

No. 647,151.

Patented Apr. 10, 1900.

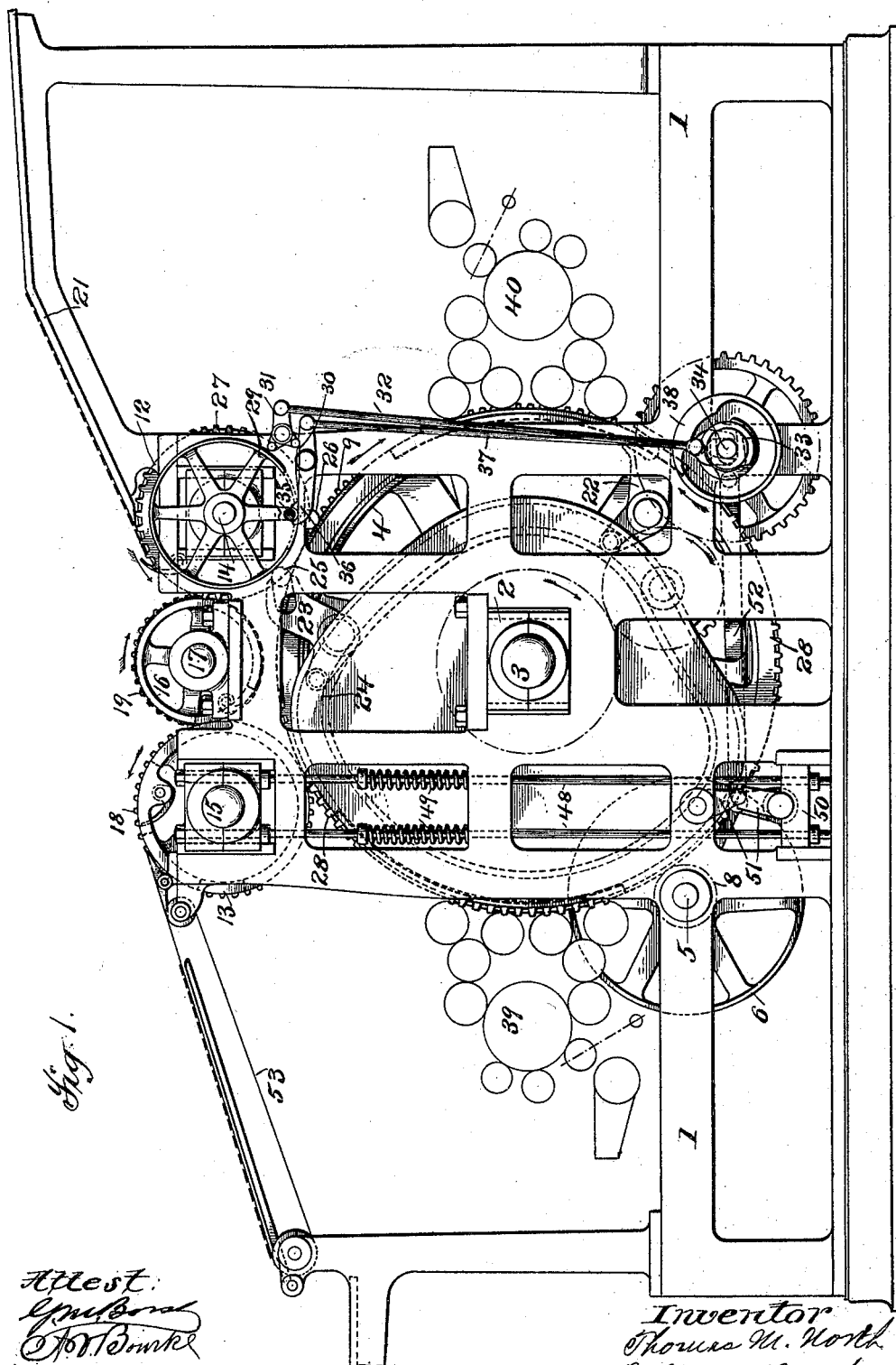
T. M. NORTH.

MULTICOLOR STOP CYLINDER PRINTING MACHINE.

(No Model.)

(Application filed May 17, 1899.)

5 Sheets—Sheet 1.



No. 647,151.

Patented Apr. 10, 1900.

T. M. NORTH.

MULTICOLOR STOP CYLINDER PRINTING MACHINE.

(Application filed May 17, 1899.)

(No Model.)

5 Sheets—Sheet 2.

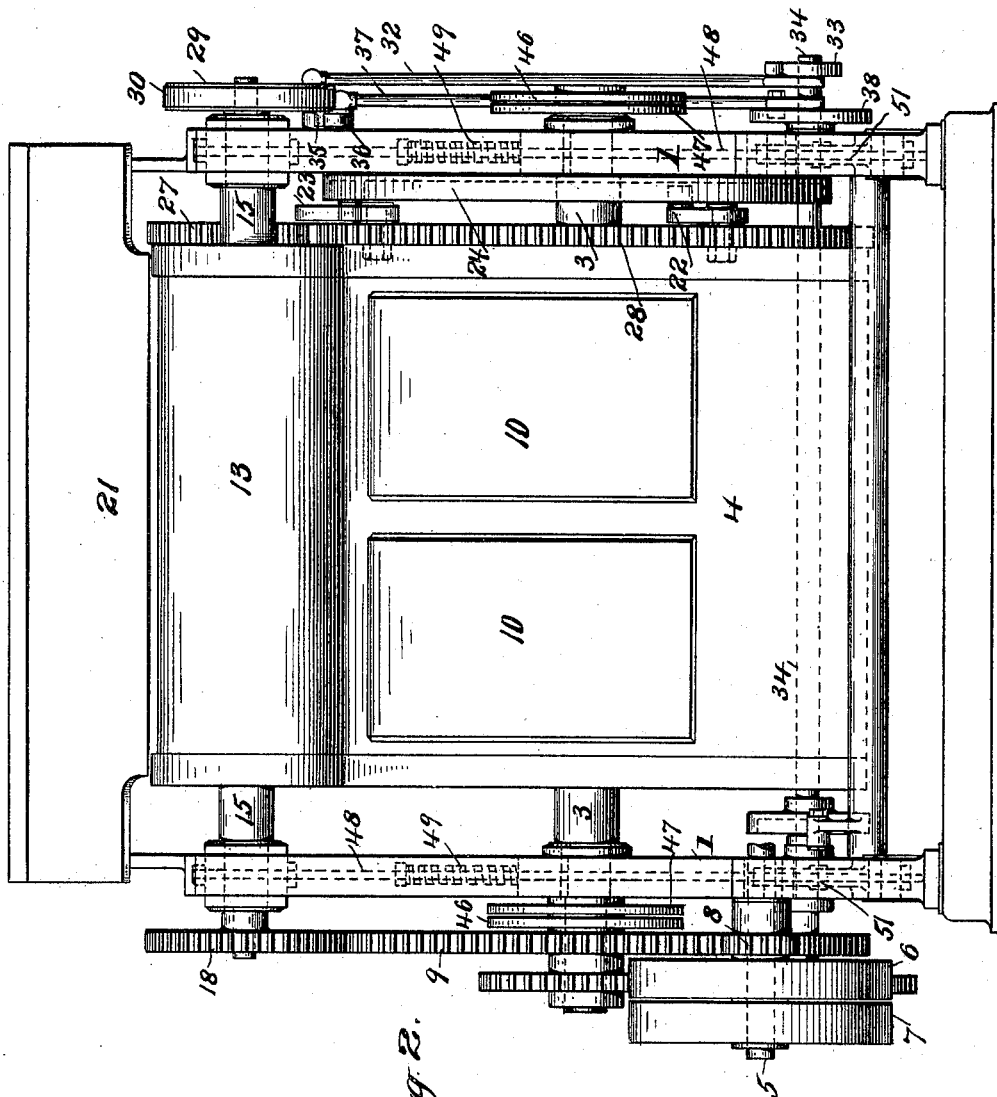


Fig. 2.

Attest:  
J. M. North  
S. M. North

Inventor:  
Thomas M. North  
By Philip Phelps Sawyer  
Attys

No. 647,151.

Patented Apr. 10, 1900.

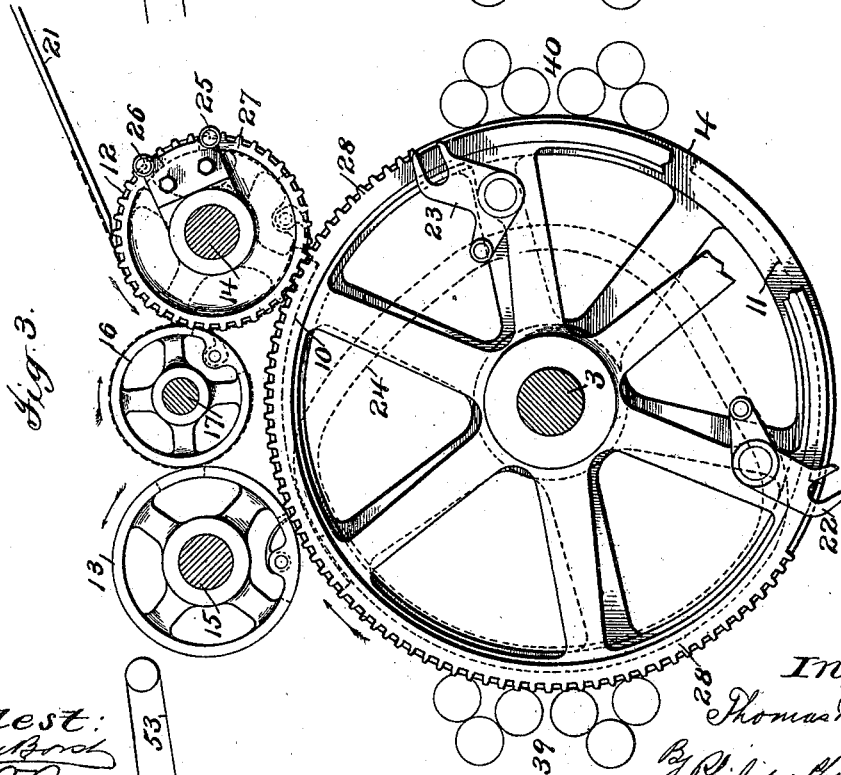
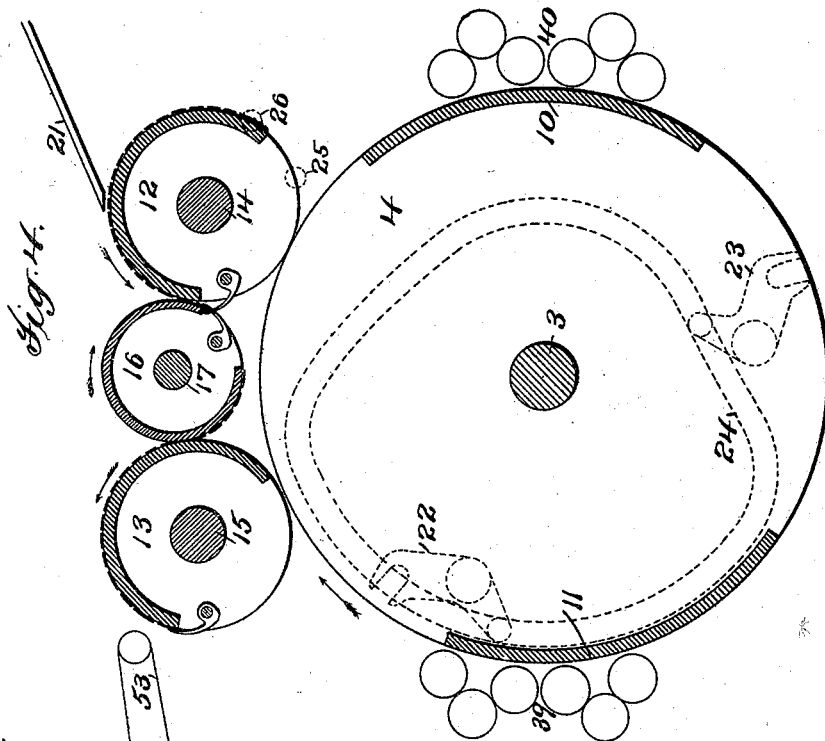
T. M. NORTH.

MULTICOLOR STOP CYLINDER PRINTING MACHINE.

(Application filed May 17, 1899.)

(No Model.)

5 Sheets—Sheet 3.



Attest:  
J. T. Bunker

Inventor  
Thomas M. North  
By Philip Phelps Sawyer  
Attys

No. 647,151.

Patented Apr. 10, 1900.

T. M. NORTH.  
MULTICOLOR STOP CYLINDER PRINTING MACHINE.

(Application filed May 17, 1899.)

(No Model.)

5 Sheets—Sheet 4.

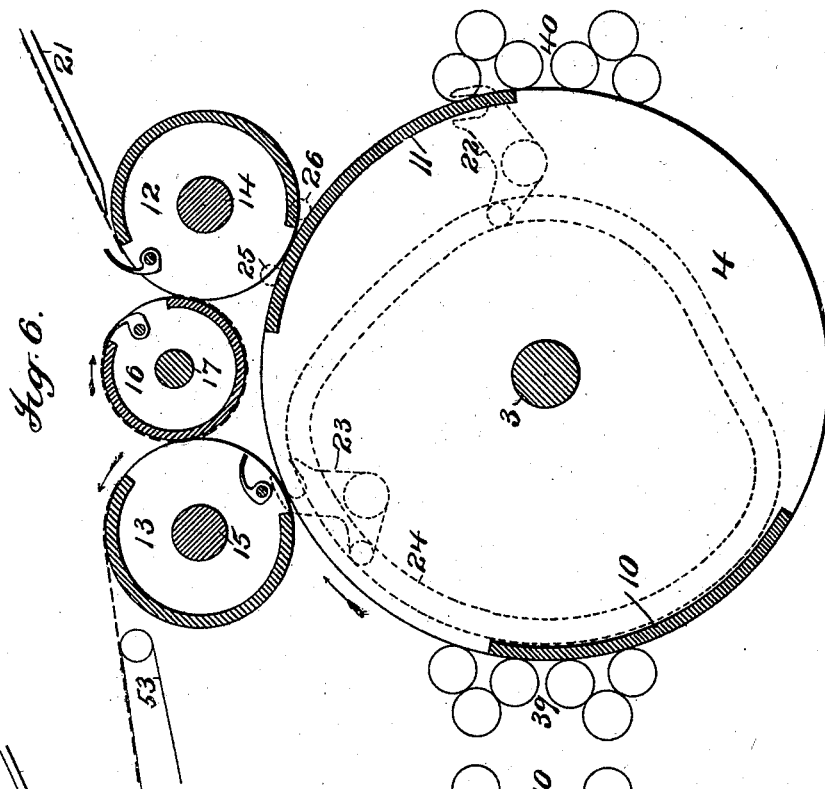


Fig. 6.

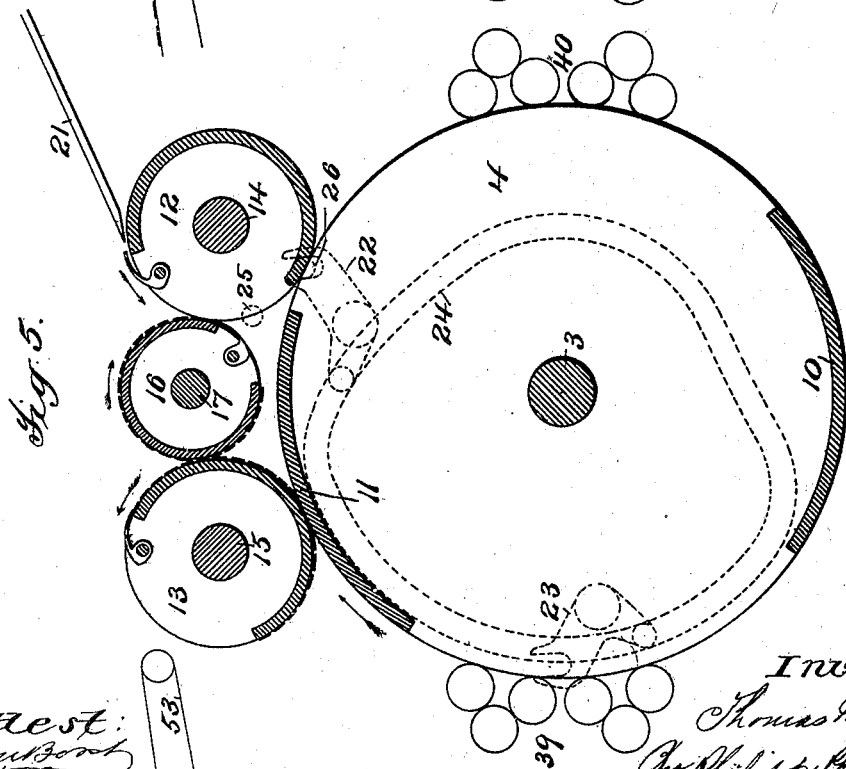


Fig. 5.

Attest:  
G. M. B. B. B.  
A. M. B. B. B.

Inventor  
Thomas M. North  
By Philip P. H. H. H.  
H. H. S.

T. M. NORTH.  
MULTICOLOR STOP CYLINDER PRINTING MACHINE.

(No Model.)

(Application filed May 17, 1899.)

5 Sheets—Sheet 5.

Fig. 7.

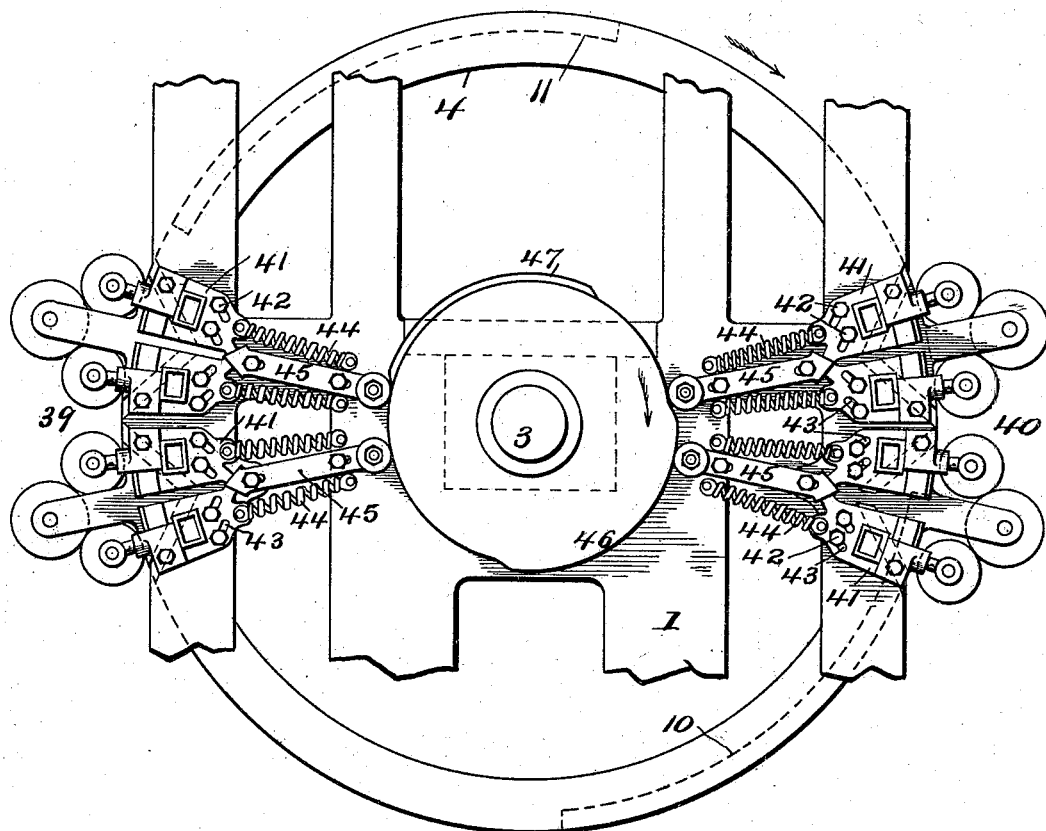
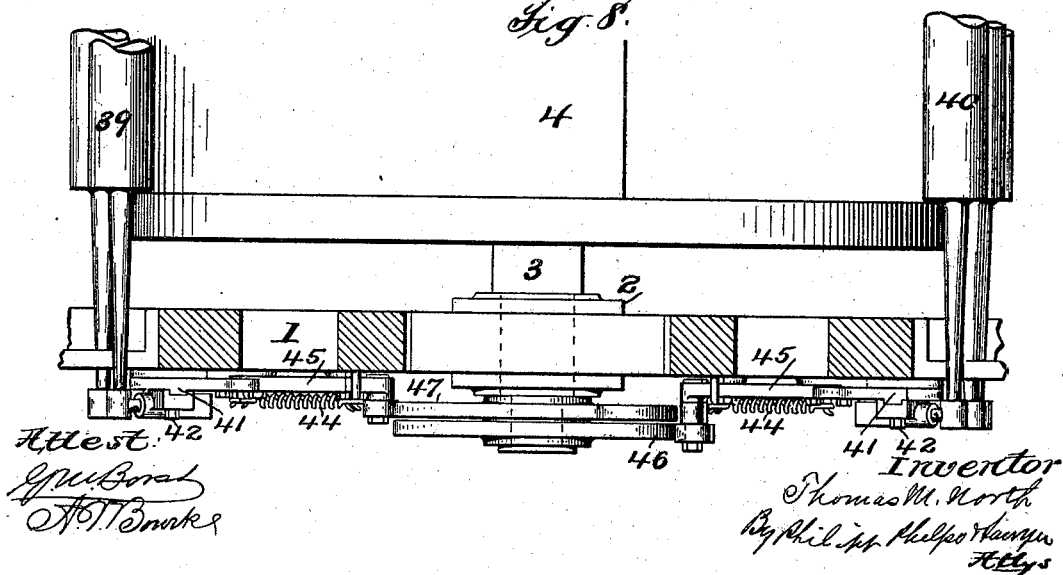


Fig. 8.



# UNITED STATES PATENT OFFICE.

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

## MULTICOLOR STOP-CYLINDER PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 647,151, dated April 10, 1900.

Application filed May 17, 1899. Serial No. 717,123. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS M. NORTH, a subject of the Queen of Great Britain and Ireland, residing at New York city, county of Kings, and State of New York, have invented certain new and useful Improvements in Multicolor Stop-Cylinder Printing-Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in printing-machines.

The advantages of the rotary type of printing-machines are well known in the printing art. While rotary machines are almost universally used for web-printing, they have not been so widely used for printing on sheets. One serious objection to the use of machines of the rotary type for printing on sheets is found in the difficulty of feeding them and yet have them run at any considerable speed, because of the difficulty of accurately feeding a sheet to a moving part and at the same time obtaining that excellence of register which is necessary for first-class work.

It is the object of this invention to construct a sheet-printing machine, preferably for multicolor work, in which the forms are mounted upon a rotary carrier which is preferably, though not necessarily, rotated continuously, the machine being provided with a plurality of impression members, preferably cylinders, cooperating with the forms, and with means for varying the speed, preferably by stopping and starting, of that impression member which receives the sheet in the first instance, so that the sheet may be fed thereto with little difficulty and accurate register obtained, there being also suitable means in the machine, such as a transfer cylinder or cylinders, for transferring the sheet after printing from one impression-cylinder to the succeeding one.

With this and other objects in view the invention consists in certain constructions and in certain parts, improvements, and combinations, which will be hereinafter described, the invention being then specifically pointed out in the claims hereunto appended.

In the accompanying drawings, which form a part of this specification, in which like char-

acters of reference indicate the same parts, Figure 1 is a side view of a printing-machine embodying the invention. Fig. 2 is an end view of the machine shown in Fig. 1 with the delivery and inking mechanism removed. Figs. 3, 4, 5, and 6 are diagrammatic sectional elevations indicating the positions of the several cylinders at various times during the printing operation. Fig. 7 is a detail view illustrating the means for operating the inking mechanisms. Fig. 8 is a horizontal section of the construction shown in Fig. 7.

In the machine shown, which has been selected as illustrating one embodiment of the invention, 1 indicates the frame. The frame is provided with the usual journal-boxes 2, which carry a shaft 3, upon which the form-carrier, which in the present instance is a cylinder 4, is mounted.

The form-carrying cylinder may be rotated in any convenient or desirable way. In the machine shown a shaft 5 is mounted in the frame, said shaft being driven by suitable fast and loose pulleys 6 7 from any suitable source of power. The shaft 5 is provided with a pinion 8, which meshes with a large gear 9, mounted on the shaft 3 of the impression-cylinder.

In the machine shown the form-carrying cylinder is provided with two form-carrying surfaces 10 11. The invention is not, however, limited to this particular number of form-carrying surfaces, as more might be used, if desired. These surfaces may be provided with any suitable printing-form—as, for instance, an aluminium sheet or a stereotype-plate.

In the machine shown there are two impression-cylinders 12 13, which cooperate with the form-surfaces on the form-carrier before described, the cylinder 12 being arranged to cooperate with the form-carrying surface 10 and the cylinder 13 being arranged to cooperate with the form-carrying surface 11. These cylinders 12 and 13 are carried by the shafts 14 15, suitably mounted in journal-boxes located in the upper part of the frame.

The machine in which the invention is shown as embodied is a multicolor-printing machine. After the sheets have been printed,

therefore by the form-surface 10 on the cylinder 4 cooperating with the impression-surface on the cylinder 12 it is necessary that they be transferred with the printed side out, so as to receive a second impression on the same side from the form-surface 11, cooperating with the cylinder 13.

The transfer of the sheet may be effected in various ways. In the machine shown the transfer is effected by means of a transfer-cylinder 16, located between the cylinders 12 and 13, this cylinder being carried on a shaft 17, suitably mounted in the frame of the machine.

The transfer and impression cylinders may be driven in any suitable manner. In the machine shown the cylinders 13 and 16 are provided with intermeshing gears 18 19, and the gear 18 meshes with the gear 9, before described as mounted on the shaft of the impression-cylinder 3. The cylinders 13 16 will therefore be continuously driven, and in the machine shown the gears by which these cylinders are driven are so related that the cylinder 13 makes three revolutions for one revolution of the form-carrying cylinder 4 and the cylinder 16 makes four revolutions during one revolution of the form-carrying cylinder.

The cylinder 12 has its speed varied in order that the sheets may be fed thereto and is preferably stopped for that purpose, the sheets being fed in any suitable way, as from a feed-board 21, suitably mounted on the frame of the machine.

The cylinder 12 may be stopped, started, and driven by any suitable form of mechanism. Preferably, however, the cylinder 12 will be stopped and started by means of cam-operated hooks 22 and 23, these hooks being pivoted on the cylinder 4 and being given a movement additional to the rotary movement imparted by the cylinder by a path-cam 24, which is suitably secured to the machine-frame. The construction and operation of these cam-operated hooks are fully set forth in my application, Serial No. 618,024, filed January 5, 1897, and a detailed description of the peculiar movement imparted by these cams and the manner in which it is accomplished is therefore unnecessary in this specification. It is sufficient to say that the hooks which engage the studs 25 26, suitably secured to the cylinder 12, impart to said cylinder a varying movement both in stopping and starting—that is to say, the cylinder is taken by the hook 22 while running at full speed and is gradually brought to a position of rest and is taken by the hook 23 while at rest and brought up to full speed. In the machine shown the cylinder 12 having been started by the hook 23 cooperating with one of the studs 25 26 and brought up to full speed is thereafter driven by the gear 27, which is mounted on the cylinder and which meshes with a mutilated gear 28, suitably mounted on the form-carrying cylinder or so connected

thereto as to rotate in unison therewith. As the mutilated gear 28 runs out of mesh with the gear 27 the hook 22 engages with its cooperating stud on the cylinder 12 and brings the said cylinder to a gradual stop.

The stopping of the cylinder may be assisted by any suitable form of brake mechanism. In the machine shown there is provided a friction-pulley 29, which is engaged by the friction-strap 30, the said strap being operated in the well-known manner from a lever 31, suitably pivoted on the frame of the machine. The lever 31 is operated through a connecting-rod 32 from the cam 33, which is mounted on a cam-shaft 34, suitably journaled in the machine-frame. After the cylinder 12 has been brought to a stop it is preferably locked in that position. In the machine shown the said cylinder is provided with a stud 35, which is engaged by a locking-lever 36, suitably pivoted to the frame of the machine, the said lever being operated through a connecting-rod 37, which in turn is operated from a cam 38, mounted on the shaft 34 before described.

The friction and brake mechanisms just described are usual ones and form no part of the present invention. It is furthermore to be understood that any other suitable form of friction and brake mechanisms may be used, if desired.

Any suitable form of inking mechanism may be used to supply ink to the forms on the surfaces 10 and 11. In the machine shown two groups of inking-rollers 39 40 are used, the group 39 cooperating with the surface 10 and the group 40 cooperating with the surface 11. As the machine shown is a multicolor-printing machine, it will be understood, of course, that the inking mechanisms before referred to supply different-colored inks to the forms. Means, therefore, must be provided to keep each group of inking-rollers out of contact with the form which is intended to be inked by the other group. Various means widely different in character may be used for keeping the inking-rollers out of contact with the forms which they are not intended to ink. In the machine shown the inking-rollers of the two groups are shown as mounted in sliding brackets 41. These brackets are slidably held to the frame by pins 42, which engage with diagonal slots 43 in the said brackets. The brackets 41 are arranged in pairs, and the diagonal slots before referred to are so arranged that the slots of each pair of brackets are at an angle to each other. The sliding brackets are held down in their inking position by springs 44, and they are moved away from this position by cam-lifting slides 45. Each of these lifting-slides is provided with two cam-faces and operates to move a pair of the ink-roll-supporting slides, as will be readily understood from the drawings, more particularly Fig. 7. Sets of slides such as have been before described are located at each end of the inking-rolls, and the shaft 3 of the cylinder 4 is pro-

vided at each end with a pair of cams 46 47, by which the lifting-slides of each group of slides are operated, the slides 45 being suitably provided with friction-rolls, which run upon said cams. The cam 46 operates in connection with the group of inking-rolls 40 and holds them out of contact with the printing-surface 10. In the same way the cam 47 operates in connection with the group of inking-rolls 39 and holds them out of contact with the surface 11.

The second impression-cylinder 13 is arranged so that it will not contact with the form 10. Various constructions may be devised for this purpose. In the machine shown the said cylinder is controlled so that it will not contact with the form-surface 10, but will contact with the form-surface 11 by means of lifting mechanism of the ordinary form. This mechanism consists of rods 48, connected to the journal-box of the said cylinder and forced upward by springs 49. The rods are connected at their lower ends by a cross-piece 50, which is operated upon by a pair of toggles 51, one of which is mounted in the cross-piece and the other in the frame of the machine. The toggles 51 are made and broken by a sliding rod 52, which is operated from a cam on the shaft 34.

The sheets may be delivered from the second cylinder by any usual or desired form of delivery mechanism. In the machine shown a tape delivery 53 of ordinary form is used, the sheets being taken therefrom by a fly or in any other suitable manner.

The impression and transfer cylinders may be provided with any suitable form of sheet-taking mechanisms. In the machine shown the sheets are taken and held upon each of these cylinders by ordinary gripper mechanisms. Any other suitable form of sheet-taking mechanism may, however, be substituted for the grippers, if desired.

The operation of the machine is as follows: A sheet having been fed down the feed-board 21 is taken by the grippers on the cylinder 12, the cylinder being stationary at the time that the sheet is fed thereto, being held in its stationary position by the locking-lever 36 and the stud 35, before described. The rotation of the cylinder 4 brings the starting-hook 23 into position to engage the starting-stud 25 on the cylinder 12. The position of the parts just described is shown in Fig. 1. Just as the hook engages the pin the cam 38 operates to release the locking-lever, and the further movement of the cylinder 4 causes the starting-hook 23, coöperating with the stud 25, to impart to the cylinder 12 an easy starting movement, which is gradually accelerated until the speed of the cylinder 12 is the same as that of the cylinder 4. At this time the mutilated gear 28 of the cylinder 4 engages the gear 27 of the cylinder 12. When the gears 28 and 12 come into engagement and the two cylinders are moving at the same speed, the form-surface 10 will meet the im-

pression-surface of the cylinder 12 and the sheet upon said surface will receive an impression from the said form-surface. The mutilated gear 28 is of such a length as to cause the impression-cylinder 12 to make two revolutions, the first being made in order to print the sheet and the second in order that the sheet may be delivered to the transfer-cylinder 16. In the position of the parts shown in Fig. 4 the impression-cylinder 12 is transferring its printed sheet to the cylinder 16. In effecting the transfer the cylinder 12 will continue its revolutions until it reaches the position of the parts shown in Fig. 5. At this time the said cylinder has completed its revolution and its pin 26 has been engaged by the stopping-lever 22, whereby the cylinder is brought to a stop and released by said lever. At this time the form-carrying cylinder 4 has made about two-thirds of a revolution. It will be understood, therefore, that during one part of a revolution of the form-carrying cylinder the impression-cylinder 12 makes two revolutions and then remains stationary while the form-carrying cylinder completes its revolution. After the transfer-cylinder 16 has taken the sheet from the cylinder 12 it makes four revolutions, carrying the sheet, and on its fourth revolution the timing of the parts is such that it delivers its sheet to the second impression-cylinder 13 and takes a fresh sheet from the first impression-cylinder 12, the first sheet being, of course, transferred to the second impression-cylinder with its printed side out. It will be remembered that in the machine shown the second impression-cylinder, as well as the transfer-cylinder, is a continuously-rotating cylinder. After receiving its sheet, therefore, this cylinder makes an idle revolution and then makes a revolution, during which the sheet is printed and delivered. Its third revolution, it being remembered that it makes three revolutions to one revolution of the cylinder 4, is an idle revolution, and on its next revolution it receives a sheet and operates it as before described. The lifting mechanism is preferably so arranged that the cylinder will be held up away from the path of the forms on the cylinder 4 except during the passage of the form with which it coöperates in the printing operation.

Various modifications may be made in the mechanism by which this invention is carried into effect. It is to be understood, therefore, that the invention is not limited to the specific mechanism which has been described in the foregoing specification and which is illustrated in the accompanying drawings, but that it includes all such changes and modifications as fall within its spirit and scope.

What I claim is--

1. The combination with a rotating form-carrier having a plurality of forms, of a plurality of impression members, means for varying the speed of one of the members to receive a sheet, and means whereby the sheet



is transferred from said impression member to a succeeding member, substantially as described.

2. The combination with a rotating form-carrier having a plurality of forms, of a plurality of impression members, stopping and starting mechanism by which one of said members is stopped to receive a sheet and then started, means for rotating said member at a constant speed, and means whereby the sheet is transferred from said impression member to a succeeding member, substantially as described.

3. The combination with a rotating form-carrier having a plurality of forms, of a plurality of impression members, means by which one of these members is brought to a gradual stop to receive the sheet, means for gradually starting said member and bringing its speed up to the speed of the form-carrier, means for rotating the impression member at the speed of the form-carrier during the printing operation, and means for transferring the sheet from said impression member to a succeeding member, substantially as described.

4. The combination with a continuously-rotating form-carrier having a plurality of forms, of a plurality of impression members, means for varying the speed of one of the members to receive a sheet, and means whereby the sheet is transferred from said impression member to a succeeding member, substantially as described.

5. The combination with a continuously-rotating form-carrier having a plurality of forms, of a plurality of impression-cylinders, stopping and starting mechanism by which one of said cylinders is stopped to receive a sheet and then started, means for rotating said cylinder at a constant speed, and means whereby the sheet is transferred from said impression-cylinder to a succeeding cylinder, substantially as described.

6. The combination with a continuously-rotating form-cylinder having two forms thereon, of a continuously-rotating impression-cylinder coöperating with one of the forms and a rotating cylinder coöperating with the other form, means for varying the speed of said rotating cylinder to receive the sheet, and means whereby the sheet is transferred from one cylinder to the other, substantially as described.

7. The combination with a continuously-rotating form-cylinder having two forms thereon, of a continuously-rotating impression-cylinder coöperating with one of the forms and a rotating cylinder coöperating with the other form, means whereby said rotating cylinder is stopped to receive the sheet and then started, means for rotating the cylinder at a constant speed, and means whereby the sheet is transferred from one cylinder to the other, substantially as described.

8. The combination with a rotating form-carrier having two forms, of two impression-cylinders one coöperating with each form, means whereby the speed of one of the cylinders

is varied to receive a sheet, and a transfer-cylinder operating to transfer the sheet from one impression-cylinder to the other, substantially as described.

9. The combination with a rotating form-carrier having two forms, of two impression-cylinders one coöperating with each form, stopping and starting mechanism by which one of the cylinders is stopped to receive a sheet and then started, means for rotating the cylinder at a constant speed, and a transfer-cylinder operating to transfer the sheet from one cylinder to the other, substantially as described.

10. The combination with a continuously-rotating form-carrier, of a continuously-rotating impression-cylinder, a rotating impression-cylinder, means whereby said rotating cylinder is stopped to receive the sheet, and a continuously-rotating transfer-cylinder operating to transfer the sheet from one impression-cylinder to the other, substantially as described.

11. The combination of a rotating form-carrier having a plurality of forms, of a plurality of impression-cylinders, means carried by the form-carrier for varying the speed of one of said impression-cylinders, and means whereby the sheet is transferred from one cylinder to the other, substantially as described.

12. The combination of a rotating form-carrier having a plurality of forms, of a plurality of impression-cylinders, means carried by the form-carrier for gradually stopping and starting one of said impression-cylinders, means also carried by the form-carrier for rotating said cylinder at a constant speed, and means whereby the sheet is transferred from one of the cylinders to another, substantially as described.

13. The combination with a rotating form-carrier having a plurality of forms, of an impression-cylinder, means whereby said cylinder is stopped and started, a second continuously-rotating impression-cylinder, raising and lowering devices for said cylinder, and means for transferring the sheet from one impression-cylinder to the other, substantially as described.

14. The combination with a continuously-rotating form-carrier having a plurality of forms, of an impression-cylinder, means whereby said cylinder is stopped and started, a second continuously-rotating impression-cylinder, raising and lowering devices for said cylinder, and means for transferring the sheet from one impression-cylinder to the other, substantially as described.

15. The combination with a form-cylinder having two forms thereon, two impression-cylinders coöperating with said forms, means whereby one of said cylinders is stopped to receive the sheet, means for continuously rotating the other impression-cylinder, raising and lowering devices therefor, and a continuously-rotating transfer-cylinder, substantially as described.

16. The combination with a single form-cylinder having a plurality of forms, of two impression-cylinders cooperating therewith, means intermediate the form-cylinder and one of the impression-cylinders whereby said impression-cylinder is brought to a gradual stop to receive a sheet and is then started with a gradually-accelerating motion until it reaches the speed of the form-cylinder, means on the form-cylinder for continuing the rotation of said cylinder, and means for transferring a sheet from one impression-cylinder to the other, substantially as described.

17. The combination with a single continuously-rotating form-cylinder having a plurality of forms, of two impression-cylinders cooperating therewith, means intermediate the form-cylinder and one of the impression-cylinders whereby said impression-cylinder is brought to a gradual stop to receive a sheet, and is then started with a gradually-accelerating motion until it reaches the speed of the form-cylinder, means on the form-cylinder for continuing the rotation of said cylinder, substantially as described.

18. The combination with a continuously-rotating form-cylinder having two forms thereon, of an impression-cylinder cooperating with one of the forms, means intermediate the form-cylinder and the impression-

cylinder whereby said impression-cylinder is started with a gradually-accelerating motion, is rotated at the same speed as the form-cylinder and is gradually stopped, a second continuously-rotating impression-cylinder, and a continuously-rotating transfer-cylinder for transferring the sheet from one cylinder to the other, substantially as described.

19. The combination with a continuously-rotating form-cylinder having two forms thereon, of an impression-cylinder cooperating with one of the forms, means intermediate the form-cylinder and the impression-cylinder whereby said impression-cylinder is started with a gradually-accelerating motion, is rotated at the same speed as the form-cylinder and is gradually stopped, a second continuously-rotating impression-cylinder, raising and lowering devices therefor, and a continuously-rotating transfer-cylinder for transferring the sheet from one cylinder to the other, substantially as described.

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

THOMAS M. NORTH.

Witnesses:

F. W. H. CRANE,  
L. ROEHM.