Nov. 6, 1951 V. KUNSTADTER 2,574,215

AUTOMATIC PHOTOPRINTING AND DEVELOPING APPARATUS

Filed July 15, 1947

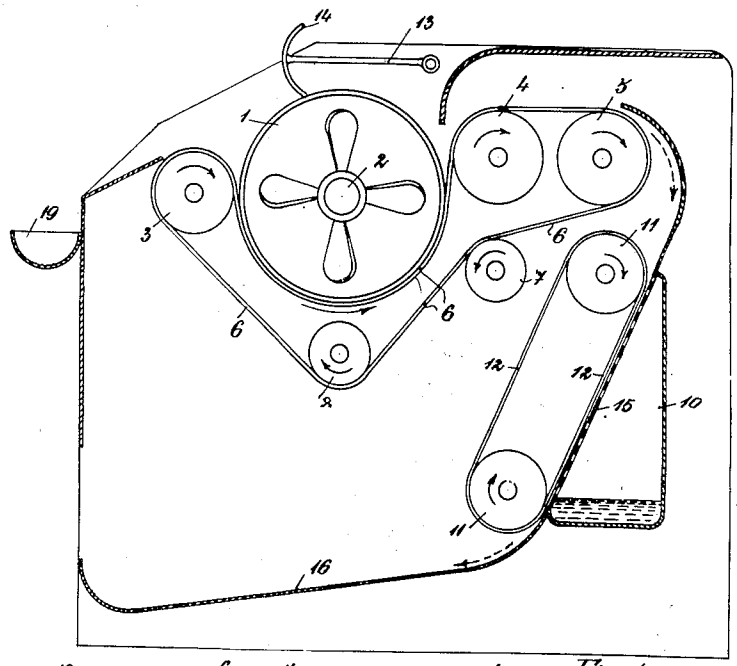


Fig. 1.

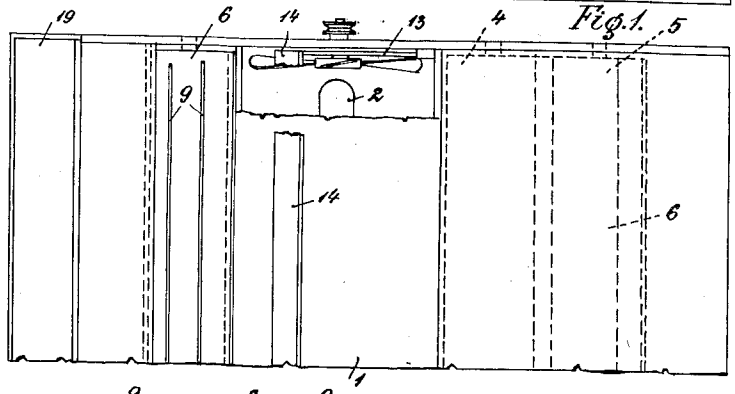


Fig. 2.

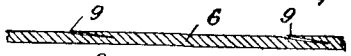


Fig. 3.

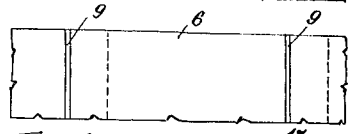


Fig. 4.

Fig. 5.

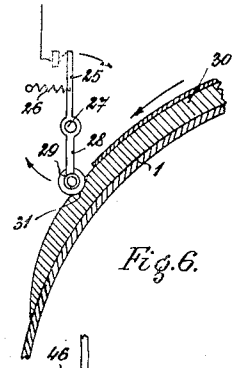


Fig. 6.

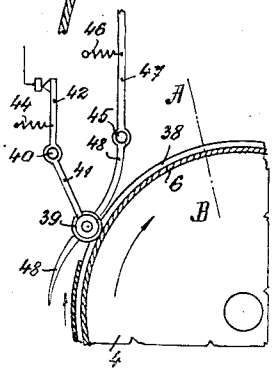


Fig. 7.



Fig. 8.

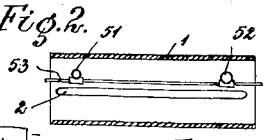


Fig. 9.

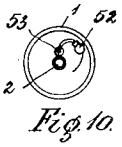


Fig. 10.

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AUTOMATIC PHOTOPRINTING AND DEVELOPING APPARATUS

Vilmos Kunstädter, Budapest, Hungary

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In Hungary May 9, 1947

4 Claims. (Cl. 95—77.5)

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In the known types of photo-printing and developing apparatus, it is, as appears also from the Patent No. 2,900,389 of the applicant, necessary, in case it is desired to prepare more than one print of any drawing, to place the drawing into the apparatus separately for preparing each print, and, moreover, the drawing, of which a print is to be made, is, independently of the size of the drawing, always lighted through by means of a source of light of the same illuminating power. Accordingly, from the point of view of utilisation of labour, as well as from that of current consumption, these types of apparatus are not economical. As against this, the apparatus according to the invention possesses the advantage that photo-prints are prepared by it in series entirely automatically from the drawing, and, further, that for drawings of smaller size, or according to how the process of photo-printing may render this necessary, it is possible to vary the illuminating power and possibly also the position of the source of light, thereby enabling a substantial saving in current, and an advantageous printing effect to be obtained.

On the annexed sheet of drawings, the invention is represented in one of its embodiments shown by way of example. On this drawing,

Fig. 1 shows schematically, in vertical section, the general arrangement of the whole apparatus, whilst

Fig. 2 is a plan view and partly a section of the same apparatus,

Figs. 3–4 are detail drawings belonging thereto,

Fig. 5 shows, in vertical section, the printing drum only, as well as the feeding and guiding cylinder, in connection with an electromagnetically operated automatic paper-feeding device and an automatic device for the guiding of the drawing;

Figs. 6–7 are detail drawings, drawn to a larger scale, belonging thereto,

Fig. 8 is a section taken along the line A—B of Fig. 7, whilst

Figs. 9–10 are a longitudinal section and a side elevation, respectively, drawn to a smaller scale, of the printing drum with adjustable lamps.

On the drawing, 1 denotes the printing drum, 2 the source of light arranged in its interior, 3 the feeding cylinder, 4—5 as well as 7—8 and 11 the guiding cylinders, 6 the endless guiding tape and 10 the developer tank.

The general principle of operation of the new type of apparatus consists in that after printing has been effected the original drawing and the printing paper are separated from each other, only the printing paper passing into the developer, whilst the original drawing is guided back along the envelope surface of the printing drum to the place of feeding.

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Accordingly, according to the general arrangement shown on Fig. 1, the original drawing from which a print is to be made and a photo-sensitive paper arranged in the coil holder 19 are introduced into the apparatus at the feeding cylinder 3 in such a manner that the front edge of the photo-sensitive paper is held fast in one of the slots 9 of the guiding tape 6. The drawing and the photo-sensitive paper, guided together on the lower part of the drum envelope 1 by the tape 6, are lighted through, whilst subsequently, after printing has been effected, the photo-sensitive paper leaves the drum 1 and the cylinder 4, and passing along between the grating surface 15 of the tank 10 and the tape 12, becomes developed and slides forward on the inclined bottom 16 to the outlet opening. The original drawing, on the other hand, is guided back along the drum 1 to the feeding cylinder 3, the said drawing being guided during this time through the gap of adjustable size between the drum envelope and the lower edge of the drawing guiding device 14 supported by the arm 13, following which the tape 6 again automatically grips the drawing and guides it further along the drum 1. When the lower edge of the surface 14 finds support on the drum envelope, the latter will catch the original drawing.

In the case of the arrangement shown on Figs. 5–8, there is provided, in front of the printing drum 1, the feeding cylinder 17, and below the latter the ledge 18 for introducing the printing paper. That end of the ledge 18 which is facing the drum 1 projects into the space between the feeding cylinder 3 and the drum. It is to this end of the guiding ledge that the closing tongue 20 extends, which latter forms one of the arms of the two-armed lever pivotable around the pivot 21, whilst the other arm 22 of the lever forms the soft iron of the electro-magnet 23. If the circuit of the electro-magnet is closed the electro-magnet will keep the arm 22 in the attracted position, whilst at the same time the end of the tongue 20 will become supported against the end of the ledge 18, thereby obstructing the path of the photo-sensitive paper towards the drum; from this position it is the force of the spring 24 that endeavours to displace the arm 20.

Into the circuit of the electro-magnet there is connected the switch contact 25 which is kept in the contact position by the force of the tension

spring 26. This switch contact constitutes one of the arms of the double-arm lever pivotable around the pivot 27, whilst the other arm 28 of the lever carries the roller 29, which places itself into the groove 31 of generatrix direction provided on the envelope 30 of the drum (Fig. 6).

Into the circuit of the electro-magnet 23 there is connected a second electro-magnet 32, the soft iron of which is constituted by the lever arm 34 pivotable around the pivot 33. On the other arm 35 of the lever, a cutting edge 36 of transverse direction is provided, below which the groove 37 of transverse direction extends along the ledge 18 (Fig. 5).

Along the center of the endless guiding tape 6 there extends the longitudinal groove 18 (Fig. 8); at that point of the tape, where it leaves the printing cylinder and becomes applied on the guiding cylinder 4, the roller 39 finds support in the groove 38, the said roller being carried by the arm 41 of the double-arm lever pivotable around the pivot 40. The other arm 42 of the same lever (Fig. 5) is constructed so as to constitute a switch contact connected into the circuit of the electro-magnet 43, the said contact being kept in the contact position by the force of the spring 44. The soft iron of the electro-magnet is constituted by the arm 47 of the double-arm lever pivoting around the pivot 45 and subject to the action of the spring 46, whilst the other arm 48 of the lever is constituted so as to form a separating tongue the end of which will in case of a closed circuit find support on the envelope surface of the drum 1.

When it is desired to perform the printing process, the photo-sensitive paper is guided on the ledge 18 below the feeding cylinder 17 up to the closing tongue 20. The original drawing of which a photo-print is to be prepared is pushed below the forwarding cylinder 49 up to the point when the front edge of the drawing will raise the roller 29, and at the same time the electric current operating the magnets is switched on, in consequence whereof the feeding cylinders 17 and 49 will be set in motion and the printing paper as well as the original drawing, from which a photo-print is to be prepared, are guided on the tape 6. These will travel together along the lower envelope surface of the drum 1, where the lighting-through takes place. The front edge of the original drawing lags behind by about 2 to 3 cm. behind the front edge of the photo-printing paper. As soon as the photo-sensitive paper has reached the switch arm 41, it will lift out the roller 39 from the groove 38 of the tape 6, and will pivot the switching arm around the pivot 40. This will cause the circuit of the electro-magnet 43 to be broken at the contact 42, the spring 46 will deflect the arm 47 around the pivot 45 and press the separating tongue 48 against the guiding cylinder 4. Thus the printing paper will continue its travel along the cylinder 4 to the developer, whereas the original drawing will continue its travel along the surface of the protecting jacket 30 and will become displaced below the cylinder 49 towards the arm 20.

As soon as the end of the original drawing has passed below the roller 29, the spring 26 will close the switch contact 25, in consequence whereof the closing tongue 20 will, pivoting around the pivot 21, become tilted into the closing position. Simultaneously, the electro-magnet 32 will be placed under current, and will attract the cutting arm 34 and, at the same time, will stop the feeding cylinder 17; thereupon the cutting edge 36 will cut off the necessary length of printing paper.

As soon as the end of the printing paper has left the arm 41 on the guiding cylinder 4, the roller 34 will again descend into the groove 38 of the tape 6, the circuit of the electro-magnet 43 will become closed and the end of the tongue 48 will again find support on the envelope of the drum 1.

As soon as the front edge of the original drawing again comes to be placed below the roller 29, it will raise the arm 25, thereby causing the circuit of the magnets 23 and 32 to be broken, the feeding cylinder 17 will be set in motion and the operation will be repated.

In the printing drum shown on Figs. 9–10 there are provided, in addition to the source of light 2, also the sources of light 51, 52 which are capable of being slid at will along the supporting bar 53, and of being rotated around the said supporting bar. In the case of this arrangement it is possible to increase the intensity of illumination in places, thereby causing the printing process to be intensified in these places. When preparing prints from drawings of smaller size, it is possible to cut out the source of light 2 and to employ the sources of light 51, 52 only.

What I claim is:

1. In an apparatus for photo-printing and developing, the combination of a stationary cylindrical drum having at least a lower portion thereof transparent with a light source disposed within the same; a plurality of rollers rotatably mounted at the feeding and delivery sides of the drum; an endless belt enveloping the rollers and extending slidably about the transparent lower portion of said drum; a pendant separating member pivotally mounted intermediate the cylindrical drum and one roller disposed at the delivery side of the latter; resilient means effective to rock the pendant separating member away from said drum toward said one roller upon the advance end of a print reaching said roller from between said belt and said drum and thereby causing the print to be separated from a negative fed with said print about the transparent portion of said drum; and electro-magnetic means for rocking said pendant separating member toward said drum when said electro-magnetic means becomes energized in response to the termination of the print issuing from between said drum and said one roller.

2. In an apparatus for photo-printing and developing the combination of a stationary cylindrical drum having at least a lower portion thereof transparent with a light source disposed within the same; a plurality of rollers rotatably mounted at the feeding and delivery sides of the drum; and endless belt enveloping the rollers and extending slidably about the transparent lower portion of said drum; a pendant separating member pivotally mounted intermediate the cylindrical drum and one roller disposed at the delivery side of the latter; a magnetically responsive extension upon the pendant separating member beyond the pivot mounting of the latter; an electromagnet fixed in operative position relative to the magnetically responsive extension and effective to shift the latter upon being energized to simultaneously rock said pendant separating member toward said drum away from said one roller; and operative means effective to cut off electric current from said electromagnet upon the advance end of a print reaching said roller from between said belt and

said drum and thereby causing the print to be separated from a negative fed with said print about the transparent portion of said drum.

3. In an apparatus for photo-printing and developing the combination of a stationary cylindrical drum having at least a lower portion thereof transparent with a light source disposed within the same; a plurality of rollers rotatably mounted at the feeding and delivery sides of the drum; an endless belt enveloping the rollers and extending slidably about the transparent lower portion of said drum; a pendant separating member pivotally mounted intermediate the cylindrical drum and one roller disposed at the delivery side of the latter; a magnetically responsive extension upon the pendant separating member beyond the pivot mounting of the latter; an electromagnet fixed in operative position relative to the magnetically responsive extension and effective to shift the latter upon being energized to simultaneously rock said pendant separating member toward said drum away from said one roller; a pivotally mounted switch arm having a contact roller at one end thereof normally rolling upon said endless belt on said one roller; and an electrical contact adjacent to the other end thereof connected to said electromagnet there being a source of current; a spring normally biasing the extension upon said pendant separating member away from said electromagnet; and a second spring biasing the other end of said switch arm toward said electrical contact, the arrangement being such that when the advance end of a print arrives beneath the contact roller the switch arm will be rocked thereby to bring said other end thereof out of effective contact with said electrical contact and thereby open the circuit of said electromagnet and thus cause said pendant separating member to be rocked by said first-mentioned spring toward said one roller in order to separate the print from a negative in said apparatus.

4. In an apparatus for photo-printing and developing the combination of a stationary cylindrical drum having at least a lower portion thereof transparent with a light source disposed within the same; a plurality of rollers rotatably mounted at the feeding and delivery sides of the drum; an endless belt enveloping the rollers and extending slidably about the transparent lower portion of said drum; a pendant separating member pivotally mounted intermediate

the cylindrical drum and one roller disposed at the delivery side of the latter; a magnetically responsive extension upon the pendant separating member beyond the pivot mounting of the latter; an electromagnet fixed in operative position relative to the magnetically responsive extension and effective to shift the latter upon being energized to simultaneously rock said pendant separating member toward said drum away from said one roller; the endless belt having an intermediate groove along its entire length; a pivotally mounted switch arm having a contact roller at one end thereof normally rolling in the intermediate groove on said endless belt upon said one roller; an electrical contact adjacent to the other end thereof connected to said electromagnet there being a source of current; a spring normally biasing the extension upon said pendant separating member away from said electromagnet; and a second spring biasing the other end of said switch arm toward said electrical contact, the arrangement being such that when the advance end of a print arrives beneath the contact roller the switch arm will be rocked thereby to bring said other end thereof out of effective contact with said electrical contact and thereby open the circuit of said electromagnet and thus cause said pendant separating member to be rocked by said first-mentioned spring toward said one roller in order to separate the print from a negative in said apparatus.

VILMOS KUNSTÄDTER.

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