

July 12, 1955

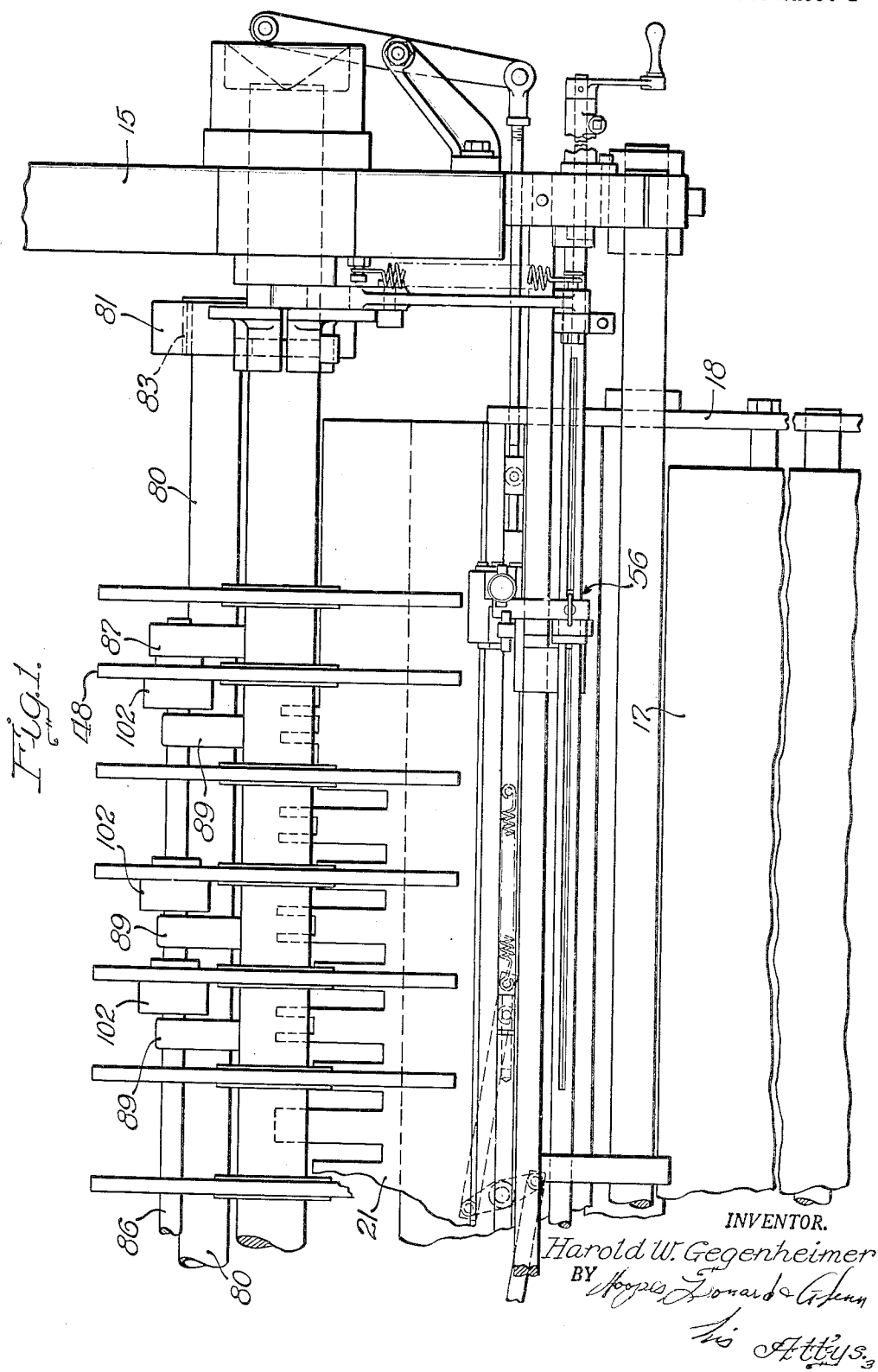
H. W. GEGENHEIMER

2,712,935

PRINTING PRESS AND HANDLING OF SHEETS

Filed June 28, 1952

6 Sheets-Sheet 1



July 12, 1955

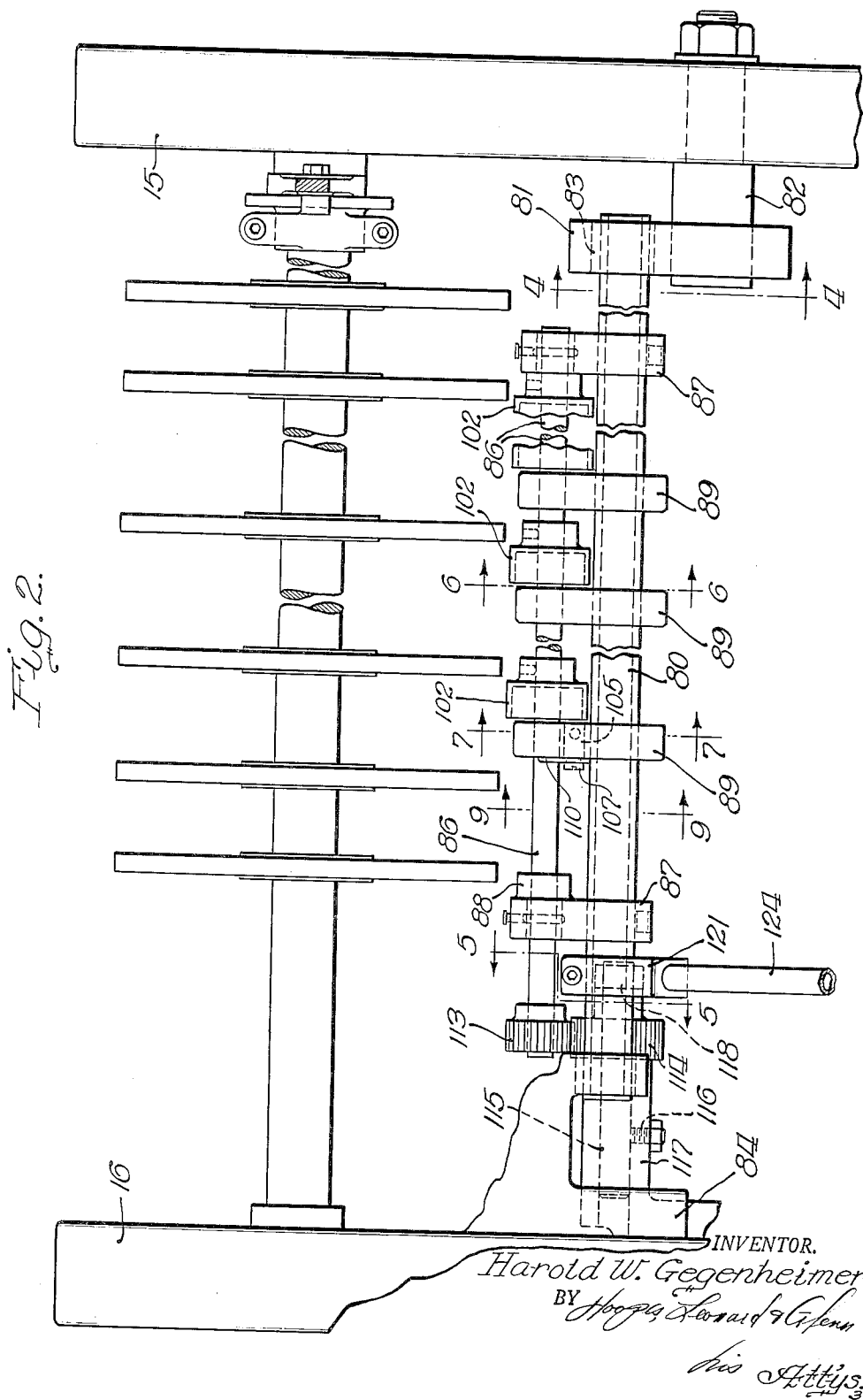
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2,712,935

PRINTING PRESS AND HANDLING OF SHEETS

Filed June 28, 1952

6 Sheets-Sheet 2



July 12, 1955

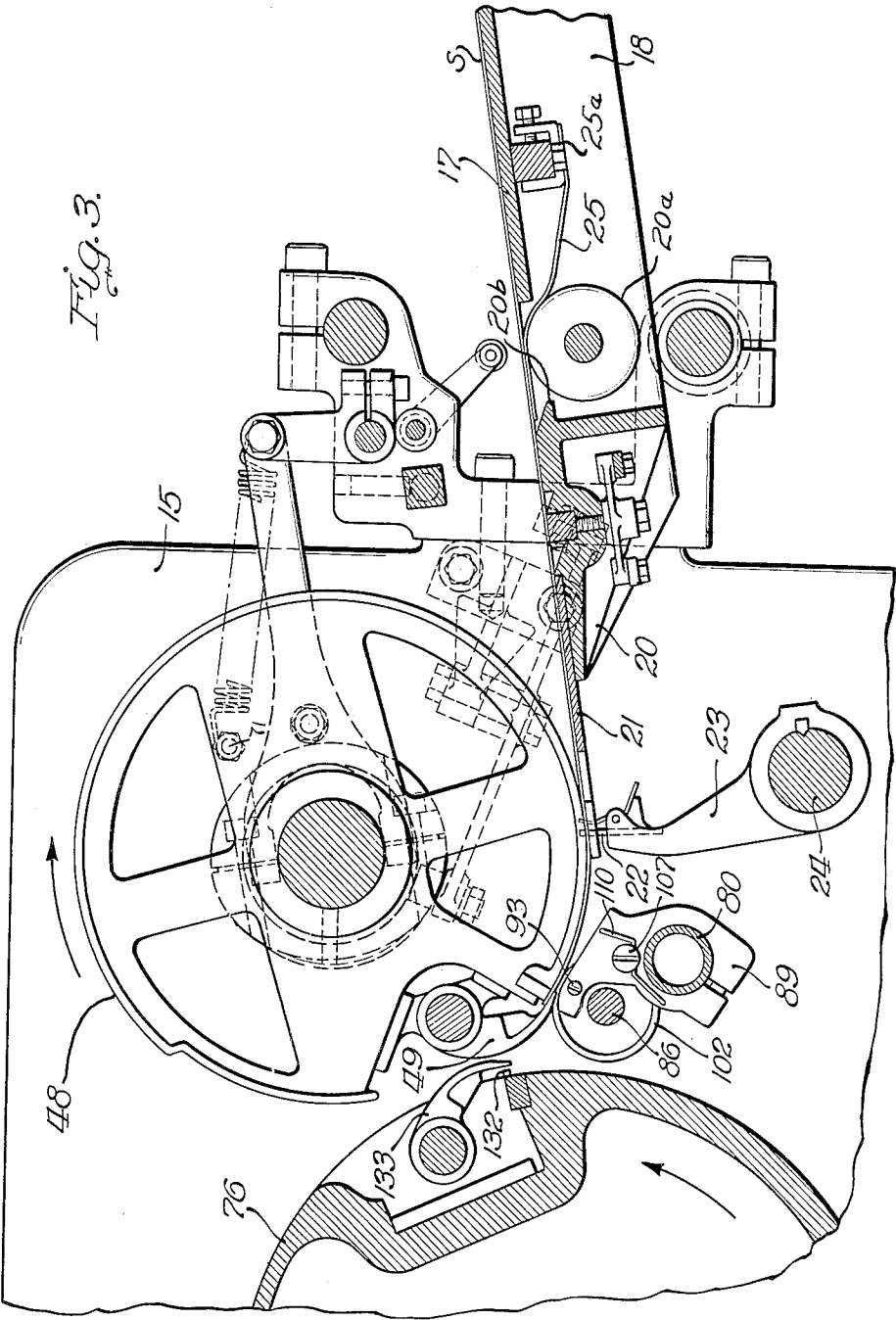
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PRINTING PRESS AND HANDLING OF SHEETS

Filed June 28, 1952

6 Sheets-Sheet 3



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PRINTING PRESS AND HANDLING OF SHEETS

Filed June 28, 1952

6 Sheets-Sheet 4

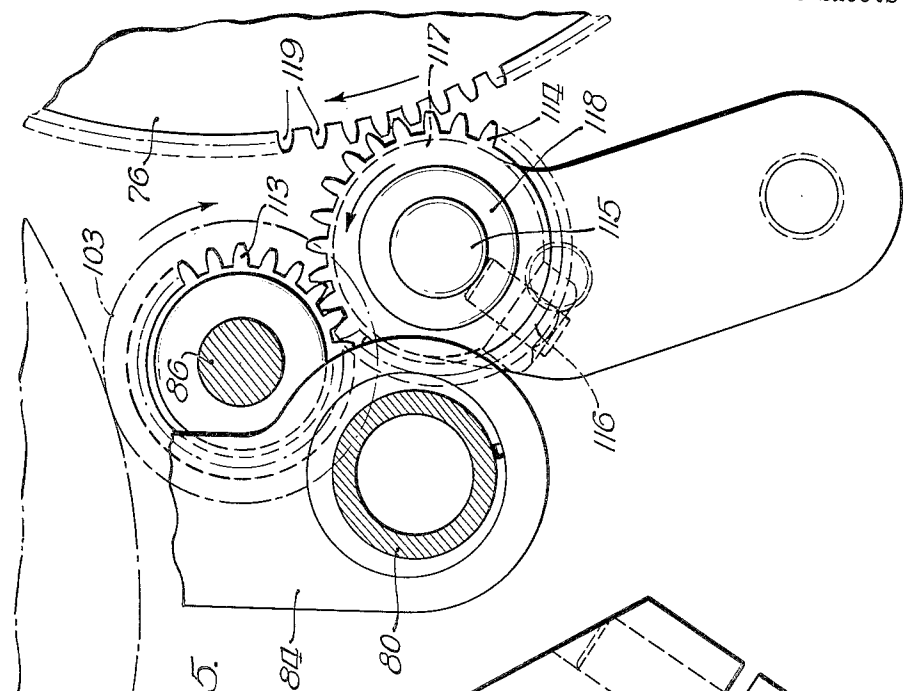


Fig. 5.

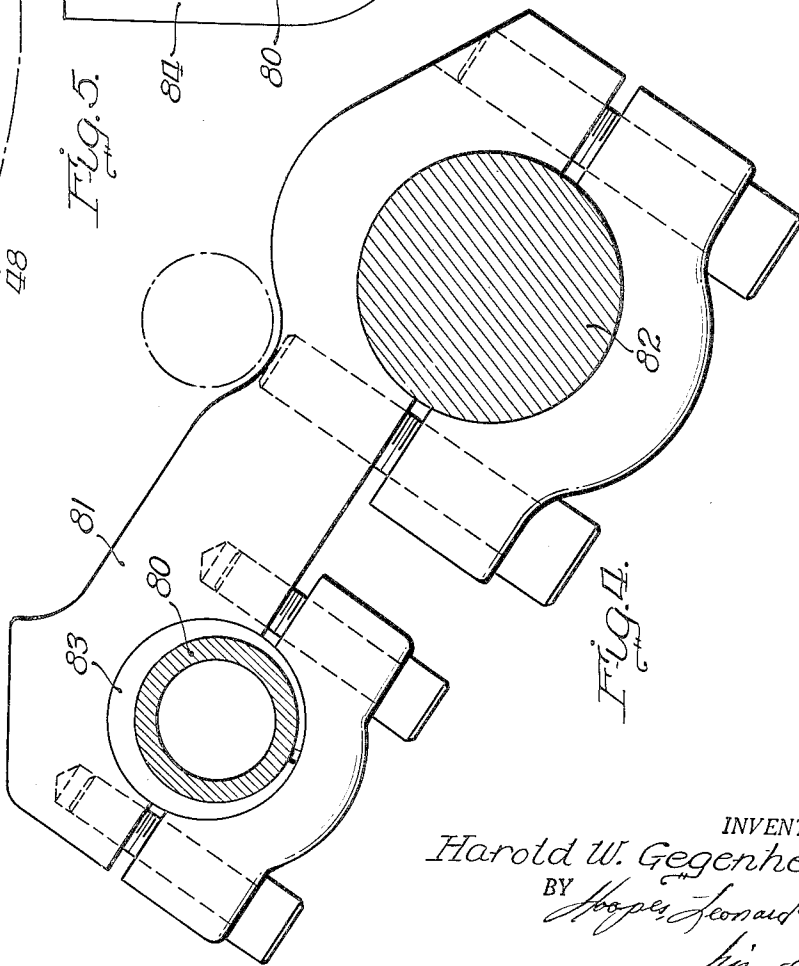


Fig. 4.

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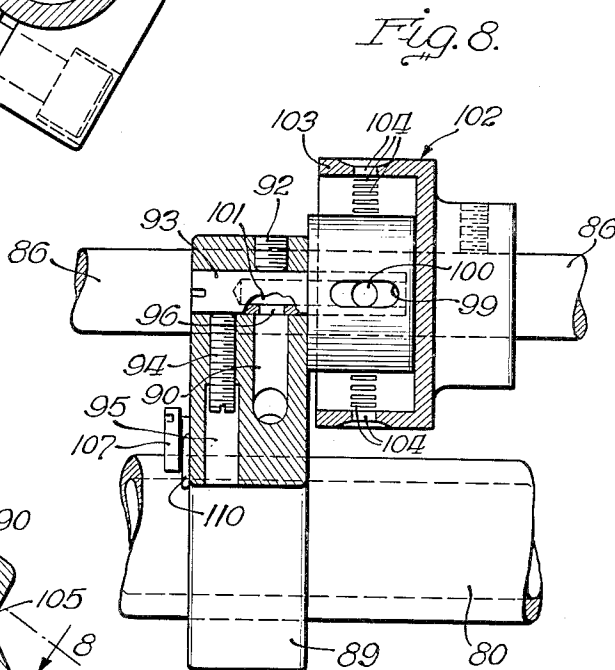
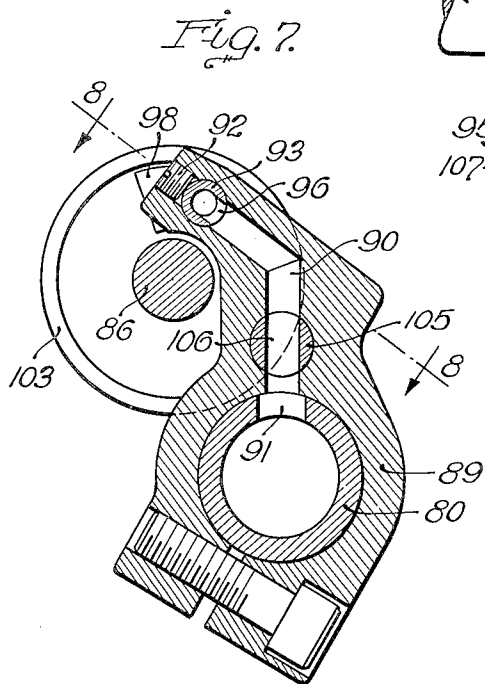
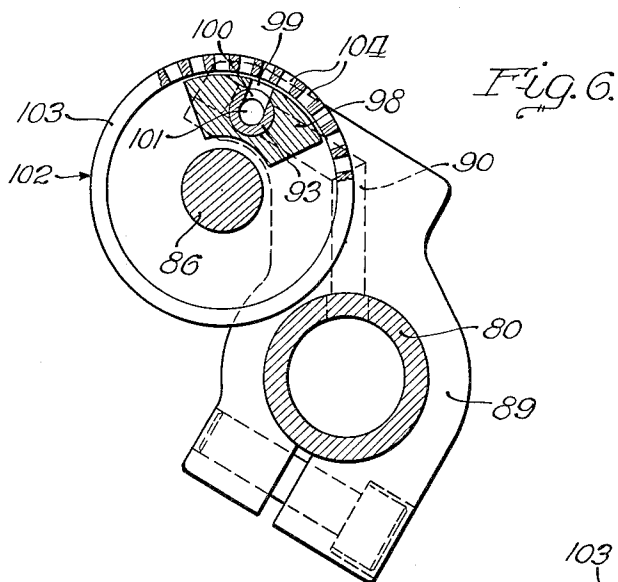
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2,712,935

PRINTING PRESS AND HANDLING OF SHEETS

Filed June 28, 1952

6 Sheets-Sheet 5



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2,712,935

PRINTING PRESS AND HANDLING OF SHEETS

Filed June 28, 1952

6 Sheets-Sheet 6

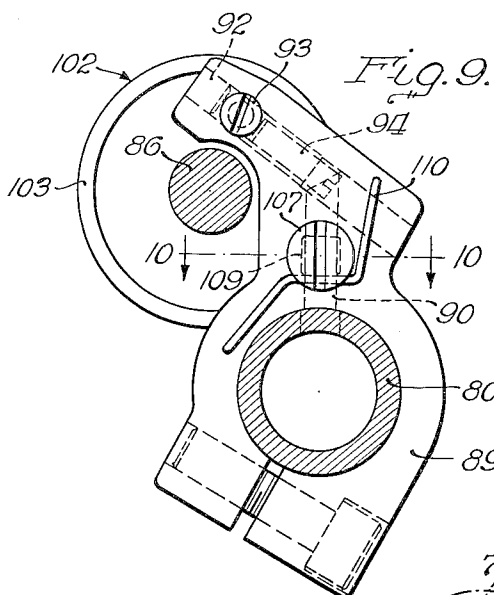


Fig. 10.

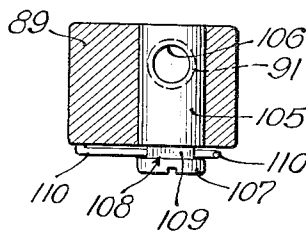
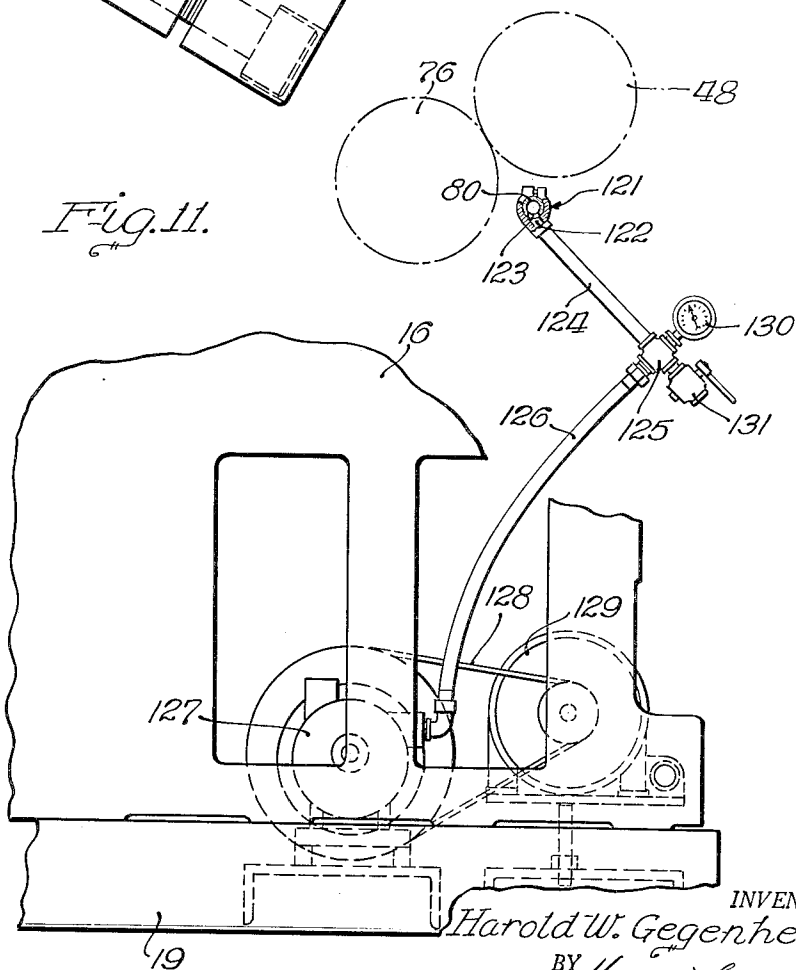


Fig. 11.



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PRINTING PRESS AND HANDLING OF SHEETS

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Application June 28, 1952, Serial No. 296,137

18 Claims. (Cl. 271—53)

This invention relates to printing presses and to the handling of sheets, and has to do with means for transferring sheets to be printed upon from feeding mechanism to an impression cylinder and with a method of effecting such transfer.

It is known to deliver sheets from the feed table to the impression cylinder by transfer means comprising a transfer cylinder and grippers carried thereby which grip the leading edge of a sheet in contact with the front guide stops of the table. Such known transfer means requires high precision in timing and adjustment of parts and, due to the inertia of moving parts, is not best suited to high speed operation of the press. It is also known to deliver the sheets from the front guide stops to the impression cylinder by pneumatic transfer means. One known type of pneumatic transfer means comprises a reciprocatory suction head disposed in underlying relation to a sheet in contact with the front guide stops. That is not suitable for high speed operation because there is risk that the suction head may interfere with forward travel of the sheet to the front guide stops and, also, slippage between the sheet and the suction head in the initial forward movement of the latter may occur, since the sheet is then at a standstill and its inertia has to be overcome. With a view to reducing those difficulties it has been proposed to provide a valve, operated in timed relation to the press, for varying the degree of suction or vacuum in the suction head. The provision of such a regulating valve necessarily involves mechanical complications and moving parts, which tends rather to aggravate the situation than otherwise. Further, the degree of vacuum in the suction head cannot be varied to the desired extent instantaneously, so that the transfer means comprising a reciprocatory suction head is, for that reason alone, not well suited for high speed operation, aside from the fact that it involves a number of moving parts, which renders it further unsuited for high speed operation. Another form of pneumatic transfer means comprises rotating suction drums, each perforated for a portion of its circumference, disposed in overlying relation to a sheet which is in contact with the front guide stops. This second form of pneumatic transfer means also has a valve for controlling the suction effect exerted by the drums, and is open to the same objections as the first mentioned pneumatic transfer means.

My invention is directed to sheet transfer means of comparatively simple construction and operation, which is well suited to high speed operation and avoids the objections to the known transfer means above mentioned. I have found that through proper use of pneumatic transfer means and also by properly combining mechanical transfer means with pneumatic transfer means it is possible to effect transfer of the sheets from their position at the front guide stops of the table to the impression cylinder accurately and at high speed. In one form of my invention I may provide a transfer cylinder having grippers, which cooperate in a novel manner with pneumatic transfer means. More particularly, the transfer cylinder grippers grip the leading edge of the sheet in contact with

the front guide stops and start it on its travel to the impression cylinder, the grippers then release the sheet and it is then advanced at accelerated speed by the pneumatic transfer means into contact with the stops on the impression cylinder, to be gripped by the grippers of the latter cylinder. By starting the sheet from rest by the transfer cylinder grippers, the pneumatic means may be disposed forwardly beyond the support on which the sheet rests in contact with the front guide stops, thereby eliminating any possibility of interference by the pneumatic means with the sheet in its passage to the stops. Also, due to the fact that the sheet is in motion when the pneumatic means takes over, a degree of vacuum in the pneumatic means sufficiently low to permit slippage between the latter and the sheet, when the latter is held by the transfer cylinder grippers or contacts the stops on the impression cylinder, suffices to assure accurate and high speed delivery of the sheets to the impression cylinder. Accordingly, a substantially uniform vacuum of the low degree stated may be continuously maintained in the pneumatic means, which may remain continuously effective for gripping sheets moved into cooperative relation thereto by the transfer cylinder. That eliminates all necessity for control valves and timing means therefor in respect to the pneumatic transfer means, which is conducive to high speed and accuracy in operation thereof. Further, by providing for slippage between the pneumatic transfer means and the sheets, the same high degree of precision in timing of the transfer cylinder as is necessary in the known transfer means above mentioned is not required, which is further conducive to accuracy and high speed in the operation of the press.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof and a present preferred method of practicing the same proceeds.

In the accompanying drawings I have shown a present preferred embodiment of the invention and have illustrated a present preferred method of practicing the same in which

Figure 1 is a fragmentary plan view of the sheet feed table and the transfer cylinder and associated parts of a printing press embodying the transfer means of my invention, this view being semi-diagrammatic with certain parts broken away and certain other parts omitted for clearness of illustration;

Figure 2 is a plan view of the transfer cylinder and the associated pneumatic feed means, this view being semi-diagrammatic in character and showing the side frames of the press fragmentarily in plan, certain parts being broken away and certain other parts being shown partly in section, with certain parts omitted for clearness of illustration;

Figure 3 is a fragmentary vertical sectional view of the front portion of the press looking toward the right side thereof as viewed from in back or in the direction of travel of the sheets over the feed table to the cylinders, certain parts being omitted for clearness of illustration;

Figure 4 is a sectional view, on an enlarged scale, taken substantially on line 4—4 of Figure 2, showing the supporting bracket for the suction manifold, and associated parts;

Figure 5 is a sectional view, on an enlarged scale, taken substantially on line 5—5 of Figure 2, showing the mounting bracket and the gearing for driving the suction drum shaft, and associated parts;

Figure 6 is a sectional view, on an enlarged scale, taken substantially on line 6—6 of Figure 2, with certain parts being broken away and shown in section;

Figure 7 is a sectional view, on an enlarged scale, taken substantially on line 7—7 of Figure 2;

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Figure 8 is a sectional view taken substantially on line 8—8 of Figure 7;

Figure 9 is a sectional view, on an enlarged scale, taken substantially on line 9—9 of Figure 2;

Figure 10 is a sectional view taken substantially on line 10—10 of Figure 9, with the valve member shown in plan; and

Figure 11 is a fragmentary side view of the press, showing one of the side frames thereof broken away in major portion, this view showing the suction pump with its driving motor and the connections between the pump and the suction manifold of the pneumatic transfer means, and associated parts.

I have illustrated the transfer means of my invention, by way of example, as applied to an offset printing press which is, in general, of known construction and operation and need be described but briefly, except as to those features having to do particularly with my instant invention. The press comprises suitable side frames 15 and 16 (Figure 2) between which is supported a feed table 17 (Figure 1) having forwardly extending side rails, one of which is shown and indicated by the reference number 18. The side frames 15 and 16 are secured to and extend upward from a suitable base or foundation 19 (Figure 11) as is known.

A sheet support 20, which may be a suitably formed casting, is suitably mounted on the rails 18, at the forward ends thereof, and extends therebetween transversely of the feed table 17. A support plate 21 is secured to and extends forwardly from the sheet support 20, this plate 21 being appropriately slotted at its forward end to accommodate front guide stops 22, one of which is shown in Figure 3, carried by arms 23 keyed on a rockably mounted shaft 24 operated in a suitable known manner in proper timed relation to the operation of the press. The sheets to be printed upon are delivered from a stack forwardly over the table 17 and pass successively over the sheet support 20 and the plate 21 into contact with the front guide stops 22, which provide for front register of the sheets prior to delivery thereof to the press cylinders. A sheet in process of being thus delivered is shown at S in Figure 3.

A roller 20a is positioned with its upper portion in the gap between the forward edge of the feed table 17 and the adjacent edge 20b of the sheet support 20, and a bridge member 25 connected with the feed table 17 at 25a extends forwardly and overlies the roller 20a as shown in Figure 3 to obviate the possibility that a turned down corner of a sheet might become caught between the roller 20a and the edge 20b. After the sheet has been moved into contact with the front guide stops 22, which provide for front register, it is moved into contact with a stop member of side guide means, providing for side register.

The press is of the offset type and is, in general, of known construction and operation, except as to those features having to do with my instant invention. It comprises a plate cylinder and a blanket cylinder (neither of which is shown), the transfer cylinder 48 and the impression cylinder 76, as well as known delivery means and other mechanisms common to such presses. The transfer cylinder and its gripper may be of any suitable construction and operation, as noted. The transfer cylinder 48 turns constantly in the same direction (indicated by the arrow in Figure 3) at constant speed. The means herein illustrated for effecting side register of the sheets, particularly the side guide stop assembly 56, is illustrated and described in detail in my Patent No. 2,553,758. While I preferably employ the side register means of that patent, that is not essential to my instant invention, within the broader aspects of which any suitable side guide means may be employed. Suffice it to state, that I provide suitable means for effecting side register of the sheets in properly timed relation to the operation of the press.

As above explained, immediately upon completion of side register of the sheet, the sheet is released from the

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side guide stop means and is gripped by the grippers 49 of the transfer cylinder 48, which advances the sheet S toward the impression cylinder 76, as shown in Figure 3. During this advancement of the sheet S it is moved into cooperating relation to pneumatic transfer means comprising a suction head or manifold 80 (Figures 2 and 3) mounted at one end, by means of a split clamp bracket 81, shown more clearly in Figure 4, on a shouldered stud 82 bolted to side frame 15 of the press. The end portion of the suction manifold or head 80 is mounted in an eccentric collar 83 for effecting adjustment of the manifold relative to bracket 81. The manifold 80 is mounted at its other end in a suitably formed bracket 84 bolted to side frame 16 of the press, and said other end of manifold 80 may be mounted in an eccentric collar similar to the collar 83. As is shown more clearly in Figure 3, the manifold 80 is disposed in underlying parallel relation to the transfer cylinder 48 and is spaced rearward an appreciable distance from the impression cylinder 76.

A transfer shaft 86 is rotatably mounted at one end, and a short distance from its other end, in two brackets 87 (Figure 2) suitably secured on manifold 80 and extending upward and forward therefrom. The shaft 86 is restrained against endwise movement in one direction by a collar 88 fixed thereon at the inner side of one of the brackets 87. Means is provided for restraining shaft 86 against endwise movement in the other direction, as will appear more fully presently.

A plurality of split clamp brackets 89 are secured on the suction manifold 80 and extend upward and forward therefrom. Each of the brackets 89 is provided with an angular passage 90 opening at its lower end into the suction manifold 80, through a port 91 at the top thereof. The upper end of the passage 90 is closed by a screw plug 92. The bracket 89 is further provided with a horizontal bore extending therethrough, adjacent the upper end thereof, this bore receiving an elongated cylindrical plug 93 fitting snugly therethrough and secured in position by a set screw 94 screwing in bracket 89 and accessible through a bore 95 therein. The plug member 93 projects a substantial distance beyond one side of the bracket 89 and is provided with a bore extending from its outer end and with a port 96 opening through its circumferential wall into the passage 90 of bracket 89; as will appear more clearly from Figures 6 to 8, inclusive.

The portion of the plug member 93 projecting beyond bracket 89 fits tightly within a shoe 98 secured thereon. This shoe 98 is provided with an upwardly opening lengthwise slot 99 into which opens a port 100 from bore 101 of plug member 93, whereby the slot 99 is in communication with passage 90 of bracket 89. The shoe 98 extends into a suction drum 102 fixed on the shaft 86 and has its outer upper surface shaped conformably to and seating snugly against the inner face of flange 103 of drum 102. This drum 102 is provided throughout the circumference 103 thereof with spaced radial slots 104 which are disposed to pass successively over the slot 99 of shoe 98 in the rotation of drum 102 with shaft 86. The slots 104 are spaced apart a distance less than the width of slot 99, so that at least one of the slots 104 will at all times be in communication with slot 99 and, therefore, subject to the partial vacuum or suction obtaining within the manifold 80, as will appear more fully presently. Certain of the brackets 89, as the two outermost or end brackets, may also be provided with a horizontal bore intersecting passage 90 a short distance above the manifold 80. This bore receives a plug valve 105 turnable therein and provided with a transverse bore 106 which, in the full operative position of valve 105, registers with passage 90. The valve 105 is provided, at one end thereof, with a head 107 connected to the body of the valve by a reduced neck 108 provided with flats 109. A suitably formed wire spring 110 is mounted on the side of bracket 89 with a portion thereof disposed for contact with the flats 109, for holding the valve 105 in

either its full operative position shown in Figure 7, or in an inoperative position, in which the valve 105 is turned through a quarter rotation or 90°, in which position it is effective for closing the passage 90 thereby shutting off communication between manifold 80 and the plug member 93. That may be desirable in certain cases, as when the sheets used in the press are of such width that they do not extend the full distance between the two end brackets 89. In such cases objectionable leakage of air, such as might interfere with the desired degree of vacuum or suction within the manifold 80, might occur through the end bracket 89 disposed outward beyond the sheet. The end suction drum 102 at the right end of shaft 86, as viewed in Figure 2, is disposed at the inner face of the adjacent bracket 87 and, in cooperation therewith, restrains shaft 86 against endwise movement toward the right, that is, toward the press side frame 15.

A spur pinion 113 is fixed on the left end of shaft 86 (Figure 2) and meshes with a spur pinion 114 rotatably mounted on a stub shaft 115 fixed by a set screw 116 in a sleeve 117 extending inward from the bracket 84. The pinion 114 is confined between the inner end of sleeve 117 and a collar 118 fixed on the inner end of shaft 115. Pinion 114 meshes with a ring gear 119 fixed on the adjacent end of the impression cylinder 76. In the operation of the press, the impression cylinder 76 rotates clockwise, as viewed in Figure 5, effective for rotating the transfer shaft 86 and the drums 102 thereon in clockwise direction, as viewed in that figure, and at high speed relative to the speed of rotation of impression cylinder 76.

A split clamp fitting 121 (Figures 2 and 11) is clamped about the manifold 80 a short distance from one end thereof, adjacent the press side frame 16. This fitting 121 is provided with a passage 122 therein which opens into the manifold 80 through a port 123 at the under side thereof. The fitting 121 is connected by a tube 124 to one arm of a T 125 another arm of which is connected by a tube 126 to the intake of an air pump 127 of known type suitably mounted on the base 19 of the press. The pump 127 is driven, conveniently by means of a belt 128, by a constant speed electric motor 129 of known type, suitably mounted on the press frame. A gauge 130, for indicating the degree of vacuum within the manifold 80, is mounted in a third arm of the T 125, and an air admission valve 131 of suitable type is mounted on the fourth arm of the T 125. By having the pump 127 driven at a constant known speed it is possible, by proper adjustment of the valve 131, to maintain within the manifold 80 a partial vacuum of a uniform desired value, it being understood that the ends of manifold 80 are closed.

When a sheet disposed in contact with the front register stops 22 is gripped by the grippers 49 of the transfer cylinder 48, it is advanced over the suction drums 102 toward the impression cylinder 76. Shortly after the leading edge of the sheet passes beyond the tops of the drums 102, and before it reaches the impression cylinder 76, the grippers 49 of the transfer cylinder 48 are opened, thus releasing the sheet. As soon as the sheet reaches the tops of the drums 102 it is gripped by the latter, but at that time slippage occurs between the drums and the sheet, the vacuum maintained within the manifold 80 being of sufficiently low degree to permit of that. Accordingly, the sheet is advanced a short distance by the transfer cylinder which thus functions to impart the initial forward movement to the sheet. When the grippers 49 of the transfer cylinder 48 open, releasing the sheet, the suction drums 102 then take over and advance the sheet at accelerated speed, such that it contacts the impression cylinder 76 and moves upward along the latter cylinder into contact with the stops 132 thereof. That may occur shortly in advance of closing of the grippers 133 of the impression cylinder 76, since

slippage between the drums 102 and the sheet may occur when the latter contacts stops 132. When the leading edge of the sheet has been moved into contact with the stops 132, or shortly thereafter, the grippers 133 of the impression cylinder 76 close and grip the leading edge portion of the sheet. The sheet is then wrapped upon the impression cylinder 76 and is moved thereby in contact with the blanket cylinder which prints the desired image or matter upon the sheet, the printed sheet then passing to delivery means, as is known.

It will be noted that the pneumatic transfer means is shown as being disposed in advance of the plate 21 (Figure 3) extending from the sheet support 20. Such disposition of the pneumatic transfer means is preferred because when the pneumatic transfer means is so disposed it can in no way interfere with either front or side register of the sheet. A further advantage of that arrangement is that the transfer cylinder grippers 49 positively grip the leading edge portion of the sheet on the plate 21, and the transfer cylinder 48 moves the sheet from its position of rest and imparts to it initial travel toward the impression cylinder. Accordingly, when the pneumatic means takes over, the sheet is in motion and traveling toward the impression cylinder at a speed somewhat less than that required to move it into contact with the impression cylinder stops 132. When the grippers 49 of the impression cylinder open, releasing the sheet, the pneumatic transfer means takes over and immediately accelerates the speed of travel of the sheet since, as noted, the sheet is now travelling toward the impression cylinder and there is no lag such as would occur if the sheet were at a standstill when the pneumatic means took over. The acceleration of the sheet by the pneumatic means is adequate to assure that the leading edge of the sheet will be moved into contact with the stops 132 of the impression cylinder 76 before closing of the grippers 133 of the latter cylinder. Since slippage may occur between the drums 102 of the pneumatic means both while the sheet is held by the grippers 49 of the transfer cylinder and while it is in contact with the stops 132 of the impression cylinder 76, high precision in timing in respect to the transfer cylinder and the impression cylinder and the grippers thereof is not essential, which is conducive to high speed and accuracy in effecting transfer of the sheets to the impression cylinder and, therefore, in the operation of the press, with corresponding increase in output. It is possible under some circumstances to position the pneumatic transfer means otherwise than in accordance with the present preferred embodiment herein shown and described.

It will be clear from what has been said that my invention comprehends a novel method of transferring sheets from the sheet support of the press to the impression cylinder, as well as new and improved means for practicing that method. In the method of my invention the sheet, while positioned at rest on the support, may be positively gripped by mechanical means and advanced thereby a predetermined distance toward the cylinder. During its advancement by the mechanical means, the sheet may be gripped pneumatically by pneumatic means under a degree of vacuum such as to permit slippage between the pneumatic means and the sheet while the latter is gripped by the mechanical means. The sheet may then be released from the mechanical means and advanced by the pneumatic means, at accelerated speed, into contact with the stops on the cylinder, at which time the sheet may be gripped by the grippers of the cylinder. The degree of vacuum of the pneumatic means, above referred to, permits of slippage between that means and the sheet when the latter is in contact with the cylinder stops, or is gripped by the cylinder grippers. The sheet may be and preferably is in motion when it is gripped by the pneumatic means which under such circumstances does not have to overcome the inertia of the sheet at rest. However, advantages may also be realized when the

sheet is not in motion when gripped by the pneumatic means.

As above indicated, and as will be understood by those familiar with presses of the type herein disclosed, changes in detail may be resorted to without departing from the field and scope of my invention, and I intend to include all such variations, as fall within the scope of the appended claims, in this application in which the preferred form only of my invention has been disclosed.

I claim:

1. In a printing press, a sheet support, a cylinder in front of said support spaced therefrom, mechanical means for positively gripping the leading edge portion of a sheet at rest on said support and advancing the sheet a predetermined distance toward said cylinder and then releasing it, and pneumatic means effective for gripping the sheet in its travel toward said cylinder and advancing it at accelerated speed when it is released from said mechanical means.

2. In a printing press, a sheet support, a cylinder in front of said support spaced therefrom, mechanical means for positively gripping the leading edge portion of a sheet at rest on said support and advancing the sheet a predetermined distance toward said cylinder and then releasing it, and continuously effective pneumatic means effective for gripping the sheet in its travel toward said cylinder and advancing it at accelerated speed when it is released from said mechanical means.

3. In a printing press, a sheet support, a cylinder in front of said support spaced therefrom, mechanical means for positively gripping the leading edge portion of a sheet at rest on said support and advancing the sheet a predetermined distance toward said cylinder and then releasing it, and pneumatic means operating at a substantially uniform predetermined degree of suction effective for gripping the sheet in its travel toward said cylinder and advancing it at accelerated speed when it is released from said mechanical means.

4. In a printing press, a sheet support, a cylinder in front of said support spaced therefrom, mechanical means for positively gripping the leading edge portion of a sheet at rest on said support and advancing the sheet a predetermined distance toward said cylinder and then releasing it, and pneumatic means operating at a continuous substantially uniform predetermined degree of suction effective for gripping the sheet in its travel toward said cylinder and advancing it at accelerated speed when it is released from said mechanical means.

5. In a printing press, a sheet support, a cylinder in front of said support spaced therefrom, mechanical means for positively gripping the leading edge portion of a sheet at rest on said support and advancing the sheet a predetermined distance toward said cylinder and then releasing it, and continuously driven unidirectional pneumatic means operating at a continuous substantially uniform predetermined degree of suction effective for gripping the sheet in its travel toward said cylinder and advancing it at accelerated speed when it is released from said mechanical means.

6. In a printing press, a sheet support, a cylinder in front of said support spaced therefrom, pneumatic means between said support and cylinder, and mechanical means for positively gripping the leading edge portion of a sheet at rest on said support and advancing the sheet a predetermined distance toward said cylinder into cooperating relation to said pneumatic means and then releasing it, said pneumatic means being effective for gripping the sheet in its travel toward said cylinder and advancing it at accelerated speed when it is released from said mechanical means.

7. In a printing press, a sheet support, a cylinder in front of said support spaced therefrom, pneumatic means between said support and cylinder, and mechanical means for positively gripping the leading edge portion of a sheet at rest on said support and advancing the sheet a prede-

termined distance toward said cylinder into overlying cooperating relation to said pneumatic means and then releasing it, said pneumatic means being effective for gripping the sheet in its travel toward said cylinder and advancing it at accelerated speed when it is released from said mechanical means.

8. In a printing press, a sheet support, a cylinder in front of said support spaced therefrom and having sheet grippers and stops, pneumatic means between said support and cylinder, and mechanical means for positively gripping the leading edge portion of a sheet at rest on said support and advancing the sheet a predetermined distance toward said cylinder and into cooperating relation to said pneumatic means and then releasing it, said pneumatic means being effective for gripping the sheet in its travel toward said cylinder and advancing it at accelerated speed when it is released from said mechanical means, said pneumatic means providing for slippage between it and a sheet gripped thereby while the sheet is gripped by either said mechanical means or by the grippers of said cylinder or is in contact with the stops of said cylinder.

9. In a printing press, a sheet support, a cylinder in front of said support spaced therefrom, pneumatic means comprising suction drums rotating in a direction to advance a sheet gripped thereby to said cylinder, the respective drums being provided for the full circumference thereof with suction openings, and mechanical means for positively gripping the leading edge portion of a sheet at rest on said support and advancing it a predetermined distance toward said cylinder into cooperating relation to said drums and then releasing it, said drums being effective for advancing said sheet at accelerated speed when it is released from said mechanical means.

10. In a printing press, a sheet support, a cylinder in front of said support spaced therefrom, pneumatic means comprising suction drums rotating in a direction to advance a sheet gripped thereby to said cylinder, the respective drums being provided for the full circumference thereof with suction openings, and mechanical means for positively gripping the leading edge portion of a sheet at rest on said support and advancing it a predetermined distance toward said cylinder into cooperating relation to said drums in overlying relation thereto and then releasing it, said drums being effective for advancing said sheet at accelerated speed when it is released from said mechanical means.

11. In a printing press, a sheet support, a cylinder in front of said support spaced therefrom, pneumatic means comprising suction drums rotating in a direction to advance a sheet gripped thereby to said cylinder, the respective drums being provided for the full circumference thereof with suction openings, mechanical means for positively gripping the leading edge portion of a sheet at rest on said support and advancing it a predetermined distance toward said cylinder into cooperating relation to said drums and then releasing it, and means for maintaining said drums under a substantially uniform predetermined degree of vacuum, said drums being effective for advancing said sheet at accelerated speed when it is released from said mechanical means.

12. In a printing press, a sheet support, a cylinder in front of said support spaced therefrom, pneumatic means comprising suction drums continuously rotated in a direction to advance a sheet gripped thereby to said cylinder, and mechanical means for positively gripping the leading edge portion of a sheet at rest on said support and advancing it a predetermined distance toward said cylinder into cooperating relation to said drums and then releasing it, said drums being effective for advancing said sheet at accelerated speed when it is released from said mechanical means.

13. In a printing press, a sheet support, a cylinder in front of said support spaced therefrom, pneumatic means comprising suction drums between said cylinder and sup-

port continuously rotated in a direction to advance a sheet gripped thereby to said cylinder, mechanical means for positively gripping the leading edge portion of a sheet at rest on said support and advancing it a predetermined distance toward said cylinder into cooperating relation to said drums and then releasing it, and means for maintaining said drums under a substantially uniform predetermined degree of vacuum, said drums being effective for advancing the sheet at accelerated speed when it is released from said mechanical means.

14. In a printing press, a sheet support, a cylinder in front of said support spaced therefrom, pneumatic means comprising a stationary suction manifold and suction drums between said cylinder and support communicating with said manifold and continuously rotated in a direction to advance a sheet gripped thereby to said cylinder, mechanical means for positively gripping the leading edge portion of a sheet at rest on said support and advancing it a predetermined distance toward said cylinder into cooperating relation to said drums and then releasing it, and means for maintaining a substantially uniform predetermined degree of vacuum in said manifold, said drums being effective for advancing the sheet at accelerated speed when it is released from said mechanical means.

15. In a printing press, a sheet support, a cylinder in front of the support spaced therefrom, rotary suction means gripping by suction a sheet to be delivered from the support to the cylinder and impelling the sheet toward the cylinder and means varying the degree of suction so that slippage occurs between the rotary suction means and the sheet during gripping of the sheet by the rotary suction means.

16. The method of transferring sheets from a sheet support of a printing press to a cylinder thereof, which comprises positively gripping by mechanical means the leading edge portion of a sheet at rest on the support and advancing the sheet a predetermined distance toward

the cylinder and then releasing it, and pneumatically gripping by pneumatic means the sheet while in motion and advancing it to the cylinder at accelerated speed when it has been released from the mechanical gripping means.

17. The method of transferring sheets from a sheet support of a printing press to a cylinder thereof, which comprises positively gripping by mechanical means the leading edge portion of a sheet positioned at rest on the support and advancing the sheet a predetermined distance toward the cylinder, pneumatically gripping by pneumatic means the sheet during its advancement while positively gripped, and then releasing the positive grip on the sheet while retaining the pneumatic grip on the sheet and advancing it at accelerated speed to the cylinder.

18. The method of transferring sheets from a sheet support of a printing press to a cylinder thereof having sheet grippers and stops, which comprises positively gripping by mechanical means the leading edge portion of a sheet positioned at rest on the support and advancing the sheet a predetermined distance toward the cylinder, pneumatically gripping by pneumatic means the sheet during its advancement while positively gripped with provision for slippage between the sheet and the pneumatic gripping means, and then releasing the positive grip on the sheet while retaining the pneumatic grip on the sheet and advancing it at accelerated speed into contact with the cylinder stops with provision for slippage between the sheet and the pneumatic gripper means when the sheet is in contact with the cylinder stops or is gripped by the cylinder grippers.

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