

G. E. PANCOAST.
 MULTICOLOR PRINTING PRESS.
 APPLICATION FILED DEC. 30, 1905.

902,165.

Patented Oct. 27, 1908.

Fig. 1.

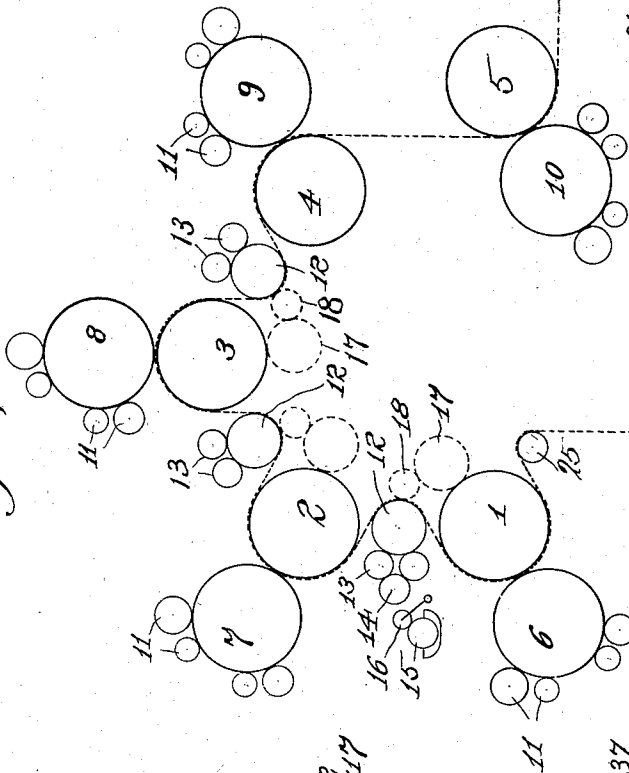


Fig. 2.

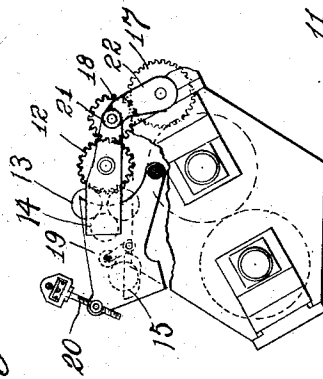
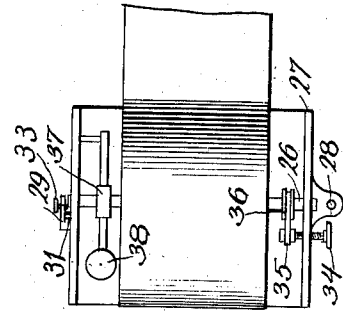


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE E. PANCOAST, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN LITHOGRAPHIC COMPANY, A CORPORATION OF NEW YORK.

MULTICOLOR-PRINTING PRESS.

No. 902,165.

Specification of Letters Patent.

Patented Oct. 27, 1908.

Application filed December 30, 1905. Serial No. 293,927.

To all whom it may concern:

Be it known that I, GEORGE E. PANCOAST, a citizen of the United States, and a resident of Brooklyn borough, New York city, county of Kings, and State of New York, have invented certain new and useful Improvements in Multicolor-Printing Presses, of which the following is a specification.

My invention relates to printing presses; and while as to some of its features it may be embodied in presses of various kinds, it is more particularly useful as applied to rotary multicolor presses employing relief design surfaces and printing on the web.

Where relief design surfaces are employed in a press, it is necessary to provide a separate impression surface for each of a plurality of design surfaces which print on the same part of the paper. With this type of machine, and particularly with those machines which are designed to superimpose a series of designs upon the same side of the web, as in multicolor printing, great difficulty has been experienced in transferring or forwarding the web from one impression surface to another so as to secure and maintain even approximate registration of the successive designs. As such presses have been heretofore constructed, slight inequalities in the texture or condition of the web, or in the tension to which the same is subjected while passing to or through the machine, will cause irregularities in the position of the paper with relation to the successive design and impression cylinders and consequently inaccurate register between designs successively applied to the web. Moreover, these presses have been constructed so that the design cylinders act to forward the web or to influence its movement. The design surfaces, however, are necessarily spaced apart on the design cylinders and are necessarily variable in character. By reason of these surface inequalities of the design cylinders their action on the web is variable, and this variable action in connection with irregularities in the tension to which all parts of the web are subjected causes irregularities in the travel of the web through the press such as to prevent accurate registration of the superimposed designs. These defects in the prior constructions have been such as to make it impossible to secure that degree of accuracy in the registration of the successive designs which is essential in high class multicolor printing

and in printing by the so-called three color process where a slight defect in the register of the designs causes a serious defect in the result.

Numerous attempts have been made to overcome the defects referred to but none has proven successful. Among other things, attempts have been made to control the web during its travel through the press. The means provided with this object in view, however, have not only been ineffective to accomplish the desired result, but they have given rise to other defects, among which are the injury to the freshly printed designs on the web by the contact therewith of the web controlling means and the offset or transfer of the ink from the designs to other parts of the paper.

My invention is especially directed to the provision of a construction whereby the defects referred to are effectually overcome. More particularly, my invention has for an object to provide a construction whereby the web may be fed to and forwarded through the press with great precision, independently of the inequalities ordinarily present in web paper and independently of the surface inequalities of the design cylinders so as to secure and maintain an accurate registration between a plurality of designs superimposed thereon; also to provide a construction whereby the web may be transferred from one to another of a plurality of impression cylinders and accurately controlled and forwarded through the press without injury to the freshly printed designs and without liability of offset. These and other objects of the invention will in part be obvious and in part be more fully explained hereinafter.

My invention consists in the novel parts, improvements, and combinations herein shown and described.

In the accompanying drawings, which are referred to herein and form a part hereof, one embodiment of my invention is illustrated, the same serving in connection with the description herein to explain the principles of the invention.

Of the drawings: Figure 1 represents a diagram of a press embodying certain features of the invention; Fig. 2 represents a side elevation of certain details of the construction, exemplifying certain features of the invention, parts being shown broken away to more clearly illustrate the construction; and Fig. 110

3 represents a diagrammatic plan view of the web feeding means indicated in Fig. 1.

A press constructed in accordance with certain features of my invention includes in combination, a plurality of rotary printing couples for superimposing a series of designs upon the web each couple having a single impression surface for each design surface, and web forwarding means including a member for forwarding the web from one printing couple to the next, the relative arrangement of the forwarding member and the impression cylinders of the couples being such that the travel of the web through the press is substantially unaffected by inequalities in the web or by the surface inequalities of the design cylinders of the couples.

In one embodiment of the invention the combination also includes web feeding means so constructed that irrespective of its inequalities the web may be passed smoothly into the press.

In accordance with one feature of the invention, the web forwarding means includes a member intermediate of and adjacent to the impression cylinders of successive couples and driven at substantially the same surface speed, said intermediate member having a surface character such as to cause the web to adhere thereto.

According to another feature of the invention, the web forwarding means includes a member intermediate of and adjacent to, but upon the opposite side of the web from, the impression cylinders of successive couples, said intermediate member having a surface which is ink repellent in character.

In one embodiment of the invention the intermediate web forwarding members are in the form of cylinders, so arranged with relation to the adjacent impression cylinders of the couples as to cause the web to extend part way around and thereby to cling to the impression cylinders, the arrangement being such also that relatively small portions of the web extend between the impression cylinders and the web forwarding means, said web forwarding cylinders being driven at the same surface speed as the impression cylinders and having a surface character such as to cause the web to adhere thereto and at the same time to repel the ink of the freshly printed designs, whereby a web which is fed smoothly into the press will be unaffected in its travel through the press by inequalities in its character or condition or by the surface inequalities of the design cylinders of the couples, and this without injury to the impressions of the designs and without offset.

Referring now to the particular construction diagrammatically illustrated by way of example in the drawings, the same will be seen to consist of a plurality of impression cylinders 1, 2, 3, 4, and 5, the same being arranged to cooperate with a plurality of de-

sign cylinders 6, 7, 8, 9, and 10, one for each impression cylinder. The plurality of printing couples thus formed may be arranged in various positions with relation to each other. As shown, they are so arranged that the same side of the web is presented to each of the design cylinders 6, 7, 8, and 9, and the opposite side of the web to the design cylinder 10 so that the web may be printed with four colors on one side and one on the other side. Any suitable means may be provided for supplying ink to the design cylinders. Only the form or ink applying rollers 11 of a suitable inking mechanism are indicated in connection with each of the design cylinders.

The means for forwarding the web through the press may be constructed in various ways. As indicated in the drawing, the web forwarding means includes a web forwarding member in the form of the cylinder 12 intermediate of each of the successive pairs of impression cylinders, the cylinders 12 being adjacent to the impression cylinders and so located on the opposite side of the web as to cause the web to extend around the impression cylinders and cling to the surface thereof, the web also extending part way around the web forwarding cylinders 12, and the portions of the web which extend between the impression cylinders and the web forwarding cylinders being so short that the web will not become materially shifted out of its true course by reason of irregularities in its character or condition.

In accordance with the preferred construction, the cylinders 12 are driven at substantially the same surface speed as the impression cylinders and positively so driven as by means of suitable gears 17 and 18 which may receive their motion from one of the impression cylinders as indicated. By reason of this construction the web is caused to travel accurately in unison with the impression cylinders, and it is transferred from one cylinder to the next positively and without loss of control so that the travel of the web through the press is unaffected either by inequalities in the web, such as differences in the texture or in the condition as to moisture of the web at different parts with respect to its width, or differences in the tension of the web, or by inequalities in the surface character of the design cylinders, such as are due to the spacing of the plates and to the differences in the surface character thereof.

According to one feature of the invention, the surfaces of these web forwarding cylinders 12 are rendered of such a character as to cause the web to adhere thereto. This may be accomplished in any suitable way. Preferably, the surfaces of these cylinders are made web adherent by moistening them with a suitable liquid. This liquid should be of such a nature that when it is supplied to the surface of the roller in such quantity as

to cause an effective adherence of the web to the surface of the cylinder, it will not stain or injure the web; and where the web forwarding cylinder is on the opposite side of the web from the impression cylinder and comes in contact with the freshly printed side of the web, as in the embodiment of the invention shown, the liquid should be of such a character as to repel the ink of the freshly printed designs. Water may be employed for this purpose, or a mixture of water and oil in the nature of an emulsion may be used. For the purpose of keeping the surfaces of the web forwarding cylinders suitably moistened with the liquid, means are employed for continuously supplying the moisture in suitably regulated quantities. As indicated in the drawings, the liquid supplying means for each cylinder comprises a pair of applying rollers 13, a distributing roller 14, a fountain and fountain roller 15, and a vibrating ductor roller 16.

In order that the length of the path of the web between successive impression cylinders may be varied so as to secure accurate registration between the designs printed upon the web, the web forwarding cylinders 12 are movably mounted with relation to the impression cylinders. This may be accomplished in any suitable manner. As shown in Fig. 2, one of the cylinders 12 is journaled in a frame 19 which is pivotally mounted in the frame of the press, preferably at a point substantially in the line connecting the axes of the two adjacent impression cylinders, and the position of the frame is regulated and fixed at the desired point by means of an adjusting screw 20. In order that the driving connections for the cylinder 12 may be positively maintained irrespective of the variations in the position of the latter, the intermediate gear 18 is connected with the axes of the cylinder 12 and the gear 17 by means of links 21 and 22 so that the mesh of the gears is not varied by variations in the position of the cylinder 12.

According to one feature of the invention, means are provided for feeding a web to the press so that irrespective of its inequalities the web may be caused to pass smoothly onto the circumferentially continuous members of the web forwarding means. In the embodiment of the invention illustrated the web feeding means is so constructed that the tension of the web may be varied locally with respect to its width and in order that the web may be caused to pass into the press at a desired place widthwise thereof notwithstanding the differences in tension at opposite sides of the web, provision is also made in the web feeding means for varying the trend of the web to the press. As shown, the web feeding means comprises a means for supporting a supply roll 23 and suitable guide rollers, as 24 and 25. The

support for the supply roll includes a spindle 26 and a frame 27 in which said spindle is journaled. Any suitable means may be provided for varying the tension on the web locally with relation to its width to remove or compensate for local inequalities in the web. As these inequalities usually consist in variations in the length of the web at or near its opposite sides, the means for varying the tension on different parts of the web are preferably constructed to vary the tension at the opposite sides of the web. As shown, this is accomplished by pivotally mounting the web supporting frame 27 at or near one end, as indicated at 28, Fig. 3, and providing means for moving the opposite end of the frame to and from the press. As shown, this is accomplished by means of a lever 29 which is fulcrumed on a suitable base 30 and is pivotally connected at an intermediate point, as 31, Fig. 1, to the frame 27, the lever being held in its adjusted position by any suitable means, as a sector 32 and clamp screw 33. As the variation in the tension of the web at opposite sides would cause or tend to cause the web to pass into the press at different positions transversely thereof, means are provided for shifting the position of the supply roll in the direction of its axis. By reason of this construction the direction from which the web approaches the press or the trend of the web to the press may be varied so as to cause the web to pass smoothly into the press at a predetermined place widthwise thereof irrespective of the inequalities ordinarily present in web paper. The means shown for shifting the web roll in the direction of its axis comprises a hand screw 34 threaded into the frame 27 and suitably connected with the spindle 26, as by means of a finger 35 and grooved collar 36 so as to shift the spindle longitudinally without interfering with its rotation.

Means are provided also for suitably regulating the tension on the web. The means shown for this purpose comprises a friction brake 37 arranged to engage the spindle 26, a hand screw 38 being provided to vary the pressure of the brake upon the spindle.

Advantages of the construction herein shown and described other than those set forth will be obvious to persons skilled in the art.

It is to be understood that my invention in its broader aspects is not limited to the particular construction and arrangement herein shown and described or to any particular construction or arrangement by which it has been or may be carried into effect, as various features of the invention may be embodied in many different forms without departing from the main principles of the invention and without sacrificing its chief advantages.

What I claim is:

1. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, and web forwarding means including a member for forwarding the web from one couple to the next, the relative arrangement of the forwarding member and the impression cylinders of the couples being variable and such that the portions of the web in contact with the impression surfaces are relatively great and the intermediate portions relatively small whereby the travel of the web through the press is substantially unaffected by the inequalities in the web or by the surface inequalities of the design cylinders of the couples.

2. A rotary multicolor press including in combination, a plurality of printing couples, each having a single impression surface for each design surface and means for forwarding the web from one couple to the next, the relative arrangement of the web forwarding means and the impression cylinders of the couples being variable and such that the portions of the web in contact with the impression surfaces are relatively great and the intermediate portions relatively small whereby the travel of the web through the press is substantially unaffected by inequalities in the web or by the surface inequalities of the design cylinders of the couples.

3. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, and a cylinder for forwarding the web from one couple to the next, the web forwarding cylinder being movable with relation to and adjacent to the impression cylinders of the couples and so arranged with relation thereto that the web is caused to cling to each of the cylinders whereby the travel of the web through the press is substantially unaffected by inequalities in the web or by the surface inequalities of the design cylinders of the couples.

4. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, web feeding means constructed so that irrespective of its inequalities a web may be passed smoothly into the press, and means for forwarding the web through the press, the relative arrangement of an element of the forwarding means and the impression cylinders of the couples being variable and such that the portions of the web in contact with the impression surfaces are relatively great and the intermediate portions relatively small whereby the travel of the web through the press is substantially unaffected by inequalities in the web or by the surface inequalities of the design cylinders of the couples.

5. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, web feeding means having provision for varying the tension of the web locally with relation to its width, and means for forwarding the web through the press, the relative arrangement of the forwarding means and the impression cylinders of the couples being such that the portions of the web in contact with the impression surfaces are relatively great and the intermediate portions relatively small whereby the travel of the web through the press is substantially unaffected by inequalities in the web or by the surface inequalities of the design cylinders of the couples.

6. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, web feeding means having provision for varying the trend of the web to the press, and means for forwarding the web through the press, the relative arrangement of the forwarding means and the impression cylinders of the couples being such that the portions of the web in contact with the impression surfaces are relatively great and the intermediate portions relatively small whereby the travel of the web through the press is substantially unaffected by inequalities in the web or by the surface inequalities of the design cylinders of the couples.

7. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, web feeding means having provision for varying the tension of the web locally with relation to its width and for varying the trend of the web to the press, and means for forwarding the web through the press, the relative arrangement of the forwarding means and the impression cylinders of the couples being such that the portions of the web in contact with the impression surfaces are relatively great and the intermediate portions relatively small whereby the travel of the web through the press is substantially unaffected by inequalities in the web or by the surface inequalities of the design cylinders of the couples.

8. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, and web forwarding means including a member for forwarding the web from one couple to the next, the relative arrangement of the web forwarding member and the impression cylinders of the couples being such that the travel of the web through the press is substantially unaffected by the inequalities in the web or by the surface inequalities of the design cylinders of

the couples, said web forwarding member having a surface character such as to cause the web to adhere thereto.

9. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, and web forwarding means including a member for forwarding the web from one couple to the next, the relative arrangement of the web forwarding member and the impression cylinders of the couples being such that the travel of the web through the press is substantially unaffected by the inequalities in the web or by the surface inequalities of the design cylinders of the couples, said web forwarding member being located on the opposite side of the web from the impression cylinders and having an ink repellent surface.

10. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, a member for forwarding the web from one couple to the next, and means for driving said web forwarding member at the same surface speed as the impression cylinders of the couples, the relative arrangement of said member and the impression cylinders being such that the travel of the web through the press is substantially unaffected by the inequalities in the web or by the surface inequalities of the design cylinders of the couples, said web forwarding member having a surface character such as to cause the web to adhere thereto.

11. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, a member for forwarding the web from one couple to the next, and means for driving said web forwarding member at the same surface speed as the impression cylinders of the couples, the relative arrangement of said member and the impression cylinders being such that the travel of the web through the press is substantially unaffected by the inequalities in the web or by surface inequalities of the design cylinders of the couples, said web forwarding member being arranged on the opposite side of the web from the impression cylinders and having an ink repellent surface.

12. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, web feeding means constructed so that the web may be caused to pass smoothly into the press, a member for forwarding the web from one couple to the next, and means for driving said member at the same surface speed as the impression cylinders of the couples, the relative arrangement of said web forwarding members and the impression cylinders being such that the travel of

the web through the press is substantially unaffected by the inequalities in the web or by the surface inequalities of the design cylinders of the couples, said web forwarding member having a surface character such as to cause the web to adhere thereto.

13. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, web feeding means constructed so that the web may be caused to pass smoothly into the press, a member for forwarding the web from one couple to the next, and means for driving said member at the same surface speed as the impression cylinders of the couples, the relative arrangement of said web forwarding members and the impression cylinders being such that the travel of the web through the press is substantially unaffected by the inequalities in the web or by the surface inequalities of the design cylinders of the couples, said web forwarding member being located on the opposite side of the web from the impression cylinders and having an ink repellent surface.

14. A rotary multicolor press including in combination, a plurality of printing couples, web feeding means constructed so that the web may be caused to pass smoothly into the press, a member for forwarding the web from one printing couple to the next, and means for driving said member at the same surface speed as the impression cylinders of the couples, the relative arrangement of the web forwarding member and the impression cylinders being such that the travel of the web through the press is substantially unaffected by the inequalities in the web or by the surface inequalities of the design cylinders of the couples, said web forwarding member being located on the opposite side of the web from the impression cylinders and having an ink repellent surface of such a character as to cause the web to adhere thereto.

15. A rotary multicolor press including in combination, a plurality of printing couples, web feeding means having provision for varying the tension on the web locally with relation to its width, a web forwarding cylinder intermediate of and adjacent to the impression cylinders of each succeeding pair of printing couples, and means for driving said intermediate cylinders at the same surface speed as the impression cylinders, said intermediate cylinders being located on the opposite side of the web from the impression cylinders.

16. A rotary multicolor press including in combination, a plurality of printing couples, web feeding means having provision for varying the tension on the web locally with relation to its width, a web forwarding cylinder intermediate of and adjacent to the impression cylinders of each succeeding pair of

printing couples, and means for driving said intermediate cylinders at the same surface speed as the impression cylinders, said intermediate cylinders being located on the opposite side of the web from the impression cylinders and having ink repellent surfaces.

17. A rotary multicolor press including in combination, a plurality of printing couples, web feeding means having provision for varying the tension on the web locally with relation to its width, a web forwarding cylinder intermediate of and adjacent to the impression cylinders of each succeeding pair of printing couples, and means for driving said intermediate cylinders at the same surface speed as the impression cylinders, said intermediate cylinders being located on the opposite side of the web from the impression cylinders and having ink repellent surfaces of such a character as to cause the web to adhere thereto.

18. A rotary multicolor press including in combination, a plurality of printing couples, web feeding means having provision for varying the tension on the web locally with relation to its width, a web forwarding cylinder intermediate of and adjacent to the impression cylinders of each succeeding pair of printing couples, means for driving said intermediate cylinders at the same surface speed as the impression cylinders, said intermediate cylinders being located on the opposite side of the web from the impression cylinders, and means for moistening the surfaces of said intermediate cylinders.

19. A printing press including in combination, two printing couples each having a single impression surface for each design surface, an intermediate web forwarding member driven at substantially the same surface speed as the printing couples and means for preventing offset on said intermediate member.

20. A printing press including in combination, two printing couples each having a single impression surface for each design surface, and an intermediate web forwarding member driven at substantially the same surface speed as the printing couples, said intermediate member having an ink repellent surface.

21. A printing press including in combination, two printing couples each having a single impression surface for each design surface, and an intermediate web forwarding member driven at the same surface speed as the printing couples, said intermediate member having an ink repellent surface of such a character as to cause the web to adhere thereto.

22. A printing press including in combination, two printing couples each having a single impression surface for each design surface, an intermediate web forwarding mem-

ber driven at the same surface speed as the printing couples, and means for applying an ink repellent to the surface of said intermediate member.

23. A printing press including in combination, two printing couples each having a single impression surface for each design surface, an intermediate web forwarding member driven at the same surface speed as the printing couples, and means for moistening the surface of said intermediate member.

24. A printing press including in combination, two printing couples, an intermediate web forwarding member driven at the same surface speed as the printing couples, said intermediate member having an ink repellent surface, and means for varying the relation between the intermediate member and the impression cylinders to secure registration of the designs printed on the web.

25. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, a plurality of intermediate web forwarding cylinders driven at the same speed as the printing couples, and means for varying the relations between the intermediate cylinders and the impression cylinders of the respective printing couples to secure registration of the designs printed on the web.

26. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, and a plurality of intermediate web forwarding cylinders driven at the same surface speed as the printing couples, one of said intermediate cylinders being movably mounted adjacent to the impression cylinders of the couples so as to cause the web to cling to both sets of cylinders.

27. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, a plurality of intermediate web forwarding means driven at the same surface speed as the printing couples, said intermediate web forwarding means being located on the opposite side of the web from the impression cylinders of the couples and arranged adjacent to the impression cylinders so as to cause the web to cling to both sets of cylinders, and means for preventing offset on said intermediate cylinders.

28. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, and a plurality of intermediate web forwarding means driven at the same surface speed as the printing couples, said intermediate web forwarding means being located on the opposite side of the web from the impression cylinders of the couples

and arranged adjacent to the impression cylinders so as to cause the web to cling to both sets of cylinders, said intermediate cylinders having ink repellent surfaces.

29. A rotary multicolor press including in combination a plurality of printing couples each having a single impression surface for each design surface, and a plurality of intermediate web forwarding means driven at the same surface speed as the printing couples, said intermediate web forwarding means being located on the opposite side of the web from the impression cylinders of the couples and arranged adjacent to the impression cylinders so as to cause the web to cling to both sets of cylinders, said intermediate cylinders having surfaces of a character to cause the web to adhere thereto.

30. A rotary multicolor press including in combination, a plurality of printing couples each having a single impression surface for each design surface, means for feeding a web constructed so that the web may be caused to pass smoothly into the press, and a plurality of web forwarding cylinders intermediate of and driven at the same surface speed as the printing couples, one of said intermediate cylinders being movably mounted adjacent to the impression cylinders of the couples so as to cause the web to cling to both sets of cylinders.

31. A rotary multicolor press including in combination, a plurality of printing couples, each having a single impression surface for

each design surface, means for feeding a web constructed so that the web may be caused to pass smoothly into the press, a plurality of web forwarding cylinders intermediate of and driven at the same surface speed as the printing couples, said intermediate cylinders being located on the opposite side of the web from the impression cylinders of the printing couples and so arranged with relation to the impression cylinders as to cause the web to cling to both sets of cylinders, and means preventing offset on the intermediate cylinders.

32. A rotary multicolor press including in combination, a plurality of printing couples, means for feeding a web constructed so that the web may be caused to pass smoothly into the press, a plurality of web forwarding cylinders intermediate of and driven at the same surface speed as the printing couples, said intermediate cylinders being located on the opposite side of the web from the impression cylinders of the printing couples and so arranged with relation to the impression cylinders as to cause the web to cling to both sets of cylinders, and means for moistening the surfaces of the intermediate cylinders.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GEORGE E. PANCOAST.

Witnesses:

WM. J. DOLAN,
EDWIN SEGER.