June 13, 1950 C. S. CRAFTS 2,511,149

ROTARY PRINTING AND FOLDING MECHANISM

Filed July 12, 1945 2 Sheets-Sheet 1

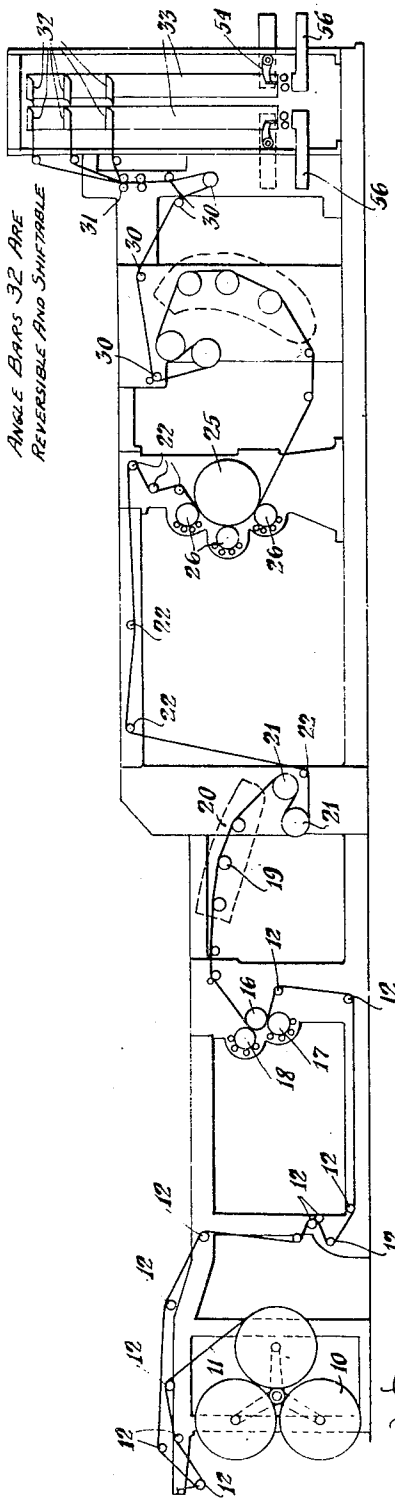


Fig. 1

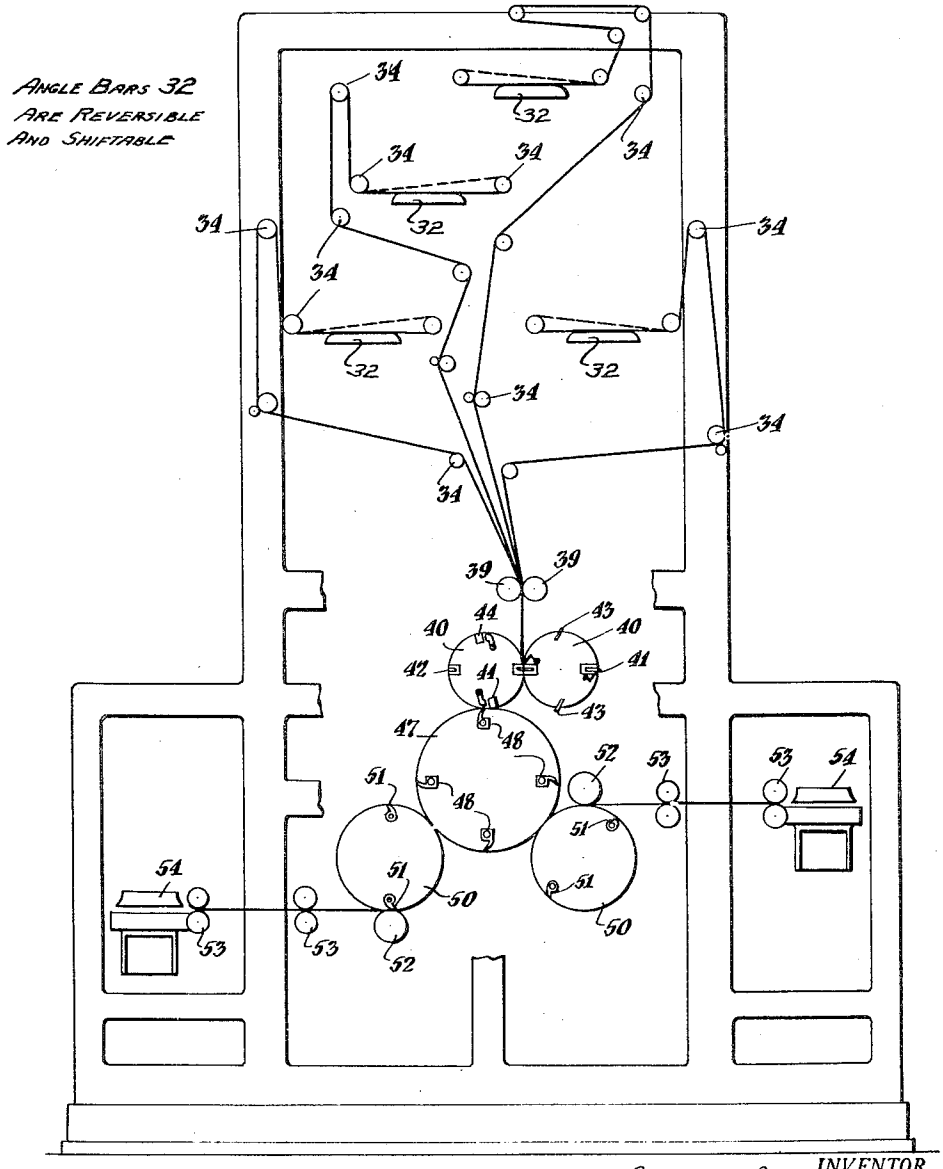
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Fig. 2



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ROTARY PRINTING AND FOLDING MECHANISM

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4 Claims. (Cl. 270—21)

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The present invention has for its object the provision of a new and improved, multicolor, web perfecting, rotary combined printing and folding mechanism.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Figure 1 is a schematic showing of a typical and illustrative embodiment of the invention in which means are provided for printing a maximum of two colors on the first side of a web of paper and three or more colors on the second side of the web, after which the paper web is slit into narrow ribbons, associated, cut and folded into products, the products being delivered alternately from a plurality of delivery mechanisms; and

Figure 2 is an end elevation, showing schematically the folding, associating and delivery mechanism of Figure 1.

The present invention has for its object the provision of a novel and improved folding mechanism by which products to be delivered in separate deliveries may be uniformly folded. A further object is the provision of an improved mechanism for producing printed and folded products from a web which has been printed on its second side with a larger number of colors than on its first side, with means for positioning the printed sheets in the finished product as desired and with the color pages arranged as desired. Still another object is the provision of an improved web printing, associating, cutting, folding and delivery mechanism in which uniformly folded products may be delivered by each of two delivery mechanisms.

Heretofore, multicolor web perfecting rotary combined printing and folding mechanism having alternately operating folding cylinders have been so constructed that the concentration of color on the second impression has been impossible. With such mechanism, and in printing a product in two colors on one side and four colors on the

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other side, it is necessary to print alternate sheet lengths in four colors on each side of the web, thereby making it necessary to operate eight printing cylinders and their inking mechanisms. If the alternate products are folded reversely with respect to each other, the corresponding pages occur on opposite sides of the web, and thus necessitate the use of different impression cylinders for printing the same page on alternate products, that is if page 1 is to be in four colors and if this page is printed on the second impression, reversely folding the next subsequent product would result in page 1 being formed on the opposite side of the web and thus would require that it be printed on the first impression. With the present invention, in printing a similar product it is only necessary to operate six printing mechanisms, and all of the four color printing is done on the second side of the web thereby improving its quality due to the elimination of four color printing on the first side. Also, with prior multicolor web perfecting rotary combined printing presses having folding means for making a double fold in the products, the overall speed of the press has generally been limited by the slowness of operation of the chopper folder making the second fold in the products.

In accordance with the present preferred and illustrative embodiment of the invention means are provided for printing in multicolor on the first side of a web of paper, for printing in a larger number, for instance three or more colors on the other side of the web, with means, such as driers, for rendering the impression on each side non-smutting. After being printed on both sides, the web is cut into suitable narrow ribbons, the ribbons are associated into one or more groups and the associated ribbons are then cut into sheet lengths and folded alternately from each folding cylinder into two delivery mechanisms which fold the products all with the same side of the ribbons as the outside of the products regardless of which delivery delivers the particular product.

It will be understood that the foregoing general description and the following detailed description as well are exemplary and explanatory of the invention but are not restrictive thereof.

Referring now in detail to the illustrative embodiment of the invention as shown by the accompanying drawings means are provided for printing a wide web of paper on both sides, with a larger number of colors on the second side than on the first side. As embodied, there is provided a magazine reel 10 from which a web 11 is fed through web guiding and feeding rollers 12 to the

first impression cylinder 16 where the web is printed by the printing surfaces on cylinders 17 and 18 after which the first side impressions are dried by means of the drier 19 preferably comprising the radiant burner gas oven 20 and the cooling cylinders 21. Other guide rollers 22, some of which may be driven, are provided for feeding and leading the once printed web to the second printing means. This second printing means comprises the impression cylinder 25 and a plurality, such as three or more, printing cylinders 26, suitable anti-offset means being provided if needed. After the printing is complete, the web is fed to the second drying means 30, also preferably comprising a heated oven 20 and cooling cylinders 21. Thereafter, the perfected web is fed to slitting mechanism after which it is associated, cut, folded and delivered in accordance with the present invention.

The perfected web is fed and led to the folding mechanism by means of guide and feeding rollers 30 after which it is slit into narrower ribbons by means of the slitters 31 and these are passed over angle bars 32 and guide rollers 34 so they may be associated into one or more alleys to form associated groups 33 of ribbons.

The ribbons are led over the angle bars 32 and guide rollers 34 variously positioned in accordance with conventional practice so the ribbons may be interchanged, variously intercollated, reversed or not, and led to either alley, after which they are fed by the nipping rollers 39 as groups to one or the other longitudinal half of the cutting and folding cylinders 46 provided with cutting knives 41, cheek blocks 42, folding blades 43 and folding jaws 44. The ribbons are thus cut into sheet lengths, impaled and folded after which they are transferred by the fold to the transfer cylinder 47 provided with the grippers 48 to receive the product from the folding means.

Cooperating with the transfer cylinder 47 are a pair of delivery cylinders 50 each having a pair of grippers 51 to receive the products by the fold and deliver them alternately through the bite of rollers 52 and cylinders 50 to one or the other of a series of roller pairs 53 which forward the products to a transverse folder 54, of the reciprocating type.

Means are provided for actuating the grippers 48 in alternate sequence so that the products are first delivered to one and then to the other of the delivery cylinders 50, thereby reducing to one-half the speed of operation of the reciprocating folders 54.

Delivery cylinders 50 rotate in the same direction and to them the products are always folded with the same side of the ribbons forming the outside of the product.

From the reciprocating folders 54 the twice folded products are delivered to delivery belts or packer boxes 56 of conventional construction.

The various cylinders and grippers both for folding and transferring the folded sheets are provided with suitable driving and actuating means of conventional construction, while the reciprocating folders 54 are suitably actuated in correct timed relation to the proper positioning of the products with relation to the folding blades.

The cylinders 46, 47 and 50 and the rollers 52 and 53 are preferably sufficiently wide to handle the sheets from either or both ribbons 33, while two reciprocating folders 54 are provided for each delivery cylinder 50 so that the products

from the two ribbons may be fed separately to form different products and are folded and delivered to one or the other of the two packer boxes 56, depending on which alley the product comes from, the alternate products being folded into the other packer box 56 in the same alley. The rollers 53 preferably operate at a slower surface speed, about 60% to 80% of the surface speed of the cylinders 50 and rollers 52.

By suitably reversing various of the angle bars 32, any one or more of the ribbons 33 may be turned over with respect to the other ribbons so as to produce a product having the desired arrangement of color pages. By shifting the angle bars from one alley to another, the ribbons may all be led to either alley or divided at will between them so as to produce one product including all of the printed pages, printed by a one-half revolution of the printing cylinders 17, 18 and 26 (assuming each is four page lengths in circumference), or two products having the same total number of pages divided between them as desired. Thus, the single product may comprise four sheets of eight pages each (thirty-two pages) or two products may be produced of eight and twenty-four pages or two products of sixteen pages each.

The multicolor pages containing more than two colors, or containing the larger number of colors, are always printed against the second impression cylinder to avoid the possible deterioration of quality on those pages by the second impression, and these sheets with more than two colors may be reversed at will in the association of the product. Thus the outside and center pages of a thirty-two page product, as well as pages 3, 5, 7, 10, 12, 14, 19, 21, 23, 26, 28 and 30 may be printed in more than two colors. Alternatively, the pages just enumerated may be printed in two colors and pages 2, 4, 6, 8, 9, 11, 13, 15, 18, 20, 22, 24, 25, 27, 29 and 31 in more than two colors. By reversing one of the ribbons before association, the order may be varied considerably. Thus, pages 1, 4, 5, 7, 10, 12, 13, 16, 17, 20, 21, 23, 26, 28, 29 and 32 may all be printed in more than two colors. Alternatively, pages 2, 3, 6, 8, 9, 11, 14, 15, 18, 19, 22, 24, 25, 27, 30, 31 may be printed in more than two colors. By dividing the ribbons into more than one product, and by varying the reversal of the ribbons, a wide variety of products may be produced, all of uniform high quality in the multicolor impressions.

In all instances, the products are delivered from both folders 54 uniformly folded, and successive sheet lengths in the ribbons may be exact duplicates, or may be different. If different, the products from the two sets of folders 54 are different. Also, the successive sheet lengths of the ribbons may be different and the ribbons associated into the one group may be different from those in another alley, thereby allowing for the delivery after folding of four different products.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:

1. In a folding and delivering mechanism, the combination of a pair of cylinders forming sheet cutting and sheet folding means for cutting sheets from a ribbon and folding the cut sheets, a pair of delivery cylinders, a transfer cylinder

taking folded sheets from the cutting and folding means and transferring them alternately to first one and then the other delivery cylinder, two reciprocating folding means for again folding the sheets, one reciprocating folding means being provided to receive the once folded sheets from each delivery cylinder and sheet forwarding means operating at a slower speed than the delivery cylinders to forward once folded sheets from a delivery cylinder to the respective reciprocating folder.

2. In a web perfecting, associating, folding and delivery mechanism having two rotary multicolor printing units, the second of which is adapted to print in a greater number of colors than the first, the combination of means for slitting a web into a plurality of ribbons, a plurality of reversible and shiftable angle bars for guiding a plurality of ribbons optionally to one or another of a plurality of alleys, means for associating the ribbons in their alleys, a pair of cylinders forming sheet cutting and sheet folding means, operating on the ribbons to cut and fold sheets therefrom, a pair of delivery cylinders, a transfer serving to transfer once folded sheets alternately to the delivery cylinders, said cutting, folding, transfer and delivery means operating on the sheets from all the alleys, pairs of reciprocating folding means for again folding the sheets, one of each pair operating on sheets received from each delivery cylinder, each pair operating on the folded sheets in a single alley and sheet forwarding means operating at a slower speed than the delivery cylinders to forward once folded sheets from a delivery cylinder to the respective reciprocating folder.

3. In a folding and delivery mechanism, the combination of a pair of cylinders forming sheet cutting and sheet folding means, a transfer cylinder, two rotary delivery means to which successive once folded sheets are alternately transferred for delivery, said delivery means being rotatable in the same direction and two folding means receiving folded products from said delivery means respectively and acting to uniformly fold the once folded sheets and sheet forwarding means operating at a slower speed than the delivery cylinders and arranged to forward once folded sheets from a delivery cylinder to its respective second folding means.

4. In a folding and delivery mechanism, the combination of a pair of cylinders forming sheet cutting and sheet folding means from a ribbon and folding the cut sheets, a pair of delivery cylinders, a transfer cylinder taking folded sheets from the cutting and folding means and transferring them alternately to first one and then the other delivery cylinder, each of said means and cylinders being of double width to operate on the ribbons, and two pairs of reciprocating folding means for again folding the sheets and receiving products from the delivery cylinders, one of each pair operating on sheets received from each delivery cylinder, and each pair operating on the folded sheets in a single alley.

CURTIS S. CRAFTS.

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