

Aug. 31, 1926.

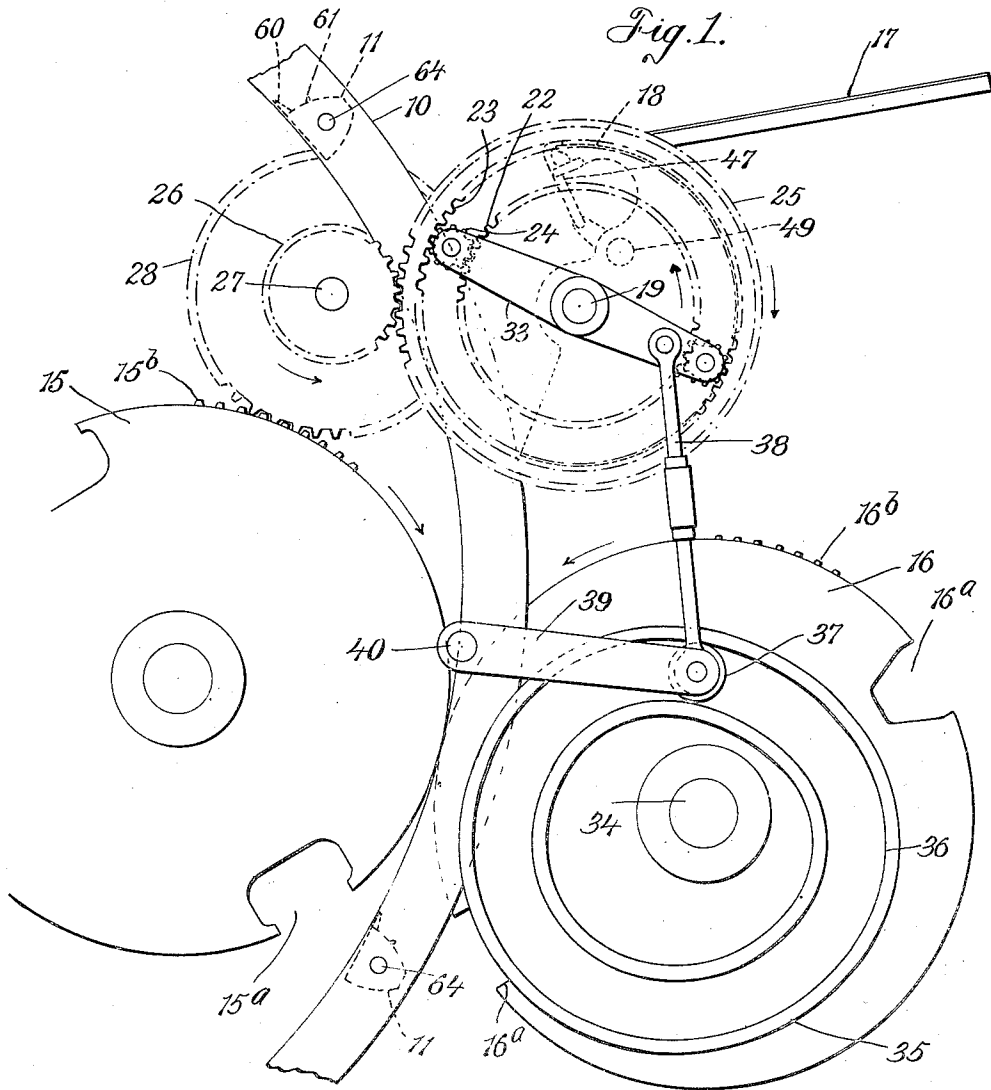
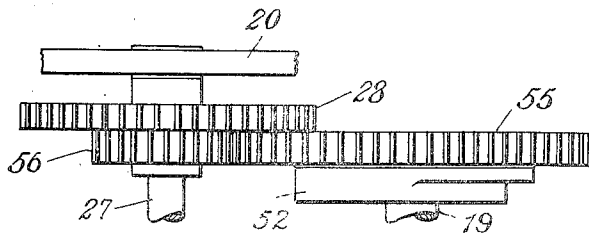
B. C. WHITE

1,597,941

SHEET FEEDER FOR PRINTING PRESSES

Filed April 18, 1922

3 Sheets-Sheet 1



Inventor

Bruce C. White

By his Attorney

Wm. Dodge

Aug. 31, 1926.

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SHEET FEEDER FOR PRINTING PRESSES

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3 Sheets-Sheet 2

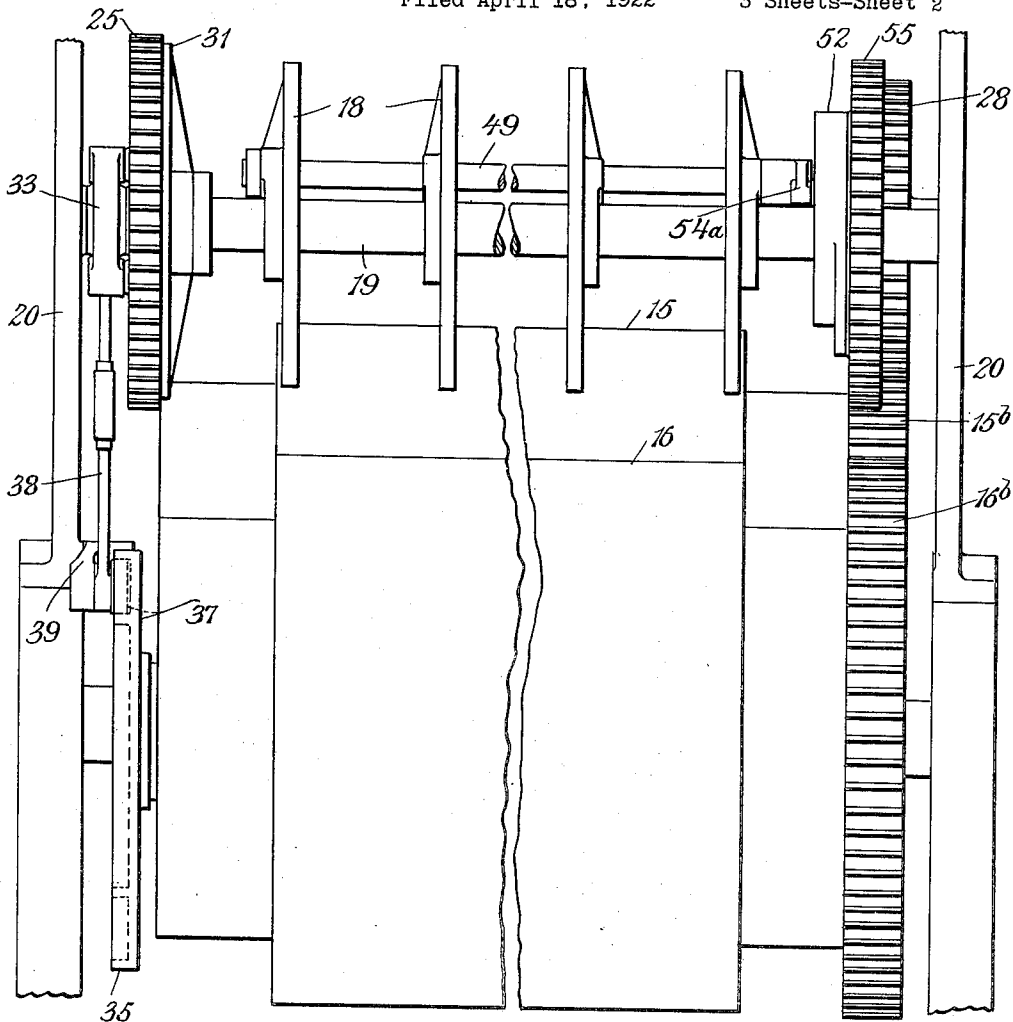


Fig. 2.

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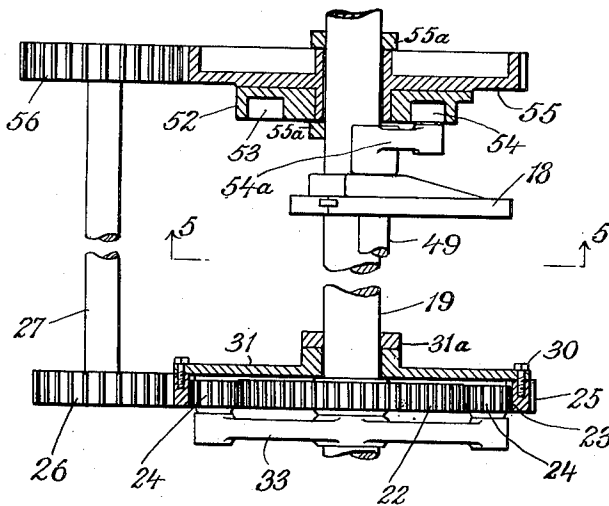
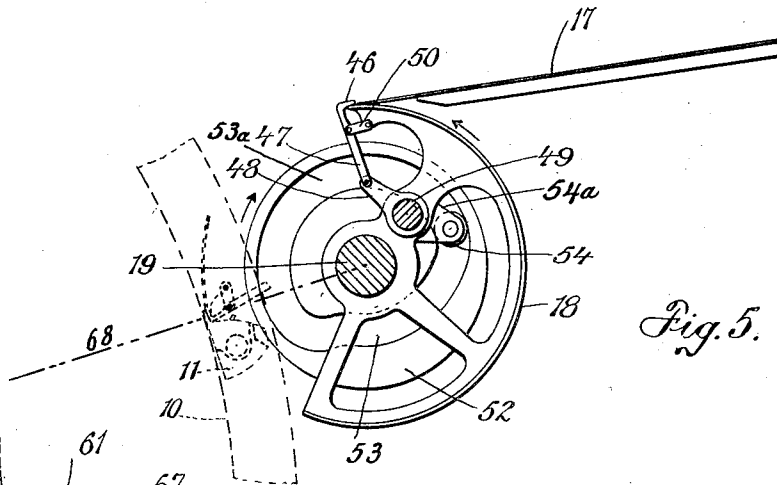
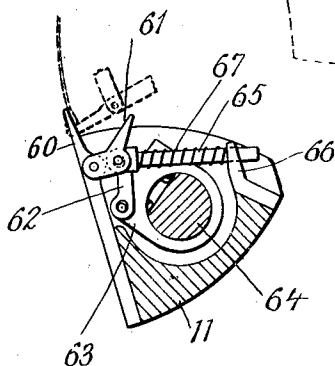
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SHEET FEEDER FOR PRINTING PRESSES

Filed April 18, 1922

3 Sheets-Sheet 3



Inventor

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UNITED STATES PATENT OFFICE.

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BRUCE C. WHITE, DECEASED.

SHEET FEEDER FOR PRINTING PRESSES.

Application filed April 18, 1922. Serial No. 554,886.

The present invention relates to sheet feeding mechanism for printing presses, being intended more particularly for application to multicolor printing presses in which a rotary sheet carrier is arranged to present the sheets to multiple printing couples each having a plurality of impression surfaces adapted for printing in separate colors, presses of this general type being shown and described in the United States Patent No. 538,852, dated May 7, 1895.

The present invention relates more especially to the means for feeding to the carrier the sheets to be printed, and it has for an object to provide means for automatically feeding or transferring the sheets from a stationary support to the rotating carrier.

More particularly the invention has for its object to provide an improved transfer device which will receive the sheet while remaining at rest and deliver it to the carrier at a speed corresponding with that of the carrier, or the printing speed.

The invention further includes certain details of construction and arrangement of parts hereinafter set forth.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly pointed out.

Fig. 1 of the drawings is a fragmentary side view of a printing press showing one set of printing couples only, with the present invention applied thereto, the supporting frames being omitted. Fig. 2 is an end view thereof. Fig. 3 is a fragmentary plan view, illustrating particularly the driving means for the gripper operating cam. Fig. 4 is a horizontal sectional view taken substantially along the axis of the feed sheet transfer drum.

Fig. 5 is a detail transverse sectional view taken along the line 5—5 of Fig. 4.

Fig. 6 is a fragmentary sectional view illustrating particularly the manner in which the sheet is delivered from the transfer element or feed drum to the carrier.

In Fig. 1 of the drawings I have indicated generally at 10 a portion of the sheet carrier which may comprise the usual pair

of rings between which extend the gripper bars 11, carrying suitable sheet grippers, preferably of the type shown and described in my co-pending application filed August 28, 1924, Serial No. 734,666.

Further illustration or description of the general features of construction of the sheet carrier is not deemed necessary as it may be of the type shown in the patent previously referred to. The sheet carrier or carrier ring 10 feeds the sheet in the ordinary manner between the usual printing couples composed of impression and plate cylinders, only one of these couples being here shown, the impression cylinder being indicated at 15 and the plate cylinder at 16. These cylinders are of ordinary construction, the former being shown with the usual grooves 15^a for receiving the connections for the removable impression facings, and the latter with grooves 16^a for clearing the gripper bars 11. These cylinders have fixed thereto the usual meshing gears 15^b and 16^b whereby they are caused to rotate in unison, fragmentary portions only of these gears have been indicated in Fig. 1. The sheets to be printed are placed on an inclined feed board 17 located at one side of the carrier ring and spaced a short distance therefrom.

As here shown the rotary transfer element comprises a segmental drum made up of a number of disk segments 18, provided with suitable sheet gripping devices, and fixed to and spaced along a horizontal shaft 19 which extends across the face of the carrier ring and is suitably journaled in the side frame members 20, the drum being positioned to have its periphery meet tangentially the path of the sheet supporting elements of the carrier ring. This drum is driven at the same general rate of rotation as the cylinders 15 and 16, or in other words turn for turn of the latter, although the drum does not rotate continuously at a given speed as do the cylinders.

The means which I have designed to drive the drum in a manner to permit of desired variation of speed during individual revolutions comprises a planetary gear 22 fixed on one end of the drum shaft 19 and which receives motion from a surrounding internal gear 23 through the medium of a pair of pinions 24 which mesh with said gears 22

and 23 and are adapted to be shifted bodily in addition to their rotary movement, it being understood that the gear 22 can be made to stand still, or to move at increasing or decreasing velocities, by imparting a proper bodily traveling movement to the pinions 24. The internal gear 23 may be driven in such manner as may be convenient, being here shown as provided with external gear teeth 25 meshing with a pinion 26 fixed on one end of a shaft 27 parallel to shaft 19 and having a gear 28 on its opposite end which meshes in turn with the gear 15^b fixed to the impression cylinder 15, the relative proportions of the various gears being properly calculated to make the drum 18 travel at the same uniform rate of rotation as that of cylinder 15 while the pinions 24 are rotating about their axes temporarily fixed. The internal gear 23 is supported for loose rotation on the shaft 19 and is here shown in the form of a ring fixed by the screws 30 on the face of a disk 31, the hub thereof being engaged at one end by the collar 31^a fixed on shaft 19 and on the opposite end positioned by the gear 22.

To provide for the shifting of the pinions 24 they are here shown as mounted on the opposite ends of an oscillatory lever 33 loosely fulcrumed between its ends on the shaft 19. To oscillate this lever in the proper manner I mount on the shaft 34 of the plate cylinder 16 a disk cam 35 having a cam groove 36 in the face thereof. In this groove engages a roller 37 mounted on the lower end of a link 38, the upper end thereof being pivotally connected to the lever 33. To guide the lower end of the link 38 I connect it to an arm 39 pivoted as at 40 to the frame of the machine. The cam 35, as will be understood, rotates turn for turn with the drum 18.

The sheets to be transferred to the carrier ring are taken by the drum while the latter is at rest from the inclined feed board 17, which may be of ordinary construction, and which has its forward end located above the drum 18 and in close proximity to the periphery thereof. The drum 18 is brought to rest with the leading ends of its segments just in advance of the forward end of the feed board 17. The forward edge of the sheet which is projected from the feed board 17 onto these segment ends is clamped against the latter by the rearwardly turned ends 46 of the gripper fingers 47 of which there is one on each segment. These fingers 47 extend in a general radial direction and are pivotally connected at their inner ends to arms 48 fixed on a shaft 49 carried by the drum 18 and extending parallel to the shaft 19 around which it swings as the drum rotates. Connected to the fingers 47 near the outer ends thereof are short guiding and supporting links 50 which are connected to

the drum segments 18. By suitably oscillating shaft 49 the grippers are opened and closed at the desired time. This oscillatory movement of shaft 49 is obtained from a cam 52 loosely mounted on the opposite end of shaft 19 to that on which the internal gear ring 23 is carried and having a cam groove 53 in which engages a roller 54 carried on the arm 54^a fixed to the shaft 49. This cam 52 is adapted to rotate in a direction opposite to that of the shaft 19 and at an equal rate of revolutions therewith, being here shown as fixed on a gear 55 which is loose on the shaft 19 and meshing with a pinion 56 fixed on the opposite end of shaft 27 to that on which the pinion 26 is fixed, the loose gear 55 being held in position on its shaft by the collar 55^a. Since the cam 52 rotates at equal turns and in opposite direction with the drum 18, it follows that the roller 54 will travel twice around the groove 53 for each rotation of the drum, causing a double operation of the grippers with each revolution of the cam. This double operation of the grippers, however, is not objectional since, as shown in Fig. 5, the drum only travels through an arc of about ninety degrees between its sheet receiving and sheet delivering points. Fig. 5 also shows the position in which the sheet has just been gripped by the fingers 47, the latter being held in closed position by engagement of the roller 54 in the concentric portion 53^a of the groove 53 which extends through approximately one hundred and eighty degrees. As will be apparent, when the roller 54 reaches the end of this concentric portion the drum 18 will have traveled substantially ninety degrees, or to the point at which the grippers are to be released, the remainder of the groove 53 being suitably formed to open and close the grippers at the proper time. As the rotation of the gripper-operating cam 52 is continuous it will be clear that these gripper fingers 47 will operate to grip the leading edge of the sheet while the drum is at rest and thus avoid disturbing the register of the sheet. The detail description of these grippers is more particularly set forth in my co-pending application filed August 28, 1924, Serial No. 734,667.

Also the sheet grippers which I prefer to employ on the carrier ring are of the type illustrated in detail in Fig. 6 and which also form the subject matter of a separate patent application. These grippers each comprise a finger 60 fixed to the inner face of the bar 11 and projecting rearwardly therefrom, and a co-operating movable finger 61, hinged to the finger 60 a short distance from the rear end of the latter. The finger 61 is of angular shape as seen in side view and has connected thereto between its ends one end of a link 62 whose

opposite end connects to a short arm 63 fixed to a rock shaft 64 extending along, and suitably journaled in the bar 11. Pivotally connected to the movable finger 61, coaxially to the point of connection of link 62, is the headed end of rod 65, whose opposite end is guided in a bracket 66 fixed to the bar 11. A coiled expansion spring 67, which surrounds the rod 65 and bears between the bracket 66 and the head of the rod, normally urges the movable finger 61 to closed position. This finger is opened by a cam (not shown) which is operatively connected to a shaft 64 in the usual manner. This construction is designed to ensure of an independent gripping action of each finger on the sheet, the movable finger 61 being inwardly urged to clamping position by its spring, sufficient loss motion being provided, preferably at the opposite ends of link 62, to allow the necessary individual spring action of the different fingers along the bar 11. The relative position of the grippers of the feed drum 18 with respect to those of the carrier ring 10 is shown in dotted lines in Fig. 5 at the point or line of sheet transfer, indicated by the broken line 68 passing through the axial centers of the drum and ring, and at which point the grippers of the ring close slightly in advance of the release of the drum grippers to insure at this point constant engagement with the sheet without possibility of displacement of the latter, Fig. 6, showing in larger scale the said relative position of the grippers at the transfer line, the dotted lines indicating the drum grippers.

Referring again to the cam 35 by means of which the pinions 24 are bodily moved, the precise shape of the cam grooves depends on the relative diameters of the drum 18 and the impression cylinder 15, the general principle involved being that at times when the pinions 24 are bodily moving in the direction of rotation of the driving gear 23, the driven gear 22 will rotate at proportionally less speed than when the pinions are held stationary, and when the latter are moving bodily in an opposite direction a proportional increase will be made in the rotation of the drum gear 22. While a single pinion 24 on the lever 23 will effect the desired movement, a pair of pinions arranged as shown to balance the respective gear thrusts are preferably employed.

As herein shown, the diameter of the cylinder 15 is substantially greater than that of the feed drum 18, and as it is desired in the transfer movement of the sheet to gradually increase the peripheral speed of the drum from a point of rest up to that of the carrier ring 10, and to uniformly maintain the latter speed until the rear end of the sheet leaves the drum and passes to the carrier ring, it will be obvious that the

groove in the cam 35 must be correspondingly shaped to bodily move the pinions 24 in a direction opposite to that of the driving gear 23 until the latter position of the sheet has been reached, after which, the bodily movement of the pinions are gradually reversed to correspond in direction with that of the driving gear until the drum has been brought to rest, the pinions uniformly continuing their bodily movement in this latter direction during the necessary period required for the drum to rest for its engagement of a new sheet, it being obvious that during the period in which the drum is at rest the bodily movement of the pinions will be in a direction similar to that of the driving gear 23, but at half the peripheral speed thereof.

For the engagement and support of the sheet in its transfer movement, the drum segments 18 with their connected gripper fingers 47 are suitably spaced along the shaft 19, the spacing thereof being in fairly close lateral relation with the carrier gripper fingers 60 fixed on the bars 11. At the transfer point the two sets of grippers pass each other at a common rotative speed, their relative positions allowing for the necessary clearance between the gripper-bar 11 of the carrier and the gripper fingers 47 of the drum segments, the latter fingers being given an independent movement by the cam 52 to effect their clearance from the moving sheet.

As the operation of the various parts has been set out in detail and in the connections wherein they co-operate with each other it is believed a recapitulation of the entire operation is unnecessary. It is apparent, of course, that while I illustrate and describe the preferred embodiment of the invention it is susceptible of various changes as regards its form, proportion, detail construction, application and arrangement of parts, without departing from the essential principle and scope or sacrificing any of the advantages of the invention. Also, while I have shown and described the feed drum 18 as being of particular application to a carrier ring, it is to be understood that the drum may with equal advantage be used to transfer sheets directly to the impression cylinder of a printing couple.

What I claim as my invention and desire to secure by Letters Patent, is:—

1. In a printing press, printing devices arranged to print at a uniform rate of speed, a rotary transfer element having a series of sheet grippers, and means for operating said grippers while said transfer element is at rest.

2. In a printing press, printing devices arranged to print at a uniform rate of speed, a feed board for the sheets to be printed, a rotary transfer element adjacent thereto;

sheet grippers mounted on said transfer element, and means for operating said grippers while said transfer element is at rest.

3. In a printing press, printing devices arranged to print at a uniform rate of speed, a rotary transfer element, a series of sheet grippers carried thereby, a rock-shaft carried by said transfer element and operatively connected to said grippers, and means for operating said rock-shaft while said transfer element is at rest.

4. In a printing press, printing devices arranged to print at a uniform rate of speed, a feed drum, means for variably rotating said drum, sheet grippers carried by said drum, and means for operating said grippers while said drum is at rest.

5. In a printing press, printing devices arranged to print at a uniform rate of speed, a feed drum, driving means whereby said drum is brought to rest, sheet grippers carried by said drum, and means for operating said grippers while said drum is at rest.

6. In a printing press, printing devices arranged to print at a uniform rate of speed, a rotary feed drum, driving means whereby the rotative speed of said drum may be increased from a state of rest to that of the printing speed and decreased from the printing speed back to a state of rest, sheet grippers carried by said drum, and means for operating said grippers during the periods in which said drum is at rest.

7. In a printing press, printing devices arranged to print at a uniform rate of speed, a rotary feed drum, driving means whereby the rotative speed of said drum may be increased from a state of rest to that of the printing speed, then maintaining said latter speed during the delivery of the sheet from said drum, then decreasing said rotative speed back to a state of rest, sheet grippers carried by said drum, and means for operating said grippers during the periods in which said drum is at rest.

8. In a printing press, a feed drum including a rotatively mounted supporting shaft therefor, sheet grippers carried by said drum, a wheel loosely mounted on said shaft, means for variably rotating said shaft between periods of rest, means for continuously rotating said loosely mounted wheel, and means carried by said wheel for operating said grippers during the periods of rest.

9. In a printing press, a feed drum including a rotatively mounted supporting shaft therefor, sheet grippers carried by said drum, a wheel loosely mounted on said shaft, means for variably rotating said shaft between periods of rest, means for continuously rotating said loosely mounted wheel in an opposite direction from that of said shaft, and means carried by said wheel for operating said grippers during the periods of rest.

10. In a printing press, a series of printing devices having means for advancing a sheet thereto, a feed drum, sheet grippers carried by said feed drum, means for variably rotating said feed drum between periods of rest means for operating said grippers during the periods in which the drum is at rest, and means for operating said grippers to transfer a sheet from said drum to the sheet advancing means of said printing devices.

11. In a printing press, a plurality of printing couples, means for advancing a sheet thereto, a feed drum for said sheet advancing means, sheet grippers carried by said drum, means for operating said grippers to engage a sheet while the drum is at rest, and means for delivering the sheet said drum to said sheet advancing means at a common speed therewith.

12. In a printing press, a rotary sheet transfer element adapted to remain at rest for a time during a revolution to receive the sheet, a sheet gripper device carried thereby, and means for operating said sheet gripper device, said means including a cam mounted co-axially with said transfer element and rotating turn for turn therewith in an opposite direction.

13. In a printing press, a driving shaft, a transfer drum including a central shaft for the rotative support thereof, grippers mounted on said drum, a rock-shaft carried by said drum and operatively connected to said grippers, a cam loosely mounted on said central shaft and operating said rock shaft, gearing mounted on said central shaft and engaged by said driving shaft for effecting a forward variable rotative movement of said drum, and means actuated by said driving shaft for effecting a continuous backward rotation of said cam.

14. In a printing press, a feed drum having a rotatively mounted supporting shaft, and an operatively mounted planetary gear device carried by said shaft whereby the rotative speed of said drum may be gradually increased from a state of rest to that of the printing speed and decreased back to the state of rest.

15. In a printing press, a feed drum having a rotatively mounted supporting shaft, and an operatively mounted planetary gear device carried by said shaft whereby the rotative speed of said drum may be gradually increased from a state of rest to that of the printing speed, said latter speed being maintained during the delivery of the sheet, and then decreased back to the state of rest.

16. In a printing press, a feed drum having a rotatively mounted supporting shaft, and an operatively mounted planetary gear device carried by said shaft whereby the latter may be variably rotated.

17. In a printing press, a feed drum hav-

ing a rotatively mounted supporting shaft, a gear loosely mounted on said shaft, means for continuously rotating said loosely mounted gear, a rock arm loosely carried by said shaft, a gear fixed to said shaft, means carried by said rock arm for transmitting movement between said loosely mounted gear and said fixed gear, and means for oscillating said rock arm.

Signed at New York in the county of New York and State of New York this 4th day of April A. D. 1922. 10

BRUCE C. WHITE.