No. 770,488. PATENTED SEPT. 20, 1904

J. WHITE.

PRINTING MACHINE.

APPLICATION FILED NOV. 28, 1903.

NO MODEL.

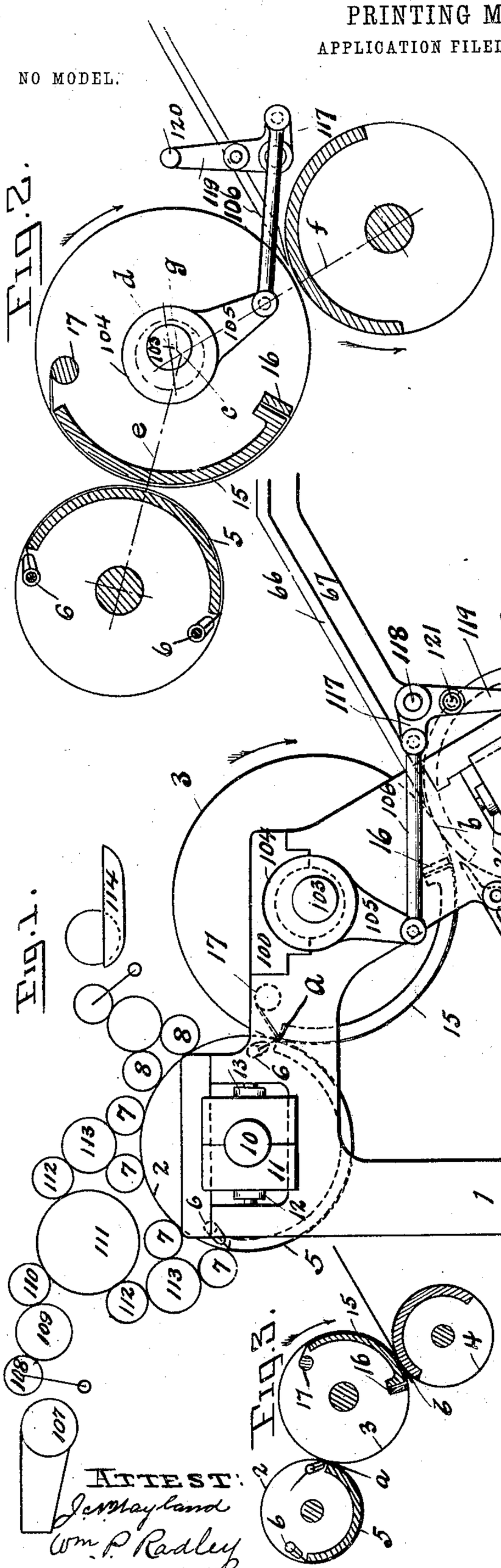

Fig. 1.

Fig. 2.

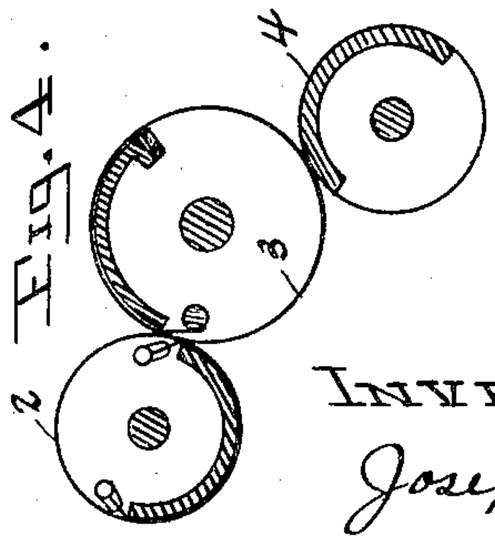

Fig. 4.

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No. 770,488. Patented September 20, 1904.

UNITED STATES PATENT OFFICE.

JOSEPH WHITE, OF NEW YORK, N. Y.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 770,488, dated September 20, 1904.

Application filed November 28, 1903. Serial No. 183,015. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH WHITE, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Printing-Machines, fully described and shown in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to that class of printing-machines in which the product receives the design indirectly from the form through the agency of a transfer-surface. This principle is of especial value where the material to be printed upon is a hard unyielding surface—such, for instance, as a sheet of tin or glass or similar substance.

The invention has for its object the production of a rotary machine for printing of this character where simplicity and compactness of the parts and simplicity of mechanical operations are of primary consideration, a machine in which the cylinders which operate to produce the printed sheet are so proportioned that an efficient inking is simply accomplished, and as I have found that it is desirable in the style of machine which I introduce in this invention to arrange the cylinders so as to be readily separable for the necessary purposes such an arrangement also forms part of this invention. To illustrate these and other points which fall within the scope of the invention, I have chosen as a preferred form a machine in which the form, transfer, and impression surfaces are each formed upon a continuously-running cylinder, and the cylinder having the transfer-surface is one and one-half times the diameter of the form and impression cylinders.

Referring to the drawings, Figure 1 is an elevation showing so much of a printing-machine as is necessary to illustrate the invention. Fig. 2 is a view showing the tripping mechanism with the cylinders separated. Fig. 3 is a diagrammatic view of cylinders in another position. Fig. 4 is a similar view showing the cylinders in a third position.

The frames 1 of the machine support the bearings for form-cylinder 2, transfer-cylinder 3, and impression-cylinder 4. The shaft 10 of the form-cylinder 2 is mounted in the boxes 11, supported on ways in the side frames and are adjusted by means of the impression-screws 12 and 13. This adjustment is for the purpose of regulating the printing pressure between the form and transfer cylinders. The shaft 24 of the impression-cylinder 4 is mounted in the boxes 25, supported in ways in the side frames and are adjusted by means of impression-screws 26 27. This adjustment is for the purpose of regulating the printing pressure between the transfer and impression cylinders. The form, transfer, and impression cylinders have each mounted upon their shafts and fastened thereto a gear whose pitch-diameter coincides with the periphery of the cylinder. These gears intermesh and form the driving means for the cylinders. The source of power is from the usual pulley-shaft, which is connected to the cylinder-gears by a compound gear-train. As these are common forms of construction and well known in the art, they are not shown.

While any of the various kinds of form or design surfaces used in the art of printing may be employed in the machine, the preferred form is a flexible metal plate of aluminium or zinc 5, which is shown stretched over the impression-cylinder by means of the clamps 6, which are fastened to each end of it.

In planographic printing where an aluminium plate is employed the plate is first dampened by water-rollers and then inked by inking-rollers. Any suitable method for manipulating these rollers may be employed, and as the mechanisms for producing the desired motions for said rollers are well known in the art and as such mechanisms do not form part of this invention these rollers are shown diagrammatically.

The efficiency of an inking mechanism consists, primarily, of the number of rollers which come in contact with the form and ink it at each impression. The source of ink-supply, as here shown, consists of an ink-fountain 107, from which ink is taken by supply-roller 108, which deposits it on distributing-roller 109, which through intermediate distributing-rollers 110 111 112 113 gives a well-distributed supply to form-rollers 7.

The water distribution is from fountain 114 to water form-rollers 8, as can be seen by referring to Fig. 1.

It will be seen that while the efficiency of inking is increased by increasing the number of rollers the machine is rendered cumbersome and harder to manage because of the multiplicity of parts, especially where a small form-cylinder is utilized; but by causing the form-cylinder to make a plurality of revolutions to each impression this difficulty is obviated and the efficiency of inking is maintained, as one roller will ink the form just as efficiently with two rollers as two rollers will ink it with one rolling. In the machine illustrated the form-cylinder makes three revolutions to each impression, thus producing an equivalent of twelve form-rollers. When the form has been inked three times in the manner described, it comes in printing relation with the transfer-surface 15 of the cylinder 3. This transfer-surface is preferably formed on a yielding substance and in the machine shown consists of a rubber blanket stretched on the segmental surface of the cylinder 3, one end of which is held to the surface by the clamping-bar 16 and the other end by the reel-rod 17.

It will be readily seen that by proportioning the cylinders described three to one the form-surface would contact with the impression-surface once at every third revolution; but an object of this invention is to accomplish this result without making the transfer-cylinder so unnecessarily large. It can also be understood that by moving the transfer-cylinder into contact with the form-cylinder only at each third revolution of the form-cylinder the inking result desired would be accomplished; but by employing the principles involved in this invention the need of mechanism for moving the transfer-cylinder into contact with the form-cylinder at each third revolution is avoided, and a firmer more rigid machine is made possible. Referring to the drawings, it will be seen that I accomplish this result by so proportioning the cylinders that a plurality of revolutions of both form and transfer cylinders is effected to each contact of the printing-surfaces, the ratio in the form of construction shown being two to three. The form-surface occupies slightly less than one-half of the circumference of the form-cylinder. The transfer-surface which coacts with it is of the same length as the form-surface; but as it is formed upon a cylinder one and one-half times as large as the form-cylinder it occupies slightly less than one-third of the transfer-cylinder.

Referring to Fig. 1, it will be seen that the act of transferring the design from the form-surface to the impression-surface is about to be effected—that is, the head of the form-surface is in contact with the head of the transfer-surface. Fig. 3 shows the position when the form-cylinder has completed one revolution. In this case the transfer-cylinder has made two-thirds of a revolution; but it can be seen that the form and transfer surfaces are out of printing relation to each other during the second revolution of the form-cylinder. Fig. 4 shows the relation of the printing-surfaces when the form-cylinder has completed its second revolution. The transfer-cylinder has now made one and one-third revolutions, and it can be seen that the surfaces are out of printing relation during the second revolution of the form-cylinder. In the next revolution of the form-cylinder the transfer-cylinder will make two-thirds of a revolution, bringing the parts to the position shown in Fig. 1, when the operation of printing will be effected, thus completing the cycle of movement. Thus it will be seen that although both form and impression surfaces have passed the printing-point at *a* a plurality of times they have not passed this point at the same time, and so have not come in printing relation with one another, or, in other words, a plurality of revolutions of both cylinders is effected with but one printing contact, and this is done without changing the diametral relation of the cylinders.

It will be seen by referring to the drawings that the relation between the impression-cylinder 4 and the transfer-cylinder 3 is precisely the same as the relation between the plate-cylinder and the transfer-cylinder, and for the same reasons given it is obvious that but one impression will be taken during the plurality of movements of these cylinders. In Fig. 1, where the form and transfer cylinders are about to come into printing relation, the transfer which is about to be imparted to transfer-blanket 15 on the transfer-cylinder 3 will in its forward movement on the same revolution come in printing relation with impression-cylinder 4 and at the point *b* impart its design to the sheet fed between the cylinders, as shown in Fig. 3. During the next revolution the relation will be as in Fig. 4, and returning to Fig. 1 the cycle of operations is completed. It will be seen that while each of the cylinders has made a plurality of revolutions they have come into printing relation at the impression-taking point *b* but once during the cycle.

While the proportions of the cylinders shown is desirable for the purposes mentioned and will be preferably employed, other proportions under certain conditions might be used. With these and other contemplated arrangements the essential features of this invention would still be maintained.

I have found that in the class of machines shown it is highly essential that the form-cylinder be so arranged as to be readily accessible and that it is desirable to separate the transfer-cylinder from the form-cylinder and also to throw the transfer-cylinders out

of printing contact with the impression-cylinder at times. While this may be accomplished in various ways, I have in the machine illustrated arranged these cylinders in such a way that by effecting a diametral movement of the transfer-cylinder alone, all three cylinders are thrown out of printing relation. Referring to Fig. 2, point *c* represents the position of its diameter when the transfer-cylinder is in printing relation with its coacting cylinders and point *d* the position to which it is moved up out of printing relation with the coacting cylinders. The lines *e* and *f* are diagrammatic lines connecting the centers of the cylinders when in printing relation. It will be seen by inspection that the arc *g*, indicating the eccentric movement of the diametral center of the transfer-cylinder, curves in a direction which is generally away from both impression and plate cylinders. Therefore when this eccentric movement of the diametral center from *c* to *d* is accomplished the transfer-cylinder is out of printing relation with both these cylinders. The means by which this is accomplished may be widely varied; but, as shown, the transfer-cylinder shaft 103 is mounted at both ends in the eccentric bearings 104, which in turn are mounted in the frame 1 and the frame-caps 100. These bearings have arms 105 projecting from flanges on the outside of the frame 1, and upon these arms are pivotally mounted links 106, which in turn are pivotally mounted on arms 117, which are fast to the shaft 118, which finds its bearings in the feed-board stand 67. This shaft 118 passes across the machine, and the mechanism described is duplicated on the other side. On the front of the machine, as shown, the arm 117 is part of a bell-crank lever consisting of this arm 117 and another arm 119, on the end of which is secured the handle 120. This arm also carries pin 121, which passes through the arm into a hole in the feed-board stand 67, thus securing the mechanism described in the position shown in Fig. 1. When it is found desirable to trip the cylinder, the operator moves the handle 120 to the position shown in Fig. 2, by which movement through the mechanism just described the cylinders are thrown out of printing relation with each other. This arrangement for moving the transfer-cylinder may be varied widely. While the hand-operated means shown is very efficient in connection with the particular improvements for which I desire Letters Patent, under certain circumstances it might be desirable to employ an automatically-operated tripping mechanism. This could be readily accomplished by such a mechanism as described in my application Serial No. 142,973, and reference can be made to this application for such an automatic mechanism. While the cylinders are so positioned as to allow the three cylinders forming the printing combination to be separated by a movement of the transfer-cylinder, under certain circumstances—as, for instance, where it is desirable to place the three cylinders in line—it might be necessary to separate the cylinders by moving two cylinders, which would preferably be the transfer-cylinder and the impression-cylinder. This could readily be accomplished by placing the cylinder it is desired to move in eccentric bearings similar to the one described, and thus operate both cylinders with the agency of the handle 120 and connecting-links thereto, and such an arrangement falls within the scope of the principles set forth in this application.

The arrangement of the feed and delivery in the machine illustrated is similar to that in my application Serial No. 142,973, and reference can be had to such application for detailed description of its working, but herein it is sufficient to say that it consists of feed-board 66, upon which the sheet is placed to be properly adjusted for register to the printing-cylinders, and when printed upon by said cylinders passing between the transfer-cylinder 3 and the impression-cylinder 4 is deposited on the delivery-frame 64, from which it is transferred to the carrier 65, which passes the sheet to a place where it can readily be removed without interfering with the operation of the machine.

It will be seen by reference to the drawings that the arrangement of printing-cylinders and delivery is such as to result in a handy and accessible machine.

It is to be understood that this invention consists in correlated elements of a printing-machine, which when combined as illustrated and described produce in the preferred form a machine embracing the features of the invention; but some of the features described may be varied without radically modifying the arrangement and relation of parts shown and described, and it is to be understood that such variations are contemplated and are held to be within the scope of the following claims.

What I claim is—

1. In a printing-machine having a form-carrying cylinder, a transfer-cylinder and an impression-cylinder, means for separating the cylinders and holding them apart; thereby placing the transfer-cylinder out of printing relation with the form-cylinder and the impression-cylinder, substantially as described.

2. In a printing-machine having a form-carrying cylinder making a plurality of revolutions to each impression, a transfer-cylinder and impression-cylinder, means for separating the transfer-cylinder from both the form-cylinder and the impression-cylinder and holding them apart when desired, substantially as described.

3. In a printing-machine having a form-carrying cylinder making a plurality of revolutions to each impression, a transfer-cylinder,

and an impression-cylinder making a plurality of revolutions to each impression, means for separating the cylinders and holding them apart when desired, substantially as described.

4. In a printing-machine having a form-carrying cylinder, a transfer-cylinder and an impression-cylinder, said cylinders making a plurality of revolutions to each impression, means for separating the cylinders, substantially as described.

5. In a printing-machine having a form-carrying cylinder, a transfer-cylinder and impression-cylinder, means for effecting a diametral movement of the transfer-cylinder to place said cylinder out of printing relation with both form-cylinder and impression-cylinder, substantially as described.

6. In a printing-machine having a form-carrying cylinder making a plurality of revolutions to each impression, a transfer-cylinder and an impression-cylinder, means for effecting a diametral movement of the transfer-cylinder to place said cylinder out of printing relation with both form-cylinder and impression-cylinder, substantially as described.

7. In a printing-machine having a form-carrying cylinder making a plurality of revolutions to each impression, a transfer-cylinder, and an impression-cylinder making a plurality of revolutions to each impression, means for effecting a diametral movement of the transfer-cylinder to separate the cylinders, substantially as described.

8. In a printing-machine having a form-carrying cylinder, a transfer-cylinder and an impression-cylinder, said cylinders making a plurality of revolutions to each impression, means for effecting a diametral movement of the transfer-cylinder to separate the cylinders, substantially as described.

9. In a printing-machine having a form-carrying cylinder, a transfer-cylinder and an impression-cylinder, said form-carrying and transfer cylinders making a plurality of revolutions to one printing operation without changing the diametral relation of said cylinders, means for separating the cylinders, substantially as described.

10. In a printing-machine having a form-carrying cylinder, a transfer-cylinder and an impression-cylinder, each making a plurality of revolutions to one printing operation without changing the diametral relation of said cylinders, means for separating the cylinders, substantially as described.

11. In a printing-machine having a form-carrying cylinder, a transfer-cylinder and an impression-cylinder, each making a plurality of revolutions to one printing operation without changing the diametral relation of said cylinders, means for moving the transfer-cylinder to place the cylinders out of printing relation when desired, substantially as described.

12. In a printing-machine having a form-carrying cylinder, a transfer-cylinder and an impression-cylinder, each making a plurality of revolutions to one printing operation, means for moving the transfer-cylinder out of printing relation with the other two cylinders when desired, substantially as described.

13. In a printing-machine, the combination of a planographic form-carrying cylinder, ink and water rollers adjacent thereto, a transfer-cylinder having a yielding surface, an impression-cylinder, and means for separating the transfer-cylinder from both the form-cylinder and the impression-cylinder, substantially as described.

14. In a printing-machine, the combination of a planographic form-carrying cylinder, ink and water rollers adjacent thereto, a transfer-cylinder having a yielding surface, an impression-cylinder substantially beneath the transfer-cylinder, a feed-table on one side of the transfer and impression cylinders, a sheet-receiving device on the other side of said cylinders, and means for separating the transfer-cylinder from both the form-cylinder and the impression-cylinder, substantially as described.

15. In a printing-machine, the combination of a planographic form-carrying cylinder, ink and water rollers adjacent thereto, a transfer-cylinder having a yielding transfer-surface, an impression-cylinder, and means for moving the transfer-cylinder to place the transfer-cylinder out of printing relation with both the form-cylinder and the impression-cylinder, when desired, substantially as described.

16. In a printing-machine, the combination of a planographic form-carrying cylinder, ink and water rollers adjacent thereto, a transfer-cylinder having a yielding transfer-surface, an impression-cylinder substantially beneath the transfer-cylinder, a feed-table on one side of the transfer and impression cylinders, a sheet-receiving device on the other side of said cylinders, and means for moving the transfer-cylinder to place the transfer-cylinder out of printing relation with both form-cylinder and the impression-cylinder, when desired, substantially as described.

17. In a printing-machine, the combination of a planographic form-carrying cylinder making a plurality of revolutions to each impression, ink and water rollers adjacent thereto, a transfer-cylinder having a yielding transfer-surface, an impression-cylinder substantially beneath the transfer-cylinder, a feed-table on one side of the transfer and impression cylinders, a sheet-receiving device on the other side of said cylinders, and means for separating the cylinders, substantially as described.

18. In a printing-machine, the combination of a planographic form-carrying cylinder making a plurality of revolutions to each impression, ink and water rollers adjacent thereto, a transfer-cylinder having a yielding trans-

fer-surface, an impression-cylinder substantially beneath the transfer-cylinder, a feed-table on one side of the transfer and impression cylinders, a sheet-receiving device on the other side of said cylinders, and means for moving the transfer-cylinder in order to separate the cylinders, substantially as described.

19. In a printing-machine, the combination of a planographic form-carrying cylinder, ink and water rollers adjacent thereto, a transfer-cylinder having a yielding transfer-surface, an impression-cylinder substantially beneath the transfer-cylinder, said form-carrying, transfer and impression cylinders each making a plurality of revolutions to one printing operation without altering the diametral relation of the cylinders, a feed-table on one side of the transfer and impression cylinders, a sheet-receiving device on the other side of said cylinders, and means for separating the cylinders, substantially as described.

20. In a printing-machine, the combination of a planographic form-carrying cylinder, ink and water rollers adjacent thereto, a transfer-cylinder having a yielding transfer-surface, an impression-cylinder substantially beneath the transfer-cylinder, said form-carrying, transfer and impression cylinders each making a plurality of revolutions to one printing operation without altering the diametral relation of the cylinders, a feed-table on one side of the transfer and impression cylinders, a sheet-receiving device on the other side of said cylinders, and means for moving the transfer-cylinder in order to separate the cylinders, substantially as described.

21. In a printing-machine, having a form-carrying cylinder, a transfer-cylinder and an impression-cylinder, said transfer-cylinder being eccentrically mounted, means for operating the eccentric bearing to move the transfer-cylinder out of printing relation with both the form-cylinder and the impression-cylinder, substantially as described.

22. In a printing-machine having a form-carrying cylinder, a transfer-cylinder and an impression-cylinder, said form-carrying cylinder and impression-cylinder being mounted in adjustable bearings for impression-regulating purposes and the transfer-cylinder being mounted in movable bearings for separating the transfer-cylinder from both the form-cylinder and the impression-cylinder, substantially as described.

23. In a printing-machine having a planographic form-carrying cylinder, the form consisting of a metal sheet, clamps for holding said sheet to the cylinder, a transfer-cylinder having a yielding blanket and straining devices for said blanket, and an impression-cylinder, means for moving the transfer-cylinder to place the transfer-cylinder out of printing relation with both form-cylinder and the impression-cylinder, substantially as described.

24. In a printing-machine having a planographic form-carrying cylinder, the form consisting of a metal sheet, clamps for holding said sheet to the cylinder, a transfer-cylinder having a yielding blanket and straining devices for said blanket, and an impression-cylinder, said form-carrying and impression cylinders being mounted in adjustable cylinder-boxes for impression-regulating purposes, and the transfer-cylinder being mounted in eccentric bearings, and having connections to said bearings to move the bearings to place the transfer-cylinder out of printing relation with both form-cylinder and impression-cylinder, when desired, substantially as described.

25. In a printing-machine, the combination of a form-carrying cylinder, a transfer-cylinder and an impression-cylinder; said form-carrying cylinder and transfer-cylinder each making a plurality of revolutions to one printing operation without changing the diametral relation of said cylinders, substantially as described.

26. In a printing-machine, the combination of a form-carrying cylinder, a transfer-cylinder and an impression-cylinder, each making a plurality of revolutions to one printing operation without changing the diametral relation of said cylinders, substantially as described.

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

JOSEPH WHITE.

Witnesses:
J. N. WAYLAND,
WM. P. RADLEY.