April 4, 1961 J. K. WOODWORTH 2,977,867

MULTIPLE PRINTING MACHINE

Filed Sept. 3, 1957 3 Sheets-Sheet 1

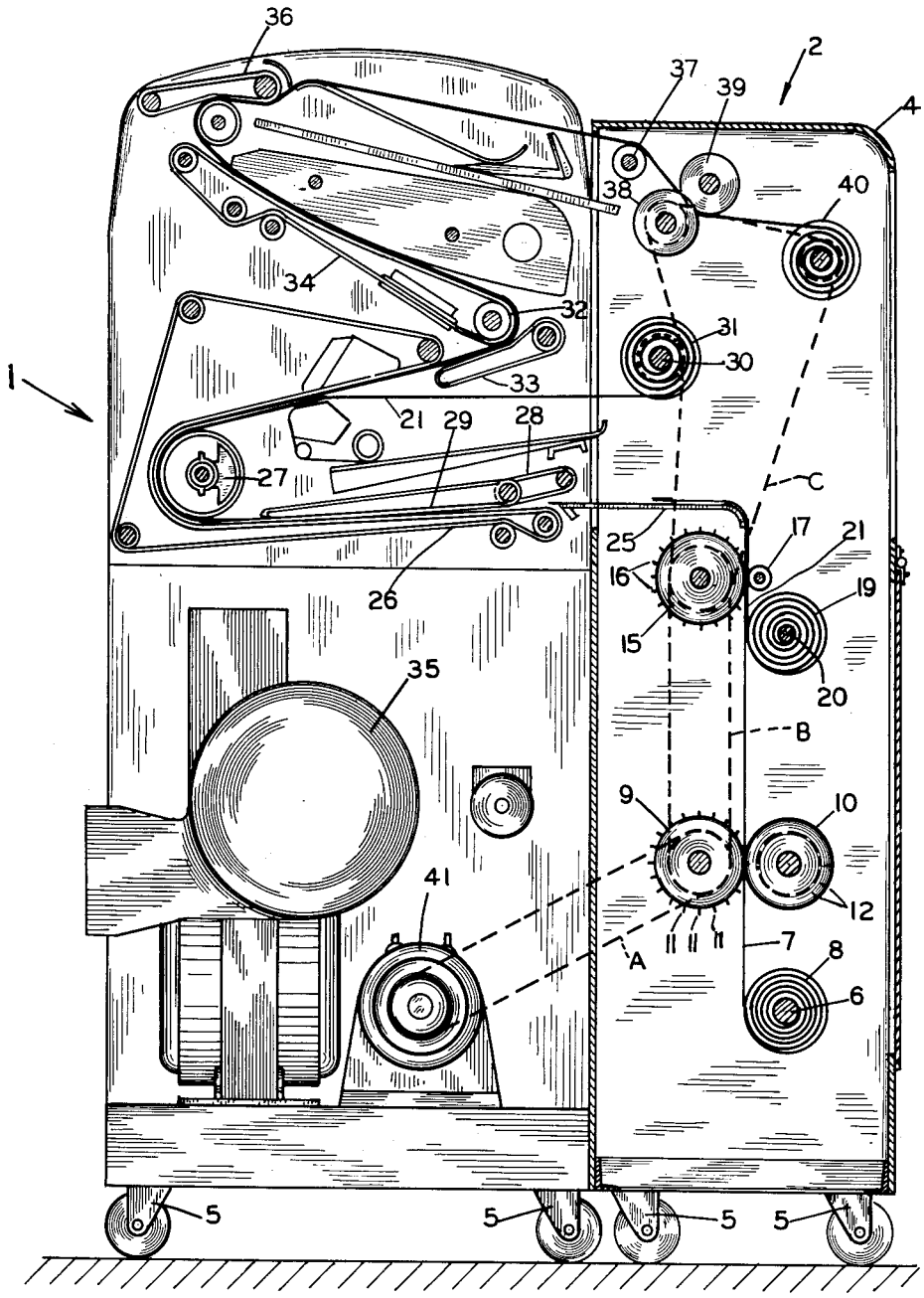


FIG. 1.

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MULTIPLE PRINTING MACHINE

Filed Sept. 3, 1957 3 Sheets-Sheet 2

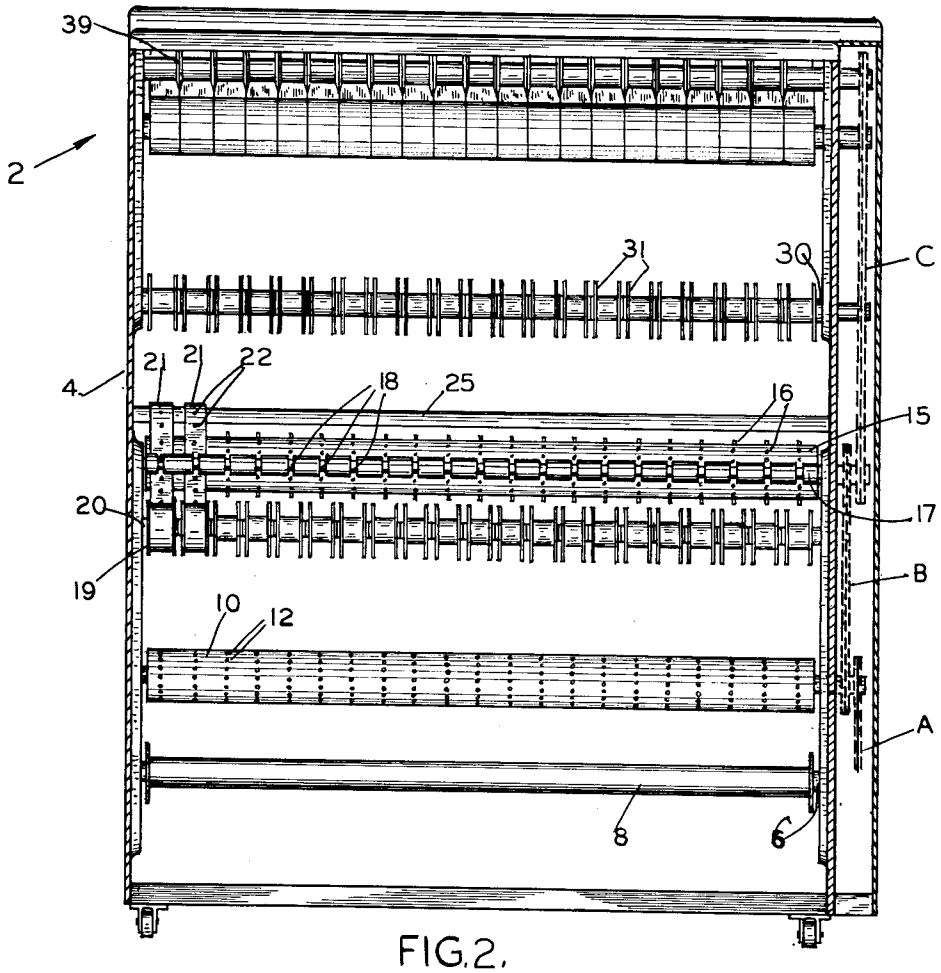


FIG. 2.

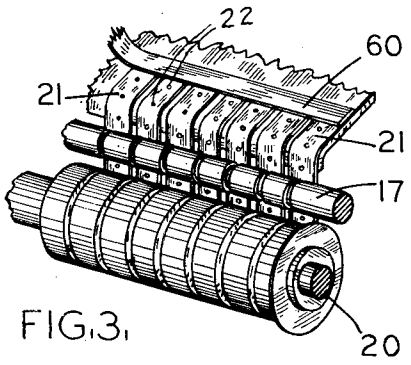


FIG. 3.

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MULTIPLE PRINTING MACHINE

Filed Sept. 3, 1957 3 Sheets-Sheet 3

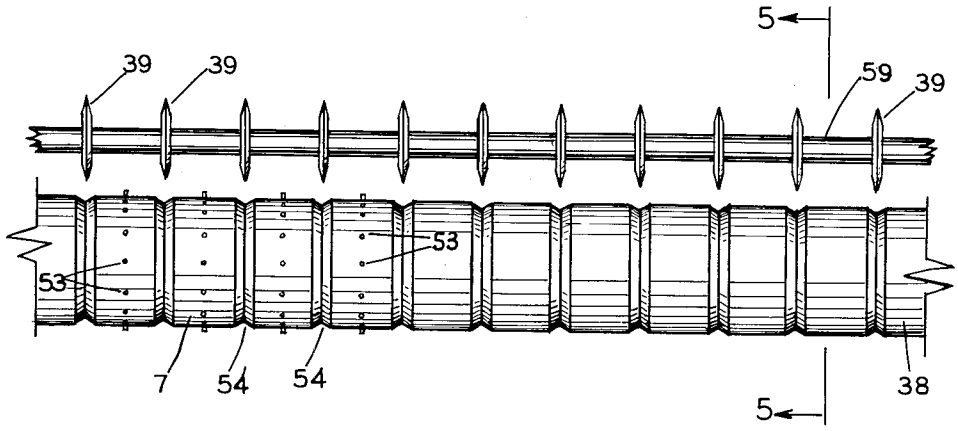


FIG. 4.

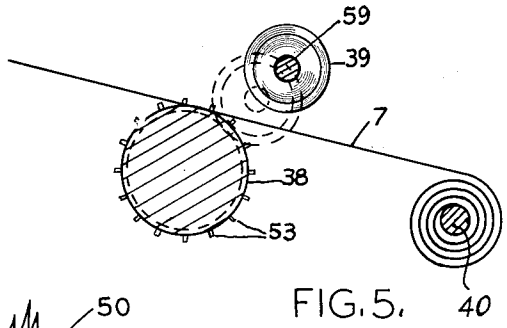


FIG. 5.

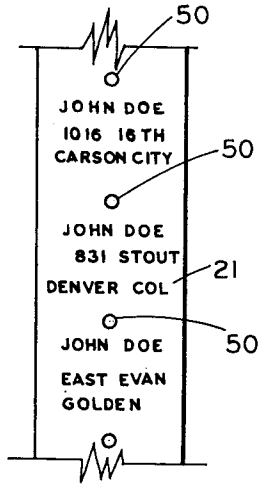


FIG. 6.

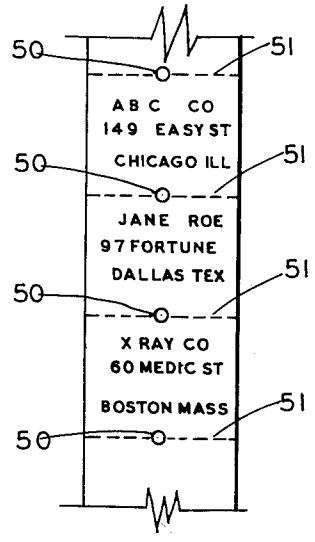


FIG. 7.

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United States Patent Office

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2,977,867

MULTIPLE PRINTING MACHINE

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2 Claims. (Cl. 95—75)

This invention relates to a method and apparatus for the photoprinting reproduction of narrow strips of light transmitting material containing printable matter in non-repetitive series, and more particularly to a method and apparatus for the high speed reproduction of series of addresses and like lists impressed on narrow strips of light transmitting material by photo reproducing on a light sensitive paper web.

In many industries, long lists of non-repetitive, printable items are required to be reproduced at periodic intervals. For example, magazines, newspapers, etc., require a large volume of individual address stickers or labels which are applied to various mailing pieces on a periodic basis. One common procedure is to print the mailing piece and then apply a label containing the addressee's name and address to the mailing piece. Many different systems have been devised to handle the addressing of the mail pieces, but in general the systems are much too slow and costly, consuming substantial periods of time and labor. Common systems include the use of individual cards or metal plates having impressed thereon the address and name of the addressee which must be reproduced in a discontinuous sequence. These individual pieces not only take up considerable volume for filing, but an elaborate filing system must be maintained since frequent address and name changes are the rule in any particular system. In these cases, the ability to provide frequent changes of addresses, storage of the mailing lists, speed of printing, costs of the original lists and replacement costs, etc. have not been efficient and economical.

It is, therefore, an object of the invention to provide an apparatus and a method of high speed, continuous photo printing of a plurality of addresses or other similar lists impressed on narrow strips, and the printing of which is accomplished by impressing on a light transmitting strip wound on a roll with subsequent development of the exposed rolls.

It is another object of the invention to provide economical apparatus and methods of alining, printing and slitting a wide printed, light sensitive paper web using a plurality of narrow, light transmitting strips simultaneously imprinted on the light sensitive paper web.

Another object of the invention is to provide an attachment for existing photo printing machine which alines, punches and continuously prints a plurality of strips on a single, wide, web paper and to simultaneously feed a plurality of alined master strips into an existing printing machine superimposed on the web.

It is another object of the invention to provide an attachment for an existing photoprinting machine which utilizes a plurality of master strips printing simultaneously on a continuous paper web, which is arranged to rewind the master strips onto a plurality of reels mounted on a shaft and to slit the printed paper into narrow strips containing the printed lists from the master strips and to wind the slitted strips on reels for subsequent use.

A further object of the invention is to provide novel

feed means for a plurality of alined master strips including means for rewinding the strips on spools and shafts.

A still further object of the invention is to provide a novel system and apparatus for storage of large volume of addresses in a small space and to provide easy access to the names on the storage devices for easy change thereof.

Another object of the invention is to provide a novel system of storing narrow strips of addresses and like lists on rolls, and a plurality of such rolls on a shaft for storage and use in changing, printing and revising the address lists.

These and other objects and advantages of the invention may be readily ascertained by reference to the following description and appended illustrations in which:

Fig. 1 is a side elevational view, in partial cross section, illustrating the positioning of a device according to the invention in relation to a standard photo-printing machine;

Fig. 2 is a front elevational view of the attachment device of Fig. 1 showing the position of the various spools and rollers and operating mechanism of the device of the invention;

Fig. 3 is a partial perspective view of a roll carrying storage shaft, and a threading mechanism for a plurality of strips of masters used in the printing process of the device of the present invention;

Fig. 4 is a front elevational view of a portion of a printed paper slitting mechanism for slitting a wide web into narrow strips;

Fig. 5 is a side elevational view of the device of Fig. 4, illustrating the positioning of alining pins on the slitting rollers;

Fig. 6 is one form of strip punched, printed and slit by the machine of the invention; and

Fig. 7 is a modified strip punched, printed and slit with a machine of the invention.

In the device illustrated, a machine designated in general by numeral 1 represents a more or less schematic form of a diazo printer in which a coated web of paper, with printable matter impressed on a master which is overlying the web, is exposed to the high intensity light for a definite period of time by continuously running the web and master through the machine, after which the master is removed from the exposed sensitized sheet and the exposed sensitized sheet is subsequently exposed to ammonia vapors, or other developer to develop the printing thereon. Since such machines are commercially available, only sufficient details of construction will be enumerated to show the relation of the machine with the device of the present invention.

The device of the present invention, illustrated in general by numeral 2, includes a series of operative components mounted in a cabinet 4, which is mounted on a series of rollers 5, as is the print machine, so that it may be moved into position adjacent the printing machine and temporarily or otherwise attached for operation therewith. The printing machine may be made of a size to accommodate a desired width of sensitized paper, however, a very common size of sensitized paper which may be obtained in a long web wound in a roll is 42 inches, and the description of the printing machine and the apparatus of the invention will be made for the 42 inch width. It is to be understood, however, that the principle applies to machines accommodating any width, normally in multiples of the width of the particular master strips.

A web 7 of sensitized paper in a roll 8 is mounted in the cabinet 4 for subsequent use in the printing machine. The shaft 6 is mounted with a friction-type brake, which is common in industry, or other retarding means, to prevent undue unwinding of the roll on starting and stopping of the machine, such brakes are common and

need not be described for present purposes. The web of paper 7 passes between a male punch roll 9 and a female die roll 10. A plurality of punch mandrels 11 are uniformly mounted on the roll 9 and mesh with the die holes 12 in the roller 10. The roller 10 is normally hollow and under a slight vacuum to pick up the punched out sections of sensitized paper and prevent the same from passing through the machine with the web. The mandrels 11 are uniformly spaced around the roller 9 to provide punching of each line of lists, and in one application are spaced one inch apart along the roll so that the web may ultimately be cut into one inch wide strips. The punched web after leaving the two rollers 9 and 10 passes to an alining roller 15 which includes a series of pins 16 which mesh with the punch holes in the web 7. An idler roll 17 having a plurality of grooves 18 uniformly spaced therealong and arranged to align with the pins 16 provide means for holding the web 7 in position on the pins of the roll 15. The idler roll 17 swings away from the pin platen roll 15 for loading and swings back into position to hold the web alined on the pin 16. A plurality of spools 19 mounted on a shaft 20 are juxtaposed in position to have the master strips 21 mounted and alined on the pins 16 of the pin platen. The master strip 21, which corresponds in construction to the strip of Fig. 6, is a light transmitting strip punched with a plurality of holes 22 spaced apart to match the punched holes in the web 7 and to aline with the pins 16 of the platen 15. The information to be printed which is impressed on the web, is typed or otherwise impressed on the master strips 21.

The pin platen roller 15 alines the punched web 7 with the strips 21, when superimposed thereon, so that they will be alined when they pass through the printing machine. The alined web and master strips pass over the end of a feed table 25 which feeds the superimposed strips into the belt feed arrangement of the print machine. The print machine includes a continuous belt feed 26 which is interlaced around a light source 27 for exposing the light sensitive strip and a series of returning rollers to provide a continuous belt. Such machines are well known and detailed construction is not necessary for present purposes. A second continuous belt 28 is juxtaposed above one stretch of the belt 26 for holding the print paper and master in close alinement as they pass to the light source 27. The belt 28 helps force the alined paper and master under a tension pan 29 prior to passing the strip around the light source. As the paper and master emerge from the other side of the light source, the master 21 is separated from the exposed web and it passes to a rewind shaft 30, which may contain a plurality of spools or reels 31 or the strips may be wound directly on the shaft. The print paper passes over a roll 32, being held in place by a tension pan 33 and up through the developing section of the print machine by means of an endless belt 34 threaded over a plurality of rollers. In this section, when necessary, the ammonia fumes for developing the paper are generated and subsequently the fumes are withdrawn from the machine by a blower 35 in the lower part of the cabinet and exhausted, or developing liquid is used for development of the paper, as is well known in the art. The paper is then carried under a tension belt 36 and is threaded through a plurality of rollers into a slitting section. The paper passes over an idler roll 37 into a slitting section which includes a pin platen 38 and a plurality of slitting discs 39, shown in detail in Fig. 4. The slitted paper is then wound on a plurality of reels 40 for ultimate use in labeling and mailing machines. A motor 41 by means of a drive system, indicated in dashed lines, A drives the punch rollers 9 and 10. A drive chain or belt B from the punch roller interconnects with the alining pin platen 15, and ultimately through a belt drive C which is interconnected with the master rewind, the slitters and the paper rewind.

As shown in Fig. 6, a master strip 21 includes printed addresses between the spaced punch holes 50 which are evenly spaced along the length thereof, and after the information has been printed on the web and the web is cut to the same size as the master, the individual addresses may be cut or otherwise severed from the strip through the punch holes 50. Where desired, the slitting roller may include a plurality of perforators, not shown, which are alined with the pins to provide a plurality of perforated severance lines 51 as shown in Fig. 7 for use with certain types of mailing machines, or separated by hand. This modification is especially valuable for a diazo-coated web, which is gum coated on the reverse side, and therefore ready to apply to the mail pieces after moistening the gum coated back. In either case, however, the individual addresses are easily separated from the printed paper strip, and the punched out holes permits accurate alinement with a cutter or other machine.

The slitting operation is performed by means of the pin platen roll partially shown in Figs. 4 and 5, where the roll 38 includes a plurality of pins 53, only a part of which are shown, which are spaced to mesh with the punched holes in the printed paper. In some cases, the pins may not be necessary, but when they are all spaces between the slitters should have the pins. A plurality of slots or grooves 54 are spaced along the roll to permit a plurality of strips the same size as the master to be cut from the wide paper web. A plurality of cutter discs 39 rotatably secured on shaft 59 are mounted in position to swing into and out of the grooves or notches 54 and are arranged to cut or slit the paper as it passes between the two rollers with the slitters in the grooves. The holes in paper web 7 mesh with the pins 53 on the rollers for holding the web in correct position for the slitting. In starting the operation, the slitting discs mounted on the shaft 59 are swung away from the guide rollers 38 as indicated in Fig. 5. This permits the easy passing of the web between the rollers and placing it on the roll or shaft 40 prior to any slitting operation, which simplifies the threading of the web through the machine. After the web has been fastened to the windup roll, the slitters 39 are moved into slitting position on the guide roll 38.

In operating the device of the invention, the auxiliary cabinet 2 is first moved into position on the front of a print machine 1 and securely attached thereto by bolts, latches, etc. The drive chain is secured between the motor 1 and the mechanism of the cabinet 2. A roll of print paper 8 is mounted on the shaft 6 and the web 7 is pulled through the punch rollers 9 and 10, across the alining pin platen 15, and placed up on the table 25. In some cases, the web or a blank lead for the web may be run through to the rewind before inserting the master strips. A lead strip 60 which may be an adhesive strip, or other gripping means having spacing slots for the strip ends, is secured to the ends of the master strips 21 which have been alined on platen 15, so that each of the strips will be in alinement with other strips and with the web as they are pulled through the machine. The master strips are superimposed on top of the web 7 and the tension roller 17 moved into position to hold the holes in the master strips in alinement with the punched holes in the web 7. The machine is then started and the paper web 7 and the master strips 21 pass into the machine for printing. As the strips 21 emerge from the exposing section, they are pulled onto the rewind spools 31 for rewinding and the paper web 7 passes on through the developing section and ultimately emerges over the tension roller 37 into the slitter section between the rollers 38 and 39. With the slitters 39 moved above the guide roll 38, the web is pulled onto the shaft 40 for rewind and the slitting rolls are then moved into position to slit the web. Normally, the master strips 21 will have a sufficient lead or blank section so that they may be passed through the machine onto the rewind rollers without having any addresses to be printed until after the strips and web are

correctly alined and secured to the rewind rolls. Once the machine is threaded for operation, continuous operation may be performed by merely attaching a new web to the end of the used web by means of adhesive tape, or the like. In like manner, additional master strips may be attached to the ends of the previously used masters and passed through the machine to a position where they may be detached and placed on a new rewind roll. In certain instances, it may be desirable to utilize a magnetic material on the lead strip and by using a magnetic shaft the strips may be readily secured thereto for rewinding.

In one convenient form, using an Ozalid 42 inch machine, that is, one accommodating a roll of 42 inch coated paper, and by using 21 two inch master strips on rolls, the device prints addresses at a rate of about 150,000 addresses per hour. This rate is at a web speed of 10 feet per minute. Since the ten feet per minute speed of the web through the printing machine is rather slow, other machines which may have speeds up to 40 or 50 feet per minute, the number of addresses which may be printed may be substantially increased, e.g., at 40 feet per minute, the number of addresses printed is increased to about 600,000 per hour. The master tapes or strips are commercially available translucent two inch tapes of paper which may be printed by a typewriter or any other ink impression, the typewriter being the most commonly used. Also, with this system, about 151,200 addresses may be stored in a single 200 yard long strip which is 42 inches wide and is about 5 inches in diameter and weighs about 18 pounds, as compared with the storage of one piece metal plates of a common variety where the weight of the plates is from 40 to 50 pounds plus the weight of special cabinets. Also, the translucent tape is easily cut and attached or joined together, so changing addresses and names is a simple matter.

While the machine has been illustrated as an attachment to an existing machine, obviously the mechanism may be permanently attached to a printing machine where the same is to be utilized only for the particular printing of strips of masters. In such a case, the extra cabinet is not necessary and the various rollers may be completely incorporated in a single cabinet print machine. Furthermore, the illustrations show a right hand drive system. It is obvious, however, that the auxiliary machine or permanent machine may be driven by left hand drive systems depending on the particular print machine on which it is used, the important thing being synchronizing the two sets of rollers, etc. The particular system of the print machine is not important, it may be the ammonia dry process or a wet developing process or any other process which provides a continuous exposure and development of a coated paper web. The width of the coated paper web is not important, it is preferable, however, to utilize the machines which will accommodate standard width of print papers which are commercially available. In this connection, for economy the width of the paper web should be in multiples of two inches, or in multiples of the master width, which is the common master strip width. Special widths, however, may be accommodated by changing the width of the slitters, the pin platens and the punching rolls.

While the invention has been illustrated by reference to specific devices, there is no intent to limit the spirit or the scope of the invention to the precise details so set forth where a change in parts and dimension would be obvious to one skilled in the art.

I claim:

1. Apparatus for simultaneously reproducing information from multiple master strips of non-repetitive lists comprising the combination with a photo-reproducing machine of means for continuously feeding a light-sensitive web from an elongated roll through the photo-reproducing machine, the width of the web being at least equal to the combined widths of the master strips to be printed, a pair of perforating rolls arranged for punching a plurality of alining holes centerwise along the course of each light sensitive strip to be printed prior to its entrance in said photo-reproducing machine, alining rollers mounted between said perforating rollers and said photo-reproducing machine arranged to aline and maintain in contacting position the punched web and a plurality of master strips superimposed across the web whereby the master strips and the web pass simultaneously and essentially without relative movement through the photo-reproducing machine, means for continuously passing the superimposed members through an exposing section of the photo printing machine, means for separating the exposed web and master strips, a rewind shaft mounted adjacent said separating means and arranged to rewind the separate master strips into separate rolls in side by side relation on said shaft, means for passing the exposed web through a developing section, means for slitting the developed web into strips corresponding in width to the master strips, and a wind-up shaft adjacent said slitting means for winding the slitted strips in separate rolls mounted in side by side relation on said shaft.

2. Apparatus for simultaneously reproducing information from multiple master strips of non-repetitive lists comprising the combination with a photo-reproducing machine of means for continuously feeding a light-sensitive web from an elongated roll through the photo-reproducing machine, the width of the web being equal to the combined widths of the master strips to be printed, there being a plurality of alining holes in said web substantially along the course of each master strip to be printed, alining means inclusive of a plurality of pins meshing with the holes in said web and corresponding holes in said master strips to aline and maintain in contacting position the web and a plurality of master strips superimposed across the web whereby the master strips and the web pass simultaneously and essentially without relative movement through the photo-reproducing machine, means for continuously passing the superimposed members through an exposing section of the photo printing machine, means for separating the exposed web and master strips, rewind means mounted adjacent said separating means and arranged to rewind the separate master strips into separate rolls in side by side relation on said rewind means, means for passing the exposed web through a developing section, means for slitting the developed web into strips corresponding in width to the master strips, and wind-up means adjacent said slitting means for winding the slitted strips in separate rolls mounted in side by side relation on said wind-up means.

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