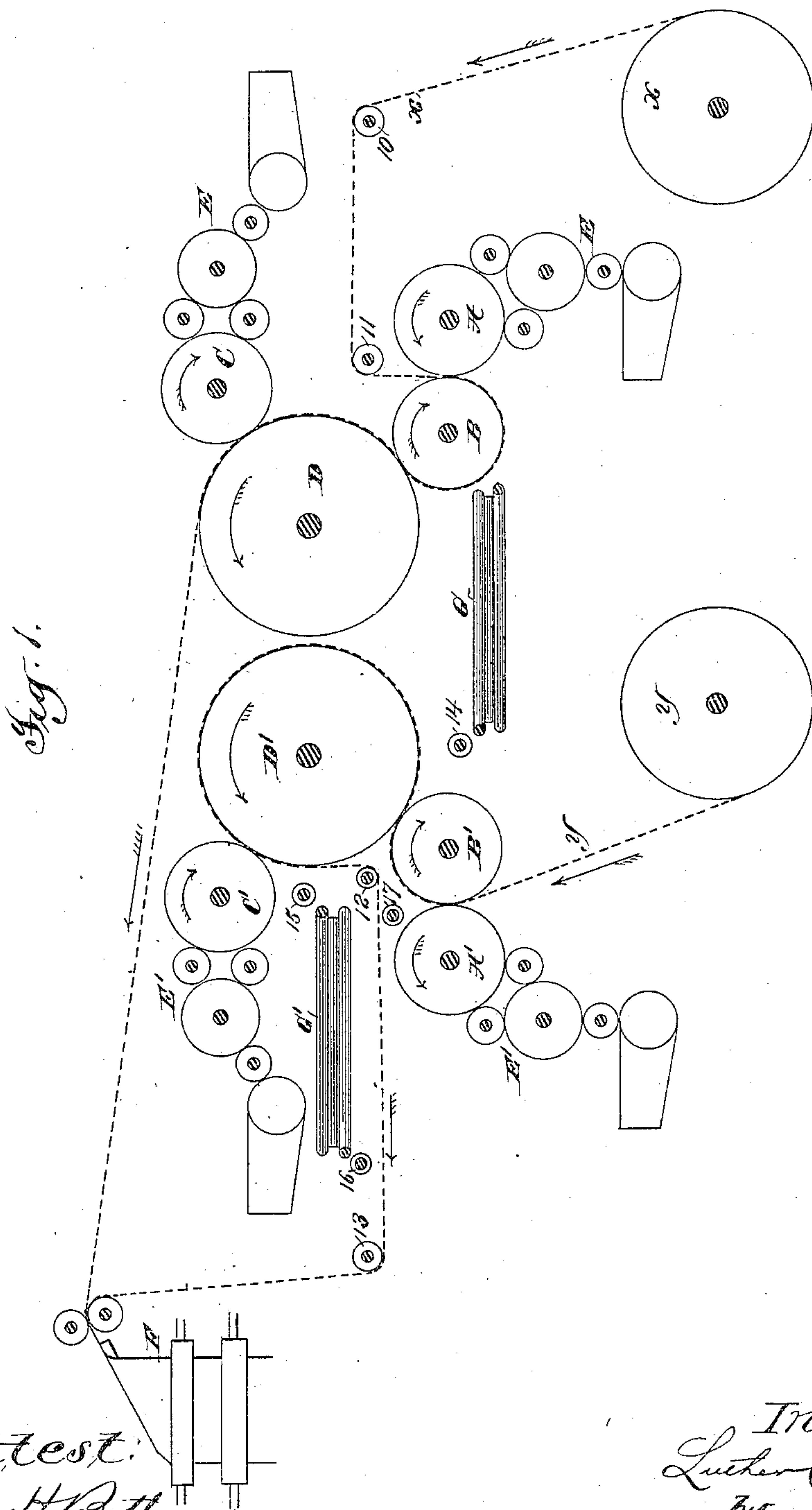


No. 836,669.

PATENTED NOV. 27, 1906.

L. C. CROWELL.  
WEB PRINTING MACHINE.  
APPLICATION FILED JUNE 13, 1892.

4 SHEETS—SHEET 1.



Attest:  
Geo H Potts,  
C. J. Sawyer

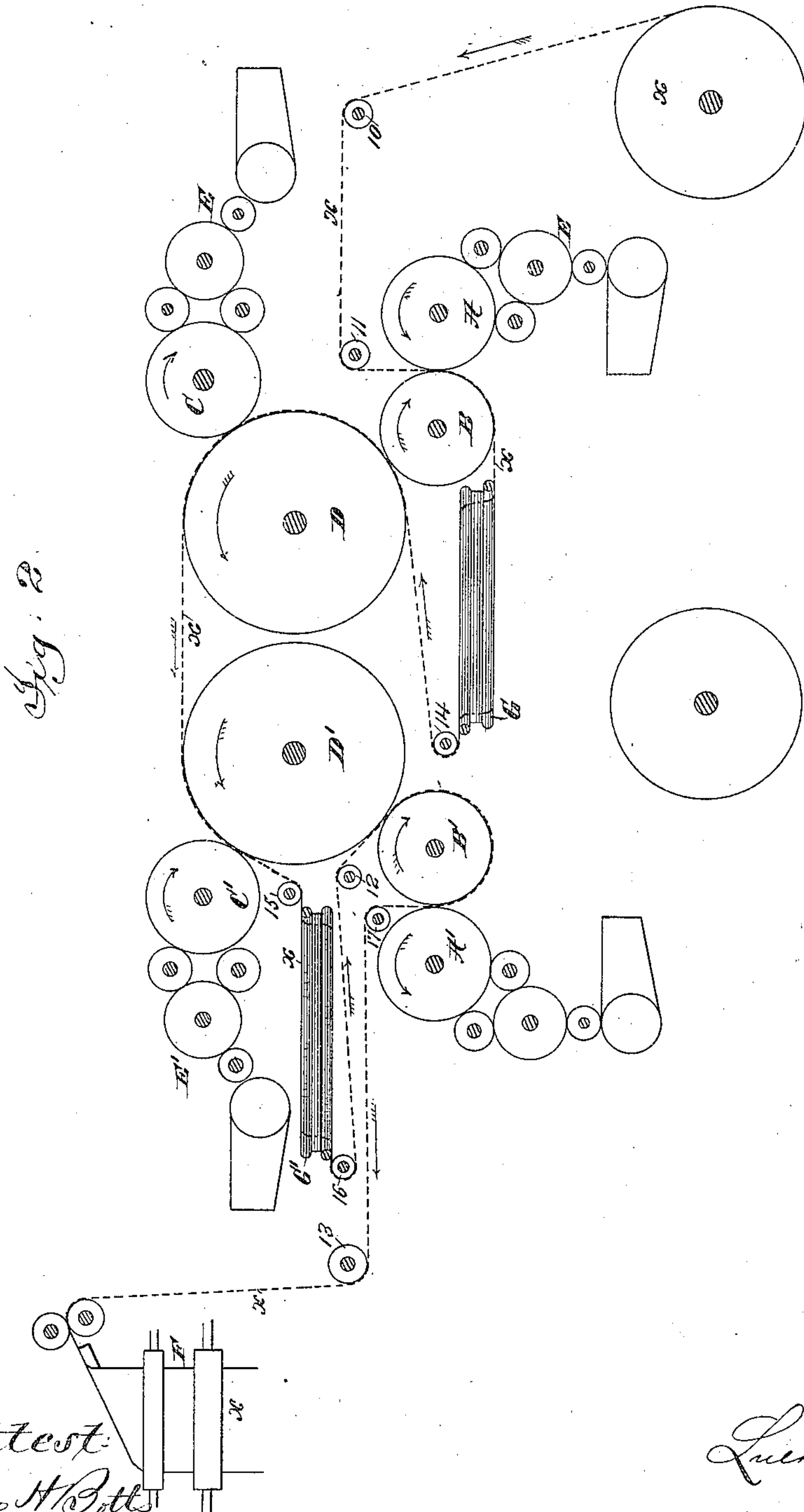
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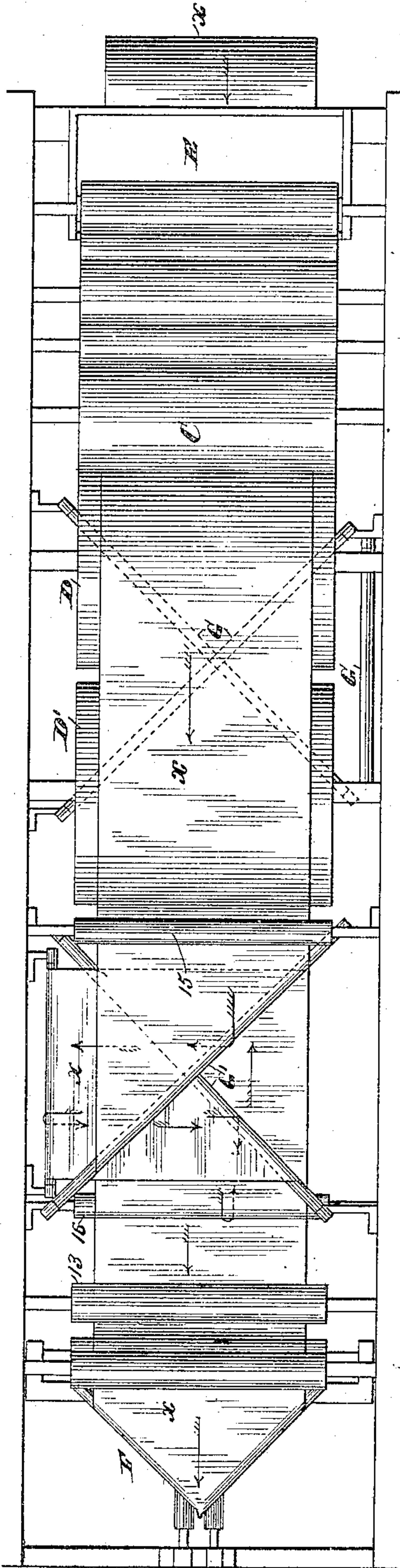
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4 SHEETS—SHEET 3.

*Fig. 3.*



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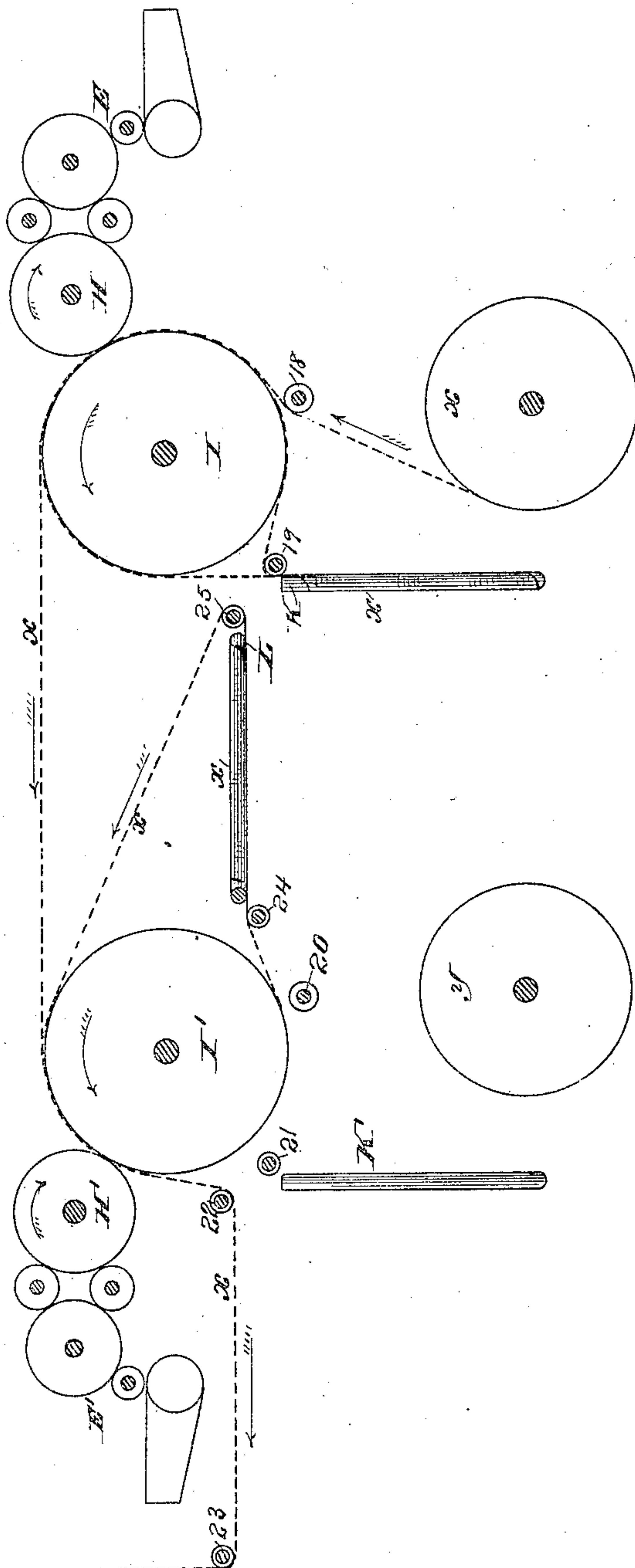
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4 SHEETS—SHEET 4.

*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, NEW YORK, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO ROBERT HOE AND CHARLES W. CARPENTER, OF NEW YORK, N. Y.

## WEB-PRINTING MACHINE.

No. 836,669.

Specification of Letters Patent.

Patented Nov. 27, 1906.

Application filed June 13, 1892. Serial No. 436,590.

*To all whom it may concern:*

Be it known that I, LUTHER C. CROWELL, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Web-Printing Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The web-printing machines heretofore constructed for multicolor-printing have been machines of special construction, either not capacitated to perfect a web or consisting of color-printing devices added to a web-perfecting mechanism, so that the full capacity of the printing-surfaces is not utilized in the usual work of web-perfecting. In newspaper-printing it is often desirable to print a paper or part of a paper in colors, while it is undesirable to further increase the size and complication of rapid web-printing machines by additional printing mechanisms for such color-printing, and the cost of such machines of high capacity and the extra floor-space required prevent the general use of separate color-printing machines. In all printing offices, moreover, in which multicolor-printing is ever desirable the advantages of a construction enabling such color-printing from printing mechanisms the full capacity of which is available for web-perfecting will readily be recognized.

The object of the present invention is to provide an improved construction of web-printing machines by which the full capacity of the printing devices may be utilized for web-perfecting or multiple impressions for color-printing be taken therefrom, and I attain this object by combining a plurality of web-printing mechanisms in such a manner that they may be used to print and perfect a plurality of webs or may coact in color-printing on a single web. While I claim such a combination broadly and my invention includes a construction in which a plurality of web printing and perfecting mechanisms are arranged to coact in printing multiple impressions on one or both sides of a web, it is desirable that the number of colors which may be applied upon the same side of the web be made as large as possible, and I prefer to combine with the plurality of web printing and perfecting mechanisms

thus arranged web-controlling devices, by which the web may be presented to some or all of the mechanisms in position to receive the second impression therefrom on the same side as the first, thus doubling the number of colors which may be applied on the same side of the web or securing the desirable product of a perfected web printed in many colors on one side only.

While all the features of my invention are included only in a construction employing a plurality of web printing and perfecting mechanisms combined with web-controlling devices for the purpose described, it will be seen that by my invention I provide also a single web printing and perfecting mechanism combined with web-controlling devices so as to print and perfect a web or to print two impressions upon the same side of the web, and I claim also as a part of my invention such a single web-printing mechanism.

It is evident that my invention may be applied in connection with web printing and perfecting mechanisms of any suitable form, that the web-controlling devices for guiding the web for the color-printing may be of any suitable construction, and that many different arrangements of the two may be made in accordance with the result required.

In the accompanying drawings, forming a part of this specification, I have shown for the purpose of illustration constructions embodying my invention as applied to two common forms of high-speed web-printing mechanisms, and from a description of these constructions the application of my invention in other constructions may readily be devised by those skilled in the art.

In the drawings, Figure 1 is a longitudinal sectional diagram taken inside the frame of a construction embodying my invention in the preferred form as applied in connection with web printing and perfecting mechanisms having two couples or pairs of type and impression cylinders and showing the course of the web in perfecting. Fig. 2 is a similar view showing the course of the web in printing four colors on one side. Fig. 3 is a plan view corresponding to Fig. 2 with one of the inking mechanisms removed to show the web-reverser. Fig. 4 is a view similar to Figs. 1 and 2, showing my invention as applied in the preferred form in connection with web-



printing and perfecting mechanisms consisting of a single couple or pair of type and impression cylinders and a web-turner and showing the course of the web in printing three colors on one side of a perfected web.

Referring now to Figs. 1 to 3, A B and C D are the two couples forming the first web printing and perfecting mechanism, and A' B' and C' D' the corresponding couples of the second web printing and perfecting mechanism, A C and A' C' being the respective type-cylinders provided with inking mechanisms. E E' of any suitable form. These web printing and perfecting mechanisms may be provided with separate deliveries, if desired, or may constitute each a separate machine, the web being led from one to the other in color-printing; but they are shown as forming a single two-web machine and having a common delivery F, which may be of any suitable form, that shown having the common longitudinal folder on which the two webs are associated. It will be seen that these two web printing and perfecting mechanisms are so arranged that the web perfected by the first mechanism may be led directly to the second mechanism and receive another impression on one or both sides, these two mechanisms thus coacting to print a single web in two colors, and it is evident that other web-printing mechanisms may be added arranged in a similar manner to perfect independent webs or to coact in color-printing on a single web, so that any desired number of colors may be obtained. It will be seen also that the couples A B and A' B' form a plurality or set of printing-couples arranged in the same horizontal planes, and the couples C D and C' D' form a plurality or set of printing-couples arranged in the same horizontal planes above the set of couples A B and A' B', all the cylinders of these two sets of printing-couples being parallel and lying in the same vertical planes transverse to the cylinders and the cylinders of each set of printing-couples rotating in the same direction, so that the different couples of each set act to advance a web in the same direction, and the sets being arranged so as to perfect simultaneously a plurality of webs running in the same vertical planes or print a single web in multiple impressions without reversing the direction of rotation of any of the couples, the lower set of printing-couples being adapted to print on the under side of a web passing through the couples of this set and the upper set of printing-couples on the upper side of a web passing through the couples of this set, so that the two sets of printing-couples print upon opposite sides of a web led through all the couples unless the web be reversed, while the conducting rolls or guides provide for leading a single web through all the couples of both sets to the delivery mechanism F, or a plurality of webs may be led through a part

of the couples of each set associated and led to the delivery mechanism. Thus with the web lead shown in Fig 2 if the web be not run through the web-reversers G G' it will be printed with two impressions on the under side by the couples A B and A' B' and with two impressions on the upper side by the couples C D and C' D'. While this organization forms a part of my invention, I prefer to combine with the web printing and perfecting mechanisms web-controlling devices by which the web may be presented to some or all of the mechanisms in position to receive the second impression on the same side as the first. In the drawings I have shown as combined with each of the web printing and perfecting mechanisms a web-reverser by which the web may be reversed before the second impression, and by this combination of two or more web printing and perfecting mechanisms of the form shown and two web-reversers, either or both of which may be used, I am able to secure a large variety of color-printed products.

The web-reversers G G' may be of any suitable construction adapted to reverse the web without transferring, so as to receive the second impression on the same side as the first. As shown, these web-turners are of a common form, consisting of three bars arranged to reverse the web without transferring, such a web-reverser being shown and fully described in my Patent No. 212,444, so as to need no further description here.

The lead of the webs or web is as follows: In perfecting two webs, as shown in Fig. 1, first web *x* is led around conducting-rolls 10 11 between the first type and impression cylinders A B, then around cylinder B and upward between the second type and impression cylinders C D, whence the perfected web passes to the delivery mechanism F. The second web *y* passes upward between the first type and impression cylinders A' B' of the second web printing and perfecting mechanism, then around second impression-cylinder D', and downward between the second type and impression cylinders C' D', whence the perfected web passes around conducting-rolls 12 13 to the delivery mechanism F, where it is associated with the first web *x*. In printing one side of the web in four colors, as shown in Figs. 2 and 3, the web *x* is led to the first type and impression cylinders A B, as in perfecting; then about the reverser G, by which it is reversed, then around the conducting-roll 14 to the second type and impression cylinders C D, where the web receives a second impression on the same side as the first, then between the cylinders C' D', receiving a third impression on the same side, then about the conducting-roll 15 and over the web-reverser G', by which the web is again reversed, then around the conducting-rolls 16 12 and upward between the



type and impression cylinders A' B', receiving a fourth impression on the same side, whence the web printed in four colors on one side passes over the conducting-rolls 17 13 to the delivery F. In printing three colors on one side and one on the other or three colors on one side of a perfected web the lead is the same as in printing four colors on one side, except that the web is not reversed by the reverser G, but is perfected by the cylinders C D, the result being three colors on the side perfected by the first mechanism. In printing two colors on each side it is evident that the web  $x$  is led directly through the two printing mechanisms, being perfected once by each mechanism, the lead through the second mechanism being downward between cylinders C' D', around cylinder D', and upward between cylinders A' B', as previously described, and by omitting one impression from the second mechanism the web may be printed in two colors on one side and one on the other.

It is evident that one of the web printing and perfecting mechanisms may be used without the other and with its web-reverser will form a web printing and perfecting mechanism which may be used to print and perfect a web or to print two colors on the same side of a web, and such a construction in itself forms a part of my invention independently of the combination of two or more such mechanisms.

It is evident that the web-controlling devices may readily be located as shown, so as not to interfere with the lead of the web in perfecting, thus enabling the construction to be used for web-perfecting or color-printing without other change than the lead of the web; but it will be understood that this is not absolutely essential and that my invention may be embodied in a construction in which the web-controlling devices must be removed or thrown out of position for web-perfecting.

In Fig. 4 I have shown my invention as applied in connection with two web printing and perfecting mechanisms of the class employing a single type and impression cylinder, at the opposite ends of which the web receives its first and second impressions, the web being reversed and transferred by a web-turner for the perfecting impression. In this construction the type and impression cylinders H I and turner K form the first web printing and perfecting mechanism and the corresponding parts H' I' K' the second such mechanism. Between the two impression-cylinders I I' is located a web-transfer L, which may be of any suitable form to transfer the web from one end of the cylinders to the other without reversing, but is preferably of the common form consisting of two parallel bars inclined to the path of the web. The lead of the web is as follows: In

perfecting the first web  $x$  is led about the conducting-roll 18, then between the cylinders H I at one end over conducting-roll 19 and the web-turner K, returning between the opposite ends of the cylinders H I, and thence to the delivery mechanism. The second web  $y$  is led around the conducting-roll 20 between the type and impression cylinders H' I' at one end, about the conducting-roll 21 and web-turner K', returning between the type and impression cylinders H' I' at their opposite ends, then around conducting-rolls 22 23 to the delivery mechanism, where it is associated with the first web. In printing three colors on one side and one on the other, as shown in Fig. 4, the web  $x$  is perfected by the first printing and perfecting mechanism, as just described, then led to the second mechanism and receives a second impression on the same side as the perfecting impression from the cylinders H' I', then passes around the cylinder I' and conducting-roll 24 to and over the web-transfer L, by which it is transferred without reversing, returning between the opposite ends of the cylinders H' I', over the conducting-roll 25, receiving a third impression on the same side, the web thus printed in three colors on one side and one on the other then passing over the conducting-rolls 22 23 to the delivery mechanism. In printing two colors on one side and two on the other the web  $x$  will be perfected by each printing mechanism, and the last impression of the second mechanism may be omitted for two colors on one side and one on the other. In printing four colors on one side the web  $x$  will be led between the type and impression cylinders H I at one end, then directly to the type and impression cylinders H' I', receiving a second impression on the same side at the same end of the cylinders, then over the web-transfer L and to the cylinders H I and H' I' again at the opposite end from the first and second impressions, receiving two more impressions on the same side, thence to the delivery mechanism. It is evident that in this construction also one of the printing and perfecting mechanisms may be used without the other one pair of the cylinders with turner K and transfer L forming a web printing and perfecting mechanism capacitated to print and perfect a web or to print the same side of the web in two colors.

Many other constructions embodying my invention may readily be devised by those skilled in the art, such constructions being varied in accordance with the result desired. It will be understood, therefore, that my invention is not limited to any of the special arrangements shown nor to the specific form of any of the printing and perfecting mechanisms or of the web-controlling devices combined therewith, but that the form and arrangements of the parts may be varied



widely without departing from my invention.

What I claim is—

1. The combination of two sets of printing-couples arranged one above the other with their cylinders parallel and lying in the same vertical planes transverse to the cylinders, the printing-couples of one set being arranged to print on one side and the printing-couples of the other set on the opposite side of a web, a delivery mechanism located at one end of the two sets, and means whereby a single web may be led through all the couples of both sets to the delivery mechanism, or a plurality of webs may be led through a part of the couples of each set, associated and led to the delivery mechanism, substantially as described.

2. The combination of two sets of printing-couples arranged one above the other with their cylinders parallel and lying in the same vertical planes transverse to the cylinders with the cylinders of each set rotating in the same direction, the printing-couples of one set being arranged to print on one side and the printing-couples of the other set on the opposite side of a web, and means whereby a single web may be led through all the couples of both sets or a plurality of webs may be led through a part of the couples of each set, substantially as described.

3. The combination of two sets of printing-couples arranged one above the other with their cylinders parallel and lying in the same vertical planes transverse to the cylinders with the cylinders of each set rotating in the same direction, the printing-couples of one set being arranged to print on one side and the printing-couples of the other set on the opposite side of a web, a delivery mechanism located at one end of the two sets, and means whereby a single web may be led through all the couples of both sets to the delivery mechanism or a plurality of webs may be led through a part of the couples of each set, associated and led to the delivery mechanism, substantially as described.

4. The combination with a plurality or set of printing-couples with their cylinders rotating in the same direction and adapted to print on the under side of a web, of a plurality or set of printing-couples arranged in the same horizontal planes above said first-mentioned couples with their cylinders rotating in the same direction and adapted to print on the upper side of a web led through all the couples, the cylinders of all the couples being parallel and lying in the same vertical planes transverse to the cylinders, and means whereby a single web may be led through all the couples of both sets or a plurality of webs may be led through a part of the couples of each set and in either case without reversing the direction of rotation of any of the couples, substantially as described.

5. The combination with a plurality or set of printing-couples with their cylinders rotating in the same direction and adapted to print on the under side of a web, of a plurality of printing-couples arranged in the same horizontal planes above said first-mentioned couples with their cylinders rotating in the same direction and adapted to print on the upper side of a web led through all the couples, the cylinders of all the couples being parallel and lying in the same vertical planes transverse to the cylinders, a delivery mechanism located at one end of the two sets, and means whereby a single web may be led through all the couples of both sets to the delivery mechanism, or a plurality of webs may be led through a part of the couples of each set, associated and led to the delivery mechanism, substantially as described.

6. The combination with a plurality of web printing and perfecting mechanisms capacitated to perfect a plurality of webs simultaneously and arranged to coact in printing a single web in multiple impressions, of web-controlling devices arranged to coact therewith so that the single web may be presented to one of the web printing and perfecting mechanisms in position to receive the two impressions of said web printing and perfecting mechanism on the same side of the web without reversal of the movement of the printing devices; substantially as described.

7. The combination with a plurality of web printing and perfecting mechanisms capacitated to perfect a plurality of webs simultaneously and arranged to coact in printing a single web in multiple impressions, of web-controlling devices arranged to coact therewith so that the single web may be presented to each or any of the web printing and perfecting mechanisms in position to receive on the same side of the web the two impressions of the web printing and perfecting mechanism or mechanisms to which the web is so presented without reversal of the movement of the printing devices, substantially as described.

8. The combination with a plurality of web printing and perfecting mechanisms arranged to perfect simultaneously a plurality of webs running in the same vertical planes and arranged for the lead of a single web to said mechanisms for printing a single web in multiple impressions without reversal of the printing devices, of web-controlling devices arranged to coact therewith so that the single web may be presented to one of the web printing and perfecting mechanisms in position to receive the two impressions of said web printing and perfecting mechanism on the same side of the web, substantially as described.

9. The combination with a plurality of web printing and perfecting mechanisms arranged to perfect simultaneously a plurality



of webs running in the same vertical planes and arranged for the lead of a single web to said mechanisms for printing a single web in multiple impressions without reversal of the printing devices, of web-controlling devices arranged to coact therewith so that the single web may be presented to each or any of the web printing and perfecting mechanisms in position to receive on the same side of the web, the two impressions of the web printing and perfecting mechanism or mechanisms to which the web is so presented, substantially as described.

10. The combination of a plurality of web printing and perfecting mechanisms capacitated to perfect simultaneously a plurality of webs each of the full width of the printing-cylinders, and means for directing a single web of full width to the respective mechanisms so that the single web may be printed with two impressions from each mechanism and with the two impressions of one or more of said mechanisms on the same side of the web without reversal of the movement of the printing devices, substantially as described.

11. The combination with a plurality of web printing and perfecting mechanisms each having two pairs of type and impression

cylinders, said mechanisms being capacitated to perfect a plurality of webs simultaneously or to coact in perfecting a single web in multiple impressions without reversal of the printing devices, of web-reversers coacting with each printing and perfecting mechanism, substantially as described.

12. The combination with a web printing and perfecting mechanism, of web-controlling devices coacting therewith to present the full-width web for a second impression on the same side as the first without reversal of the movement of the printing devices, substantially as described.

13. The combination with two pairs of type and impression cylinders forming a web printing and perfecting mechanism, of a web-reverser coacting therewith to present the web for another impression on the same side as the previous one without transferring the web, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LUTHER C. CROWELL.

Witnesses:

J. J. KENNEDY,  
C. J. SAWYER.