Nov. 7, 1939. W. L. SULLIVAN 2,179,026

COMBINED BLUE PRINT MACHINE AND DRIER

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Fig. 5

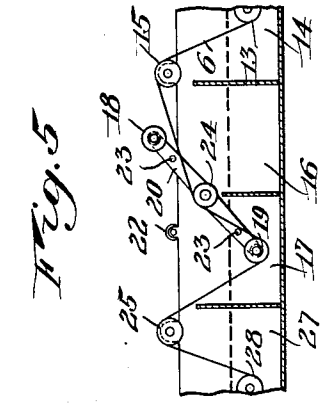
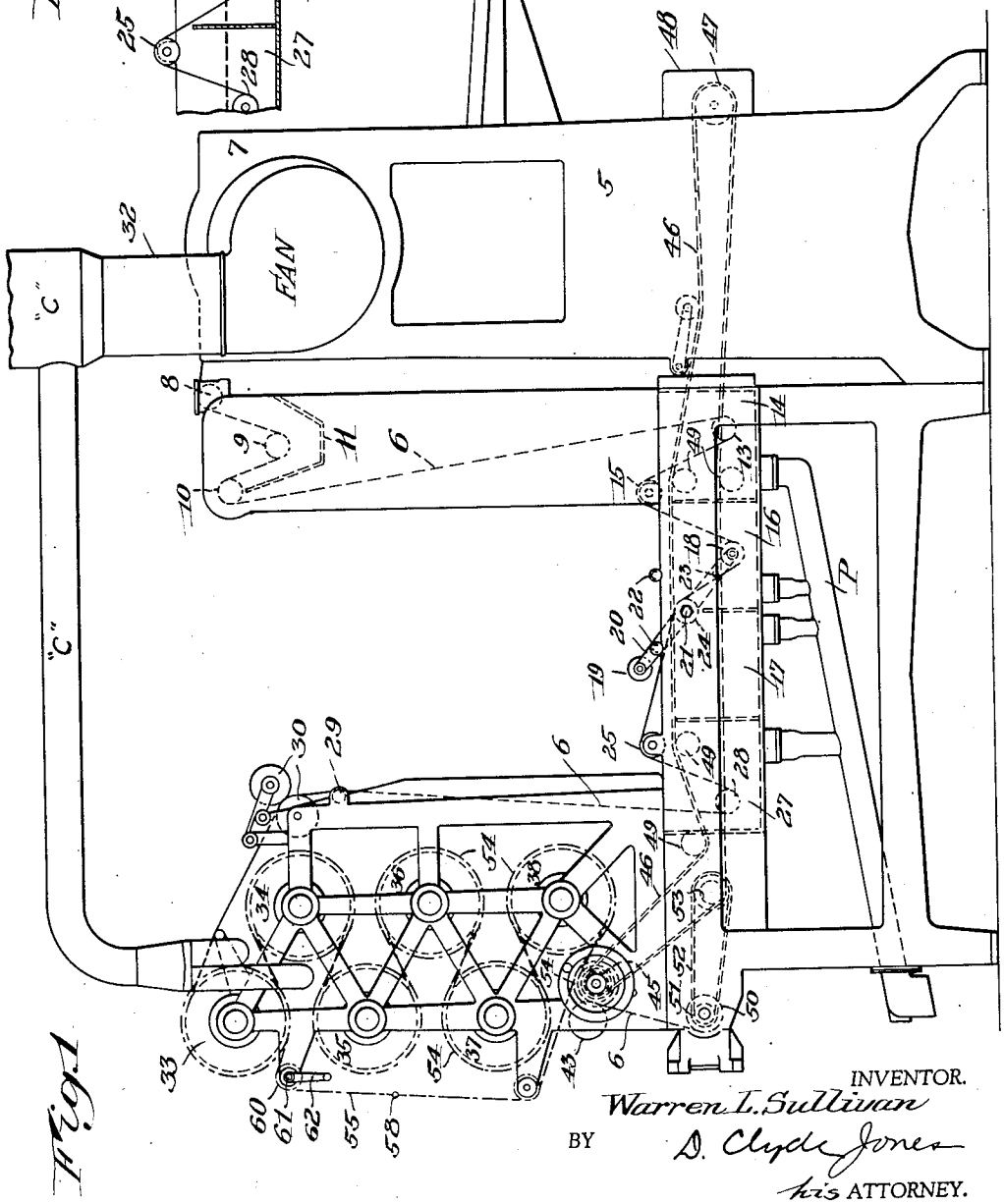


Fig. 1



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Fig. 2

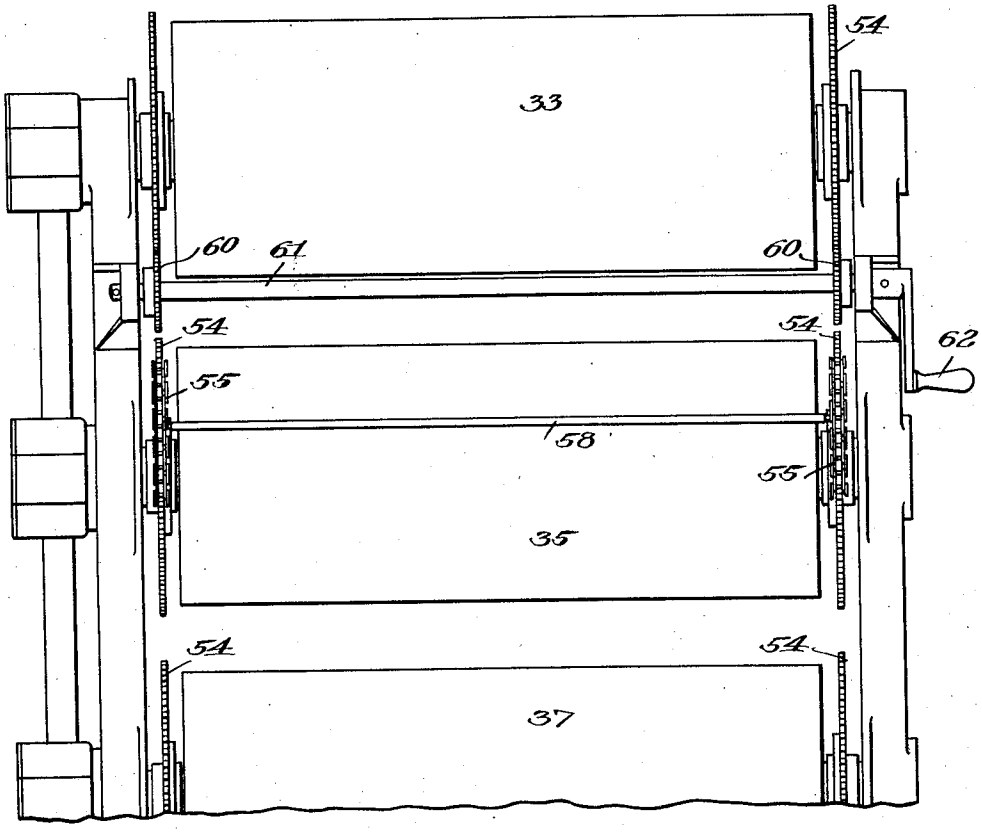
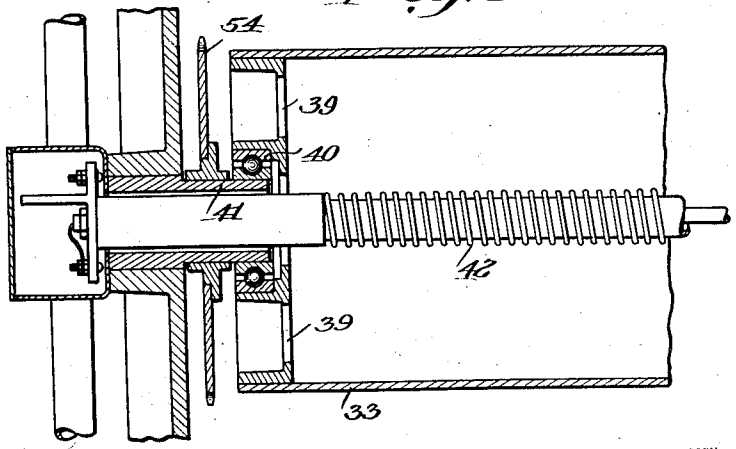


Fig. 3



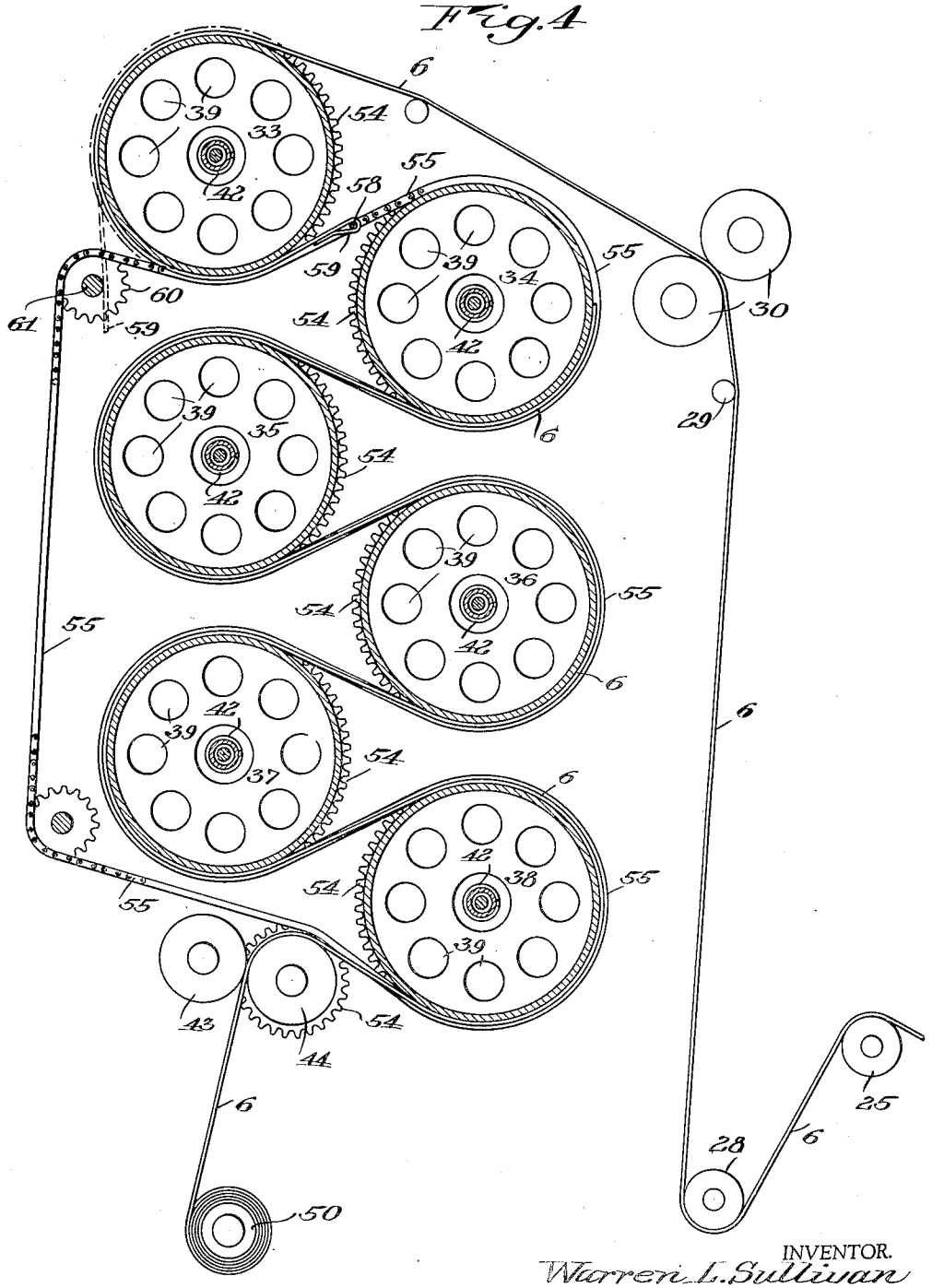
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Fig. 4



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UNITED STATES PATENT OFFICE

2,179,026

COMBINED BLUE PRINT MACHINE AND DRIER

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Application February 9, 1937, Serial No. 124,874

7 Claims. (Cl. 34—48)

This invention relates to a combined blue print machine and drier.

In former machines of this type when it was desirable to print photographic papers requiring different types of fixing or toning solutions it was necessary to empty the treating tank and substitute a treating solution appropriate for the paper to be used. Such a procedure was inconvenient to the user and delayed the production of prints in the machine. In accordance with one feature of the invention, the machine is provided with two treating tanks containing solutions for fixing or toning the two types of paper currently in use and means are provided for selectively guiding strips of photographic paper through the proper solution to the exclusion of the other.

It has been recognized that it is desirable to have the heated drums of a photographic paper drier in a compact grouping in order to permit economy of space occupied by the machine. However, such a compact arrangement of drier drums has not been practical owing to the fact that the drums are heated and it is frequently necessary to thread the end of the strip about the several drier drums, for example, when the strip or web of paper breaks during the operation of the machine.

In accordance with another feature of the invention, the drier drums are compactly arranged in vertical rows in staggered relation to each other and threading means operated at a point conveniently located with respect to the drums, drives the free or broken end of a strip of paper in a zig zag path about the several drums.

In accordance with a further feature of the invention, the drums are freely rotatable and are rotated by the moving strip of paper as its opposite surfaces alternately hug the surfaces of successive heating drums. The paper itself is pulled through the drier by driven take-up rolls at the exit end of the machine. This pulling of the paper causes it to hug the drums, thereby effecting a drying and a smoothing action similar to that of a mangle so that the paper emerges from the drier substantially free from wrinkles or other surface irregularities.

The various features and advantages of the invention will appear from the detailed description and claims when taken with the drawings in which Fig. 1 is a side elevation of the combined blue print machine and drier of the present invention; Fig. 2 is an end elevation of a fragment of the machine as viewed from the lefthand side of the drawings of Fig. 1; Fig. 3 is a fragmentary longitudinal section through one of the drier cylinders illustrating the mounting means of the cylinder as well as a portion of an integral heating element therefor and also showing the mounting of a sprocket wheel which forms a part of threading means to thread a paper strip through the drier; Fig. 4 is a cross section through the drier showing especially how a broken web of paper is threaded therethrough and Fig. 5 is a fragmentary longitudinal section of the machine illustrating the selecting arm in its alternate positions as compared with Fig. 1.

Referring especially to Fig. 1, the numeral 5 designates any well known type of photographic printer such as a blue print machine in which tracings or other material to be photographically reproduced, are superimposed on a portion of a long-length, photosensitive sheet of paper 6 such as blue print paper or the like, in which position they are exposed to a source of light (not shown) in the light chamber 7 of the printer in accordance with the well-known practice. The strip of paper 6 after being thus exposed, is guided by rolls 8, 9 and 10 through a tank 11 containing water. Thence the paper strip is guided by a roll 13 through a tank 14 also containing water to insure that the paper is thoroughly saturated before it engages the roll 13 which otherwise might introduce wrinkles in the strip. Thereafter the web or strip of paper passes over the guide roll 15 to a fixing solution.

In former machines of this character, a single tray for a treating solution was provided so that when it was desired to change to a photosensitive paper requiring a different treating solution it became necessary to drain the tray and refill it with the appropriate solution. However, the present machine is provided with two tanks 16 and 17, in side by side relation, one of which such as 16 may contain "hypo" and the other tank 17 may contain potash, so that two types of paper, one requiring "hypo" and the other requiring potash in its fixing or toning may be treated in the machine without the annoyance and delay of draining and substituting the required solution. It will of course be understood that when the "hypo" solution is used, the paper should not pass through the potash solution and vice versa. A pipe P for overflow has branches connected to the tanks 14, 16, 17 and 27. In order to provide for selectively guiding the paper into the desired one of the tanks 16 or 17, a pair of rollers 18 and 19 substantially co-extensive with the width of the paper to be fed through the machine, are mounted at the respective ends of a pair of arms 20. One of these arms is piv-

otally mounted at an intermediate point thereon at one side of the machine and the other arm is similarly mounted at the other side of the machine. Suitable detents 22 (Figs. 1 and 5) of any well-known construction may be used for holding the arms 20 and the rolls 18 and 19 supported thereon, in one of two selected positions, for example, each detent 22 may be in the form of a spring-actuated pin projecting in such a direction that it can engage respectively the openings 23 in one of the arms. As illustrated in Fig. 1, the arms 20 are in such position that their roll 18 mounted thereon, directs the paper into the "hypo" solution while in Fig. 5 the arms 20 are in their alternate position in which the roll 19 carried thereon guides the paper into the potash solution. Let it be assumed that the arms 20 are in the selected position illustrated in Fig. 1 in which case the strip of paper is guided by the roll 18 into the hypo solution in the tank 16 from which the paper emerges and passes over the guide rolls 24 and 25 into the washing water in the tank 27. Let it now be assumed that the arms 20 are in the selected position shown in Fig. 5 in which case the paper after leaving the tank of water 14 passes over the guide rolls 15 and 24 and thence about the guide roll 19 into the potash solution in the tank 17. On emerging from this tank the strip of paper passes over the guide roll 25 into the washing solution contained in the tank 27. The strip of paper having been thus fixed or toned and having been washed in the tank 27 passes over the guide roll 29 and between the rolls 30 to the drier portion of the machine which will be described.

From the foregoing arrangement it will be appreciated that two different types of paper requiring different photographic baths may be readily treated in the same machine and that the path of the paper through the fixing or toning portion of the machine can be selectively changed by a simple manual adjustment of the selecting arms 20 so that one or another of a pair of photographic solutions can be utilized in treating the exposed strip of paper.

The present machine also includes a compact form of drier in which the drying drums or cylinders are stacked in compact vertical relation so that a minimum amount of space is required for the combined printer and drier. In former driers, while the desirability of a compact drier drum arrangement has been recognized, it has been impractical to provide such an arrangement, since the drums are hot, while in use, and necessarily have been rather widely separated so that the operator would not burn himself when he threaded the broken end of a web of paper through the drier. The drier as best shown in Fig. 4 includes a group of heated hollow cylinders or drums 33, 34, 35, 36, 37 and 38 with the axes of three of the drums in one vertical row and with the axes of the other three drums in another closely associated vertical row. The drums of one vertical row are staggered with respect to the drums of the other row so that the wet web of paper first has one of its surfaces in contact with a heated drum such as 33 and then has its other surface advanced into contact with the heated surface of another drum such as 34. Thereafter, the respective surfaces of the paper come alternately into contact with the heated surfaces of the drums 35, 36, 37 and 38 in succession.

As best shown in Fig. 3 each hollow drum is provided at each end thereof with a spider 39 supported by ball bearings 40 on the hollow stub shaft 41 carried by an end of the frame of the drier. By this construction each hollow drum is freely rotatable, its rotation being effected by the advancement of the web of paper through the drier, as will be described. A suitable heating unit 42 extends through substantially the entire length of each drum and through the stub shafts 41 thereof as illustrated in Fig. 3. This heating unit as herein illustrated, comprises an electrical heating coil although it will be understood that any convenient source of regulated heat may be used. In the present drier a thermostatic control system (not shown) is utilized in cooperation with the several heating units to maintain a uniform predetermined temperature within each of the heated drums 33 to 38 inclusive.

It has been mentioned that the guide rolls and the several heated drums are freely rotatable and are driven by a frictional engagement of the paper strip therewith. In order to advance the paper strip through the fixing or treating portion of the machine and the drier section thereof, a pair of contacting take-up rolls 43 and 44 (Fig. 4) are provided, roll 44 being provided at one end with a sprocket 54. This sprocket is driven by a chain 46, illustrated by a pair of broken lines (Fig. 1), which is driven by the sprocket 47 in turn driven by a motor mounted within the motor housing 48. This chain 46 which is guided by idler sprockets 49 also drives a wind-up roll 50 on which the dried strip of paper is wound. This roll is mounted in any convenient manner (not shown) so that one of its ends can be swung out of the drier when it is desired to remove a section of the strip, which has been wound on this roll. The take-up roll is rotated by a sprocket 51 secured to one end thereof which sprocket is driven by a chain 52 from a sprocket 53 in turn driven by the chain 46.

In accordance with the present invention, an arrangement is provided whereby the free end of a strip of paper can be readily threaded about the drums of the drier section without danger of the operator burning himself on these heated drums. The stub shafts at each of the ends of each of the several drums, rotatably support sprocket wheels such as 54, thus a freely rotatable sprocket wheel is provided for rotation on the stub shaft at each end of each of the drums. A pair of chains, each engaging the several sprockets at one end of the drier, travel in a path represented by the dot and dash line in Fig. 1 and represented in full lines in Fig. 4. A bar 58, secured at its ends to this pair of chains, is adapted to have the end 59 (Fig. 4) of the paper strip wrapped therearound so that as the pair of chains travel in a zig zag path about the drier drums, the bar draws the end of the strip about the several drums in the mentioned zig zag path. The pair of chains 55 are driven by sprockets 60 carried at the ends of the shaft 61, which shaft may be driven in any suitable manner such as by a crank 62, although it will be understood that it may be motor-driven if so desired.

Exhaust conduits C conduct hot air and moisture from the printer and drier.

In the operation of the threading arrangement, it is assumed that the end of the paper strip 59 is in the position shown in dotted lines of Fig. 4. The crank handle 62 is then turned to rotate its shaft 61 and the sprockets 60 thereon until the chains 55 have been moved to a position wherein the free end 59 of the strip can be wrapped around the bar 58. When this has been effected, the

handle 62 is turned clockwise so that the pair of chains 55 advances the bar 58 with the free end of the strip connected thereto in a zig zag path around the several drums as shown in Fig. 4 until the free end 59 of the strip can be started between the feed rolls 43 and 44, after which the end of the strip can be wrapped about the wind up roll 50. The operation of threading the end of the paper strip through the drier is thus quickly effected and it is unnecessary for the operator to come in contact with the heated drums.

The present disclosure is given merely by way of example and it will be understood that there can be many modifications and variations thereof within the scope of the appended claims without departing from the spirit of the present invention.

What I claim is:

1. In a machine of the class described, a series of rotatable drums adapted to engage a strip of paper or the like and to guide said strip in a zig zag path about said drums, and threading mechanism moveable independently of said drums to lead a free end of said strip in and out between said drums in said zig zag path, said mechanism including a member engaging the end portion of said strip, means movable independently of said drums for guiding said member to travel between and over certain of said drums in said path and means for moving said last mentioned means.

2. In a machine of the class described, a series of rotatable drums adapted to engage a strip of paper or the like and to guide said strip in a zig zag path about said drums, and threading mechanism moveable independently of said drums to lead a free end of said strip in and out between said drums in said zig zag path, said mechanism including a pair of endless elements, means for guiding said elements in said zig zag path, the respective elements of said pair being located adjacent opposite ends of said drums, means for advancing said elements, and a member extending between and carried by said elements for engaging an end portion of said strip.

3. In a machine of the class described, a series of rotatable drums adapted to engage a strip of paper or the like and to guide said strip in a zig zag path about said drums and threading mechanism moveable independently of said drums to lead a free end of said strip in and out between said drums in said zig zag path, said mechanism including a pair of chains, means for guiding said chains through the major portion of said zig zag path, means for advancing said chains, and a member carried by said chains for engaging an end portion of said strip.

4. In a machine of the class described, a series of rotatable drums adapted to engage a strip of paper or the like and to guide said strip in a zig zag path about said drums, and threading mechanism moveable independently of said drums to lead a free end of said strip in and out between said drums in said zig zag path, said mechanism including sprockets mounted adjacent the ends of each of said drums, chains engaging the sprockets at the respective ends of said drums, said chains being guided by said sprockets in said zig zag path, means for driving said chains, and means carried by said chains to engage an end portion of said strip.

5. In a machine of the class described, a series of rotatable drums adapted to engage a strip of paper or the like and to guide said strip in a zig zag path about said drums, and threading mechanism moveable independently of said drums to lead a free end of said strip in and out between said drums in said zig zag path, said mechanism including sprockets mounted at the ends of each of said drums to rotate about the axis of said drums, chains engaging the sprockets at the respective ends of said drums, said chains being guided by said sprockets in an endless zig zag path, means for driving said chains, and means carried by said chains to engage an end portion of said strip.

6. In a machine of the class described, a series of rotatable drums adapted to engage a strip of paper or the like and to guide said strip thru a zig zag path about said drums, and threading mechanism to lead a free end of said strip in and out between said drums in said zig zag path, said threading mechanism being normally inactive during the operation of said machine, said mechanism including a member for engaging the end portion of said strip and a pair of endless elements supporting said member and for moving said member thru substantially the entire zig zag path about said drums, the respective elements of said pair being located adjacent opposite ends of said drums, and means for advancing said elements to move said member thru substantially the entire zig zag path about said drums.

7. In a machine of the class described, a series of rotatable drums adapted to engage a strip of paper or the like and to guide said strip in a zig zag path about said drums, and threading mechanism moveable independently of said drums to lead a free end of said strip in and out between said drums in said path, said mechanism including a pair of traveling chains, means for guiding said chains in the major portion of said path, the respective chains of said pair being located adjacent opposite ends of said drums, means for advancing said chains, and a member carried by and extending between said chains for engaging an end portion of said strip.

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