

Aug. 5, 1947.

C. A. HARLESS

2,425,184

PRINTING PRESS

Filed May 19, 1943

4 Sheets-Sheet 1

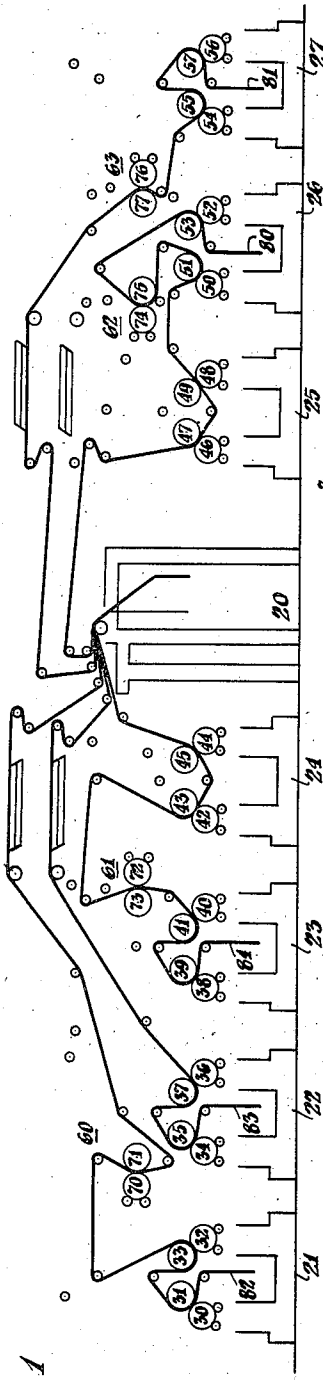


Fig. 1

3	80
2	81
2	82
2	83
1	84
1	84
4	

Fig. 2

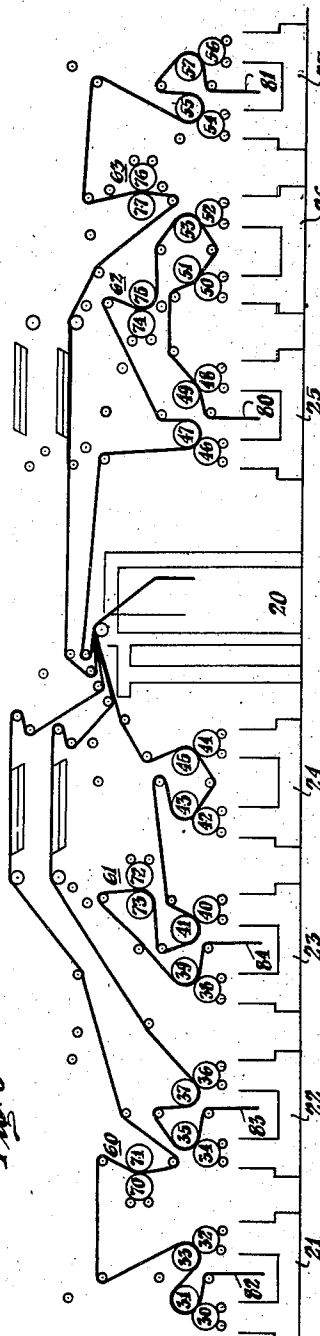


Fig. 3

2	80
3	81
1	82
2	83
1	84
2	84
3	

Fig. 4

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4 Sheets-Sheet 2

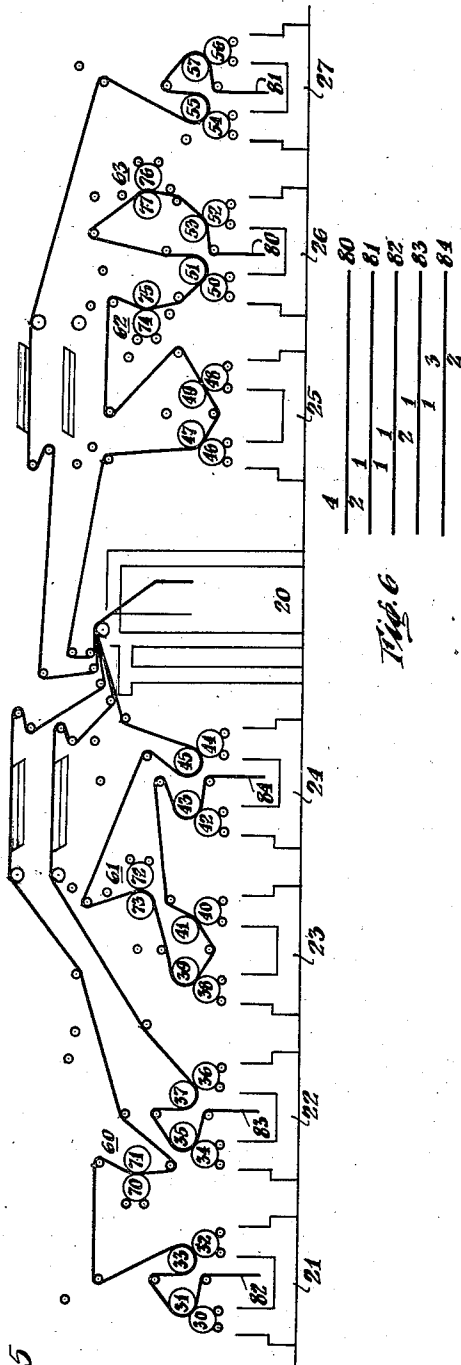


Fig. 6

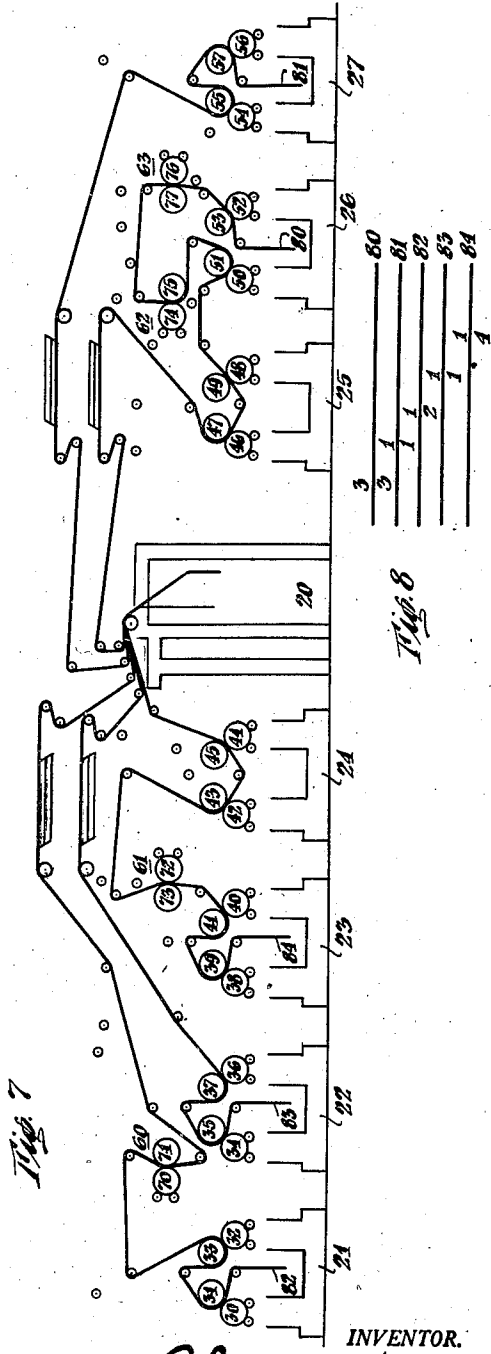


Fig. 8

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4 Sheets-Sheet 3

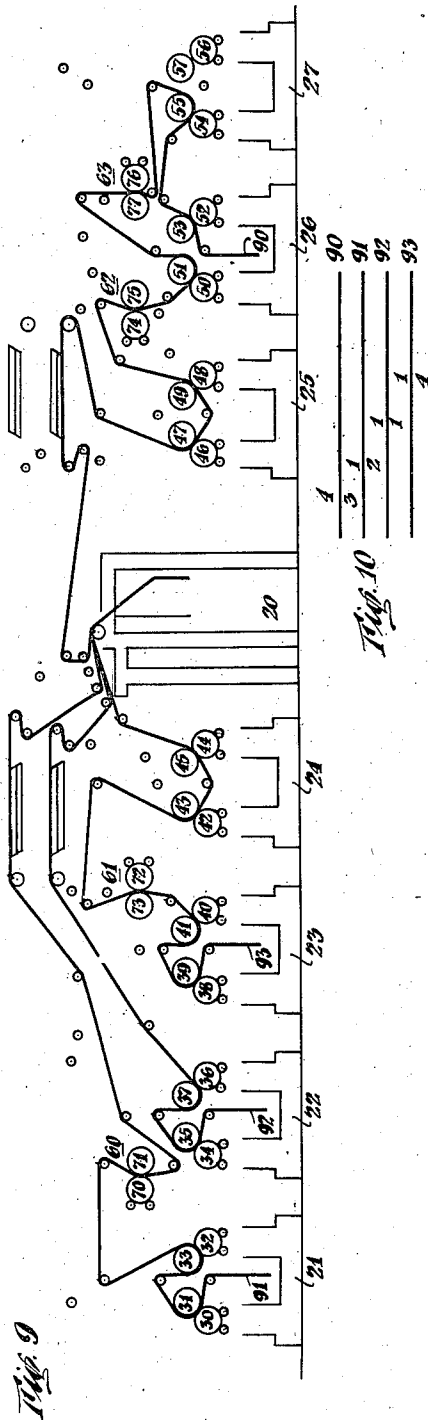


Fig. 10

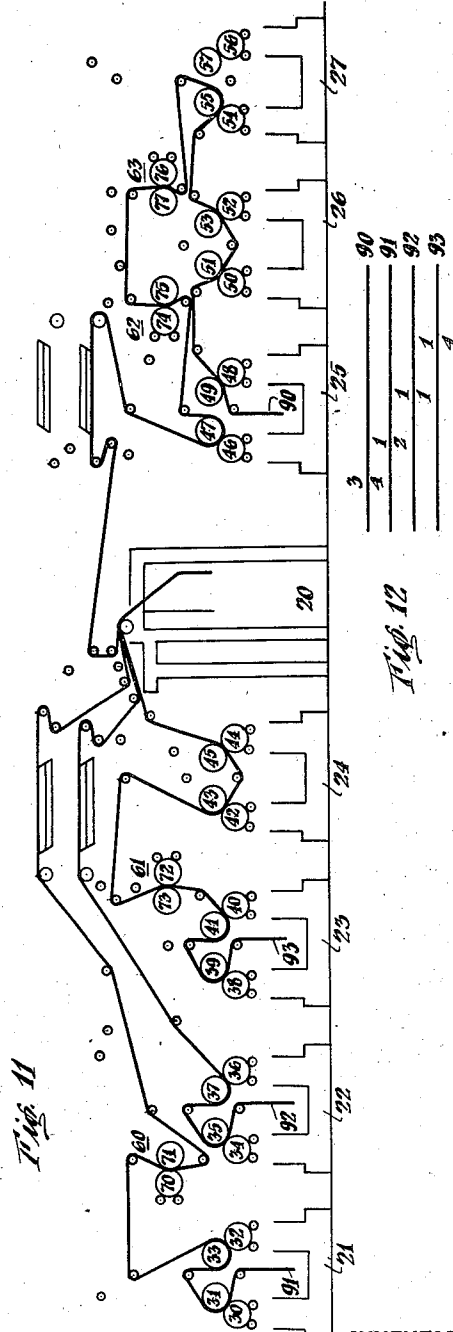


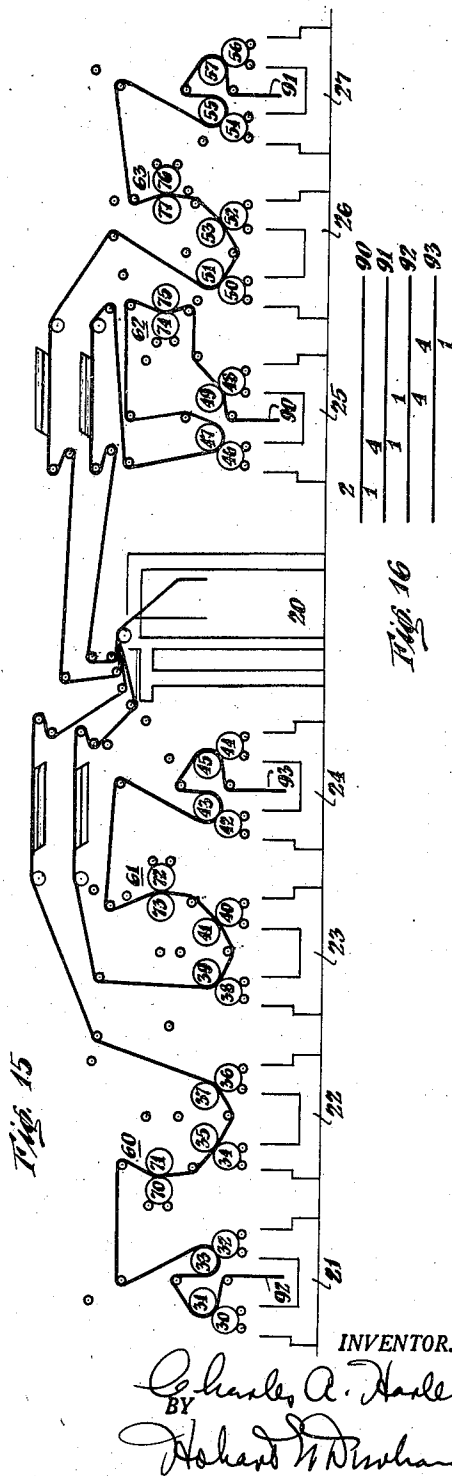
Fig. 12

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2,425,184

Filed May 19, 1943

4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE

2,425,184

PRINTING PRESS

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Application May 19, 1943, Serial No. 487,571

1 Claim. (Cl. 270—5)

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The present invention relates to printing presses and more particularly to rotary printing presses to print a plurality of colors on a running web.

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.

It is an object of the present invention to provide a multicolor printing press which is compact and efficient and which allows a very wide range of choice in the color arrangements and combinations of the printed products of the press. Another object of the invention is the provision of a printing press having the flexibility referred to which may produce a product of a relatively large number of pages and desired color combinations without the necessity to leave certain of the printing members idle. Still another object is the provision of a press with which desired color combinations may be placed at various locations in the printed product and still utilize the whole or substantially all of the printing capacity of the press.

The invention further provides a printing press allowing great flexibility in the choice of color and color arrangement and placement in the product without the use of complicated turning bar arrangements to change the order of webs in the product before final delivery. Still another object is the provision of a printing press in which web leads may be held to a minimum while enjoying the foregoing advantages.

Of the drawings:

Fig. 1 is a diagrammatic side elevation of a rotary multicolor printing press and a folder embodying the present invention, and showing one of the web leads which may be used with the press;

Fig. 2 is a diagrammatic showing of the product of the press with the web lead shown in Fig. 1, and indicating the number of colors printed on each page of the product;

Fig. 3 is a diagrammatic side elevation of the

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printing press and folder shown in Fig. 1 but with a different web lead;

Fig. 4 is a diagrammatic showing of the product of the press with the web lead shown in Fig. 3;

Fig. 5 is a diagrammatic side elevation of the printing press and folder shown in Fig. 1 with a different web lead;

Fig. 6 is a diagrammatic showing of the product of the press with the web lead shown in Fig. 5;

Fig. 7 is a diagrammatic side elevation of the printing press and folder shown in Fig. 1 with a different web lead;

Fig. 8 is a diagrammatic showing of the product of the press with the web lead shown in Fig. 7;

Fig. 9 is a diagrammatic side elevation of the printing press and folder shown in Fig. 1 with a different web lead, utilizing only four webs;

Fig. 10 is a diagrammatic showing of the product of the printing press with the web lead shown in Fig. 9;

Fig. 11 is a diagrammatic side elevation of the printing press and folder shown in Fig. 1 with another web lead utilizing four webs;

Fig. 12 is a diagrammatic showing of the product of the press with the web lead shown in Fig. 11;

Fig. 13 is a diagrammatic side elevation of the printing press and folder shown in Fig. 1 with another four web lead;

Fig. 14 is a diagrammatic showing of the product of the press with the web lead shown in Fig. 13;

Fig. 15 is a diagrammatic side elevation of the printing press and folder shown in Fig. 1 with another four web lead; and

Fig. 16 is a diagrammatic showing of the product of the press with the web lead shown in Fig. 15.

With the stated and other objects in view there is provided in an illustrative embodiment of the present invention, as shown by way of example in the accompanying drawings, a former folder of conventional construction and seven double impression printing units in line with the folder and on the same floor level. Each double impression printing unit is preferably of a construction which has come to be standard in the design of rotary printing presses and comprises a pair of printing couples, each couple consisting of a plate cylinder and an impression cylinder. The seven double impression units are ar-

ranged four at one side of the former folder and three at the opposite side of the folder.

Four single impression printing units or couples are provided in the press and these each comprise a single plate cylinder cooperating with an impression cylinder for printing. The single impression units are arranged in line with the double impression units and on the same floor level. Regarding the double impression units as numbered consecutively from one to seven the former folder being located between the fourth and fifth units, the single impression units are arranged slightly above and between the first and second, third and fourth, fifth and sixth, and sixth and seventh, double impression units.

Certain of the printing couples of the press are provided with gearing means from the press drive in order that they may be driven in either direction, or are reversible. As embodied, each of the single impression units is reversible, and one couple of each of the seven double impression units is reversible.

The plate cylinder of each printing couple is provided with suitable inking mechanism, and guide rollers are provided for guiding webs to and through the various couples and to the former folder.

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 shown in the accompanying drawings, there is provided in a rotary printing press a former folder 20 of conventional design. On one side of the folder 20 and in line therewith on the same floor level are two pairs of standard double impression units, said units being numbered in the drawings 21, 22, 23 and 24. At the other side of the folder 20 in line therewith and on the same floor level is another pair of standard double impression units 25 and 26 and another standard double impression unit 27.

The standard double impression unit 21 comprises a printing couple having a plate cylinder 30 and an impression cylinder 31, and another printing couple having plate cylinder 32 and impression cylinder 33. The plate and impression cylinders are suitably mounted, as are the other cylinders hereinafter described, in side frames for the press, which may be of any conventional construction, as will be understood by those skilled in the art.

The unit 22 comprises a plate and impression couple 34, 35 respectively and another plate and impression couple 36, 37 respectively. Unit 23 comprises couples 38, 39 and 40, 41. Unit 24 comprises couples 42, 43 and 44, 45. Unit 25 comprises couples 46, 47 and 48, 49. Unit 26 comprises couples 50, 51 and 52, 53. Unit 27 comprises couples 54, 55 and 56, 57. Of the couples mentioned, the even numbers denote plate cylinders and the odd numbers immediately following are their cooperating impression cylinders.

Four single impression printing units or couples 60, 61, 62 and 63 are provided in line with the folder and double impression units already described and on the same floor level. Single impression unit 60 is positioned between and slightly above the double impression units 21 and 22. Single impression unit 61 is positioned between and slightly above the double impression units 23 and 24. Single impression unit 62 is positioned between and slightly above double impression units 25 and 26. Single impression unit 63 is positioned

between and slightly above double impression units 26 and 27.

Single impression unit 60 comprises a plate cylinder 70 and an impression cylinder 71. Single impression unit 61 comprises a plate cylinder 72 and an impression cylinder 73. Single impression unit 62 comprises a plate cylinder 74 and an impression cylinder 75. Single impression unit 63 comprises a plate cylinder 76 and an impression cylinder 77.

The plate cylinders 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54 and 56 of the double impression units, and the plate cylinders 70, 72, 74 and 76 of the single impression units are each provided with inking mechanism of any well known and suitable construction whereby ink of any desired color may be applied to the plates on the cylinder for impression on the running webs.

Certain of the printing couples are provided with reversible driving means whereby the plate cylinder and impression cylinder of each couple may be driven in either direction from the main drive train of the press. Such gearing and drive means are well known in the art and are for that reason not shown in detail in the accompanying drawings. United States Patent No. 1,640,976 to Brueshaber shows and describes a reversible drive mechanism which may be adapted to the printing press of the present invention. The reversibly driven couples of the press are the couple 32, 33 of double impression unit 21, couple 34, 35 of double impression unit 22, couple 40, 41 of double impression unit 23, couple 42, 43 of double impression unit 24, couple 48, 49 of double impression unit 25, couple 50, 51 of double impression unit 26, and couple 54, 55 of double impression unit 27. The plate and impression cylinders of each of the four single impression units 60, 61, 62 and 63 are likewise geared for driving in either direction.

The accompanying drawings show, for the purposes of illustration, eight of the many different web leads possible with the printing press of the present invention, and also show the flexibility of color makeup and arrangement in the product which may be achieved with various web leads in the press.

As shown in Fig. 1, a web 80 is led to and through couple 52, 53 of double impression unit 26, then through single impression unit 62, through the other couple 50, 51 of unit 26, then through both couples 48, 49 and 46, 47 of double impression unit 25. Web 80 has thus been printed and perfected in color, having had two colors printed first on one side and thereafter been printed in three colors on the other side. The printed and perfected web is then led by suitable guide rollers to the former folder 20 where it becomes the outer or upper web and is folded and delivered in any usual and customary manner.

Another web 81 is perfected in multicolor on the units at the same side of the press, and as shown, is led to and through couple 56, 57 of double impression unit 27, then through the other couple 54, 55, and through single impression unit 63, and to the folder 20 where it becomes the second web from the top of the associated webs. The web 81 has thus been printed in one color on the first side, one color on the second side, and then a second color on the first side.

Three webs are printed and perfected in multicolor at the opposite side of the folder in the illustrative web lead arrangement shown in Fig. 1. Web 82 is led to and through couple

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30, 31 of double impression unit 21, then through the other couple 32, 33 of the unit, then through the single impression unit 60 and thence to the folder 20 where it becomes the third from the top of the associated webs. Web 82 has thus been printed first in one color on one side and subsequently with two colors on the opposite side.

The fourth web 83 is printed one color on each side by passing to and through double impression unit 22 and is then led to the folder 20 for folding and delivery.

Web 84 is led to and through double impression unit 23, then through single impression unit 61, then through double impression unit 24 and thence to folder 20. Web 84 has thus been printed in first one color on one side of the web and then in four colors on the opposite side of the web.

Fig. 2 of the drawings shows diagrammatically the product of the press with the web lead shown in Fig. 1 and indicates the number of colors printed on each side of each of the five webs, as has already been described.

Fig. 3 shows another web lead for the multicolor printing of five webs on the press of the present invention, and it is thought that the printing of the webs by particular units of the press will be apparent without detailed description. As may be seen from the drawings, web 80 is printed first in three colors on one side and subsequently in two colors on the other side to provide a top web with the number of colors per side reversed from that of the web in the illustration of Fig. 1.

Web 81 has been printed first in one color on one side and thereafter in two colors on the other side. Webs 82 and 83 are given the same leads as shown in Fig. 1. The lowermost web 84 has been printed first in two colors on one side and thereafter in three colors on the other side, to provide a different color combination than was the result of the lead for the web shown in Fig. 1. Fig. 4 shows diagrammatically the color arrangement of the webs utilizing the web leads of Fig. 3.

In making the multicolor product shown in Fig. 4 with the web leads shown in Fig. 3 it will be noted that several of the printing couples are driven in a reverse direction to that necessary for the web leads shown in Fig. 1. Thus in the printing of web 80 the couple 48, 49 of double impression unit 25 has been reversed, and the couple 50, 51 of unit 26. The single impression unit 62 has also been reversed in direction. In printing web 81 the single impression unit 63 has been reversed, and for the printing of web 84 unit 61 has been reversed.

In the illustrative web lead shown in Fig. 5 of the drawings, the product of which is shown in Fig. 6, the outermost web 80 is printed in four colors on one side and two on the opposite side, double impression units 25 and 26 and single impression units 62 and 63 being utilized in cooperation to print a total of six impressions on the web. Web 81 is now printed in only one color on each side by means of double impression unit 27.

The printing of webs 82 and 83 is the same as in illustrative web leads shown in Figs. 1 and 3. Web 84 is now printed with the numbers of colors reversed over the printing of the web as shown in Fig. 3, and this has been done by printing first three colors on one side and then two colors on the reverse side of the web. In doing this couple 42, 43 of unit 24, couple 40, 41 of unit 23 and the

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single impression unit 61 have been driven in the reverse direction.

Fig. 7 shows an illustrative web lead in which the color impressions on the outermost and innermost webs 80 and 84 have been changed over that shown in Fig. 6, as may be seen from Fig. 8 illustrating the product of the web lead.

The web lead illustratively shown in Fig. 9 results in the printing of a four web product as shown in Fig. 10. As shown, a single web 90 is printed on the units at one side of the folder 20. Web 90 is printed with three colors on one side and four colors are subsequently printed on the other side of the web. Double impression units 25 and 26 and couple 54, 55 of unit 27 are coordinated with single impression units 62 and 63 to print a total of seven impressions on the two sides of the web. Webs 91, 92 and 93 are printed on the single and double impression units at the other side of folder 20 with web leads identical to those for webs 82, 83 and 84 shown in Fig. 7.

Fig. 11 shows illustrative web leads for the four webs 90, 91, 92 and 93 resulting in a product shown in Fig. 12 in which the color combination for the two sides of web 90 is reversed from that shown in Fig. 10. In making this lead the couples 48, 49 and 50, 51 have been reversed, as well as the single impression unit 62.

Fig. 13 shows an illustrative web lead printing four webs, as shown in Fig. 14, in which webs 90 and 91 are printed at one side of folder 20 and webs 92 and 93 are printed at the opposite side. The four webs now provide a color combination in which three webs are printed with four colors on one side and one color on the opposite side, and the other web printed two colors on one side and one color on the opposite side, all the impressions of the press being utilized.

Fig. 15 shows an illustrative web lead printing the four webs 90, 91, 92 and 93 in the color combination shown in Fig. 16. In this illustration the web 90 has been printed identically to its printing in the illustration of Fig. 13, but the color combinations of the sides of the other three webs has been reversed.

It will be understood that all of the possible, desirable and advantageous web leads and color arrangements of the printing press of the present invention have by no means been illustratively shown. The illustrations given and described serve to show, however, how much flexibility the present invention provides in web lead arrangement and color combination in the final product while achieving the advantage of simple and compact press construction without numerous turning bar changes to be made and maintaining minimum lengths of leads for all webs printed.

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 claim without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:

In a printing press, in combination, a former folder, four double impression printing couples in line on one side of said former folder, one couple of each of said double printing couples being reversible, a reversible single impression printing couple separate from the first and second double impression couples, and positioned above and between them and capable of cooperation therewith, a second reversible single impression printing couple separate from the third and

fourth double impression couples, and positioned above and between them and capable of cooperation therewith, a fifth, sixth and seventh double impression printing couple in line on the other side of said folder, one couple of each said fifth, sixth and seventh double impression couples being reversible, a reversible single impression printing couple separate from the fifth and sixth double impression couples, and positioned above and between them and capable of cooperation therewith, and another reversible single impression couple separate from the sixth and seventh double impression coupled, and positioned above and between them and capable of cooperation therewith.

CHARLES ALONZO HARLESS.

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