July 12, 1932. A. J. HORTON 1,866,566

GRIPPER MECHANISM

Filed May 28, 1930 4 Sheets-Sheet 1

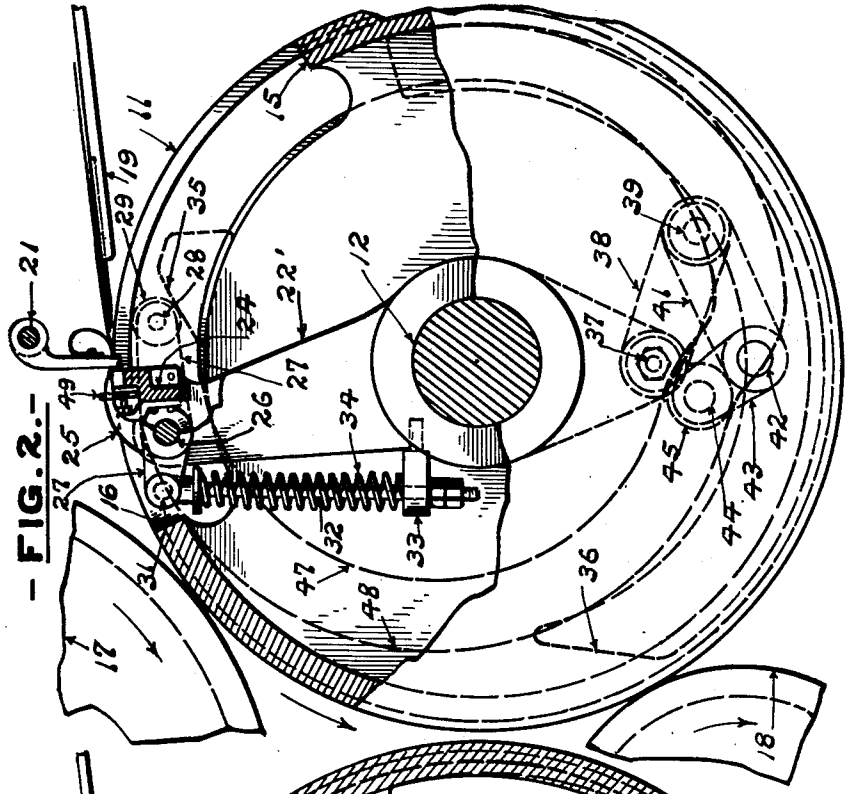


FIG. 2.

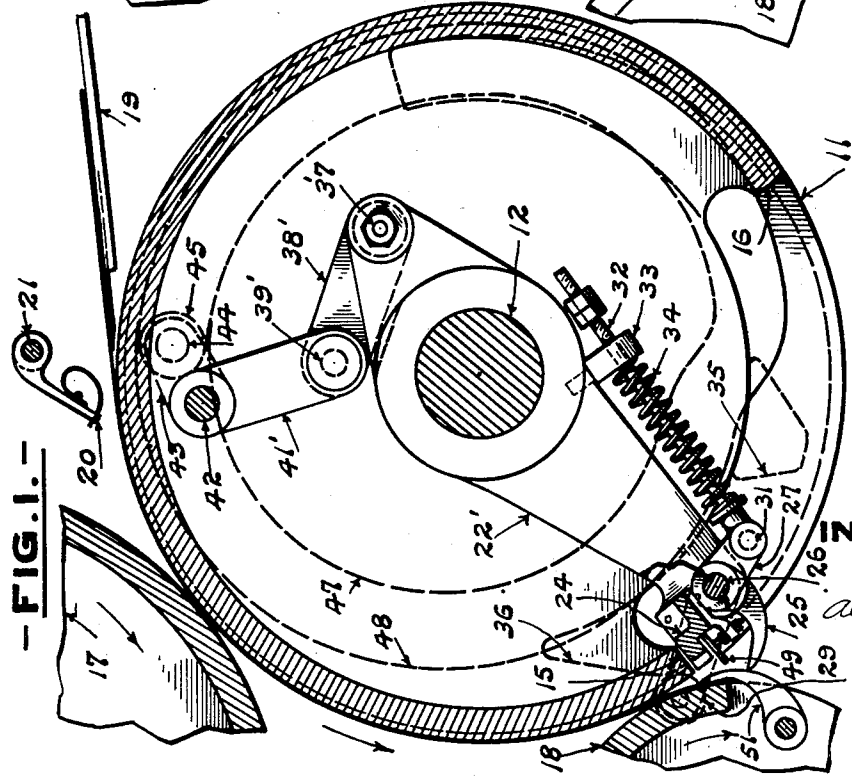


FIG. 1.

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GRIPPER MECHANISM

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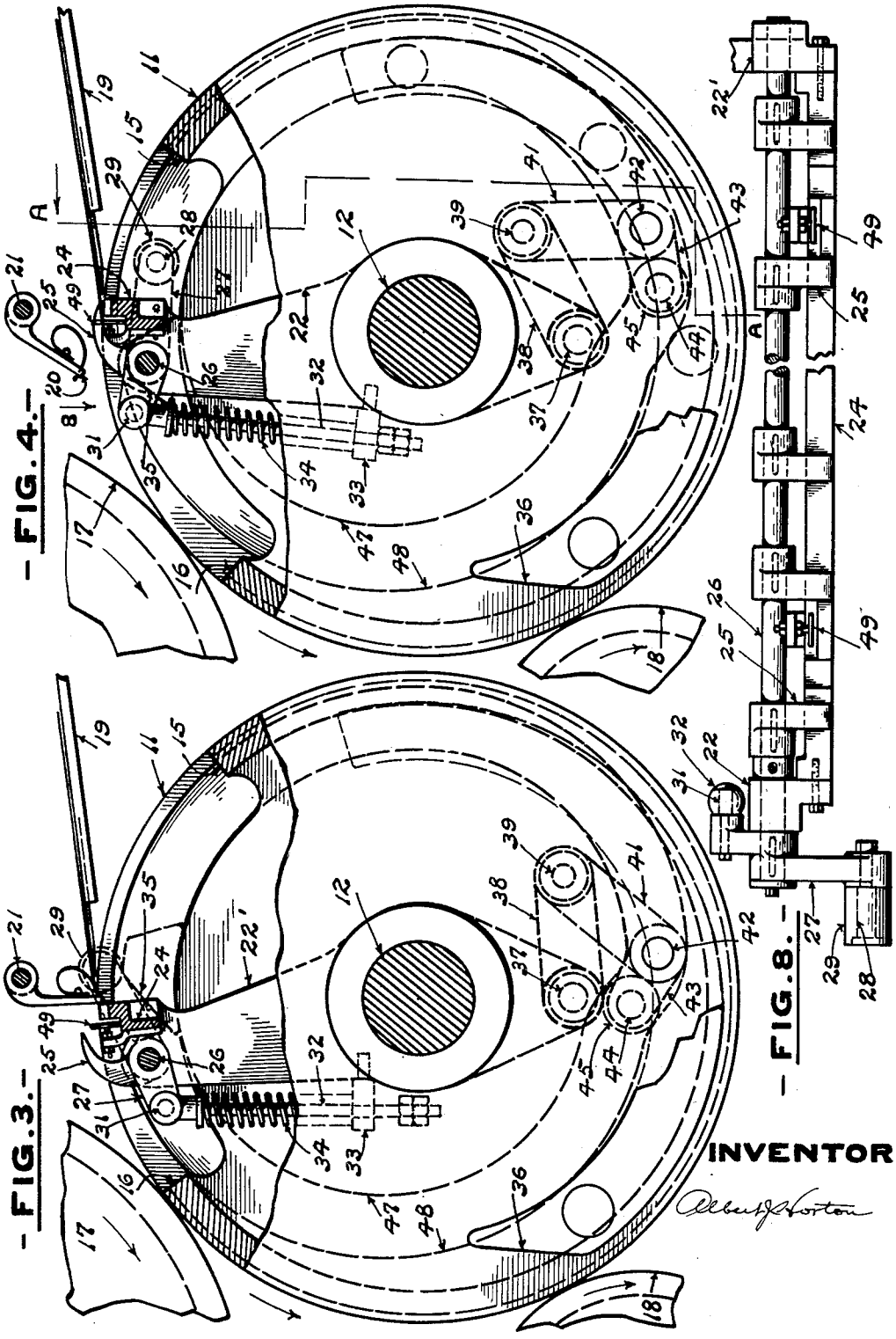


FIG. 4.

FIG. 3.

FIG. 8.

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GRIPPER MECHANISM

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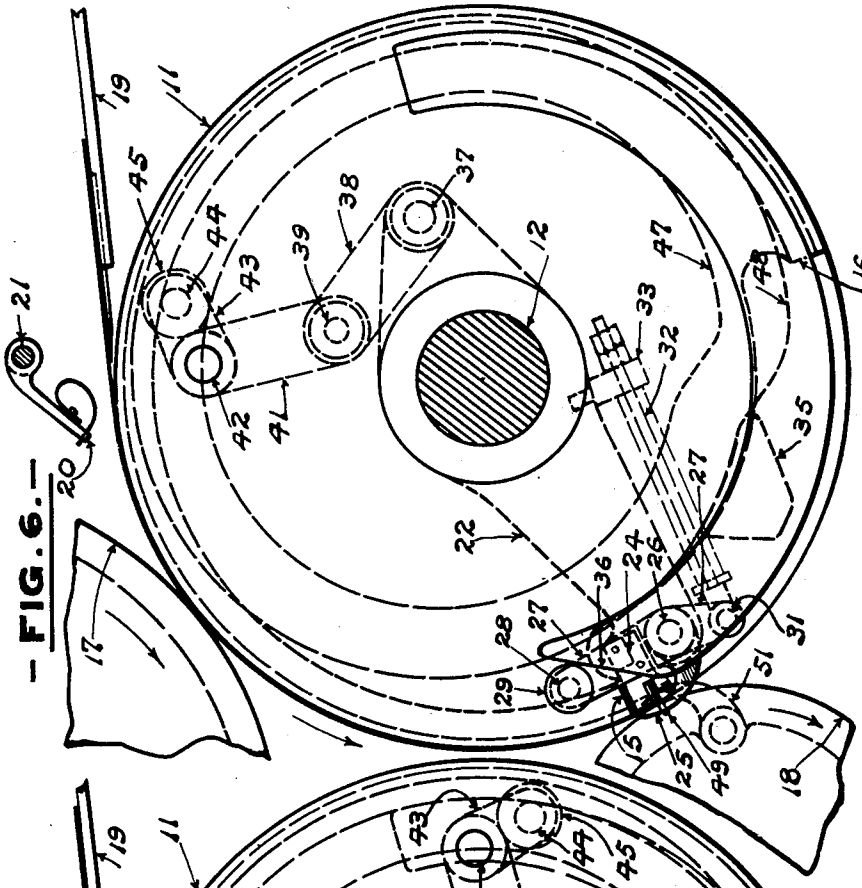


FIG. 6.

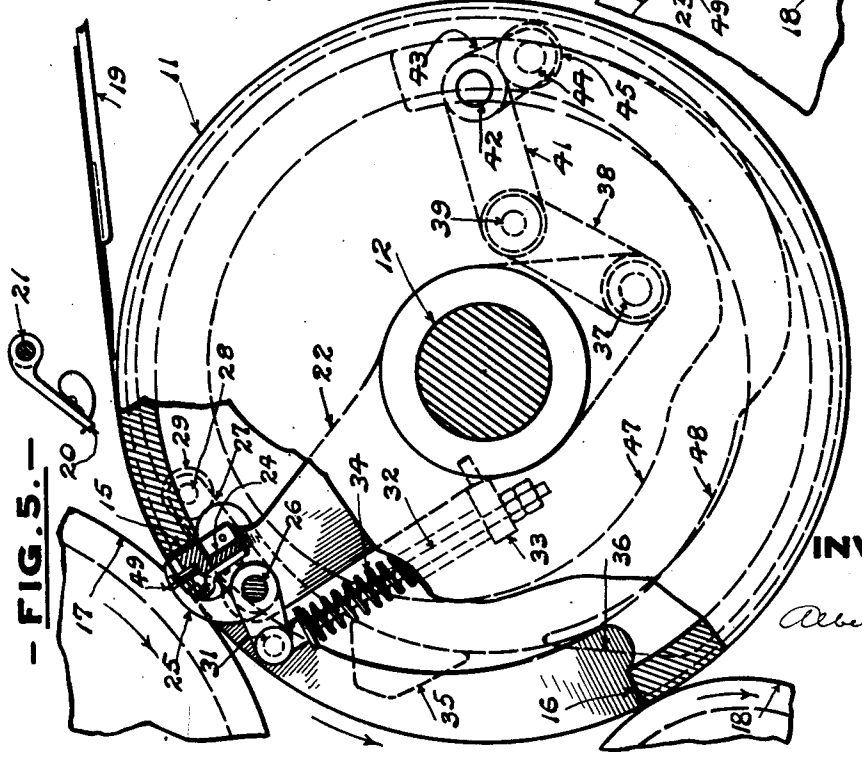


FIG. 5.

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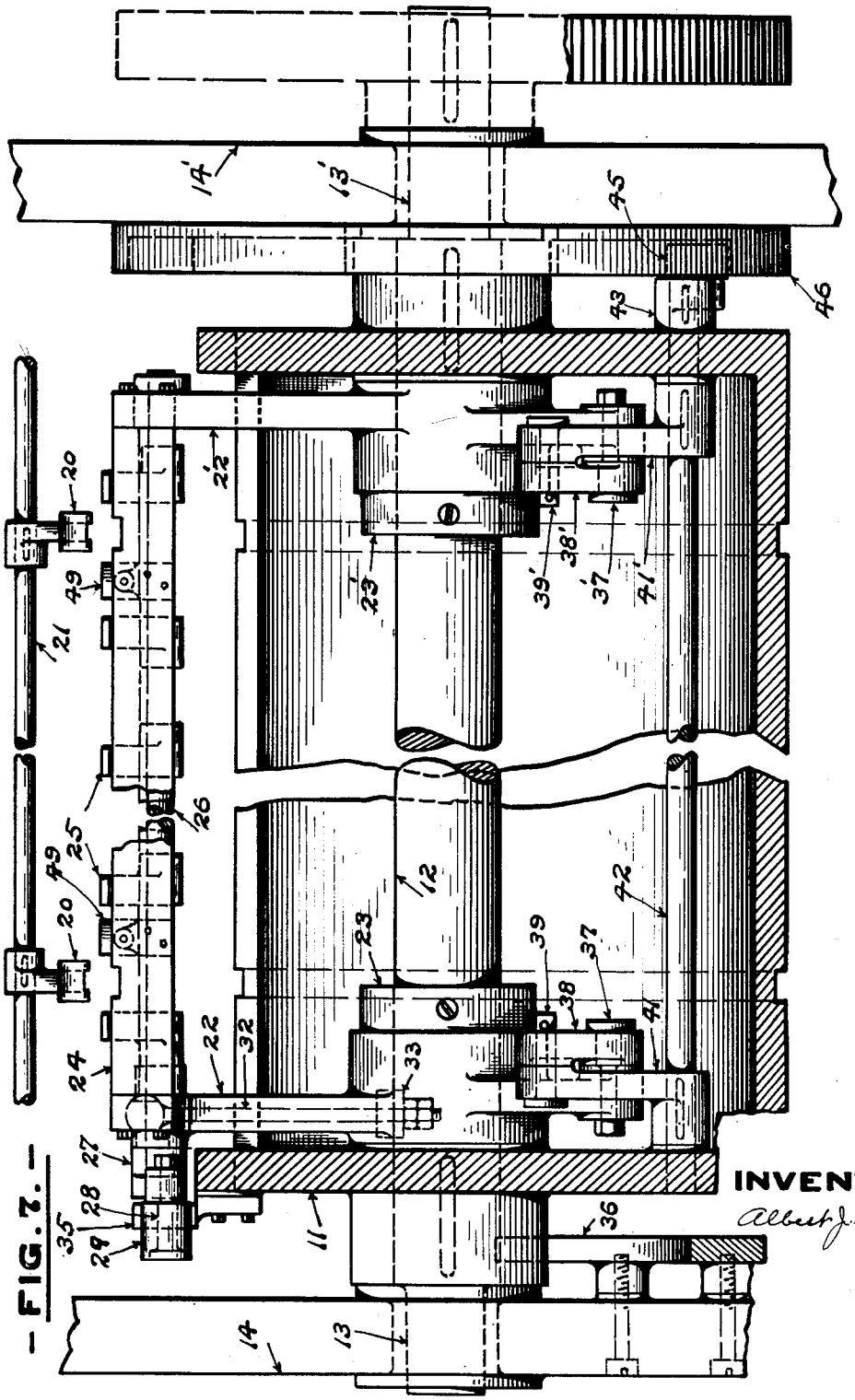


FIG. 7.

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UNITED STATES PATENT OFFICE

ALBERT J. HORTON, OF WHITE PLAINS, NEW YORK, ASSIGNOR TO R. HOE & CO., INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

GRIPPER MECHANISM

Application filed May 28, 1930. Serial No. 456,485.

The present invention relates to gripper mechanism for holding a sheet on the periphery of a cylinder for printing or otherwise operating upon it.

Heretofore, difficulty has been experienced in obtaining accurate register of sheets that are fed to a moving cylinder as, when grippers carried by the cylinder engage stationary sheets, there is frequently a variation in the action of the grippers on successive sheets that results in a corresponding variation in the position in which the sheets are held on the cylinder.

Efforts to overcome this difficulty have been made by using a feeding cylinder or equivalent device that is held stationary while the sheet is fed to it and thereafter accelerates the sheet to impression cylinder speed and transfers it to grippers carried on the impression cylinder, but such devices have not been entirely satisfactory, as loss of register frequently occurs when transferring the sheet, even though the sheet is moving at a speed that is the same as that of the impression cylinder.

The arrangement disclosed herein provides a gripper mechanism that may be used with the usual form of sheet registering mechanism in which the sheet is held in a definite position on the feed board of the printing machine, and in accordance with the invention, means are provided for moving the grippers backward to engage the sheet and then to move them forward with the sheet and accelerate it to the speed of the printing cylinder before the printing operation begins.

It will be seen that this arrangement avoids the necessity for transferring the sheet from one moving mechanism to another, and as the gripper mechanism is so arranged that the gripper seats are at rest when the grippers take the sheet, it is possible to obtain very accurate register in the printing.

An object of the invention is to provide a gripper mechanism for holding a sheet on a rotating support, so arranged that during a portion of its cycle of operation, the mechanism will move backward to take the sheet.

Another object of the invention is to provide a gripper mechanism for holding a sheet on a rotating support, so arranged that during one portion of its cycle of operation, it will move backward to take a sheet, and during another portion of its cycle of operation, will move forward and accelerate the sheet to the speed of the support.

It is also an object of the invention to provide a gripper mechanism of generally improved construction, whereby the device will be simple, durable and inexpensive in construction, as well as convenient, practical, serviceable and efficient in its use.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts, and in the details of construction hereinafter described and claimed, it being understood that various changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:

Figure 1 shows a sectional view of an impression cylinder of a printing machine in which the invention is incorporated, and showing fragments of a cooperating form cylinder and of a delivery cylinder, the view showing the relative position of the parts after the sheet has been released by the gripper mechanism and taken by the grippers of the delivery cylinder;

Figure 2 is a view similar to Figure 1, but showing an end view of the impression cylinder with a portion of its end wall broken away, and showing the relative position of the parts prior to the opening of the fingers of the gripper mechanism to take a sheet from the feed board;

Figure 3 is a similar view in which the fingers of the gripper mechanism have opened to take a sheet and the mechanism is moving backward;

Figure 4 shows the gripper mechanism in the position in which it is held stationary ex-

cept for the motion of the gripper fingers which at that instant close on the sheet;

Figure 5 shows the relative positions of the parts when the gripper mechanism has accelerated the sheet to cylinder speed and it is about to be engaged by a plate on the form cylinder;

Figure 6 shows the relative positions of the parts when the leading end of the sheet is about to be transferred to the delivery cylinder;

Figure 7 is a view partly in section showing the impression cylinder, the gripper mechanism and the sheet registering mechanism as viewed on the line A—A of Figure 4 and in the direction of the arrow; and

Figure 8 is a view of the gripper shaft and associated parts as seen in the direction of arrow 8 of Figure 4.

In the drawings, 11 indicates an impression cylinder that is secured to a shaft 12, that is arranged to rotate in bearings 13 and 13′, in side frames of a machine indicated in Figure 7, at 14 and 14′. The impression cylinder is provided with an impression surface extending clockwise about the cylinder from a point indicated by the numeral 15 to a point indicated by the numeral 16, and there is an opening or gap extending clockwise from the point 16 to the point 15. A form cylinder adapted to carry a printing plate is indicated at 17 and a transfer cylinder is indicated at 18. A feed board of the usual design is shown at 19, and a portion of a registering mechanism, including stops 20 secured to a shaft 21.

The gripper mechanism that is the subject of the invention includes arms 22 and 22′ rotatable on the shaft 12, and held in place by means of collars 23 and 23′ secured to the shaft 12. The arms 22 and 22′ have secured thereto, a cross member 24 that forms a seat for gripper fingers 25 secured to a shaft 26 that is rotatable in bearings formed in the arms 22 and 22′. An arm 27 is secured to the shaft 26, and on one end, carries a pivot pin 28, that rotatably supports the roller 29. The other end of the arm 27 carries a pivot pin 31, that serves as a connection for the head of a plunger rod 32, the opposite end of which is slidably supported by the poppet 33 that is secured to the arm 22. A spring 34 is mounted on the rod 32, and it will be understood, tends to turn the gripper shaft in a direction to close the grippers.

A cam 35 is secured to the end wall of the cylinder 11 in position to be engaged by the inner end of the roller 29, and the cam 36 is secured to the frame 14 in position to be engaged by the outer end of the roller 29, these cams acting to open the grippers as will be hereinafter explained.

The arms 22 and 22′ are extended beyond the shaft 12 and carry pivot pins 37 and 37′ on which one end of each of the links 38 and 38′ are pivoted, and the opposite ends of the links rotate on pivot pins 39 and 39′, carried by arms 41 and 41′, that are secured to a shaft 42, rotatably supported in bearings in the cylinder 11.

The shaft 42 extends beyond the cylinder 11, and secured thereto is an arm 43, provided with a pivot pin 44 that rotatably supports a roller 45 adapted to engage a cam member 46 secured to the frame 14′. The cam member 46 has an inner face 47 and an outer face 48 both of which are adapted to engage the roller 45 and affect the motion of the arms 22 and 22′ that carry the gripper mechanism. Register stops 49 are adjustably secured to the cross member 24 and serve to align the edge of the sheet in proper register with the gripper mechanism, before the gripper fingers engage it. The transfer cylinder 18 is provided with gripper fingers 51 which are arranged to take the sheet after it is printed and transfer it to a delivery mechanism not shown.

In describing the operation, it is convenient to start with the position shown in Figure 1 in which a sheet is being printed and the leading edge has just been released by the gripper fingers 25 and has been taken by the gripper fingers 51. It will be understood that rotation of the cylinder in the direction indicated by the arrows will result in transferring the sheet from the impression cylinder to the delivery cylinder.

The operation of opening the gripper fingers 25, at this point is effected by the stationary cam 36, which as shown in Figure 1, acts on the roller 29 to rotate the gripper shaft.

It will be noted that in Figure 1, the cross member 24 is closely adjacent the point 15 on the impression cylinder. Rotation of the impression cylinder from the position shown in Figure 1 to the position shown in Figure 2 results in moving the gripper mechanism forward in the cylinder gap, increasing the distance between the cross member 25 and the point 15, so they are widely separated when the gripper fingers 25 pass under the edge of the next sheet to be taken, this being effected by the action of the cam surface 48 on the roller 45 which results in rotating the gripper mechanism at a higher speed than the impression cylinder during this portion of its rotation. It will be understood that the impression cylinder is rotated at a speed that is constant throughout its revolution. It will be noted that in Figure 2, the roller 29 is in engagement with the cam 35, and that in the position of the impression cylinder as shown in Figure 3, the cylinder has moved forward, while the gripper seat has remained stationary and that the gripper fingers have opened. The maintenance of the gripper seat in a stationary position is effected by the con-

tour of that portion of the inner cam face 47, with which the roller 45 is shown in contact in Figure 3, and the grippers are opened by the action of the cam 35 on the roller 29.

Rotation of the impression cylinder to the position shown in Figure 4 results in moving the gripper mechanism clockwise, and further backward with respect to the rotation of the impression cylinder, then arresting its motion, and simultaneously closing the gripper fingers 25 to engage the sheet. It will be understood that suitable mechanism of well known form that is not shown, is provided to move the sheet registering arms 20 out of the path of the sheet to the position shown in Figure 4.

As the impression cylinder travels forward from the position shown in Figure 4 to that shown in Figure 5, the cam surface 48 acts on the roller 45 to move the arms 22 and 22′ forward and accelerate them to the speed of the impression cylinder. The cross member 24 will then again be adjacent the point 15 of the impression cylinder, and the sheet in position to be presented to the printing plate carried on the form cylinder 17. Further rotation of the impression cylinder brings it to the position shown in Figure 6, in which the cam roller 29 is in position to engage with the cam 36 and open the gripper fingers 25 to deliver the sheet to the transfer cylinder as shown in Figure 1, thus completing a cycle of operation.

From the foregoing description, it will be seen that a gripper mechanism has been provided that is supported on a rotatable carrier and arranged to pass under a sheet held in registered position on the feed board of a printing machine, the gripper fingers will then open slightly and the carrier move backward and remain stationary for an instant while the gripper fingers close on the sheet, and the carrier will then move forward with the sheet, and accelerate it to printing cylinder speed by the time it reaches the form cylinder, thus avoiding the difficulty encountered in maintaining register when a sheet is taken from rest by a moving gripper mechanism or transferred from one gripper mechanism to another while both are moving at a high rate of speed.

What I claim is:

1. In a printing machine, a rotatable impression cylinder, a rotatable gripper carrier supported coaxial with the cylinder, a gripper mechanism on the carrier, and means to rotate the carrier oppositely to the rotation of the cylinder during a portion of the cylinder's revolution.

2. In a printing machine, a rotatable impression cylinder, a rotatable gripper carrier supported coaxial with the cylinder, a gripper mechanism on the carrier, and means to rotate the carrier in the same direction as the cylinder during the greater portion of the cylinder's revolution, and oppositely to the rotation of the cylinder during the remainder of its revolution.

3. In a printing machine, registering mechanism to position a sheet in register, an impression cylinder, a gripper carrier rotatable on bearings concentric with the axis of the cylinder, a gripper mechanism on the carrier, means to rotate the carrier oppositely to the rotation of the cylinder to take the sheet from the registered position, and in the same direction as the cylinder to accelerate the sheet to the peripheral speed of the cylinder.

4. In a printing machine, an impression cylinder rotatable in a forward direction at constant speed, a gripper mechanism on a rotatable carrier supported coaxially with the impression cylinder, and means to rotate the carrier backward to take a sheet and forward at a varying speed, to accelerate the sheet to the speed of the impression cylinder.

5. In a printing machine, a sheet support having means to locate a sheet in position to be taken, a rotatable impression cylinder, a gripper mechanism on a rotating carrier separate from the cylinder, means to actuate the gripper mechanism to take a sheet from the support and to hold it for printing, and means for rotating the carrier backward to take a sheet, and forward at the speed of the cylinder to hold the sheet thereon.

6. In a printing machine, a sheet support having means to register a sheet in position to be taken, a rotatable impression cylinder, a gripper mechanism on a rotary carrier separate from the cylinder, means to actuate the gripper mechanism to take a sheet from the support, to hold it on the cylinder, and to release it for delivery, and means for rotating the carrier backward to take a sheet, to rotate it forward at cylinder speed while holding the sheet on the cylinder, and to rotate it forward at an accelerated speed after the sheet is released.

7. In a printing machine, a sheet support, a sheet registering mechanism adapted to register a sheet on the support, a rotatable impression cylinder, a gripper carrier rotatable around the axis of the cylinder, and means to rotate the gripper carrier with the cylinder to hold the sheet thereon and oppositely to the cylinder to take a sheet from the support.

8. In a printing machine, a sheet support, means to register a sheet on the support, a rotatable impression cylinder, grippers on a rotary carrier supported on bearings concentric with the axis of the cylinder, means to rotate the cylinder forward at a constant speed, means to rotate the carrier forward to move the grippers past the edge of a sheet on the support, then backward into sheet engaging position, then to hold it stationary while the grippers take the sheet, and then

to rotate it forward at cylinder speed while the sheet is being printed.

9. In a printing machine, a sheet support, means to register a sheet on the support, a rotatable impression cylinder, grippers on a rotary carrier supported on bearings concentric with the axis of the cylinder, means to rotate the cylinder forward at a constant speed, means to rotate the carrier forward to move the grippers past the edge of a sheet on the support, then backward into sheet engaging position, then to hold it stationary while the grippers take the sheet, and then to rotate it forward at cylinder speed while the sheet is being printed, and registering stops on the gripper carrier adapted to register the edge of the sheet.

10. In a printing machine, a sheet support, a sheet registering mechanism adapted to register a sheet on the support, a rotatable impression cylinder, grippers on a rotary carrier rotatable around the axis of the cylinder, means to rotate the cylinder forward to move the grippers past the edge of a sheet on the support, then backward into sheet engaging position, then to hold it stationary while the grippers take the sheet, and then to gradually accelerate it to the speed of the cylinder.

In testimony whereof, I affix my signature.

ALBERT J. HORTON.