

Nov. 24, 1953

C. A. LEVIN

2,660,431

SHIFTABLE SHEET FEEDING DEVICE FOR DUPLICATING MACHINES

Filed Jan. 16, 1950

4 Sheets-Sheet 1

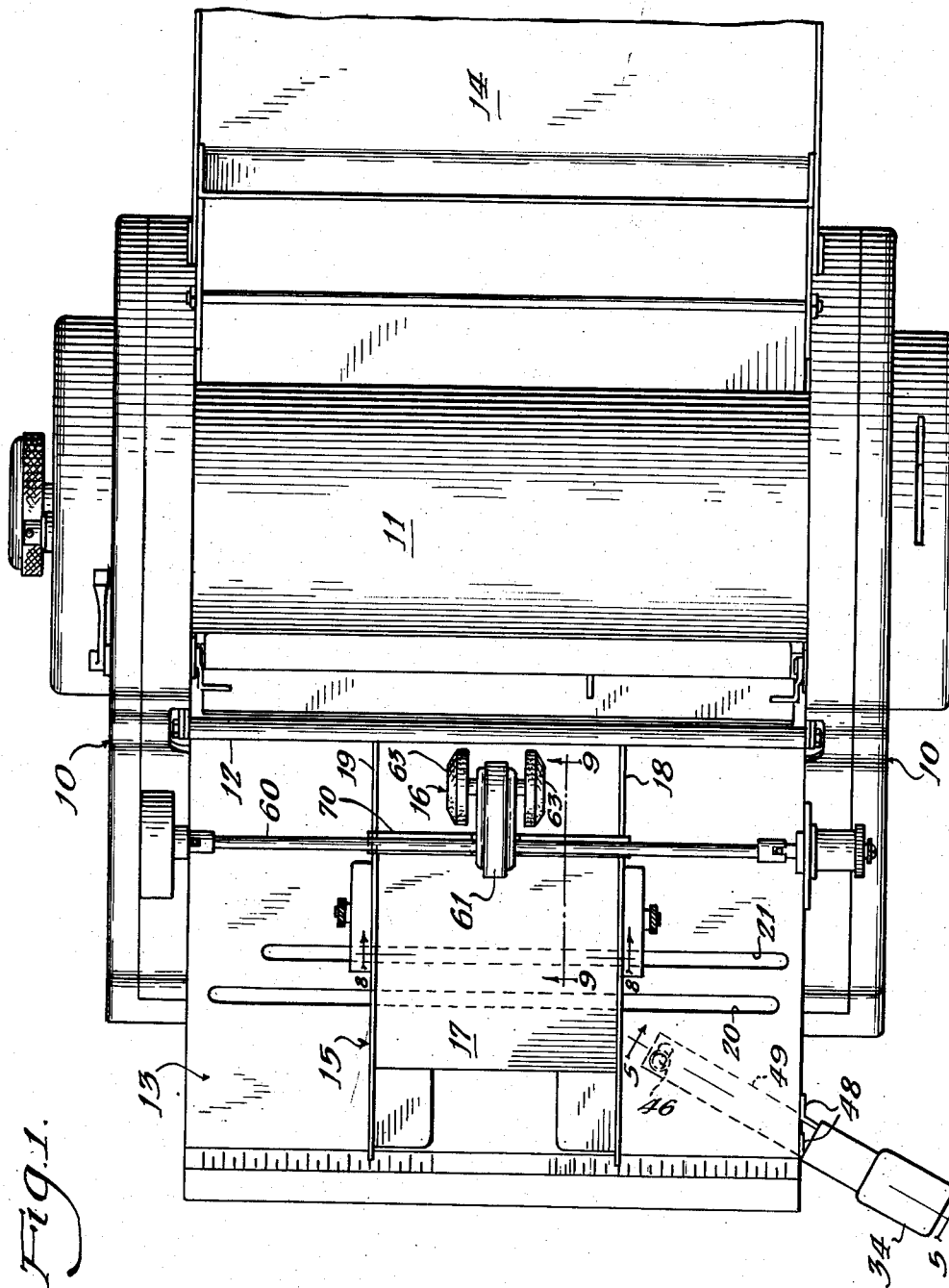


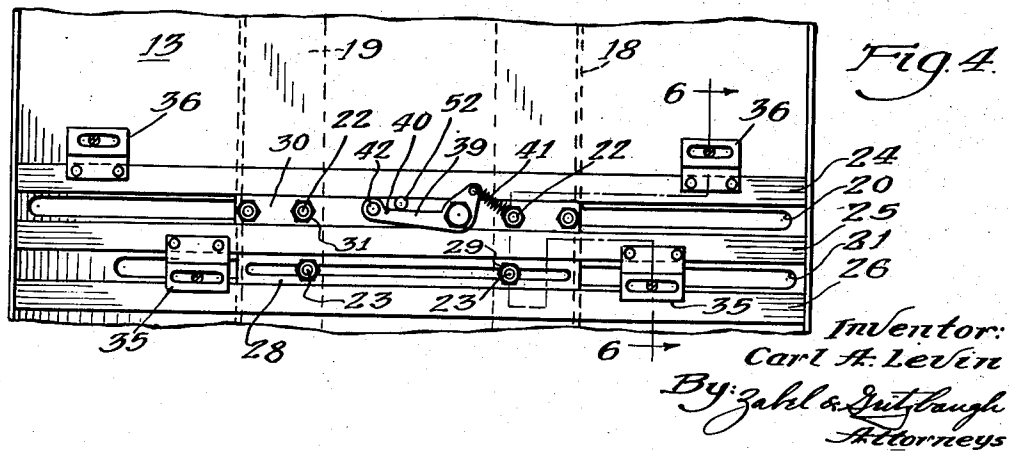
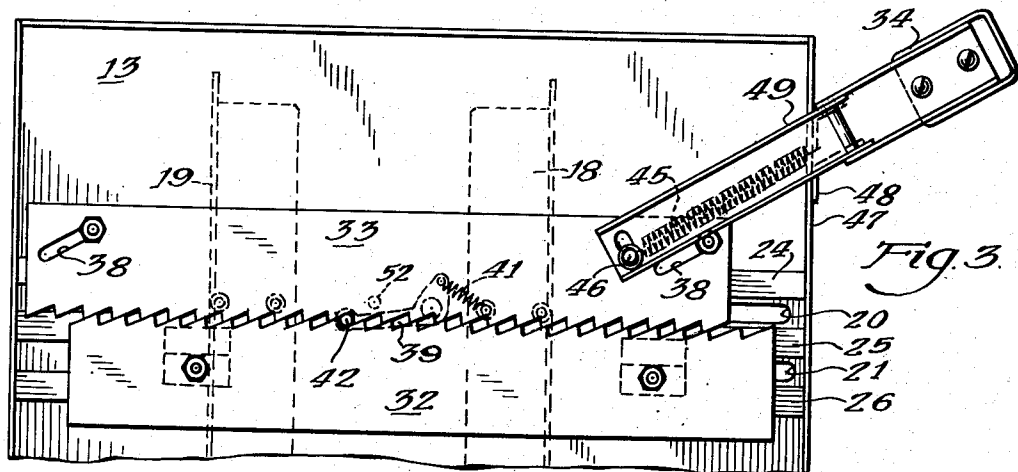
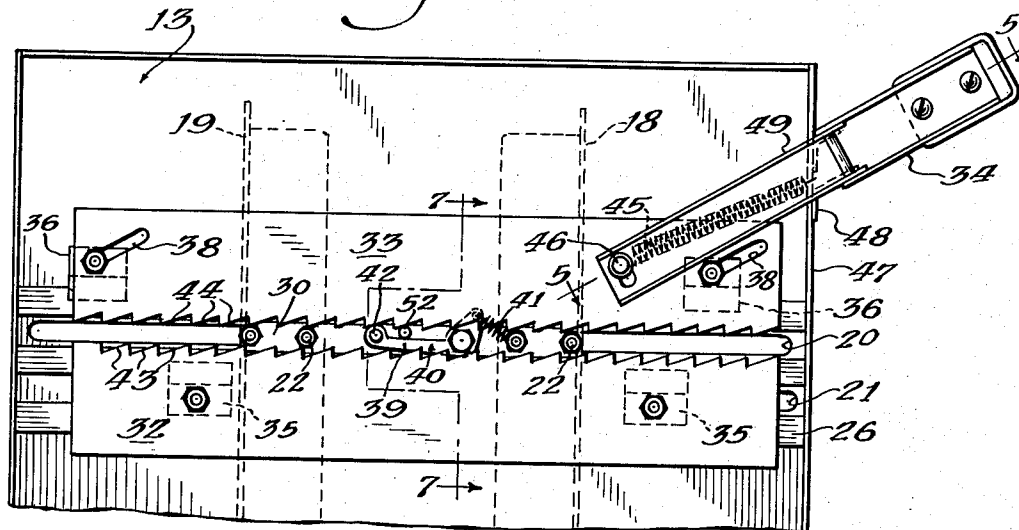
Fig. 1.

Inventor:
Carl A. Levin
By: Zabel & Gutblough
Attorneys

C. A. LEVIN

SHIFTABLE SHEET FEEDING DEVICE FOR DUPLICATING MACHINES

4 Sheets-Sheet 2



Nov. 24, 1953

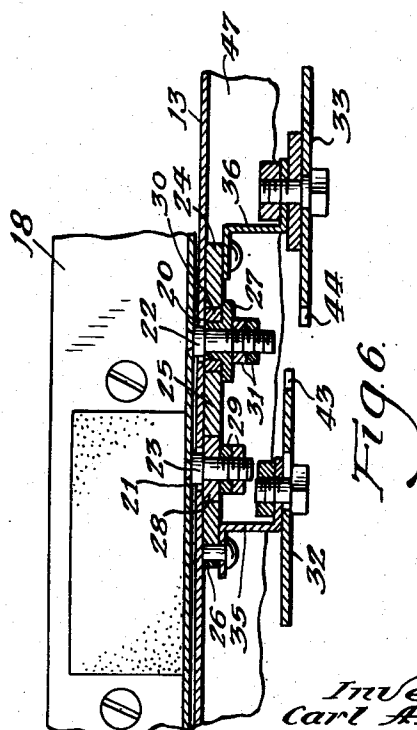
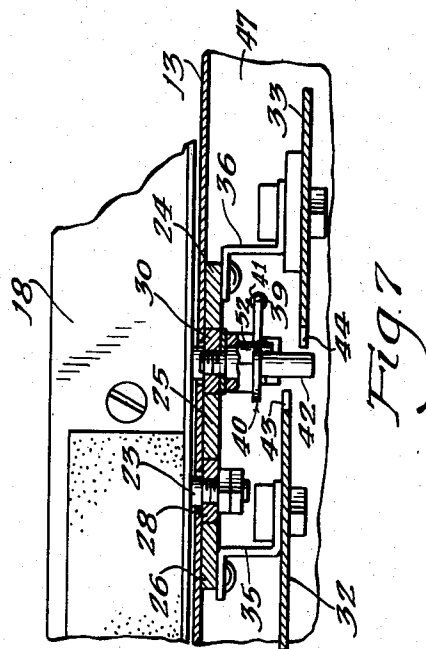
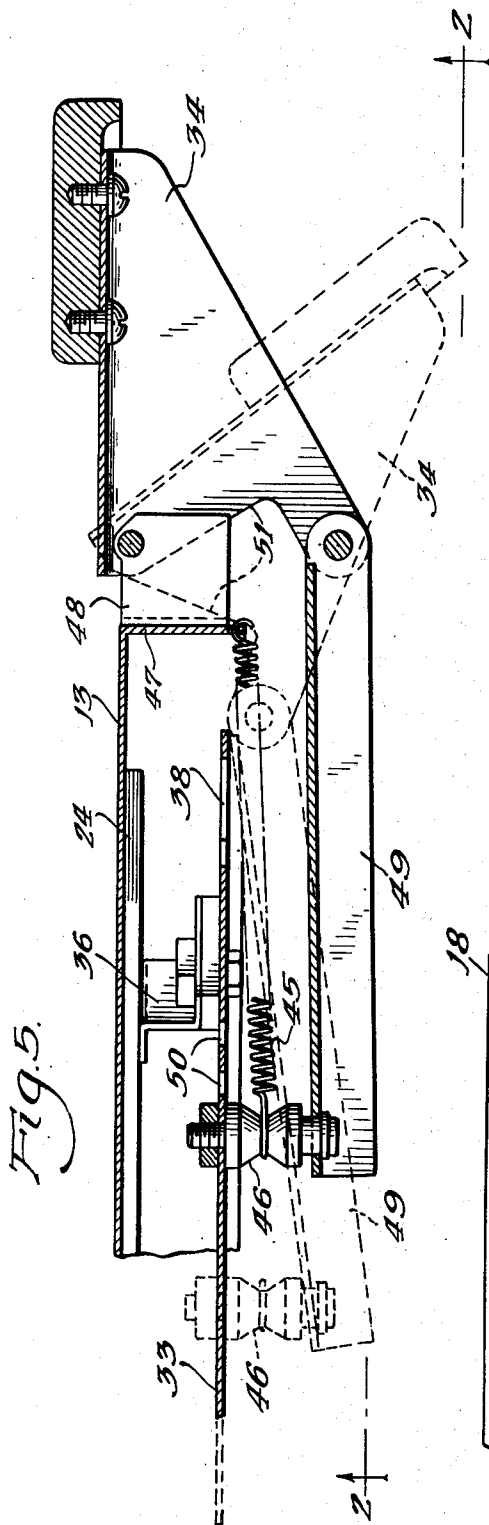
C. A. LEVIN

2,660,431

SHIFTABLE SHEET FEEDING DEVICE FOR DUPLICATING MACHINES

Filed Jan. 16, 1950

4 Sheets-Sheet 3



Inventor:
Carl A. Levin
By: Zabel & Sutzbaugh
Attorneys

Nov. 24, 1953

C. A. LEVIN

2,660,431

SHIFTABLE SHEET FEEDING DEVICE FOR DUPLICATING MACHINES

Filed Jan. 16, 1950.

4 Sheets-Sheet 4

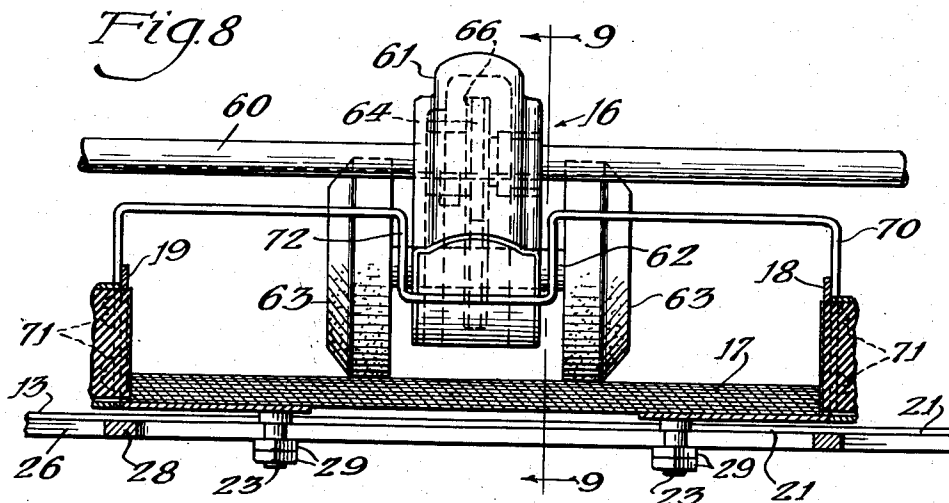
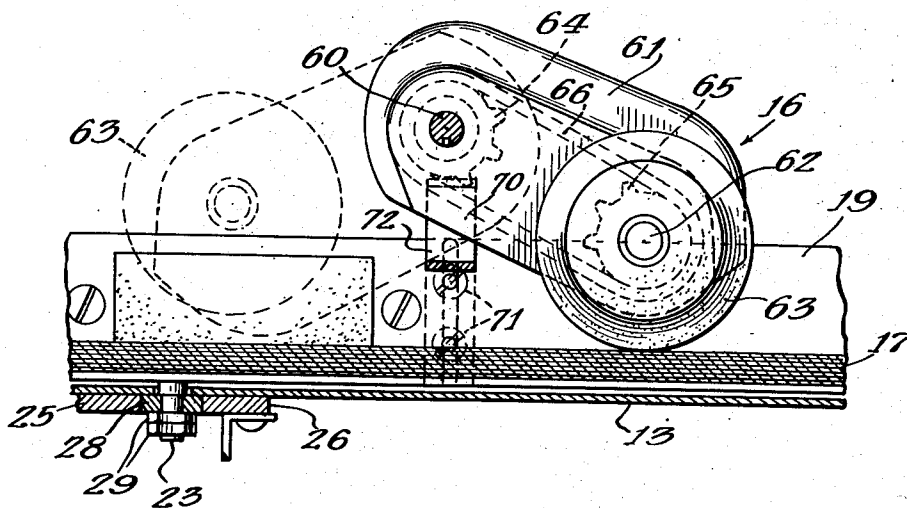


Fig. 9.



Inventor:
Carl H. Levin
By: Zabel & Gutbaugh
Attorneys

UNITED STATES PATENT OFFICE

2,660,431

SHIFTABLE SHEET FEEDING DEVICE FOR
DUPLICATING MACHINESCarl A. Levin, Park Ridge, Ill., assignor to Ditto,
Incorporated, Chicago, Ill., a corporation of
West Virginia

Application January 16, 1950, Serial No. 138,841

12 Claims. (Cl. 271-36)

1

This invention relates to shiftable sheet feeding devices for duplicating machines, and in particular, to one that can be shifted in a step by step manner.

The transverse position of a copy sheet with respect to the printing couple of a duplicating machine is generally determined by a side guide, a tray, or by other sheet feeding devices which are disposed on the feed table of a duplicating machine for shifting movement in a transverse direction. Means have been proposed whereby such sheet feeding devices can be shifted in a step by step manner by semi-automatic means. However, these prior art devices, some of which operate on an escapement principle, have the disadvantage that they are adapted only for step by step movement, and may not be manually shifted several steps at a time. Furthermore, it is not possible to manually set the sheet feeding device at some intermediate position, that is, at a position between the two adjacent predetermined positions which corresponds to one step.

It is an object of this invention to provide a shiftable sheet feeding mechanism which can be shifted semi-automatically in a step by step manner, and which in the alternative can be shifted manually to any desired position.

It is a further object of this invention to provide a simple and inexpensive step by step means for actuating a side guide, a feed tray, or the like.

It is a further object of this invention to provide a sheet feeding device, such as a side guide or a tray, which includes sheet advancing means, such as a pair of rollers, which sheet advancing means is automatically shiftable with the side guide or tray in a step by step manner.

A still further object is to provide in a sheet feeding device, an improved sheet advancing means which is capable of being moved into an inoperative position without affecting the position of the stack of copy sheets on which it rests.

Other objects, features and advantages will become apparent as the description proceeds.

With reference now to the drawings in which like reference numerals designate like parts:

Fig. 1 is a plan view of a duplicating machine embodying a preferred form of my invention;

Fig. 2 is a bottom plan view of the feed table;

Fig. 3 is a view similar to Fig. 2 but showing the parts in changed position;

Fig. 4 is a view similar to Fig. 2, but in which certain of the parts are removed;

Fig. 5 is a vertical section taken along line 5-5 of Figs. 1 and 2;

2

Fig. 6 is a vertical section taken along line 6-6 of Fig. 4;

Fig. 7 is a vertical section taken along line 7-7 of Fig. 2;

Fig. 8 is a transverse vertical section taken along line 8-8 of Fig. 1; and

Fig. 9 is a longitudinal vertical section taken along lines 9-9 of Figs. 1 and 8.

As shown in Fig. 1 the duplicating machine comprises a frame 10 in which is rotatably mounted a drum 11 whose operation is controlled by a trip bar 12. The duplicating machine includes a feed table 13 at the front end and a receiving tray 14 at the rear end. A sheet feeding device is shiftable mounted on the table 13 and comprises a feed tray 15 and sheet advancing mechanism 16. A stack of sheets 17 is disposed in the feed tray 15 and is adapted to be advanced, sheet by sheet, into duplicating engagement with the drum 11 by means of the sheet advancing mechanism 16.

The feed tray 15 comprises a pair of L-shaped side guides 18 and 19 which are slidably mounted in transverse slots 20 and 21 formed in the table 13.

As shown in Figs. 6, 7, and 8, the horizontal portion of each side guide is provided with shoulder rivets 22 and 23, the lower ends of which are threaded and which project downwardly through the slots 20 and 21 respectively, and between bars 24 and 25, and bars 25 and 26 respectively. The bars may be suitably secured to the undersurface of the table 13, as by welding.

A spacer plate 30 is slidably disposed in the space between bars 24 and 25 through which the shoulder rivets 22 pass, and to which the shoulder rivets are secured by lock nuts 31. The spacer plate 30 serves to maintain the spacing between the two side guides. A sleeve washer 27 permits the lock nuts to be securely tightened up without impairing the free sliding movement of the plate 30 and the side guides, since the shoulder on the rivet maintains the desired clearance between the parts. Similarly, the shoulder rivets 23, are held in freely sliding engagement with the slot 21 by means of a plate 28 and lock nuts 29.

The feed tray 15 which comprises the side guides 18 and 19 and the spacer plate 30 is caused to shift in a step by step direction, from the right to the left, as viewed in Fig. 1, by an actuating member in the form of a displaceable rack 33, which is operated by means of a lever 34. The displaceable rack 33 is mounted below the table by means of brackets 36 and screws 37, the screws passing through diagonally disposed slots

38 formed in the rack 33. Thus, the actuating member is capable of displacement in a diagonal direction from its Fig. 2 position into its Fig. 3 position.

A pawl 40, in the form of a lever 39 and pin 42 is pivotally mounted on the underside of the spacer plate 30. The pawl shown in Fig. 4 is biased by a spring 41 in the clockwise direction toward the rack 33. A stop pin 52 limits the displacement of the pawl in its clockwise direction. The displaceable rack 33 is provided with a plurality of teeth 44 which are adapted to engage the pawl 40 when the rack is displaced, thereby causing the feed tray 15 to be shifted transversely. When the rack 33 is released and permitted to return to its initial position by means of spring 45, the feed tray will remain in its shifted position and the pawl will remain in a position in which it will be engaged by the next succeeding tooth 44, or the second or third tooth as the case may be.

The spring 45, as shown in Fig. 5, is tensioned between a suitable pillar 46, mounted in the rack 33, and the flange 47 of the table 13.

A displacement of the rack 33 may be effected by any suitable means such as the lever 34. The lever is journaled in suitable brackets 48 which are secured to the flange 47. A link 49 connects the lever with the pillar 46. Thus, as the lever is depressed downwardly into the dotted line position of Fig. 5, the pillar 46 and the rack 33 will be displaced into the position shown.

The extent of the step by step movement of the sheet feeding device is determined primarily by the spacing of the teeth 44, but the movement may be in multiples of the inter-tooth distance if the displacement of the actuating member 33 is sufficiently great. The extent of the displacement of the actuating member can be determined by any one of several means, such as the length of the slots 38, the throw of the lever 34 and link 49, or by the provision of a separate stop member which, as shown herein, can be in the form of a stationary rack 32 having teeth 43.

For instance, the displaced position of the rack 33 can be determined by the location of the rear end of the slots 38 or by the location of the stationary rack 32 or by the engagement of the edges 51 of the lever 34 with the table flange 47. This limiting position of the lever is shown in dotted lines in Fig. 5. By providing a series of holes 50 in the displaceable rack 33, the relative position of the pillar 46 and the link 49 with respect to the rack 33 may be shifted, thus regulating the throw of the lever. In the arrangement shown, the normal position of the displaceable rack is in all instances determined by the location of the forward end of the slots 38. It is obvious, however, that additional means may be provided for the regulation of the normal position where such regulation is deemed to be desirable.

In the foregoing it will be observed that the stationary rack 32 is only one of several alternative means for determining the displaced position of the shiftable rack. However, by mounting the stationary rack on slotted brackets 35, it is possible to adjust the position transversely thus providing a regulation of the successive positions of the sheet feeding device which is not provided by the other means herein referred to.

The sheet advancing mechanism 16 is slidably mounted on a transverse shaft 60 which is intermittently rotated, in synchronism with the drum by suitable means not shown herein. This

mechanism comprises an arm in the form of a housing 61 which is slidably and pivotally mounted on shaft 60. At the outer end of the housing is journaled a second shaft 62 on which are mounted feed rollers 63. The housing 61 is preferably of U-shaped cross section being open at its underside, when in its operative position. A gear 64 is keyed to the shaft 60 and disposed within the housing so as to be slidable therewith. A second gear 65 is keyed to the second shaft 62 and is driven from gear 64 by a chain 66. Thus, the feed rollers 63 are intermittently rotated and serve to advance the top sheet from the stack 17 when the housing is in its operative position, as shown in solid lines in Fig. 9. Since the housing is rotatably mounted on the shaft 60, it may be swung upwardly and rearwardly to permit replenishment of the stack, or it may be completely reversed into its inoperative position, as shown in dotted lines in Fig. 9. It will be observed that in this inoperative position, the housing 61 will rest on a strap 70 so that the feed rollers will be held clear of the stack. Thus, the machine can be operated without having the sheets advanced from the stack, merely by throwing the housing rearwardly into its inoperative position.

The strap 70 is connected at its ends to the side guides 18 and 19 by suitable screws 71. The central portion 72 of the strap is formed into a U-shape and engages the side walls of the housing. Thus, when the feed tray is shifted in a step by step manner, the U-shaped strap will cause the sheet advancing mechanism 16 to be shifted accordingly. The U-shaped central portion 72 also serves as the support for the housing when in its inoperative position as pointed out above. The U-shape into which the strap is formed provides a certain amount of resilience which serves as a shock absorber; thus, the housing may be thrown or flipped into inoperative position without likelihood of damage.

The operation has been described in connection with the description of the several parts of the machine.

To summarize the operation, the feed tray may initially be slid to the right hand side of the table 13 as viewed in Fig. 1. In certain line printing operations, as more fully described in the co-pending application of John R. Roberts, Serial No. 93,941, filed May 18, 1949, it is desired to shift the position of the tray by a predetermined distance between the feeding of successive sheets or groups of sheets from the stack. According to the mechanism of the present invention, this can be done merely by depressing the lever 34 with the result that the entire sheet feeding device, including the sheet advancing mechanism, is automatically shifted a predetermined distance.

This distance can be the length of one or two or more teeth, depending upon which one of the apertures 50 the pillar 46 is mounted in.

It will be observed that the stop pin 52 maintains the pin 42 clear of both of the racks with the result that the sheet feeding device may be freely shifted in either direction. Furthermore, the feeding device can be thus located in any position, irrespective of the spacing of the teeth.

In certain instances, the sheet feeding device can consist only of one side guide, or it may comprise two side guides without the sheet advancing means. However, it has been found that the complete combination shown herein

5

is of great utility in line printing. The particular arrangement of the sheet advancing mechanism permits it to be swung into an inoperative position so that other duplicating operations can be carried on with respect to copy sheets or strips other than those which are disposed in the feed tray 15.

I claim:

1. In a duplicating machine or the like having a feed table, a transversely arranged drive shaft disposed above said table, and sheet feeding means including a feed tray mounted on said table for displacement in a transverse direction, the combination of means for shifting said sheet feeding means in a step by step manner comprising a pin associated with said feed tray and projecting downwardly through said table, an elongate displaceable actuating member disposed transversely of said table and beneath the same at a point adjacent the path followed by said pin, means for displacing said actuating member in a diagonal direction into engagement with said pin, and means for mounting said pin on said feed tray to permit movement of said pin with respect to said feed tray in a direction substantially perpendicular to said transverse direction so as to permit displacement of said pin in said diagonal direction, and to cause displacement of said feed tray in a transverse direction, said sheet feeding means also including sheet advancing mechanism embodying a roller adapted to engage the top sheet of a stack of sheets disposed in a feed tray, and a member connecting said feed tray and said sheet advancing mechanism so that the latter may be shifted with the former, said sheet advancing mechanism being slidably mounted on said shaft so that it may be shifted with said sheet feed tray.

2. In a duplicating machine as claimed in claim 1, the combination of a lever pivotally mounted on said feed table for vertical motion about an axis which is perpendicular to said diagonal direction in which said actuating member is displaced, and a link disposed beneath said table and connecting said lever and said displaceable actuating member.

3. In a duplicating machine as claimed in claim 1, the combination of a lever pivotally mounted on said feed table for motion in a vertical plane, a link disposed beneath said table and connecting said lever and said displaceable actuating member, and means for adjusting the connection between said link and said actuating member so as to regulate the throw of said lever.

4. In a duplicating machine or the like having a feed table, and a feed tray mounted on said table for displacement in a transverse direction, the combination of means for shifting said feed tray in a step by step manner comprising a pawl carried by said feed tray and projecting through said table to the underside thereof, an elongate displaceable actuating member disposed transversely of said table and beneath the same at a point adjacent the path followed by said pawl, and means for bodily displacing said actuating member in a diagonal direction into engagement with said pawl so as to cause said feed tray to be laterally shifted in a step by step manner.

5. In a duplicating machine or the like having a feed table, and a feed tray mounted on said table for displacement in a transverse direction, the combination of means for shifting said feed tray in a step by step manner comprising a pawl carried by said feed tray and extending through

6

said table to the underside thereof, an elongate displaceable actuating member disposed transversely of said table and beneath the same at a point adjacent the path followed by said pawl, mounting means for said actuating member to permit bodily displacement thereof in a longitudinal direction, and means mounted on said feed tray and extending beneath said table for holding said pawl clear of said actuating member when said actuating member is in normal position so that said feed tray and pawl can be freely moved in either direction.

6. In a duplicating machine having a feed table provided with a transversely disposed slot, a transversely shiftable longitudinally arranged side guide, a transversely shiftable plate disposed beneath said table, means extending through said slot and connecting said side guide and said plate, said plate engaging the walls of said slot to prevent rotation of said plate with respect to said table, a lever mounted on said plate, a pawl pin mounted on said lever, a rack mounted beneath said table for displacement in a diagonal direction with respect to the sliding motion of said plate and having teeth adapted to engage said pin to move the same in a transverse direction, and a stationary rack spaced from said displaceable rack and having teeth formed thereon to be engaged by said ratchet pin to limit the displacement thereof whereby said side guide may be advanced step by step through a series of positions which correspond to the positions of the teeth on said stationary rack.

7. Means for advancing a side guide in a step by step manner in a transverse direction comprising a downwardly extending pin associated with said side guide, a displaceable actuating member for engaging said pin, a stationary stop member spaced from said actuating member and adapted to be engaged by said pin to limit the motion thereof, said actuating member and said stop member being elongate and being disposed substantially parallel to each other beneath said side guide, said actuating member being displaceable in a diagonal direction and having spaced teeth thereon for engaging said pin, and means for mounting said pin for longitudinal movement with respect to said side guide so as to permit motion of said pin in a diagonal direction and so as to cause motion of said side guide in a transverse direction.

8. A sheet feeding device for the table of a duplicating machine comprising a tray having a pair of side guides disposed longitudinally of said table, means for mounting said tray for sliding movement transversely of said table, a rotatable shaft mounted in fixed position with respect to and transversely of said table and above said tray, an arm supported from said shaft for slidable and rotatable movement with respect thereto, said arm being rotatable between an operative and an inoperative position, sheet advancing rollers carried by said arm and adapted to rest on a stack of copy sheets disposed in said tray when said arm is in operative position, and a member connecting said side guides and having a U-shaped central portion which embraces the sides of said arm so that said arm may be shifted transversely with said tray.

9. A sheet feeding device as claimed in claim 8 in which said U-shaped central portion is disposed beneath said arm and provides a resilient support therefor when in inoperative position.

10. A sheet feeding device for a table of a duplicating machine comprising a tray for re-

ceiving a stack of copy sheets and mounted on said table for sliding movement transversely thereof, a rotatable shaft mounted in fixed position transversely of said table and above said tray, an arm in the form of a housing supported from said shaft for slidable and rotatable movement with respect thereto, said arm being rotatable between an operative and an inoperative position, sheet advancing rollers carried by said arm and adapted to rest on a stack of copy sheets disposed in said tray when said arm is in operative position, a driving connection between said shaft and said rollers disposed in said housing and slidable therewith for advancing, successively, the top sheet of said stack, means for maintaining said housing in said inoperative position so that said rollers do not contact said copy sheets when said arm is in said inoperative position, and means for bodily shifting said tray and said arm transversely with respect to said table in a step by step manner.

11. A sheet feeding device for a table of a duplicating machine comprising a tray having a pair of side guides disposed longitudinally of said table, means for mounting said tray for sliding movement transversely of said table, a shaft mounted in fixed position transversely of said table and above said tray, an arm supported from said shaft for slidable and rotatable movement with respect thereto, sheet advancing rollers carried by said arm and adapted to rest on a stack of copy sheets disposed in said tray for advancing the top sheet of said stack, and a member connecting said side guides and having a U-shaped central portion which embraces the sides of said arm so that said arm may be shifted transversely with said tray, and means for shifting said tray transversely in a step by step manner.

12. A sheet feeding device for a table of a duplicating machine comprising a tray having a pair of side guides disposed longitudinally of said table, means for mounting said tray for sliding movement transversely of said table, a rotatable shaft mounted in fixed position transversely of said table and above said tray, an arm supported from said shaft for slidable and rotatable movement with respect thereto, said arm being rotatable between an operative and an inoperative position, sheet advancing rollers carried by said arm and adapted to rest on a stack of copy sheets disposed in said tray for advancing the top sheet of said stack, a member connecting said side guides and having a U-shaped central portion which embraces the sides of said arm so that said arm may be shifted transversely with said tray, and means for shifting said tray transversely in a step by step manner, said U-shaped central portion being disposed beneath said arm and serving to support the same when said arm is in inoperative position.

CARL A. LEVIN.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,089,946	Davidson	Aug. 17, 1937
2,204,715	Wimmer	June 18, 1940
2,236,442	Neidich	Mar. 25, 1941
2,260,045	Morrison et al.	Oct. 21, 1941
2,267,998	Storck	Dec. 30, 1941
2,288,149	Williams	June 30, 1942
2,313,633	Ford	Mar. 9, 1943
2,398,315	Little	Apr. 9, 1946