

C. REYNOLDS.
 ROTARY CARDBOARD AND PAPER PRINTING PRESS.
 APPLICATION FILED NOV. 4, 1910.

1,013,516.

Patented Jan. 2, 1912.

2 SHEETS—SHEET 1.

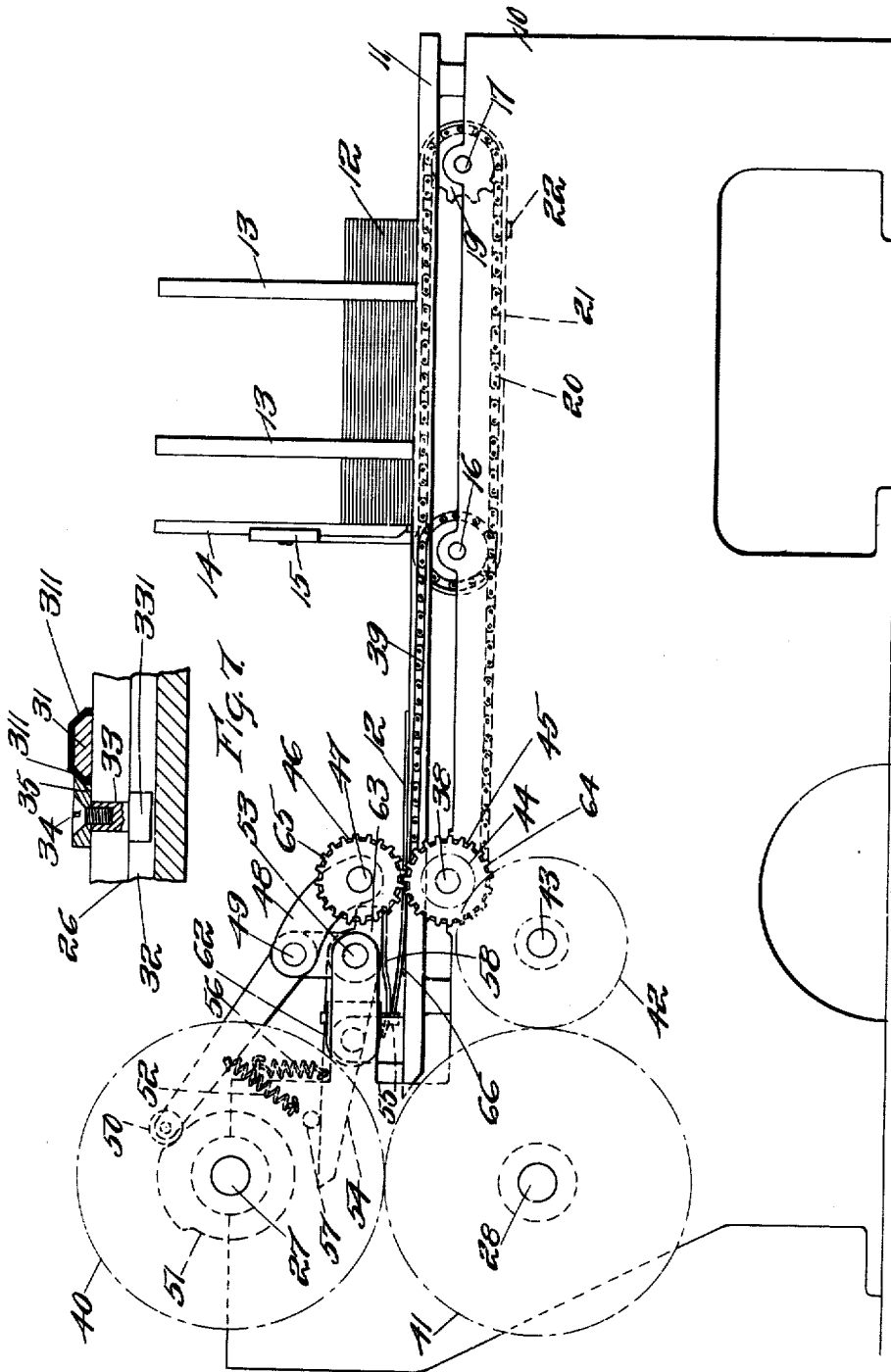


Fig. 1.

Witnesses:
 John H. Parker
 Aline Jan

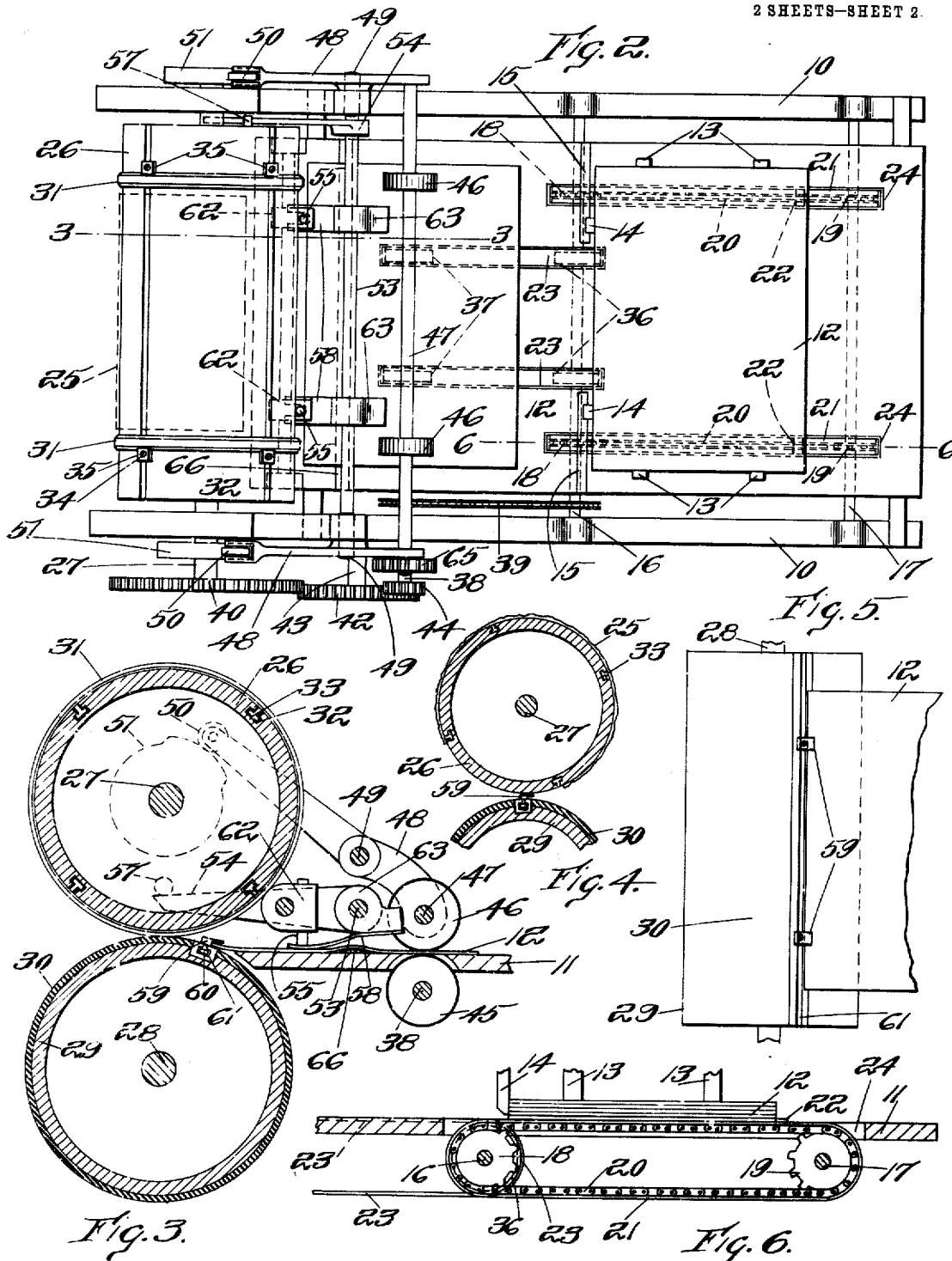
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 Clark Reynolds
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2 SHEETS—SHEET 2.



Witnesses:
 John H. Parker
 Aline Tarr

Inventor:
 Clark Reynolds
 by Macleod, Colver, Copeland & Dike
 Attorneys.

1,013,516. ROTARY CARDBOARD AND PAPER PRINTING PRESS. CLARK REYNOLDS, Boston, Mass., assignor of one-fourth to Amos J. Dawley, Wyoming, R. I. Filed Nov. 4, 1910. Serial No. 590,609.

To all whom it may concern:

Be it known that I, CLARK REYNOLDS, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented a certain new and useful Improvement in Rotary Cardboard and Paper Printing Presses, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to a rotary printing press for printing sheets of paper or cardboard from an electrotpe plate secured to a rotary cylinder, the separate sheets being fed in successively to the printing mechanism.

In machines heretofore used for printing cards it has been common to use a reciprocable flat bed which carries the type form so that the printing is done during the forward movement of the flat type bed under an impression cylinder; then the form has to be moved backward into position for another forward stroke while the cylinder is still revolving, the printing taking place only during the forward movement. In this way the impression cylinder has to make a complete revolution during the return movement of the form, being lifted above the form for that purpose, so that it will not make any impression on the return stroke and thereby causing a lost rotation—that is the cylinder has to make two rotations to each impression, so that every alternate rotation is lost movement, or else the cylinder has to be made so large that the impression will be made during the first half rotation of the cylinder and during the remaining half rotation it will be out of contact with the type form while the type form is moving backward so that in either event there is lost time in printing.

It is common to have a printing cylinder and an impression cylinder for printing on a continuous sheet where a sheet is cut off at each rotation of the cylinder, as for instance in printing newspapers, but I am unaware of any machine heretofore used for printing separate sheets or cards, employing a type cylinder and an impression cylinder, in which each card has to be fed independently of the others.

The object of the present invention is to provide a rapid rotary printing press for separate sheets of cardboard or paper employing a type cylinder and an impression cylinder in which a sheet is printed at each rotation of the cylinder.

The main feature of the invention consists

in feeding each sheet to a running guide on one of the cylinders so that the sheet will be properly registered with relation to the electrotpe plate. The invention also consists in the mechanism for feeding the sheets to said running guide.

The invention will be fully understood from the following description taken in connection with the accompanying drawings, and the novel features will be pointed out and clearly defined in the claims at the close of the specification.

In the drawings,—Figure 1 is a side elevation of a machine embodying the invention. Fig. 2 is a plan of the machine shown in Fig. 1. Fig. 3 is an enlarged section, partly broken away, on line 3—3 of Fig. 2 but showing the parts in the position they will occupy after the sheet of cardboard has been fed from the position shown in Figs. 1 and 2 to engage the guide clips on the impression cylinder. Fig. 4 is a section through the electrotpe cylinder and a portion

of the impression cylinder. Fig. 5 is a plan of the lower or impression cylinder with a sheet of cardboard engaged with the guide clips, the other parts of the machine being removed. Fig. 6 is a section on line 6—6 of Fig. 2 showing the feed chain for drawing the bottom sheet of the cardboard from the hopper which contains the sheets. Fig. 7 is an enlarged sectional view showing the means for clamping the feed rings to the type cylinder.

Referring now to the drawings,—10, 10 represent the side walls of the frame of the machine in which are journaled the shafts which carry the cylinders. Mounted upon the frame is the table 11 on which is supported the pile of cards or sheets 12 and which also serves as a runway for the sheets. Suitable means are provided to retain the sheets of cardboard in a pile in properly squared position until they are to be taken out for feeding to the printing mechanism. The means shown consists of the upright standards 13, two on each side, and the two front standards 14, the front standards 14 being secured to brackets 15 so that the lower ends of the standards 14 may be held a short distance above the top of the table 11, clearing the table sufficiently to allow the forward feed of one sheet at a time, namely the bottom sheet in the pile 12, through the space below the standards 14. After the bottom sheet is pushed out, the pile of sheets will settle down so that the next sheet above the one which has been removed and which then becomes the bottom sheet in the pile will be in position to be pushed out next in order.

Any suitable means may be provided for removing the bottom sheet of the pile and carrying it to the mechanism for feeding it to the printing cylinder. The mechanism shown is as follows: Journaled in suitable

bearings, as for instance in the side walls 10, 10, of the frame, are two shafts 16, 17, the shaft 16 having mounted thereon at some distance apart, the two sprocket wheels 18, 18, and the shaft 17 having mounted thereon similar sprockets 19, 19. Running over the sprockets 18, 19, are the two chains 20, 20, each carrying a belt 21 and on each of said belts 21 there is mounted a projection 22, which each time the belt revolves comes into engagement with the rear end of the lowermost sheet in the pile and pushes it forward out of the hopper and onto the belts 23, whence it is fed forward to the registering mechanism which will be hereinafter described. If thin sheets of paper are to be used instead of cardboard, some other form of feed mechanism may be employed to feed the sheets onto the belt. There are well known means for doing this. It is not deemed necessary to describe them, as this preliminary feed from the hopper does not constitute the present invention.

The table 11 is formed with slots or openings 24 through which the sprocket chain and belt project from beneath, so that the projection 22 can engage with the blank. It is obvious that instead of having the projection 22 mounted on a belt 21 carried by the chain 20, the projection 22 may be carried directly by the chain and the belt 21 be dispensed with.

The electrotpe plate 25 is suitably mounted upon the cylinder 26, said electrotpe plate being cast of suitable shape so as to conform to the curvature of the periphery of the cylinder. The cylinder 26 is mounted on shaft 27 which is driven by any suitable means. Mounted on shaft 28 is a cylinder 29 which has a vulcanized rubber blanket 30, somewhat yielding, which coöperates with the cylinder 26 and serves as an impression cylinder. The cylinder 26 is provided with feed rings 31 which are preferably slightly greater in thickness than the thickness of the electrotpe plate and which engage the periphery of the rubber blanket 30 of the cylinder 29. Preferably the feed rings 31 have a coating of rubber so that there will be rubber engaging with both faces of the card and prevent slipping. It is important that these rings 31 should be removable as well as adjustable longitudinally of the cylinder, so that the electrotpe plate may be slipped on and off endwise and at the same time the rings 31 should be prevented from rotation with relation to the cylinder 26 although they are carried by and rotate with the cylinder 26. The means shown are as follows: The rings 31 are formed with beveled edges 311. The cylinder 26 is formed with a series of longitudinal grooves 32 in the periphery, said grooves being T-shaped in cross-section. T-shaped bolts 33 are provided which can be engaged in said grooves 32 by

inserting them into the end of the groove, being formed with a foot 331 which engages with the lower, wider portion of the groove. Clamp disks 35 each have a beveled flange which engages with one of the beveled sides 311 of the ring and is clamped thereon by a screw 34 which screws into the bolt 33. When the rings are slipped onto the cylinder 26 and are adjusted to the desired position, the bolts 33 can be slid along in the grooves 32 to the proper position for the flange of the disk 35 to engage the ring and the screw 34 will then be tightened to clamp the disk to the ring.

The card which has been pushed from the bottom of the pile in the hopper and carried by the chain 20 onto the belts 23, has to be fed forward to be engaged by and passed between the type cylinder 26 and the impression cylinder 29. The means for doing this

and for properly timing the feed of the card so that it will pass between the cylinders at the right time with relation to the position of the electrotpe plate will now be described.

Each of the belts 23 runs over a pulley 36 on the shaft 16 and over a pulley 37 on the shaft 38. Said shaft 38 has driving connection with the shaft 16 by a sprocket chain 39 which runs over sprockets mounted on said shafts 16 and 38 respectively. Mounted on shaft 27 is a gear wheel 40 which engages with a gear wheel 41 mounted on the impression cylinder shaft 28. Said gear 41 engages with a gear 42 mounted on stud 43. Said gear 42 engages with a pinion 44 mounted on shaft 38. Thus by the several gears and sprockets the printing cylinder shaft 27 controls and drives the mechanism which withdraws the card from the hopper and also drives the belts 23. After the sheet of cardboard has been carried forward by the belts 23 into proximity to the printing cylinder, other feed mechanism grips the card to feed it still further forward and this gripping and feeding mechanism comprises two pairs of gripping rolls 45 and 46. Preferably these rolls have rubber covered pe-

ripheries. The gripping rolls 45 are mounted on shaft 38 and the gripping rolls 46 are mounted on shaft 47. Said shaft 47 is journaled in the rearward arms of levers 48 which are fulcrumed on studs 49 so that said shaft 47 may be raised and lowered by turning the said levers on their fulcrums, thereby moving the gripping rolls 46 toward and from the rolls 45. Mounted on shaft 38 is a gear 64 which is adapted to engage with a gear 65 on shaft 47 whereby the rotation of shaft 38 will rotate shaft 47. The forward arm of each lever 48 carries a friction roller 50 which engages with a cam 51 mounted on shaft 27. A spring 52 keeps the roller 50 in constant engagement with the cam 51. When the high part of the cams 51 engage the roller 50, the levers 48 are turned on their fulcrums so as to lower the rolls 46 so that they press the card 12 against the rolls 45 causing the card 12 to feed forward. When the rollers 50 ride off of the high part of the cam 51 the gear 65 will be raised slightly although not enough to entirely disengage the teeth, but enough so that the rollers 46 will be lifted out of engagement with the card 12 and cease the feeding action, the gears still revolving. The card 12 is fed forward between the gripping rolls 45, 46, by the belts 23 during the period while said rolls 45, 46, are separated from each other. When the card is fed forward by the belts 23 it is desired to have them always stop in a certain position ready to be taken up by the gripping feed rolls 45, 46. Above the path of the card are brackets 62 from each of which a pin 55 projects down nearly to the table 11 with sufficient clearance for the card to pass under it when the card is flat on the table. Mounted on a rockshaft 53 is a lever 54, said lever 54 and rockshaft 53 being normally held by a spring 56 with the lever turned up so that the spring 58 hereinafter referred to will be elevated slightly above the curled up end of the card 12 as shown in Fig. 1. When the forward end of the card is curled up, as shown in Fig. 1, it will engage the pin 55 which thereby stops the forward progress of the card 12 until it is released from the pin. Means are provided for giving to the forward end of the card an upward incline to engage said stop pin 55. The means shown consists of a slight hump 66 with sloping back and front which gives to the forward end of the card in its forward feed an upward slant so that it engages the stop pin 55, as shown in Fig. 1. Projecting from the end of the cylinder 26 is a pin 57 which at a certain point in the rotation of the cylinder engages with the upper side of the lever 54 near the forward end, causing it to turn down and rock the shaft 53. Secured to the under side of brackets 63, which are fast to rockshaft 53, are springs 58 the forward end of each of

which is free and bends downwardly and is adapted to engage the curled up forward portion of the card 12. When the said lever 54 is turned down by the pin 57, the rockshaft 53 will be turned, thereby carrying down the free end of the spring 58 which thereby flattens down the curled up forward portion of the card 12 so that it will be enabled to pass under the pin 55 when the card 12 is fed forward. The pin 57 is so located with relation to the high part of the cam 51, that the lever 54 will be turned so as to flatten down the forward end of the card 12 at the same time that the high part of the cam 51 engages the roller 50 to cause the gripping rolls 46 to grip the blank to feed it forward.

Additional means are provided to still further insure that the blank will be squared up and advanced between the impression cylinder and the type cylinder at the right time with relation to the electrotpe plate. This means constitutes what I term a running guide and is one of the main features of the invention. The means shown is as follows: Secured to the periphery of the impression roll 29 are clips 59 pointing backward and with which the forward end of the card 12 is adapted to engage. These clips 59 may be secured to the impression cylinder in any suitable manner. The means shown is T-shaped bolts 60 which engage with a T-groove 61 in the periphery of the impression cylinder and the clips are secured to the bolts in somewhat similar manner as the disks 35 which clamp the rings 31 are secured to the type cylinder. The gears which drive the gripping rolls 45 and 46 are of such diameter with relation to the driving gears for the type cylinder that the surface speed of the gripping rolls 45, 46, will be a little in excess of the surface speed of the type cylinder and of the impression cylinder, so that when the card 12 is fed forward by the rolls 45, 46, it will catch up with the clips 59 which are moving in the same direction as the card 12 and cause the card 12 to engage in the under side of the clip as shown in Fig. 3. The thickness of the rings 31 allows sufficient clearance between the periphery of the cylinder 26 and of the impression cylinder to allow the clips 59 to go through in the rotation without interference. As soon as the card has entered between the type cylinder and the impression cylinder it will be gripped by the rings 31 and impression cylinder 30 so that the card will be fed forward after it is released from the gripping rolls 45, 46. The adjustment is such that the gripping rolls 45, 46, will release the card just as soon as the feed rings 31 and the impression cylinder grip it. The flexible surface of the impression cylinder blanket 30 will yield sufficiently under the pressure of the rings 31

31 so that the electrotpe plate may engage the surface of the card and give the proper printing impression. After the clip has ridden past the center it will ride away
 5 from and release the card so that the card may travel free from the clip and be thrown off or carried away in any suitable manner. The speed of the clip 22 which pushes out the card from the pile should be timed so as
 10 to push out one card at each rotation of the type cylinder.

It is obvious that the cam 51 might be carried by the impression cylinder shaft instead of by the type cylinder shaft and also
 15 that the means for operating the gripping rolls 45 and 46 might be varied without departing from the invention, and also that the entire mechanism for feeding the card so that it will engage with the running
 20 guide 59 may be varied and still come within the scope of the invention.

What I claim is:

1. In a rotary printing press, a rotary type cylinder, a rotary impression cylinder
 25 cooperating therewith, feed rings on said type cylinder, guides carried by one of said cylinders projecting at an angle to the periphery of the cylinder in a backward direction from the direction of rotation of the
 30 cylinder on which they are mounted, means for feeding a sheet into engagement with said guides, said feeding means being regulated to feed the sheet at a greater rate of speed than the speed of the guides and feed-
 35 ing and holding the sheet in such running engagement with the guides until the sheet is gripped by the cooperating feed rings and impression cylinder which carry the sheet away from the said first feed mechanism,
 40 the rotation of the cylinder on which the guides are mounted carrying the guides out of engagement with the sheet while the sheet continues to be gripped and fed by the feed rings and impression cylinder.

45 2. In a rotary printing press, a rotary type cylinder, a rotary impression cylinder of the same diameter as the type cylinder and cooperating therewith, feed rings on
 50 said type cylinder, guides carried by one of said cylinders projecting at an angle to the periphery of the cylinder in a backward direction from the direction of rotation of the cylinder on which they are mounted,
 55 means for feeding a sheet into engagement with said guides, said feeding means being regulated to feed the sheet at a greater rate of speed than the speed of the guides and feeding and holding the sheet in such running engagement with the guides
 60 until the sheet is gripped by the cooperating feed rings and impression cylinder which carry the sheet away from the said first feed mechanism, the rotation of the cylinder on which the guides are mounted carrying
 65 the guides out of engagement with the sheet

while the sheet continues to be gripped and fed by the feed rings and impression cylinder.

3. In a rotary printing press, a rotary type cylinder, a rotary impression cylinder
 70 cooperating with the said type cylinder, a guide carried by one of said cylinders for registering the sheet to be printed with the type plate on the type cylinder, feed mechanism which feeds the sheet into engage-
 75 ment with said guide and into feeding engagement with said cylinders, a stop located above the path of the sheet to said guide with a clearance space for the travel of the
 80 sheet beneath the stop, means for causing the advance end of the sheet to rise into engagement with said stop and means controlled by the rotation of one of said cylinders to depress the sheet out of engagement
 85 with said stop.

4. In a rotary printing press, a rotary type cylinder, a rotary impression cylinder
 90 cooperating with the said type cylinder, a guide carried by one of said cylinders for registering the sheet to be printed with the type plate on the type cylinder, feed mechanism which feeds the sheet into engage-
 95 ment with said guide and into feeding engagement with said cylinders, a stop located above the path of the sheet to said guide with a clearance space for the travel of the
 100 sheet beneath the stop, means for causing the advance end of the sheet to rise into engagement with said stop and means controlled by the rotation of one of said cylinders to depress the sheet out of engagement
 105 with said stop, the means for controlling the release of the stop and the actuating of the feed being so timed with relation to each other that the sheet will be released from
 the stop before said feed mechanism begins to feed the sheet.

5. In a rotary printing press, a rotary type cylinder, a rotary impression cylinder
 110 cooperating with the said type cylinder, a guide carried by one of said cylinders for registering the sheet to be printed with the type plate on the type cylinder, feed mechanism which feeds the sheet to be printed, a stop
 115 located just over the path of the sheet to said cylinders with a clearance space for the travel of the sheet under the stop, means for turning up the advance end of the sheet to engage with said stop and means controlled
 120 by the rotation of one of said cylinders to depress the advance end of the sheet out of engagement with said stop.

6. In a rotary printing press, a rotary type cylinder, a rotary impression cylinder
 125 cooperating with the said type cylinder, a guide carried by one of said cylinders for registering the sheet to be printed with the type plate on the type cylinder, feed mechanism which feeds the sheet to be printed, a
 130 stationary stop located just over the path

of the sheet to said cylinders with a clearance space for the travel of the sheet under the stop, means for turning up the advance end of the sheet to engage with said stop and means controlled by the rotation of one of said cylinders to depress the advance end of the sheet out of engagement with said stop.

7. In a rotary printing press, a rotary type cylinder, a rotary impression cylinder cooperating with the said type cylinder, a guide carried by one of said cylinders for registering the sheet to be printed with the type plate on the type cylinder, feed mechanism which feeds the sheet to be printed, a stop located just over the path of the sheet with a clearance space for the travel of the sheet under the stop, means for turning up the advance end of the sheet to engage with said stop and yielding presser mechanism controlled by the rotation of one of said cylinders to depress the advance end of the sheet out of engagement with said stop.

8. In a rotary printing press, a rotary type cylinder, a rotary impression cylinder cooperating with said type cylinder, a guide carried by one of said cylinders for registering the sheet to be printed with the type plate on the type cylinder, means for feeding the sheet into engagement with said guide and said cylinders, means for giving an upward incline to the advancing end of the sheet, a stop with which the upturned end of the sheet engages and means actuated by the rotation of one of said cylinders to press down the upturned end of said sheet out of engagement with said stop whereby the sheet is free to be fed forward to the type cylinder.

9. In a rotary printing press, a rotary type cylinder, a rotary impression cylinder cooperating with the said type cylinder, a guide carried by one of said cylinders for registering the sheet to be printed with the type plate on said cylinder, feed rolls which grip and feed the sheet into engagement with said running guide and into feeding engagement with said cylinders, one of said gripping rolls being movable toward and from the other, means controlled by the rotation of one of said cylinders to bring said movable roll into gripping relation with its cooperating feed roll, a stop located in the path of the sheet from the said gripping rolls to said running guide on the cylinder, means for causing the sheet to engage with said stop if the sheet is fed through the space between said feed rolls when separated and means controlled by the rotation of one of said cylinders to release the sheet from engagement with said stop.

10. In a rotary printing press, a rotary type cylinder, a rotary impression cylinder cooperating with the said type cylinder, a guide carried by one of said cylinders for

registering the sheet to be printed with the type plate on said cylinder, feed rolls which grip and feed the sheet into engagement with said running guide and into feeding engagement with said cylinders, one of said gripping rolls being movable toward and from the other, means controlled by the rotation of one of said cylinders to bring said movable roll into gripping relation with its cooperating feed roll, a stop located in the path of the sheet from the said gripping rolls to said running guide on the cylinder, means for causing the sheet to engage with said stop if the sheet is fed through the space between said feed rolls when separated and means controlled by the rotation of one of said cylinders to release the sheet from engagement with said stop, the means for controlling the release of the stop and the actuating of the feed rolls being so timed with relation to each other that the sheet will be released from the stop before the feed rolls begin to feed the sheet.

11. In a rotary printing press, a rotary type cylinder, a rotary impression cylinder cooperating with the said type cylinder, a guide carried by one of said cylinders for registering the sheet to be printed with the type plate on said cylinder, feed rolls which grip and feed the sheet into engagement with said running guide and into feeding engagement with said cylinders, one of said gripping rolls being movable toward and from the other, means controlled by the rotation of one of said cylinders to bring said movable roll into gripping relation with its cooperating feed roll, a stop located in the path of the sheet from the said gripping rolls to said running guide on the cylinder, means for causing the sheet to engage with said stop if the sheet is fed through the space between said feed rolls when separated, means controlled by the rotation of one of said cylinders to release the sheet from engagement with said stop, the means for controlling the release of the stop and the actuating of the feed rolls being so timed with relation to each other that the sheet will be released from the stop before the feed rolls begin to feed the sheet and means for driving said gripping rolls at a greater rate of surface speed than the speed of said running guide.

12. In a rotary printing press, a rotary type cylinder, a rotary impression cylinder cooperating with the said type cylinder, a guide carried by one of said cylinders for registering the sheet to be printed with the type plate on said cylinder, two feed rolls which are adapted to grip and feed the sheet into engagement with said running guide and said cylinders, a rocking lever in which one of said feed rolls is journaled, means for normally retaining said rocking lever in a position where the feed

roll carried thereby will be out of gripping engagement with its cooperating feed roll, a cam carried by the shaft on which one of said cylinders is mounted which engages
5 with said rocking lever and at a certain period in the rotation of the cylinder moves the said rocking lever to carry the said movable feed roll into gripping relation with the cooperating feed roll, means for feeding
10 the sheet through the space between said feed rolls when they are separated from each other, means for giving an upward incline to the advancing end of said sheet, a stop with which the upturned end of the said
15 sheet engages and means actuated by the rotation of one of said cylinders to press down the upturned end of said sheet out of engagement with said stop whereby when the feed rolls are brought into gripping en-
20 gagement with the sheet the sheet is free to be fed forward to the type cylinder.

13. In a rotary printing press, a rotary type cylinder, a rotary impression cylinder cooperating therewith, feed rings on said
25 type cylinder, guides carried by one of said

cylinders projecting in a backward direction from the direction of rotation of the cylinder on which they are mounted and at an angle to the periphery of the cylinder, means for feeding a sheet into engagement
30 with said guides, said feeding means being regulated to feed the sheet at a greater rate of speed than the speed of the guides and feeding and holding the sheet in such en-
35 gagement until the sheet is gripped by the cooperating feed rings and impression cylinder which carry the sheet away from the said first feed mechanism, the rotation of the cylinder on which the guides are mounted carrying the guides out of engagement with
40 the sheet while the sheet continues to be gripped and fed by the feed rings and impression cylinder, said guides being at all times open.

In testimony whereof I affix my signature, 45
in presence of two witnesses.

CLARK REYNOLDS.

Witnesses:

WILLIAM A. COPELAND,
ALICE H. MORRISON.