotatable shaft, a cam thereon for operat- 130

ing the said means, a light box for the said printing frame, an electric lamp mounted in the said light box, an electric lamp circuit, contacts therein normally open, and
5 air-controlled means for closing the said contacts, the arrangement being such that upon the rotation of the said operating shaft the presser plate is forced upon the open end of the said printing frame and simultaneously therewith the contacts of the electric lamp circuit are automatically closed.

4. A photographic reproduction apparatus according to claim 3, in which the said contacts are formed as spring contacts and
15 the said air-controlled means comprises an air ball arranged to engage one of said contacts and when expanded to press it against the other contact, and an air-bulb connected with the said air ball, a cam on said operating shaft being provided and a pivoted arm for compressing said air-bulb adapted to be engaged by the said cam, and adjustable means for exhausting the said air ball.

5. A photographic reproduction apparatus according to claim 4, in which the means for exhausting the said air ball comprises a closed casing provided with a tapering opening, an adjustable needle valve for controlling the said opening, and a communicating duct between the said casing and the
30 said air ball.

6. In a photographic reproduction apparatus according to claim 3, in which the

means for operating the said presser plate comprises a pivoted lever arm arranged to
35 be engaged by the said cam, a vertical rod being provided attached at its one end to the said lever arm through a tension spring connection and connected at its other end to the said hinged presser plate, and a compression spring engaging the said presser plate and normally forcing the same away from the said printing frame.

7. In a photographic reproduction apparatus the combination with the printing
45 frame, and a presser plate adapted to be pressed upon the open end of the said frame, of an enlarger apparatus comprising a lens frame and a negative holder adjustable relative to each other and to the said printing
50 frame, and a light box beneath the negative holder, an electric lamp mounted in the said light box, and means whereby the circuit of the said lamp is normally kept open but is closed for a regulatable period
55 simultaneously with the closing of the said presser plate onto the opening of the said printing frame.

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

MATTHEW MARRIN KULUS.

Witnesses:

DAVID BROWN HUTTON,
JOSEPH STANLEIGH McAVEN.