June 20, 1939. W. M. KELLY 2,163,492

SHEET-HANDLING MACHINERY

Original Filed July 9, 1937 2 Sheets-Sheet 1

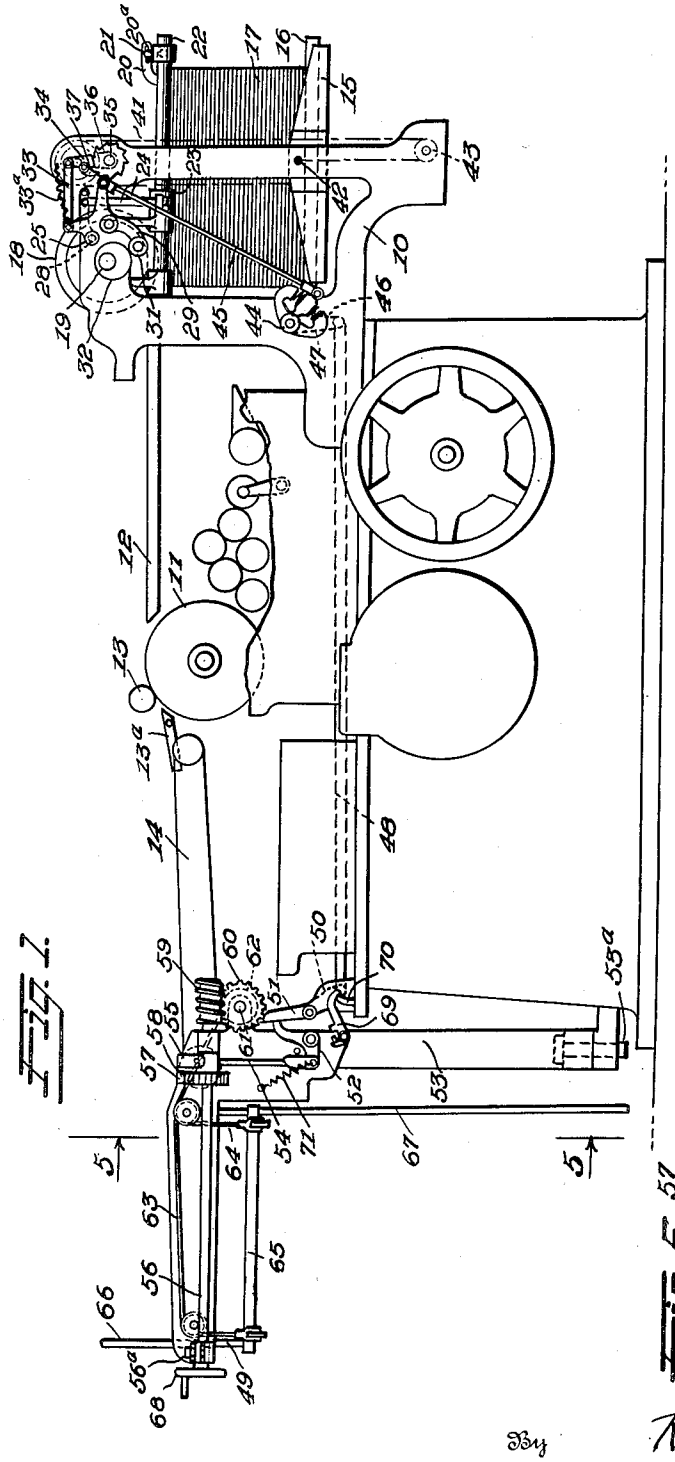


Fig. 1.

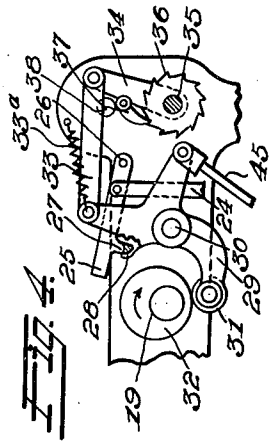


Fig. 4.

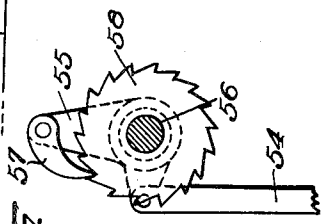


Fig. 5.

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Fig. 4.

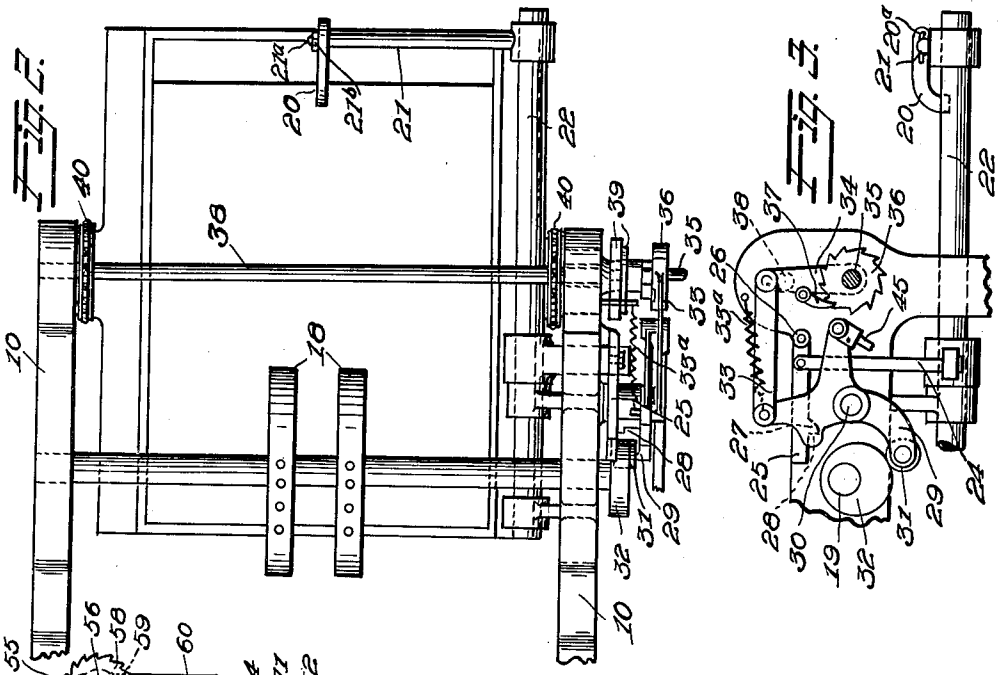
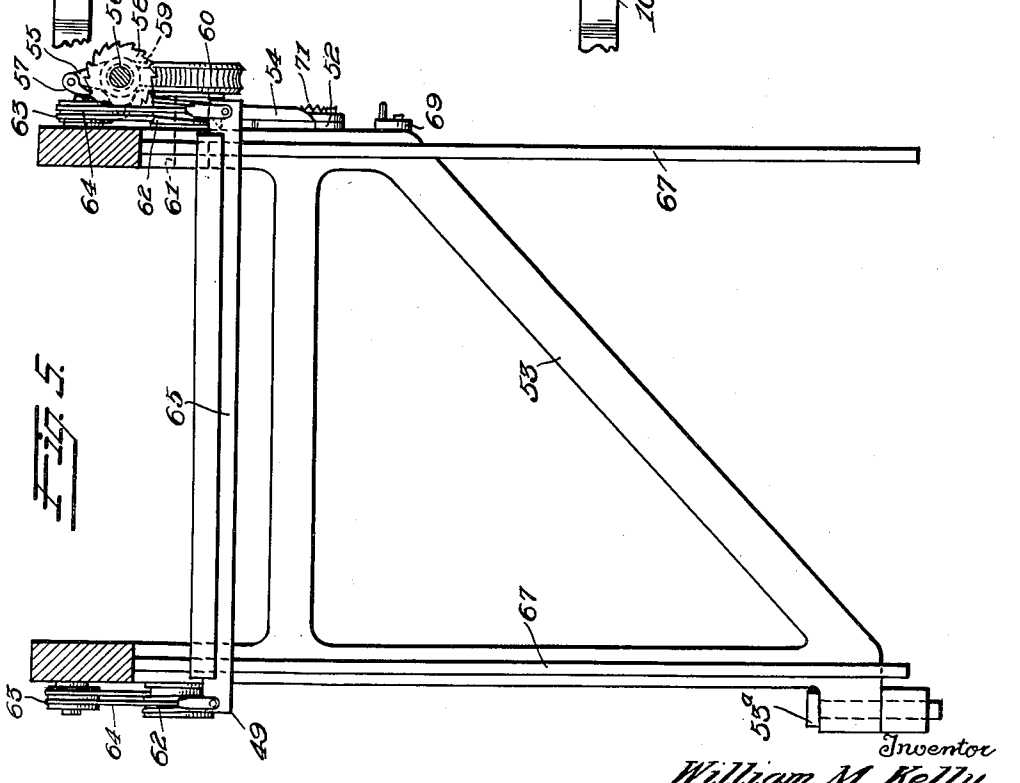


Fig. 4a.

Fig. 5.



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SHEET-HANDLING MACHINERY

William M. Kelly, Westfield, N. J.

Continuation of application Serial No. 152,721, July 9, 1937. This application December 21, 1938, Serial No. 247,113

6 Claims. (Cl. 271—62)

This invention relates to the feed mechanisms of various kinds of sheet handling machines and particularly to sheet printing or processing machines employing means at one end thereof for automatically feeding a pile of paper into position to be fed into and through the machine, and with means at the other end for delivering the paper onto a delivery table, and the object of the invention is to provide in combination with means for automatically raising the paper or worksheets at the feed end of the machine, means at the delivery end thereof in operative engagement with said feed actuating mechanism for lowering the delivery table to accommodate the delivered sheets; a further object being to provide a coupling between the feed and delivery tables, maintaining said operation wherein the coupling and linkage or leverage between the two mechanisms are normally in engagement, but in some cases are detached one from the other, when a swinging delivery table is employed and moved into an open position; a further object being to provide means for compensating for any shock or sudden blow to which the link or coupling members may be subjected in the operation of moving a swinging delivery table from an open to a closed position; a further object being to provide a linkage and coupling between the feed and delivery tables of a machine of the kind under consideration wherein a direct mechanical positive coupling is provided between said mechanisms and at the same time the desired result is accomplished by a simple and economical construction; and with these and other objects in view, the invention consists in an apparatus of the class and for the purpose specified, constructed as more fully hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which:

Fig. 1 is a diagrammatic side view of a press showing only a part of the construction with parts broken away and in sections and showing my invention applied thereto.

Fig. 2 is a plan view diagrammatically illustrating one end portion of the press.

Fig. 3 is an enlarged detail view of a part of the construction shown in Fig. 1.

Fig. 4 is a view similar to Fig. 3 showing the parts in a different position.

Fig. 5 is a partial section on the line 5—5 of Fig. 1 on an enlarged scale, and

Fig. 6 is an enlarged detail view of a part of the construction shown in Fig. 5.

For the purpose of illustrating one method of carrying my invention into effect, I have diagrammatically illustrated in the accompanying drawing at 10 part of the frame of a press within which is the usual or any desired printing mechanism 11 to which sheets of paper, or other matter to be printed, are fed along a feedboard 12 and from which the same is passed to a gripper 13 and stripper 13a for transmission to delivery tapes 14 for delivering the printed sheets onto suitable delivery mechanism, later described.

At one end of the press is a feed mechanism consisting of a carriage 15 movable vertically in the frame 10 and carrying a feed table 16 upon which the paper or other sheets 17 to be printed are adapted to be piled. Suction feed wheels 18 are arranged upon a shaft 19 in the upper end of the frame and are adapted to engage the uppermost sheet of the pile for feeding the same onto the feedboard 12. Resting upon the top of the paper stack 17 is a feeler finger 20 coupled with the free end of an arm 21 which is secured to a shaft 22. Secured to the shaft 22 is a crank 23 carrying an upwardly extending link 24 which engages a latch 25 pivoted to the upper end of the frame as seen at 26 and having adjacent its free end a latch element 27 adapted to cooperate with a pin 28.

The pin 28 is secured to a lever 29 pivoted to the frame as seen at 30. The lever 29 is provided with three angularly extending arms, one carrying a roller 31 adapted to cooperate with an eccentric or cam 32 on the shaft 19, whereas another arm has the pin 28 thereon, and also a link 33 is coupled therewith, the latter also being coupled with an arm 34 mounted on a shaft 35. On the shaft 35 is a ratchet 36 adapted to be engaged and operated by a pawl 37 pivoted to the arm 34. A spring 33a is coupled with the link 33 and with the frame in such manner as to normally hold the lever 29 or the roller 31 thereof in engagement with the cam 32, a slight engagement being maintained to permit free movement of the latch element 27 relatively to the pin 28 as the link 24 is moved upwardly.

The shaft 35 is geared to a shaft 38 arranged thereabove by suitable gears as is indicated at 39, note Fig. 2 of the drawings. On the shaft 38 adjacent each side of the press are sprockets 40, over which chains 41, indicated by dot and dash

lines in Fig. 1 of the drawings, are adapted to pass, the ends of the chains being coupled with the sides of the carriage 15 as seen at 42. One end portion of the chain passes around an idler 43 arranged in the frame, so that intermittent rotation of the shaft 38 through the pawl 37 and ratchet 36 will cause the carriage 15 including the table 16, to be raised in the frame.

A lever 44 is pivoted to the frame 10 adjacent the feed mechanism and is coupled with the third arm of the lever 29 through a connecting rod 45. Mounted on the pivot of the lever 44 is another operating lever 46 coupled with the lever 44 through a resilient coupling yoke 47 having normally equalized pressure on the lever 44, but it is designed to take up and compensate for any sudden shock to which the lever 46 may be subjected, especially in the operation of moving a swinging delivery unit or mechanism 49 from an open to a closed position.

Means is provided at one side of the press, below the path of the sheets passing through the press for operating a delivery pile lowering mechanism from the feed pile elevating mechanism. For this purpose a rod or link 48 extends from the lever 46 to one arm 50 of a lever pivoted to the other end portion of the frame, the upper arm 51 of said lever being adapted to be engaged by a bellcrank 52 pivotally mounted in a frame 53 of the delivery mechanism 49, so that the bellcrank 52 is free to swing toward and away from the lever end 51, as well be apparent. The delivery frame 53 is arranged on suitable pivots to swing the entire delivery mechanism and associated parts toward and from the delivery end portion of the press. A link 54 is coupled with the free end of the bellcrank 52 and is coupled with another bellcrank 55 arranged upon a shaft 56, the bellcrank having a pawl 57 engaging a ratchet 58 on the shaft 56 so as to rotate said shaft, the shaft carrying at its inner end a worm 59 engaging a worm wheel 60 mounted on a shaft 61.

Arranged upon the end portions of the shaft 61 are doubble pulleys or drums 62 around which hoisting cables 63 and 64 are passed, the free ends of said cables being coupled with a delivery table 65 after passing around suitable idler or guide pulleys as seen in Fig. 1 of the drawings. The delivery table 65 is guided in the swinging frame 53 by suitable upwardly and downwardly extending rods 66 and 67. A hand crank 68 is also provided at the outer end of the shaft 56 by means of which the table 65 may be raised and lowered, as will be apparent.

At 69 I have shown a latching element pivoted to the frame 53 and adapted to engage a suitable catch device 70 on the main frame in supporting the swinging frame 53 in closed or operative position.

A spring 71 is employed for supporting the bellcrank 52 in constant engagement with the lever 51 when the delivery table is in its normal position.

The operation of my improved synchronized operation of the feed and delivery mechanism of the printing press will be readily understood from the foregoing description when taken in connection with the accompanying drawings and the following statement.

It will be understood that the feed table 16 will be normally moved into lowered position thereof to suit a given pile or stack of worksheets 17, and the delivery table 65 will be moved into its raised position. In the operation of the press, the sheets 17 will be delivered one at a time by the suction wheels 18 into and through the press and then transmitted to the delivery table 65 through the mechanisms 13 and 14.

At the beginning of this operation, the parts 25 and 29 are in the position shown in Fig. 3, in which position the roller 31 clears the eccentric 32 and is held in this position by the latch 27 of the arm 25 which engages the pin 28. As a predetermined number of sheets are delivered from the top of the pile into the press, the finger 20 gradually lowers by gravity to maintain a constant engagement with the uppermost sheet. This downward movement gradually raises the arm 25 through the link 24 until the latch 27 disengages the pin 28 which will permit the movement of the arm 34 and pawl 37 from the position shown in Fig. 3 to that shown in Fig. 4, stepping the pawl back at least one notch on the ratchet 36. Then as the cycle of the eccentric 32 is completed, the arm 34 will be moved forwardly to return the parts to the position shown in Fig. 3 and to relatch the lever 29, during which operation the table 16 has been raised by the rotation of the sprockets 40 on the shaft 38 driven from the shaft 35 through the gears 39 and through the chains 41 employed.

In the above operation of the lever 29, the ratchet 58 is also operated to correspondingly lower the table 65 by means of the connection 44, 45, 46, 48, 50, 51, 52 and 54, 55, and 57.

In the last mentioned operation it will be understood that the lever 51 is moved to the left as shown in Fig. 1, which movement operates the bellcrank 52 which draws the rod 54 downwardly, and the shaft 56 is rotated a partial revolution by the pawl 57. In rotating the shaft 56, the worm 59 is rotated and thus the shaft 61 is rotated through the worm wheel 60 to release the cables 63, 64 and allow the table 65 to drop a distance equal to or substantially equal to, the raising of the table 16. A split bearing 56*a* is provided for engaging the shaft 56 to apply friction thereto to check sudden dropping of the table 65.

By providing a free separable coupling between the parts 51, 52, the delivery table 65 together with its associated parts supported in connection with the frame 53, may be swung on the pivot 53*a*, note Fig. 5, to give free access to the printing form resting on the bed of the press.

The feeler 20 is provided with an elongated slot 20*a* through which the reduced end 21*a* of the rod 21 passes, and a nut 21*b* is in threaded engagement with the reduced end 20*a* to adjustably support the feeler 20 with respect to the uppermost sheet as will be seen upon a consideration of Figs. 2 and 3 of the drawings. This construction insures the proper movement of the latch arm 25 to regulate the intermittent upward feed of the table 16.

This application is a continuation of my prior application Serial No. 152,721, filed July 9, 1937, Sheet handling machinery.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A machine of the character described, including in combination, a vertically movable feed table disposed at one end of the machine, a delivery table at the other end thereof, said delivery table being mounted to move toward and from the last named end of the machine, means constituting a part of said movable delivery table for lowering said table, a driving means

between said feed table and said delivery table disposed at an elevation below the path of the sheets through the press, and means for raising the feed table intermittently to compensate for the removal of worksheets therefrom, said driving means including a separable coupling for substantially synchronizing the relative raising and lowering movements of the feed and delivery tables.

2. A machine of the character described, including in combination, a vertically movable feed table disposed at one end of the machine, a delivery table at the other end thereof, said delivery table being mounted to move toward and from the last named end of the machine, means constituting a part of said movable delivery table for lowering said table, a driving means between said feed table and said delivery table disposed at an elevation below the path of the sheets through the press, means for raising the feed table intermittently to compensate for the removal of worksheets therefrom, said driving means including a separable coupling for substantially synchronizing the relative raising and lowering movements of the feed and delivery tables, said free coupling comprising levers normally arranged in abutting relation to each other, and one of said levers being supported on and movable with the frame of said movable delivery table.

3. In combination with feed and delivery tables for printing presses, automatically actuated means for intermittently raising the feed table, means in operative engagement with the first named means for automatically lowering the delivery table to compensate for the raising of said feed table, direct mechanical couplings between the first and second named means, said couplings comprising rods, links, and levers, disposed at an elevation below the path of the sheets through the press between the feed mechanism at one end of the press and the delivery mechanism at the other end of the press, the delivery table being free to swing toward and from the end of the press, and two of said levers being disposed in abutting relation to each other but free to be moved one from the other in the swinging movement of the delivery table.

4. A delivery mechanism for printing presses comprising a table mounted to move vertically at one end portion of a press, means involving a let-off mechanism for lowering the delivery table intermittently as the worksheets are placed thereon, an automatic feed mechanism at the other end of the press, means coupled with said first named means located at an elevation below the path of the sheets through the press and having a separable coupling operatively connected to said feed mechanism for lowering the delivery table consistent with the automatic action of said feed mechanism, said delivery table and associated parts being mounted on a frame pivotally supported in the press frame to swing toward and away from one end of the press to give access to said end of the press.

5. In combination with feed and delivery tables for machines of the character described, automatically actuated means for intermittently raising the feed table, means in operative engagement with the first named means for automatically lowering the delivery table in the raising of said feed table, direct mechanical couplings between the first and second named means, said couplings comprising rods, links, and levers disposed between the first and second named means, and a yieldable element between predetermined links and levers for preventing transmission of shock from the mechanism of one means to the mechanism of the other means.

6. In combination with feed and delivery tables for machines of the character described, automatically actuated means for intermittently raising the feed table, means in operative engagement with the first named means for automatically lowering the delivery table in the raising of said feed table, direct mechanical couplings between the first and second named means, said couplings comprising rods, links, and levers disposed between the first and second named means, a yieldable element between predetermined links and levers for preventing transmission of shock from the mechanism of one means to the mechanism of the other means, said delivery table being movable toward and from the machine, and means forming a free coupling between the two of the levers adjacent said delivery table.

WILLIAM M. KELLY.