April 27, 1943. O. R. BETTS ET AL 2,317,343

PHOTOGRAPHIC EXPOSING AND DEVELOPING MACHINE AND THE LIKE

Original Filed July 18, 1938

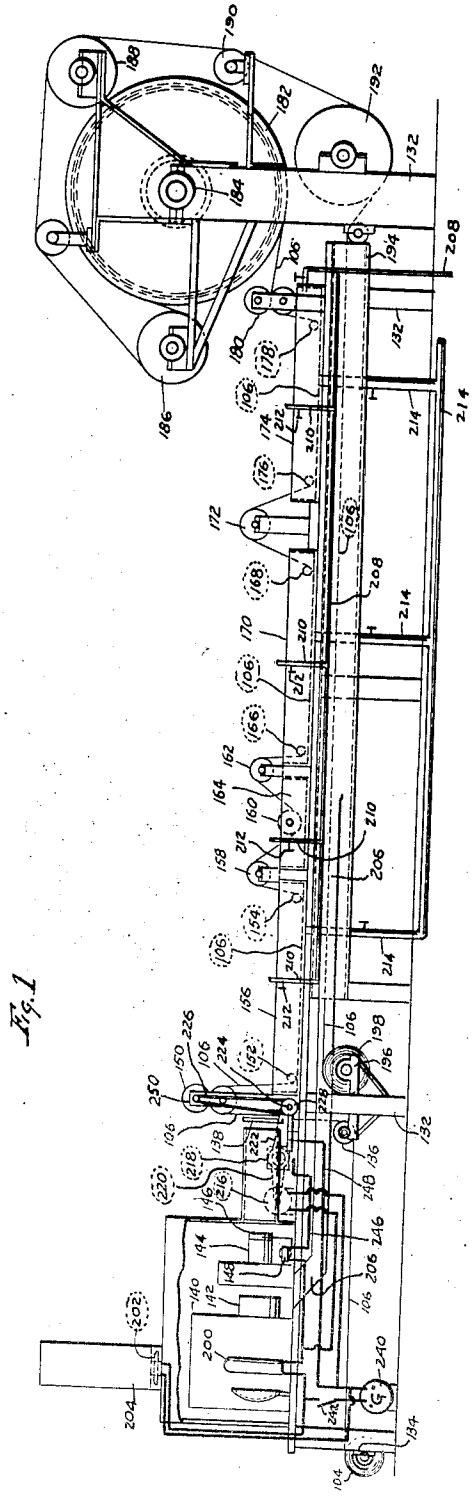


Fig. 1

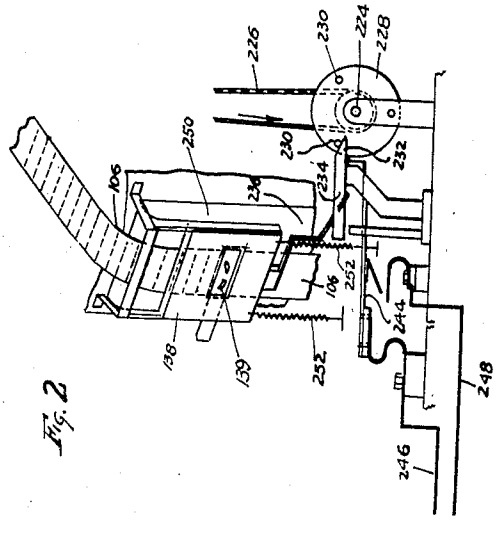


Fig. 2

INVENTORS

Orville R. Betts.

John W. Nervius

Wheeler Peters & Glendenning

Patented Apr. 27, 1943

2,317,343

UNITED STATES PATENT OFFICE

2,317,343

PHOTOGRAPHIC EXPOSING AND DEVELOPING MACHINE AND THE LIKE

Orville R. Bettes, John W. Nevius, and Wilhelm Petrus Hendrickson, Long Beach, Calif.

Original application July 18, 1938, Serial No. 219,786. Divided and this application July 21, 1939, Serial No. 285,828

1 Claim. (Cl. 95—75)

This is a divisional application, as originally filed July 18, 1938, Serial Number 219,786.

Our invention relates to the photographic exposing and developing machine and more particularly to the apparatus which is used and adapted for exposing the photographic image upon the passing paper for simultaneously developing and rewinding it in readiness for use.

Another object of our invention is to provide a suitable picture photographing means for photographing pictures upon said emulsion coated paper, comprising a suitable means for feeding said paper from a roll which is fed through a paper carrier, said paper carrier being adapted to receive a picture film having a suitable projection means and a suitable light ray concentrating member for concentrating said light rays upon said film under which said paper is travelling or passing, also, having a suitable aperture so arranged whereby the linear speed of said paper when passing under the aperture provided with the film therein, may be moved and synchronized in the same direction and, at the same time controlling their linear speed, while the picture image from said film is transposed upon the surface of said passing paper.

Another object of our invention is to provide said picture photographing apparatus with suitable means for developing and fixing the picture upon the paper and for controlling its speed thereto and into another process of development, also having suitable means connected thereto for drying said paper over a suitable heated drum member, then allowing it to pass into a suitable duct through which a volume of drying air is allowed to pass. Said volume of air being agitated by a suitable agitating member attached and operated by a motor and adapted for drying said paper immediately after its development and in addition thereto having a suitable means for re-winding said developed and dry paper into rolls, having it in readiness for other and further process of operation.

Further objects and advantages of our invention as will hereinafter more fully appear, we attain by the construction herein shown on the drawing and described in the specification, forming a part of our application.

Reference is had to the accompanying drawing, in which the similar reference characters denote the similar parts.

In the drawing:

Fig. 1 shows the diagrammatical and elevational view of the picture applicating apparatus, adapted for applying the picture image upon the surface of the passing paper, for fixing and developing of said picture, then drying said paper and finally re-winding same upon a suitable roll.

Fig. 2 shows a perspective diagrammatical view of the picture film carrying apparatus showing the paper passing thereunder and having means for actuating said apparatus at the same linear speed and operating in conjunction with the passing paper.

Describing our invention more in detail, said invention comprises the photographic apparatus for photographically reproducing pictures and wherein the sensitized paper in a continuous form is used for transposing pictures and upon its surface in succession or at intervals and which may be for the purpose to photograph and reproduce work of art or advertising matter, which may be used in cut form, such as pages for periodicals, or, for any other advertising matter as may come within the general course of business.

Said apparatus comprises a frame **132** which is provided with a suitable hanger **134** upon which a roll of sensitized paper **104** is rotatably positioned and wherefrom the paper web **106** passes under a roller **136** then into a suitable holder **138** having an aperture wherein the picture film **139** is positioned as shown, the construction of which and its operation will be presently described.

The pictures or image from the picture film **139** and upon said paper surface are transposed by means of the use of suitable lantern member **140** having a passage **142** allowing the light rays to pass into a suitable light beam concentrating lens **144**, which is provided with a suitable shutter member **146** and which is operated by means of a suitable solenoid member **148** as shown.

After the picture from the picture film **139** is transposed upon the paper surface, said paper **106** passes between a pair of feeding rollers **150** wherefrom it is guided by means of glass rollers **152** and **154** into and through a developing tank **156** wherein the pictures are developed, while said holder **138** together with said film **139** slides downwardly and is held at its lowermost position in readiness for another sucessive exposure.

From said developing tank **156**, the paper is then guided over a roller **158**, then under the roller **160** and again over a roller **162** thus passing into a and through wash tank **164**, wherefrom it is led and guided by a means of guiding rollers **166** and **168** respectively into and through a fixing bath tank **170** which will allow the photokinetic action in said emulsion upon said paper surface to be promptly fixed and the resulting

picture registration to be permanently established.

When the paper passes through and from said fixing bath tank 170, it is necessary to allow said paper to pass over a roller 172 and into a wash tank 174 wherein it is guided by means of rollers 176 and 178, then allowing it to pass between a pair of wringer rollers 180 in order to extract and eliminate as much as possible the moisture from said paper, whereupon the paper web 106 is permitted to pass over a suitable drum 182 which may, if so desired, be heated by suitable heating means (not shown) for the purpose to permit complete evaporation of the moisture therefrom.

Said drying drum 182 is rotatably mounted upon suitable bearing or trunnion 184 which may, if so desired, be mounted upon or connected to the upright extension of the frame 132, so as to shorten the operation and drying process which in rotation said drum 182 allows the paper 106 to pass over a plurality of airing rolls 186, 188 and 190 passing into a guiding roller 192 which guides the paper into an air duct 194 and then allowing it to pass through a re-wind apparatus 196, wherein said paper web 106 is wound into a roll 198, as shown.

It may be noted that the photographing apparatus, as herein shown, produces a certain amount of heat which is generated by a lamp 200 and therefore we have provided a suitable fan 202 at the upper structure of the enclosure 204 which is for the purpose to blow the hot air downwardly and into a sub-duct 206 leading into the duct 194 previously mentioned. The paper web 106 passing through the photographing and developing apparatus runs very slow through the entire process and therefore the chemicals used in the developing and fixing process may be quickly removed, exchanged, or added thereto without diminishing the speed of the machine and for that purpose, we have provided said apparatus with a water pipe line 208 which is provided with water inlets 210, each being provided with a suitable valve member 212 as shown, and, for the purpose of draining said tanks, each of said tanks 156, 164, 170, and 174, is provided with a suitable drain pipe 214, so that after each operation or after a certain period of time, all the chemicals may be drained therefrom and the tanks cleaned out with fresh water.

The drive for said machine, may be arranged in any manner most adaptable in practice, therefore, for the purpose of driving rollers 158, 160, 162, also roller 172, and wringer rollers 180, then drying drum 182 and airing rollers 186, 188, 190 and 192 inclusive, also, the rewind apparatus 196 may be driven by suitable mechanism, which is simple in its operation and therefore its description is not deemed necessary.

However, for operating the photographic apparatus and the passing paper in synchronization, the lantern 140 and the shutter mechanism 146 also the sliding movement the aperture holder 138 including said rollers 150, are combined together and are provided with a suitable drive, comprising a motor 216 having a reduction gear 218 operated by means of a belt 220, said reduction gear 218 transmits its power by means of a suitable chain 222, which is connecting a suitable sprocket mounted upon a cross shaft member 224, see Fig. 2, which in combination are adapted to drive said feed rollers 150 by means of a chain 226, and which is also utilized for actuating and providing the sliding movement for said aperture holder 138.

One end of said cross shaft member 224 is provided with a suitable timing plate member 228 which is provided with a plurality of timing pins 230 and which are so arranged, whereby the synchronization lever member 232 is actuated thereby, as shown more particularly in Fig. 2, said lever member 232 is fulcrumed as at 234 having an extension which extends rearwardly and to which the aperture holder movement controlling lever 236 is attached and which is adapted to control the movement of said aperture holder 138 in synchronism with the linear speed of the paper web 106 passing thereunder.

In operation, the source of energy is delivered from the generator 240, see Figs. 1 and 2, respectively, or, it may come from an outside source in any form, as in practice may be most desirable and which may provide sufficient current for energizing the lamp 200 and for operating the fan member 202 including the motor, also for driving the power motor 216 of the apparatus, wherein the electric circuit is controlled by a suitable main switch 242 provided therein, as shown.

Further, in order to operate the solenoid 148, which is opening and closing the shutter member 146 in synchronism with the vertical movement of the aperture holder member 138 while the paper web 106 moves therewith and passes thereunder, the lever 232 is provided with a switch lever 244 from which a lead wire 246 leads to said solenoid 148 and follows through the circuit leading into the main switch 242, while the other lead wire 248 leads to the source of energy 240 as shown, also, in order to prevent a possible slowness and for insuring the aperture holder sliding movement in the frame 250 supported by the rod member 236, and when moved by the lever member 232 which is actuated by the timing pins 280, a suitable tension springs 252 are provided therein, which are for the purpose to hold said aperture holder 138 in its lowermost position and to hold same at all times in readiness to be moved vertically by the lever member 232 actuated by the timing pins 230 during the revolution of said plate member 228.

The apparatus herein described is adapted for and may be used in printing and photographing the diversified advertising matter upon the paper and because of the particular construction of the apparatus and the operation thereof as an individual unit or in combination, it may be used for printing and reproducing pictures and the advertising matter in great quantities. Further, that because of the particular construction of the combine of the apparatus, together with the printing, photographing, developing and drying apparatus, it is exceptionally adapted for the production of color pictures upon the paper and therefore such pictures or pictorial advertising may be effectively produced for the exclusive or personal stationery, business stationery, magazines and periodical advertising and the like.

Having thus described our invention in all particulars, we do not wish to be limited to the exact details described or shown in the drawing, as many variations may occur to those skilled in art to make changes and modifications therein, which may come within the scope of the appended claim.

We claim as our invention:

In the apparatus of the class described adapted for photographically reproducing pictures upon the surface of a sensitized paper which is moving continually and in one continuous operation, in combination, a frame member, a light producing

means mounted upon said frame member, a light rays concentrating means associated with said light producing means for concentrating said light rays passing therethrough, an aperture holder frame mounted upon said frame member, an aperture holder means slidably disposed in said holder frame and positioned in juxtaposition to said light rays concentrating means, an aperture disposed in said aperture holder means for allowing said light rays to pass therethrough and be restricted to its size, a picture film member disposed in said aperture, a sensitized surface paper disposed in close proximity to said picture film member, a sensitized paper carrying means mounted upon said frame member, means mounted upon said frame member and connected to said paper carrying means for moving said aperture holding means and for moving said sensitized paper at the same speed, resilient means connected to said aperture holder means for retracting of said aperture holder at intervals, a shutter member connected to said light rays concentrating means for shutting off the light while said aperture holder means is in its retracting movement so that the picture from said film may be reproduced upon said sensitized paper surface, and sensitized paper developing and drying means mounted upon said frame member for holding said paper in position during its continuous movement and for completing the photographic reproduction of picture from said film in one continuous operation, substantially as described.

ORVILLE R. BETTS.
JOHN W. NEVIUS.
WILHELM PETRUS HENDRICKSON.