March 1, 1938. J. F. JIROUSEK 2,109,486

PRINTING PRESS

Filed March 23, 1934 5 Sheets-Sheet 1

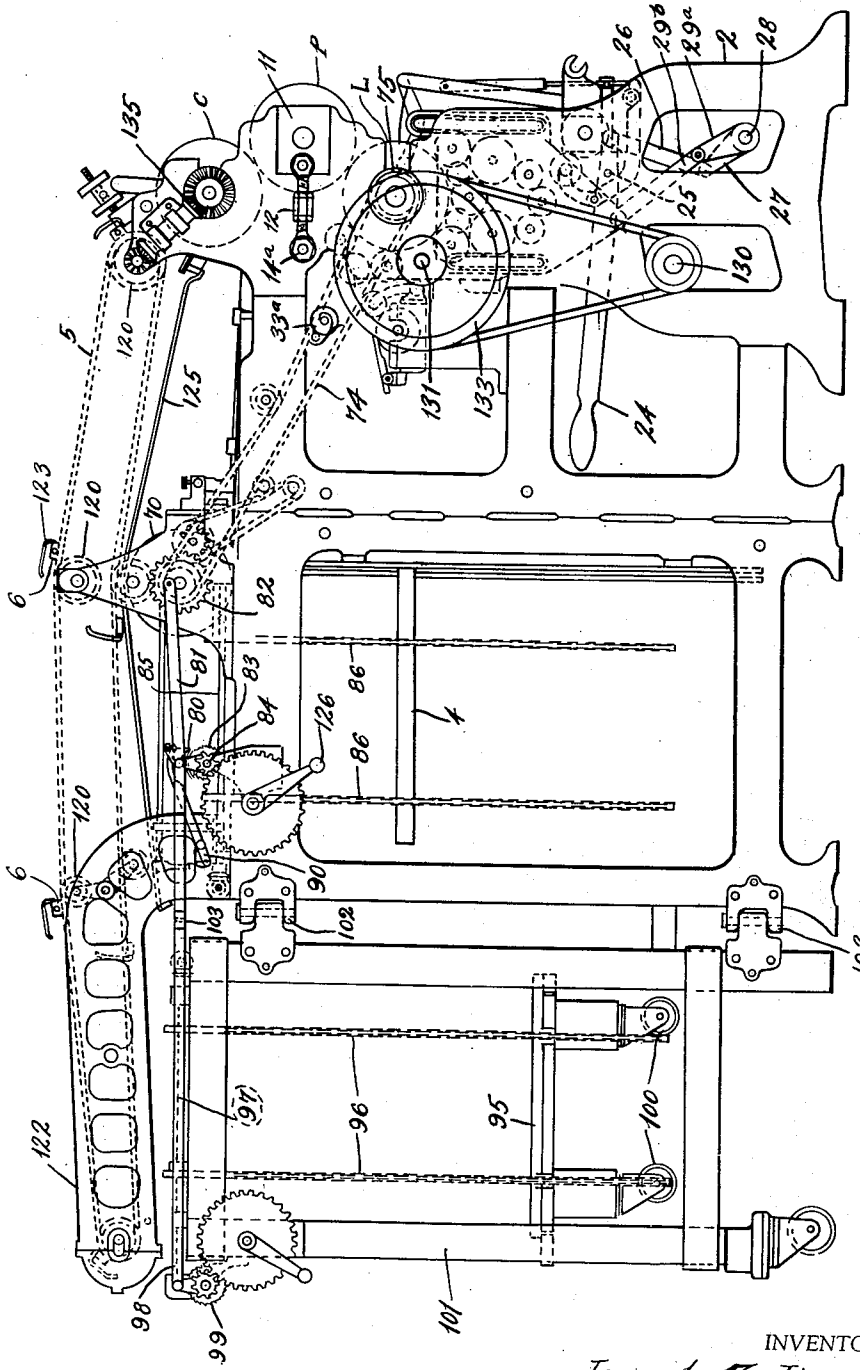


Fig. 1

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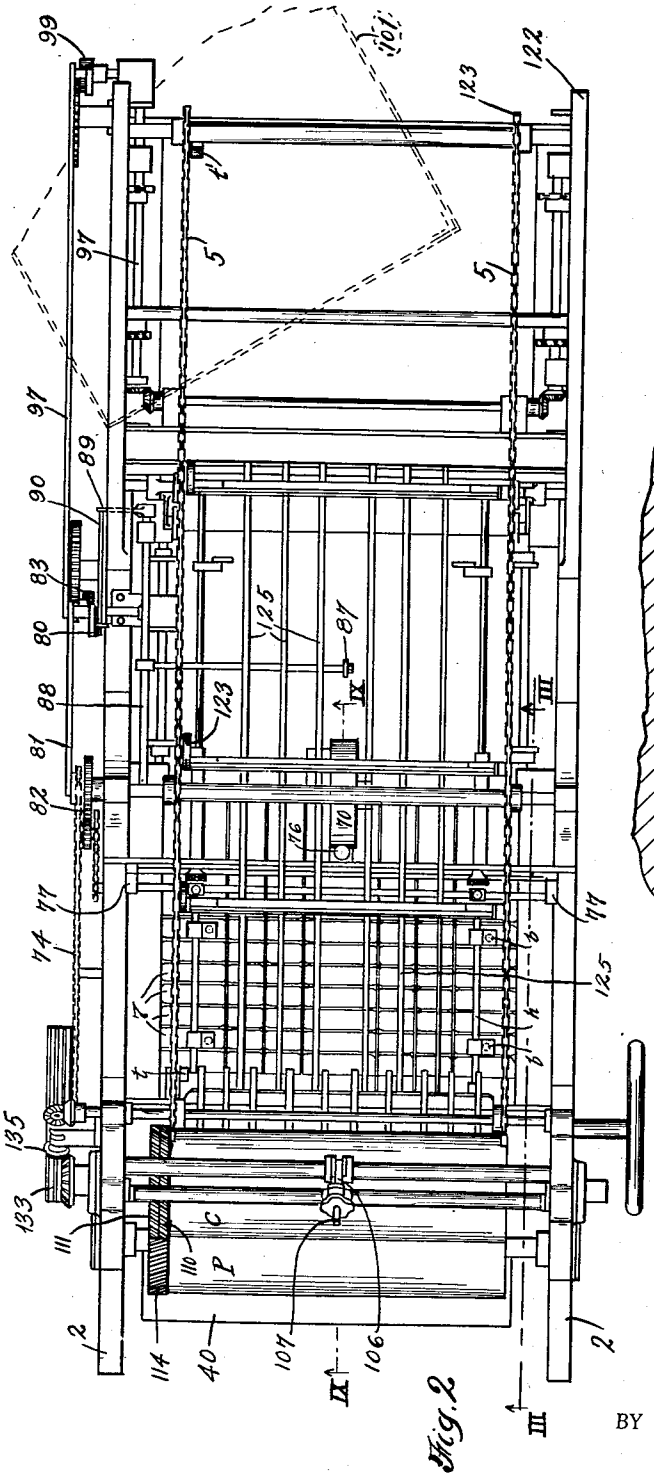


Fig. 2

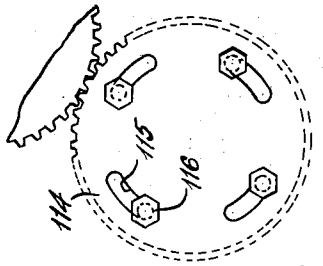


Fig. 6

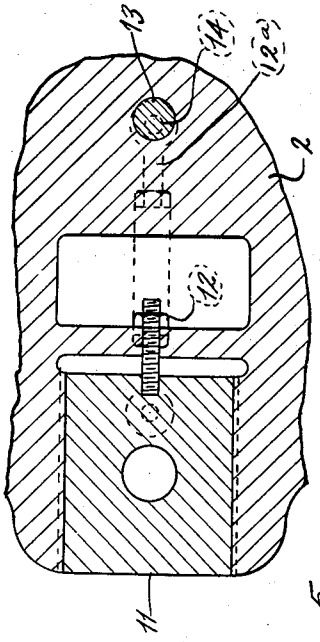


Fig. 4

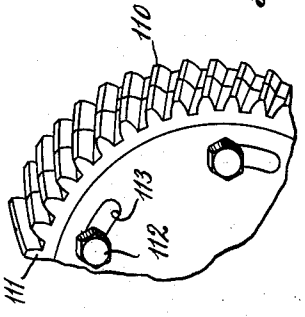


Fig. 5

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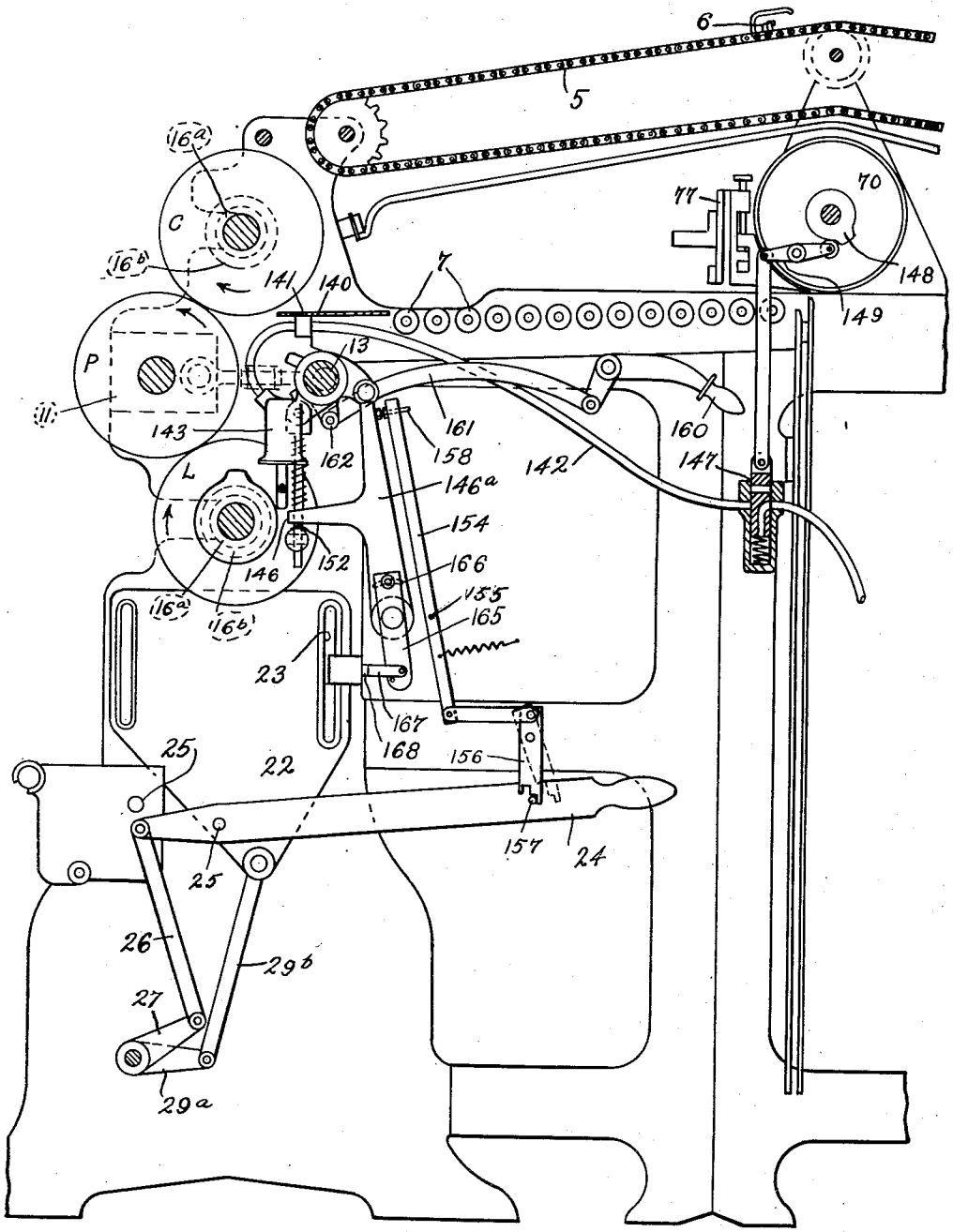


Fig. 3

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March 1, 1938. J. F. JIROUSEK 2,109,486

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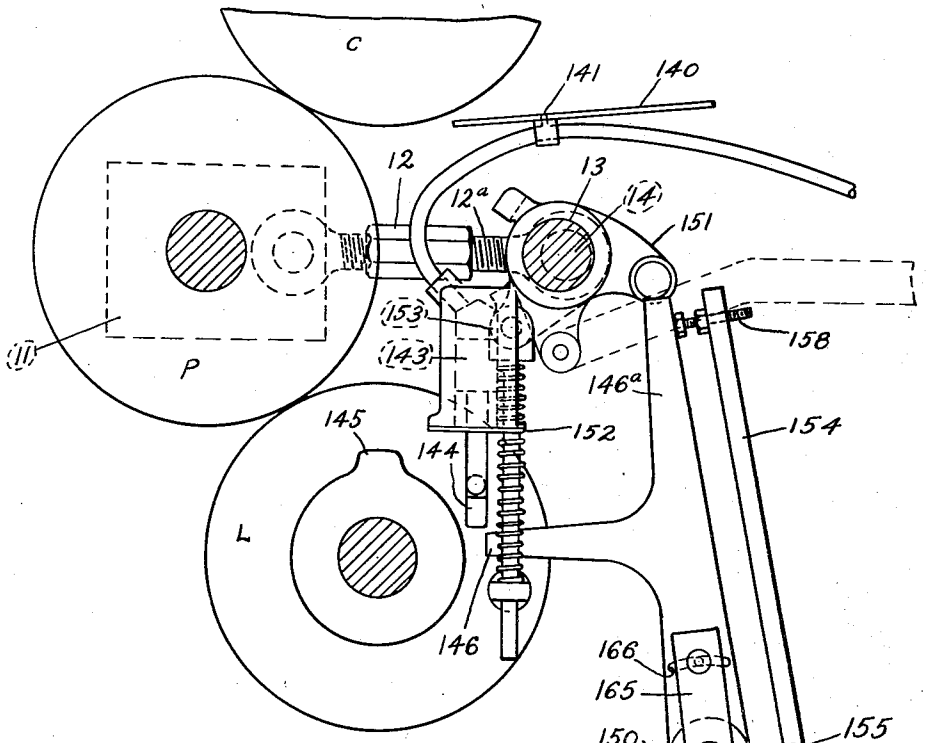


Fig. 7

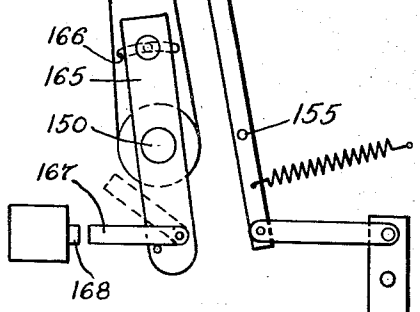


Fig. 10.

Fig. 8.

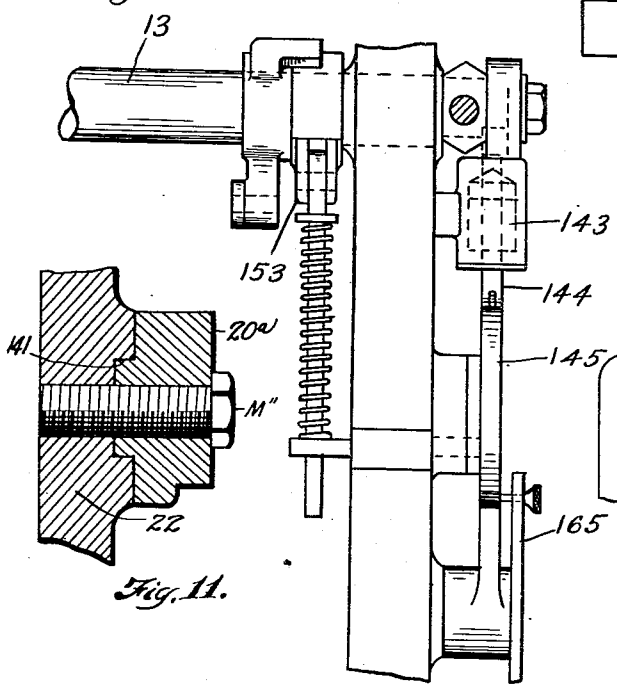
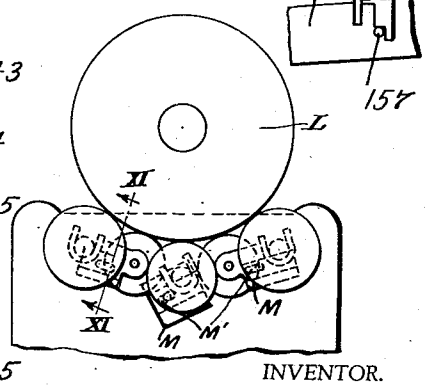


Fig. 11.



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March 1, 1938. J. F. JIROUSEK 2,109,486

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Filed March 23, 1934 5 Sheets-Sheet 5

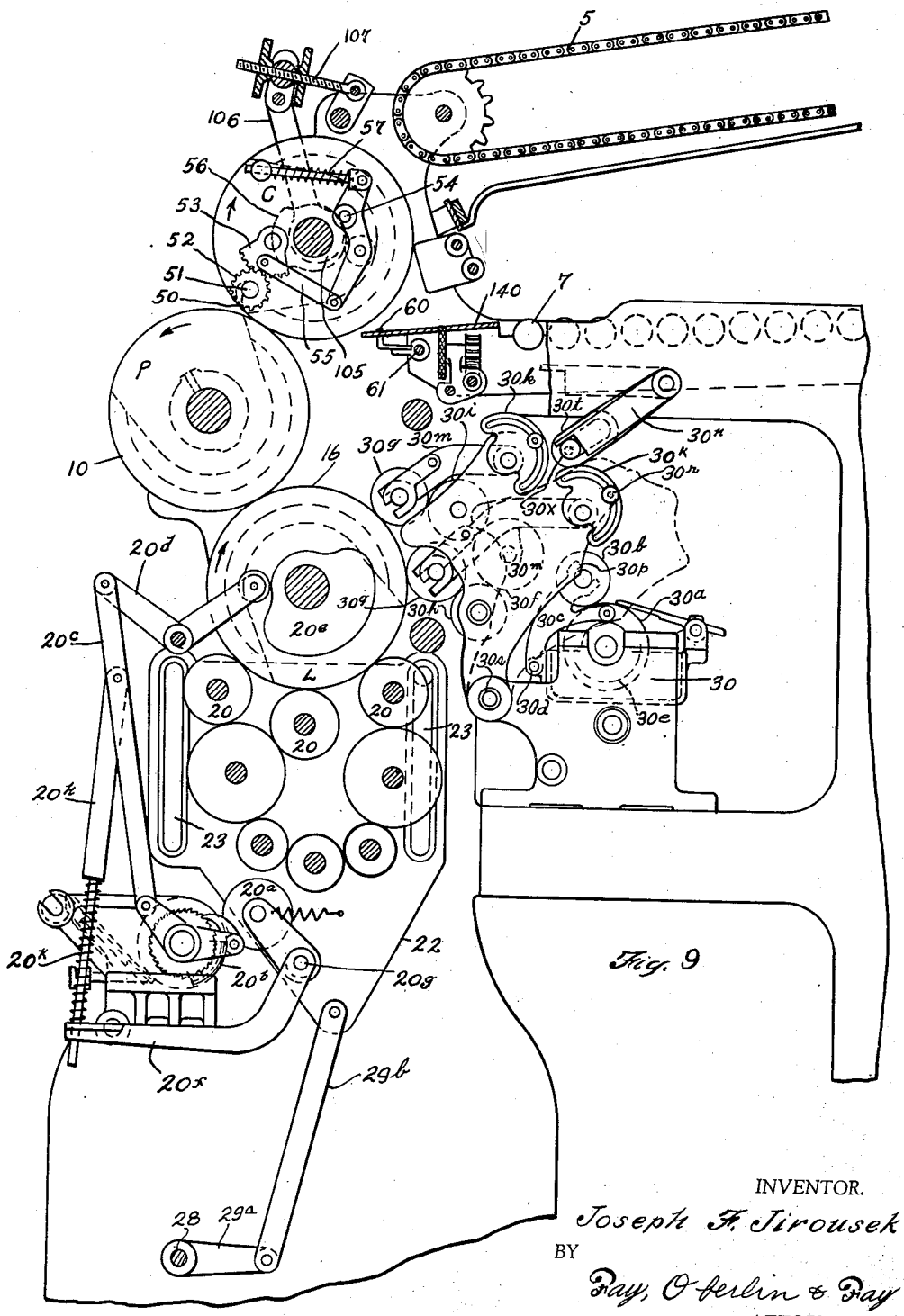


Fig. 9

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Patented Mar. 1, 1938 2,109,486

UNITED STATES PATENT OFFICE

2,109,486

PRINTING PRESS

Joseph F. Jirousek, Cleveland, Ohio, assignor to The Chandler and Price Company, Cleveland, Ohio, a corporation of Ohio

Application March 23, 1934, Serial No. 717,028

13 Claims. (Cl. 101—144)

This invention relates to printing presses; and it is among the objects of the invention to provide a high speed continuous press of compact construction. A further object is the provision of mechanism for printing or for lithographing, at will. Other objects and advantages will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail certain illustrative embodiments of the invention, these being indicative however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawings:

Fig. 1 is a side elevational view of an embodiment of the invention; Fig. 2 is a plan view of the same; Fig. 3 is a vertical sectional view, slightly enlarged, taken on a plane substantially indicated by line III, Fig. 2; Fig. 4 is an enlarged fragmentary sectional detail of a cylinder mounting; Fig. 5 is a fragmentary perspective view and Fig. 6 is a fragmentary and elevational view of cylinder adjustments; Fig. 7 is an enlarged fragmentary and elevational view, framing being omitted, of the lower cylinders and adjacent mechanism; Fig. 8 is a fragmentary front elevational view of the latter; Fig. 9 is an enlarged vertical sectional view taken on a plane substantially indicated by the line IX, Fig. 2; Fig. 10 is an end elevational detail showing the inking roller mountings; and Fig. 11 is an enlarged sectional detail of same, taken on a plane substantially indicated by line XI, Fig. 10.

Referring generally to the drawings, there is shown a framework **2** of suitable construction, in which is mounted an impression cylinder C for carrying paper to be printed or lithographed, and cooperating therewith is a cylinder P, preferably in generally vertical stack, and illustrated as in placement below the impression cylinder. In addition, another cylinder L is conveniently arranged to be driven in step with the cylinders C and P. The impression cylinder C is supplied with paper from a supply feed table **4**, there being suitable transfer means as a series of rollers **7** between the feed table or stock **4** and the impression cylinder. From the impression cylinder C the printed sheet is taken by off-bearing means, illustrated as a carrier **5** with gripper-fingers **6**, and is delivered to delivery table means, illustrated as table **95**.

The cylinder P may comprise a body **10** with shaft ends or trunnions mounted in bearing blocks **11** carried in the frame, preferably with undercut or tongue and groove interengagement. Adjustment of the blocks and corresponding adjustment of cylinder P is provided by a turnbuckle and locknut regulator **12** between each block **11** and the frame. A throw-out mechanism is incorporated, in the form of a shaft **13**, (Fig. 4), mounted in the frame and having eccentric ends **14** to engage the link-ends **12a** of the turnbuckle regulators **12**. The shaft **13** is turned in its mounting by suitable means, as described hereinafter. The cylinder L is also mounted in movable bearings and preferably provided with a body **16** and suitable clamping means for holding lithograph plates upon the periphery.

Inking rollers 20, (Fig. 9) are arranged adjacent the cylinder L, and it is preferable to mount one at least of the inking rolls as a distributor, providing it with a vibrating or reciprocating motion in addition to its rotary movement, some means being provided, such as a cam cooperating with a cam race carried by the end of the inking roll shaft. Such details are known in the art and need not be particularized here. The inking rolls are in a carriage **22** which is movable up and down as guided by pin and slot guides **23**, and the assemblage may be dropped down out of working position. For this, a hand lever **24** (Fig. 1), fulcrumed at **25** on the frame, is connected through a link **26** to swing a lever arm **27** and its attached shaft **28**, and operate the levers **29a**, **29b**, into extended (up) or collapsed (down) position. The ink-applying rollers **20** (Fig. 9) are supplied through a plurality of adjacent feed rollers by a carrier roller **20a** which swings alternately to pick up a charge from the ink fount roller **20b**. The latter is intermittently rotated by a ratchet actuated through link **20c** and lever **20d** by a cam **20e** on the shaft of the cylinder L. The carrier roller **20a** is mounted on a lever **20f** which is pivoted at **20g** to be intermittently operated by a link **20h** connected to the aforesaid link **20c**. A spring **20k** is interposed between the lever **20f** and link **20h**.

A water-supply or fount **30** (Fig. 9) is arranged near cylinder L for supply of water when the press is being operated for off-set lithographing. A pick-up roller **30a** in the fount is arranged to supply the carrier roller **30b** which is mounted by a pair of swing levers **30c**, one at each end, and pivoted at **30d**. The levers **30c** are intermittently operated by cam **30e** on the shaft of the water fount roller. By this means, the carrier roller **30b** is alternately contacted with the pick-up roller **30a** in the water fount and then with the distributor roller **30f** supplying the cylinder-contacting rollers **30g** through the intermediary of rollers **30h**, **30i**. For permitting fine adjustment of the water-supplying rollers **30g** with cylinder L, pin and slot controlled eccentric cams **30k** are provided to which the arms **30m** of the rollers **30g** are connected. Set-nuts **30r** hold the adjusted position. The water roller assembly may be slightly withdrawn into inoperative position

by turning the cam 38x, thereby pulling the swing carriage 38p back slightly on its pivot mounting 38s. For permitting entire withdrawal movement of the water-supplying roller assembly, the locking bar 38n may be swung up out of engagement with the cam 38x, and the slotted links 38t allow the entire roller assembly to be swung back out of the way, as shown in dotted line position.

For holding the sheets to the impression cylinder C, grippers 50 (Fig. 9) are arranged in the periphery, being secured to a bar 51 mounted therein. On one end of the bar 51 extending beyond the impression cylinder is a means for operating the grippers. This may comprise a pinion 52 on said bar 51, and a coacting gear segment 53 is pivoted on the end of the cylinder and rocked by a lever 54 and link 55, the lever 54 being operated by fixed cam 56. A spring 57 is arranged to bear against the extending end of lever 54. From this, it will be seen that as the cylinder carries the lever 54 around the fixed cam, the lever is periodically rocked to open the gear segment and pinion and close the grippers 50 in the lower position and open them in the upper or discharge position.

The sheets of paper are received by the grippers of the impression cylinder C by being brought to seizing position beneath the cylinder against a gauging-stop 60 (Fig. 9), being thereby accurately positioned in each case ready for the gripper. The gauging-stop 60 is mounted on a rock-shaft 61, so as to be alternately raised and lowered to stop and to release the forwarded sheet. Above the rollers 7 a hold-down or steadying means is provided, such as bars *h* (Fig. 2) carrying adjustably thereon housings containing freely rotatable pressure-balls *b*.

Feeding the sheets across the rollers 7 is a pneumatic feeder, preferably in the form of an air-suction wheel 70 which picks up the top sheet off the stack which is carried by the supply table 4 directly under the suction wheel. The suction wheel is driven in synchronism with the cylinder C, D, etc., through suitable drive means, for instance connecting chain 74 (Fig. 1).

The supply-table 4 is fed upwardly step by step as the sheets are removed from the top of the stack, and a suitable mechanism for this may comprise a lifting-pawl 80, as swung by throw arm 81 (Fig. 1) operated by a crank pin on sprocket 82 on the air-suction wheel shaft. The pawl 80 engages teeth on the ratchet 83 secured to the end of the shaft 84, and the latter through the medium of gearing, turns the shafts 85 to wind up the chains 86 and correspondingly raise the table 4. The extent of throw of the pawl 80, and the corresponding extent of movement for the table 4 at any given time, is controlled by a suitable caliper 87 contacting the top of the stack of feed-sheets. The caliper 87 is carried by an arm on rock shaft 88, which in turn has a lever arm 89 extending in the general path of pawl lever 90, such that the position of the arm 89 limits the extent to which the pawl-arm 90 may effectively throw at each movement.

Adjacent to the supply table 4 or to the rear thereof is a delivery table 95, likewise arranged to be stepwise moved downwardly as the printed sheets are deposited thereon. For this, the table may be supported by chains 96 unwound from shafts 97 which are operated through suitable gearing by the same throwing arm 81 that operates the lifting pawl 80 for the supply table 4. Link 98 extends from the arm 81 to a lowering pawl on the ratchet 99 lowering the chains 96, and the table 95 is thereby stepped down as the table 4 is stepped up. By providing the delivery table 95 with castors 100, the table may be run off on the floor as desired, when lowered into full discharge position. It will be understood that when in position within discharge frame 101, the table 95 is maintained in proper vertical alignment for operation of the chains 96, by guide-engagement with the said frame. For general convenience, and especially for allowing access to the table 4, the discharge frame 101 may be mounted to swing laterally from alignment with the main frame 2. Thus, the frame 101 may be connected to the main frame 2 by hinge connections 102. These allow the entire frame 101, with its contained delivery table 95, to be swung aside laterally, the initial swing-out position thereof being indicated in dotted lines, in Fig. 2, and the construction allowing swing-out to the full extent to give clear access to the portions of the apparatus therebeyond. To permit of such swing-out movement, the connecting rod 98 is provided with a universal joint 103 in alignment with the hinges 102.

Accuracy of alignment and adjustment-relation of the cylinders is provided. A portion of this has already been referred to. Adjustment of the cylinder C may further be had for instance, by providing the cylinder with an eccentric mounting 105 (Fig. 9), from which extends an arm or arms 106, the radial position of which may be adjusted by screw-threaded take-up means 107 connecting to a bracket on the frame. In order to tighten backlash in the gearing driving the cylinder C when it is adjusted away from cylinder P, the helical gear may be arranged in the form of a split gear wheel, one part 110 (Fig. 5) being fixed to the cylinder C, and the other part 111 being adjustable with relation thereto, bolts or cap-screws 112 taking through slots 113 into the gear-portion 110. On being loosened, the movable gear portion 111 can be turned sufficiently to in effect tighten the teeth of combined parts 110, 111, in the coacting gear on the cylinder P, and bolts 112 being tightened, the gear portions 110, 111 work together as one. An adjustment of the helical gear 114 (Fig. 6) on the cylinder L may be had by providing slots 115 through which bolts or cap-screws 116 take into the cylinders. Again, when the bolts 116 are loosened, the cylinder L may be adjusted arcuately as desired, and on then tightening the bolts 116, its position relative to the gearing is maintained.

The printed sheets, in order to reach the delivery table 95 from the impression cylinder C, are carried over the top of the intervening mechanism, the feed mechanism, and the off-bearing conveyor 5 extends from pick-up position to above the delivery table 95, the conveyor chains being supported by suitable idlers 120. The end-run of the conveyor 5 is carried by an overhanging or outrigger support 122, thereby being independent of any movements of the delivery frame 101. The conveyor 5 is provided with gripper fingers 6, the movable members 123 of which are carried by transverse spindles which extend out to the side of the conveyor to engage suitable trips at charge and discharge positions. One stationary trip *t* (Fig. 2) throws the arm of the spindle into gripping position at a point adjacent to impression cylinder C at its upper side where the gripper 50 thereof releases the sheet, and another stationary trip *t'* over the delivery table 95 throws the arm of the gripper finger spindle

into release position at such point. Thereby, the sheet falls onto the table, being guided by stop-guides, as need not be further detailed. Guard-strips 125 are arranged under the conveyor 5 to prevent trailing sheets from entangling in the mechanism below.

The operation of the mechanism will be understood from the foregoing. A stack of sheets to be printed or lithographed is placed on supply table 4, and by means of a hand crank 126, the table is run up to feed position against the air-suction wheel 70. The lithograph cylinder L and the transfer cylinder P being in position, as shown in Fig. 3, the cylinder L carrying the lithograph form to be employed, the water-rollers 30g are set into engagement with the face of the lithograph cylinder, and the ink fount supplied with ink. Drive is applied through the shaft 130, this being operated by suitable means, such as a motor, and the main drive shaft 131 is thence actuated through belt 132 and pulley 133. A gear on cylinder L operates the inking rollers and also the water-supply rollers. The off-bearing conveyor 5 is driven from the cylinder C by a bevel-gear connection 135 (Fig. 1). The feed and delivery tables are operated through a sprocket chain 74 whose drive sprocket 75 is carried with the cylinder L. With all portions of the mechanism thus in operation, the top-most sheet of the stack on the supply table is picked off by the air-suction wheel 70 and passed over the conveyor-rollers 7 to the gauge stop 60. The gauge stop 60 is then depressed and at the same time the gripper 50 is also in position to receive the sheet. The conveyor rollers 7 have a higher surface speed than the cylinder C, and the sheet is seized by the gripper 50, and the cylinder C carries the sheet against the cylinder P and thence around to the top where the gripper 50 is released and the conveyor-gripper 6 catches the sheet and carries it along the path of the conveyor 5 over the back of the machine, where the conveyor-gripper 6 is released and the sheet discharges onto the delivery table 95. The supply table 4 is progressively stepped up, as controlled by the caliper 87 on the top of a stack, this governing the pawl 80 to actuate the ratchet to the extent required, and wind up the chains 86 to raise the table. Correspondingly, the delivery table 95 is lowered by the ratchet mechanism 99, in step with the movement of the supply table 4. When the delivery table 95 is full, it is disengaged from the chains 96 and is run off on its own castors 100. The delivery frame 101 may be swung aside laterally on the hinges 102, allowing access to the feed table for reloading with paper stock.

For printing instead of lithographing, the cylinders P, L, are taken out and a printing cylinder with the desired forms clamped thereon is substituted in the bearings 11. The cylinder L may be removable conveniently by having its bearings in the form of bushings 16a to seat in the enlarged recesses in the frame and be fastened to the frame by bolts or cap screws through the bushing flange 16b. A slight movement axially of the cylinder shaft serves to slide the bushings or bearings out of the frame laterally and the shaft or trunnions of the cylinder can then be slid forwardly out of the frame. It is advantageous to have similar mountings for the upper cylinder also. The water roller mechanism is swung back, and the inking roller carriage 22 is raised up to its highest position such that the inking rollers supply the ink to the face of the printing cylinder. The sheet feed to the printing impression cylinder is as described foregoing, likewise the discharge to the delivery table.

For insuring accuracy of alignment of the inking rollers for contact with the cylinder L, automatically compensating means are provided, in the form of slide mounts M (Fig. 10), each end of the inking roller having such a slide-mounting, and these having ribs slideable in corresponding guide-ways 141 (Fig. 11). Pin and slot means M' (Fig. 10) make possible a sufficient range of movement for adjustment, and by tightening the pin or screw-threaded member M'', the desired adjusted position of the inking roller mountings may be had.

In the event of failure of proper feed of sheets, or from any cause, it may sometimes happen that it is desirable to prevent making an ink impression onto the cylinder C. As a further refinement of the invention then, a means is provided for taking care of this situation. The sheets as fed to the impression cylinder pass over a small table 140 (Figs. 3 and 7), in which one or more suction openings 141 are provided in communication with a source of vacuum by a suitable conduit connection 142. The suction is applied normally such that the advance sheet stops off the orifice 141 and in such situation a plunger 143 in a suitable casing is drawn up such that its stem 144 allows clearance between cam 145 and lever arm 146. The application of the suction is timed with the feeding of the sheets, for instance by a valve 147 in the suction line, actuated by a cam 148 to the lever 149 and connecting rod. If a sheet fails to feed onto the table 140 properly, the orifice 141 is uncovered, breaking the vacuum, and the plunger 143 is allowed to fall by gravity, whereupon the stem 144 falls down between the lever arm 146 and the cam 145, and the latter pushes the lever arm 146 on its fulcrum 150. An arm 151 on shaft 13, normally held up by lever 146, is thereupon released, and the spring 152 connected to an arm 153 on the shaft 13 is thereupon permitted to turn the shaft and through the intermediary of the eccentric connection 14, 12, push the bearing blocks 11 and cylinder P outwardly and out of impression contact. By arranging the upper and lower cylinders substantially in the same vertical plane and the intermediate cylinder just forward thereof, such movement is facilitated. Associated with the lever 146, and particularly the end of its arm 146a, is another setting lever mechanism including the lever 154 pivoted at 155 and connecting below with a stop-link 156 which normally rests with its shallow notch on top of a lug 157 on the hand lever 24. Fine adjustment between lever arm 146a and lever 154 is available by a screw-threaded stem 158 in the end of lever 154 extending into contact with lever arm 146a. By such arrangement, at the same time that the lever 146 is operated by cam 145 when the stem 144 intervenes, as above-described, the lever 154 is also actuated so as to shift the link 155 to its deep notch on lug 157 on hand-lever 24, and allow the latter to move and the inking carriage 22 to correspondingly swing downwardly out of feed relation to the cylinder. There is thus no ink supplied at such time as there is a failure of sheet feed. Additionally, the shaft 150 may carry an arm 165, preferably with a slot 166 and set nut adjustment, and having a link 167 to at the same time push a spring urged push-button contact switch 168 and thereby break the circuit to the motor and stop the press automatically. The mechanism may be conveniently

reset by actuation of handle 160, which through the intermediary of link 161 swings arm 162 and the shaft 13 back into setting position, and the handle 24 being thrown down at the same time, thereby elevating the inking carriage, the trip link 156 is restored to holding position above the lug 157 of the handle 24. The press is thus again in operative position. Also, the link 167 may be swung up, and the switch 168 will restore the motor circuit.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. A printing press, comprising an impression cylinder, another cylinder adjacent thereto, throw-out bearings for said last-named cylinder, operating means for said throw-out bearings including a rock shaft, links connecting said bearings and rock shaft, an arm for operating said rock shaft, and pneumatically actuated means controlled by the paper feed for operating said arm.

2. A printing press, comprising an impression cylinder, another cylinder adjacent thereto, throw-out bearings for said last-named cylinder, operating means for said throw-out bearings including a rock shaft, links connecting said bearings and rock shaft, an arm for operating said rock shaft, means controlled by the paper feed for operating said arm, a lever arm, a cam movable near said lever arm, and a member interposable between said cam and lever arm on failure of paper feed.

3. A printing press, comprising an impression cylinder, another cylinder in association therewith, an inking roller movable with respect to said other cylinder, and throw-out means for said inking roller controlled by the paper feed to said impression cylinder.

4. A printing press, comprising an impression cylinder, another cylinder in association therewith, an inking roller movable with respect to said other cylinder, and throw-out means for said inking roller controlled by the paper feed, including a vacuum-table having openings normally covered by the paper.

5. A printing press, comprising an impression cylinder, another cylinder in association therewith, an inking roller movable with respect to said other cylinder, throw-out means for said inking roller controlled by the paper feed, including a vacuum-table having openings normally covered by the paper, a pneumatic-head in communication with said vacuum-table, and an arm controlling the inking roller.

6. A printing press, comprising an impression cylinder, another cylinder adjacent thereto, throw-out bearings for said last-named cylinder, and means for operating said throw-out bearings, including a rock shaft, links connecting the said bearings and rock shaft, an arm for operating said rock shaft, a cam movable near said arm, a member interposable between said cam and arm on failure of paper-feed, and a pneumatic-head normally holding said member out of inter-position.

7. A printing press, comprising an impression cylinder, another cylinder adjacent thereto, throw-out bearings for said last-named cylinder, means for operating said throw-out bearings, including a rock shaft, links connecting the said bearings and rock shaft, an arm for operating said rock shaft, a cam movable near said arm, a member interposable between said cam and arm on failure of paper-feed, a pneumatic-head normally holding said member out of inter-position, and a vacuum-table in communication with said pneumatic head and over which paper is fed to said cylinders, said vacuum-table having openings normally covered by the paper.

8. A printing press, comprising an impression cylinder, another cylinder adjacent thereto, throw-out bearings for said last-named cylinder, pneumatically actuated means controlled by the paper-feed for operating said throw-out bearings, and a manually-controllable lever for resetting said bearings.

9. A printing press, comprising an impression cylinder, another cylinder adjacent thereto, throw-out bearings for said last-named cylinder, means for rotating said cylinders, and means controlled by the paper feed for operating said throw-out bearings and for stopping the cylinder rotation.

10. A printing press, comprising an impression cylinder, another cylinder adjacent thereto, throw-out bearings for said last-named cylinder, means for operating said throw-out bearings, including a rock shaft, links connecting said bearings and rock shaft, an arm for operating said rock shaft, a cam movable near said arm, a member interposable between said cam and arm on failure of paper-feed, a pneumatic-head normally holding said member out of interposition, and a manually controllable lever for resetting said rock shaft.

11. A printing press, comprising an impression cylinder, another cylinder adjacent thereto, throw-out bearings for said last-named cylinder, means for operating said throw-out bearings, including a rock shaft, links connecting said bearings and rock shaft, an arm for operating said rock shaft, a cam movable near said arm, a member interposable between said cam and arm on failure of paper-feed, a pneumatic-head normally holding said member out of interposition, a vacuum-table in communication with said pneumatic-head and over which the paper is fed to said cylinders, said vacuum-table having openings normally covered by the paper, and a manually-controllable lever for resetting said rock-shaft.

12. A printing press comprising an impression cylinder, another cylinder adjacent thereto and forming therewith a printing couple, and pneumatically-actuated means controlled by the paper feed for moving said second cylinder relatively to said first cylinder to thereby stop the printing operations.

13. A printing press comprising an impression cylinder, another cylinder adjacent thereto and forming therewith a printing couple, throw-out bearings for said last-named cylinder, and pneumatically-actuated means controlled by the paper feed for moving said throw-out bearings whereby to move said second cylinder relatively to said first cylinder to thereby stop the printing operations.

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