

Jan. 11, 1944.

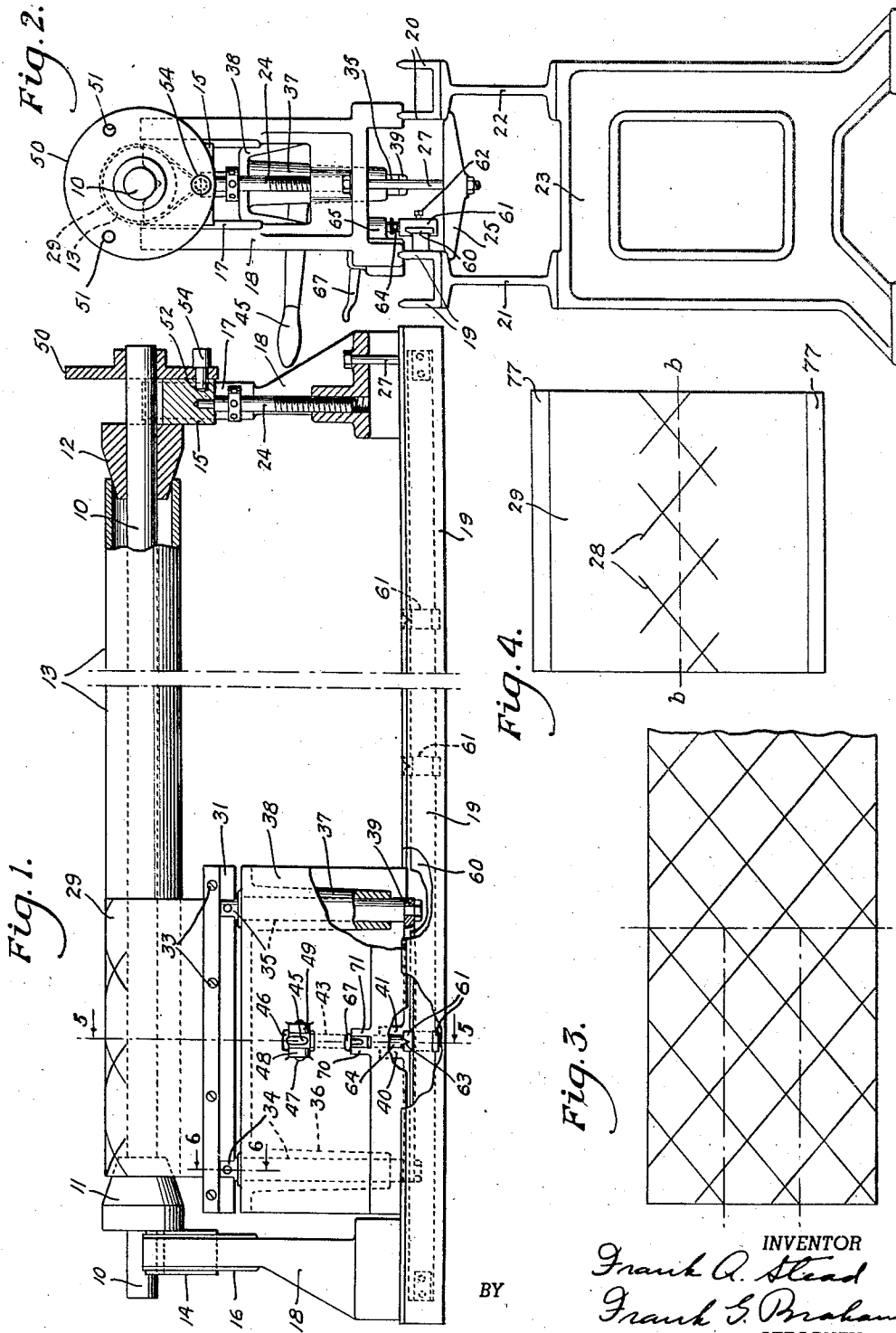
F. A. STEAD

2,338,877

CLAMP FOR ROLLER PRINTING

Filed July 26, 1941

2 Sheets-Sheet 1



INVENTOR
Frank A. Stead
Frank S. Proham
ATTORNEY

Jan. 11, 1944.

F. A. STEAD

2,338,877

CLAMP FOR ROLLER PRINTING

Filed July 26, 1941

2 Sheets-Sheet 2

Fig. 5.

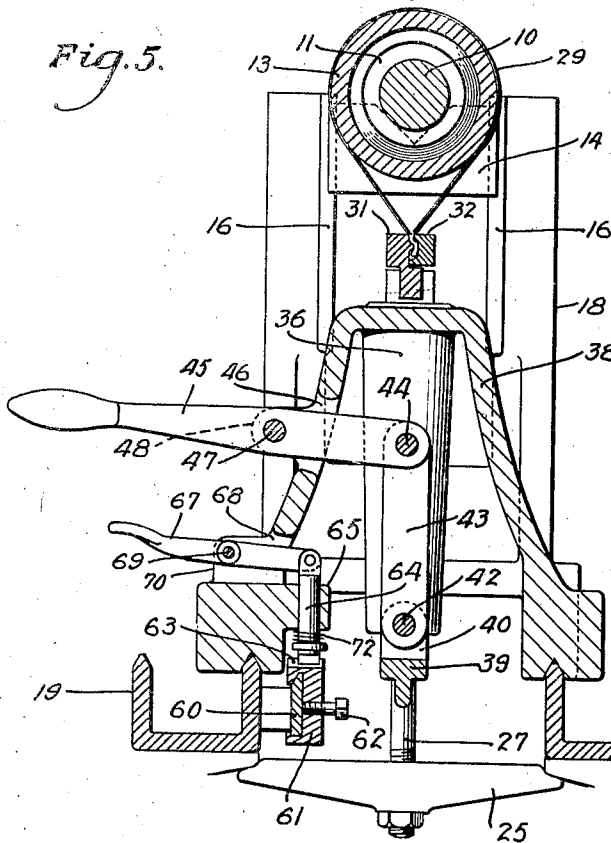


Fig. 6.

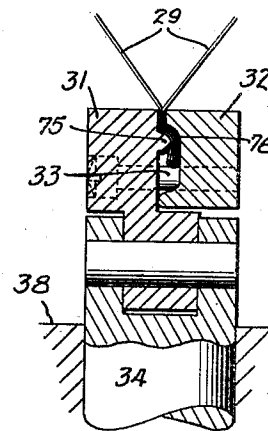
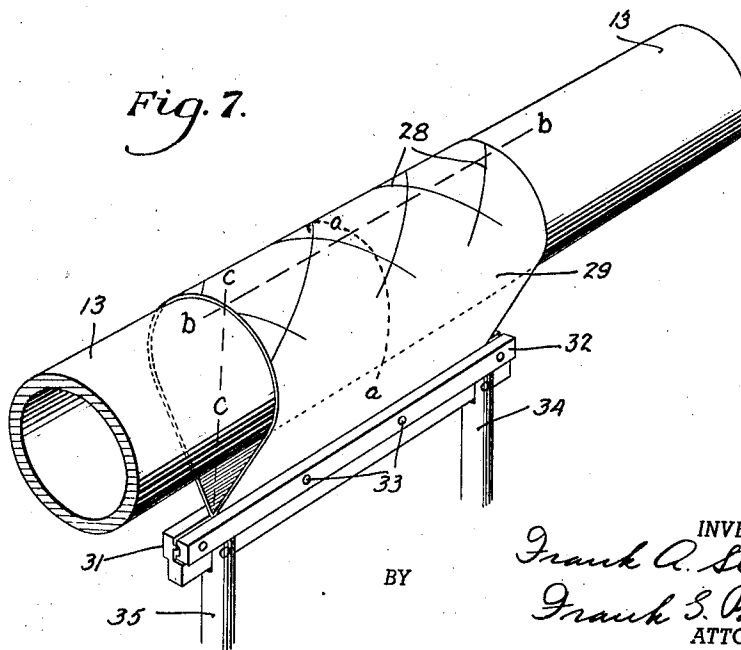


Fig. 7.



INVENTOR
Frank A. Stead
BY
Frank S. Graham
ATTORNEY

UNITED STATES PATENT OFFICE

2,338,877

CLAMP FOR ROLLER PRINTING

Frank A. Stead, Rye, N. Y., assignor to Linotone Corporation, a corporation of New York

Application July 26, 1941, Serial No. 404,120

2 Claims. (Cl. 95—73)

This invention relates to roller printing machines of the so-called step and repeat type commonly used in the photomechanical production of a design on a printing roller.

In accordance with one well known method of producing a design on such a roller, a positive of a unit portion of the design is created photographically on a flexible film, and after the roller has been coated with a light sensitive emulsion, the image bearing portion of the positive is brought into contact with the sensitized surface of the roller and then subjected to the action of light during which those areas of the sensitized surface underlying the opaque reproductions of the design element on the positive remain unaffected by light whereas those areas of the sensitized surface underlying the transparent areas which define the design element on the positive become affected by light. Thereafter, the image bearing portion of the positive is carried out of contact with the sensitized surface of the roller and the relative positions of the positive and roller are changed either longitudinally or circumferentially after which the image bearing portion of the positive is again brought into contact with the sensitized surface of the roller and subjected to the action of light to create a second reproduction of the design element on the sensitized surface of the roller in the form of light unaffected areas bounded by light affected areas. In like manner, additional reproductions of the design element are created along and about the sensitized roller to cover that portion thereof from which it is desired to print with reproductions of the design element. Thereafter, the coating on the roller is developed to fix those areas of the coating affected by light, and then washed to remove those areas of the coating which remained unaffected by light and which are reproductions of the design element, and finally, the roller is subjected to the action of acid to etch out the areas thus bared and so form in intaglio reproductions of the design element.

In many instances, it is desirable that the several reproductions of a design element thus created about and along the roller bear a predetermined relationship with respect to one another. For example, when it is desired to print an endless pattern, the several reproductions of the design element created about and along the roller should interfit along their edges.

While with present arrangements it is a relatively simple matter to accurately control the change in the relative positions of the film and roller between the successive reproducing opera-

tions considerable difficulty has heretofore been experienced in bringing the image bearing portion of the film into the exact position it must occupy on the roller after the change has been made to insure that the reproduction created therefrom bears the intended predetermined relationship with the other reproductions.

In accordance with one phase of the present invention, however, the above noted as well as other difficulties are obviated by positioning the image or reproduction of the design on the central portion of the film and then after the film has been looped over the roller clamping its ends so that the circumferential center line through the center of the loop thus formed is in a plane perpendicular to the axis of the roller and so that the distances from the ends of the loop to the center of the roller are equal and the distances from the ends of the loop to the center of the reproduction or image on the film are equal. When carrying the image bearing portion of the film into and out of contact with the roller, relative movement is caused between the two and in such a path that the distances from the ends of the loop to the center of the roller remain equal. Under these conditions each time the image bearing portion of the film is brought into contact with the roller the longitudinal center line through the image bearing portion of the film will automatically be brought into alignment with a point on the roller as determined by a line drawn through a point midway of the ends of the loop and the center of the roller. In consequence, the only requirements necessary to insure that several reproductions created along and about the roller bear a predetermined relationship with respect to one another is that the changes in the relative positions of the film and roller between the several reproducing operations be accurately controlled.

In accordance with another phase of the present invention means are provided for so clamping the ends of the film and for effecting the relative movement between the roller and the film in the desired path.

For a more detailed description of the invention reference may be made to the accompanying drawings wherein—

Figure 1 is a front elevation, partly in section, of a machine embodying the principles of the present invention;

Figure 2 is an end view of the machine shown in Figure 1. In this view, however, the base for supporting the machine is also shown;

Figure 3 is a plan view of a portion of an endless design that may be created on a roller;

Figure 4 is a plan view of a film having an image bearing portion on which is formed a reproduction of a design unit;

Figure 5 is a view in section taken along line 5—5 of Figure 1;

Figure 6 is an enlarged view of the film clamping arrangement; and

Figure 7 is a perspective view showing a roller, a film trained thereon, and the clamping device for holding the film.

As shown in the drawings, a roller printing machine of the type wherein the present invention may be employed with advantage comprises a shaft 10 having a pair of cone-shaped members 11, 12 between which a roller 13 may be mounted axially of the shaft 10. The shaft 10 is journaled at its ends in a pair of open bearing blocks 14, 15 each of which is slidably mounted between a pair of vertically disposed gibs 16, 17 carried by an end member 18. Each end member 18 is mounted on the inner upstanding wall of a pair of horizontally disposed U-shaped cross beams 19, 20 which in turn are carried by a pair of horizontally disposed I beams 21, 22 supported at their opposite ends by base members 23. Each of the bearing blocks 14, 15 is supported between the gibs 16, 17 by means of an adjusting screw 24, this arrangement being provided so that the bearing blocks 14, 15 may be raised or lowered to accord with rollers of different diameters as well as to enable any adjustment to be effected that may be necessary to insure the roller 13 is level in the machine. In addition, each of the end members 18 which carry the bearing blocks 14, 15 is slidably mounted on the inner walls of the U-shaped cross beams 19, 20 so that rollers of different lengths may be accommodated in the machine. In operation, however, each of the end members 18 is locked in fixed positions by means of a clamping bar 25 which may be brought into engagement with the inner upper faces of the I beams 21, 22 by means of a clamping stud 27 carried by the end member.

In describing the invention, let it be assumed that a series of reproductions of a given design are to be created along and about the roller and that these reproductions are to merge or interfit along their edges to form an endless pattern (see Fig. 3). In practice an image 28 of this design is created on a flexible film 29 and the film is looped over the roller 13, it being understood that the roller 13 is first provided with a coating of a light sensitive material.

In the present embodiment of the invention, the image 28 of the design on the film 29 is made equal in length to a third of the circumference of the roller 13 and in width to one-third the length of the roller. Under these conditions, the image of the design on the film must be reproduced three times around the roller and three times along the roller to form an endless pattern. It is to be understood, however, that the image of the design on the film in length may be made equal to any aliquot part of the circumference of the roller 13 up to one-half and in width to any aliquot or aliquant part of the length of the roller. In creating a reproduction of the design on the sensitized roller, the image bearing portion of the film is brought into intimate contact with the roller and then light from any suitable source (not shown) is projected through the transparent areas thereof onto the sensitized area of the

roller therebeneath, the remaining sensitized areas of the roller being protected against the action of light by any suitable means (not shown).

In accordance with the present invention, the ends of the film 29 are clamped between a pair of bars 31, 32 by means of studs 33 in such a manner that the circumferential center line *a—b* through the loop thus formed is at right angles to the axis of the roller 13 and so that the distances from the ends of the loop to the center of the image on the film 29 are equal, and here it is to be noted that since the ends of the film 29 are clamped together the distances from the ends of the loop to the center of the roller 13 are also equal.

One clamping bar 31 is offset and it is secured to the upper ends of a pair of rods 34, 35 slidably mounted in vertically disposed sleeve members 36, 37 carried by an inverted U-shaped carriage member 38, the arrangement of parts being such that as the rods 34, 35 move upwardly and downwardly through the sleeve members 36, 37, the distances from the ends of the loop to the center of the roller 13 remain equal. The rods 34, 35 project downwardly beyond the sleeve members 36, 37 and they are connected by a cross arm 39 having hub portions 40, 41 in which a shaft 42 is mounted. A vertically disposed link 43, at its lower end, is pivotally secured to the shaft 42 and at its upper end it is pivotally secured by means of a stud 44 to a fore-and-aft lever 45 at the inner end thereof. The lever 45 projects forwardly through an opening 46 formed in the front wall of the carriage 38 and it is pivotally mounted on a shaft 47 mounted in hub portions 48, 49 carried by the carriage 38 on opposite sides of the opening 46. When the lever 45 is depressed, the slide rods 34, 35 move upwardly through the sleeve members 36, 37 and so force the film 29 upwardly to carry the image bearing portion 28 out of contact with the roller 13. When the lever 45 is thereafter released, the rods 34, 35 slide downwardly under the influence of gravity and thus cause the image bearing portion 28 of the film 29 to be brought into contact with the sensitized surface of the roller 13 and here it is to be noted as the image bearing portion 28 of the roller 29 is brought into contact with the roller 13 that the ends of the loop are subjected to the same pull. Inasmuch as the distances from the ends of the loop to the center of the roller 13 remain equal during this movement and since the circumferential center line through the loop is at right angles to the axis of the roller and the distances from the ends of the loop to the center of the image bearing portion 28 of the film 29 are equal, the longitudinal center line *b—b* through the image bearing portion 28 of the film 29 will automatically be brought into alignment with a point on the roller determined by a straight line *c—c* drawn through a point midway between the ends of the loop and the center of the roller 13 each time the image bearing portion of the film is brought into alignment with the roller.

Under these conditions, the only requirements necessary to insure that the edges of several reproductions created along and about the roller 13 merge or interfit to form a continuous pattern are that between the several reproducing operations the rotation of the roller 13 beneath the film 29 and the lateral movement of the film 29 along the roller 13 be accurately controlled.

To the end that the rotation of the roller 13 beneath the film 29 may be so controlled, the

shaft 10 as usual, is provided at one end with an indexing disk 50 having a number of holes 51 so located that as the shaft 10 carrying the roller 13 is rotated they pass in front of a locking recess 52 formed in the bearing block 15. Since three reproductions of the design are to be created about the roller, the disk 50 is provided with three holes spaced 120° apart. During the creation of a reproduction of the design on the roller 13, the shaft 10 is locked in fixed position by means of a pin 54 inserted through one of the holes 51 in the disk 50 and into the locking recess 52. When it is desired to rotate the roller 13 beneath the film 28 a distance equal to the length of the image of the design on the film, the pin 54 is removed, the shaft 10 is turned to bring another hole in the disk 50 in front of the recess 52 and the shaft 10 is again locked by means of the pin 54. Since the length of the image of the design on the film 29 is equal to a third of the circumference of the roller 13 and since the holes 51 are spaced 120°, the roller 13 will be thus turned beneath the film 29 a distance equal to the length of the image of the design element on the film. Under these conditions when the second reproduction of the design is created around the roller one of its ends will interfit with an end of the first reproduction, and for like reasons when the remaining hole in the indexing disk 20 is brought opposite the locking recess 52 and a third reproduction of the design is created about the roller its ends will interfit with the ends of the other two reproductions to form a continuous pattern about the roller.

To the end that the film 28 may be accurately located along the roller, the carriage member 38 is slidably mounted on the inner upstanding walls of the U-shaped cross beams 13, 20. The inner upstanding wall of the front U-shaped cross beam is provided with a rail 60 having a number of blocks 61 secured thereto as by means of set screws 62. Each block on its upper face is provided with a fore-and-aft wedge-shaped groove 63 adapted to receive the tapered lower end of a plunger 64 slidably mounted in a shelf 65 carried by the carriage 38. The blocks 61 are so spaced along the rail 60 that the distances between the centers of the grooves 63 are equal to the width of the image of the design on the film 29. The plunger 64, at its upper end, is pivotally secured to a fore-and-aft lever 67 which projects forwardly through an opening 68 formed in the front wall of the carriage 38 and which is pivotally mounted on a shaft 69 carried by bearings 70, 71 located on opposite sides of the opening 68. Normally, the carriage 38 is locked in fixed position during the creation of a reproduction of the design on the roller 13 by the engagement of the lower end of the plunger 64 in the recess 63 in the upper face of one of the blocks 61. When it is desired to move the film 29 along the roller 13 a distance equal to the width of the image of the design on the film, the plunger 64 is raised by depressing the outer end of the lever 67 and the carriage 38 is moved along the machine until the tapered lower end of the plunger 64 is above the groove in an adjacent block 61. Then the lever 67 is released whereupon a spring 72 positioned about the plunger 64 acts to force the plunger downwardly to seat the tapered lower end thereof in the wedge-shaped groove in this block at which time the film 29 has been shifted along the roller 13 a distance equal to the width of the image of the design on the film. Under these conditions when the second reproduction of the design element is created along the roller

one of its sides will interfit with a side of the first reproduction, and for like reasons when the carriage is again shifted and a third reproduction of the design element is created along the roller one of its sides will interfit with a side of the second reproduction to form a continuous pattern along the roller.

As stated heretofore, the ends of the film 29 are clamped between the bars 31, 32 by means of studs 33. Ordinarily those portions of the film between the studs 33 would have a tendency to stretch and buckle as the image bearing portion of the film was repeatedly brought into contact with the roller 13. Under such conditions, the image bearing portion of the film 29 would not be brought into intimate contact with the roller 13 throughout its entire width. In accordance with another feature of the present invention, therefore, means are provided for clamping the ends of the film 29 in such a manner as to insure uniform pressure throughout the entire width of the clamped portions so that no buckling of the film will take place above the upper edges of the clamping bars 31, 32. To this end, the clamping face of bar 32 is recessed to provide a shoulder 75 and the clamping face of the bar 31 is provided with a ledge 76 so positioned that as the bars are forced together by the screw 33 the ends of the film are crimped throughout their width between the shoulder 75 and the ledge 76. In addition, the ends of the film 29 may be provided with a binding 77 to prevent tearing of the film during the clamping operation.

While in the present embodiment of the invention the ends of the film 29 are clamped together equally favorable results may be obtained by clamping the ends of the film in such a manner as to form parallel or divergent tangents where the film 29 leaves the surface of the roller 13, the essential features in all cases being that the circumferential center line of the film be at right angles to the axis of the roller, that the ends of the film be subjected to the same pull when the image bearing portion thereof is brought into contact with the roller and that the distances from the ends of the loop to the center of the image bearing portion of the film be equal and the distances from the ends of the loop to the center of the roller remain equal as the image bearing portion of the film 29 is carried into and out of contact with the roller 13.

Also while in the present embodiment of the invention the film 29 is of such length as to enable the ends thereof to be clamped in the manner set forth a considerable saving may be effected in the operation of the machine by making the film but slightly longer than the length of the image thereon and securing the film to a flexible transparent blanket in such manner that the image bearing portion will bear the same relation with respect to the ends of the loop formed by the blanket.

Having thus described my invention, what I claim is:

1. In a machine adapted to create on a sensitized roller a reproduction of a design element carried by the central portion of a flexible member looped over the roller, the combination of means for supporting said roller, a pair of bars for clamping said member at its ends and so positioned that the distances from the ends of the loop thus formed to the center of the roller are equal, a slide rod for moving said bars to carry the image bearing portion of the member into and out of intimate contact with the sensi-

tized surface of the roller, and a sleeve member in which said rod is slidably mounted, said sleeve member being so positioned that during the movement of the rod therein the distances from the ends of the loop to the center of the roller remain equal.

2. In a machine adapted to create on a sensitized roller a reproduction of a design element carried by the central portion of a flexible member looped over the roller, the combination of means for supporting said roller, a pair of bars for clamping the member at its ends and so positioned that the distances from the ends of the

5 loop thus formed to the center of the roller are equal, a slide rod for moving said bars to carry the image bearing portion of the member into and out of intimate contact with the sensitized surface of the roller, a sleeve member in which said rod is slidably mounted, and a movable carriage for shifting the film along the roller, said sleeve member being carried by said carriage and adapted to so guide the rod during its movement 10 therein that the distances from the ends of the loop to the center of the roller remain equal.

FRANK A. STEAD.