May 3, 1927. 1,627,064

C. F. ROOT

FEED TABLE FOR SHEET FEEDING MECHANISM

Filed Oct. 16, 1923 2 Sheets-Sheet 1

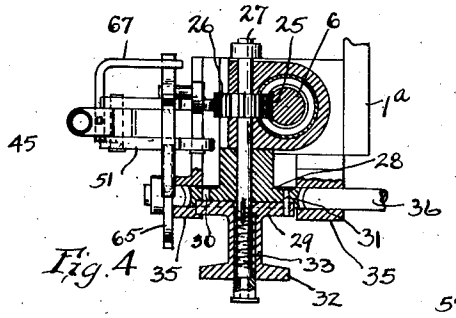


Fig. 4

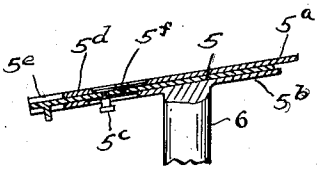


Fig. 5

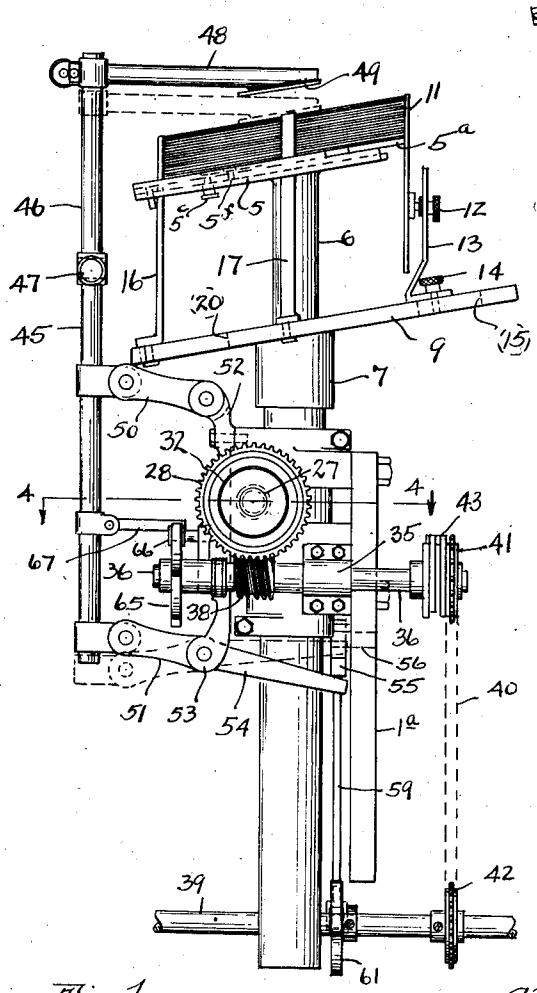


Fig. 1

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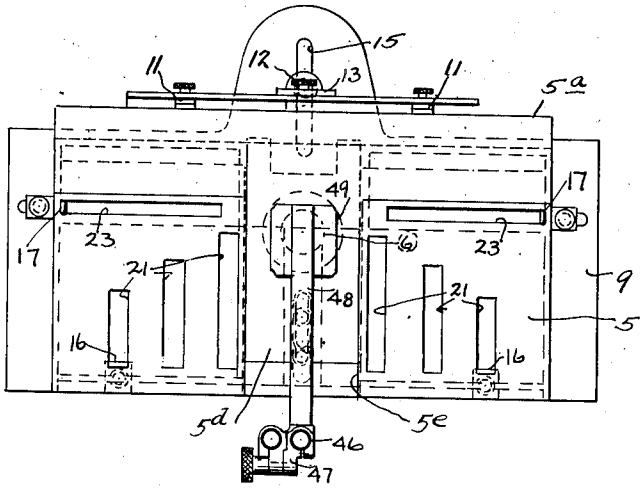


Fig. 3

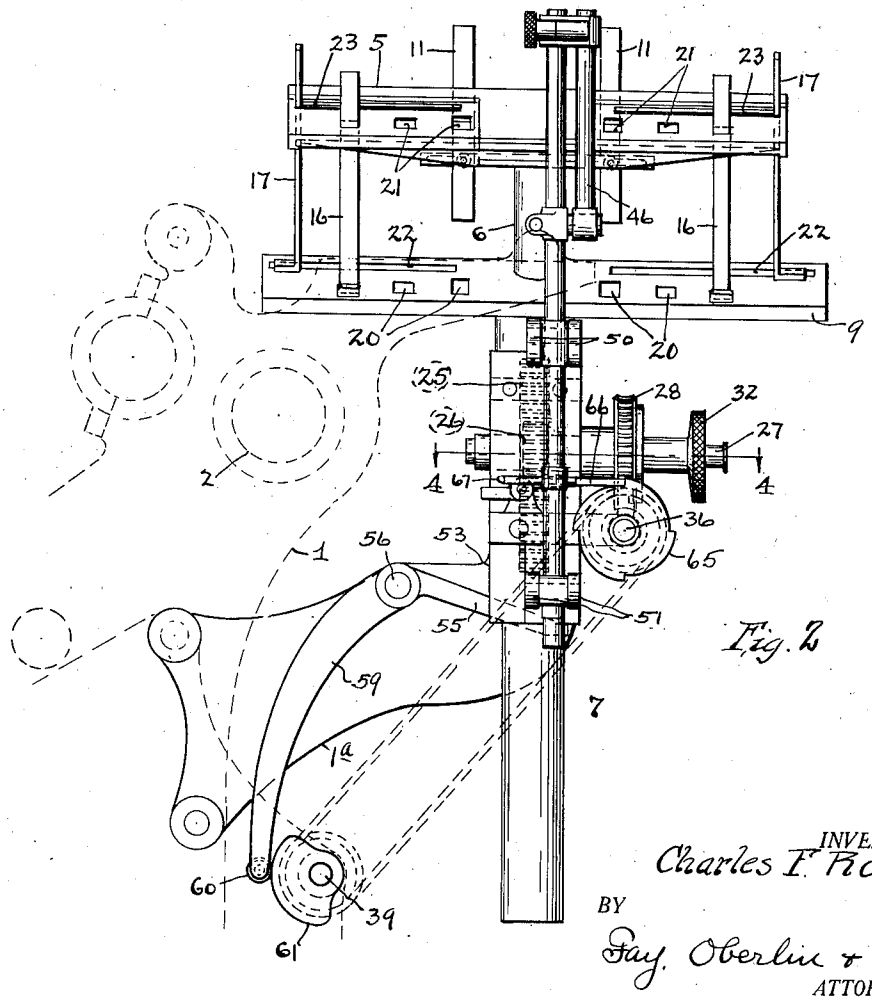


Fig. 2

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UNITED STATES PATENT OFFICE.

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FEED TABLE FOR SHEET-FEEDING MECHANISM.

Application filed October 16, 1923. Serial No. 668,903.

In connection with sheet feeding mechanisms, such as are employed for example to feed blank sheets to printing presses of the platen or so-called Gordon type, where individual sheets are successively transferred from a stack to the platen, it is desirable that the stack of blank sheets be elevated so as to maintain the topmost sheet in substantially a constant plane. This in fact is more or less essential for otherwise the construction and operation of the feeding mechanism is very greatly complicated inasmuch as the platen on which the sheets are to be deposited always lies in a predetermined fixed plane when in sheet receiving position. Furthermore, in order that the successive sheets may be deposited in proper register on such platen, it is desirable that the stack be located and held with the sheets in proper alignment both longitudinally and transversely so that when picked up by the feeding mechanism and transferred to the platen, they will be deposited on the latter in exactly the right place.

The principal object of the present invention, accordingly, is to provide in connection with a table for supporting such a stack of sheets means for automatically elevating the same so as to always maintain the top of the stack at the proper height. A further object is to provide means whereby the stack may be conveniently as well as accurately located on such table in proper relation to the platen.

To the accomplishment of the foregoing and related ends, the invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims, the annexed drawings and the following description setting forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—

Fig. 1 is a front elevation of a feed table embodying my present improvements; Fig. 2 is a side elevation of the same as viewed from the left in Fig. 1; Fig. 3 is a top plan view of such table; Fig. 4 is a horizontal section through the elevating mechanism of the table, the plane of the section being indicated by the line 4—4 on Figs. 1 and 2, respectively; and Fig. 5 is a vertical section on line 5—5, Fig. 3.

As indicated, my improved feed table is designed more especially for use with platen presses and the embodiment shown in the drawings follows such design. It will be understood, however, that the use of the table is not necessarily limited to any such particular type of printing press. On the contrary, such feed table may be employed in various fields where similar problems are encountered. Of the press, the only part shown in the drawings (see Fig. 2) is one of the stationary side frames 1, the table being disposed laterally and more or less to the front of such frame so as to lie forwardly of the main shaft 2 of the press.

The feed table consists primarily of a flat plate 5, preferably of rectangular form, as shown in Fig. 3, and is carried on the upper end of a shaft 6, vertically movable in a tubular housing 7 that is suitably supported, as by means of a bracket 1^a, from the side frame 1 of the press. As shown in Fig. 1, such table inclines at an angle to the horizontal, the right-hand edge thereof, from which the successive sheets are intended to be removed from the stack 8, being higher than the opposite edge. If desired, however, the table may be horizontally disposed, its particular disposition in this respect depending upon the type of feeding device wherewith it is intended to be used. It will be understood that similarly the angular position of the table about the axis of the supporting shaft 6, i. e. with respect to the side frame 1, or in other words the median line of the press, may be varied to properly accommodate the table to the operation of such feeding device. The table comprises, in addition to two flat plates 5, 5^a, on which the sheets directly rest, a second, base plate 5^b that is directly attached to the supporting shaft 6, as shown in Fig. 5. Said plate 5 is transversely adjustable on such base plate, a clamp screw 5^c being provided to retain same in predetermined position thereon, as will be readily understood; while plate 5^a is in turn adjustable relatively to plate 5 in the same transverse direction, being formed with a tongue 5^d that is guided in a groove 5^e in said plate 5. A clamp

screw 5' serves to secure the two plates together. A sub-base 9, also in the form of a plate, is provided, such sub-base being fixedly secured to the tubular housing 7 wherein shaft 6 is vertically movable, as previously described. This sub-base desirably inclines at the same angle as plates 5 and 5a and is utilized to carry a series of guides that may be adjusted to contact with the respective sides of the stack of sheets when the latter are properly located on the table.

For thus contacting and retaining in place the right-hand edge of the stack, as viewed in Fig. 1, two vertical guides 11 are employed, these being vertically adjustably secured by means of clamp screws 12 to a longitudinally extending bracket 13 that is in turn transversely adjustably secured to the sub-base 9 by means of a clamp screw 14 which co-operates with a transverse slot 15 in said sub-base. In addition two guides 16 are provided to engage the left-hand edge of the stack and two end guides 17 are provided to engage with the front and rear edges of the stack, as viewed in said Fig. 1. For the purpose of adjustably supporting each of said guides 16, the sub-base 9 is formed with a series of transversely extending slots 20 which are of graduated lengths corresponding with the lengths of similar slots 21 formed in the table proper. Said guides may be secured at their lower ends in selected pairs of slots 21 and adjusted along such slots towards or from the opposite guides 11 so as to accommodate sheets of varying widths. Similarly the guides 17 that contact with the ends of the stack are adjustably secured at their lower ends to longitudinally extending slots 22 in the sub-base, the table proper being formed with corresponding slots 23 through which the upper ends of said guides project. Vertical adjustment of guides 16 and 17 is unnecessary, it being sufficient that guides 11 be thus adjustable so that the upper ends of such last mentioned guides may be brought to just the proper level to permit the topmost sheet of the stack to be carried thereover by the feeding mechanism.

The tubular housing 7, wherein shaft 6 is vertically movable, also serves as a support for the table elevating mechanism which includes a rack 25, directly cut or otherwise fixed to one side of said shaft 6, and a pinion 26 that meshes with said rack, said pinion being mounted on a transverse spindle 27 journaled in suitable bearings in said housing (see Fig. 4). Freely rotatably mounted on the forwardly projecting end of said spindle is a worm gear 28 that is adapted to be normally clutched to said spindle by means of a disk 29, keyed or otherwise non-rotatably mounted on the latter and having limited longitudinal movement with respect thereto, the outer face of said gear being formed with a circular series of holes 30 and the juxtaposed face of said disk being provided with one or more pins 31 adapted to enter selected ones of said holes. The disk is provided with a knurled knob 32, whereby it may be pulled longitudinally outwardly against a compression spring 33 so as to disengage such pin or pins from the holes in the gear, and thereupon by rotation of said knob the spindle 27 may be rotated independently of the gear to raise or lower the shaft 6, and thus the table, in order initially to adjust the vertical position of the latter.

Journaled in suitable bearings 35 attached to or forming a part of the housing 7 is a second spindle 36 that lies at right angles to spindle 27 and directly below the same, such spindle carrying a worm 38 that meshes with worm gear 28 and is adapted, when the latter is clutched to said spindle 27 through the medium of clutch plate 29, to rotate said last mentioned spindle and thus actuate shaft 6. Rotation of spindle 36 is designed normally to be secured through automatically controlled mechanism driven by the press or, specifically in the construction shown, by a shaft 39 that is suitably intergeared with the driving mechanism of the press, such shaft being located forwardly of the lower portion of side frames 1 of the latter. The specific driving connections between said spindle 36 and shaft 39 comprise a sprocket chain 40 and sprocket gears 41 and 42 on said spindle and shaft, respectively. One such sprocket wheel, e. g. sprocket wheel 41, as shown, is connected with the corresponding driving or driven member through the medium of a friction clutch 43, whereby it is rendered possible to lock spindle 36 against rotation when and as desired.

The device for thus locking spindle 36 against rotation, it will be seen, constitutes the means for controlling the raising of shaft 6 and thus the elevation of the table carried thereby and these means will now be described.

Disposed to the left of the table, as viewed in Fig. 1, is a vertical support 45, preferably consisting of a tubular rod for the sake of lightness, the upper portion of such support being a telescoping rod 46 that may be secured at desired elevation in the main support 45 by means of a suitable clamp 47. Extending at approximately a right angle from the upper end of the support is an arm 48 that is provided with a plate 49 disposed in a plane parallel with that of the table 5 so as to be adapted to contact flatwise with the top of the stack 8. The support 45, and thus the plate 49 carried thereby, is secured to housing 7 so as to be vertically reciprocable by means of paired parallel links 50 and 51, pivotally attached

at their outer ends to said support and at their inner ends to brackets 52 and 53 that project laterally from said housing.

One of the links 51 is provided with an extension 54 that constitutes in effect a lever arm, the inner end of which is disposed to be engaged by one arm 55 of a double lever pivoted about an axis 56 to bracket 1ª by means of which the table is attached to the side frame 1 of the press. The other arm 59 of such lever is provided with a roller 60 at its lower end which is adapted to contact with a disk cam 61 on the same shaft 39 from which spindle 36 of the table elevating mechanism is driven. The contour of cam 61 is such that the lever arm 51 will be periodically depressed through the medium of said double lever 55, 59, and thereby raise support 45 with plate 49 to the position idicated in full lines in Fig. 1. Following each such lifting movement, plate 49 is allowed to drop until it rests and is supported by the stack of sheets 8. Obviously the limit of such downward movement of the plate 49 will vary as the stack of sheets is depleted by the removal of successive sheets from the top of the stack.

Fixedly secured on the end of spindle 36, adjacent support 45, is a ratchet wheel 65 and pivotally attached to the housing 7 on the corresponding side thereof is a pawl 66 that is normally adapted under the influence of gravity to engage with a tooth on said ratchet wheel and thereby retain same against rotation. When the pawl thus engages with the ratchet wheel the driving connections between shaft 39 and spindle 36 are of course ineffective to rotate the latter. Whenever the support 45 drops to a predetermined point, the pawl is adapted to be raised out of engagement with the ratchet wheel through the medium of an arm 67 that projects inwardly from said support into position to engage with the rearwardly extending portion of said pawl, as will be readily understood. Accordingly whenever the stack 8 is depleted sufficiently so that when plate 49 is dropped into contact therewith the arm 67 effectively engages said pawl, the ratchet wheel 65 and thus spindle 36 are left free to be rotated through the aforesaid driving connections, with the result that the shaft 6 and thus the table will be elevated until plate 49 no longer can drop far enough to keep the pawl from locking the ratchet.

From the foregoing description of the several component parts of my improved feed table, it will be seen that not only is provision made for accurately locating the stack of sheets on the table so as to present such sheets to the feeding mechanism in proper relation, but also by reason of the automatic elevating device, the topmost sheet of such stack will be always maintained at substantially a predetermined height. Such elevating mechanism is not only entirely automatic in its operation, but at the same time consists of only a few parts readily accessible and not likely to get out of order.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the means and the steps herein disclosed, provided those stated by any one of the following claims or their equivalents be employed.

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

1. The combination with a feed table of the character described; of means adapted to elevate said table at a predetermined rate; a vertically reciprocatory member adapted to contact on downward movement with the top of a stack of sheets on said table; means adapted periodically to raise said member; a second member normally preventing operation of said elevating means; and connections between said members whereby the second thereof is rendered ineffective and operation of said elevating means is permitted whenever said first member is allowed by the stack to drop to a predetermined position.

2. The combination with a feed table of the character described; of a vertically movable support for said table; a rack and pinion adapted to raise and lower said support; driving means for said pinion; a vertically reciprocatory member adapted to contact on downward movement with the top of a stack of sheets on said table; and connections between said member and driving means for controlling operation of the latter, whereby such operation is permitted only when said member is allowed by the stack to drop to a predetermined position.

3. The combination with a feed table of the character described; of a vertically movable support for said table; a rack and pinion adapted to raise and lower said support; means normally tending to drive said pinion to elevate said support; a pawl and ratchet device normally locking said means against operation: a vertically reciprocatory member adapted to contact upon downward movement with the top of a stack of sheets on said table; and connections between said member and device adapted to render the latter inoperative and so permit said pinion to be driven whenever said member is allowed by the stack to drop to a predetermined position.

4. The combination with a feed table of the character described; of a vertically movable support for said table; a rack and pinion adapted to raise and lower said support; a driving shaft for said pinion; means for rotating said shaft, including a friction

clutch; a pawl and ratchet device normally locking said shaft against rotation; a vertically reciprocatory member adapted to contact upon downward movement with the top of a stack of sheets on said table; and connections between said member and device adapted to render the latter inoperative and so permit said pinion to be driven whenever said member is allowed by the stack to drop to a predetermined position.

5. The combination with a feed table of the character described; of a vertically movable support for said table; a rack and pinion adapted to raise and lower said support; a driving shaft for said pinion; a manually operable clutch adapted to dis-connect said pinion from said shaft when desired; means for rotating said shaft, including a friction clutch; a pawl and ratchet device normally locking said shaft against rotation; a vertically reciprocatory member adapted to contact upon downward movement with the top of a stack of sheets on said table; and connections between said member and device adapted to render the latter inoperative and so permit said pinion to be driven whenever said member is allowed by the stack to drop to a predetermined position.

6. The combination with a feed table of the character described; of a vertically movable support for said table; a rack and pinion adapted to raise and lower said support; a worm and worm gear for driving said pinion; a shaft for said gear whereon the latter is loosely mounted; and a clutch member non-rotatably but longitudinally movably mounted on said shaft and adapted to engage with said gear.

7. The combination with a feed table of the character described; of a vertically movable support for said table; a rack and pinion adapted to raise and lower said support; a worm and worm gear for driving said pinion; a shaft for said gear whereon the latter is loosely mounted; a clutch member non-rotatably but longitudinally movably mounted on said shaft and adapted to engage with said gear; a ratchet wheel connected to rotate with said worm; a pawl normally engaging said ratchet wheel to prevent rotation thereof and of said worm; a vertically reciprocatory member adapted to contact upon downward movement with the top of a stack of sheets on said table; and an arm carried by said member adapted to engage and actuate said pawl to release said ratchet wheel, whenever said member is allowed by the stack to drop to a predetermined position.

8. The combination with a feed table of the character described; of a vertically movable support for said table; a rack and pinion adapted to raise and lower said support; a worm and worm gear for driving said pinion; a shaft for said gear whereon the latter is loosely mounted; a clutch member non-rotatably but longitudinally movably mounted on said shaft and adapted to engage with said gear; a ratchet wheel connected to rotate with said worm; a pawl normally engaging said ratchet wheel to prevent rotation thereof and of said worm, a vertically reciprocable support disposed adjacent said table; a plate carried by the upper end of said support adapted upon downward movement thereof to contact with the top of a stack of sheets on said table, thereby limiting such downward movement; means adapted periodically to raise said support; and an arm carried by said support adapted to engage and actuate said pawl to release said ratchet wheel, whenever said member is allowed by the stack to drop to a predetermined position.

9. In a feed table of the character described, the combination of a plate whereon a stack of sheets may be placed; a vertically movable support for said plate; a fixed support beneath said plate; plural series of slots lying in a plane parallel with that of said plate, the slots of each series differing in length and those of one series extending in a rectangularly related direction to those of the adjacent series; and vertical guides adjustably secured in such slots and projecting above said plate.

Signed by me, this 11th day of October, 1923.

CHARLES F. ROOT.