

No. 837,345.

PATENTED DEC. 4, 1906.

L. A. SCHMIDT.
PRINTING MACHINE.
APPLICATION FILED FEB. 16, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

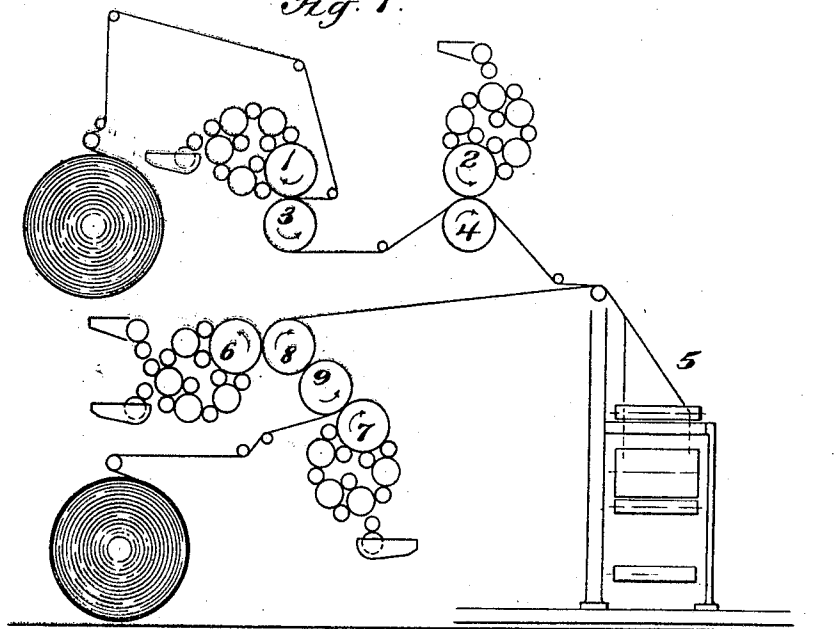
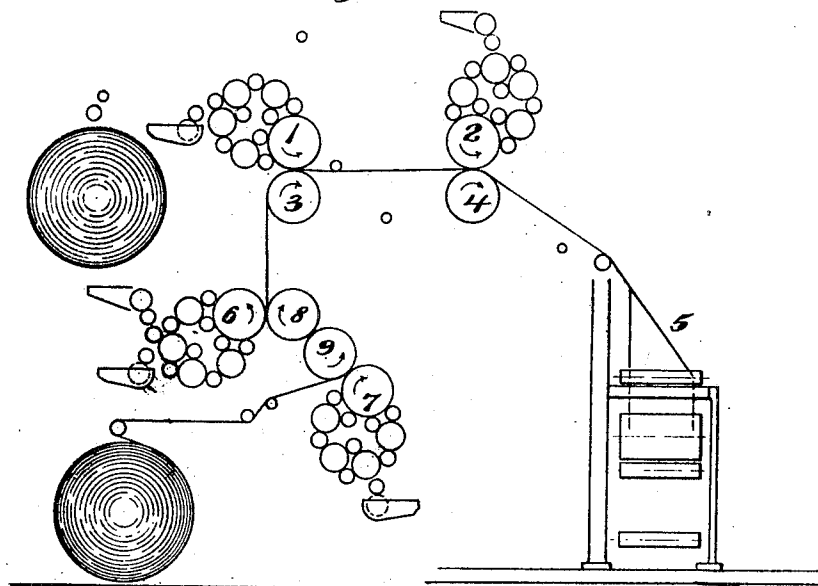


Fig. 2.



Attest:
A. White
J. H. Graves

Inventor:
Louis A. Schmidt
By his Atty:
Philip. Baum. Rice & Kennedy

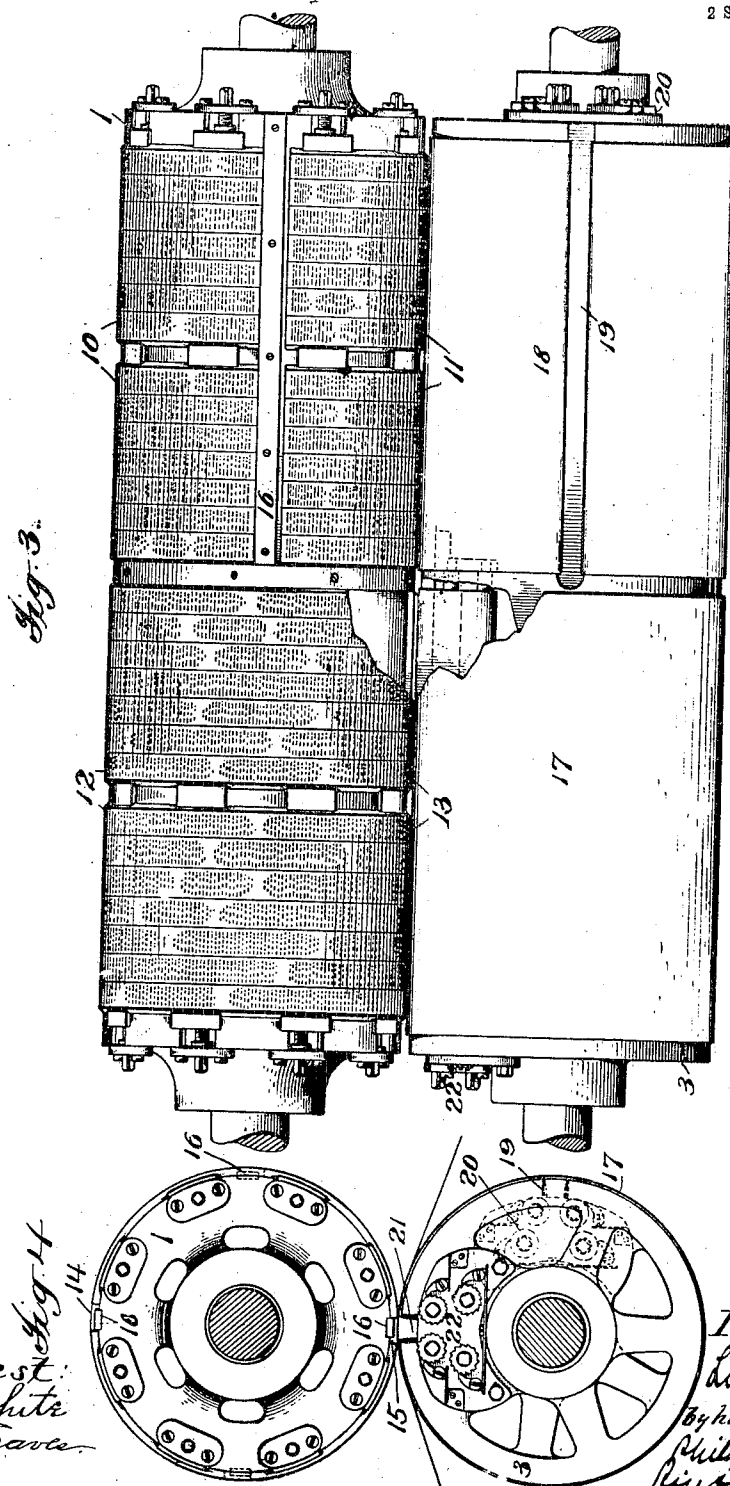
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Attest:
A. White
J. A. Grava.

Inventor
Louis A. Schmidt
By his Attys
Philip H. Hays
Rust & Kennedy

UNITED STATES PATENT OFFICE.

LOUIS A. SCHMIDT, OF NEW YORK, N. Y., ASSIGNOR TO ROBERT HOE, OF
NEW YORK, N. Y.

PRINTING-MACHINE.

No. 837,345.

Specification of Letters Patent.

Patented Dec. 4, 1906.

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To all whom it may concern:

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

This invention relates to improvements in printing-machines.

In the construction of modern printing machinery, and particularly in the construction of rotary machines having long cylinders which are adapted to carry plates or sets of plates arranged side by side, it has been found exceedingly advantageous to stagger the plates and to provide the impression-cylinders with correspondingly-staggered blanket-openings, this construction preventing jumping or knocking of the cylinders, for the reason that with staggered plates and openings some part of the unbroken surface of the printing-cylinder or the plates carried thereby is always running in contact with some unbroken part of the impression-cylinder or the blanket carried thereby. The amount of stagger ordinarily given the plates was from six to eight inches, this being sufficient to prevent the jumping or knocking which was liable to occur when the leading ends of the plates were in register and arrived at a gap or opening extending entirely across the cylinder.

The requirements of modern printing machinery have rendered it desirable to employ in printing - machines one or more couples, the direction of rotation of which can be reversed, so that the material to be printed can be passed between the cylinders in opposite directions when occasion requires. The construction of a printing-couple of the staggered type above referred to presented, however, considerable difficulty when such a couple was to be reversed, for the reason that the impressions from what may be termed the "leading" side of a staggered cylinder when the cylinder was running in one direction became the rear impression when the cylinder was running in the opposite direction by an amount equal to double the amount of stagger. When, therefore, a staggered

couple was embodied together with other couples in a printing-machine, it became necessary to introduce special slitting mechanism into the machine and also to use compensating mechanism to increase or retard the length of travel of one or both portions of the web when one of the couples was reversed in order to bring the impressions of the several couples into proper relation to each other.

The difficulties in the way of employing staggered couples in the manner referred to led to the production of a printing-couple having two impression-cylinders provided with differently-staggered blanket-openings, one of these cylinders coöperating with the printing-cylinder when that cylinder was running in one direction and the other coöperating with the cylinder when it was running in the opposite direction, the form-cylinder being also arranged so that the stagger could be shifted—i. e., so that the plates on either side of the cylinder could run in the lead, according as the cylinder rotated in one direction or the other. While this form of couple has been used to a considerable extent, it is expensive in that it requires the introduction into the machine of an additional cylinder and the necessary mechanism for operating it. Further, this type of couple required a special construction of certain of the plate-holding devices, such as margin-bars, so as to enable the position of the plates to be shifted when the direction of rotation of the cylinder was reversed.

The use of impression-cylinders constructed in two parts, one of the parts being rotatable axially with relation to the other, so that the position of the blanket-openings could be shifted when the couple was reversed, has also been suggested. The construction of such a cylinder, however, involves certain practical difficulties and, further, requires the use therewith of form-cylinders having the shiftable plate-retaining devices before referred to as being used with the double-impression-cylinder type of couple.

It is the object of this invention to produce a simple and effective construction of reversible couple for use in printing-machines, said couple consisting of two cylinders, the arrangement being such that no adjustment

of one part of the impression-cylinder with respect to the other part is necessary when the couple is reversed and the necessity for employing shiftable plate-retaining devices is done away with.

With this and other objects in view the invention consists in certain constructions and in certain parts, improvements, and combinations, as will be hereinafter fully described and then specifically pointed out.

Referring to the drawings, Figure 1 represents diagrammatically two sets of printing and perfecting couples arranged to deliver printed webs to a folder, one of the couples being a reversible couple. Fig. 2 represents the couples illustrated in Fig. 1 as printing upon a single web to produce color impressions, the direction of rotation of one of the couples being changed. Fig. 3 is an enlarged view illustrating the construction of one of the couples. Fig. 4 is an end view of the construction illustrated in Fig. 3.

Referring to the drawings, a simple form of printing mechanism has been selected for the purpose of illustrating the invention, this mechanism embodying an upper deck of double-wide couples, the printing or form cylinders of these upper couples being indicated at 1 2 and the impression-cylinders at 3 4. These couples, as illustrated in Fig. 1, print and perfect a double-wide web, the web being delivered by proper guides to a longitudinal folder of ordinary construction, (indicated at 5.) The lower deck of double-wide couples includes two cylinders 6 7, having in cooperation therewith impression-cylinders 8 and 9, respectively. The lower deck of couples is, as shown in Fig. 1, also arranged to print and perfect a double-wide web, this web being delivered to the longitudinal folder 5 and being there associated and folded with the web printed and perfected by the upper deck of couples. All the couples are of the staggered type, and the couple 1 3, as illustrated, is reversible—that is, it is capacitated to be run in either direction.

In Fig. 2 the web printed by the upper deck of couples has been cut out and the web from the lower deck is shown as being printed and perfected by the couples 7 9 6 8, the couples 1 3 2 4 being employed to print additional colors on the web, the direction of rotation of the couple 1 3 being, as indicated by the arrows in Figs. 1 and 2, reversed.

It will be understood that in the ordinary machine employing staggered couples if the several couples are so arranged with relation to each other that the impressions produced on the webs come into proper register when the machine is arranged as in Fig. 1 the impressions produced by the couple corresponding to the couple 1 3, unless special provision be made therefor, will not fall in their proper places on the web with relation

to the impressions produced by the other couples, for the reason that with the ordinary staggered couples, as has been pointed out, the impressions produced by the leading set of plates, and which are therefore the leading impressions when the machine is arranged as in Fig. 1, become the rear impressions when the machine is arranged as in Fig. 2 by an amount equal to twice the stagger, this resulting, of course, from the staggering of the plates.

For the purpose of illustrating this invention in a simple form the cylinders are understood to be provided with four sets of plates, these plates being arranged as in the enlarged views, Figs. 3 and 4. Referring to these views, the cylinder 1 is provided with four sets of plates, two sets on each side. The sets on the right-hand side are marked 10 11 and the sets on the left-hand side 12 13. It may be here remarked that according to the ordinary mode of staggering plates on a cylinder the amount of the stagger—that is, the amount by which the leading end of one set of plates was in advance of the adjacent set—bore no relation whatever to the length, circumferentially considered, of the plate, but was an arbitrarily-selected distance. Under ordinary circumstances the amount of the stagger was determined solely with the idea of insuring that the leading end of the leading set of plates passed the opening in the blanket-cylinder and was in contact with the unbroken portion thereof before the leading end of the adjacent set of plates reached the opening in the blanket-cylinder. As has been before pointed out, the amount of stagger ordinarily given the plates was from six to eight inches, this being sufficient to prevent the jumping or knocking which was liable to occur when the leading ends of the plates were in register and arrived at a gap or opening extending entirely across the cylinder.

According to the present invention the amount of stagger bears a determined relation to what may be termed the "form-surface." The term "form-surface" as herein used is meant to include not only the length of the form, but the circumferential extent of the cylinder which is devoted to the establishment of a margin between the head and tail of a form, provided the form extends entirely around the cylinder or the tail of one form and the head of a succeeding form where two or more forms follow each other around the cylinder. The amount of stagger given the forms according to the present invention is one-half the circumferential length of a form-surface—that is to say, one-half the length of the form proper plus one-half the length of the means by which the margins referred to are established. Referring to Fig. 3 and assuming that the plates 10 are leading with respect to the plates 12, which

are adjacent to them, and the plates 11 with respect to the plates 13, the plates 10 are located in advance of the plates 12 a distance equal to one-half the length of the plates 12 plus one-half the width of the openings 14 15, which openings contain the margin-bars 16, by which the plates are spaced.

In the particular construction shown the impression-cylinder 3 is provided with blankets 17 18, the blanket 17 cooperating with the forms 12 13 and the blanket 18 cooperating with the forms 10 11. It is further provided with a blanket-opening 19, through which the blanket 18 passes to the usual straining and controlling devices, located inside the cylinder and indicated in dotted lines at 20 in Fig. 4. It is also provided with a blanket-opening 21, through which the blanket 17 passes to the usual straining and controlling devices 22, located inside the cylinder. These blanket-openings 19 and 21 are staggered to correspond with the stagger of the forms on the cylinder 1—that is to say, they are staggered by an amount equal to one-half a form-surface as the same has been previously defined in the specification.

Referring to the particular construction illustrated, it will be seen that with the machine arranged as in Fig. 1, and assuming the forms 10 11 on the cylinder 1 to be the leading forms and the corresponding forms on the cylinders of the other couples to be also the leading forms, the impressions on both webs will fall in proper relation or register to each other, so that when the webs are led over the former, it being understood that this former is, as is usual, double wide, and the usual splitter, (not shown) employed, two eight-page papers will be produced, with the pages produced by the sets of forms in proper register.

Fig. 2 shows an arrangement of the same machine in which instead of perfecting two webs a single web is printed and perfected in three colors. In order to effect this, the cylinders 1 3 have the direction of rotation reversed, as indicated by the arrows in Fig. 2. The web after being printed on the cylinders 7 9 and 6 8 is led to the cylinders 1 3. With the cylinders running in this direction the forms 10 11, which were before the leading forms, are now the rear forms, but they are in the rear by exactly the same amount they were before in the lead. The impressions produced by them will therefore fall on the web in the same relative position with respect to the impressions produced by the other forms that they did when the cylinders were turning in the opposite direction. In other words, because the lead of the plates on one side of the cylinder is always equal to one-half the "form-surface," as this term has been defined in this specification, the impressions produced by the forms 10 11 on the cylinder

which happens to be reversed will always fall in proper register with the impressions produced by the forms 10 11 on the other cylinders and also in proper relation to the other forms on the other cylinders. It will be seen, therefore, that the necessity of employing in such cases the additional impression-cylinder heretofore usually employed and changing the stagger of the form-cylinder to correspond therewith is entirely done away with.

While the machine selected to illustrate the invention employs on each cylinder two sets of plates arranged side by side, it is obvious that the number of plates employed may be varied, the results being the same no matter what the number of plates is.

What is claimed is—

1. The combination with a printing-couple, of a second rotary couple, the cylinders whereof may be run in either direction, the printing-cylinder of said couple being provided with devices for retaining forms thereon side by side, said devices being arranged so that adjacent form-surfaces on said cylinder may be staggered by an amount equal to one-half the circumferential length of a form-surface, whereby the couple may be run in either direction without changing the position of the retaining devices.

2. The combination with a rotary printing-couple, of a second rotary couple, the cylinders whereof may be run in either direction, the printing-cylinders of the couples being provided with devices for retaining forms thereon side by side, said devices being arranged so that adjacent form-surfaces may be staggered by an amount equal to one-half the circumferential length of a form-surface, and the impression-cylinder being provided with blankets arranged side by side, the blanket-openings being staggered by an amount equal to one-half the circumferential length of a form-surface.

3. The combination with a printing-couple, of a second rotary printing-couple, the cylinders whereof may be run in either direction, the printing-cylinder of said couple being provided with a plurality of forms arranged side by side, adjacent forms being staggered by an amount equal to one-half the circumferential length of a form-surface.

4. The combination with a printing-couple, of a second rotary printing-couple, the cylinders whereof may run in either direction, the printing-cylinder of said couple being provided with a plurality of forms arranged side by side, adjacent forms being staggered by an amount equal to one-half the circumferential extent of a form-surface, and the impression-cylinder being provided with blankets arranged side by side, the blanket-openings being staggered by an amount equal to one-half the circumferential extent of a form-surface.

5. The combination with a printing-cylinder constructed to carry staggered forms arranged side by side, of an impression-cylinder provided with blanket-openings said openings being staggered by an amount equal to one-half the circumferential length of a form-surface.

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

LOUIS A. SCHMIDT.

Witnesses:

F. W. H. CRANE,
LOUIS ROEHM.