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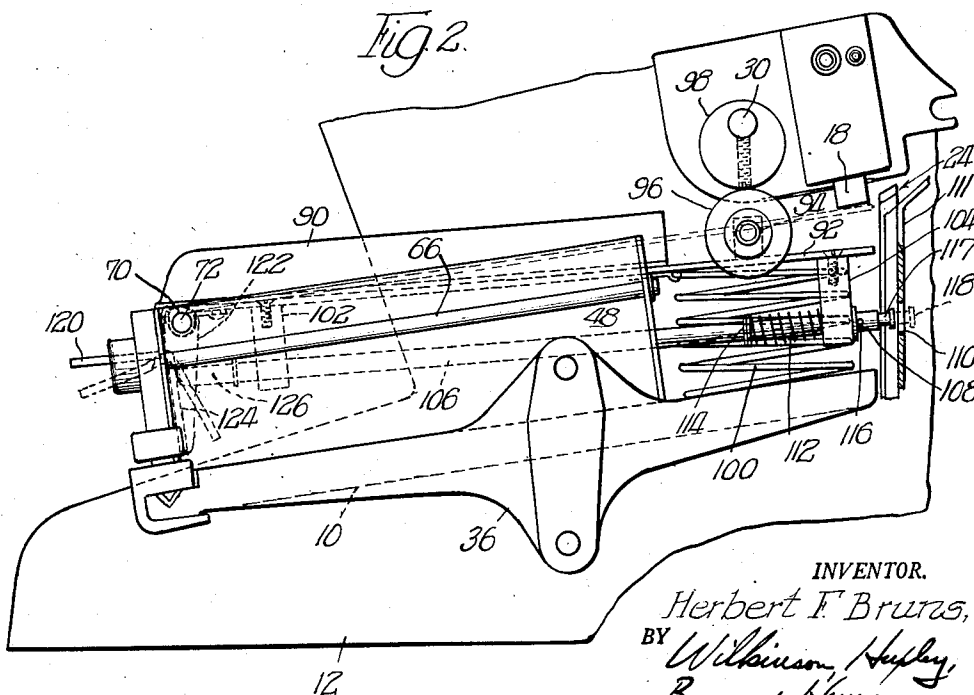
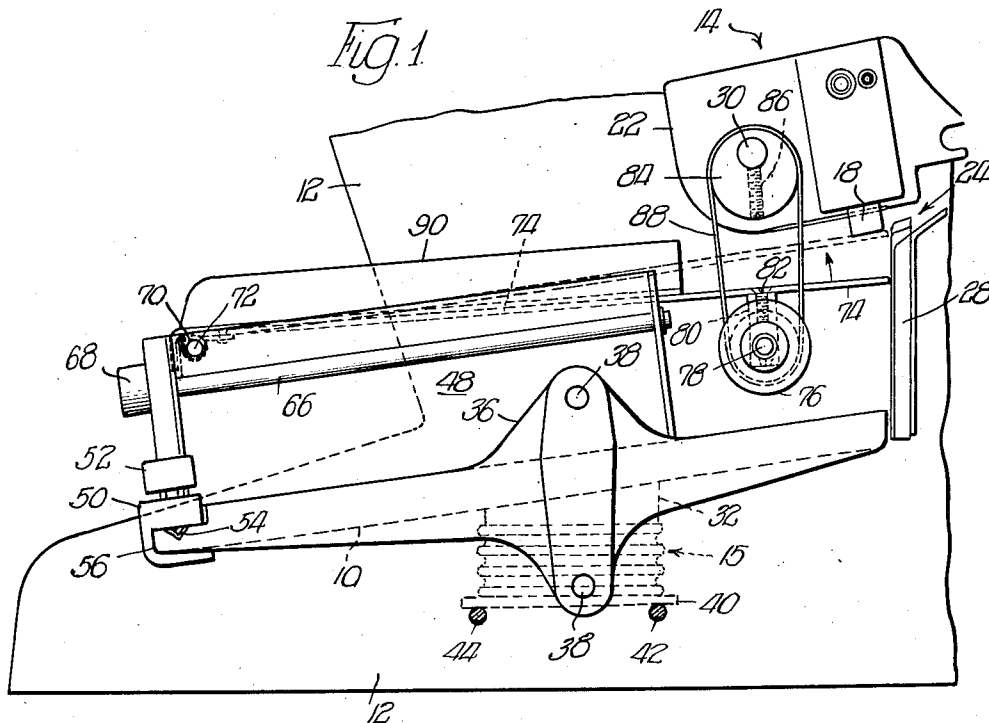
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2,824,737

HAND FEED TABLE FOR DUPLICATING MACHINES

Filed June 6, 1952

2 Sheets-Sheet 1



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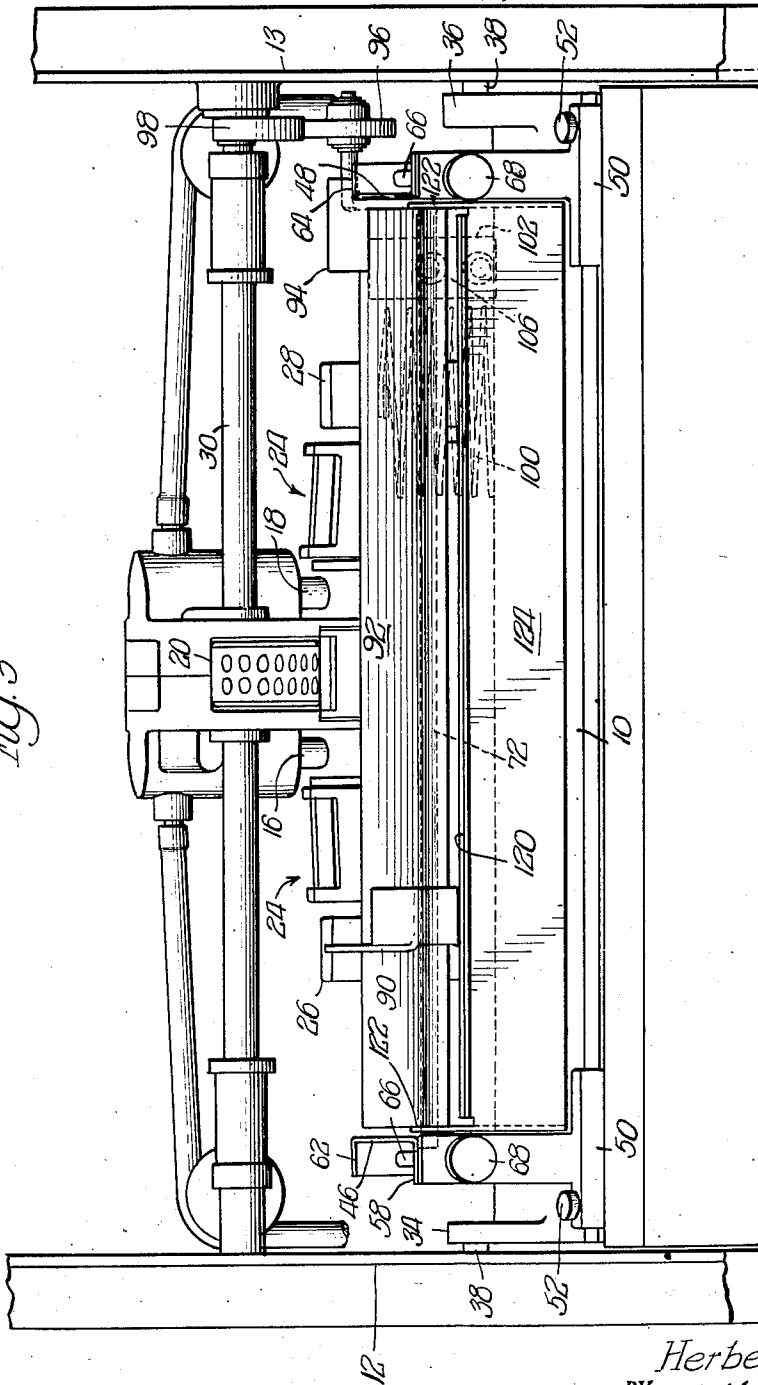
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2 Sheets-Sheet 2

Fig. 3



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HAND FEED TABLE FOR DUPLICATING MACHINES

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9 Claims. (Cl. 271—8)

This invention relates to a feed table for duplicating machines or the like, and more particularly to an auxiliary feed table which may be in the form of an attachment adapted to be removably secured to the existing, stack supporting feed table, which existing table is adapted to cooperate with a suitable feeding mechanism to automatically feed paper sheets into the machine, one by one, in conventional duplicating machines.

A duplicating machine of the offset lithographic type, with which the present invention is particularly adapted to be used, is disclosed in applicant's copending application, Serial No. 154,009, filed April 5, 1950, now Patent No. 2,753,795. The sheet feeder disclosed in that application is characterized as being capable of delivering sheets accurately, one by one, at rates as high as from 12,000 to 15,000 per hour. The feeding from a suitable stack of sheets placed on the stack supporting feed table in that device is entirely automatic. However, it is sometimes desirable to be able to feed only a relatively small number of sheets into the machine by hand, either as a group, or one by one, and without some special provision having been made therefor, it is quite difficult to adapt the automatic mechanism to this hand feeding even though provision is made for reducing the speed of the machine. This difficulty stems largely from the fact that the feed table in such a machine when in the operative position, without having sheets disposed thereon, will be actually abutting the lower extremities of the suction feed which normally pick up the sheets individually from the table. This means that in order to feed sheets to the machine one at a time, for example, it will be necessary to operate the control that raises and lowers the table so as to momentarily lower the table out of contact with the suction feet, so that a sheet may be placed on the table in the proper position to be picked up by the feet. The table may then be raised to the normal position and the sheet will be picked up by the feet in the normal fashion. Every time an additional sheet is fed, this process must be repeated.

It is therefore an object of this invention to provide a feed table for duplicating machines or the like which is particularly adapted for the hand feeding of either single sheets or a relatively small number of sheets and which does not require the operation of the height control mechanism every time a single sheet is fed.

Another object of this invention is to provide a device of the character described which is in the form of an attachment for a conventional feed table which is adapted to be quickly and conveniently mounted in association therewith.

Still another object of this invention is to provide a device of the character described which permits the operator to feed into association with the automatic feed mechanism either a single sheet or a plurality of sheets, and which will permit the single sheet to be picked up and fed into the machine or, likewise, which will permit the small stack of sheets to be fed automatically one at

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a time after they have been placed in position on the table.

Another object of this invention is to provide a feed table which is pivotally mounted at the end nearest the operator and which is activated so as to cause the end farthest from the operator and in association with the automatic feeding mechanism to be moved periodically up and down, into and out of direct association with the automatic feeding mechanism.

Yet another object of this invention is to provide a simple control which will permit the feed table, which moves in the oscillatory manner just described, with a locking mechanism or latch which can be activated as desired to maintain the table in its lowermost position out of direct association with the automatic feeding mechanism, so that the desired number of sheets to be fed can be readily placed on the table while the latter is so latched.

Another object of this invention is to provide a device of the character described which may be activated directly from the automatic feeding mechanism and therefore is operated in complete synchronism therewith.

A further object is to provide a device of the character described which is easy to attach and also quite simple in construction and operation, but which is nevertheless very effective and positive in its action.

Further objects and advantages of this invention will become evident as the description proceeds and from an examination of the accompanying drawing which illustrates one embodiment of the invention and in which similar numerals refer to similar parts throughout the several views.

In the drawings:

Figure 1 is a view in side elevation of one form of feed table incorporating the present invention, the feed table being shown in association with a fragmentary portion of a duplicating machine;

Figure 2 is a view in side elevation of another form of feed table embodying the present invention, the table again being shown in association with a fragmentary portion of a duplicating machine; and

Figure 3 is an end view in elevation of the feed table and the fragmentary portion of a duplicating machine shown in Figure 2.

Referring now to Figure 1, a fragmentary portion of a duplicating machine of the type disclosed in applicant's copending application referred to above is there shown. The table or platform 10 forms the feed table of that machine and is adapted to support a stack of paper sheets which are fed automatically into the machine. This feed table 10 is movably supported between two side plates 12 and 13 (Figure 3), one of these side plates 13 having been removed, in Figure 1. The feed table 10 is adapted to be moved upwardly by a suitable bellows arrangement 15 so that the stack of sheets disposed thereon can be brought into association with the feeding mechanism, indicated generally by the numeral 14. The sheet feeder 14 is provided with a pair of reciprocating suction feet 16 and 18, which are vacuum operated, and an intermittently movable perforated belt 20, all as best shown in Figure 3. The perforated belt 20 travels along under the suction box 22 and receives the sheets fed into the machine from the suction feet 16 and 18 so as to advance them, one by one, into the machine, all as described in detail in the above identified copending application.

A sheet separator mechanism, indicated generally by the numeral 24, is also provided which is adapted to subject the leading edges of the sheets in a stack supported by the table 10 to drafts of air which produce an improved separating action. Adjustable guide blocks 26 and 28 are also provided, as best shown in Figure 3, which may be

moved laterally relative to the air separator, and to each other, so as to be positioned near the front corner of a stack of sheets on the table 10.

The belt 20 is driven by suitable drive mechanism within the suction box 22, the drive shaft 30 therefor extending outwardly on both sides of the suction box 22 into association with the side plates of the machine, as best shown in Figure 3. Suitable control mechanisms are provided so that the stack of sheets supported by the table 10, when the machine is in operation, is normally positioned so that the uppermost sheet is in contact with the suction feet 16 and 18 when they are in the lowermost position. When suction is applied to these feet, the uppermost sheet is gripped thereby and immediately thereafter the feet and the sheet so gripped are lifted upwardly so that the sheet is brought into association with the suction belt 20. The sheet is then transferred to the belt 20 so that it can be moved forwardly into association with further elements of the machine, not shown.

As previously mentioned, the feed table 10 is provided with a bellows indicated generally by the numeral 15 in Figure 1, the upper end of which is constituted by a wedge shaped block 32 having a downwardly and forwardly inclined upper surface upon which the platform or table 10 is mounted in forwardly and downwardly inclined relation. The side edges of the platform or table 10 are provided with the mounting plates 34 and 36 each having a pair of outwardly projecting studs 38 upon which are mounted guide rollers (not shown) disposed in vertical slots (not shown) in the side plates 12 and 13. The bellows 15 has a rigid bottom plate 40 which in turn is supported by the tie-rods 42 and 44 extending between the side plates 12 and 13.

Mounted upon the upper surface of the platform 10 are adjustable side guides 46 and 48, each having a base 50 adapted to be secured by a clamping screw 52 in the desired position of lateral adjustment on the outer end of the table 10, the lower extremity of the clamping screw 52 being adapted to be received in the transverse groove 54 in the stepped end portion 56 of the table 10. The side guides 46 and 48 are each provided with a laterally turned flange 58 and 60, respectively, and a similar flange 62 and 64 at the opposite end thereof. In each pair of such flanges a shaft 66 is mounted for rotation, the shafts having knobs 68 secured thereon at their forward ends. These shafts are adapted to carry tail guides (not shown) which may have the construction disclosed in applicant's copending application, Serial No. 86,325, filed on April 8, 1949, now Patent No. 2,652,249. These tail guides may be swung upwardly and laterally by turning these associated knobs 68, thereby facilitating the placing of a stack of sheets on the table 10. Thereafter they may be swung downwardly and forwardly to make firm engagement with the stack on the table.

Each of the side guides 46 and 48 is provided with an aperture 70 adjacent the outer edge thereof, which apertures are adapted to receive the outer extremities of the shaft 72 upon which the outer end of the auxiliary feed table 74 is mounted. The ends of the shaft 72 may be inserted in the aperture 70 by first moving the side guides 46 and 48 outwardly a sufficient distance to permit the shaft 72 to be inserted therebetween. When the ends of the shaft are aligned with the opening 70, the side guides may be moved inwardly so that the ends of the shaft project therethrough, as best shown in Figure 3. The outer end of the table 74 is then pivotally mounted with respect to the side guides which are secured in place after being moved inwardly to receive the ends of the shaft 72. The inner end of the auxiliary table 74 may have a pulley 76 rotatably mounted on the undersurface thereof on a shaft 78 which projects laterally beyond the side of the table 74. The shaft 78 is carried in turn by the mounting 80 which is secured to the table 74 by a plurality of screws 82. An eccentric pulley 84 is fixed to the shaft 30 extending from the suction box 22 by the set screw 86,

the pulley 84 being in the same vertical plane as the pulley 76. A flexible drive belt 88 is disposed between the two pulleys 76 and 84 and because of the eccentric character of the pulley 84 the table 74 is caused to oscillate about the shaft 72 as the shaft 30 and the pulley 84 rotate. The table 74 is shown in the extreme downward position in Figure 1, the extreme upward position also being shown therein in dotted lines.

It will be noted that the table 74 when in the extreme upward position is brought into contact with the suction foot 18. This means that if a sheet or a number of sheets have been placed on the table 74 so as to abut the guide block 28, the leading edge thereof will be brought into association with the lower extremity of the suction foot 18 when the table 74 is moved into the position represented by the dotted lines in Figure 1. The pulley 84 should be so disposed on the shaft 30 that the table 74 will reach this position just prior to the application of suction to the feet 18. Obviously when the table 74 is in the lowermost position, a sheet or a number of sheets can be quickly placed in position against the guide blocks 26 and 28 as shown in Figure 3 and the uppermost sheet will be picked up by the suction foot when the table moves into the uppermost position. If desired, a single sheet may be fed into this position of abutment with the guide blocks 26 and 28 each time the table 74 drops to the lowermost position. To facilitate the positioning of sheets on the auxiliary table 74, a laterally adjustable side guide 90 may be provided as best shown in Figure 3.

An alternative form of auxiliary feed table is shown in Figure 2. This table differs from the form just described in that the form of drive is slightly altered and a latching mechanism is also provided. The inner end of the auxiliary table 92, shown in Figure 2, is provided with a support 94 for a cam member 96, the support being mounted on the upper surface of the auxiliary table 92 at one side thereof. An eccentric cam 98, similar to the eccentric pulley 84 previously described, is mounted on the shaft 30 in the same vertical plane as the cam or roller 96 so that if the roller 96 is urged against the cam a reciprocal oscillating movement will be imparted to the table 92. A spring 100 may be provided to exert an upward force on the table 92, the spring being disposed between the table 92 and the conventional table 10. For convenience, the upper end of the spring 100 may be secured to the underside of the table 92 so that when the latter is put in place in the same fashion as the table shown in Figure 1, the spring 100 will automatically be seated on the table 10 in an operable position.

The outer end of the auxiliary table 92 is adapted to be pivotally mounted in substantially the same manner as the table 74 previously described, the shaft 72 being adapted to be received in the aperture 70 in each of the side guides associated with the table 10. Since the outer end of the auxiliary table 92 is pivotally mounted in the manner just mentioned, the inner end thereof and the roller 96 will normally oscillate up and down as the shaft 30 rotates the eccentric cam 98 against which the roller 96 is urged by the spring 100. During such oscillatory movement of the auxiliary table 92, if it is desired to feed sheets one at a time into the machine, the sheets can be fed or placed onto the table in abutting relation with the guide blocks previously described when the auxiliary table 92 is out of association with the lower end of the suction foot 18. If, for example, the table 92 is in the extreme downward position as shown in full lines in Figure 2, either a single sheet or a small stack of sheets can readily be placed onto the table 92 before the table 92 rises into association with the foot 18.

In order to simplify the feeding, the auxiliary table may be provided with a latching mechanism as shown in Figure 2 which will permit the auxiliary table to be locked in the extreme downward position, and when released will allow the table to again move in synchronism with the remainder of the feeding mechanism of the ma-

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chine. This latching mechanism, as shown in Figure 2, comprises the two support members 102 and 104 which extend downwardly from the undersurface of the table 92 and which are adapted to have the rod 106 slidably journaled therein. The inner extremity 108 of the rod 106 is so disposed when the table 92 is in the extreme downward position, that it may enter the opening 110 provided in the mounting plate 111 for the sheet separator 24. The rod 106 is normally held out of association with the opening 110 by the spring 112 which is disposed between the mounting 104 and the stop or collar member 114, the latter being mounted on the rod 106. A similar stop or collar member 116 is provided on the rod 106 on the opposite side of the mounting member 104 to limit the movement of the rod 106 in a direction away from the opening 110.

The inner end 108 of the rod 106 is provided with an area of reduced diameter 117 terminating in a flange member 118. The flange 118 is adapted to cooperate with the upper edge of the opening 110 in the mounting plate 111 so that when the table 92 is urged upwardly by the spring 100, a sufficient distance so that the end of the rod is in abutment with the edge of the opening 110, the rod cannot be withdrawn from that opening. This means that once the rod 106 has been inserted in the opening 110, and the table 92 has moved upwardly, the rod 106 cannot be removed from that opening until the table 92 has again been moved downwardly to the extreme downward position, so that the flange 118 will clear through the opening 110. This means that after the table 92 has been locked in the extreme downward position it will not again be unlocked until the cam 98 has moved in such a way as to depress the table slightly in order to clear the flange 118 from the upper edge of the opening 110.

For convenient operation of the latching mechanism just described, a control plate 120 may be provided which may be pivotally mounted on the shaft 72 through the arms 122 so that it projects outwardly from just below the outer end of the auxiliary table 92 and may be readily operated by the heel of the hand of the operator. The plate 120 is provided with a depending flange portion 124 which is adapted to abut the forward extremity 126 of the rod 106 and also forms a closure member to fill the gap between the front edge of the auxiliary table 92 and the front edge of the conventional table 10. Depression of the pressure plate 120 to the position shown in the dotted lines in Figure 2, will therefore cause the rod 106 to be moved inwardly so that the inner extremity 108 thereof takes the position shown in dotted lines within the opening 110. As long as the plate 120 is maintained in the depressed position by the hand of the operator, the table 92 will remain in the extreme downward position since it will be latched in the manner previously described. Once every revolution of the eccentric cam 98 the table 92 will be moved downward slightly a sufficient distance to clear the flange 118 from the edge of the opening 110, but since the rod 106 is being held in the inward position by the depressed pressure plate 120 and the arm 124 formed integrally therewith, the only result will be a slight movement of the table 92 in a downward direction once every revolution. The table 92 can thus be held in a position which will enable it to receive the desired number of sheets to be fed without having to synchronize the placing of the sheets on the table with any movement of the latter member.

As soon as it is desired to begin the automatic feeding after a stack of sheets has been placed on the table 92, the pressure plate 120 may be released, so that when the forward end of the table 92 is depressed to the extreme position by movement of the eccentric cam 98 the spring 112 will operate to move the rod 106 in a direction away from the opening 110 and will withdraw the end 108 of the rod from the opening 110 so that the table 92 will be free to move upwardly as urged by the spring member

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100. It may thus be seen that the table 92 will always be unlatched at the same point in the cycle of operation and that therefore the desirable synchronism of the feeding will always be maintained.

If sheets are being fed one at a time onto the table 92, it will not normally be necessary to operate the latching mechanism since a sheet may be dropped onto the table and moved into association with the guide blocks when the table 92 is out of association with the suction foot 18. The pressure plate 120, however, may be readily depressed at any time to automatically move the rod 106 in the latching position when the table 92 reaches the downward end of its travel, to momentarily arrest the movement of the table 92, or to maintain it in the extreme downward position while a small stack of sheets is being placed thereon.

When it is desired to hand feed sheets one at a time into a machine of the character disclosed in the copending patent application first mentioned above, it may also be desirable to modify the manner in which the moisture is applied to the plate. This is true because, under normal conditions of operation, in the duplicating machine described in the application mentioned moisture is applied to the printing plate only when sheets are actually being fed. Therefore even though the machine were running and an auxiliary feed table of the type described in this application were oscillating up and down, or latched in the extreme downward position, moisture would not be applied to the printing plate. The plate would therefore tend to dry out, primarily because of the rotation of the cylinder upon which it is mounted. In other words, in a hand feeding operation there may be substantial gaps of time between the feeding of one sheet and the next, and during such a period of time considerable drying can occur if no moisture is being applied.

To overcome this difficulty the electrical circuit which controls the application of moisture to the plate may be modified so as to include a control switch which can be operated when the auxiliary feed table is put in place on the machine. Such a switch should operate when closed to cause moisture to be applied to the plate when the machine is running, whether or not sheets are actually being fed through the machine. This in effect provides a suitable standby position for the relatively long periods of time which may elapse in the hand feeding of sheets when no sheets are being fed.

In the drawing and specification, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation. Changes in form and in the proportion of parts, as well as the substitution of equivalents are contemplated, as circumstances may suggest or render expedient, without departing from the spirit or scope of this invention as further defined in the following claims.

It is claimed:

1. An auxiliary sheet supporting feed table for a duplicating machine having a sheet feeding mechanism, a stack supporting feed table and stack side guides, said auxiliary table comprising a plate having an outer end and an inner end, a pivot member at said outer end of said plate journaled in said stack side guides so that said plate is pivotally supported above said stack supporting feed table, an eccentric cam member coupled to said sheet feeding mechanism, a cam follower member carried by said plate, a resilient member normally urging said plate upwardly so that said cam follower is held in association with said eccentric cam member, and a locking mechanism located at said inner end for holding said plate out of association with said feed mechanism.

2. An auxiliary sheet supporting feed table for a duplicating machine having a sheet feeding mechanism, a stack supporting feed table and stack side guides, said auxiliary table comprising a plate having an outer end and an inner end, a pivot member at said outer end of said

plate journaled in said stack side guides so that said plate is pivotally supported above said stack supporting feed table, an eccentric cam member coupled to said sheet feeding mechanism, a roller carried by said inner end of said plate, a cam follower carried by said plate, and a resilient member normally urging said plate upwardly so that said cam follower is held in association with said eccentric cam member.

3. An auxiliary sheet supporting feed table for a duplicating machine having a sheet feeding mechanism, a stack supporting feed table and stack side guides, said auxiliary table comprising a plate having an outer end and an inner end, a pivot member at said outer end of said plate journaled in said stack side guides so that said plate is pivotally supported above said stack supporting feed table, an eccentric pulley coupled to said sheet feeding mechanism of said duplicating machine, a second pulley carried by said inner end of said plate, and a flexible belt carried by said pulleys so that as said eccentric pulley revolves the upper surface of said plate is periodically brought into association with said feeding mechanism at a particular point in the operating cycle thereof.

4. An auxiliary sheet supporting feed table for a duplicating machine having a sheet feeding mechanism provided with a drive shaft, a stack supporting feed table and stack side guides, said auxiliary table comprising a plate having an outer end and an inner end, a pivot member at said outer end of said plate journaled in said stack side guides so that said plate is pivotally supported above said stack supporting feed table, an eccentric member coupled to said sheet feeding mechanism driven by said sheet feeding mechanism, and a rotatable member mounted on said plate coacting with said eccentric member to impart an oscillatory motion to said inner end of said plate so that the upper surface of said plate is periodically brought into association with said feeding mechanism at a particular point in the operating cycle thereof, and a locking mechanism located at the said inner end for holding said plate out of association with said feed mechanism.

5. An auxiliary sheet supporting feed table for a duplicating machine having a sheet feeding mechanism provided with a drive shaft, a stack supporting feed table and stack side guides, said auxiliary table comprising a plate having an outer end and an inner end, a pivot member at the outer end of said plate journaled in said stack side guides so that said plate is pivotally supported above said stack supporting feed table, an eccentric member coupled to and driven by said drive shaft of said sheet feeding mechanism, and a rotatable member mounted on said inner end of said plate coacting with said eccentric member to impart an oscillatory motion to said inner end so that the upper surface of said plate is periodically brought into association with said feeding mechanism at a particular point in the operating cycle thereof.

6. A duplicating machine comprising a sheet feeding mechanism provided with a drive shaft; a stack supporting feed table and stack side guides; and an auxiliary sheet supporting feed table comprising a plate, a pivot member at the end of said plate furthest removed from said feed mechanism journaled in said stack side guides with said plate pivotally supported above said stack supporting feed

table, an eccentric member coupled to and driven by said drive shaft, and a rotatable member mounted on said plate coacting with said eccentric member to cause said plate to move in synchronism with said feed mechanism so that the upper surface of said plate is periodically brought into association with said feeding mechanism at a particular point in the operating cycle thereof.

7. A sheet supporting feed table for a duplicating machine having a sheet feeding mechanism comprising a plate having an inner end and an outer end, said plate pivotally supported at said outer end, an eccentric member coupled to and driven by said sheet feeding mechanism, and a rotatable member mounted on said inner end of said plate and coacting with said eccentric member to cause said plate to move in synchronism with said feed mechanism so that the upper surface of said plate is periodically brought into association with said feeding mechanism at a particular point in the operating cycle thereof, a latch member adapted, when activated, to hold said plate out of association with said feed mechanism, and a control member projecting from below the outer end of said plate for activating said latch member.

8. A sheet supporting feed table for a duplicating machine having a sheet feeding mechanism provided with a drive shaft comprising a plate below said sheet feeding mechanism having an inner end and an outer end, said outer end supported at a point spaced from said sheet feeding mechanism, an eccentric member coupled to said drive shaft, a rotatable member mounted on said inner end of said plate coacting with said member to cause said plate to move in synchronism with said feed mechanism so that the upper surface of said plate is periodically brought into association with said feeding mechanism at a particular point in the operating cycle thereof, and a latch member comprising a rod slidably mounted to the undersurface of said plate normally held out of locked position by a spring member.

9. A sheet supporting feed table for a duplicating machine having a sheet feeding mechanism provided with a drive shaft comprising a plate having an inner end and an outer end, said outer end pivotally supported at a point spaced from said sheet feeding mechanism, a cam coupled to said drive shaft sheet feeding mechanism, a cam follower member rotatably mounted on said inner end of said plate and coacting with said cam to cause said inner end of said plate to move in synchronism with said feed mechanism so that the upper surface of said plate is periodically brought into association with said feeding mechanism at a particular point in the operating cycle thereof, a latch member for holding said plate out of association with said sheet feeding mechanism, including a rod normally held out of locking association by a spring member, and a control member at said outer end of said plate for activating said latch member.

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