

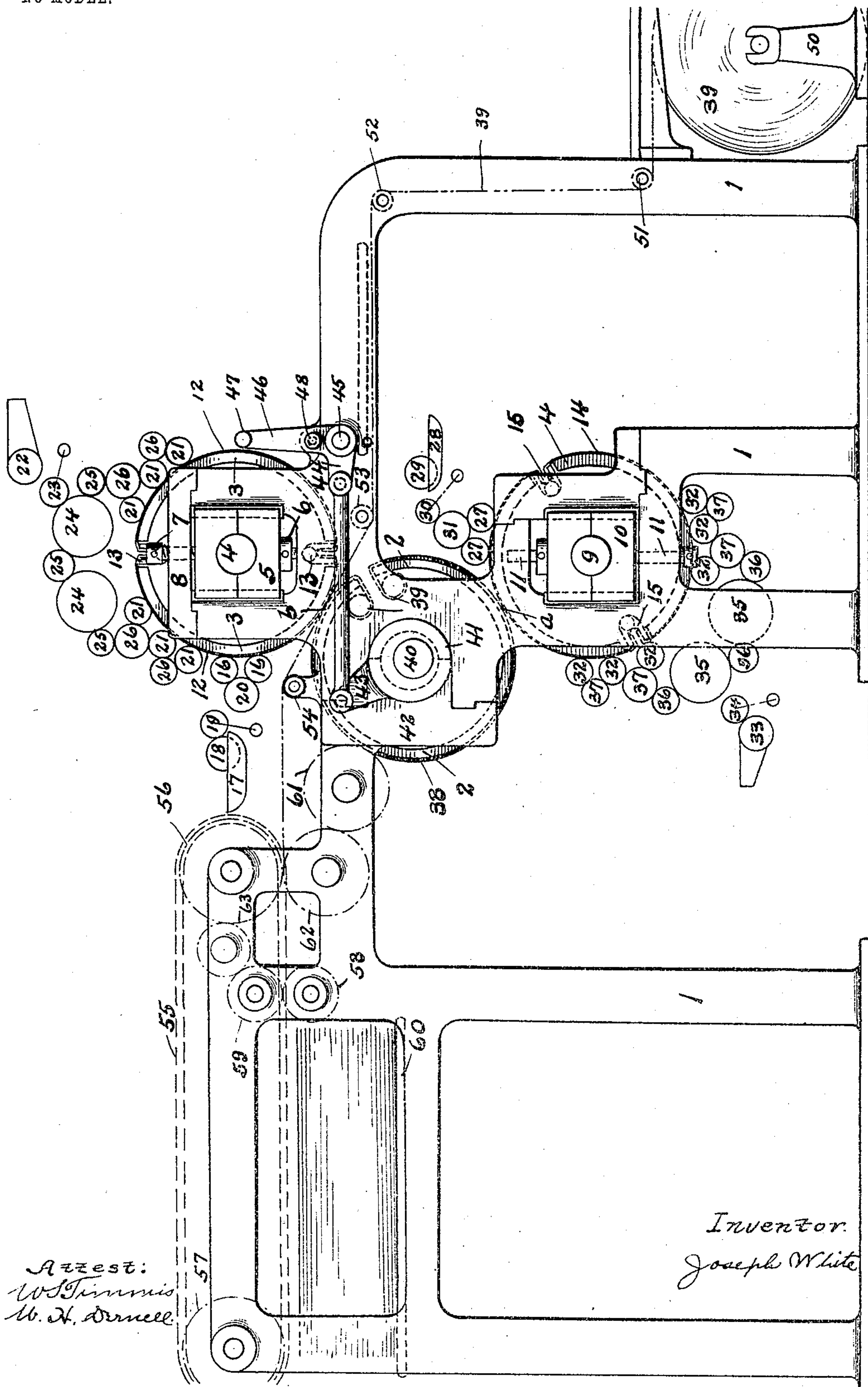
No. 774,296.

PATENTED NOV. 8, 1904.

J. WHITE.
PRINTING MACHINE.

APPLICATION FILED NOV. 30, 1903.

NO MODEL.



UNITED STATES PATENT OFFICE.

JOSEPH WHITE, OF NEW YORK, N. Y.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 774,296, dated November 8, 1904.

Application filed November 30, 1903. Serial No. 183,210. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH WHITE, a citizen of the United States, residing in New York, in the county of New York, State of New York, have invented certain new and useful Improvements in the Art of Printing, of which the following is a true and full description.

This invention has for its object the production of a "perfected" sheet—that is, a sheet printed upon both sides—with a minimum of printing elements and at the same time overcomes serious difficulties which attend the perfecting of a sheet by the ordinary means employed. In accomplishing this result I employ in combination printing-forms which are made in "reverse" and "non-reverse" designs of the product desired.

By a form in "non-reversed" design is meant a design the contour of which is exactly the same as the resulting design on the product, and this is in contradistinction to a form in reverse design, the contour of which bears the same relation to the design on the product as a mirror reflection of the product would. Ordinary type is the most common example of reverse design. Ordinary type-print is the most common example of non-reverse design. The principle of employing these two styles of printing-forms in combination and capable of producing independent non-related designs in non-reverse on both sides of the sheet is novel in the art of printing and is covered in the appended claims.

In the usual method of producing a perfected sheet two printing-couples are employed, the first printing on one side of the sheet and the second printing upon the other. In the second printing the freshly-printed side comes in contact with the second impression-surface, and when the second impression is taken the printed matter "offsets" on the impression-surface—that is, it places ink upon this surface, which in turn smuts the sheets following which come against it. Various means are employed to overcome this difficulty, which besides being complicated and expensive are more or less unsatisfactory. This difficulty is incidental to perfecting sheets by the method where relief form-surfaces are used—for instance, stereotype or

electrotype plates—and also when planographic surfaces are used. (Examples of this class are the lithograph-stone and the aluminum plate.) In addition to this when relief-plates are used "make ready" is necessary, which involves a considerable outlay of time, and the same time renders independent impression-surfaces for each printing imperative where good printing is an object. On the other hand, planographic surfaces labor under the disadvantages because of the necessity of dampening the form-surfaces. The dampness from the first form is taken up by the sheet and causes it to expand and otherwise distorts it so as to affect the proper register in perfecting the sheet. The manner in which I overcome these and other difficulties in a printing-machine having other novel and valuable features will be set forth in the following description of the machine illustrated by the drawing, which is a side elevation of a printing-machine, showing the parts necessary for a clear understanding of the principles of this invention.

1 represents the side frames of the machine, in which is mounted the transfer-cylinder 2 and the form-cylinders 3 and 4.

As I have stated, the methods at present employed for perfecting a sheet with independent designs on either side of the sheet involves the use of two pairs of printing members or four in all, and when the machine is of the rotary type having the form and impression surfaces mounted on cylinders four cylinders are used.

In the machine illustrated by the drawing embodying the principles of this invention I employ but three members (in this case individual cylinders) to perfect the sheet. The shaft 4 of the form-cylinder 3 is mounted in the boxes 5, which are adjustably mounted in the side frames, and the required printing-pressure is obtained by means of the impression-screws 6 in the frames 1 and the screws 7 in the caps 8. Any other usual or special method may be employed to obtain the proper pressure; but the method shown is preferred in the form of machine shown. The shaft 9 of the cylinder 4 finds its bearings in the boxes 10, which are adjusted by means of the screws 11.

In the machine shown planographic form-surfaces are used, and 12 represents aluminium plates strained to the form-surface of the cylinder 3 and held in place by the clamps 13.

5 The plates on cylinder 4 are numbered 14 and are similarly held by clamps 15.

Where planographic forms are used, it is necessary to dampen the form before inking. The necessary form and water rollers to accomplish a proper dampening and inking of the forms are shown diagrammatically in the drawing. The operation and requirements of these are well known in the art, and it is to be understood that the various operations necessary in adjusting and moving the rollers properly will be employed. The forms on the cylinder 3 are dampened by the rollers 16, which receives its water-supply from the fountain 17 by way of the rollers 18, 19, and 20. These forms receive their ink from the rollers 21, the ink-supply coming from fountain 22 and is properly distributed by the trains of rollers 23, 24, 25, and 26. In like manner the design-plates 14 are dampened by water form-rollers 27, which receive their supply from fountain 28 by way of rollers 29, 30, and 31 and are inked by the rollers 32, which receive the ink from fountain 33 by way of roller-trains 34, 35, 36, and 37.

30 The transfer-surface of the cylinder 2 preferably consists of a blanket 38 of rubber or similar substance of elastic and slightly-yielding material. This blanket is strained to place and held against the surface of the cylinder 2 by means of reel-rods 39.

This invention employs two well-known methods used in planographic printing. The first is the method of direct printing, where the form (which has a reversed design) receives its ink from a source, usually a set of rollers, and imparts its design to the sheet by coming in direct contact with it at the impression-taking point in non-reversed form, the impression being given to the sheet between the form and impression surface. The second involves the use of a "transfer-surface" which comes in impression relation with the previously-inked form-surface, which has a non-reversed design, and receives from it an ink-impression of the design on the form-surface. This impression is called the "transfer" and is in reversed design. The transfer-surface, with its reversed ink-transfer, is then brought into printing relation with an impression-surface, and the sheet to be printed is introduced between these surfaces and receives the transferred design in non-reversed form upon its face.

I have found that in order to obtain a good impression in any of the three printings described (which are, first, the printing from the form to the paper; second, the printing from the form to the transfer-surface, and, third, the printing from the transfer-surface to the paper) it is necessary to have a hard unyield-

ing surface coacting with yielding or elastic surface. Two hard surfaces coacting or two yielding surfaces coacting produce but indifferent results. Referring to the drawing, it can be seen how I have obtained this result and the same time employ but three printing members to accomplish a result for which four members have hitherto been used. The upper side of the sheet (in this case a web of paper 39) receives its non-reversed design directly from reversed designs on the form-surfaces 12. This sheet passes between the form-surfaces 12 and the transfer-surface 38. This transfer-surface has upon it the reversed design or transfer it received from the non-reversed-design forms on the cylinder 4, which it received at the impression position *a*, and coming in impression relation with the cylinder 3 at *b* imparts its design in non-reversed form upon the under side of the web of paper 39, and, as has been previously described, at the same time a print is made on the upper side of the sheet, thus perfecting it by a simultaneous printing on both sides. By this method it can be seen that offset is entirely obviated.

The cylinders are arranged so as to be readily accessible and at the same time are so positioned that they can when desired be placed out of printing relation with one another by a diametral movement of the transfer-cylinder. This movement is accomplished when it is desired by the following means: The shaft 40 of the transfer-cylinder 2 finds its bearing at each end in the eccentric bearings 41, mounted in the side frames 1, and the caps 42. The outer flanges of these bearings have arms 43, to which is pivoted one end of the connections. The other ends of these connections are pivoted to arm 44, which is fastened to the shaft 45, extending across the machine. The arm 44 (shown in the drawing) forms part of a bell-crank lever, the other arm of which is numbered 46, and this arm has on its end the handle 47, by which the mechanism desired can be manually actuated to rock the eccentric bearing to place the cylinders out of printing relation. The pin 48 on the lever 46 acts as a lock to hold the parts in the position desired.

In the machine shown, which it is to be understood is but a type illustrating the principle of this invention, the paper to be printed upon is a roll of paper web mounted in standards 50. The web 39 is led over guide-rolls 51, 52, and 53 and between the cylinders 2 and 3, when it is printed upon, after which it passes over the guide-roller 54 and on to the delivery. This delivery may be of any well-known or special type. As shown, it is a type well known in the art, and therefore shown diagrammatically. It consists of a pair of chains 55, which pass over sprockets 56 and 57. These chains carry a series of grippers which grasp the sides of the web and

carry it forward between cutting-cylinders 58 and 59 (when the web is severed into sheets) and over the delivery-board 60, upon which the severed sheets are dropped in a pile.

5 The initial driving mechanism of the machine is not shown; but it may be of any well-known or desired form, (a compounding train of gears from an electric motor, for instance;) but upon one side of the cylinders 4, 2, and 3
10 are fastened a train of intermeshing gears (not shown) of equal pitch diameter with the cylinders, by which means the proper relative surface speed of the printing-cylinders is maintained.

15 Intermeshing with the gear on cylinder 3 is an intermediate 61, which meshes with gear 62, which in turn drives 63, which is of equal pitch diameter with the chain-driving sprockets. This causes the delivery-grippers on the
20 chains to move at the surface speed of the printing-cylinders, thus operating to carry the web along at the proper speed. The cutting knives or cylinders are driven by gear 63, intermeshing with the gears fast on the
25 end of the cylinders or knives, (designated in the drawing 57 and 58.)

While the machine shown is the preferred form where a roll or web is used and the product required is perfected sheets with but
30 one color on either side, it serves as a type illustrating the principles of this invention, which can be applied to web or sheet feed machines of various kinds to produce one or more colors on either side of the sheet, and
35 it is to be understood that such machines employing the principles shown in application are contemplated.

I claim—

40 1. In a printing-machine the combination of two non-yielding planographic form-bearing cylinders, and a transfer-cylinder having a yielding transfer-surface, said cylinders co-acting to simultaneously print on both sides
45 of the sheet presented between a form-cylinder and the transfer-cylinder, substantially as described.

2. In a printing-machine, the combination of a plurality of non-yielding planographic form-bearing cylinders, and a transfer-cylinder
50 having a yielding transfer-surface, said cylinders coacting to simultaneously print on both sides of the sheet presented between a form-cylinder and the transfer-cylinder substantially as described.

55 3. In a printing-machine, the combination of a plurality of non-yielding planographic form-bearing cylinders, having non-related designs, and a transfer-cylinder having a yielding transfer-surface, said cylinders coacting
60 to simultaneously print on both sides of the sheet presented between a form-cylinder and the transfer-cylinder, substantially as described.

4. In a printing-machine, the combination
65 of two form-cylinders and a transfer-cylinder

coacting to simultaneously print on both sides of a sheet presented between a form-surface and the transfer-surface, said form-cylinders having planographic forms consisting of metal
70 sheets held to said cylinders by plate holding and straining devices, and the transfer-cylinder having a yielding transfer-surface consisting of a blanket held to said cylinder by sheet holding and straining devices, substantially as described.

5. In a printing-machine, the combination of a plurality of form-cylinders and a transfer-cylinder coacting to simultaneously print
75 on both sides of a sheet presented between a form-surface and the transfer-surface, said form-cylinders having planographic forms consisting of metal sheets held to said cylinders by plate holding and straining devices, and the transfer-cylinder having a yielding
80 transfer-surface consisting of a blanket held to said cylinder by sheet holding and straining devices, substantially as described.

6. In a printing-machine, the combination of two non-yielding planographic form-bearing cylinders, and a transfer-cylinder having
85 a yielding transfer-surface, said cylinders coacting to simultaneously print on both sides of the sheet presented between a form-cylinder and the transfer-cylinder, and means for separating the cylinders, substantially as de-
90 scribed.

7. In a printing-machine, the combination of two non-yielding planographic form-bearing cylinders, and a transfer-cylinder having
95 a yielding transfer-surface, said cylinders coacting to simultaneously print on both sides of the sheet presented between a form-cylinder and the transfer-cylinder, and means for moving the transfer-cylinder for the purpose of separating said cylinders, substantially as
100 described.

8. In a printing-machine, the combination of two non-yielding planographic form-bearing cylinders, and a transfer-cylinder having
105 a yielding transfer-surface, said cylinders coacting to simultaneously print on both sides of the sheet presented between a form-cylinder and transfer-cylinder and means for moving the transfer-cylinder for the purpose of separating said cylinders and means for lock-
110 ing them apart, substantially as described.

9. In a printing-machine, the combination of two form-cylinders, having non-yielding planographic forms, and a transfer-cylinder
115 having a yielding transfer-surface, coacting to simultaneously print on both sides of a sheet, said form-cylinders adjustably mounted for pressure-regulating purposes, and the transfer-cylinder movably mounted for cylinder-separating purpose, substantially as de-
120 scribed.

10. In a printing-machine, the combination of two form-cylinders, having non-yielding planographic forms, and a transfer-cylinder
125 having a yielding transfer-surface, coacting

to simultaneously print on both sides of a sheet, said form-cylinders adjustably mounted for pressure-regulating purposes, and the transfer-cylinder movably mounted in eccentric bearings in order to separate the cylinders, and connections to said eccentric bearings for moving and locking transfer-cylinder in or out of contact with the form-cylinders, substantially as described.

10 11. In a printing-machine, the combination of two form-cylinders having non-yielding planographic forms, and a yielding transfer-cylinder, coacting to print simultaneously on both sides of a web, web-leading means from
15 a paper-roll on one side of the cylinder, and product handling and receiving means on the other side of the cylinders, substantially as described.

12. In a printing-machine, the combination
20 of two non-yielding planographic form-bearing cylinders each having form and water rollers adjacent thereto, a transfer-cylinder having a yielding transfer-surface, coacting to simultaneously print on both sides of a web,
25 and means for separating the cylinders, substantially as described.

13. In a printing-machine, the combination of two non-yielding planographic form-bearing cylinders each having form and water
30 rollers adjacent thereto, a transfer-cylinder having a yielding transfer-surface, coacting to simultaneously print on both sides of a web, and means for moving the transfer-cylinder for the purpose of separating said cylinders,
35 substantially as described.

14. In a printing-machine, the combination

of two non-yielding planographic form-bearing cylinders each having form and water rollers adjacent thereto, a transfer-cylinder having a yielding transfer-surface, coacting
40 to simultaneously print on both sides of a web, and means for moving the transfer-cylinder for the purpose of separating said cylinders and means for locking the cylinders in or out of contact, substantially as described. 45

15. In a printing-machine, the combination of a form-cylinder which imparts its inked design to a transfer-surface, a transfer-cylinder having a yielding planographic transfer-surface, and a planographic form-bearing cylinder;
50 said transfer-cylinder and planographic form-bearing cylinder simultaneously printing on both sides of the sheet passed between them, substantially as described.

16. In a printing-machine, the combination
55 of a form-cylinder which imparts its inked design to a transfer-surface, a transfer-cylinder having a yielding planographic transfer-surface and a planographic form-bearing cylinder;
60 said transfer-cylinder and planographic form-bearing cylinder simultaneously printing on both sides of the sheet passed between them, and means for moving the transfer-cylinder out of printing relation with both form-cylinders, substantially as described. 65

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

JOSEPH WHITE.

Witnesses:

W. S. TIMMIS,

W. H. DERNELL.