June 20, 1944. R. F. HALL 2,351,854

SHEET FEEDING APPARATUS

Filed Feb. 3, 1941 3 Sheets-Sheet 1

Fig. 1.

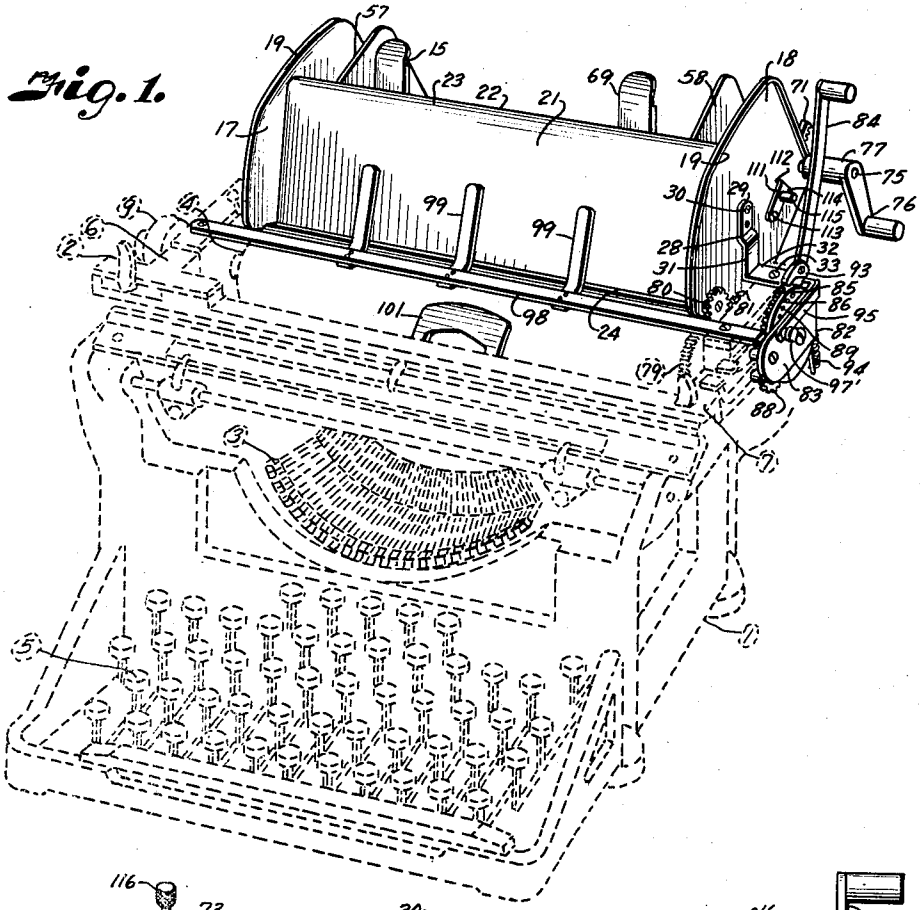
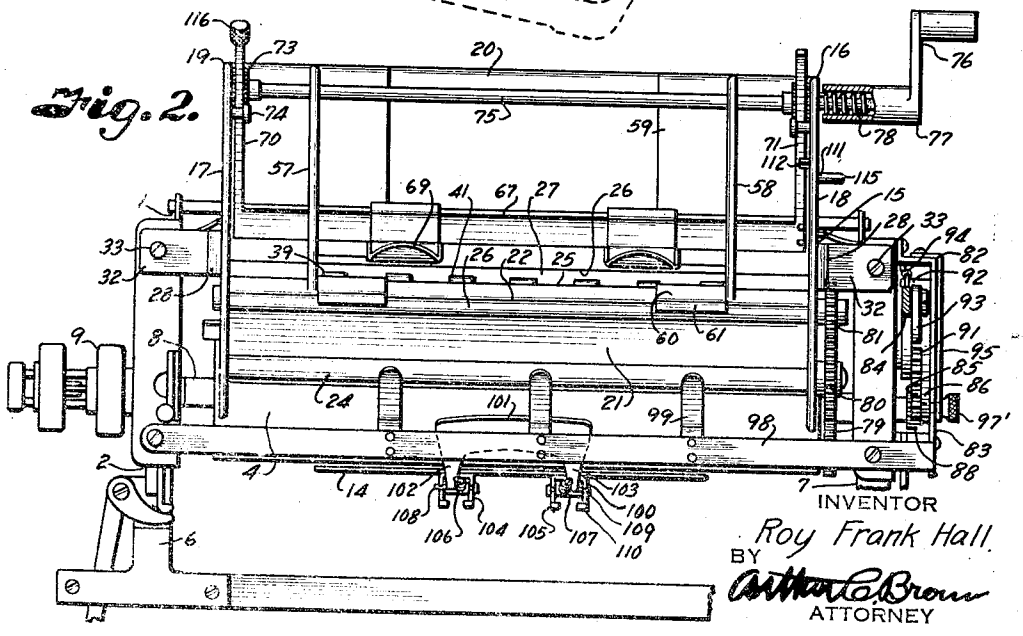


Fig. 2.



INVENTOR
Roy Frank Hall
BY
Arthur C. Brown
ATTORNEY

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Fig. 3.

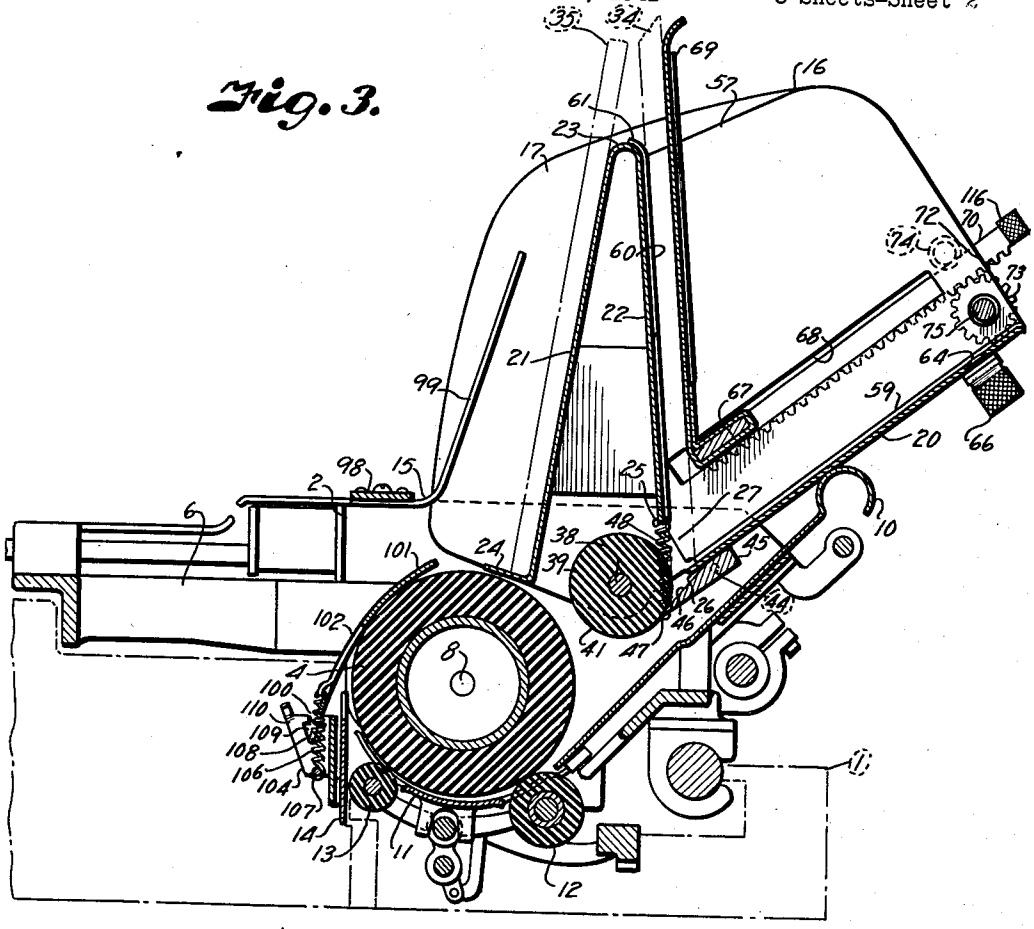


Fig. 4.

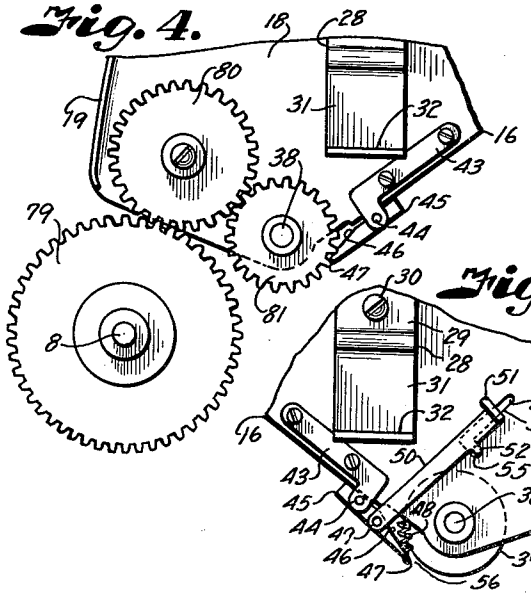
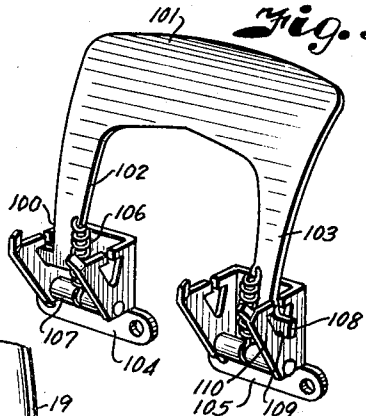


Fig. 6.

Fig. 5.



INVENTOR

Roy Frank Hall

BY

Arthur C. Brown

ATTORNEY

June 20, 1944. R. F. HALL 2,351,854

SHEET FEEDING APPARATUS

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Fig. 7.

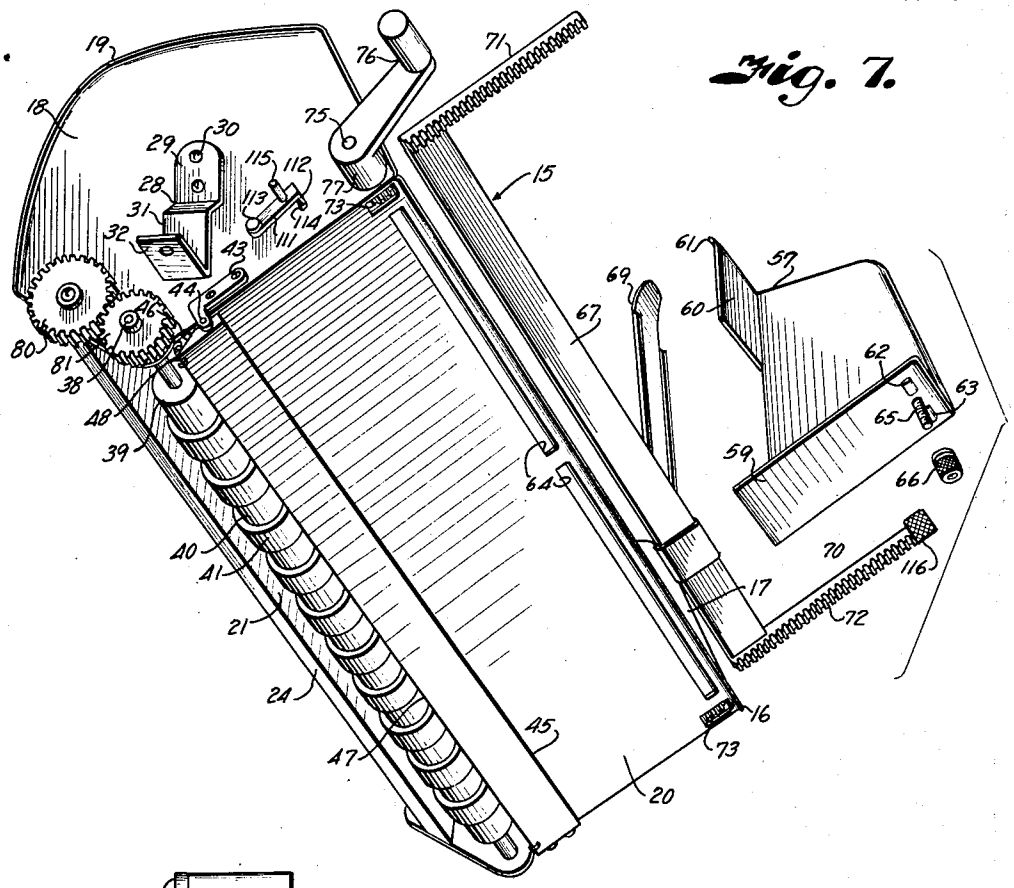


Fig. 8.

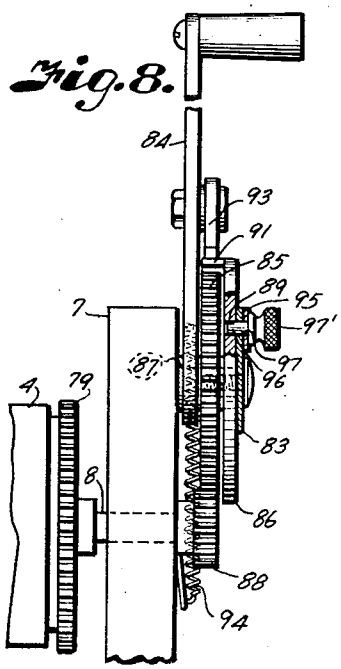
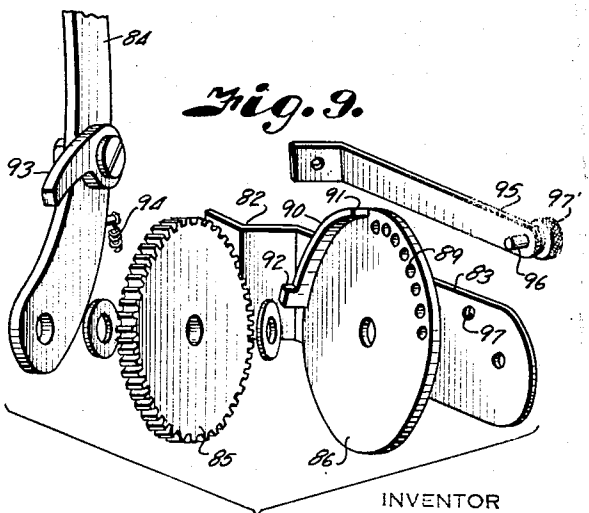


Fig. 9.



INVENTOR
Roy Frank Hall
BY
Arthur C. Brown
ATTORNEY

Patented June 20, 1944

2,351,854

UNITED STATES PATENT OFFICE

2,351,854

SHEET FEEDING APPARATUS

Roy Frank Hall, Kansas City, Mo., assignor to Benjamin A. Babb, Kansas City, Mo.

Application February 3, 1941, Serial No. 377,090

10 Claims. (Cl. 271—4)

This invention relates to a sheet feeding apparatus for typewriters and similar machines adapted for writing entries on sheets, such as invoices, checks, envelopes, cards and the like, and is a continuation in part of my copending application Serial No. 336,230, filed May 20, 1940, which matured into Patent No. 2,289,011, dated July 7, 1942, for "Sheet feeding apparatus."

The principal object of the invention is to provide a positively operating feed for sheets from a stack into a typewriter in successive order and to subsequently discharge the sheets and deposit them in a stack without handling thereof by the operator.

Other objects of the invention are to provide a feeding mechanism that is adapted for ready attachment to a conventional typewriter or like machine; to provide a feeding mechanism that is readily adjustable to sheets of any size within the capacity of the typewriter platen; to provide a positive follow-up pressure on the stack of sheets being fed into the machine; to provide manual means for releasing the follow-up pressure and retaining the pressure bar in retracted position when making adjustment of the feeding apparatus to the size of the sheets; to provide an adjustable incremental feed of the sheets; and to provide a simple, inexpensive construction which may be manufactured and sold at low cost.

In accomplishing these and other objects of the invention, as hereinafter pointed out, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of a sheet feeding apparatus applied to a typewriter, the typewriter being shown in dotted lines.

Fig. 2 is a plan view of the sheet feeding apparatus.

Fig. 3 is a cross-section through the platen carriage of the typewriter and the feeding apparatus carried thereby.

Fig. 4 is an elevational view of the gears connecting the platen roller with the feed roller.

Fig. 5 is a perspective view of the sheet guide and hold-down plate used in connection with the feeding apparatus, when applied to one make of typewriter.

Fig. 6 is a fragmentary view of the stripper plate and latch mechanism therefor, showing the latch in position to retain the stripper plate in spaced relation with the feed roller.

Fig. 7 is a detail perspective view of the sheet feeding apparatus, parts being shown in disassembled spaced relation to better illustrate their construction.

Fig. 8 is a detail elevational view of the sheet feed actuating mechanism.

Fig. 9 is a detail perspective view of the parts of the actuating mechanism shown in disassembled spaced relation.

Referring more in detail to the drawings:

1 designates a conventional form of typewriter, including a carriage 2 shiftable to position the impression of type 3 on a sheet carried by the platen roller 4 forming a part of the carriage. The type 3 is moved to and from printing contact by manipulation of keys 5, which also effect shift of the carriage from the right to the left as the writing progresses.

The carriage includes a frame having end members 6 and 7 in which the platen shaft 8 is journalled. The ends of the platen shaft project through the frame and carry knobs 9 at the ends thereof by which the platen may be selectively rotated to feed sheets into the typewriter. In the present instance, one of the knobs is removed and replaced by a gear, later described. The carriage also includes a paper rest 10 for guiding a sheet between the platen roller 4 and a substantially arcuate guide plate 11 in cooperation with pressing rollers 12 and 13, when the pressing rollers are released. Extending along the front of the platen is a bar 14 for carrying various parts of the typewriter which relate to guiding and positioning of the sheets therein.

The typewriter parts above described are conventional and specifically form no part of the present invention, but are illustrated in that they are associated with the sheet feeding apparatus 15, now to be described.

The sheet feeding apparatus includes a main frame 16, preferably formed of sheet metal and provided with end plate portions 17—18, having the marginal edges 19 flanged outwardly to enhance rigidity of the frame and form a finished edge for the plate portions. The plate portions are interconnected by a bottom plate portion 20 and a sheet metal divider member, providing downwardly diverging plate portions 21 and 22 connected by a rounded ridge portion 23. The lower edge of the plate portion 21 terminates at the lower edge of the end plates in a laterally extending flange or ledge 24 adapted to overlie the platen roller and form a support for the typewritten sheets, as shown in Fig. 3. The lower edge 25 of the other plate 22 terminates short of the forward edge 26 in forming a throat-like opening 27.

The bottom plate 20 may be formed integrally with the end plates, or may be suitably welded thereto as in the instance of the divider member. The plate 20 extends rearwardly at an upwardly inclined angle and has support on the rest 10 to effect gravitational feed of sheets against the plate portion 22, as later described.

The frame just described is of a length to be received between the end members 6 and 7 of the platen carriage and extends into the space between the platen and paper rest 10, as shown in Fig. 3. The frame is supported on brackets 28 having attaching portions 29 fixed to the outer faces of the end plates 17 and 18 by suitable fastening devices, such as screws 30. The brackets also have flexible portions 31 extending downwardly in spaced relation with the outer faces of the side plates and terminate in laterally extending foot portions 32 seated upon the end members of the carriage frame, as shown in Fig. 1, and attached thereto by fastening devices, such as screws 33.

The plate portions 21 and 22 are so positioned relatively to each other that the plate 22 inclines slightly forwardly and the plate portion 21 is substantially parallel with a diametrical plane passing through the axis of the platen, the rear plate portion 22 forming an abutment for a stack of sheets 34 and the front plate a similar abutment for the typewritten sheets 35 as they are delivered from the machine.

Journalled in suitable bearings 36 and 37, which are carried by the end plates 17 and 18 at a point intermediate the lower edges of the plates 21 and 22, is a shaft 38 carrying a feed roller 39. The feed roller 39 is formed of substantially soft, resilient material and is of a diameter to provide clearance between the platen, the paper rest 10, and the forward edge 26 of the bottom plate 20. The feed roller 39 has a plurality of spaced circumferential grooves 40 to provide intermediate sheet contact faces 41.

Fixed to the end plates are brackets 42 having depending arms 43 for journalling the trunnions 44 of a stripper plate 45. The stripper plate 45 closes the throat-like opening 27 and has a bevelled upper face 46 terminating in a relatively thin edge 47 contacting the circumferential faces 41 of the feed roller 39. The plate is normally retained in yielding contact with the feed roller by springs 48 having ends hooked in suitable openings in the lower edge of the plate portion 22 and the opposite ends in suitable openings at the forward edge of the stripper plate 45, as shown in Figs. 3 and 6. Connected with one end of the stripper plate, by a pin 49, is a lever 50 extending upwardly alongside the outer face of one of the end plates and terminating in a laterally extending ear 51. The lever 50 is further supported by a lug 52 thereon engaging in an L-shaped slot 53 of the end plate 17, the slot being arranged so that the longer portion 54 thereof extends substantially parallel with the arm and the lateral, shorter portion in a downward direction so that when the lever is pushed downwardly to engage the lug 52 in the portion 55 of the slot, the stripper plate will be retained in retracted position relatively to the feed roller to provide a free space 56 therebetween (see Fig. 6). The lever is readily released from latching engagement by raising the ear end thereof so that the lug 52 passes out of the portion 55 of the slot, whereupon the action of the springs 48 returns the stripper plate 45 into feeding relation with the feed roller.

In order to support the stack of sheets in a fixed location relatively to the length of the platen 4, the sheet retaining pocket formed between the plate 22 and bottom plate 20 is provided with adjustable gauge plates 57 and 58, shaped to fit within the angle of the pocket and provided with foot flanges 59 slidably engaging the upper face of the bottom plate. The front edges 60 of the gauge plates engage the rear face of the plate 22, and the upper portions thereof carry laterally extending fingers 61 having bearing contact therewith. The fingers preferably extend above the upper edges of the end plates and curve outwardly over the ridge 23 to guide and stabilize the movement of the gauge plates along the pocket. In order to additionally guide the plates, the foot flanges 59 have lugs 62 and 63 engaging in slots 64 formed along the rear edge of the bottom plate 20, as best shown in Fig. 7. Carried by the foot flanges are threaded studs 65 which project through the slots 64 to accommodate thumb nuts 66 thereon. The nuts 66, when tightened, secure the foot flanges in clamping relation with the bottom plate to retain the gauge plates 57 and 58 in selected position, whereby the spacing therebetween may be made to conform to the width of the sheets used in the machine.

The feeding apparatus also includes a follow-up bar 67, having its ends slidable in guide slots 68 that are formed in the edges of the gauges and extend in substantially parallel relation with the bottom plate portion 20. The bar 67 carries upwardly extending fingers 69 which are slidably positioned therealong to engage the rearmost sheet in the stack, as best shown in Fig. 3. Fixed to the ends of the follow-up bar, adjacent the side plates of the frame, are rack bars 70 and 71, having downwardly facing teeth 72 meshing with pinion gears 73. The rack bars are retained in engagement with the gears by rollers or studs 74 engaging the upper faces of the bars as shown in Figs. 2 and 3. The pinions 73 are carried on a shaft 75 having its ends journalled in the end plates of the frame. The shaft 75 is rotated to reciprocate the rack bars by a crank 76 having a hub portion 77 fixed to the shaft. The hub portion of the crank is preferably counterbored to form a housing for a coil spring 78, having one end fixed to the adjacent end plate of the frame and its opposite end fixed to the hub whereby the spring may be tensioned to rotate the shaft in a counter-clockwise direction, Fig. 3, to yieldingly urge the sheet engaging fingers 61 and bar into follow-up contact with the stack of sheets. When the shaft is rotated in a clockwise direction, the spring is tensioned and the pinions move the rack bars retractively to carry the sheet engaging fingers to the rear portion of the pocket so that sufficient space is provided for the insertion of a stack of sheets 34. Upon release of the crank, the spring unwinds to return the fingers into pressing engagement with the rearmost sheet in the stack so that the sheets are kept in feeding relation with the feed roller. Attention is directed to the fact that the feed roller 39 frictionally engages the foremost sheet in the stack 34 directly above the stripper plate 45, so that when the feed roller is rotated the foremost sheet is fed downwardly across the paper rest 10 between the pressing rollers 12—13, and around the platen roller.

In order to actuate the feed roller 39 in synchronism with movement of the platen roller, the shaft of the platen roller carries a spur gear 79

fixed thereto and which meshes with an idle gear 80 that is rotatably mounted on the end plate of the frame, as shown in Fig. 4, the idle gear in turn meshing with a gear 81 fixed to the projecting end of the feed roller shaft 38. It is thus obvious that when the platen is rotated by the knob 9, the foremost sheet in the stack is fed therefrom and around the platen roller 4 into writing position, the stripper plate 45 yielding to allow passage of the sheet.

In addition to the conventional feed, I provide a faster operating mechanism whereby the sheets may be injected through a single movement of an actuating lever, or by predetermined increments, as now to be described. Fixed to the end of the platen carriage, preferably on the right-hand end, is a bracket 82 having a forwardly extending arm 83 that is spaced therefrom to accommodate an actuating lever arm 84, gear wheel 85, and an increment adjusting wheel 86 therebetween, the lever, gear wheel, and adjustment wheel being mounted on a shaft 87 fixed to the end member of the carriage frame and extending through an opening in the arm 83. The gear 85 meshes with a pinion gear 88 that is fixed to the projecting end of the platen roller shaft, which mounted the right-hand knob (the knob being removed to permit application of the pinion gear as above mentioned). The wheel 86 is of slightly larger diameter than the gear 85 and has a plurality of spaced apertures 89 formed in the periphery thereof and registering with the teeth of the gear 85. Also formed on the plate 85 is a laterally extending flange 90 forming a shroud arranged to cover a portion of the gear teeth. The flange 90 is so positioned that its forward end 91 is spaced from the spaced apertures 89, and its opposite end carries a lug or stop 92 adapted to be engaged by the lever arm 84.

The lever arm carries a pawl 93 having a tooth adapted to engage the teeth of the gear 85. The lever is normally retained in retracted position by a spring 94, with the lever resting against the lug 92 and the pawl 93 upon the forward end of the shroud flange, whereby the pawl is supported out of engagement with the teeth. In order to anchor the plate and retain it in a fixed adjusted position, the arm 83 of the bracket 82 carries a spring latch 95, having a pin 96 projecting through an opening 97 in the arm and into one of the apertures 89 in the wheel 85, the arm being provided with a knob 97' to facilitate actuation thereof.

Extending across the carriage, in front of the plate portion 21, is a bar 98 carrying a plurality of upwardly extending fingers 99 to guide typewritten sheets for support upon the flange 24 and in stacked relation against the plate portion 21, as shown in Fig. 3.

In one form of typewriter, it is necessary to provide the platen roller with a sheet guide plate 100, having a plate portion 101 pressing on the platen and having depending leg portions 102 and 103 pivotally carried by brackets 104 and 105 attached to the bar 14, previously described. The guide plate is normally retained in contact with the roller by springs 106 having one end fixed to an arm and the other end to pins 107 carried by the brackets 104 and 105. The leg portions 102 and 103 of the plate have laterally extending ears 108 pivoted in V-shaped slots 109 formed in forwardly projecting ears 110 of the brackets. When the follower bar is moved to retracted position, it is retained by a latch 111 having an ear 112 adapted to drop back of the bar 87 to hold temporarily the bar from return movement. The latch 111 is pivoted on a stud 113 fixed to the outer face of the right-hand plate 18, and the ear 112 extends through an arcuate slot 114 in the end plate. The ear normally rides upon the upper face of the adjacent rack bar 71, but drops behind the follow-up bar when the bar has been moved to its furthermost position. The ear is lifted from engagement with the bar to permit return movement thereof under action of the spring by a pin-like handle 115 extending from the latch 111, as shown in Fig. 1.

In attaching the feeding apparatus, openings are drilled in the end members of the side frames to receive the fastening devices 33 and the fastening devices which secure the ends of the bar 98. Suitable openings are also provided for securing the bracket 82 to the right-hand end member. The right-hand knob is removed from the platen shaft and the gear 88 is applied thereon. The bracket 82, carrying the platen operating mechanism, is then applied with the gear 85 meshing with the pinion gear 88. The frame of the feeding apparatus is then applied to the end rails with the foot portions 32 resting thereon, after which the screws 33 are applied. The flexible portions 31 of the brackets allow for any slight miscalculations in drilling the openings for the fastening devices 33, or slight variations in width of the platen frame. The bar 98 is then secured in position. On some typewriters it is necessary to apply a guide plate 100 to the cross-bar 15 so as to direct the printed sheets in the space between the fingers 99 and the plate portion 21.

The feeding apparatus is now ready for use. The crank 76 is rotated in a clockwise direction, or the knob 116 on one of the rack bars may be grasped to draw the follow-up carriage to retractive position. This movement winds up the spring 78. When the follow-up bar has moved past the lock-out latch 111, the ear thereon drops behind the bar to retain the follow-up carriage in a retracted position. The thumb nuts 66 are then loosened so that the gauge plates may be adjusted within the pocket formed between the plate portion 22 and bottom plate portion 20 according to the width of the blanks to be used and to position the stack in a desired relation relatively to the platen roll. After adjustment of the gauge plates, the thumb nuts are retightened. A stack of blanks having been inserted in the pocket or magazine, the lock-out latch is lifted so that the spring 78 returns the follow-up carriage into pressing contact with the stack of sheets, as shown in Fig. 3. In this position the lower face portion of the foremost sheet in the stack is contacting the faces 41 of the feed roller, and the lower edges of the foremost sheets in the stack are supported upon the stripper plate 45. The operating lever 84 is then pulled in a forward direction so that the tooth of the pawl 93 engages the teeth of the gear wheel 85 and causes rotative movement thereof to effect rotation of the platen through meshing engagement of the pinion 88. Rotation of the platen rotates the feed roller through the gears 79, 80 and 81 so that frictional engagement of the feed roller with the foremost sheet will effect downward feed thereof, the stripper plate yielding sufficiently to allow passage of the sheet. As soon as the sheet engages the paper rest it will be directed thereby between the platen and pressure rolls 12 and 13. If the stroke of the operating lever is not sufficient to move the sheet the re-

quired distance, the lever may be released so that it is returned to its original position by the spring 94. On return movement, the pawl rides idly over the teeth of the gear. The lever may then be pulled forwardly the second time to continue advance of the sheet. The knob at the left-hand side of the platen roller may be used as in the case of the typewriter to make the final adjustment of the sheet, however, for fast work it is desirable that the hand lever correctly position the sheet, and this is effected by changing the position of the wheel 86. For example, if a shorter stroke of the operating lever is necessary, the spring latch will be released and the operating lever swung forwardly, the adjusting wheel also being moved to retain the stop 92 thereon in engagement with the lever, and with the pawl resting upon the shroud flange 90, until the number of teeth are exposed to give desired stroke of the operating lever, whereupon the spring latch will be released so that the pin 96 thereon will enter the registering aperture of the adjustment wheel. With this arrangement the sheet is advanced the correct amount each time so that the sheet is positioned relatively to the type. After writing the desired entries in the manner of an ordinary typewriter, the sheet is automatically removed and the next sheet advanced by actuating the operating lever. As soon as the trailing edge of the sheet clears the feed roller, the next sheet is in contact with the feed roller so that it is fed into typewriting position, as previously described. The typewritten sheet, being moved by the platen upwardly under the fingers 99, falls in supporting position on the flange 24, as shown at 35 in Fig. 3.

It is thus apparent that the feeding apparatus is adapted to be installed on a typewriter, tabulating, or similar machine, with a minimum change in the parts, and that the apparatus is well adapted for fast, accurate work on the part of the operator.

What I claim and desire to secure by Letters Patent is:

1. A sheet feeding mechanism including, a frame adapted for support upon a machine of the character described, said frame having a bottom plate portion and downwardly diverging plate portions, one of said plate portions cooperating with the bottom plate portion to form a magazine for supporting a supply of sheets, said magazine having a throat-like outlet between said plate portions, an outwardly extending flange on the other diverging plate portion to form a support for typewritten sheets, a feed roller rotatably carried by the frame intermediate said diverging plate portions, a stripper plate closing said throat-like outlet and having yielding contact with said roller, means for actuating said roller for removing sheets from the magazine for delivery to the support for typewritten sheets, gauge plates slidably supported in said frame to engage sides of the supply of sheets in said magazine, and means for retaining said gauge plates in adjusted position.

2. A sheet feeding mechanism including, a frame adapted for support upon a machine of the character described, said frame having a bottom plate portion and interconnected downwardly diverging plate portions, one of said plate portions cooperating with the bottom plate portion to form a magazine for supporting a supply of sheets, said magazine having a throat-like outlet between said plate portions, gauge plates supported in said frame to engage sides of the supply of sheets in said magazine, foot flanges on said gauge plates for slidably engaging the bottom plate portion, means on said gauge plates slidably engaging the interconnection of said diverging plate portions, guide means on the gauge plate foot flanges having engagement with the bottom plate portion for maintaining said gauge plates in alignment, and means for retaining said gauge plates in adjusted position.

3. A sheet feeding mechanism including, a frame adapted for support upon a machine of the character described, said frame having a bottom plate portion and interconnected downwardly diverging plate portions, one of said plate portions cooperating with the bottom plate portion to form a magazine having a throat-like outlet between said plate portions, gauge plates slidably supported in said magazine, means for retaining said gauge plates in adjusted position, and a follow-up carriage supported by the gauge plates.

4. A sheet feeding mechanism including, a frame adapted for support upon a machine of the character described and having cooperating plate portions to form a magazine having a throat-like outlet between said plate portions, a feed roller rotatably carried in the throat-like outlet, a stripper plate cooperating with the feed roller for closing said throat-like outlet and having yielding contact with said roller, means for actuating said roller, gauge plates slidably supported in said frame, means for retaining said gauge plates in a selected position, said gauge plates having slots, a follow-up bar slidable in said slots, stack pressing members on the follow-up bar, and means yieldingly urging the follow-up bar in the direction of said feed roller.

5. A sheet feeding mechanism including, a frame forming a magazine having an outlet, a feed roller rotatably carried in said outlet by the frame, a stripper plate cooperating with the feed roller for closing said outlet and having yielding contact with said roller, means for actuating said roller, gauge plates slidably supported in said magazine to engage sides of the supply of sheets in said magazine, means for retaining said gauge plates in adjusted position, and means in said magazine supported by said gauge plates for urging the sheets in the direction of said feed roller.

6. A sheet feeding mechanism including, a frame adapted for support upon a machine of the character described and having a magazine provided with a throat-like outlet, a feed roller rotatably carried in said outlet, a stripper plate cooperating with the feed roller to close said throat-like outlet and having yielding contact with said roller, means for actuating said roller, gauge plates slidably supported in said frame, means for retaining said gauge plates in adjusted position, said gauge plates having slots, a follow-up bar slidable in said slots, stack pressing members on the follow-up bar, toothed racks connected with ends of the follow-up bar, a shaft journalled in the frame, pinions on the shaft meshing with the toothed racks, means for rotating the shaft in one direction, and a spring for rotating the shaft in the opposite direction.

7. A sheet feeding mechanism including, a magazine, gauge plates slidably supported in said magazine to engage sides of the supply of sheets in said magazine, means for retaining said gauge plates in adjusted position, said gauge plates having slots, a follow-up bar slidable in said slots, stack pressing members on the follow-up bar, toothed racks connected with ends of the follow-up bar, a shaft journalled in the frame, pinions

on the shaft meshing with the toothed racks, means for rotating the shaft in one direction, and a spring for rotating the shaft in the opposite direction.

8. In a machine of the character described, a magazine including end plates for supporting sheets, a downwardly inclined bottom plate connecting the end plates, a divider member for dividing the magazine into compartments including diverging plate portions connecting the end plates, one of the plate portions cooperating with the bottom plate portion to form a throat-like outlet for one of the compartments, a lateral flange on the other of said diverging plate portions to form a bottom for the other compartment, and means for delivering sheets from one compartment to the other.

9. In a sheet feeding mechanism, a frame adapted for support upon a machine of the character described, said frame having a bottom plate portion and downwardly diverging plate portions, one of said diverging plate portions cooperating with the bottom plate portion to form a support for a supply of sheets, an outwardly extending flange on the other diverging plate portion to form a support for typewritten sheets, a feed roller rotatably carried by the frame intermediate said diverging plate portions and having engagement with one of the supply of sheets, a stripper plate having yielding contact with said roller and adapted to yield for the passage of one sheet, means for moving the stripper plate into inoperative position, means for locking said plate in inoperative position, and means for actuating said roller.

10. A sheet feeding mechanism including, a frame adapted for support upon a machine of the character described, said frame having a bottom plate portion and downwardly diverging plate portions, one of said plate portions cooperating with the bottom plate portion to form a support for holding a supply of sheets, an outwardly extending flange on the bottom of the other diverging plate portion for supporting typewritten sheets in substantially vertical position, a feed roller rotatably carried by the frame intermediate said diverging plate portion and having engagement with the lower edge of one of the supply of sheets, a stripper plate having yielding contact with said roller adapted for automatic adjustment of its position relative to the roller to pass one sheet therebetween, and means for actuating said roller to withdraw a sheet from the sheet supply for delivery to the typewritten sheet support.

ROY FRANK HALL.