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C. W. HARROLD ET AL

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SHEET FED OFFSET PERFECTING PRESS

Filed July 13, 1945

2 Sheets-Sheet 1

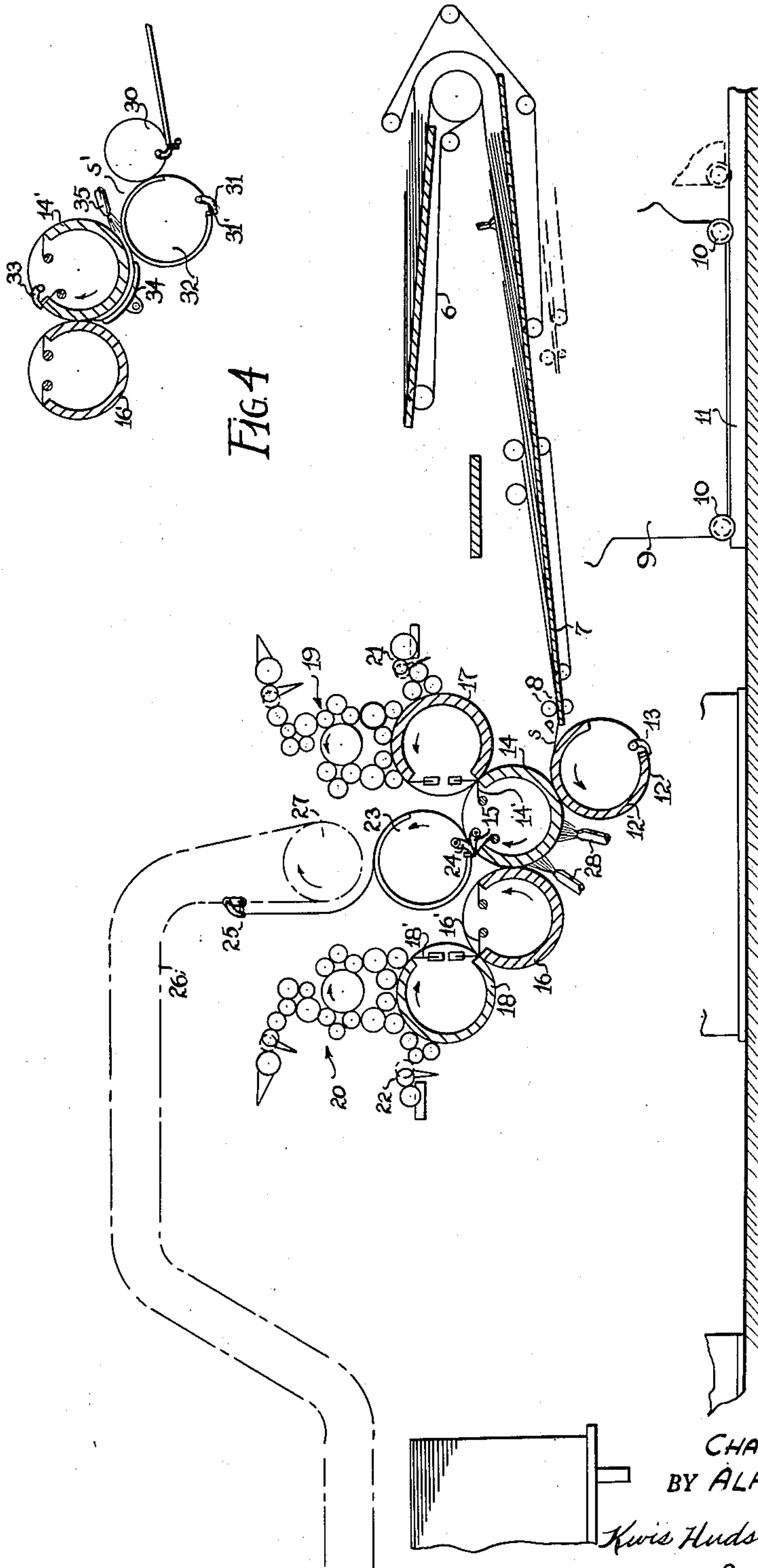


Fig. 1

Fig. 4

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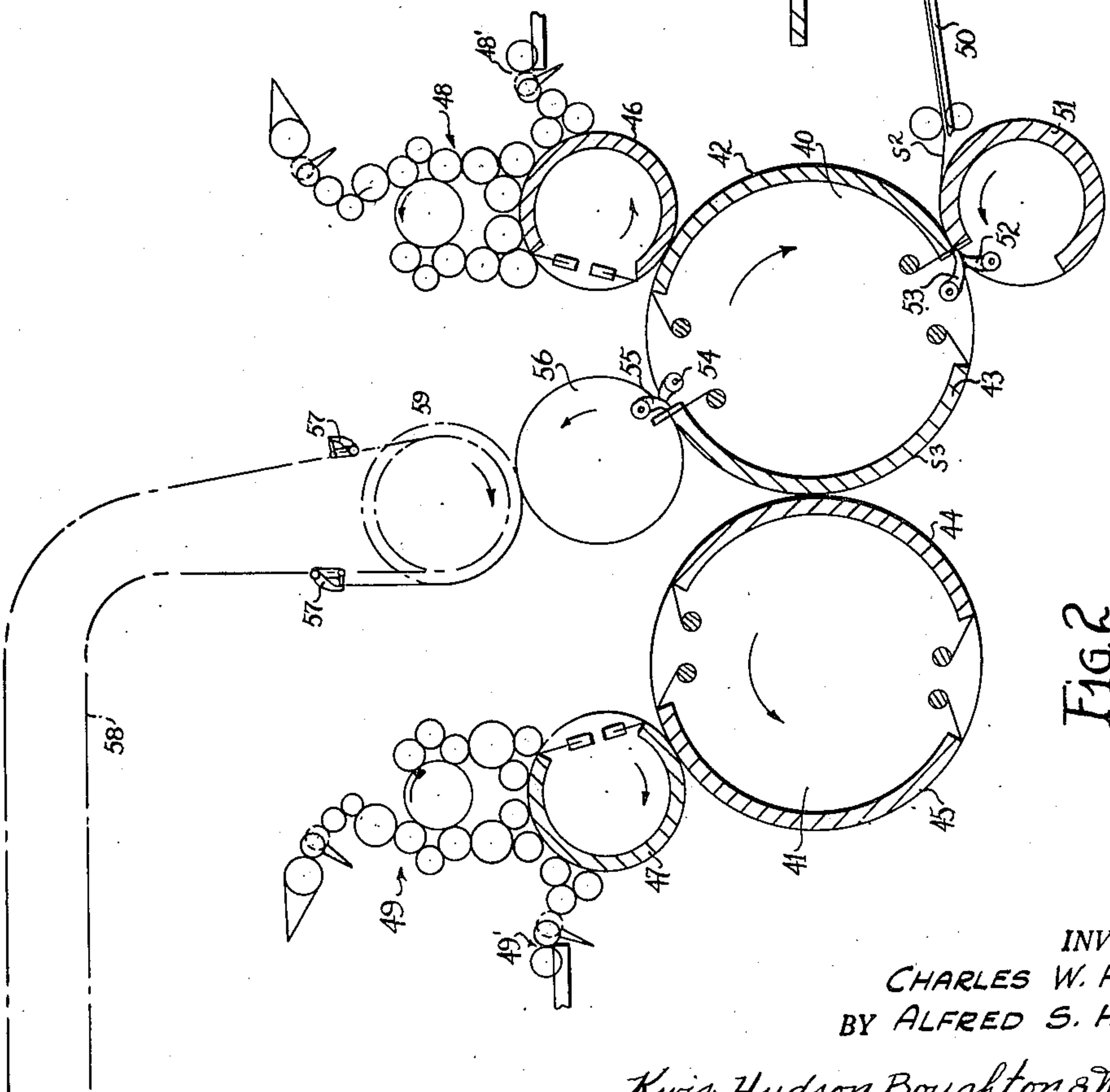
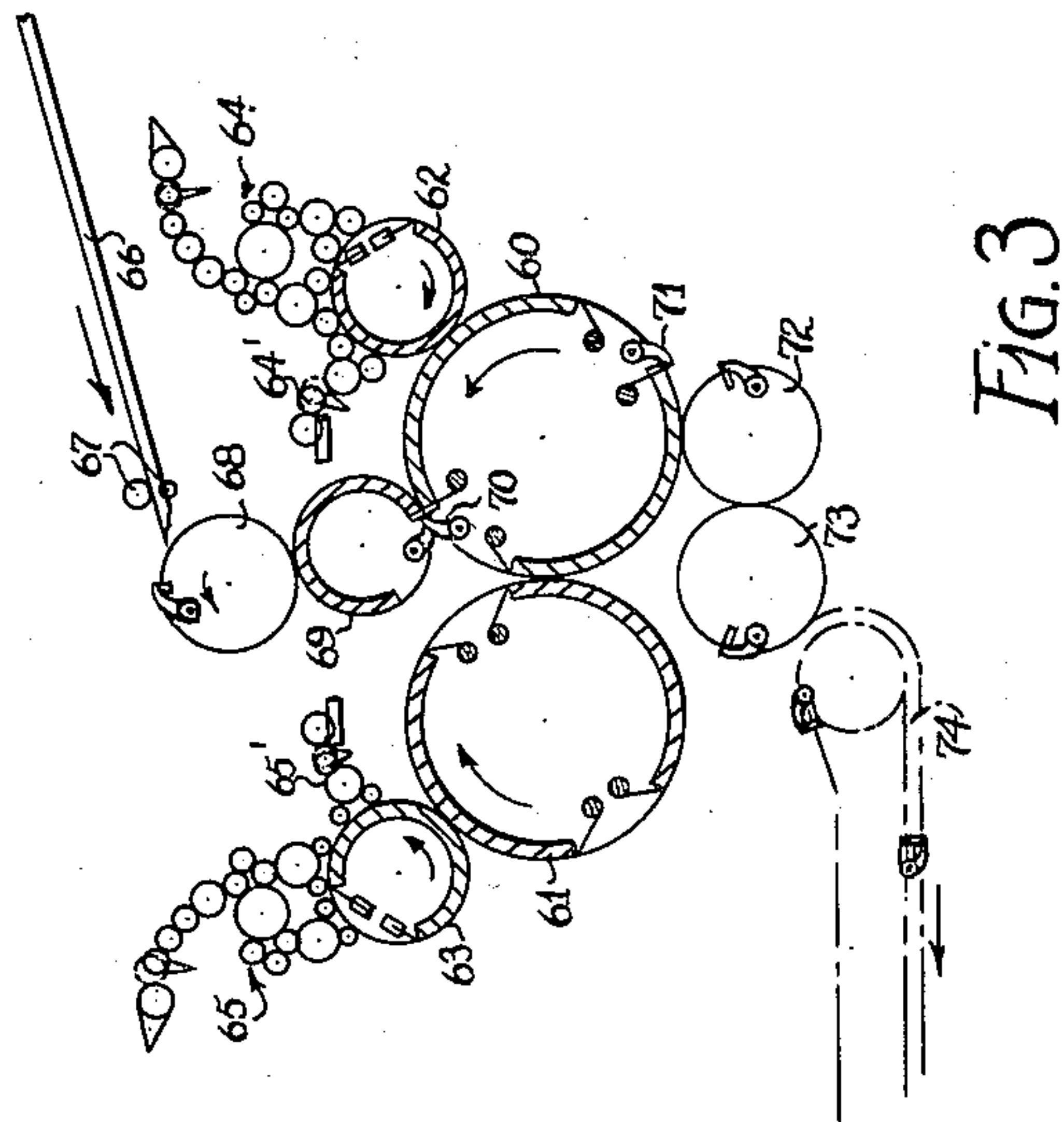
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SHEET FED OFFSET PERFECTING PRESS

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6 Claims. (Cl. 101—142)

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This invention relates to improvements in perfecting presses, especially perfecting presses utilizing the offset printing process. One of the objects of the invention is the attainment of simplicity in construction and operation.

Another object is the provision of a press of low cost due to the small number of cylinders employed.

Another object is the elimination of drying between impressions.

A further object is the provision of a press in which smudging of the sheet by partial accidental contact of a surface thereof with an inked blanket cylinder prior to the printing of that surface by the cylinder, is avoided.

Still another object is the provision of a press of the character stated with the parts so disposed as to afford convenient operation and servicing.

Another object is the provision of a press of this character wherein the inkers are disposed above the plate cylinders in the most approved relation of those parts of a press.

A general object is the provision of a press which shall be capable of producing printing of high quality.

Other objects and features of novelty will appear as we proceed with the description of those embodiments of the invention which, for the purposes of the present application, we have illustrated in the accompanying drawings, in which

Fig. 1 is a diagrammatic elevational view, partly in vertical section, of a printing press embodying the invention, including sheet feeding and sheet delivery mechanisms.

Fig. 2 is a similar view of a modified construction in which blanket cylinders of double size are employed.

Fig. 3 is a view similar to Fig. 2 on a smaller scale with provision for feeding the sheets downwardly instead of upwardly between the two blanket cylinders, and

Fig. 4 is a detail view illustrating a means for preventing accidental contact of sheets with the inked blankets before the impression line is reached.

Referring first to Fig. 1, 6 illustrates a bank feeder for transmitting sheets in succession along a feed board 7 either singly or in lapped relation, as shown, to a set of feed rolls 8. Any other means for advancing sheets to these rolls could be employed, as the feeder per se forms no part of the present invention. Preferably the feeder, including the feed board, is mounted upon movable frames 9 carrying rollers 10 running on tracks 11 so as to permit the feeder to be re-

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tracted a desired distance, as indicated in dotted lines, to permit operations to be more readily performed on the cylinders and other parts of the press. 12 is a continuously rotating feed cylinder which takes sheets advanced by the rollers 8 at a speed slightly greater than the surface speed of the cylinder and grips them by grippers 13 while they are front registered against stops on the cylinder. Mechanism of this type is disclosed more or less in detail in Patent No. 1,307,969 to A. F. Harris dated June 24, 1919. However any other suitable means for presenting sheets to the grippers 13 may be substituted for that just described without departing from the spirit of the invention.

Each sheet, after it is registered and taken by the grippers 13, is advanced to the nearest point adjacent a blanket cylinder 14, is released by those grippers and taken by grippers 15 on the blanket cylinder 14. 16 is another blanket cylinder disposed alongside cylinder 14 and in impression relationship therewith to form a printing couple for printing on both sides of a sheet simultaneously. In the form illustrated there are no grippers on cylinder 16. Plate cylinders 17 and 18 are arranged in operative relation to blanket cylinders 14 and 16 respectively, being disposed above the axes of the latter cylinders but laterally thereof in order to provide a considerable space between the plate cylinders for a purpose presently to appear. Above each of the plate cylinders 17 and 18 there is an inking mechanism, the parts of which may be referred to collectively as 19 and 20 respectively. Dampening equipment, such as is required when lithographic plates are employed on cylinders 17 and 18 is indicated at 21 and 22.

In the space between plate cylinders 17 and 18 we mount a stripper cylinder 23 having grippers 24 adapted to take the forward edge of each sheet from the grippers 15 and carry it upwardly to a point where it is taken by one of a plurality of sets of travelling grippers 25 on a chain conveyor 26 which conveys the sheets over the inking and dampening mechanisms 20, 22 and over a working space to piling mechanism of conventional form. The spacing apart of the plate cylinders 17 and 18 and of the inking mechanisms 19 and 20 leaves a clear space for the conveyor chains 26 and sprockets 27 as well as for the cylinder 23.

We have illustrated two modes of handling the sheets prior to the time they pass through the impression line between the blanket cylinders 14, 16. In the preferred form, cylinder 12

not only acts as a means for feeding the sheets to the grippers 15 of cylinder 14 but also acts as an impression cylinder for pressing the sheets against the blanket cylinder 14. For this purpose, cylinder 12 is appropriately constructed to provide a continuous impression surface of proper radius as shown in Figure 1. The action of this cylinder is to press the sheet against the blanket cylinder 14 so as to be printed by the latter and so as to be caused to adhere thereto during travel of the sheet from cylinder 12 to the impression line between cylinders 14 and 16. The adherence of the sheet to the blanket cylinder 14 is effected partly by the stickiness of the ink on the blanket, and partly by the substantial absence of air beneath the sheet and atmospheric pressure on the outside of the sheet, and these effects may be assisted if desired by the use of brushes 28 arranged to press against the sheet and hold it in contact with cylinder 14.

In the above described form, the sheet is twice pressed against the blanket cylinder 14, once as it passes impression cylinder 12 and again as it passes blanket cylinder 16. The effect, however, is that of a single printing only, since the sheet does not change its position on cylinder 14 between impressions. The amount of pressure exerted by cylinder 12 may be equal to that ordinarily required for a full imprint, or if desired, it may be less than that amount so as to produce only a partial or faint imprint, the pressure exerted by cylinder 16 completing the imprinting; but in any case, in this form of the invention, cylinder 12 so cooperates with cylinder 14 when placing a sheet thereon as to effectively iron out the sheet against that cylinder in a manner to enable it to be held there without harmful movement until it reaches the impression line between cylinders 14 and 16. In this manner smudging of the sheets is avoided.

In the second mode of handling the sheets, as illustrated in Figure 4, we provide different means for preventing smudging of the work. In this case, sheet S' is taken from the feed board by a rotary gripper device 30 of known construction and advanced to the grippers 31 and cooperating pads 31' of a continuously rotating transfer cylinder 32. From these grippers it is transferred to grippers 33 on the blanket cylinder 14' and thereby drawn around that cylinder in an upward direction past the printing line between that cylinder and blanket cylinder 16', after which it may be taken by a stripping cylinder similar to cylinder 23 of Fig. 1. The body of feed cylinder 32 is depressed radially below the level of gripper pad 31' so that the sheet S' can travel over cylinder 32 without touching cylinder 14'. A guard 34, consisting preferably of a series of narrow fingers spaced transversely of the machine, is disposed to prevent any part of the sheet S' from swinging far enough away from cylinder 14' to contact cylinder 16' and become smudged by the ink image on that cylinder. To prevent the sheet from contacting cylinder 14' ahead of the line of impression between the two cylinders, a series of transversely spaced air nozzles 35 is caused to inject a layer of air under pressure between the sheet and the cylinder 14'. Alternatively, suction devices may be placed in the position occupied by fingers 34 and operated to draw the sheet toward them and away from cylinder 14'.

The form of the invention illustrated in Fig. 2 is like that of Fig. 1 in major respects. However its two blanket cylinders 40 and 41, instead of

being of the same diameter as the feed cylinders and the plate cylinders, are double size, and each of them is equipped with two blankets 42, 43 in the one case and 44, 45 in the other. The same ink image is transferred to each of the blankets 42 and 43 by a plate cylinder 46, and another ink image is transferred to each of the blankets 44 and 45 by a plate cylinder 47, the plate cylinders 46 and 47 being inked by mechanisms 48 and 49 respectively and dampened by dampening devices 48' and 49' respectively. An advantage of the double size blanket cylinders lies in the greater accessibility of those cylinders. Another advantage is the greater space available for other parts of the press such as the delivery mechanism.

A sheet of paper S² is taken from a feed board 50, forced against front stops on a continuously rotating combination feed and impression cylinder 51, gripped by sheet grippers 52 thereon and transferred to grippers 53 on cylinder 40 at the front end of blanket 42. The forward edge of the sheet is then carried along the periphery of the cylinder 40 in a clockwise direction and upwardly through the impression line between the two cylinders 40 and 41. The sheet preceding sheet S² is shown at S³ under the grip of sheet grippers 54. The sheet S³ received an imprint, either complete or faint, as it moved between cylinder 51 and blanket 43, but as it moves through the line of contact between the two cylinders 40 and 41 it receives a full imprint on both sides. The blankets 43 and 44 cooperate to perfect alternate sheets and the blankets 42 and 45 cooperate to perfect the other alternate sheets. When the sheets have been printed they are transferred from grippers 53 or 54, as the case may be, to grippers 55 on a stripper cylinder 56 which then transfers them to one of a plurality of sets of grippers 57 on a chain conveyor 58 constituting part of a delivery mechanism which includes sprocket wheels 59.

In Figs. 1, 2 and 4 the design and arrangement of the machine is such as to cause the sheets to travel upwardly between the blanket cylinders. The invention also contemplates a reversed arrangement wherein the sheets travel downwardly between a pair of blanket cylinders. A construction of this kind is illustrated in Fig. 3, wherein double blanket cylinders 60 and 61, similar to cylinders 40 and 41, are shown. The blankets on these cylinders receive ink images from plate cylinders 62 and 63 to which ink is applied by inking mechanisms 64 and 65 and dampening material is applied by dampening mechanism 64' and 65'. The sheets are caused to travel down a feed board 66. At the front end of the latter they are gripped by feed rolls 67 and pushed against front stops on a continuously rotating feed cylinder 68 from which they are transferred to a second feed cylinder 69 that occupies a position such that it is adapted to transmit sheets in the proper direction to grippers 70 or 71, as the case may be, on blanket cylinder 60. Cylinder 69 may be merely a feed cylinder similar to cylinder 32 of Fig. 4 and means similar to air nozzles 35 and fingers 34 may be provided for holding the sheet away from cylinder 60 prior to its arrival at the printing line between cylinders 60 and 61, but preferably, and as shown, cylinder 69 is constructed and disposed to act also as an impression cylinder similar to cylinders 12 and 51 of Figs. 1 and 2. After the sheet is taken by grippers 70 or 71 it is then caused to pass downwardly between cylinders 60 and 61 and to be imprinted on both sides by the images carried by the blankets

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on those cylinders. After the forward edge of each sheet passes downwardly through the printing line, it is stripped from cylinder 60, as by a stripper cylinder 72, and then passed to a cylinder 73 from which it is transmitted to grippers on a chain conveyor 74 constituting part of a delivery mechanism. It is apparent that the arrangement just described enables operations to be performed on the in-running side of each pair of plate and blanket cylinders and provides for location of the cylinders such that the blanket cylinders may readily be moved out of contact with each other, with their plate cylinders and with the feed impression cylinder, when the impression is tripped.

It is obvious that either of the two cooperating blanket cylinders may be provided with grippers and the sheets fed to those grippers by an appropriate arrangement of the feed cylinder; or both blanket cylinders may be provided with grippers and the sheets transferred from the grippers on one such cylinder to those on the other, from which they may be taken by a suitable stripping cylinder. Other variations may be made within the spirit of the invention.

The mode of operation of the constructions above described will be evident to those skilled in the art, it is believed, without further explanation.

Having thus described our invention, we claim:

1. In a perfecting offset press, two blanket cylinders disposed side by side in impression relation to each other, sheet grippers on at least one of said blanket cylinders, plate cylinders disposed above the axes of said blanket cylinders, inking mechanism disposed above each of said plate cylinders, a stripper cylinder disposed above said blanket cylinders between said plate cylinders adapted to take sheets from a gripper equipped blanket cylinder, a feeding cylinder for feeding sheets to a gripper equipped blanket cylinder at a point below the axis thereof, and means for holding the sheet away from the other blanket cylinder until the impression line between blanket cylinders is reached.

2. In a perfecting offset press, two blanket cylinders disposed side by side in impression relation to each other, sheet grippers on at least one of said blanket cylinders, plate cylinders disposed above the axes of said blanket cylinders, a stripper cylinder disposed above said blanket cylinders between said plate cylinders adapted to take sheets from the said gripper equipped blanket cylinder, a feed cylinder for feeding sheets to the said gripper equipped blanket cylinder at a point below the axis thereof, means for holding the sheet behind its gripped edge away from the latter cylinder, and means for holding it away from the other blanket cylinder until the impression line between blanket cylinders is reached.

3. In a perfecting offset press, two blanket cylinders disposed side by side in impression relation to each other, sheet grippers on at least one of said blanket cylinders, plate cylinders disposed above the axes of said blanket cylinders, a stripper cylinder disposed above said blanket cylinders between said plate cylinders adapted to take sheets from a gripper equipped blanket cylinder, and a feed-impression cylinder disposed below a gripper equipped blanket cylinder for feeding sheets to the latter cylinder and squeez-

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ing air from between the sheets and that cylinder.

4. In a perfecting offset press, two blanket cylinders disposed in impression relation with each other, a plate cylinder in operative contact with each of said blanket cylinders, sheet gripper means, including grippers on at least one of said blanket cylinders, adapted to convey the leading edges of sheets through the impression line between said blanket cylinders, a feed impression cylinder having grippers thereon adapted to transmit sheets to the grippers on one of said blanket cylinders and to press the sheets against the latter blanket cylinder and squeeze the air from between the sheets and that cylinder, means for presenting sheets to the grippers on said feed impression cylinder, and delivery means arranged to take sheets from said sheet gripper means after their leading edges have passed through said impression line.

5. In a sheet-fed perfecting offset press, in combination, a pair of cooperating blanket cylinders arranged in impression relation with each other and adapted to print on opposite sides of sheets passing between them, a plate cylinder in operative contact with each of said blanket cylinders, sheet grippers on one of said blanket cylinders, and a feed-impression cylinder arranged to transfer sheets to said latter blanket cylinder and to squeeze the air from between the sheets and that cylinder prior to their passage between said blanket cylinders.

6. In a sheet fed perfecting offset press, two blanket cylinders disposed side by side in impression relation, two plate cylinders wholly disposed on the same side of the plane containing the blanket cylinder axes and spaced apart a distance greater than the diameter of one of them, inking mechanism for each plate cylinder also disposed on the same side of said plane as said plate cylinders, sheet grippers on at least one of said blanket cylinders, a sheet handling cylinder on one side of said plane having sheet grippers to feed sheets to the grippers of said blanket cylinder and disposed in pressure relation thereto, and a sheet handling cylinder on the other side of said plane having sheet grippers cooperating with said sheet grippers on said blanket cylinder to take sheets therefrom, one of said two sheet handling cylinders being disposed between said spaced apart plate cylinders.

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