

June 22, 1937.

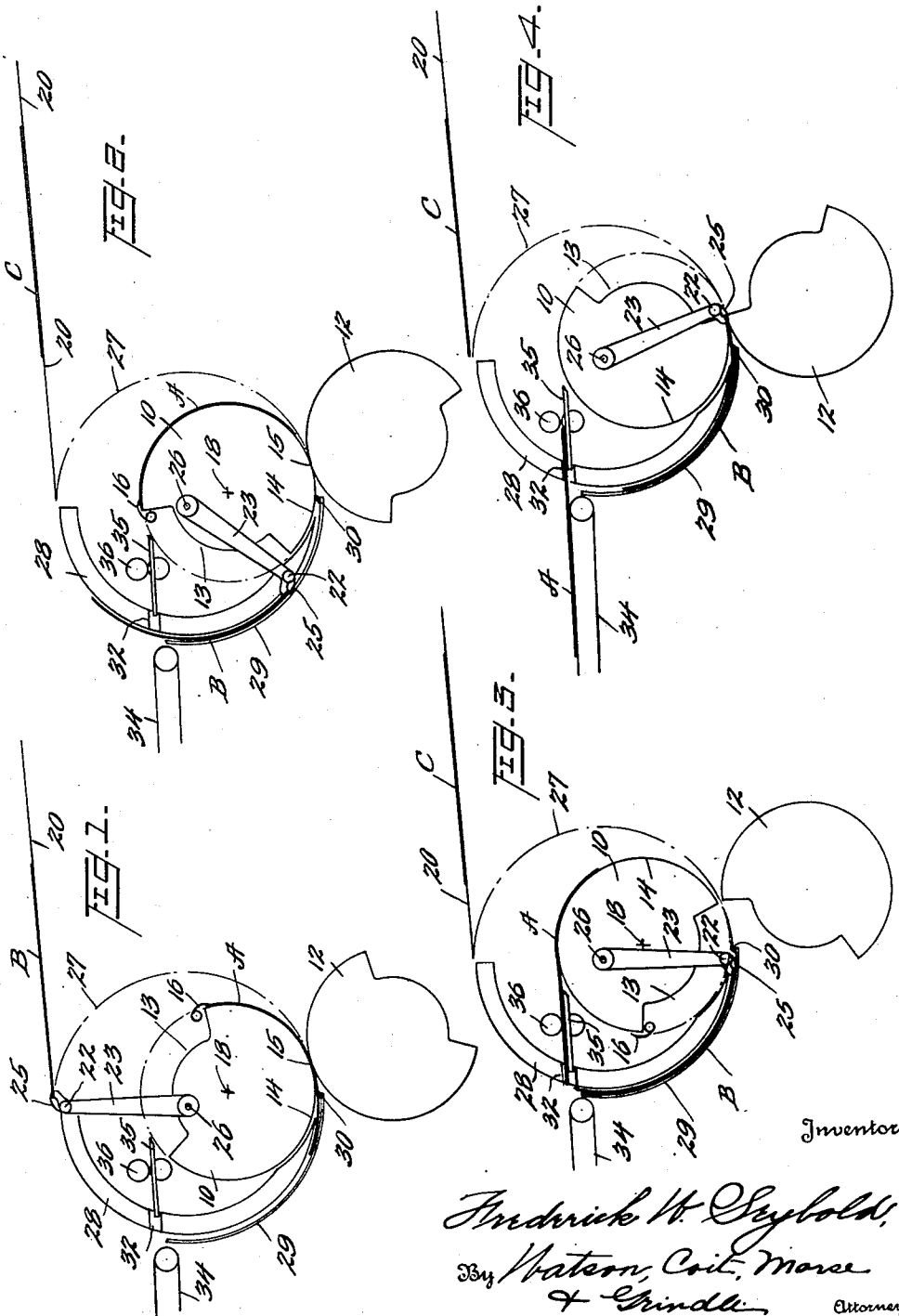
F. W. SEYBOLD

2,084,783

PRINTING PRESS

Filed April 3, 1936

3 Sheets-Sheet 1



Inventor

Fredrick W. Seybold,
By *Watson, Coit, Morse*
 & Spindle Attorney

June 22, 1937.

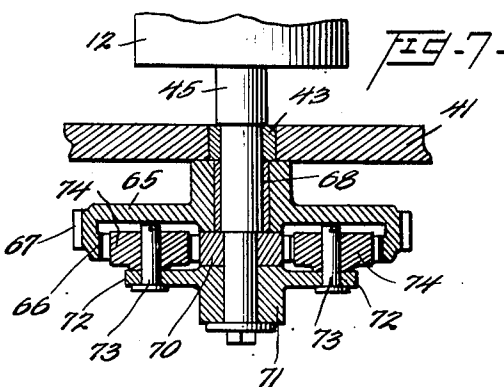
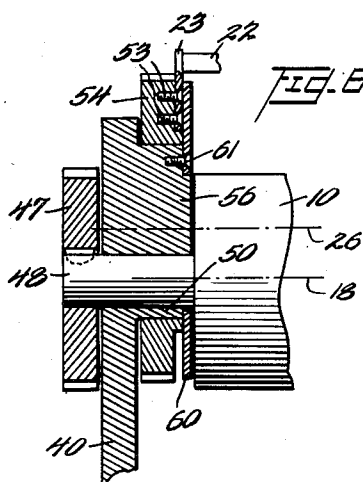
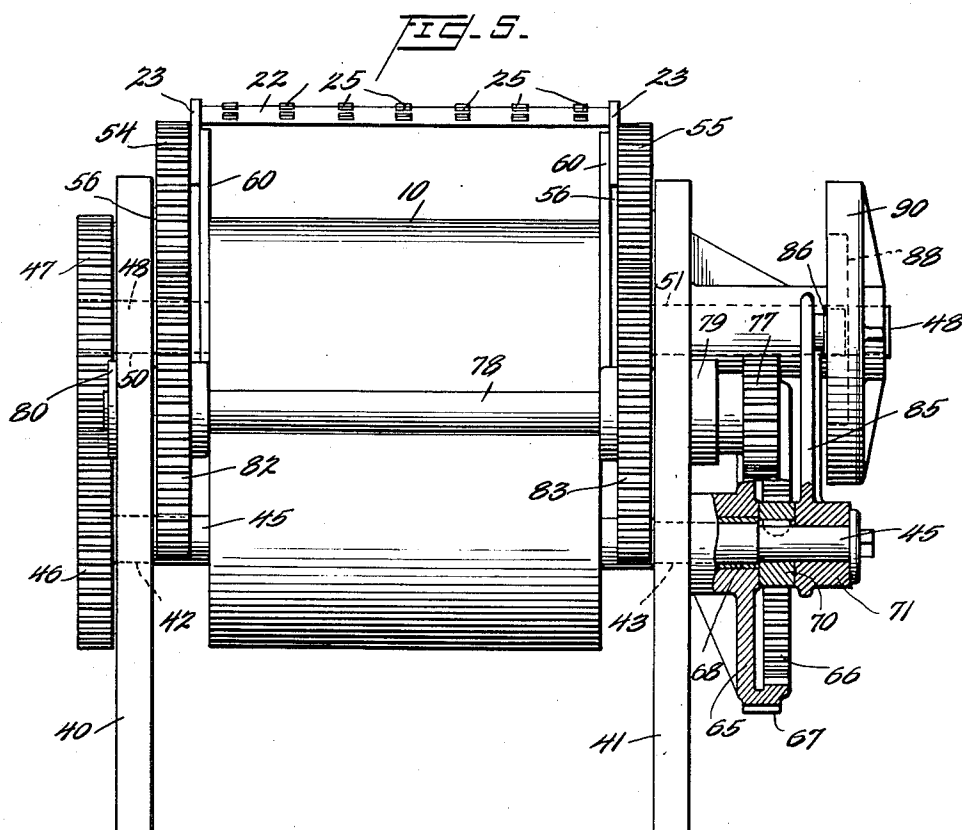
F. W. SEYBOLD

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PRINTING PRESS

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3 Sheets-Sheet 2



Inventor

Frederick W. Seybold,

*Watson, Coit, Moore
& Grindle,*

Attorneys

June 22, 1937.

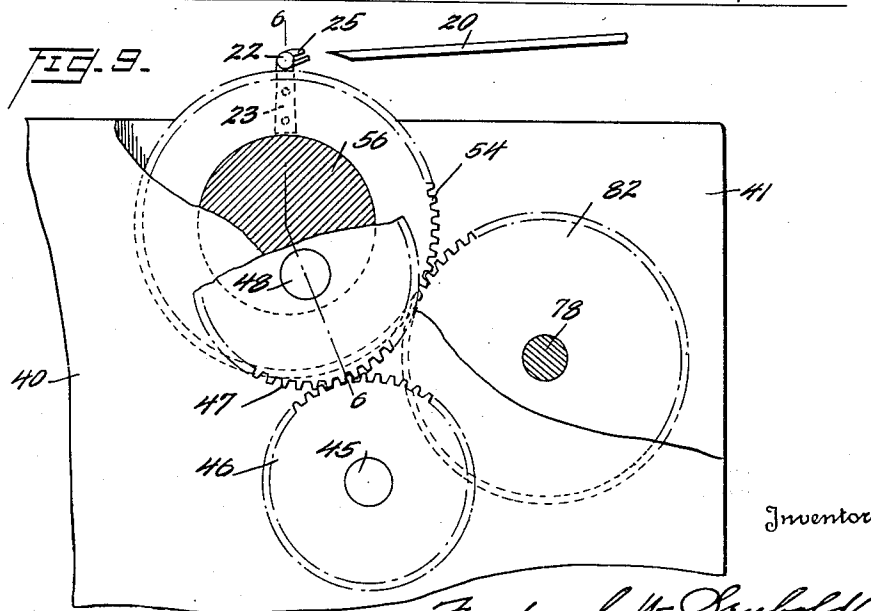
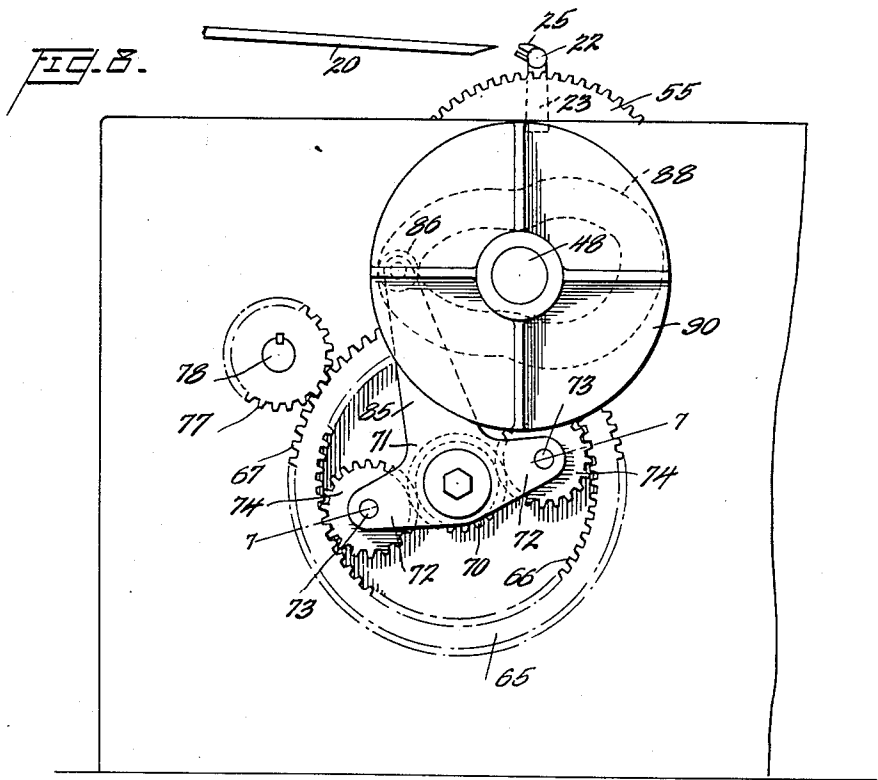
F. W. SEYBOLD

2,084,783

PRINTING PRESS

Filed April 3, 1936

3 Sheets-Sheet 3



Inventor

Frederick W. Seybold,
By Watson, Coit, Morse
& Grindle
Attorney

UNITED STATES PATENT OFFICE

2,084,783

PRINTING PRESS

Frederick W. Seybold, Westfield, N. J., assignor
to American Type Founders Incorporated, Elizabeth, N. J., a corporation of New Jersey

Application April 3, 1936, Serial No. 72,622

20 Claims. (Cl. 101—232)

This invention relates to printing presses and more particularly to printing presses of the type in which a rotary impression cylinder is employed as one member of the printing couple, and in which the arrangement and operation are such that one impression may be effected during each rotation of the impression cylinder.

The general object of the invention is to provide a novel and improved printing press of the class described.

It is more specifically an object of the invention to provide, in connection with the impression cylinder of a press of this type, certain auxiliary sheet handling mechanism which is adapted to cooperate with the impression cylinder to accomplish the successive feeding, printing, and delivery of a sheet during a single rotation of the cylinder, while at the same time preserving the accuracy of registry throughout the various exchanges of control over the sheet, and also ensuring that the impression will not be smudged or blurred.

In the operation of any printing press having a rotary impression member for printing separate sheets, there is presented the problem of taking each successive sheet from its stationary position on the feed board of the press against the registering devices, increasing the speed of the sheet to that of the form carrying member while maintaining the proper registry, and finally transferring the printed sheet to the delivery tapes or other receiving mechanism.

In most presses of this character, including those of the two-revolution bed and cylinder type, the impression cylinder is rotated at a constant angular velocity and the cylinder grippers are adapted to successively seize the sheets from the feed board while moving at the speed of the impression cylinder; but in some types, means have been employed to enable the sheet to be taken from the feed board while the gripper elements are moving at a slower speed and brought gradually up to impression speed, and thus aid in maintaining the proper registry during and after the transfer of the sheet. These latter presses have included reversing or oscillating impression cylinders; and in certain kinds of high speed rotary presses, there have been employed feeding cylinders which are designed to bring the sheet from its position of rest on the feed board up to impression cylinder speed and deliver it to that cylinder. Furthermore, in order to attain increased speed of operation, a transfer cylinder or spider is often provided to receive the printed sheet from the impres-

sion cylinder before it has completed one revolution thereon, and deliver it to its proper destination.

It is obvious, however, that these expedients require relatively costly installations and that in the use of transfer or delivery cylinders, the sheets are inverted during the process and thus the fresh impression is subject to smudging.

The present invention is designed to attain these stated general objects and purposes without resort to complicated or expensive feeding and delivery mechanism and, in its preferred embodiment, contemplates the provision of an auxiliary set of transfer grippers associated with the impression cylinder and having an eccentric orbit which is tangent to the periphery of the cylinder; the movement of the auxiliary gripper mechanism being variable during its cycle and designed to permit these grippers to seize a sheet from the feed board while they are at rest or nearly so, to carry the sheet forward at increased velocity, and then the sheet having attained the same speed as that of the cylinder, to transfer it to the usual cylinder grippers, and finally to proceed rapidly on to its initial position to receive the succeeding sheet, while the first mentioned sheet is being printed. Provision is also made for successively stripping the sheets from the impression cylinder at a point within the circle defining the orbit of the auxiliary gripper devices and delivering each of them through said circular orbit at intervals so timed as to avoid interference with the succeeding sheet which is being brought by the auxiliary grippers to the point of transfer to the impression cylinder; it being noteworthy that the sheets are delivered with the impression side uppermost without having passed around a delivery cylinder and that smudging is thus avoided.

Other objects and features of novelty, including the provision of novel driving gearing for correlating the speeds of the auxiliary grippers at the several stages of cooperation with the impression cylinder and the feed board, will be apparent from the following specification when read in connection with the accompanying drawings in which one embodiment of my invention is illustrated by way of example.

Figures 1-4 inclusive are diagrammatic views in side elevation of a rotary printing press embodying the principles of my invention, and from which a clear understanding of the operation of the auxiliary gripper feature may be obtained;

Figure 5 is a view in end elevation of the press, with the delivery mechanism and certain other

parts removed for the sake of clearness, and portions of the gearing shown in vertical transverse section;

Figure 6 is a fragmentary view in vertical section taken on line 6—6 of Figure 9;

Figure 7 is a fragmentary view in substantially horizontal section taken on line 7—7 of Figure 8;

Figure 8 is a partial view of the press in side elevation; and

Figure 9 is a similar view from the opposite side of the press, several of the parts being broken away for the sake of clearer illustration.

For purposes of illustration there is depicted in the drawings a rotary printing press embodying the various novel features of my invention, although the principles of the invention are also adaptable to presses of the bed and cylinder and other types.

In order to enable a clearer understanding of the invention to be obtained, the essential elements of the novel press and their general operation will be described first and then the details of the various elements comprising the press and their driving mechanisms will be set forth after the broader functions and operations of the press have become apparent. In this sequence, then, reference is made to Figures 1-4 of the drawings in which the essential elements are diagrammatically illustrated. The numeral 10 designates a rotary impression cylinder, which together with the plate cylinder 12 comprises the printing couple between which the sheets are successively passed to receive the impression. The impression cylinder is recessed as at 13 to provide space for the attachment of the cylinder blanket in the usual way and for certain operative portions of the gripper mechanism, which are not illustrated but which may be of any conventional or suitable type. The remainder of the periphery of the cylinder 10 comprises the impression surface 14 which generally occupies somewhat more than half of the circumference of the cylinder. The point of impression, where the impression cylinder 10 and the plate cylinder 12 contact, is indicated at 15, which in this instance is located just to the right of the lowest point of the impression cylinder. The usual cylinder grippers for seizing and registering the sheets in their proper position on the impression cylinder are indicated at 16. These grippers describe during the operation of the press a circular orbit represented substantially by the periphery of the impression cylinder and having its center at 18, which also represents the axis of the impression cylinder.

A feed board 20, provided with the usual front and side registering guides (not shown) is disposed, as in the usual arrangement, at a point remote from the point of impression 15, and in this case also in spaced relation with the plate cylinder 12. The reason for positioning the feed board in this manner will become apparent as the description of the operation of the press proceeds. In order to successively transfer the sheets to be printed from the feed board 20 to the impression cylinder there is provided an auxiliary gripper carrier 22 which is mounted upon suitable arms 23 and carries gripper members 25 which may be of conventional detailed construction, provided with sheet registering devices and actuated to seize and release a sheet at the proper intervals by mechanism well known in the art.

The gripper carrier arms 23 are indicated diagrammatically in Figures 1-4 as being pivoted

at 26 and the grippers 25 thus describe an orbit 27 which is eccentric to the orbit of the cylinder grippers 16 and which is tangent to the feed board 20 and is also arranged in tangential relation to the peripheral orbit of the cylinder grippers 16 substantially at the point of impression 15. The inner sheet bands or guides 28 are disposed across the width of the press and conform to approximately the first half of the orbit 27 of the auxiliary grippers 25, extending from the feed board 20 to the impression cylinder. Outer sheet bands 29 are also provided adjacent the lower segment of the orbit 27 and may carry a conventional brush 30 at their lower ends. The inner sheet bands or guides 28 are interrupted as at 32 to provide an opening through which the printed sheet may be transferred to the delivery tapes 34 by means of the stripping fingers 35 and feeding rollers 36 disposed within the orbit 27 of the auxiliary grippers and adjacent the periphery of the impression cylinder 10.

The operation of the sheet handling and printing portions of the press, which have been thus diagrammatically set forth, will now be described. In Figure 1 of the drawings, sheet B has been registered against the front and side guides of the feed board 20 and the auxiliary or transfer grippers 25 are about to seize the sheet. At this juncture the grippers 25 are either stationary or moving in a counterclockwise direction at a very slow speed, while the impression cylinder 10 is rotating, preferably at a constant speed, about its axis 18 also in a counterclockwise direction in printing contact with the plate cylinder 12, a previously fed sheet A being carried upon the impression cylinder 10 by means of the cylinder grippers 16. Immediately after the grippers 25 have seized the front edge of the sheet B, and upon release of the front guides of the feed board, the auxiliary gripper mechanism moves through approximately the first half of its orbit 27 at increasing velocity, drawing the sheet B along the guides 28 as shown in Figure 2 of the drawings.

In the position shown in Figure 2, the impression cylinder grippers 16 are about to release the first sheet A which has received its impression, so that the sheet strippers 35 may remove the sheet from the impression cylinder. By the time that the auxiliary grippers 25 have reached the lowermost point of their orbit as indicated in Figure 3 of the drawings the tail end of the sheet B which they are carrying along the guides 28, 29 has passed the opening 32 in the sheet bands or guides 28 and the front edge of the printed sheet A is being passed through the opening 32 and onto the delivery tapes 34. At this point the movement of the auxiliary grippers is retarded somewhat so that the cylinder grippers 16 may overtake them in order to effect the transfer of the sheet.

In the position shown in Figure 4, the printed sheet A is being carried away by the delivery tapes 34 and the front edge of the sheet B has been brought by the auxiliary grippers 25 to the point of tangency 15 of the auxiliary gripper orbit 27 and the periphery of the impression cylinder 10, which is substantially the point of impression between the members of the printing couple. At this point the auxiliary grippers 25 are moving at exactly the same linear velocity as the cylinder grippers 16 and are also in registry. During this period, the usual gripper actuating mechanism associated with each set of grippers is tripped to release the grippers 25

and to clamp the sheet B to the impression cylinder blanket by means of the cylinder grippers 16. Immediately after this transfer of the sheet B from the auxiliary grippers 25 to the cylinder grippers has occurred, the auxiliary gripper mechanism moves rapidly through the remainder of its orbit 27 back to its initial position at the edge of the feed board where it is again brought to rest, or nearly so, in order to receive the next succeeding sheet C which has by this time been properly registered upon the feed board 20 by means of the front and side guides. During this relatively rapid return movement of the auxiliary grippers 25, the sheet B is being carried through the printing operation by means of the cylinder grippers 16 and is taken from the impression cylinder by means of the stripper fingers 35 in just the same way as described in connection with the preceding sheet A.

It will be readily understood that by the means thus described and schematically illustrated in Figures 1-4 of the drawings, there has been provided mechanism for accurately feeding a sheet to the impression cylinder of a printing press, effecting the impression upon the sheet and delivering the same to its proper destination during each rotation of the impression cylinder, and accomplishing this without the use of complicated or expensive transfer cylinders or the like.

One embodiment of the mechanism which has been briefly described, is illustrated in Figures 5-9 of the drawings and will now be explained in considerable detail. In these figures of the drawings, the side frames of the press are illustrated at 40 and 41 and are provided with suitable bearings as at 42 and 43 for the shaft 45 of the plate cylinder 12. Upon one end of the shaft 45 is keyed the gear 46 which may be driven from any suitable source of power. This gear meshes with the gear 47 which is keyed to one end of the shaft 48 of the impression cylinder 10. The impression cylinder shaft 48 rotates in bearings 50 and 51 carried by the side frames 40 and 41. The gears 46 and 47 are of the same diameter, and thus the impression cylinder 10 and the plate cylinder 12, being also of the same diameter, are driven at identical speeds and in rolling contact.

The auxiliary grippers 25 are mounted on the carrier 22 which is supported between the arms 23, these arms 23 being secured as by means of the screws 53 to the gears 54 and 55 which are rotatably mounted upon the enlarged hubs 56 formed on or suitably secured to the side frames 40 and 41. Stationary flanges 60 are provided on each side of the impression cylinder 10 and are secured to a stationary portion of the press as by means of the screws 61. These flanges may carry the sheet bands or guides 28 and 29, illustrated in Figures 1-4 of the drawings, but omitted from Figures 5-9 for the sake of clearness. It will be noted also that the delivery mechanism has also been eliminated from the illustration in these latter figures. The eccentricity of the mounting of the auxiliary gripper carriers 22, 23 with respect to the impression cylinder 10 is readily apparent from Figure 6 of the drawings where the axis of the auxiliary grippers is indicated at 26 and that of the impression cylinder at 18.

In order to move the grippers 25 along their orbit 27 at their variable peripheral velocity, suitable gearing is operatively connected to the gears

54 and 55 which drive the auxiliary gripper mechanism and will now be described. Upon the right hand end of the plate cylinder shaft 45 exteriorly of the side frame member 41 there is rotatably mounted the ring gear member 65 provided with the internal toothed portion 66 and the external toothed portion 67. A bushing 68 is disposed tightly in this ring gear member 65 and rotates on the shaft 45. Outwardly of the ring gear 65 there is keyed the sun gear 70, and still further beyond this sun gear the planet carrier 71, mounted for relative rotation upon the shaft 45. Upon the two shorter arms 72 of the planet carrier 71 are rotatably mounted, as by means of the pins 73, the planet gears 74 which are in meshing engagement with both the sun gear 70 and the internal toothed portion 66 of the ring gear 65. The external toothed portion 67 of this ring gear meshes with the pinion 77 keyed to the shaft 78 which rotates in bearings 79 and 80 carried by the side frames 41 and 40 of the press. The shaft 78 is provided interiorly of each of the side frame members 40 and 41 with gears 82 and 83 which mesh respectively with the gears 54 and 55 which carry the auxiliary gripper mechanism 22, 25.

The planet carrier 71 is provided with a lever arm 85 on the end of which there is mounted a cam roller 86 which is disposed within and adapted to be guided by the cam groove 88 formed in the cam member 90 carried by the end of the impression cylinder shaft 48. Thus the planet carrier or spider 71 receives an oscillating motion from the irregularly shaped cam groove 88, which produces the alternate speeding up and slowing down of the ring gear 65 to effect the variable motion of the auxiliary gripper devices.

The gear ratio of the sun gear 70 to the internal gear 66 is 1:3 and the gear ratio of the external toothed portion 67 of the ring gear to the gear 77 is 3:1, and gears 82, 83 and 54, 55 are of the same diameter. The auxiliary gripper members 25 would, therefore, make one complete revolution for every revolution of the impression cylinder 10 were the planet carriers 71 to be held stationary. This is also true, although planet carrier 71 is oscillated in both directions by means of the cam groove 88, since the cam groove is a continuous groove and this oscillatory movement has no effect on the ultimate relative number of revolutions of the auxiliary grippers and the impression cylinder.

The shape of the cam groove 88 is such that preferably the speed of the auxiliary grippers 25 is zero or thereabouts, when a sheet is fed to these grippers as shown in Figure 1 of the drawings. In order to produce this zero angular velocity of the auxiliary grippers 25, the planet carrier 71 must have an angular velocity equal to one-quarter that of the sun gear 70 and turn in the same direction, this condition producing a zero velocity of the ring gear 65. Immediately thereafter the auxiliary grippers 25 must be accelerated so that the tail end of the sheet held by these grippers will pass the line of delivery of the preceding sheet through the opening 32 and onto the delivery tapes 34, before the arrival of the preceding sheet. In Figure 8 the driving mechanism is illustrated in its position at the point where the auxiliary grippers are about to receive this accelerated motion. As shown in Figure 3 of the drawings, the tail end of the sheet having passed the opening 32, the auxiliary grippers 25 must now be retarded so as to permit

the cylinder grippers 16 to overtake them, in order that the transfer of the sheet may take place as shown in Figure 4, at which point the linear velocity of both sets of grippers are identical, and their angular velocities are inversely proportional to their respective distances from their centers of rotation. Then, as already described, after the sheet has been transferred to the impression cylinder grippers 16 the auxiliary grippers 25 are again accelerated to the position shown in Figure 1, then again held stationary momentarily to receive the next succeeding sheet, and the cycle is repeated.

It will be understood from the description of the mechanism disclosed to best advantage in Figure 8 of the drawings that a clockwise rotation of the planet carrier 71 by the cam groove 88 produces an acceleration of the movement of the auxiliary grippers 25, and a counter-clockwise rotation of the planet carrier results in a slowing down of the auxiliary gripper arms or even brings them to a standstill.

Any suitable mechanism may be employed to actuate the stripper fingers 35 and to drive the delivery rollers 36 and tapes 34, with the details of which the present invention is not concerned. Similarly the inking mechanism and other details of the press can be of any conventional type, and the impression cylinder or the plate cylinder can be tripped by suitable devices when no impression is desired.

It will also be understood that the principles of my invention may be readily applied to presses of other types than the rotary press illustrated, such as for example a bed and cylinder press.

Various changes and modifications may be made in the embodiment illustrated herein without departing from the scope of the invention as defined in the following claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a printing press or the like, in combination, a printing couple including a rotary impression cylinder, sheet feeding means revoluble through an orbit which contains and is eccentric to said impression cylinder, means for rotating said cylinder, means for actuating said sheet feeding means to cause it to seize a sheet to be printed and transfer it to said impression cylinder, and means on said impression cylinder for receiving the sheet from said sheet feeding means.

2. In a printing press or the like, in combination, a printing couple including a rotary impression cylinder, a sheet feeding device revoluble through an orbit which contains and is eccentric to and substantially tangent to the periphery of said impression cylinder, means for rotating said cylinder, means for actuating said sheet feeding device to cause it to seize a sheet to be printed and transfer it to said impression cylinder, and means on said impression cylinder for receiving the sheet from said sheet feeding means.

3. In a printing press or the like, in combination, a printing couple including a rotary impression cylinder, a sheet feeding device revoluble through a circular orbit which contains and is eccentric to and substantially tangent to the periphery of said impression cylinder, means for rotating said cylinder, means for actuating said sheet feeding device to cause it to seize a sheet to be printed and transfer it to said impression cylinder, at the point of tangency, and means on said impression cylinder for receiving the sheet from said sheet feeding means.

4. In a printing press or the like, in combination, a feed board, a printing couple including a rotary impression cylinder, a gripper carrier revoluble through a circular orbit which contains and is eccentric to and substantially tangent to the periphery of said impression cylinder, means for rotating said cylinder, means for moving said gripper carrier at a variable speed which is momentarily substantially zero as it passes the feed board, and increases to the same peripheral speed as the peripheral velocity of the impression cylinder at the point of tangency, grippers on said gripper carrier, and means for actuating said grippers to seize a sheet from the feed board while they are substantially stationary, and transfer it to said cylinder at said point of tangency.

5. In a printing press or the like, in combination, a feed board and sheet delivery mechanism, a printing couple including a rotary impression cylinder provided peripherally with grippers, an auxiliary gripper carrier revoluble through a circular orbit which contains and is eccentric to and substantially tangent to the periphery of said impression cylinder, means for rotating said cylinder at a constant speed, means for moving said auxiliary gripper carrier at a variable speed which is momentarily substantially zero as it passes the feed board, and increases to the peripheral velocity of the impression cylinder at the point of tangency, grippers on said auxiliary gripper carrier, means for actuating the auxiliary grippers to seize a sheet from the feed board while they are substantially stationary, and transfer it to said cylinder at said point of tangency, and means for actuating said cylinder grippers to receive the sheet at said point of tangency and to transfer it to said delivery means after the impression is effected.

6. In a printing press or the like, in combination, a feed board, a printing couple including a rotary impression cylinder provided peripherally with cylinder grippers, a set of auxiliary grippers revoluble through an orbit which contains and is eccentric to and substantially tangent to the periphery of said impression cylinder and consequently to the circular orbit of said cylinder grippers, said feed board being disposed at a point on the orbit of said auxiliary grippers remote from the point of tangency of said gripper orbits, sheet supporting guides shaped to conform to the path of movement of said auxiliary grippers from the feed board to said point of tangency, means for rotating said impression cylinder, and means for actuating said auxiliary grippers to seize a sheet from the feed board, transfer it along said guides to said point of tangency and there transfer it to said cylinder grippers.

7. In a printing press or the like, in combination, a feed board, a printing couple including a rotary impression cylinder provided peripherally with cylinder grippers, a set of auxiliary grippers revoluble through an orbit which contains and is eccentric to and substantially tangent to the periphery of said impression cylinder and consequently to the circular orbit of said cylinder grippers, said feed board being disposed at a point on the orbit of said auxiliary grippers remote from the point of tangency of said gripper orbits, sheet supporting guides shaped to conform to the path of movement of said auxiliary grippers from the feed board to said point of tangency, means for rotating said impression cylinder, and means for actuating said auxiliary grippers to seize a sheet from the feed board, transfer it along said guides to said point of

tangency and there transfer it to said cylinder grippers, said sheet supporting guides being interrupted intermediate their lengths for the delivery therethrough of a printed sheet from the impression cylinder.

8. In a printing press or the like, in combination, a feed board, a printing couple including a rotary impression cylinder provided peripherally with cylinder grippers, a set of auxiliary grippers revoluble through an orbit which contains and is eccentric to and substantially tangent to the periphery of said impression cylinder and consequently to the circular orbit of said cylinder grippers, said feed board being disposed at a point on the orbit of said auxiliary grippers approximately opposite to the point of tangency of said gripper orbits, sheet supporting guides shaped to conform to the path of movement of said auxiliary grippers from the feed board to said point of tangency, means for rotating said impression cylinder, means for actuating said auxiliary grippers to seize a sheet from the feed board, transfer it along said guides to said point of tangency and there transfer it to said cylinder grippers, means disposed within the orbit of said auxiliary grippers adjacent the path of the cylinder grippers and remote from said point of tangency for delivering the printed sheet from the impression cylinder across said first named orbit.

9. In a printing press or the like, in combination, a feed board, a printing couple including an impression cylinder provided at a point upon its periphery with grippers, means for driving said cylinder in one direction, auxiliary sheet feeding means associated with said cylinder and adapted to carry successive sheets from said feed board and transfer them to said impression cylinder grippers, means for moving said sheet feeding means continuously in the same direction of rotation as said cylinder in an orbit which contains said cylinder and is tangent thereto and consequently to the orbit of said cylinder grippers, means for varying the movement of said auxiliary sheet feeding means from a substantially stationary position at a point on its orbit, remote from said point of tangency, where it receives a sheet to be printed, through a phase of accelerated movement to a point in advance of said point of tangency, where the motion is retarded until the cylinder grippers overtake the auxiliary feeding means, then at the same linear velocity as said cylinder grippers during transfer of the sheet to the latter elements at said point of tangency, then at a relatively rapid velocity from said point of tangency through the remainder of its orbit to the first mentioned position where it is approximately at rest.

10. In a printing press or the like, in combination, a feed board, a printing couple including an impression cylinder provided at a point upon its periphery with sheet grippers, means for driving said cylinder in one direction at a uniform angular velocity, auxiliary sheet feeding means associated with said cylinder and adapted to carry successive sheets from said feed board and transfer them to said impression cylinder grippers, means for moving said sheet feeding means continuously in the same direction of rotation as said cylinder in an orbit which contains said cylinder and is tangent thereto and consequently to the orbit of said cylinder grippers, means for varying the movement of said auxiliary sheet feeding means from an approximately stationary position at a point on its orbit, remote from said point of tangency where it receives a sheet to be

printed, through a phase of accelerated movement to approximately the point of tangency, where it attains the same linear velocity as said cylinder grippers during transfer of the sheet to the latter elements, then at a relatively rapid velocity from said point of tangency through the remainder of its orbit to the first mentioned position where it is approximately at rest.

11. In a printing press or the like, in combination, a feed board, a printing couple including an impression cylinder provided at a point upon its periphery with sheet grippers, means for driving said cylinder in one direction at a uniform angular velocity, auxiliary sheet feeding means associated with said cylinder and adapted to carry successive sheets from said feed board and transfer them to said impression cylinder grippers, means for moving said sheet feeding means continuously in the same direction of rotation as said cylinder in an orbit which contains said cylinder and is tangent thereto and consequently to the orbit of said cylinder grippers, means for varying the movement of said auxiliary sheet feeding means from an approximately stationary position at a point on its orbit, remote from said point of tangency where it receives a sheet to be printed, through a phase of accelerated movement to approximately the point of tangency, where it attains the same linear velocity as said cylinder grippers during transfer of the sheet to the latter elements, then at a relatively rapid velocity from said point of tangency through the remainder of its orbit to the first mentioned position of an approximate state of rest, means for stripping the printed sheet from the impression cylinder at a point remote from the point of tangency and within the orbit of the auxiliary feeding means, and means for delivering said printed sheet across the orbit of said auxiliary means at a point in advance of said point of tangency.

12. In a printing press or the like, in combination, a feed board, a printing couple including a rotary impression cylinder, a gripper carrier adapted to move independently of said impression cylinder to transfer a sheet to be printed from said feed board to said impression cylinder, transfer grippers on said carrier, driving means for said impression cylinder, planetary gearing operatively disposed between said driving means and said gripper carrier for operating said carrier at variable speeds, and means on said cylinder for receiving the sheet from said grippers.

13. In a printing press or the like, in combination, a feed board, a printing couple including a rotary impression cylinder, a gripper carrier revoluble independently of said impression cylinder to transfer a sheet to be printed from said feed board to said impression cylinder, transfer grippers on said carrier, driving means for said impression cylinder, planetary gearing operatively disposed between said driving means and said revoluble gripper carrier, said planetary gearing comprising an oscillating planet carrier, a grooved cam member rotatable by said driving means, means on said planet carrier adapted to follow said cam groove and to oscillate said carrier whereby said auxiliary gripper carrier is operated at variable speeds, and means on said impression cylinder for receiving the sheet from said grippers.

14. In a printing press or the like, in combination, a feed board, a printing couple including a rotary impression cylinder, a gripper carrier revoluble independently of said impression cylinder

der to transfer a sheet to be printed from said feed board to said impression cylinder, transfer grippers on said carrier, an impression cylinder shaft, a drive shaft, means operatively connecting said drive shaft with said impression cylinder shaft, a grooved cam member carried by said impression cylinder shaft, planetary gearing operatively disposed between said drive shaft and said gripper carrier, the sun gear of said gearing being secured to said drive shaft and the ring gear operatively connected with said gripper carrier, a planet gear carrier oscillatably disposed between said sun gear and ring gear, an arm on said planet carrier guided by the cam groove to oscillate the planet carrier, whereby the gripper carrier may be driven at variable speeds, and means on said impression cylinder for receiving the sheet from said grippers.

15. In a printing press or the like, in combination, a feed board, a printing couple including a rotary impression cylinder, a gripper carrier revoluble independently of said impression cylinder to transfer a sheet to be printed from said feed board to said impression cylinder, transfer grippers on said carrier, an impression cylinder shaft, a drive shaft, means operatively connecting said drive shaft with said impression cylinder shaft, a grooved cam member carried by said impression cylinder shaft, planetary gearing operatively disposed between said drive shaft and said gripper carrier, the sun gear of said gearing being secured to said drive shaft and the ring gear operatively connected with said gripper carrier, a planet gear carrier oscillatably disposed between said sun gear and ring gear, an arm on said planet carrier guided by the cam groove to oscillate the planet carrier, the ratio of said gearing being such that said carrier will make one revolution for each rotation of said impression cylinder, said cam groove being endless and shaped to effect a variable speed of revolution of said gripper carrier, and means on said impression cylinder for receiving the sheet from said grippers.

16. In a printing press or the like, the combination as set forth in claim 9 in which planetary gearing is operatively disposed between said cylinder driving means and said auxiliary sheet feeding means, a grooved cam member rotatable by said cylinder driving means and operatively connected with the planet carrier of said planetary gearing, the cam groove being so shaped as to oscillate said planet carrier in each direction to effect the variable movement of the auxiliary sheet feeding means described.

17. In a printing press or the like, in combination, a pair of spaced side frames, a feed board, a printing couple including an impression cylinder provided upon its periphery with sheet grippers, an impression cylinder shaft mounted for rotation in suitable bearings carried by said side frames, a drive shaft also rotatably carried by said side frames, a gear carried by said drive shaft upon one side of the press, a gear carried

by said impression cylinder shaft and meshing with said drive shaft gear, a sun gear of a planetary gearing assembly rigidly carried by the opposite end of said drive shaft, a ring gear and a planet carrier each rotatably mounted upon said drive shaft, a grooved cam member rigidly carried by one end of said impression cylinder shaft, a lever arm carried by said planet carrier and adapted to be guided by said cam groove to oscillate said planet carrier, a set of auxiliary grippers revolubly mounted upon said side frames for movement in an orbit which contains and is eccentric to said impression cylinder, gearing connecting said set of auxiliary grippers with said ring gear, the shape of said cam groove being such that through the oscillation of said planet carrier the set of auxiliary grippers is caused to move through its orbit at a variable speed for the more effective transfer of the sheet from the feed board to the cylinder grippers.

18. In a printing press or the like, in combination, a printing couple including a rotary impression cylinder, sheet feeding means revoluble through an orbit which contains and is eccentric to said impression cylinder, means for rotating said cylinder, means for actuating said sheet feeding means to cause it to seize a sheet to be printed and transfer it to said impression cylinder, means on said impression cylinder for receiving the sheet from said sheet feeding means, and sheet delivery means adapted to receive the printed sheet from said cylinder.

19. In a printing press or the like, in combination, a printing couple including a rotary impression cylinder, sheet feeding means revoluble through an orbit which contains and is eccentric to said impression cylinder, means for rotating said cylinder, means for actuating said sheet feeding means to cause it to seize a sheet to be printed and transfer it to said impression cylinder, means on said impression cylinder for receiving the sheet from said sheet feeding means, and mechanism associated with said cylinder for delivering the printed sheet along a path which intersects the orbit of said sheet feeding means.

20. In a printing press or the like, in combination, a printing couple including a rotary impression cylinder, a sheet feeding device revoluble through a circular orbit which contains and is eccentric to and substantially tangent to the periphery of said impression cylinder, means for rotating said cylinder, means for actuating said sheet feeding device to cause it to seize a sheet to be printed and transfer it to said impression cylinder, at the point of tangency, means on said impression cylinder for receiving the sheet from said sheet feeding means, and delivery mechanism disposed adjacent the periphery of said impression cylinder and within the orbit of said sheet feeding means, and adapted to deliver the printed sheet along a path which intersects said orbit.

FREDERICK W. SEYBOLD.