Jan. 13, 1931. G. J. BARRETT 1,788,376

RIBBON FEEDING AND REVERSING MECHANISM FOR ADDING MACHINES

Original Filed Aug. 14, 1925 3 Sheets-Sheet 1

Fig. 1.

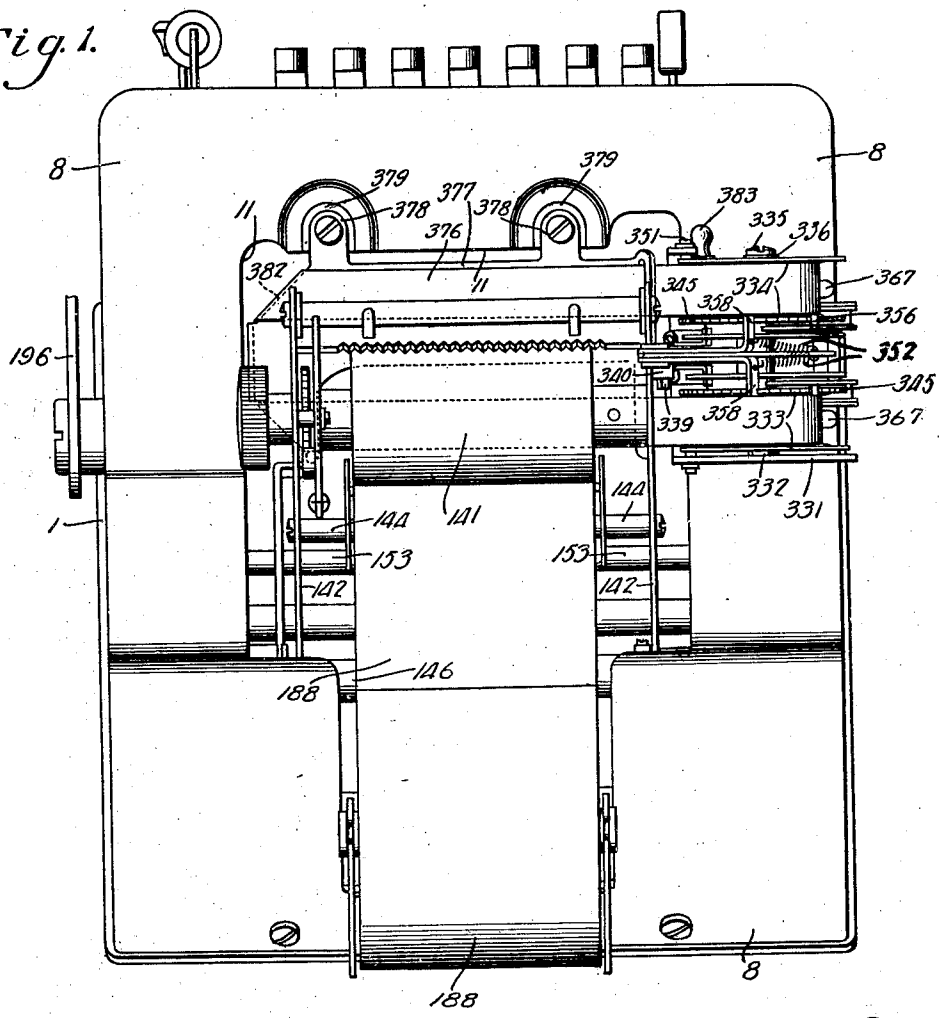


Fig. 2.

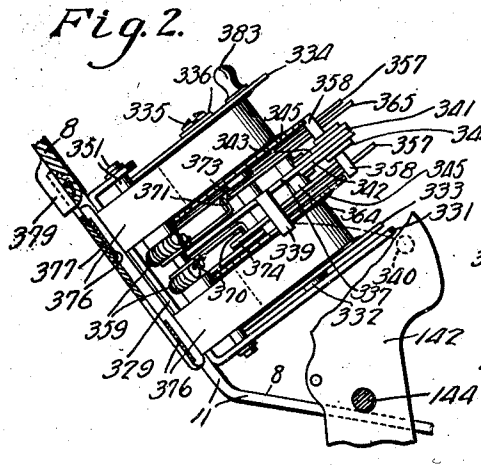
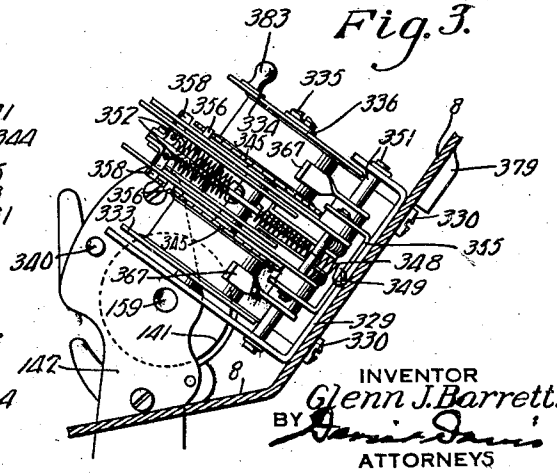


Fig. 3.



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Fig.4.

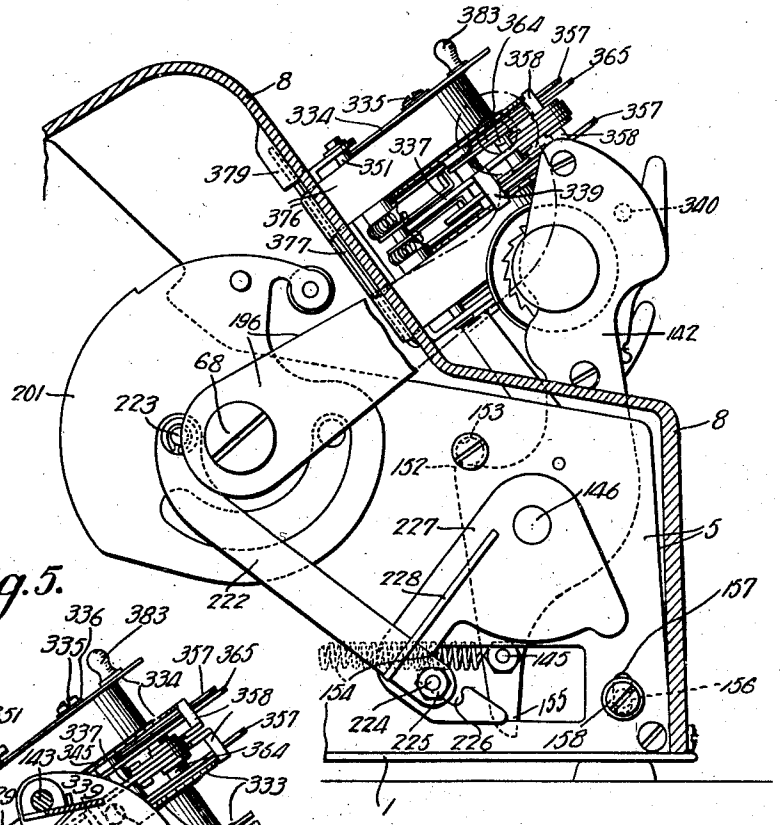


Fig.5.

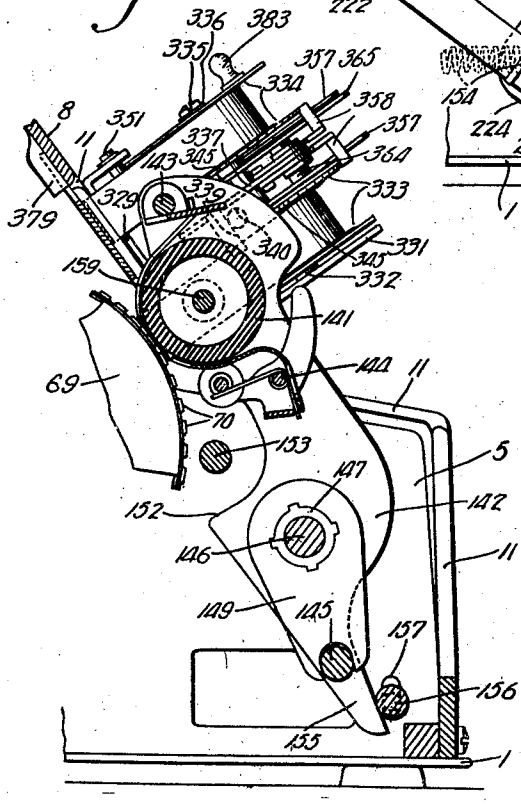
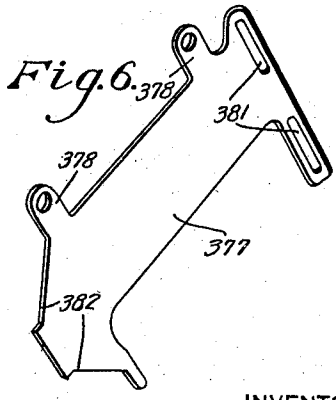


Fig.6.



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RIBBON FEEDING AND REVERSING MECHANISM FOR ADDING MACHINES

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Fig. 7.

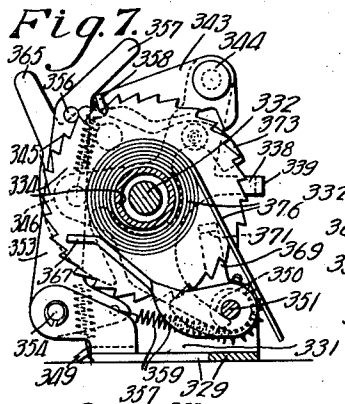


Fig. 8.

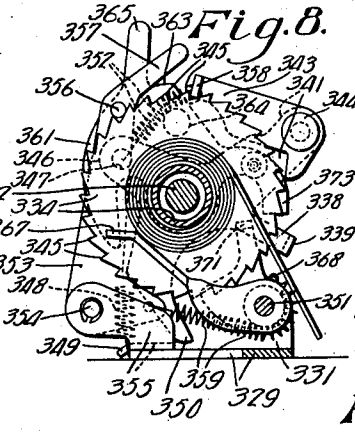


Fig. 9.

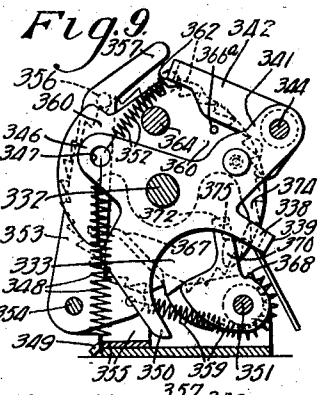


Fig. 10.

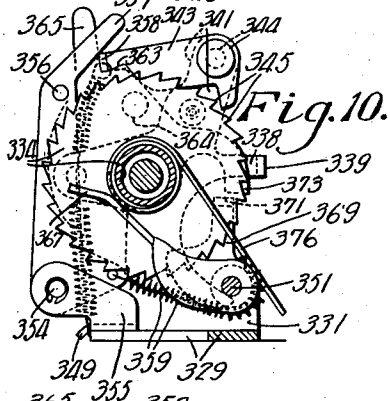


Fig. 13.

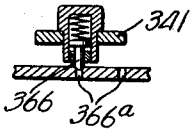


Fig. 11.

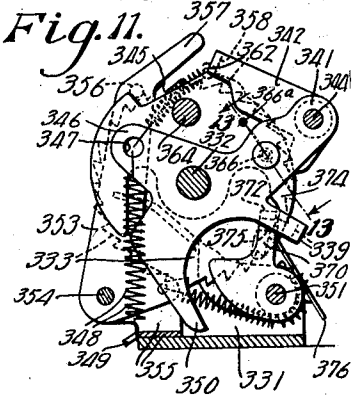


Fig. 7a

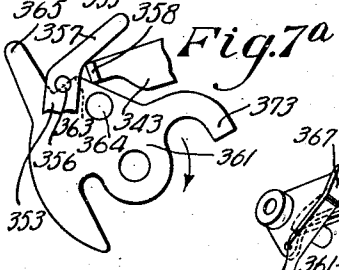


Fig. 12.

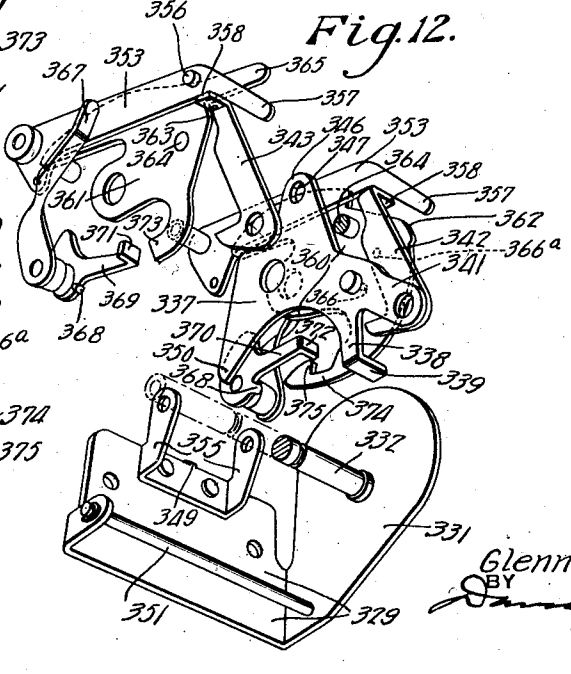
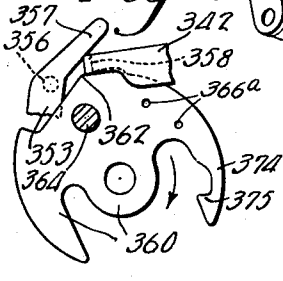


Fig. 7b



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UNITED STATES PATENT OFFICE

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RIBBON FEEDING AND REVERSING MECHANISM FOR ADDING MACHINES

Original application filed August 14, 1925, Serial No. 50,219. Divided and this application filed June 9, 1928 Serial No. 284,100.

This invention relates to improvements in listing or printing mechanism for adding machines and has for its principal objects to provide improved means for feeding and reversing the inked ribbon of the printing mechanism and to provide efficient means for feeding a reeled inked ribbon intermittently passing the impression line of the machine and pressing the same against the types at the impression line through the medium of a platen and a vibratory platen support which is controlled from the general operator of the machine to shift the platen toward and from the type at each actuation of the general operator.

To the foregoing and other ends, which will appear from the following description in detail of the preferred embodiment of the invention, the invention consists in the features of construction, arrangement of parts, and combinations of devices set forth in the specification and particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a rear view of the machine substantially perpendicular to the printing plane with the operating parts positioned as in Fig. 5;

Fig. 2 a fragmentary central longitudinal sectional view of the machine showing the ribbon mechanism in elevation as viewed from the right hand side of the machine;

Fig. 3 a fragmentary view of the machine showing the ribbon mechanism and part of the platen support in elevation as viewed from the left hand side of the machine;

Fig. 4 a vertical sectional view of the rear part of the machine casing, showing the ribbon mechanism and the platen operating mechanism in side elevation;

Fig. 5, a fragmentary vertical sectional view showing the platen in printing and ribbon feed operating position;

Fig. 6 a detail perspective view of the ribbon guiding bracket;

Fig. 7 a top plan view of the ribbon mechanism, partly broken away through the upper spool, showing the actuating arm of the dog carrier in its normal rear position and the feed-reversing mechanism in position for causing winding of the ribbon upon the upper spool;

Fig. 7[a] a detail view of the cam plate and feed dog of the upper ribbon spool in the position shown in Fig. 7;

Fig. 7[b] a detail view of the cam plate and feed dog of the lower ribbon spool in the position shown in Fig. 11;

Fig. 8 a view similar to Fig. 7 but showing the actuating arm of the dog carrier in its forward position, as at the end of the forward stroke of the operating handle of the machine, ready for effecting a feed movement of the ribbon on the return stroke;

Fig. 9 a top plan view of the ribbon mechanism with the parts above the dog carrier broken away and the dog carrier positioned as in Fig. 8;

Fig. 10 a view similar to Fig. 7 showing the reversing mechanism set to reverse the direction of feed on the next forward stroke of the actuating arm of the dog carrier to cause winding of the ribbon from the lower spool on to the upper spool;

Fig. 11 a view similar to Fig. 9 showing the reversing mechanism set to reverse the direction of feed on the return stroke of the actuating arm of the dog carrier to cause winding of the ribbon from the upper spool onto the lower spool;

Fig. 12 a perspective view of parts of the ribbon reversing mechanism and their supporting bracket detached;

Fig. 13 a detail view on the line 13—13 of Fig. 11 showing the detent means for locking the feed reversing cams to rock with the dog carrier.

This application is a division of my co-pending application, Serial No. 50,219, filed August 14, 1925, for improvements in adding machines, and only so much of the machine shown and described in said co-pending application as is necessary for a full understanding of the subject matter claimed in this divisional application will be shown and described.

The machine has a base plate 1, to which the usual rubber supporting feet may be attached. Frame side plates 5 are mounted on the base and support the working parts

of the machine, except the ribbon mechanism, which, as hereinafter described, is mounted on a cover casing 8.

Casing 8 has an open bottom to enable it to be fitted over the supporting framework and enclose most of the working parts of the machine, and said casing is held in place by screws or otherwise.

The top wall of casing 8 has an upwardly and rearwardly extending front portion and a downwardly and rearwardly extending rear portion extending to the upper end of the rear vertical wall of the casing. The downwardly and rearwardly inclined top wall portion is provided with an aperture 11 through which extends a rocking platen support mounted on the framework as hereinafter described. The types 70 of the printing segments 69 when set side by side in the printing plane face upward and rearward and are exposed through aperture 11, and the platen 141 is movable forward and downward through said aperture against said types to take an impression therefrom as shown in Fig. 5. The ribbon feeding, reversing, and guiding means are mounted on the downwardly and rearwardly extending top wall portion of casing 8.

Platen supporting means

The type 70 on the respective type segments 69 are rigidly held to the segments and face radially outward toward the rear and are adapted to be printed on by the platen 141, which is mounted for movement toward and from the type segments. The platen 141 has its shaft 159 rotatably mounted in platen frame plates 142, which are secured together by transversely extending stay rods 143, 144 and 145, to form a rocking frame, which is mounted upon a transversely extending rock shaft 146 located adjacent the rear wall of casing 8 and journalled in the frame side plates 5. The platen frame side plates 142 extend up through aperture 11 in casing 8 and may be secured to or otherwise adapted to be rocked by rocking the shaft 146, but preferably, a hub 147 is mounted on the rock shaft 146, as indicated in Fig. 5 of the drawings, and rigidly secured thereto in any suitable manner. The hub is provided with a depending arm 149 having a forked lower end engaged with the lowermost stay rod 145. The side plates 142 of the platen rocking frame are preferably provided with forwardly projecting lugs 152 adapted to engage a fixed transverse rod 153, mounted in the main frame for limiting the rearward movement of the platen under the action of a spring 154 connected at one end to the lowermost stay rod 145, the other end extending toward the front of the machine and being suitably anchored. The pendent extremities of the platen frame side plates 142 below the shaft 146 are formed as stop fingers 155, adapted to co-operate with a transversely extending stop rod 156, for limiting the movement of the platen toward the type segments under the action of the operating handle, as hereinafter described. The stop rod 156 is preferably adapted to be adjusted up and down by being mounted in vertical slots 157 in main frame side plates 5, as shown in Figs. 4 and 5, the stop rod being held in adjusted position by suitable clamping screws 158. By means of this adjustment, the pressure of the platen against the type 70 of the type segments may be regulated.

Ribbon mechanism

To provide a satisfactory ribbon mechanism for machines of this type is a difficult problem, particularly as the space is limited and it is desirable to provide not only for the satisfactory feeding of the ribbon, but also to provide for the automatic reverse of the feed, which will not require any attention on the part of the operator. I have provided a compact and simple ribbon mechanism operable by the shifting platen frame. A bracket 329 for the ribbon mechanism is mounted on the rearwardly and downwardly inclined rear portion of the top wall of the cover casing 8 at the left hand side edge of aperture 11 in the casing and secured to said portion of the casing by suitable screws 330, as indicated in Fig. 3 of the drawings. The bracket 329 is provided at its lower edge with an upwardly and rearwardly extending plate 331, provided with a rod or shaft 332, projecting laterally therefrom upwardly and forwardly and forming the axle for a pair of ribbon spools 333 and 334, which are held in place thereon by suitably spaced sealing clips (not shown) and a screw 335, threaded in the end of the axle rod 332 and cooperating with a washer 336.

The ribbon spools 333 and 334 are spaced apart on the axle 332, and pivotally mounted therebetween on said axle is a ribbon feed dog-rocker 337 provided with a laterally projecting rock-arm 338. The rock-arm 338 is provided with an ear 339 adapted to be engaged and rocked forward by a pin or stud 340, projecting from the left hand platen-rocking frame plate 142, to rock the dog rocker about axle 332 to the position shown in Figs. 8, 9 and 11 from its normal position shown in Figs. 7 and 10. A rearwardly projecting ear 341 on the dog rocker is provided with two feed dogs 342 and 343, pivotally mounted thereon on a stud 344, the feed dogs being adapted to cooperate with ratchet teeth 345, formed on the peripheries of adjacent spool flanges of the ribbon spools 333 and 334. The dog rocker 337 is provided with an arm 346 projecting laterally outward and provided with a hole 347 in the end thereof, in which one end of a dog-rocker return spring

348 is secured. The opposite end of the spring 348 is secured to a laterally projecting lug 349 on the base of a small bracket 355 secured to the base of bracket 329, as indicated in Figs. 7 and 11. The dog-rocker return spring 348 is adapted to restore the dog rocker to normal position, shown in Fig. 7 after it has been moved or rocked to the position shown in Fig. 8 by engagement of the pin 340 on the platen-rocking frame with the dog rocker ear 339. The dog rocker 337 is further provided with a stop finger 350 adapted to engage a rod 351 held to bracket 329 parallel with axle rod 332 to thereby limit the return movement of the dog rocker under the action of the spring 348. The noses 358 of dogs 342 and 343 are adapted to be urged toward the ratchet teeth 345 of the respective ribbon spools by means of springs 352 connected to the respective dogs and to the dog rocker arm 346 in the hole 347, as indicated in Figs. 1, 3, 8 and 9.

Detent dogs 353 are pivotally mounted on a rod 354 mounted in the ears of the small bracket 355, secured to the main ribbon supporting bracket 329, the detent dogs being formed with laterally projecting pins 356, adapted to cooperate with the ratchet teeth 345 of the respective ribbon spools 333 and 334. Obviously, in feeding the ribbon in one direction or the other, only one of the feed pawls 342 or 343 will be in operation at a time, and the ribbon spool not being fed by its feed dog should be left free for independent rotation as the ribbon is unreeled therefrom by the action of the feed dog of the other spool on its spool. Therefore, the detent dogs 353 are provided with overhanging ends 357 adapted to lie above the laterally bent noses 358 of the respective feed dogs 342 and 343, so that when the feed dog of either spool is lifted out of operative relation with the teeth of the corresponding ribbon spool, the detent dog 353 associated therewith will also be lifted out of the field of the ratchet teeth, when the dog-rocker is in its normal or at rest position, as shown in Fig. 10. The detent dogs 353 are preferably resiliently held in cooperative relation with the feed dogs and ratchet teeth of the respective ribbon spools by means of suitable springs 359 connecting the detent dogs with ribbon followers of the automatic feed reversing means as hereinafter described.

In order to provide means for holding one or the other of the ribbon feed dogs 342—343 out of operative engagement with its corresponding ribbon spool, a pair of cam plates 360 and 361 are mounted upon the axle 332, one on each side of the dog rocker 337.

The cam plate 360 is provided with a cam edge 362 having a dwell portion at one end and cooperating with the nose 358 of the feed dog 342, while the cam plate 361 is provided with a cam edge 363 having a dwell portion at one end and cooperating with the bent end 358 of the feed dog 343. The two cam plates 360 and 361 are rigidly secured together by a tie rod 364, so that when cam plate 361 is moved about axle 332 by means of an outwardly projecting manual ribbon-reversing finger piece 365, formed as part thereof, the other cam plate 360 will also be moved, and the arrangement is such that when the cam edge 363 is moved under its dog, the cam edge 362 will be moved out from under its dog, thereby permitting the latter to operate in the ratchet teeth 345 of its ribbon spool, for feeding action of the ribbon, when the dog rocker 357 is operated.

Obviously the cam plates 360 and 361 should rock with the dog rocker 337, in order to maintain one of the feed dogs 342 and 343 in operative position and the other feed dog in inoperative position and, therefore, a detent, operating between the cam plates and the dog rocker 337, is provided consisting of a spring pressed pin 366 in the dog rocker 337, cooperating with two positioning holes 366ª, located in the cam plate 360. When the cam plates of the duplex cam, are in the positions shown in Figs. 7, 7ª and 7ᵇ the dwell of cam edge 362 is under the nose 358 of the dog 342, and the nose of said dog 342 and the detent pin 356 of the corresponding detent dog 353 are held out of co-operative relation with the ratchet teeth 345 of the ribbon spool 333. The nose 358 of the dog 343 is released from the dwell portion 363 of the cam 361 and is in engagement with the ratchet teeth 345 of the ribbon spool 334 and the detent pin 356 of the corresponding detent dog 353 is in engagement with its associated ratchet teeth 345. With the parts in these positions the ribbon 376 will be wound on the upper spool 334. When the cam plates are shifted in the direction indicated by the arrows in Figs. 7ª and 7ᵇ, to the position shown in Fig. 10, the dwell of cam edge 363 is engaged under the nose 358 of dog 343 and holds the nose of said feed dog and the detent pin 356 of its corresponding detent dog 353 out of operative relation with the ratchet teeth 345 of the upper spool 334. The dwell portion 362 of cam plate 360 will be moved away from the nose of dog 342 and said nose will engage its associated ratchet teeth. With the parts in this shifted position the ribbon 376 will be wound on the lower spool 333. The feeding or spool-rotating action of the dog rocker 337 always takes place under the action of the dog-rocker return spring 348 upon the return movement of the platen-rocking frame, the return movement of the dog-rocker being limited by engagement of the finger 350 with the shaft 351. The ribbon spool associated with the inactive feed dog is always the let-off spool and the ribbon spool associated with the active feed dog is the take-up spool. When the dog carry-

ing lever is actuated, the active detent pin 356 holds the ratchet of the take-up spool against rotation in let-off direction, but permits it to rotate under the action of the feed dog in take-up direction. The inactive detent pin 356 drops into engagement with its associated ratchet teeth after the dog carrying lever has been moved slightly and thereby locks the let-off spool against movement in let-off direction. On the return movement of the dog carrying lever the active feed dog immediately acts upon the take-up spool and starts its rotation to take up the ribbon. During the first part of this movement the active detent is in engagement with the let-off spool and locks said spool against movement in let-off direction. This permits the take-up spool to take in any slack in the ribbon between the spools before the let-off spool is released. When the inactive feed dog engages the inactive detent dog upon the return movement of the dog carrying lever, the let-off spool is released and the take-up spool may thereafter draw the ribbon from the let-off spool. This ensures a tight ribbon through the ribbon guide and between the two ribbon spools. If there is any slack in the ribbon between the two spools there will be very slight, if any, movement of the let-off spool until after all of the slack has been taken up.

An automatic ribbon reverse is an exceedingly desirable feature, in machines of this character, for the machine may be operated indefinitely without requiring the operator to watch the ribbon and reverse the feed thereof when necessary. Therefore, in connection with my improved ribbon feed mechanism, I have provided an automatic reverse, which comprises means for automatically shifting the cam plates 360 and 361, through the medium of the dog rocker operated by the platen-rocking frame.

For this purpose, ribbon-following fingers 367 are pivotally mounted on the shaft 351, and the spring 359, previously referred to as connected with the detent dogs 353, are secured to lugs 368 on the hubs of the ribbon-following fingers so as to resiliently hold the respective following fingers in contact with the reeled ribbon on the ribbon spools. In this manner, the following fingers 367 are adapted to move toward and from the spool centers as the reeled portion of the ribbon on the respective spools decreases or increases in diameter, and this motion of the following fingers is utilized for moving ribbon reverse dogs 369 and 370 respectively carried on the hubs of the following fingers of the upper and lower spools and provided respectively with oppositely extending ears 371 and 372. The cam plates 360 and 361 are provided with operating fingers 374 and 373 respectively adapted to cooperate with the ears 371 and 372, when the latter are thrown into the paths thereof by movement toward the center of the spools of the associated following fingers 367. As will be seen in Fig. 12, the cam operating finger 373 is provided with a squared end, adapted to abut against the ear 371 when said ear is moved outward in its path, as shown in Fig. 10, while the cam finger 374 is provided with a hook end 375 adapted to hook under the ear 372 when said ear is thrown outward into its path, as shown in Fig. 11.

It will be recalled that the rigidly connected cam plates 360 and 361, carrying the respective operating fingers 374 and 373, are yieldably locked to rock with the dog rocker 337, each time the dog rocker is operated by the pin 340 on the platen-rocking frame. Hence, when the automatic reversing mechanism is set by substantial exhaustion of the ribbon from the upper spool 334 in the position shown in Fig. 10, with the ear 371 moved outward so as to lie in front of the end of the finger 373 of cam plate 361, the parts are in position to reverse the feed when the rock arm 338 is operated by the pin 340. When the dog rocker 337 is rocked by the pin 340 it will move as usual to the position shown in Fig. 8 but the cam plates 360 and 361 will be prevented from moving therewith at this time by the engagement of the operating finger 373 with the dog ear 371; thus the cam plates will be shifted relatively to the dog rocker and dogs and the cam 362 will be brought into the position shown in Fig. 9 to lift the feed dog 342 upon the dwell of cam edge 362, thereby preventing further rotation of the ribbon spool 333 by said dog, while the cam edge 363 of cam 361 will be withdrawn from support of the dog 343 and the latter, under the pull of its spring 352, will be brought into feeding relation with the corresponding ratchet teeth 345 of its ribbon spool 334, as indicated in Figs. 7 and 8. When the following finger 367 of the spool 333 reaches the position shown in Fig. 11, that is, when the spool becomes nearly empty, the corresponding dog 370 is moved outward to bring its ear 372 into the throat of hook 375 of the operating finger 374 carried by the cam plate 360, as shown, so that, upon the return movement of the dog rocker 337 from the position shown in Fig. 11, the spring 348 will restore the dog rocker to normal position, but the dog ear 372 will hold the cam plates 360 and 361 from movement with the dog rocker at this time, thereby shifting the relative position of the cams and dog rocker and placing the dwell of cam edge 363 under the nose of the dog 343, thus lifting the latter, and its cooperating detent dog 353, out of cooperative relation with the corresponding ratchet teeth 345 of the spool 334 while cam edge 362 will be withdrawn from the nose of dog 342 to permit the said dog and its de-

tent to cooperate with the teeth of spool 333 and thereby again reverse the feed.

The ribbon 376 is carried between the respective ribbon spools over a ribbon guide plate 377, which is mounted, by means of ears 378, on the rearwardly and downwardly slanting portion of the cover casing 8, as shown in Fig. 1, the ears 378 being located in depressions 379 in the cover casing at the horizontal upper edge of the opening 11 therein. The ribbon guide 377 is secured to the casing 8 by suitable screws which pass through the ears 378, so as to lie across the upper part of aperture 11 in a plane parallel to the printing plane of the types 70 on type segments 69 when at the printing line. The ribbon 376 is adapted to pass through two aligned slots 381 at the left hand end of the guide plate and over two right angle direction changing edges 382 at the right hand end of said plate so that the ribbon will pass from one spool to the other and lie in parallel bands extending from the spools over the ribbon guide across the aperture 11, the lower band of the ribbon passing over the printing line of the types, so that it is adapted to be between set types and the paper when the platen is moved forward in the printing operation. The upper ribbon spool 334 of the ribbon mechanism is preferably provided with a small knob 383 for manually winding the ribbon, when it is necessary to do so, for instance, in taking out an old ribbon and putting in a new one.

Platen support operating means

The cam disk 201 which operates the shiftable supporting frame for the accumulator of the machine (as fully described in application, Serial Number 50,219), is also utilized for operating the rocking platen-supporting frame for moving the platen toward and from the type segments in the printing operation. For this purpose, a link or pitman 222 is pivotally mounted on a stud 223 carried by the cam disk 201 and normally located forward of the axis of rotation of the main or handle shaft 68 on which the disc is fixed, as indicated in Fig. 4, the link normally extending downward and rearward from said stud at such an angle that the disc and link have a toggle action which brings the pivot 223 substantially into a straight line between the shaft 68 and the rear end of the link when the handle is at the forward end of its stroke. The rear end of the pitman or link 222 is provided with a laterally and inwardly projecting stud 224, preferably mounted for slight adjustment and secured in place by a lock nut 225. The inwardly projecting end of stud 224 is adapted to normally ride in an elongated notch or open top slot 226 in the lower extremity of a crank arm 227, secured to the outer end of the platen frame rock shaft 146, the arrangement being that there is a certain amount of lost motion during the first part of the forward stroke of the handle 196, before the stud 224 will engage the rear end of the open slot 226 and rock the platen frame to swing the platen toward the printing point. The toggle action, of the disk and link, near the end of the forward stroke of handle 196, as the pivot 223 brings the link or pitman to dead center, will force the platen against the type segments for pressure printing upon the paper strip 188 of those numeral types on the segments that stand at the printing line. The amount of pressure required for printing varies with the number of segments to be printed from, and the adjustment of the stud 224 is adapted to be made according to the pressure required. It has been previously pointed out, however, that in order to positively limit the movement of the platen against the type segments, the lower extremities 155 of the platen rock frame are adapted to engage the transversely extending stop rod 156 to thereby prevent excessive pressure when only a few type segments are to be printed from. The link or pitman 222 and its stud 224 are preferably held in proper relation with the open slot 226 in the crank arm 227, by a vertically slotted bracket plate 228 secured to the side of the crank arm 227, the slot being elongated to allow upward movement of the rear end of the link. On the return stroke of the operating handle 196 the platen-frame restoring spring 154 returns the platen and its frame to normal position and holds it there as hereinbefore described.

It is frequently desirable in machines of this type to operate the machine without printing the numbers, and this is usually effected by providing a special mechanism operated or controlled by a non-print key. In the present instance it will be seen that if the stud 224 at the end of the abutment or line 222 is lifted out of the open slot 226 the rock arm 227 will not be operated on the forward stroke of the handle and, hence, the platen will not be moved forward for printing. In my co-pending application, Serial No. 50,219 this non-print mechanism and the key for operating it is fully shown and described. Obviously one advantage of operating the ribbon feeding mechanism by means of the platen-rocking frame 142, is that, when the non-print key is depressed to eliminate the printing of a number by preventing rocking of the platen frame, operations of the ribbon feeding mechanism are automatically eliminated at the same time.

What I claim is:

1. In a key set adding and listing machine the combination of a main frame, a general operator for the machine, types adapted to be set in a printing plane, a casing for the machine having a top wall the rear portion of which extends downward and rearward and

is provided with an aperture through which types in the printing plane are exposed, a platen located above the lower part of said aperture and movable therethrough against types in the printing plane, an inked ribbon feeding mechanism mounted on the downward and rearward extending top wall portion of the casing adjacent one side of said aperture, a ribbon guide mounted on said top wall portion of the casing above said aperture and projecting over said aperture for supporting a portion of the ribbon over the printing plane of the types and in a plane substantially parallel with the printing plane, a rocking support mounted on the main frame and extending up through said aperture and in which the platen is journalled, means operable from the general operator for rocking said support to swing the platen forward and downward through said aperture against types in the printing plane, and means for actuating the ribbon feeding mechanism from the rocking platen support.

2. In an adding and listing machine, numeral types, a platen, a shiftable support on which the platen is mounted, means for shifting said support to move the platen to and from the type for taking an impression therefrom, an axle mounted independently of the platen support, a pair of ribbon spools rotatably mounted on said axle, means for guiding a ribbon between said spools between the platen and the impression taking position of the types, said spools having ratchet teeth thereon, a dog-carrying lever pivotally mounted on said axle between the spools, a pair of feed dogs pivoted on said lever for cooperation with the ratchet teeth of different spools to turn the spools, means for holding one dog out of action when the other dog is operable on the teeth of its associated spool, said dog-carrying lever being movable in one direction by the platen support, a spring for restoring said lever, and stop means determining the normal position of the lever.

3. An adding and listing machine as claimed in claim 2, wherein the means for holding one feed dog at a time out of action comprises a duplex cam rotatably mounted on the axle rod having two rigidly connected cam members effective on the respective feed dogs to hold one dog out of action and permit the other dog to act, and a spring detent device for releasably holding the duplex cam to the dog carrier in either of two feed-reversing positions to rock with the dog carrier.

4. An adding and listing machine as claimed in claim 2, wherein the means for holding one feed dog at a time out of action comprises a duplex cam rotatably mounted on the axle rod having two rigidly connected cam members effective on the respective feed dogs to hold one dog out of action and permit the other dog to act, a spring detent device for releasably holding the duplex cam to the dog carrier in either of two feed-reversing positions to rock with the dog carrier, and means are provided settable by the ribbon upon exhaustion of the ribbon from a spool for shifting the duplex cam relatively to the dog rocker between said feed-reversing positions upon actuation of the dog carrier.

5. An adding and listing machine as claimed in claim 2, wherein detent dogs associated with the respective spool ratchets are provided, each of said detent dogs being held by its associated feed dog out of action when the feed dog is held out of action and in its at-rest position.

6. An adding and listing machine as claimed in claim 2, wherein the means for holding one feed dog at a time out of action comprises a duplex cam rotatably mounted on the axle rod having two rigidly connected cam members effective on the respective feed dogs to hold one dog out of action and permit the other dog to act, a spring detent device for releasably holding the duplex cam to the dog carrier in either of two feed-reversing positions to rock with the dog carrier, and two pivotally mounted devices one for each ribbon spool, each of said devices being provided with one arm adapted to bear on the ribbon roll of its associated ribbon spool and with another arm adapted to swing into the path of an arm on one member of the duplex cam when the ribbon is exhausted from said spool, whereby the actuation of the dog carrier when the ribbon is exhausted from one spool will cause a relative movement between the duplex cam and the dog carrier and thereby reverse the feed of the ribbon.

7. An adding and listing machine as claimed in claim 2, wherein the means for holding one feed dog at a time out of action comprises a duplex cam rotatably mounted on the axle rod having two rigidly connected cam members effective on the respective feed dogs to hold one dog out of action and permit the other dog to act, a spring detent device for releasably holding the duplex cam to the dog carrier in either of two feed-reversing positions to rock with the dog carrier, and two pivotally mounted devices one for each ribbon spool, each of said devices being provided with an arm adapted to bear on the ribbon roll of its associated ribbon spool and with another arm adapted to swing into the path of an arm on one member of the duplex cam when the ribbon is exhausted from said spool, whereby the actuation of the dog carrier when the ribbon is exhausted from one spool will cause a relative movement between the duplex cam and the dog carrier and thereby reverse the feed of the ribbon, one of said devices operating to effect relative movements between the dog carrier and the duplex cam upon the actuation of the dog carrier in one direction and the other operating when the

dog carrier is moved in the opposite direction to effect the feed reversing operation.

8. In an adding and listing machine, numeral types, a platen, a shiftable support on which the platen is mounted, means for shifting said support to move the platen to and from the type for taking an impression therefrom, an axle mounted independently of the platen support, a pair of ribbon spools rotatably mounted on said axle, means for guiding a ribbon between said spools between the platen and the impression taking position of the types, said spools having ratchet teeth thereon, a dog-carrying lever pivotally mounted on said axle between the spools, a pair of feed dogs pivoted on said lever for cooperation with the ratchet teeth of different spools to turn the spools, means for holding one dog out of action when the other dog is operable on the teeth of its associated spool, said dog-carrying lever being movable in one direction by the platen support, a spring for restoring said lever, stop means determining the normal position of the lever, means to lock the let-off spool from movement in let-off direction, and means to release said lock after the take-up spool has made a part of its take up movement.

9. In an adding and listing machine, the combination of a general operator, a platen, a platen support shiftable by the general operator to and from an impression-taking position, types adapted to be engaged by the platen when the platen support is shifted into impression-taking position, means for feeding an inked ribbon between the impression-taking plane of the types and the platen operable by shifting movement of the platen support; and a feed reversing means settable by the ribbon for actuation by shifting movements of the platen support.

10. In an adding and listing machine, numeral types adapted to be set for printing, a platen, a shiftable support on which the platen is mounted, means for shifting the support to move the platen to and from set types for taking an impression therefrom, means mounted independently of the platen support and operable by the shifting movements thereof for feeding an inked ribbon between the platen and the impression-taking position of the types, and ribbon-controlled feed reversing means adapted to be set in operative position in the path of a part of the ribbon feed means by the exhaustion of the ribbon from one of the ribbon spools, whereby the operation of the ribbon feeding means by the shifting movement of the platen support will operate the ribbon reversing means when said means is set in operative position by the exhaustion of the ribbon from one ribbon spool.

11. In an adding and listing machine, numeral types adapted to be set for printing; a platen, a shiftable support on which the platen is mounted, means for shifting the support to move the platen to and from set types for taking an impression therefrom; a pair of ribbon feed dogs; means mounted independently of the platen support and operable by the shifting movements of the platen support for actuating the feed dogs to feed an inked ribbon between the platen and the impression taking position of the types; a ribbon-following finger for each ribbon spool adapted to move toward and from the spool center as the reeled portion of the ribbon on the spool increases or decreases in diameter; a ribbon reverse dog connected to and movable with each following finger and adapted to be set in operative position by the exhaustion of the ribbon from its associated ribbon spool; and a feed dog-positioning cam for each ribbon feed dog, rockable with the ribbon feed mechanism and adapted to be brought into engagement with the set ribbon reverse dog when the ribbon feed mechanism is operated by the shiftable platen support, to thereby reverse the position of the ribbon feed dog.

12. An adding and listing machine as claimed in claim 2, combined with a detent dog associated with each spool ratchet and adapted to be engaged by and swung outwardly away from its associated spool ratchet by its cooperating feed dog when said feed dog is moved out of the path of the ratchet teeth; a rockable duplex cam having two members engaged with the feed dogs and adapted to move one of said dogs into engagement with its spool ratchet and to move the other feed dog out of engagement with its associated ratchet when the duplex cam is rocked in one direction, and to reverse the positions of the feed dogs when rocked in the opposite direction, whereby the inactive detent dog will be free to engage its associated ratchet after the dog carrying lever has made a partial movement under the action of the shiftable platen support and whereby upon return movement of the dog carrying lever the active feed dog will slightly move the take-up spool before the inactive feed dog moves the detent from the let-off spool.

In testimony whereof I hereunto affix my signature.

GLENN J. BARRETT.