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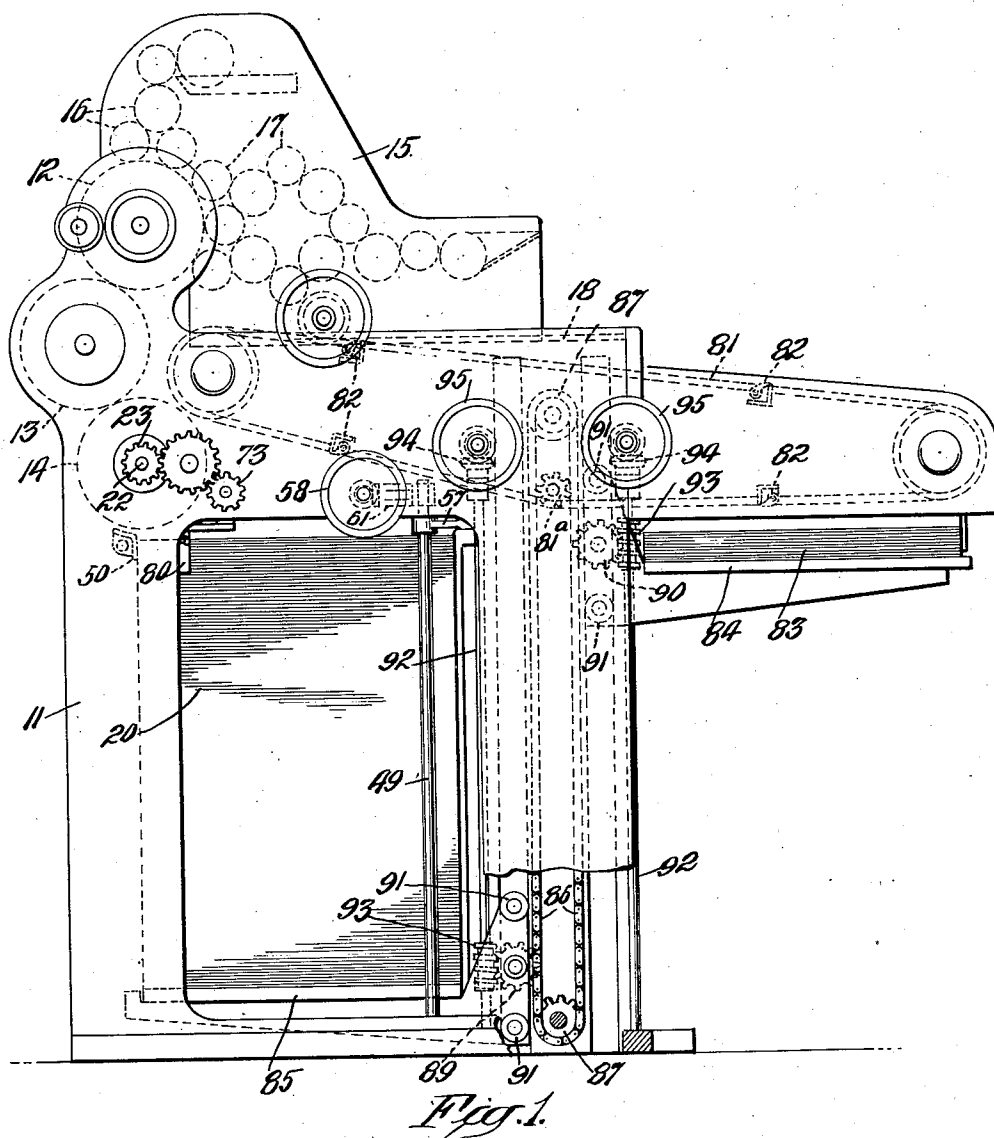
A. STOBBS

2,195,545

SHEET FED PRINTING PRESS

Filed Nov. 16, 1937

3 Sheets-Sheet 1



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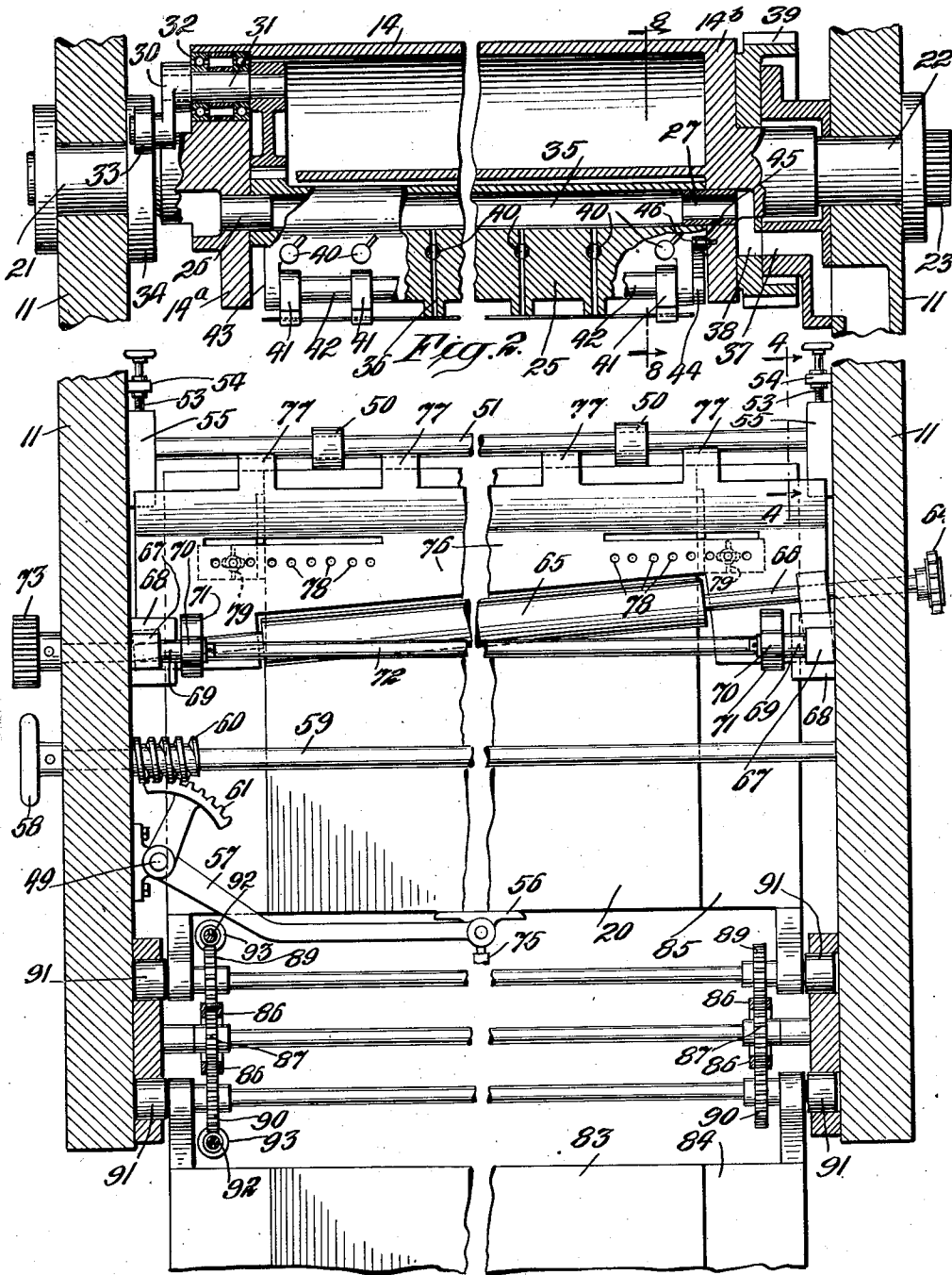
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3 Sheets-Sheet 2



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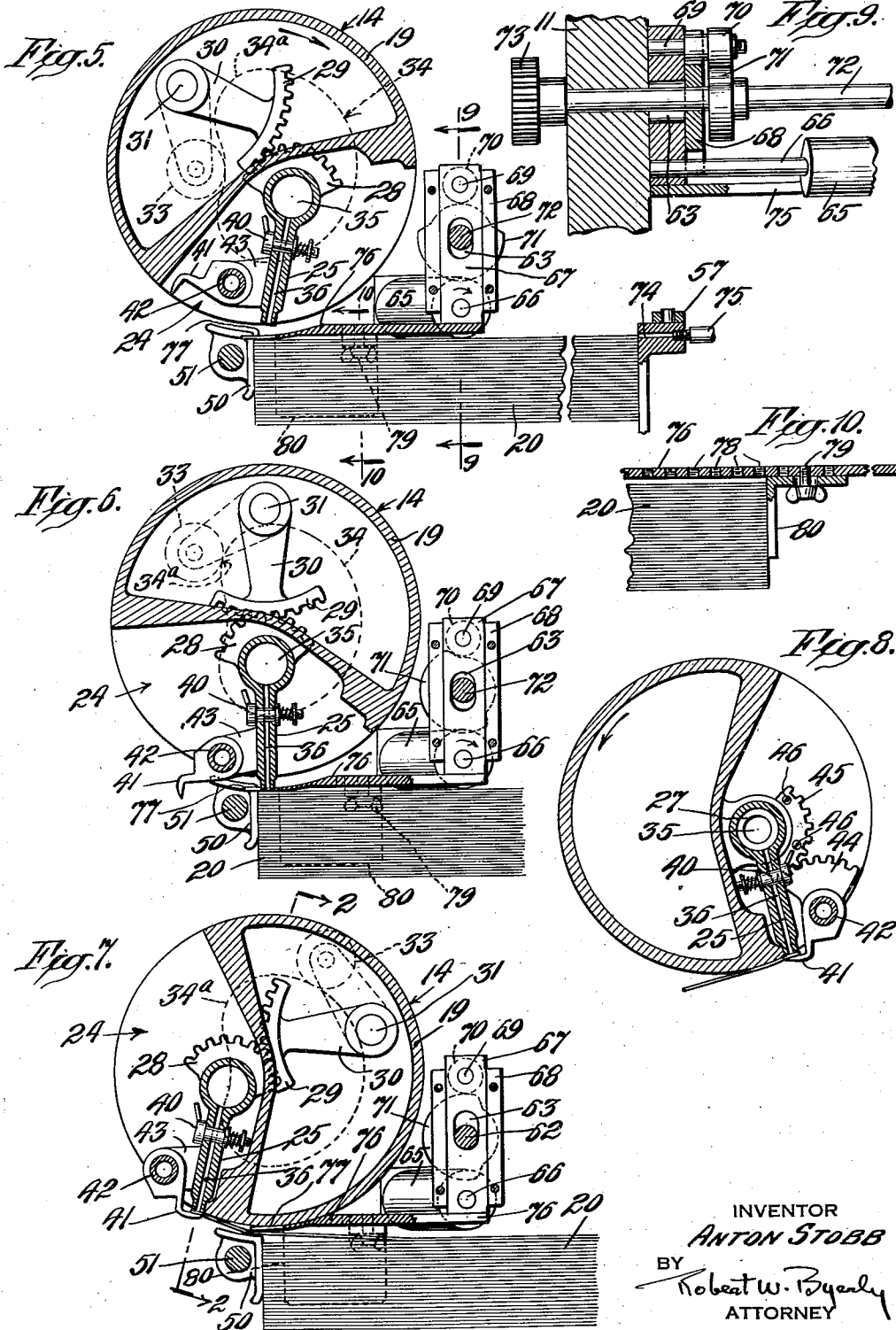
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3 Sheets-Sheet 3



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2,195,545

SHEET-FED PRINTING PRESS

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Application November 16, 1937, Serial No. 174,736

16 Claims. (Cl. 271—5)

This invention relates to sheet-fed printing presses, and aims to provide a press of this character which is more compact and convenient than those hitherto made.

In ordinary sheet-fed presses, the sheets are carried both to and from the impression cylinder by means of conveyors. This requires placing the piles of sheets to be printed and printed sheets on opposite sides of the machine—an arrangement which requires a large amount of floor space and renders access to the machine difficult.

A feature of the present invention lies in the provision of a sheet-fed printing press in which a continuously rotating impression cylinder takes the sheets to be printed directly from a pile adjacent the impression cylinder. Preferably, the pile of unprinted sheets is located within the frame of the press, and the printed sheets are delivered to a shelf at the rear of the press. In this manner, the shelves supporting the fresh and the printed sheets are arranged so that they are close together and operated by a single operating mechanism, and so that the press-man can readily inspect the press from the front.

More specifically, my printing press includes an impression cylinder provided with gripping means which moves with respect to the cylinder so that it is adapted to pick up the top sheet from a stationary pile of sheets.

Other features, objects and advantages of my invention will become apparent from the following detailed description of one form of press in accordance with the invention, reference being had to the accompanying drawings, wherein:

Fig. 1 is a side elevation of one form of printing press in accordance with the invention;

Fig. 2 is a section, on enlarged scale, taken through the impression cylinder of the press on the line 2—2 of Fig. 7;

Fig. 3 is a horizontal section, also on enlarged scale, taken above the pile of sheets shown in Fig. 1;

Fig. 4 is a vertical section taken on the line 4—4 of Fig. 3;

Fig. 5 is a vertical section taken on the line 5—5 of Fig. 2, looking toward the left;

Figs. 6 and 7 are views similar to Fig. 5, but showing the parts in successive operating positions;

Fig. 8 is a section taken on the line 8—8 of Fig. 2, looking in the direction of the arrows; and

Figs. 9 and 10 are broken away sections taken on the lines 9—9 and 10—10 of Fig. 5.

The printing press shown for the purpose of illustrating my invention is a lithographic, offset press. The press includes side frames 11 which support a plate cylinder 12, a blanket cylinder 13 and an impression cylinder 14. Supported on the top of the side-frames 11 is a sub-frame 15 in which are mounted the usual means 16 and 17 for supplying moisture and ink, respectively, to the plate cylinder 12. This sub-frame is advantageously adapted to slide in suitable grooves 18 in the side-frames 11, so that the inking mechanism can be moved out of contact with the plate cylinder, while the moistening mechanism remains in contact with this cylinder.

The pile of sheets to be printed, indicated at 20, is supported within the frame of the press, between side-frames 11, with the forward edges of the sheets below the axis of the impression cylinder 14. The impression cylinder has end walls 14a and 14b and is mounted through stub shafts 21, 22 on the side frames 11. The stub shaft 22 is driven at constant speed through a gear 23 from any suitable source of power. As best shown in Figs. 5 to 8, the impression cylinder is provided with an open sector 24 within which are mounted means for gripping the top sheet of the pile, this sheet being wrapped around the solid wall 19 of the impression cylinder and carried into contact with the blanket cylinder 13, which prints the impressions on the sheets. The gripper means illustrated comprises a plate 25 mounted in the open sector 24 of the impression cylinder and adapted to swing circumferentially rearwardly with respect to the cylinder during a part of each rotation of the cylinder, so that it can pick up the top sheet from the pile 20 while the impression cylinder is rotating at constant speed.

This may be accomplished by mounting the plate 25 on studs 26, 27 which are carried by the end walls of the cylinder eccentric to the axis of the rotation of the cylinder. Secured to the inner end of the plate 25 is a gear segment 28 which meshes with a gear segment 29 secured to one arm of a bell-crank 30 mounted through a bearing 32 in end wall 14a of the impression cylinder. On the outer arm of the bell-crank there is mounted a cam follower 33 which runs over a stationary cam 34 secured to side-frame 11. The plate 25 is of such length that its outer end is adapted to contact the top sheet of the pile when the parts occupy the positions shown in Fig. 6, and it is preferably as wide as the widest sheet to be printed on the press. The posi-

tions of the studs 26, 27 and the length of the plate 25 are such that the plate can be swung into the open sector in the cylinder, and such that the outer end of the gripping plate will project slightly beyond the circumference of the cylinder for engaging the top sheet of the pile, as shown in Fig. 6.

The shape of cam 34 is such that the rearward swinging of the gripper is at a rate equal to the rotational movement of the cylinder, so that the lower edge of the gripping plate is practically stationary, except for the downward movement of the end of the plate 25, due to the movement of the cam follower over the hump 34a, from its position in Fig. 5 to its position in Fig. 6. This down movement brings the edge of the gripper into contact with the top sheet on the pile 20, whereupon suction is applied as hereafter described. The continued swinging of the plate 25, to its position shown in Fig. 7, lifts the edge of the sheet and carries it forward.

As best shown in Fig. 2, the gripper plate 25 is provided with generally radial passages 36 which communicate with a passage 35 extending widthwise of the plate. Passage 35 is closed at one end by stud 26, and communicates at the other end, through hollow stud 27, with suction pipe 37 by means of a passage 38 in gear 39. The pipe 37 is connected to any suitable source of vacuum, and the gear 39 is rotated in synchronism with impression cylinder so that the passage 38 connects the passages 35 and 37 when the gripper plate contacts the sheets on pile 20, and until the sheets pass the blanket cylinder 13 and reach the delivery mechanism hereafter described, whereupon the vacuum is disconnected from passage 35. Suitable valves 40 are provided in the passages 36 so that some of these passages can be closed when relatively narrow sheets are to be printed.

Mechanical grippers are preferably provided to assist the pneumatic gripper means. These consist of fingers 41 secured to rock shaft 42, which is journaled in arms 43 secured to the plate 25. In order to swing the fingers 41 into engagement with the paper, there is secured to one end of the rock shaft 42 a gear segment 44 which is adapted to mesh with a gear segment 45 (as best shown in Fig. 8), the gear segment 45 being secured to end wall 14b of the impression cylinder by means of bolts 46. Since the gear segment 45 rotates with the impression cylinder, and since the gear segment 44 is carried by the plate 25, the rearward motion of the plate 25 with respect to the impression cylinder will cause the fingers 41 to swing into engagement with the paper, as indicated in Fig. 7. After a sheet has been carried between the impression cylinder and the blanket cylinder, the cam follower 33 will run onto the flat portion of the stationary cam 34, and this will cause the plate 25 to swing into the position it occupies in Fig. 5. At the same time, the fingers 41 will be swung into the open sector of the impression cylinder, thus releasing the printed sheet.

Means are provided for aligning the sheets in the pile 20, and for insuring the delivery of a single sheet at a time to the impression cylinder. For these purposes, as particularly shown in Figs. 3 and 4, there are provided a number of stops 50 of any desired vertical extent which are mounted upon a rod 51, the stops being adapted to bear against the forward end of the pile of paper. The ends of this rod are mounted in slides 52 carried between flanges 55 secured to side-frames

11. The position of the slides, and consequently of the stops, may be adjusted by thumbscrews 53 which are threaded into the slides and through brackets 54 secured to the side-frames. At the rear end of the pile there is provided a stop 56 which extends along the rear face of the pile, and is held against the paper by means of a bell-crank 57 pivoted on vertical shaft 49. If desired, a similar bell-crank (not shown) may be provided at the bottom of the pile. The position of the stop 56 may be adjusted in any suitable manner, for instance, by means of a hand-wheel 58 on a shaft 59 which is provided with a worm 60 meshing with a gear segment 61 on the bell-crank 57.

A feature of the invention lies in mechanism for registering the sheets in the pile. The means illustrated in Figs. 3 and 9 for this purpose comprise a diagonal roller 65 secured to a shaft 66 supported on vertical slides 67, which are adapted to reciprocate between guides 68 fastened to the side-frames. The roller 65 is constantly driven through a sprocket 64. A pair of cam followers 70 are mounted on stub shafts 69 secured to the upper ends of the slides 67, for engagement by cams 71 which are mounted through elongated openings 63 for rotation by shaft 72. This shaft is driven at constant speed from a gear 73, which is rotated at the same speed as the impression cylinder. The shape of the cams 71 is such that the roller 65 is dropped onto the top of pile 20 prior to the time the gripper plate 25 reaches its position shown in Fig. 6. The rotation of the diagonal roller 65, in contact with the top sheet of the pile, registers this sheet by urging it against stops, hereafter described, at the end and side of the pile. The roller also buckles the top sheet to form an air space between this sheet and the next sheet. Just after suction is applied to the top sheet by the gripper means, the cams 71 move from their positions shown in Fig. 6 to their positions shown in Fig. 7, thus lifting the roller 65 off the paper, and permitting the gripper means to withdraw the top sheet from the pile. After the top sheet has been withdrawn, the continued rotation of the cams 71 returns the roller 65 to its position in Fig. 5. In order to assist the separation of the top sheet, a blast of air is constantly blown against the rear face of the top of the pile through a slot 74, the air being supplied through suitable pipe 75.

Secured to the lower ends of the slides 67 is a hold-down plate 76 which extends forwardly, terminating in spaced feet 77 which bear against the top of the pile of paper, thus keeping the forward end of the top sheet flat while the roller 65 buckles it. The feet 77 and the ends of the tubes 36 of the gripper plate are so spaced and proportioned that the tubes 36 can engage the paper between the feet 77. As best shown in Figs. 3 and 10, the plate 76 is provided with a series of holes 78 which are threaded to receive bolts 79 for attaching angle irons 80 at the sides of the pile of paper in order to align the side edges of the paper.

In order to take the sheets from the impression cylinder, after they have been printed, there is provided a chain conveyor 81, of usual construction, having gripper fingers 82, also of usual construction. The conveyor 81, which is driven by a sprocket 81a, delivers the sheets to pile 83.

The operation of the press will be apparent from the foregoing description, but it may be briefly summarized. While the gripper on the impression cylinder is moving toward its position

shown in Fig. 6, in which it engages the top sheet of the pile, the roller which buckles the top sheet is lifted off the pile. Suction is then applied, and, as the cam follower passes over the hump on the cam, the gripper moves to its position shown in Fig. 7, thus lifting the forward edge of the top sheet from the pile.

During the succeeding half-revolution of the impression cylinder, which begins when the rear edge of the open sector passes the pile of sheets as shown in Fig. 6, the cam follower moves on an arcuate portion of the cam, so that the gripper maintains the same position with respect to the cylinder as is shown in Fig. 6, that is to say, it stays at the rear edge of the open sector. During this half-revolution suction is maintained in the gripper, and the sheet is wrapped around the solid portion of the cylindrical wall by the rotation of the cylinder. It is printed as it passes on the impression cylinder under the blanket cylinder.

When the front edge of the sheet reaches the delivery conveyor, it is seized by the grippers on this conveyor. The grippers on the impression cylinder are released, and gripper plate is swung ahead from the rear edge of the open sector toward the front edge of the open sector, in time to permit the sheet to be taken from the impression cylinder. The parts are then returned to their positions shown in Fig. 5.

A further feature of my press, which is made practical by the close spacing of the feeding and delivery piles, consists in providing a common operating mechanism for the feed pile shelf 85 and the delivery pile shelf 84 which simultaneously raises the feed shelf and lowers the delivery shelf at the same rate. The shelves are mounted for vertical movement by means of rollers 91 in vertical grooves in the side-frames. The grooves in each side-frame are only a short distance apart, and between them is a sprocket chain running over sprockets 87 which are driven at the rate at which it is desired to elevate the feed shelf and to depress the delivery shelf. The upwardly moving reach of the chain engages a sprocket 89 on the feed shelf, while the downwardly moving reach of the chain engages a sprocket 90 on the delivery shelf, so that the weights of the two shelves are counterbalanced. In order to adjust the level of one shelf independently of the other, each is provided with a vertical shaft 92, to which is keyed a worm 93. These worms are in mesh with sprockets 89 and 90. To the upper ends of the shafts 92 there are attached bevel gears 94 which mesh with gears connected to handwheels 95. By turning either one of the handwheels in the proper direction, either shelf may be raised or lowered, as desired.

The terms and expressions which have been employed are used as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described, or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed.

What I claim is:

1. In a sheet-fed printing press having an impression cylinder, means to support a pile of sheets directly beneath said cylinder, means to admit air between the top sheet of said pile and the other sheets, a device for buckling a portion of said top sheet, and means carried by said cylinder and constructed and arranged to with-

draw the top sheet from said pile on each revolution of said cylinder.

2. In a printing press having a rotary impression cylinder, an open sector in the cylinder, pneumatic gripper means mounted in said sector for movement relative to the rotation of the cylinder, and mechanical gripper means operable by said first-named gripper means.

3. In a printing press having a rotary impression cylinder, an open sector in the cylinder, pneumatic gripper means mounted in said sector for movement relative to the rotation of the cylinder, gripper fingers carried by said gripper means, and means to actuate said fingers upon movement of said gripper means relative to the cylinder.

4. In a printing press, a rotary impression cylinder having an open sector, a suction plate pivoted for swinging in said sector about an axis positioned so that the end of the plate protrudes outside the circumference of the cylinder during a portion of the swinging movement, gripper fingers carried by said suction plate, means to swing said plate rearwardly with respect to the direction of rotation of the cylinder, and means operated by the relative movement of the plate and cylinder for actuating the gripper fingers.

5. In a sheet-fed printing press, means to support a stationary pile of sheets, an impression cylinder, means mounted on said impression cylinder and comprising pneumatic and mechanical grippers constructed and arranged to withdraw the top sheet directly from said pile, and means to swing said last-named means rearwardly with respect to the rotation of the impression cylinder during a portion of each revolution.

6. In a sheet-fed printing press, means to support a stationary pile of sheets, an impression cylinder, means to raise a portion of the top sheet of said pile to admit air beneath it, means comprising pneumatic and mechanical grippers mounted on said impression cylinder and constructed and arranged to withdraw the top sheet directly from said pile, and means to swing said last-named means rearwardly with respect to the rotation of the impression cylinder during a portion of each revolution.

7. In a printing press, a shelf for supporting a pile of sheets, stops adjacent the top of the pile at one end and one side of the sheets, and combining means constructed and arranged to urge the top sheet of the pile into contact with said stops.

8. In a printing press, a shelf for supporting a pile of sheets, stops adjacent the top of the pile at one end and one side of the sheets, a continuously rotating diagonal roller adapted to contact the top sheet of the pile and register it with said stops, and means to intermittently contact said roller with the top sheet of the pile.

9. In a printing press, a shelf for supporting a pile of sheets, means for registering the top sheet on the pile, an impression cylinder mounted adjacent one edge of said top sheet, and sheet-withdrawing means mounted on said impression cylinder and constructed and arranged to engage the top sheet while substantially stationary and thereupon withdraw the top sheet from said pile.

10. A sheet-fed printing press comprising means to support a pile of sheets, printing mechanism including an impression cylinder supported adjacent one edge of the top sheet of said pile, said printing mechanism being adjacent one side of the press, and delivery means at the opposite side of the press, whereby said printing mechanism

nism is open for inspection at the first-named side of the press.

11. A sheet-fed printing press comprising means to support a pile of sheets, printing mechanism including an impression cylinder supported adjacent one edge of the top sheet of said pile, said printing mechanism being adjacent one side of the press, inking mechanism mounted on the top of the press, and delivery means at the opposite side of the press, whereby said printing mechanism is open for inspection at the first-named side of the press.

12. A sheet-fed printing press comprising a feed and a delivery pile, impression and plate cylinders located above and extending over the feeder end of said feed pile, means attached to the cylinder for withdrawing a top sheet directly from said feed pile, and inking devices arranged on top and around the plate cylinder and extending toward the delivery end of the press.

13. A sheet-fed printing press comprising an impression cylinder, means to support a pile of sheets, means to align the edges of sheets in the pile, means mounted on the impression cylinder and constructed and arranged to withdraw the top sheet from its aligned position in the pile and hold said sheet in register on the impression cylinder, and means to swing said last-named means rearwardly with respect to the rotation of the impression cylinder whereby said last-named means is practically stationary as it engages the top sheet of the pile during each revolution of the impression cylinder.

14. In a printing press, a shelf for supporting a pile of sheets, means to register the top sheet

on the pile, an impression cylinder mounted adjacent one edge of said top sheet, sheet-withdrawing means mounted on said impression cylinder for swinging rearwardly with respect to the rotation of said cylinder, and means constructed and arranged to swing said sheet-withdrawing means rearwardly at a speed such that the sheet-withdrawing means is substantially stationary as it engages the top sheet of the pile, and to thereafter draw the sheet forward at increasing speed as the impression cylinder continues to rotate.

15. In a printing press, a shelf for supporting a pile of sheets, means to register the top sheet on the pile, an impression cylinder mounted adjacent one edge of said top sheet, suction means mounted on said impression cylinder for engaging the top sheet of the pile, means constructed and arranged to swing said suction means rearwardly at a speed such that said suction means is substantially stationary as it engages the top sheet of the pile, and to thereafter draw the sheet forward, and mechanical grippers for holding the sheet in register on the impression cylinder.

16. In a sheet-fed printing press, the combination of an impression cylinder, means for supporting a pile of sheets with one edge beneath the impression cylinder, and means mounted on the impression cylinder for withdrawing sheets from the top of said pile, said means comprising a suction arm adapted to swing rearwardly with respect to the impression cylinder, and a mechanical gripper carried by said arm and adapted to hold the sheet in register on the impression cylinder.

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