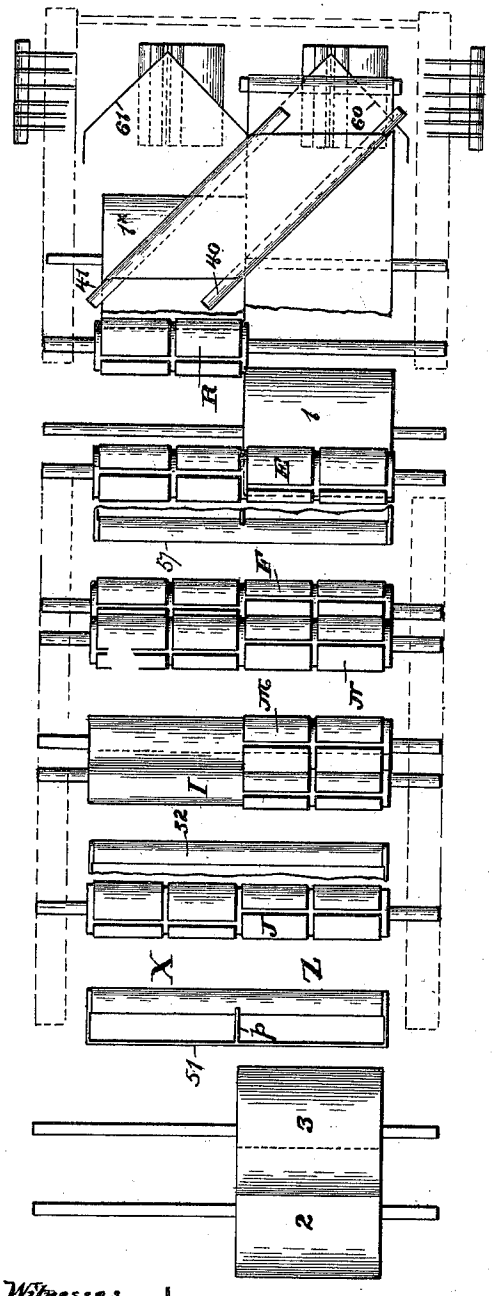
No. 627,311. Patented June 20, 1899.

W. SPALCKHAVER.

DUPLEX WEB PRINTING MECHANISM.

(Application filed Apr. 27, 1896.)

(No Model.)



Witnesses.
T. F. Kehoe.
A. V. Bourke.

Fig. 1.

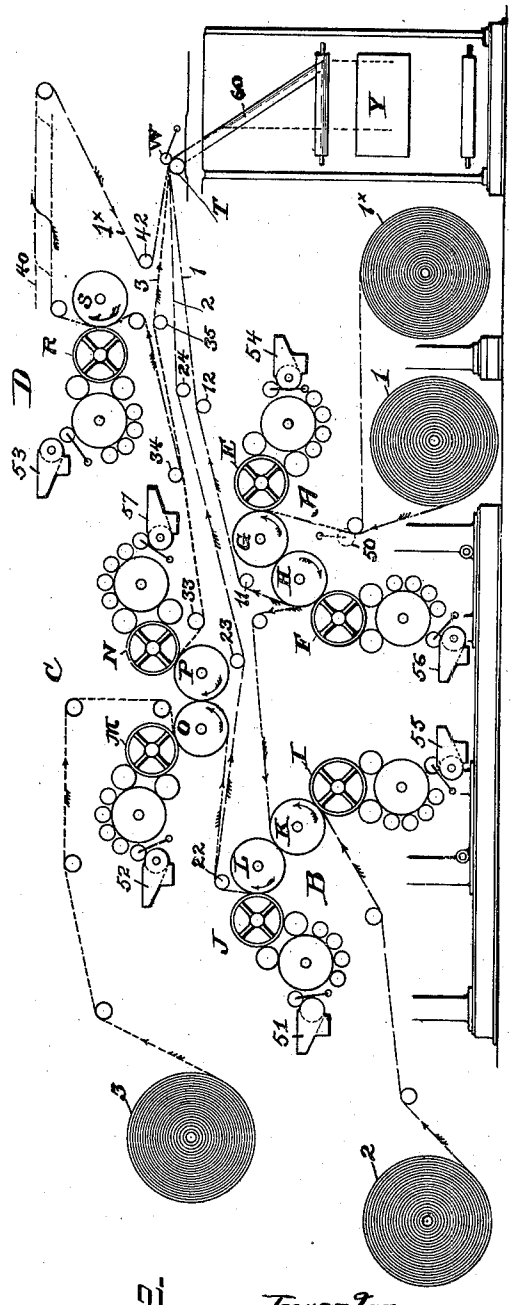


Fig. 2.

Inventor.
William Spalckhaver
By Philipp Munson & Philipp
Atty's

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM SPALCKHAVER, OF NEW YORK, N. Y., ASSIGNOR TO ROBERT HOE, THEODORE H. MEAD, AND CHARLES W. CARPENTER, OF SAME PLACE.

DUPLEX WEB-PRINTING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 627,311, dated June 20, 1899.

Application filed April 27, 1896. Serial No. 589,176. (No model.)

To all whom it may concern:

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

The object of this invention is the practical carrying out of the desirable and now requisite operations of performing by means of the same duplex printing-machines not only the perfection in black of a plurality of full-width webs, but the perfection of a plurality of narrow webs, one of which may be printed in three primary colors upon one side and receive its last impression in black from a key-plate in order to perfect the colored picture.

Machines as heretofore constructed for the printing of webs wholly in black or partially in black and partially in colors have required special constructions—that is to say, one or more of the printing mechanisms have had to be provided with means for reversal of their direction of rotation, or with web-transferrers, or with reversing mechanisms, or with both transferrers and reversers, and one or more of these special apparatuses have been requisite to cause the web to run in the proper relation to or direction with the printing mechanisms that said operations may be accomplished. By the provision of any or all of these special apparatuses the printing-machine is not only rendered complex and its use made difficult, but its cost is increased and desirable space is obstructed.

In color-printing it is necessary, as is well understood, that three primary colors shall be applied in order to produce by blending the same the desired tones in the chromatic picture, and that additionally, where the primary colors are thus superimposed, it is likewise so desirable that the impression in black from the key-plate, whereby expression is given to the picture, shall be made the last impression in the production of the final picture that it may be regarded as a requisite. Another requisite in a practical machine for printing webs independently in black and in color, as explained, is that not only shall their printing-couples revolve in the same direction for the application of the primary colors, but that the webs in both cases shall have short and direct runs, preferably in the same direction and without looping or inclosing any or all of the printing-couples, that waste of long printed portions of any web may not occur or the liability of breaking exist or the threading or rethreading of webs be obstructed. In order, therefore, to produce such a practical machine in which a plurality of both wide and narrow webs may be perfected in black and one of said narrow webs may be printed with the primary colors, as explained, the present invention consists in the combination, with duplex printing mechanism capacitated to perfect wide webs in black, of a single printing-couple of lesser length whereby the entire machine is capacitated not only to perfect narrow webs, but impart to one of them three primary colors and additionally perfect the picture by a final printing in black, so as to bring out the expression of the colored picture.

The invention also comprehends other combinations too fully hereinafter described and claimed to need preliminary explanation.

One embodiment of these improvements and a preferable one is herein illustrated by the accompanying drawings, in which—

Figure 1 is a plan view thereof, in which some of the parts are omitted to facilitate a ready comprehension of the structure of the entire machine; and Fig. 2 is a side elevation of the same, but additionally contains the parts omitted in Fig. 1.

As the direction of movement of the rotative parts of this machine will be readily understood by observing the indicating-arrows associated with each, the illustration of all gearing is omitted in order to render other parts perspicuous.

In the preferred embodiment of the invention herein shown there are three primary printing mechanisms, (designated, respectively, by A B C.) Each consists of two printing-couples composed, respectively, of a form and impression cylinder, said cylinders being of a length capacitating them to print a

double-wide web. The printing mechanism A thus has plate or form cylinders E F and impression-cylinders G H. The printing mechanism B thus has plate or form cylinders I J and impression-cylinders K L. The printing mechanism C thus has plate or form cylinders M N and impression-cylinders O P. These plate or form cylinders are respectively provided with suitable inking mechanisms, the fountains of which will be arranged to carry inks of the desired colors, as by providing them with suitable partitions *p* to so capacitate them, or they may be made independent structures for this purpose. Only the fountains belonging to two of these inking mechanisms are illustrated in Fig. 1, the others being omitted, so as to prevent obscuring the view of other parts. Thus the ink-fountain 51 is divided centrally by a partition *p* to enable it to carry in its opposite ends differing colors of ink. The ink-fountain 52 is shown without any division because it may not be required to carry more than one color of ink, as black. The ink-fountain 53, connected with the single web-printing mechanism, will be without division, as will the ink-fountain 54, and as may be the ink-fountain 55; but the ink-fountains 56 and 57 will be divided, so as to carry differing colors of ink.

Combined with the primary printing mechanisms A B C is an auxiliary printing mechanism D, located at the delivery end of the entire machine, which consists of a single printing-couple composed of a plate or form cylinder R and an impression-cylinder S, which are of a length suiting them to print upon one side of a narrow web, and its plate or form cylinder is provided with a suitable inking mechanism. All of the plate or form cylinders are adapted to be provided with printing plates or forms two pages in extent circumferentially, and said plate or form cylinders of the primary printing mechanisms are adapted to be provided with four plates lengthwise, while the plate or form cylinder of the auxiliary printing mechanism D is adapted to receive two plates lengthwise. The primary printing mechanisms A B C thus capacitated may each receive the forms for two pages circumferentially and four pages longitudinally, whereby each double set of printing-couples composing them are adapted to perfect a double-wide web or two side-by-side half-wide webs, whereby a variety of printed products, such as newspapers, may be perfected and delivered, and when double-wide rolls are used the same will be divided into two half-webs by the slitter W, mounted over a roller T, located near the longitudinal folders 60 61.

To attain the full capacity of the primary printing mechanisms, the plate or form cylinders thereof will be provided to their full capacity with sets of forms completely covering their surfaces, as is well understood.

That the run of the webs 1, 2, and 3 may be understood when the full capacity of the machine is used the same will be briefly explained, and for simplicity of description it will be assumed that these webs are double-wide webs divided into two narrow webs by the slitter W, and of course that all of the plate-cylinders will be provided to their fullest extent with plates—as, for example, like plate-cylinder J, as shown in Fig. 1, where some of the plates are omitted to aid in a later description of the printing of narrow webs. The web from roll 1 passes between the impression-cylinder G and form-cylinder E, being printed on its recto surface by the plate-cylinder E, thence passes around impression-cylinder H, between that cylinder and the plate-cylinder F, by which it is printed upon its verso side, and is thence directed out over guide-rollers 11 12 to the roll T and to the delivery mechanism. The web 2 is led between the impression-cylinder K and plate-cylinder I, by which it is printed upon its recto side, and thence around the impression-cylinder K and between the impression-cylinder L and the form or plate cylinder J, by which it is printed upon its verso side, and thence is directed over guide-rollers 22 23 24 to said roller T. The web 3 is directed between the impression-cylinder O and form or plate cylinder M, by which it is printed upon its recto side, and then is passed around the impression-cylinder O and between the impression-cylinder P and form or plate cylinder N, whereby it is printed upon its verso side, and is then directed out by guide-rollers 33 34 35 to said roller T. At the roller T these webs 1 2 3 are associated together by being superimposed in their passage over said roller and divided by the slitter W. The two three-ply groups descend, respectively, over the longitudinal folders 60 61, whereby they are longitudinally folded, and thence to a combined rotative folding and cutting mechanism, whereby they are transversely cut at points the length of a page apart to form sheets one page long and two pages wide and which are transversely folded centrally by a delivery mechanism of ordinary construction, one cylinder Y only of which is shown.

By the mechanisms thus far described, threaded with double-wide webs, as explained, the full capacity of the primary printing mechanism is in use and the greatest number of impressions capable of being made by the printing-couples A B C are delivered. The maximum product would be two side-by-side streams of perfected papers, each stream consisting of three four-page products, constituting twelve-page newspapers.

In order to produce a product consisting of a plurality of narrow webs one of which is printed upon one side with the three primary colors and without the use of transferrers or reversers or reversing any of the mechanisms in connection with the printing operation and by a straight run and without looping the mechanisms by the webs, the following dis-

positions are made: A double-wide roll mounted in the place of roll 1 and divided into two narrow webs by the operation of the slitter 50 will provide two of the narrow webs, or two narrow rolls as the equivalent thereof, one of which $1^{\times}$ is for illustrative purposes shown as set out of line with the roll 1 which will then be a narrow roll, as shown, will be used, and single-web rolls will be mounted in the positions of the rolls 2 and 3, as indicated in Fig. 1. To more readily understand the run of these webs thus disposed, the farther half of the printing mechanisms will be considered as the X side of the printing mechanisms and the nearer side of said mechanisms will be designated the Z side, and since the printing-plates on the X side of the plate-cylinders I M are unnecessary they may be omitted, as is indicated in Fig. 1. The narrow web from roll 1 will then be led to the printing-couples of the printing mechanisms A in precisely the same manner as was described with respect to the same when it was a wide web, said narrow web thus being perfected in black by the forms or plates on the Z ends of the cylinders E F. The narrow web 2 will also pass through the printing-couples of the printing mechanisms B and be perfected in black by the forms or plates on the Z ends of the cylinders I J in precisely the same manner as was described with respect to this web when it was of double width, and the web 3 will pass between the printing-couples of the printing mechanisms C and be perfected in black by the forms or plates on the Z ends of the cylinders M N in precisely the same manner as when its run was described when considered as a double-wide web.

This arrangement will, as is readily apparent, occupy the entire printing capacity of one-half on the Z side of the printing mechanisms, and the association and folding and delivery of the three superimposed narrow webs 1 2 3 will be the same as was described with respect to the nearest group of narrow webs when the same was split from wide webs, the product being twelve-page papers. Now in order to simultaneously use the other portions of these printing mechanisms on the X ends of the same and print the remaining narrow web $1^{\times}$ by not only perfecting it, but imparting to it the three primary colors, said web is led between the plate or form cylinder E and impression-cylinder G at the X ends thereof, thus receiving upon its recto side its first impression in black. It then passes around the impression-cylinder G and between the impression-cylinder H and plate or form cylinder F at the X ends thereof and receives its first impression on its verso side, say in yellow. It then passes to and between the impression-cylinder L and the plate or form cylinder J at the X ends thereof and receives its second impression on its verso side—say in red—and is then led between the impression-cylinder P and plate or form cylinder N at the X ends thereof and receives its third impression on its verso side—say in blue—and from thence it passes to and between the impression-cylinder S and plate or form cylinder R of the auxiliary or narrow printing mechanism, consisting of a single printing-couple, and receives its fourth or last impression from the key-plate in black on its verso side, and thus becomes not only a web perfected in black, but one having upon its verso side such a picture as may be produced from the three primary colors. Thus completed and requiring to be associated with the three other narrow webs perfected in black, it is passed around a lateral shifting or transferring device consisting, as shown, of two parallel angularly-arranged bars 41 40, from which it is directed around a roller 42 and over the roller T and is thus laid as the uppermost web on the three other narrow webs, the four being superimposed as a single group which is passed over the longitudinal folder 60 and thence to the transverse cutting and folding mechanisms, whereby the product is delivered complete, the same consisting of sixteen pages, the outermost pages of which will be printed in color. By omitting the narrow roll 1 the result will be twelve pages, the outermost of which will be printed in color.

By these improvements a machine capacitated to independently perfect a plurality of double-wide webs in black and to independently perfect a plurality of narrow webs one of which is printed upon one side with the primary colors is of the simplest construction in that it adds to the required number of printing-couples neither turning, transferring, or reversing devices for aiding in the accomplishment thereof and provides a straight short onward run of the webs in all cases and avoids any reversing of the direction of travel of any of the mechanisms in the production of both wide and narrow webs and enables the webs to pass through the mechanisms without looping any or all of them. If it is desired to run an offset web in connection with that portion of the impression-cylinders which are in use for the printing of a narrow web in color, the delivery and wind-up rollers therefor may be mounted where the roll $1^{\times}$ is shown, which, it will be remembered, is illustrated out of line with the spindle of the roll 1 merely for descriptive purposes. In that case the offset web may travel through the mechanisms on the X side of the machine by entering between the impression-cylinders G H and travel in contact with the impression-cylinders H, L, P, and S and thence to the wind-up roll.

If it is desired, the printing mechanism consisting of the single couple R S may be located between the printing mechanism A and the delivery mechanism, for the reason that the single web being printed in color travels on the X side of the machine and may be directed to the key-plate printing mechanism located as described, and return thence to the transferrer 41 40 for superimposition of the same upon the webs 1 2 3. Of course

the roll of paper $1^{\times}$ may be white or any color, and by omitting the plates on the X end of the roller E it would remain blank on one side.

What is claimed is—

1. The combination with a plurality of printing mechanisms adapted to perfect a plurality of wide webs, of a printing mechanism adapted to print a narrow web upon one side, said mechanisms being constructed and combined so that a plurality of wide webs may be perfected in black or a plurality of narrow webs may be perfected, one of which narrow webs may be printed on one side in black and on the other side with three colors and receive its last impression from the key-plate in black, substantially as described.

2. The combination with three printing mechanisms each consisting of two printing-couples and adapted to perfect three wide webs, of a printing mechanism consisting of a single printing-couple adapted to print an impression in black from the key-plate, said mechanisms being constructed and combined so that three wide webs may be perfected in black and four narrow webs may not only be perfected in black but one may additionally not only receive on one of its sides three impressions in color but receive its last impression thereon from the key-plate, substantially as described.

3. The combination with a plurality of printing mechanisms adapted to perfect a plurality of wide webs, and a printing mechanism adapted to print a narrow web upon one side, of a transferrer beyond the printing mechanisms, said printing mechanisms and transferrer being constructed and combined so that a plurality of wide webs may be perfected in black or a plurality of narrow webs may be perfected, one of which narrow webs may be printed on one side in black and on the other side with three colors and receive its last impression from the key-plate in black, and said webs are superimposed to form a single product, substantially as described.

4. The combination with three printing mechanisms each consisting of two printing-couples and adapted to perfect three wide webs and a printing mechanism consisting of a single printing-couple adapted to print an impression in black from the key-plate, of a transferrer, said printing mechanisms and transferrer being constructed and combined so that three webs may be perfected in black and four narrow webs may not only be perfected in black but one may additionally not only receive on one of its sides three impressions in color but the black impression from the key-plate will be the last impression received by it and said webs be superimposed to form a single product, substantially as described.

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

WILLIAM SPALCKHAVER.

Witnesses:

H. T. MUNSON,

A. L. KENT.