July 28, 1931. W. E. BENNISON 1,815,895

PLATE PRINTING MACHINE

Filed Jan. 11, 1929 3 Sheets-Sheet 1

FIG. 1.

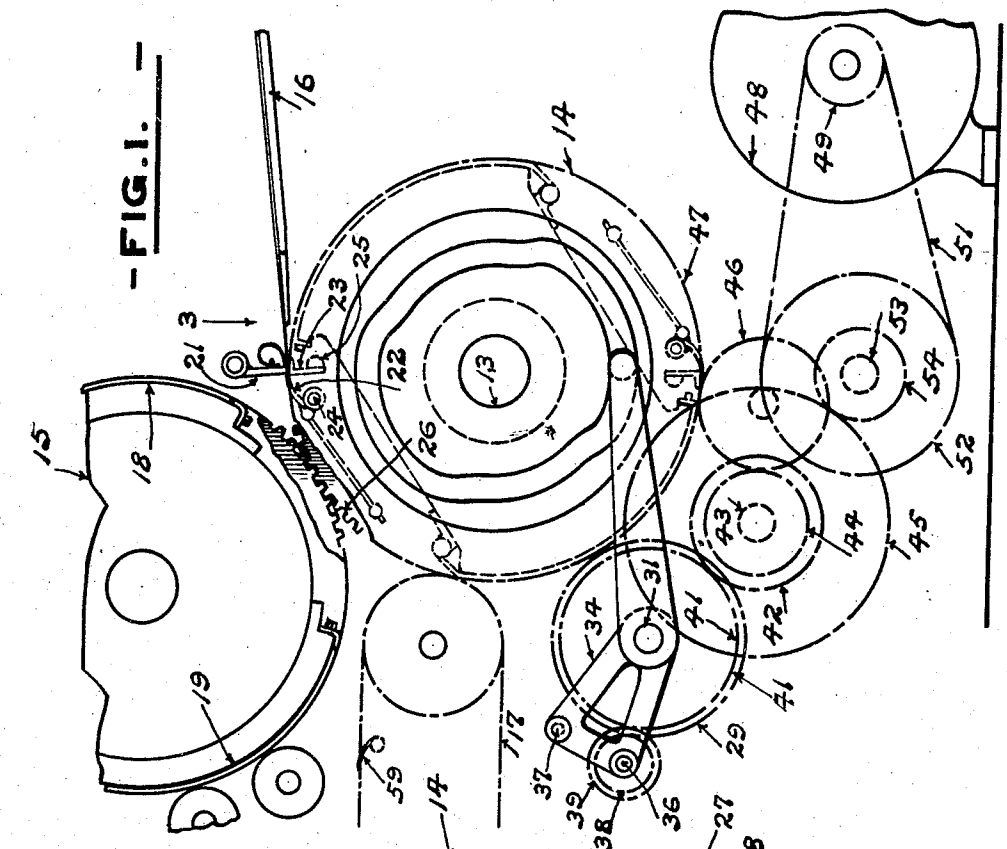
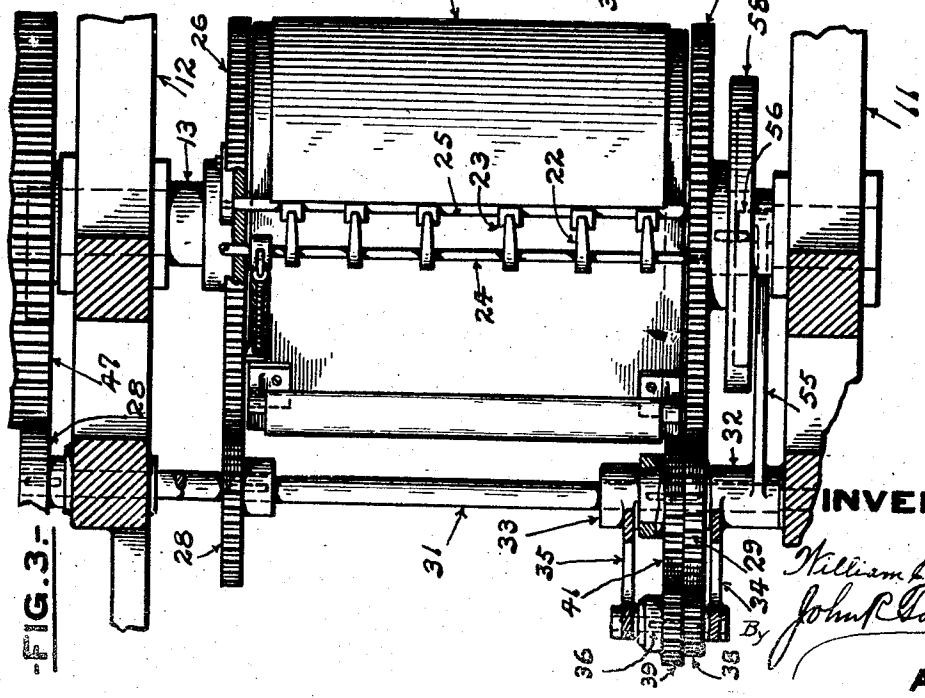



FIG. 3.




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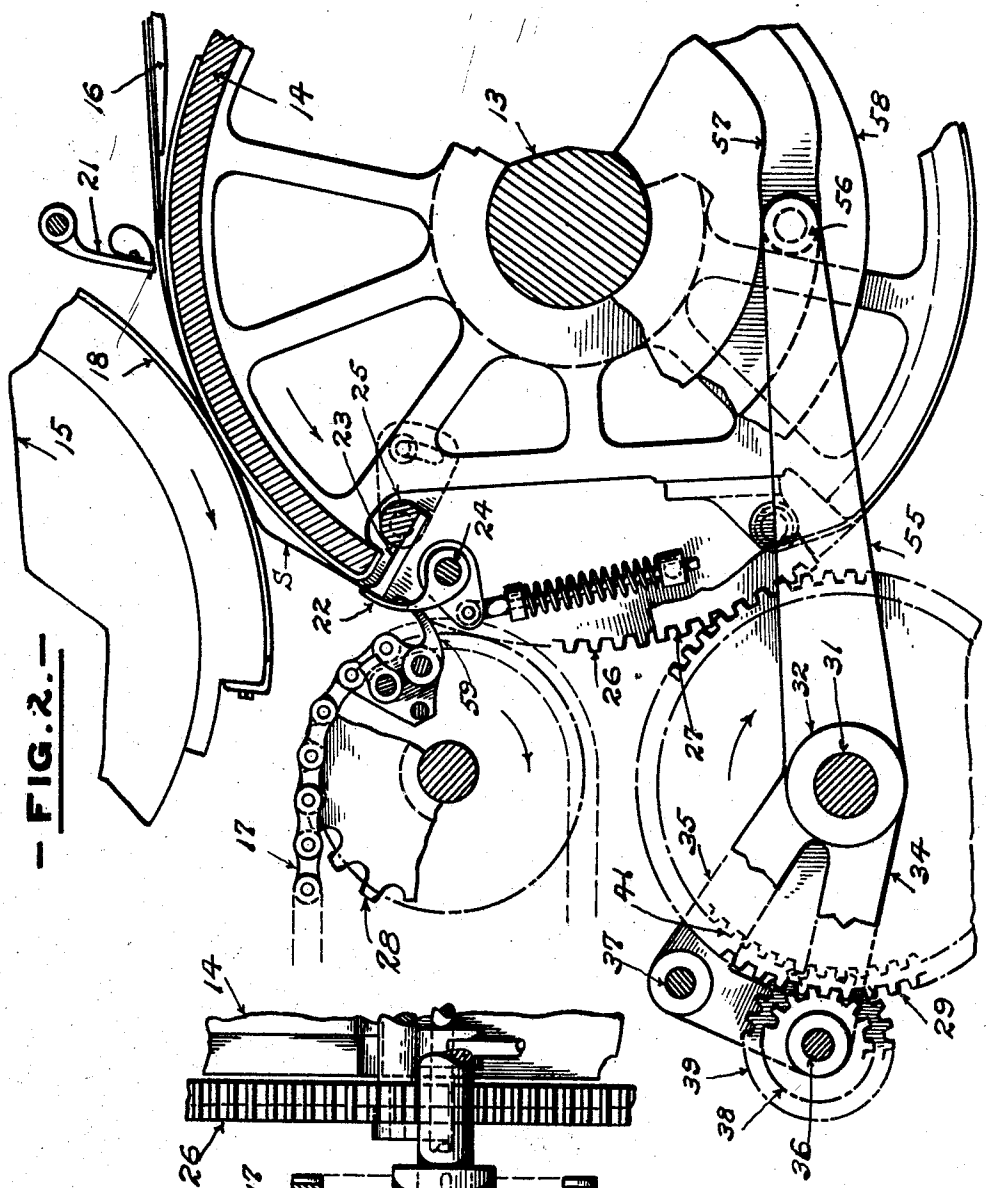



FIG. 2.

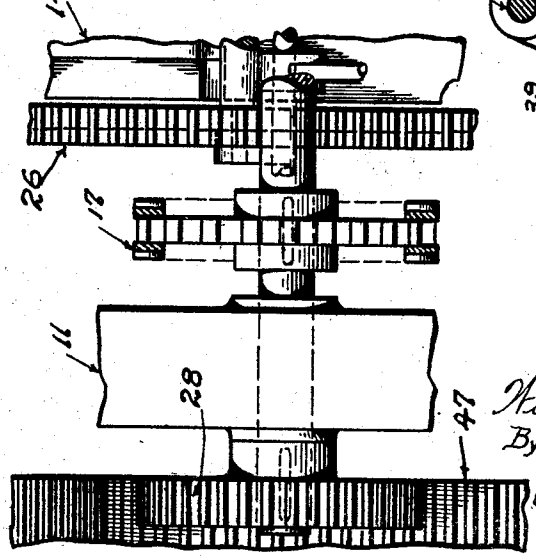



FIG. 4.

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PLATE PRINTING MACHINE

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FIG. 5.

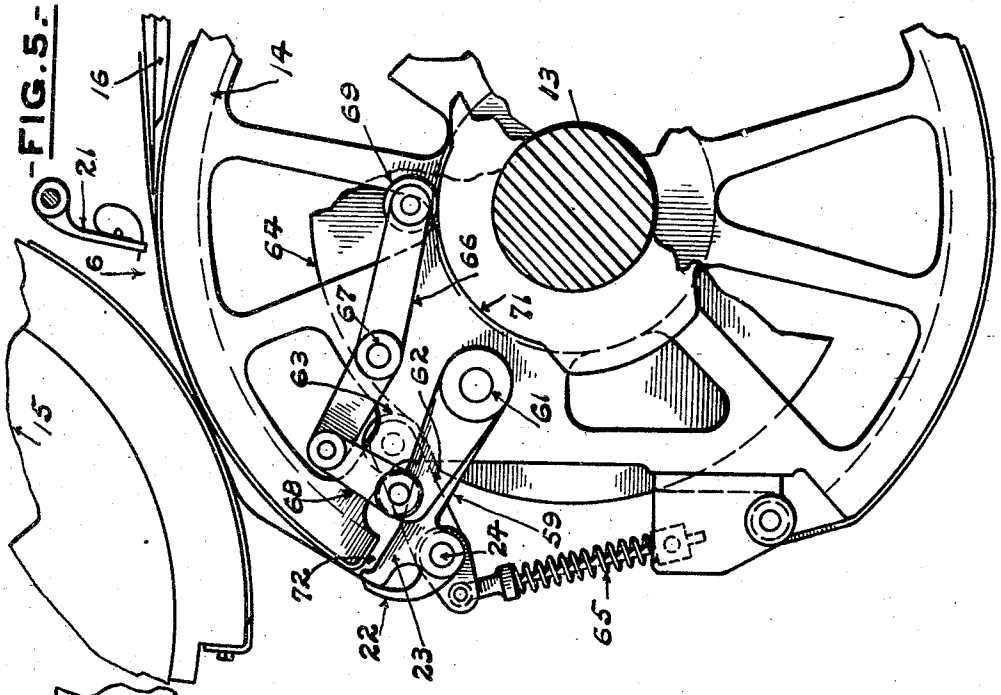
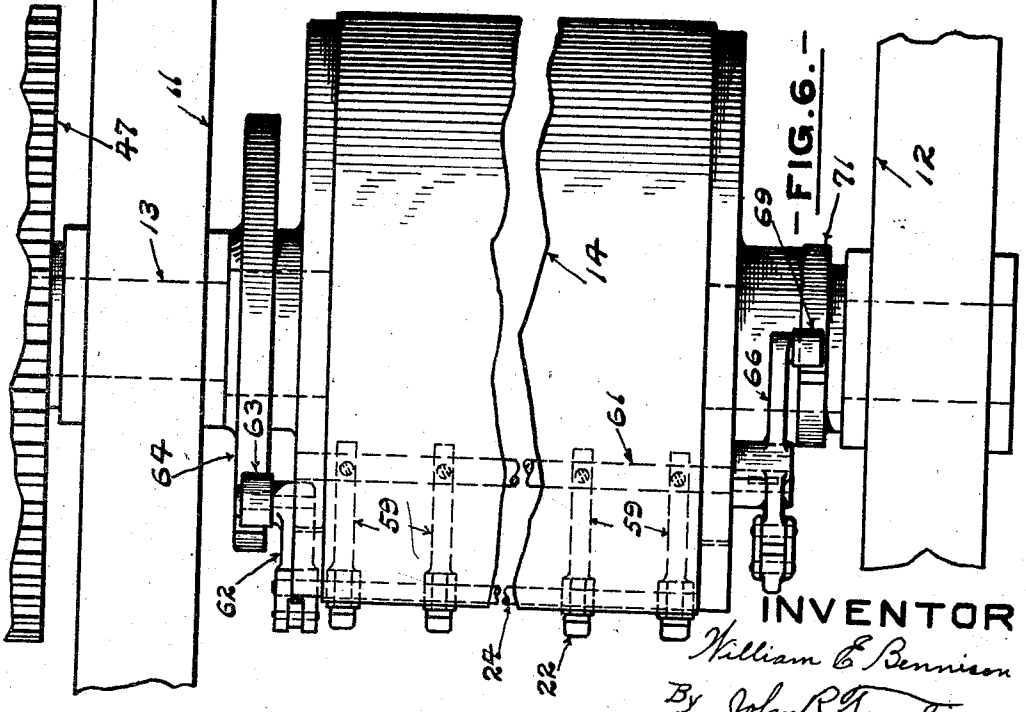



FIG. 6.




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Patented July 28, 1931 1,815,895

# UNITED STATES PATENT OFFICE

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## PLATE PRINTING MACHINE

Application filed January 11, 1929, Serial No. 331,788, and in Great Britain January 16, 1928.

This invention relates to rotary printing machines, and particularly to the class generally known as power plate printing machines, in which a plate cylinder carrying one or more engraved plates co-acts with an impression cylinder having grippers which grasp the leading edge of the sheet on which the impression is made.

It has been found that the high degree of pressure required, causes the plate and the paper to be embedded into the covering of the impression cylinder, and if the grippers maintain a firm hold on the sheet, it is frequently torn or crinkled, due to the fact that the radius of the impression cylinder at the point of impression contact is less than elsewhere, and consequently the sheet travels slower at that point. With the mechanism herein disclosed, means are provided for retarding the rotation of the grippers after they have passed the bite of the cylinders, thus causing a slackness of the portion of the sheet that has been printed, and avoiding the difficulty experienced.

The especial object of the invention is to provide a means for holding a sheet on an impression cylinder, in position to receive an impression, and after a portion of the sheet has been printed to create a slackness in that portion of it, without releasing the sheet from the holding means.

It is also an object of the invention to provide a sheet holding means of generally improved construction, whereby the device will be simple, durable and inexpensive in construction, as well as 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.

In the accompanying drawings,

Figure 1 is a diagrammatic view showing the general arrangement of a portion of a printing machine incorporating the invention.

Figure 2 is a detailed view similar to Figure 1, of the impression cylinder and co-acting mechanism shown partly broken away and partly in section,

Figure 3 is a view of the impression cylinder and adjacent parts showing the mechanism as viewed in the direction of arrow 3 of Figure 1, certain of the parts being broken away and others shown in section,

Figure 4 is a fragmentary view showing a portion of the end of the impression cylinder and the connections for driving the delivery mechanism.

Figure 5 is a diagrammatic view of a portion of a printing machine similar to Figure 2, but showing a modified embodiment of the invention; and

Figure 6 is a view showing the impression cylinder partly broken away and with the modified arrangement as viewed in the direction of arrow 6 of Figure 5.

In the drawings, 11 and 12 indicate the side frames of the printing machine which carries bearings for the shaft 13, to which the impression cylinder 14 is secured. The plate cylinder 15 is similarly supported in co-acting relation with the impression cylinder.

A feed board 16 is provided, from which sheets to be printed are fed to the printing cylinders 14 and 15, and thereafter they pass to a delivery chain 17, which conveys them to a delivery.

The plates 18 and 19 may be secured to the cylinder 15 by any suitable means, and be inked and wiped in the usual manner.

Registry stops of the usual form are provided, one of which is shown in the raised position at 21. It will be understood that except when they are raised to clear the sheet they bear against stops on the feed board and serve to align the sheet in position to be taken between grippers 22, and gripper abutments 23, these grippers being operated in a well known manner.

The grippers 22 are secured to the shaft 24, and the gripper bars 23 to the shaft 25. These shafts extend through the cylinder 14, and in the preferred arrangement, have bear-

ings in the disc gears or carriers 26 and 27, which turn on the cylinder shaft 13, and which mesh respectively with gears 28 and 29, keyed to the shaft 31.

The shaft 31 is rotatably supported in the frames 11 and 12, and carries hubs 32 and 33, to which are attached arms 34 and 35, which support the spindle 36. A rod 37 is secured to the arms 34 and 35, and serves to hold them in alignment.

The gear 29, meshes with the gear 38, which is secured to the gear 39, and both gears 38 and 39 turn freely on the spindle 36. The gear 39 meshes with a gear 41, which turns freely on the hub of the gear 29, and which in turn meshes with a gear 42, secured to a shaft 43. Gears 44 and 45 are also secured to shaft 43, and gear 44 meshes with gear 46, which meshes with the cylinder gear 47.

An electric motor 48 has a pulley 49 which is connected by belt 51 with pulley 52 secured to shaft 53, to which a gear 54 is also secured, and which meshes with the gear 45. A connection for driving the impression cylinder is thus provided from the motor to shaft 53, and thence through gears 54 to 45, 44 to 46, and 46 to 47. A connection is also provided for driving the discs 26 and 27 which support the gripper mechanism, and is made from gear 42 to 41, 41 to 39, 38 to 29, and from 29 and 28, to 27 and 26 respectively. These two gear trains are arranged to rotate the cylinder 14 and the discs 26 and 27 at the same rotative speed, so that normally they are driven in synchronism.

The hub 32 carries an arm 55, having a roller 56 running in a slot 57 in the cam disc 58, secured to the cylinder shaft 13. It will be understood that when the cylinder revolves, the arm 55 will turn the hub 32 on the shaft 31, and rock the arms 34 and 35, carrying the gears 38 and 39, and this motion will result in alternately advancing and retarding the rotation of the discs 26 and 27 with relation to the cylinder 14; this action being caused by the difference in the diameters of the gears 38 and 39, and of 29 and 41, which causes a relative motion between the gears 29 and 41 when the arms 34 and 35 are rocked.

Any suitable means may be used for controlling the action of the grippers 22, so they will close on the sheet as the cylinder passes the registry stops and open when they reach the conveyor of the delivery mechanism, where the sheet is taken by grippers 59, carried on the chain 17.

In operation, a sheet is placed on the feed board 16 and against the registry stops 21, and is taken by the grippers 22. The stops swing out of the way to let the sheet pass, and it is carried forward into the bite of the cylinders where the impression is made. After the grippers have passed this point, the arms 34 and 35 are rocked downward causing a slight deceleration of the discs 26 and 27, thus moving the grippers 22 and gripper bars 23 backward, relative to the cylinder 14, and forming a slackness in the sheet between the grippers and the bite of the cylinders, as shown at S in Figure 2.

It will thus be understood that the sheet is drawn between the cylinders solely by their nip, and provision is thus made to allow for a difference in speed between the sheet and that of the normal periphery of the impression cylinder.

After the grippers 22 release the sheet and it is taken by the delivery grippers 59, the arms 34 and 35 are rocked upward, restoring the grippers 22 and the gripper bars 23 to their former position relative to the impression cylinder 14.

In the modified form of the invention shown in Figures 5 and 6, the disc gears 26 and 27 are omitted and the gripper mechanism is carried by arms 59, secured to the shaft 61, which is arranged to oscillate in bearings in the ends of the cylinder 14.

The shaft 24 carrying the grippers 22, is rotatably supported by the arms 59, and is secured to an arm 62, carrying a roller 63, which engages a cam 64, secured to the frame 11. A spring 65, connected to the arm 62, tends to turn the shaft 24 clockwise, and hold the grippers closed, but they are opened at the proper time by the action of the roller 63 on the cam 64. The pressure of the spring 65 tends also to turn the shaft 61 clockwise.

An arm 66, is pivoted at 67, and connected to a link 68, which is in turn connected to the arm 59. A roller 69 on the arm 66, engages the cam 71, secured to the frame 12, thus resisting the action of the spring 65 on the shaft 61.

It will readily be understood that when the cylinder 14 is revolved the engagement of the roller 69 with the cam 71 will cause the gripper mechanism to be alternately moved toward and away from the side of the gap in the impression cylinder indicated at 72, and produce the same result on the sheet as the mechanism shown in Figures 1 to 4.

It will thus be seen that means have been provided, and a method disclosed, for holding a sheet by means of grippers until it is engaged by the printing cylinders and thereafter, while the grippers still hold the sheet, moving the grippers with relation to the impression cylinder to form a slackness in the sheet, whereby any difference that may exist between the speed of the sheet at the point of impression and the speed of the periphery of the impression cylinder produces no harmful result.

What I claim is:

1. In a printing machine, a rotating impression cylinder, sheet gripping mechanism rotating with the cylinder, and means for retarding the motion of the gripping mechanism with respect to the cylinder during a

portion of the time while a sheet is being printed.

2. In a printing machine, a rotating impression cylinder, and a sheet gripping mechanism associated with the cylinder and rotating at a slower speed than that of the cylinder during a portion of each revolution of said gripping mechanism and while a sheet is being printed.

3. In a printing machine, a rotating impression cylinder, and a sheet gripping mechanism associated with the cylinder and rotating at a slower speed than the cylinder during one portion of each revolution while a sheet is being printed and at a faster speed during another portion of each revolution of said gripping mechanism.

4. In a printing machine, a rotary impression cylinder, a sheet gripping mechanism supported on a separate rotating carrier, a driving mechanism adapted to normally drive the carrier at the same speed as that of the cylinder, and means for decreasing the speed of the carrier, while a sheet is being printed.

5. In a printing machine, a rotary impression cylinder, a sheet gripping mechanism supported on a separate rotating carrier, a frame carrying a planetary gear system adapted to normally drive the carrier at the same speed as that of the cylinders, and means to move the frame of the gear system to periodically increase and alternately decrease the speed of the carrier while a sheet is being printed.

6. In a rotary printing machine having a plate cylinder and a coacting impression cylinder, means for holding the leading edge of a sheet by a holding device which rotates about the axis of the impression cylinder and leads the sheet to the bite of the cylinders, and means for retarding the motion of the holding device after it has passed the bite of the cylinders.

7. In a rotary printing machine, a plate cylinder and a coacting impression cylinder, a sheet holding device that rotates with the impression cylinder while taking a sheet and while leading it to the bite of the cylinders, and means for retarding the rotation of the holding device after the leading edge of the sheet has passed the bite of the cylinders.

8. In a rotary printing machine having a plate cylinder and a coacting impression cylinder, means for holding the leading edge of a sheet and carrying it to and past the bite of the cylinders, and mechanism for moving said holding means backward relative to the motion of the impression cylinder while the sheet is in the bite of the cylinders.

9. In a rotary printing machine having a plate cylinder and a coacting impression cylinder, grippers adapted to hold a sheet on the impression cylinder, means to move the grippers at the peripheral speed of the impression cylinder, and means to retard the motion of the grippers while the sheet is in the bite of the cylinders.

10. In a rotary printing machine having a plate cylinder and a coacting impression cylinder, grippers adapted to hold a sheet on the impression cylinder, means to move the grippers in synchronism with the impression cylinder, and means to retard the motion of the grippers while the sheet is in the bite of the cylinders and to accelerate the motion of the grippers after they have released the sheet.

11. In a rotary printing machine having a plate cylinder and a coacting impression cylinder, means for taking the leading edge of a sheet and carrying it to and past the bite of the cylinders, and means for moving said taking means backward relative to the motion of the impression cylinder while the sheet is being printed and to accelerate the motion of said taking means after it has released the sheet.

In testimony whereof, I affix my signature.

WILLIAM EDWARD BENNISON.