March 1, 1927. 1,619,013

F. H. ARMSTRONG

TYPEWRITING MACHINE

Filed April 23, 1925 2 Sheets-Sheet 1

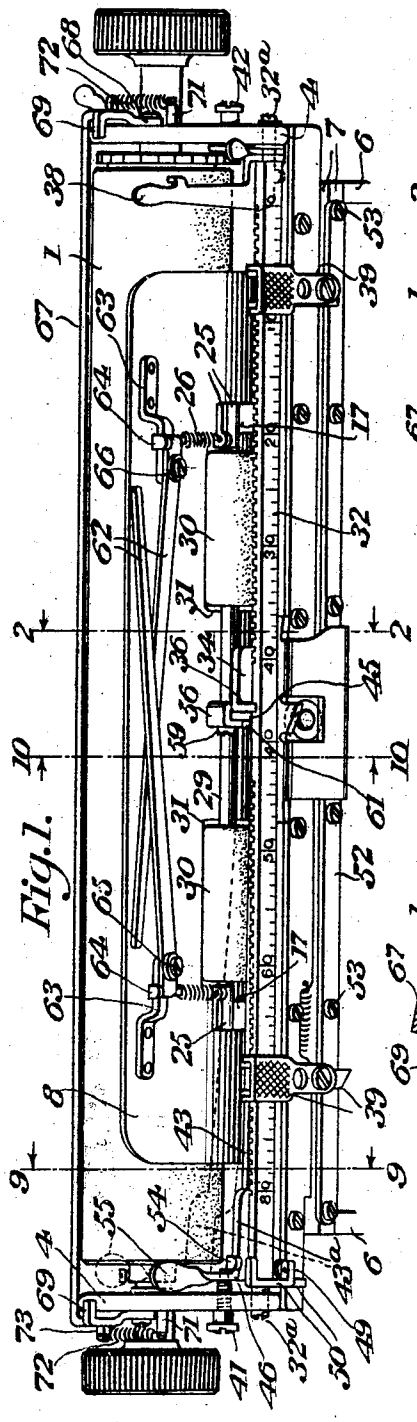


Fig. 1.

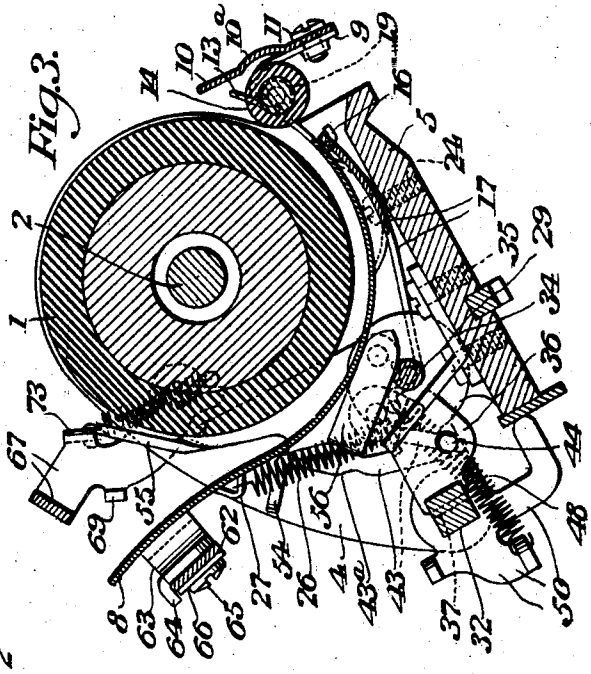


Fig. 3.

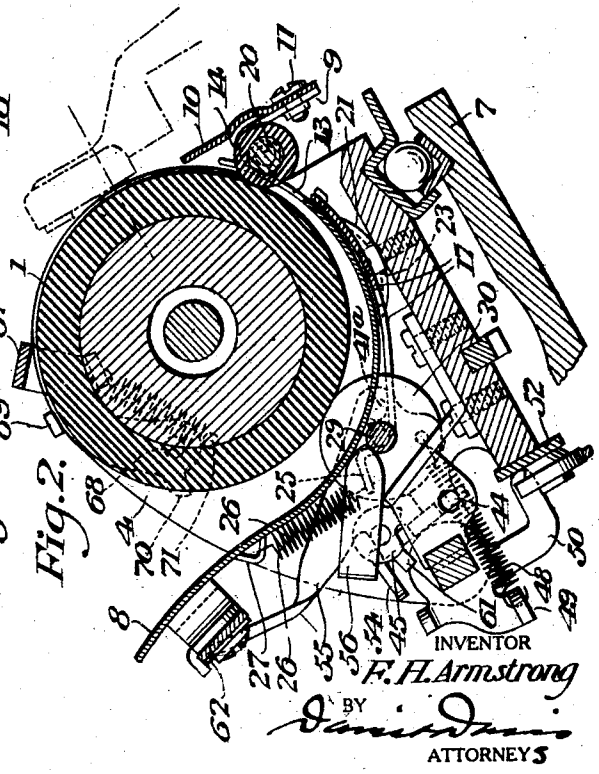


Fig. 2.

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Fig.4.

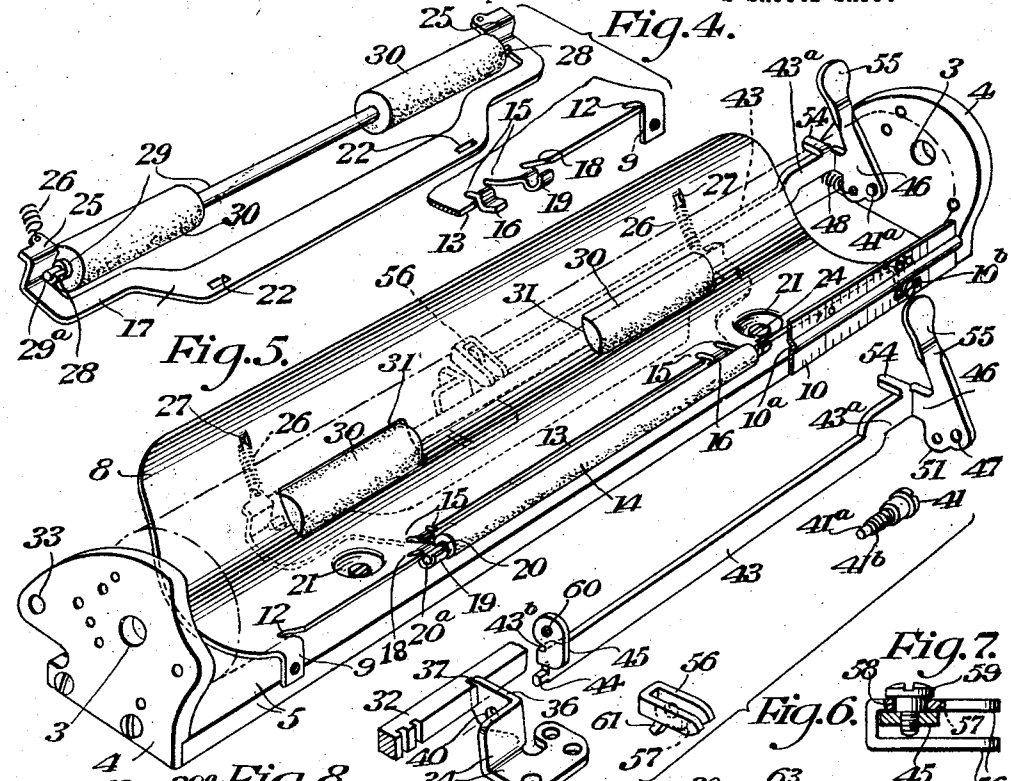


Fig.5.

Fig.6.

Fig.7.

Fig.8.

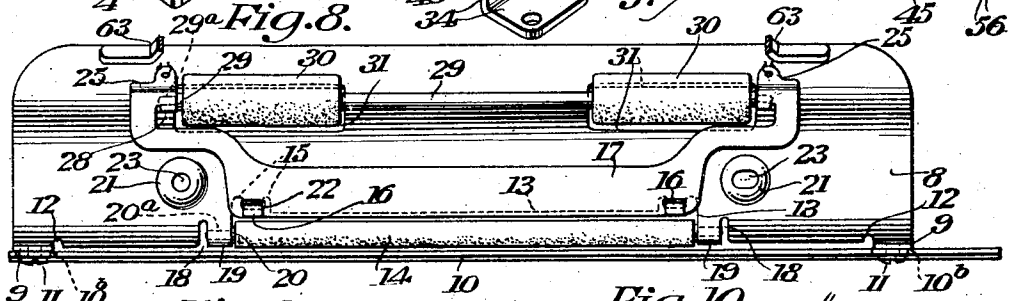


Fig.9

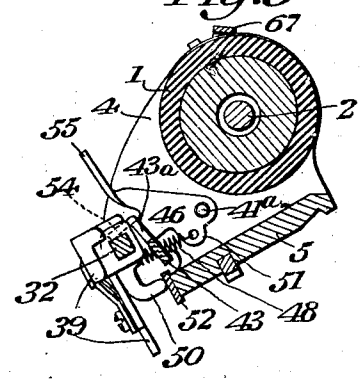
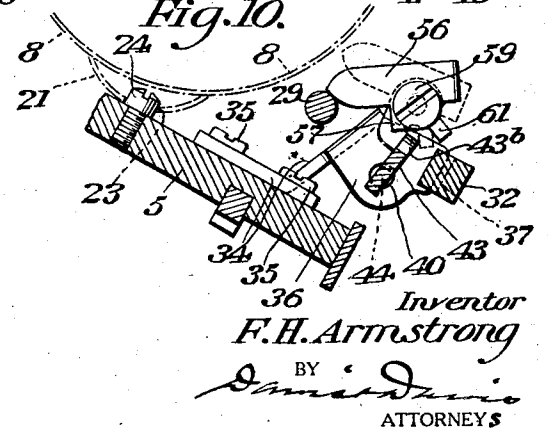


Fig.10.



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Patented Mar. 1, 1927. 1,619,013

UNITED STATES PATENT OFFICE.

FRANK H. ARMSTRONG, OF AUBURN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO L C SMITH & CORONA TYPEWRITERS INC., OF SYRACUSE, NEW YORK, A CORPORATION OF NEW YORK.

TYPEWRITING MACHINE.

Application filed April 23, 1925. Serial No. 25,277.

This invention relates to improvements in typewriting machines, and more particularly to means for feeding supporting and guiding paper or work sheets in such machines and assisting the operator to properly adjust the same with relation to the printing line and to obtain desired side register thereof with relation to the platen.

The invention has for its objects to provide a paper feed mechanism of particularly simple and compact construction especially adapted for use in a portable typewriting machine; to provide simple and inexpensive means for yieldably supporting front and rear feed rolls in cooperative relation with a platen in such manner that the front and rear rolls may move toward and from the platen either independently or together to compensate for inequalities in the platen surface or varying thickness of the work sheet or sheets; to provide a simple and efficient device for casting off feed rolls mounted on independently movable supports; to provide a simple, efficient, inexpensive and compact construction, mounting, and arrangement of paper table, tandem feed rolls and paper scale for typewriting machines; to provide an arrangement and mounting of the paper table, scale and feed rolls whereby they may be shifted by a single cam to completely free the work; and to provide an improved cast off mechanism of simple and inexpensive construction for casting off and locking off the paper feed devices.

Other objects and advantages will appear from the following description in detail of the preferred embodiment of the invention illustrated in the accompanying drawings.

In the drawings,

Fig. 1 is a fragmentary rear view of a portable typewriting machine showing the improvements;

Fig. 2 a section on the line 2—2 of Fig. 1, the parts being in normal or paper feeding position;

Fig. 3 a section similar to Fig. 2, the parts being in cast off or paper releasing position;

Fig. 4 a detail perspective view showing the rear roll support and a part of the paper table detached;

Fig. 5 a perspective view of the platen carriage, the platen being removed;

Fig. 6 a detail view showing parts of the cast off means and the supporting means therefor in perspective and detached;

Fig. 7 a detail view showing the cast-off cam or wedge and its pivotal mounting on the cast-off crank shaft;

Fig. 8 a bottom plan view showing the paper table, scale, feed rolls, and feed roll mounting;

Fig. 9 a section on the line 9—9 of Fig. 1 showing the cast-off shaft rocked back to the limit of its movement and arrested by the margin stop bar; and

Fig. 10 a detail section on the line 10—10 of Fig. 1, showing in dotted lines how upward swinging of the wedge out of operative relation with the table and rear roll shaft is prevented.

The improvements are shown embodied in a three-quarter or semi-front strike typewriting machine, i. e. a machine in which the type strike on the upper front quarter of the platen, but may be embodied in other styles of writing machines. Only so much of the machine as is necessary to a full understanding of the invention is illustrated and described.

The platen roll 1 is held on a platen shaft 2 extending through and journalled in bearings 3 in the end plates 4 of the platen carriage. The carriage comprises said end plates 4 and a flat base plate 5 to the ends of which the end plates are secured. The platen carriage is supported in a downwardly and rearwardly tilted position with respect to the main frame 6 of the machine to travel transversely of the machine on a carriage bed 7 also disposed in a downwardly and rearwardly inclined plane, suitable antifriction bearings being provided for the carriage as shown.

The particular machine to which the improvements are shown applied is more fully illustrated in the copending application of A. B. Ely, Case No. 193, and the platen is rotatable for line spacing by the means shown and described in said application. The present improvements comprise means for supporting feeding, aligning and guiding the work or sheets of paper and for releasing the work.

A paper supporting and guiding table 8 formed of stiff sheet metal extends partly around the platen roll, said table being preferably reversely curved as shown. The con-

cave forward portion of the table is normally disposed eccentrically to the lower portion of the platen, as shown in Fig. 2, the forward edge of the table being close to the front of the platen and slightly below the axis of the platen, and said concave portion extending under the platen and up behind the same to a horizontal line above the bottom line of the platen and below the platen axis and gradually diverging from the platen from its front edge to said line from which it extends in a reverse curve to its rear edge which lies in a horizontal plane above the platen axis to form a slightly convex and conveniently accessible work-introducing table section, well spaced from the rear of the platen.

The paper table is provided with a pair of flat lugs 9 at opposite ends thereof extending downwardly and forwardly from the front edge of the table and normally lying in a transverse plane substantially at a right angle to the plane of the carriage base plate. A sheet metal scale bar 10 is secured adjacent its lower edge against the front faces of lugs 9 by screws 11 said bar consisting of a thin flat sheet metal strip provided with a longitudinal stiffening corrugation 10^a and having its upper edge lying close to the front of the platen roll below the printing line and well above and preferably overhanging the forward edge of the table. The shanks of screws 11 extend through longitudinal slots 10^b in the scale bar and are screwed into threaded bosses formed up from lugs 9, so that the scale bar may be adjusted longitudinally to position its graduations properly with respect to the printing point of the machine. The table is slit rearward at 12 at the inner edge of each lug 9, so that the lugs may be independently adjusted bodily up or down by permanently bending the parts of the table directly back of the lugs, and said lugs are permanently bendable bodily backward or forward, these adjustments permitting proper positioning of the scale bar with respect to the platen and table and the printing line of the machine, so that the scale will assist in guiding the work to the printing line and may be employed to align the work with the printing line as well as transversely of the machine.

The table is cut away slightly along its forward edge for about one half its length to provide a clearance recess 13 for a long front feed roll 14, said recess and roll terminating about midway between the fore-and-aft center line of the table and the end edges of said table. Two pairs of short slots 15 extend rearwardly from the forward edge of the recessed portion of the table at opposite ends of the recess 13 and a pair of angular or hook-like bearing or pivot lugs 16 depend below the table from the forward ends of the tongues thus formed. Each lug 16 extends downward and forward and then upward and forward from its supporting tongue to form an upwardly facing open bearing for a pivoted roll shaft supporting frame 17 hereinafter described. A short distance beyond the ends of recess 13 the table is slotted rearwardly a short distance at 18 to form a pair of tongues from the forward ends of which depend arcuate upwardly-facing hook lugs or semi-cylindrical opening shaft bearing members 19. The front feed roll is of relatively small diameter and formed of rubber, and is secured on a metal shaft 20 which is reduced at its ends beyond the rolls to form journals 20^a removably fitting in the open bearings or hook lugs 19 and shoulders at the inner ends of said journals adapted to engage the inner edges of the bearing lugs 19 to prevent substantial endwise movements of said shaft. The tongues connecting the lugs 16 and 19 with the body of the table are permanently bendable up and down to adjust the bearings of the rear roll shaft frame and the front roll shaft.

The pivoted yoke-like frame 17 is formed of a single piece of stiff sheet metal, the side arms of the frame extending rearward and outward from a transverse connecting bar to clear a pair of rounded fulcrum bosses 21 pressed downward from the paper table, said arms terminating at points outside of the fore-and-aft planes of bearings 16. The connecting bar lies under the table just back of recess 13 and is provided near its ends with pivot slots or apertures 22 through which the lugs 16 extend. The metal of the bar and arms is disposed flatwise so as to occupy little space and said arms and preferably also the bar are slightly permanently bowed from front to rear to conform somewhat to the curvature of the concave portion of the table under which they lie but permit the yoke-like frame to have a swinging movement about its pivots toward and from the table.

The bosses 21 are provided with central apertures 23 at the bottom thereof through which project the upwardly projecting elongated cylindrical heads of retaining or pivot screws 24 screwed into the base plate of the carriage under the platen roll. The table bosses rest on the base plate of the carriage and are adapted to rock thereon fore-and-aft of the carriage about the screw heads which have a slightly loose fit in apertures 23. One of the apertures is elongated transversely of the table to permit engagement of the table with the screw heads notwithstanding slight inaccuracies in the manufacture of the parts. The bosses 21 are disposed nearer the ends of the table than the ends of the transverse bar of the frame 17 and in a transverse line substantially back

of the transverse line of the pivots of said frame.

The side arms of frame 17 are bent upwardly for a short distance at a point well back of the fulcrum of the table and underneath the platen well back of the vertical plane of the platen axis and then extend rearward and downward a short distance, thus forming angular lugs 25 at the free ends of said arms. The rear ends of lugs 25 are connected by a pair of strong and constantly tensioned coiled springs 26 with a pair of eyes 27 stamped rearward from the paper table at a point above and well to the rear of lugs 25, substantially on the line at which the convex and concave portions of the table merge with each other, so that said springs urge the frame upward toward the table and also exert a substantial rearward pull on the frame at all times to prevent disconnection of the frame from the table. The rearwardly extending parts of lugs 25 are bendable up and down to regulate the tension of springs 26. Lugs 25 extend inward beyond the inner edges of the side arms of the frame and the lower parts of the inwardly projecting portions of the lugs are rolled forward and upward to form upwardly facing semi-cylindrical or open bearing members 28 in which are removably engaged the reduced journal portions 29^a, of a metal feed roll shaft 29. The side arms are bendable up-and-down to adjust the shaft bearings 28. The shoulders at the inner ends of journals 29^a cooperate with bearings 28 to resist substantial endwise movement of shaft 29.

A pair of relatively short rear feed rolls 30 formed of rubber are secured on shaft 29, said rolls being spaced apart on said shaft and each extending well beyond either side of the fore-and-aft plane of the adjacent end of the front feed roll 14 and being of larger diameter than roll 14. Table 8 is provided with elongated apertures 31 through which rolls 30 are normally partly projected by the upward pull of springs 26 into firm engagement with the platen, said springs also exerting a downward pull on the table to rock the front portion of the table upward to press roll 14 firmly against the platen. The parts are so proportioned and arranged that the front and rear rolls are forced into engagement with the platen and the rear roll frame and shaft are held away from the table, the roll shafts being carried by the table and hinged frame at opposite sides of the fulcrum of the table, and the platen preventing closing of the jaws formed by the pivoted frame and table, so that the constantly tensioned springs will constantly pull upward on the pivoted frame and downward on the table at the rear of the table fulcrum. The front roll may move toward and from the platen with or independently of the rear rolls to compensate for inequalities in the platen surface or varying thickness of the work, and it will also be noted that the table may tilt laterally owing to its loose connection wit the carriage as well as fore and aft so that the rolls may cant up and down when necessary.

A margin stop carrying bar 32 extends longitudinally of the carriage and is rotatably supported by trunnions 32^a extending through bearings 33 in the rear lower parts of the end plates of the carriage. An angular sheet metal bracket 34 is secured to the upper face of the base plate of the carriage by screws 35 and has its upwardly and rearwardly inclined arm spaced well back of the paper table and provided with an ear 36 extending rearwardly and downwardly from its right hand edge substantially midway between the carriage end plates. The rear edge of ear 36 extends partly into a notch 37 in bar 32 and resists endwise thrusts on the bar but permits rocking of the bar, through the medium of a margin release rock arm 38 fixed thereon, in clockwise direction as viewed in Fig. 2 from the normal position of the bar shown in said view to shift the margin stops 39 on said bar out of cooperative relation with suitable non-traveling companion stop means.

Ear 36 is provided with a bearing aperture 40 for a feed roll cast-off crank shaft. A pair of pivot screws 41 and 42 for an escapement release bail (not shown) are screwed into the end plates of the carriage on a line above and forward of the axial line of the bearing aperture 40, the right hand screw 41 having a threaded shank extending through the right hand end plate and provided at its inner end with a reduced cylindrical bearing portion 41^a for the crank shaft. The crank shaft 43 is formed from a single piece of sheet metal and comprises a relatively narrow bar formed at its left hand end with an integral trunnion 44 projecting beyond the bar end and an integral arm 45 extending forward and upward from the left hand end of the bar at the inner end of the trunnion. At its right hand end the bar is formed with an integral forwardly extending arm 46 provided with a bearing aperture 47 through which portion 41^a of screw 41 loosely extends, the shoulder 41^b on said screw cooperating with the arm to hold the trunnion 44 in aperture 40 in which it loosely engages. The shaft may be readily removed by backing out the screw 41. A normally tensioned coiled spring 48 normally extends upwardly and rearwardly from an ear 49 on a sheet metal stop arm 50 fixed on the right hand end of bar 32 and is connected at its forward end to a depending pierced ear 51 on arm 46 at a point in the rear of and below the pivot 41^a of said arm.

The stop arm 50 is normally held by said spring 48 against the rear face of a bar 52 fixedly secured by screws 53 to the rear edge of the carriage base plate, and said spring normally extends in a straight line upward and forward under stop bar 32 and the cast-off shaft (the right hand end of which is elevated at 43ª above the main portion to afford clearance for the spring) and is of sufficient tension to yieldably hold the shaft normally in the position shown in Figs. 1, 2, 5 and 10, i. e. in front of and close to and substantially parallel with the margin stop bar but out of contact with said stop bar and margin stops thereon. An integral stop lug 54 extending rearwardly from the upper edge of part 43ª of the shaft is normally spaced above the upper edge of the margin stop bar and is arranged to engage said bar edge to positively limit forcible rocking movement of the shaft over rearwardly before said shaft can be forced against the forward edge of the bar or the margin stops thereon, thus preventing accidental injury or jamming of parts, or possible inadvertent movement of the bar and stops to and jamming thereof in release position, and excessive backward movement of the wedge hereinafter described. Arm 46 is provided with an upward and rearward extension forming a hand lever 55 the upper end of which is twisted into a transverse plane to form a finger piece rockable to a cast-off position in which it extends partly behind and slightly spaced from the rear of the platen roll, as shown in Fig. 3 and in dotted lines in Fig. 1, and adapted to engage the platen if forced beyond this position as hereinafter described.

A relatively broad feed-roll-releasing wedge or cam 56 is pivotally mounted on arm 45 on shaft 43, said wedge being formed of a single piece of sheet metal bent into U-shape and having its right hand arm provided with a depending pivot ear 57 near the rear cross-bar of the duplex wedge. Ear 57 has a bearing aperture 58 somewhat larger in diameter than the cylindrical bearing portion of a shouldered pivot screw 59 screwed into a threaded aperture 60 in ear 45 on the cast-off shaft from the right, and the bearing portion of screw 59 is somewhat longer than the thickness of ear 57. Ear 57 thus has a loose and slightly wobbling pivotal connection with the arm 45 on the cast-off shaft so that the wedge may tilt laterally somewhat relatively to the shaft. The forwardly extending, transversely spaced arms of the wedge straddle arm 45 and are tapered at their front ends, but said arms have parallel straight upper and lower edges back of the noses of the duplex wedge and forward of the pivot ear of the wedge. Spring 48 normally pulls in opposite directions on arm 50 and ear 51 to hold said arm against bar 52 and yieldably urge the noses of the duplex wedge into the bight of the paper table and rear roll shaft and hold stop lug 54 above the bar 32, as shown in Fig. 2. Rattling of the various parts when the machine is in use is thus prevented. The upwardly and rearwardly extending arm of bracket 34 underlies the left hand arm of the wedge forward of the pivotal axis of the wedge and is adapted to be engaged by said wedge arm to hold the wedge noses up upon excessive backward rotation of the shaft and guide said noses back into the bight of the table and rear roll shaft when spring 48 contracts and restores the cast-off shaft to the position shown in Fig. 2. Arm 45 is positioned midway the ends of the rear feed roll shaft and the paper table so that the arms of the broad duplex wedge will contact with said shaft and table at opposite sides of the fore and aft center lines thereof and insure uniform, or substantially uniform, cast-off movement of the table and both feed roll shafts from end to end. Another advantage of the broad wedge or cam is that it reduces or eliminates wear on the rear roll shaft and paper table. The pivotal mounting of the wedge also contributes to reduction or elimination of wear as well as to the ease with which the cast-off device may be actuated.

When it is desired to cast off the feed rolls, the hand lever is rocked forwardly by pressing against the rear face of its finger piece thus forcing the tapered nose of the wedge between the rear roll shaft and paper table until the parallel upper and lower edge portions of the wedge are interposed between the table and shaft, as shown in Fig. 3, thereby rocking the table on its fulcrum bosses to depress the front roll and swinging the rear roll shaft frame downwardly about its pivots to cast off the rear rolls. If the hand lever is pressed forward beyond the position shown in Fig. 3 its finger piece will engage the platen due to slight springing of the parts but will be pulled back by spring 48 to the position shown in Fig. 3 as soon as pressure on the lever is relieved. The frictional grip of the table and rear roll shaft on the parallel upper and lower edges of the wedge locks the parts in the position shown in Fig. 3. The spring 48 is pulled up around the margin stop bar by the cast-off movement of the hand lever so that when said lever is pushed rearward to pull the flat edges of the web out from between the rear roll shaft and table said spring will first contract and exert a downward pull on arm 46 to assist in and insure movement of the cast-off mechanism to normal position and then, when the point of connection of the spring with said arm passes below a line through the arm pivot and the point of connection of the spring

with ear 49, will stretch slightly and bring the cast-off mechanism to rest in the position shown in Fig. 2. Spring 48 is a comparatively light spring of insufficient strength to release the cast-off devices, or to actuate said devices when the margin stop bar is rocked to margin release position.

In handling a machine constructed as shown the paper table may be pulled forward by hand and the wedge might then be accidentally thrown up and back far enough to become inoperative upon release of the table. To prevent this the pivot ear on the wedge is formed with a projection or stop finger 61 extending rearwardly and downwardly from its rear edge and adapted to engage but normally spaced above the raised upper edge portion 43^b of shaft 43 which forms a companion stop or abutment. This arrangement of stops permits limited movement of the wedge by or with the yieldably supported table and rear roll shaft during paper feeding but prevents said wedge from rocking upward beyond a point at which it would be pressed back to normal position by the table, as shown in Fig. 10.

As the carriage is tilted rearward and supported at a relatively low point a pair of sheet supporting arms 62 of sheet metal are preferably mounted on brackets 63 fixed on the rear under side of the convex portion of the table so as to be foldable from the compacted position shown in Fig. 1 to an operative position in which the arms extend upward and rearward and engage stop lugs 64 on brackets 63. Friction washers 66 are provided on the pivot screws 65 of the arms to hold the arms in adjusted position. A paper holding bail 67 is also preferably provided, said bail being pivoted at 68 on the carriage end plates to swing from holding position (Fig. 2) to release position (Fig. 3). Stops 69 on said bail engage the end plates of the carriage to arrest the bail with its transverse bar spaced slightly from the top of the platen, and stops 70 on the bail engage studs 71 on the end plates to arrest the bail in release position. Springs 72 connected with lugs 73 on the bail and studs 71 hold the bail in either of its two adjusted positions.

It will be noted that the paper feeding mechanism described is of simple and inexpensive construction, and is constructed and arranged in an exceeding compact relation with other parts of the machine and so associated therewith that the number of parts is reduced to a minimum.

What I claim is:

1. In a typewriting machine, the combination of a carriage support, a platen carriage mounted on the support to travel transversely of the machine, a platen rotatably supported on the carriage, a margin-stop-carrying bar rotatably supported on the carriage, front and rear paper feed rollers, means for yieldably supporting said rollers, manually actuated means operable on said roller supporting means to cast off the feed rollers, cooperating abutments on the bar and carriage for determining the normal position of the bar, and a coiled spring connected with said bar and the cast-off means normally yieldably holding the bar in normal position and urging the cast-off means in the direction of its cast-off movement into engagement with the roller supporting means, said spring being so arranged as to initially urge the cast-off means after a cast-off operation in the opposite direction toward normal position.

2. In a typewriting machine, the combination of a carriage support, a platen carriage mounted on the support to travel transversely of the machine, a platen rotatably supported on the carriage, a margin-stop-carrying bar rotatably supported on the carriage, front and rear paper feed rollers, means for yieldably supporting said rollers, manually actuated means operable on said roller supporting means to cast off the feed rollers, cooperating abutments on the bar and carriage for determining the normal position of the bar, a coiled spring connected with said bar and the cast-off means normally yieldably holding the bar in normal position and urging the cast-off means in the direction of its cast-off movement into engagement with the roller supporting means, said spring being so arranged as to initially urge the cast-off means after a cast-off operation in the opposite direction toward normal position, and a stop on the cast-off means adapted to engage the margin-stop-carrying bar to limit movement of the cast-off means away from the roller supporting means and normally yieldably held out of contact with said bar by said spring.

3. In a typewriting machine, the combination of a carriage support, a platen carriage mounted on the support to travel transversely of the machine, a platen rotatably supported on the carriage, a margin-stop-carrying bar rotatably supported on the carriage, front and rear paper feed rollers, means for yieldably urging said rollers toward the platen, manually actuated cast-off means for the feed rollers, cooperating abutments on the bar and carriage for determining the normal position of the bar, and a coiled spring connected with said bar and the cast-off means normally yieldably holding the bar in normal position and urging the cast-off means in the direction of its cast-off movement into engagement with the roller supporting means, said spring being so arranged as to initially urge the cast-off means after a cast-off operation in the opposite direction toward normal position, said

carriage carrying an escapement release bail pivot and an end thrust resisting member interlocked with the stop-carrying bar upon which said cast-off means are rockably supported.

4. In a paper feed mechanism, the combination of a platen carriage; a platen journalled on the carriage; front and rear feed rolls; means rockably mounted on the carriage supporting the front roll to rotate about its axis and to swing bodily toward and from the platen about an axis extending longitudinally of the platen; means rockably mounted on the front roll supporting means for supporting the rear roll to rotate about its axis and to swing bodily toward and from the platen about an axis parallel with the axis about which the front roll swings; constantly tensioned spring means connecting said two rockably mounted supporting means at one side of the axes about which the same rock and normally urging said two supporting means in opposite directions about said axes to yieldably force the feed rolls toward the platen; a wedge operable directly on said two supporting means to force the same in opposition to said spring in opposite directions about the axes around which they rock to thereby cast off the feed rolls; and manually operable actuating means for forcing said wedge between adjacent portions of the two roll supporting means and retracting the wedge to a position permitting rocking movement of each supporting means in either direction about its axis.

5. In a typewriting machine, a platen carriage, a platen rotatably supported on the carriage, a sheet metal paper table rockably supported on the carriage and extending under the platen, a scale bar, integral bendable lugs on said table to which said scale bar is held with the upper edge of the bar above the front edge of the table, a front feed roll shaft, a front feed roll on said shaft behind said scale bar, integral bendable bearing lugs on said table forward of its fulcrum for said front roll shaft, a rear feed roll shaft, a rear feed roll on said rear feed roll shaft, a supporting frame for said rear feed roll shaft under the paper table, integral bearing lugs on said table to which said frame is pivotally held to swing up and down relatively to the table, and means for yieldably urging the frame toward the platen and rocking said table on its fulcrum to urge the forward part of the table toward the platen.

6. In a typewriting machine, a platen carriage, a platen rotatably supported on the carriage, a sheet metal paper table rockably supported on the carriage and extending under the platen, a scale bar, integral bendable lugs on said table to which said scale bar is held with the upper edge of the bar above the front edge of the table, a front feed roll shaft, a front feed roll on said shaft behind said scale bar, integral bendable bearing lugs on said table forward of its fulcrum for said front roll shaft, a rear feed roll shaft, a rear feed roll on said rear feed roll shaft, a supporting frame for said rear feed roll shaft under the paper table, integral bearing lugs on said table to which said frame is pivotally held to swing up and down relatively to the table, and means for yieldably urging the frame toward the platen and rocking said table on its fulcrum to urge the forward part of the table toward the platen, said supporting frame being formed of sheet metal and provided with integral bendable arms upon which said rear roll shaft is journalled and having apertures in which the frame supporting bearing lugs on the table engage.

7. In a paper feed mechanism, the combination of a platen support, a platen journalled on the support, a tiltably supported sheet metal paper table extending partly around the platen and having upwardly-facing hook-like shaft bearing lugs adjacent its forward edge, a front feed roll shaft removably supported in said bearing lugs, a front feed roll on said shaft, said table having pivot lugs for a rear roll frame, a sheet metal rear roll frame under the table having apertures through which said pivot lugs extend and upwardly facing hook-like bearing lugs for a rear roll shaft in the rear of said apertures, a rear roll shaft removably supported in said lugs on the frame, a rear feed roll on said rear roll shaft, and a spring connecting said frame and table and arranged to yieldably urge the feed rolls toward the platen and resist disconnection of the frame from its pivot lugs, said table being formed to permit the front and rear rolls to cooperate with the platen.

8. In a paper feed mechanism, the combination of a platen support, a platen journalled on the support, a tiltably supported sheet metal paper table extending partly around the platen and having upwardly-facing hook-like shaft bearing lugs adjacent its forward edge, a front feed roll shaft removably supported in said bearing lugs, a front feed roll on said shaft, said table having pivot lugs for a rear roll frame, a sheet metal rear roll frame under the table having apertures through which said pivot lugs extend and upwardly facing hook-like bearing lugs for a rear roll shaft in the rear of said apertures, a rear roll shaft removably supported in said lugs on the frame, a rear feed roll on said rear roll shaft, a spring connecting said frame and table and arranged to yieldably urge the feed rolls toward the platen and resist disconnection of the frame from its pivot lugs, and cast-off means for swinging the rear roll

frame away from the platen about its pivots and tilting the table in a direction to release the front feed rolls.

9. In a paper feed mechanism, the combination of a rotatably supported platen, a front feed roll, a front feed roll support mounted to swing relatively to the platen about an axis extending longitudinally of the platen in the rear of said front feed roll, a rear feed roll located back of the pivotal axis of the front roll support, a rear roll support mounted on the front feed roll support to swing about an axis extending longitudinally of the platen forward of the rear roll and the pivotal axis of the front roll support, a constantly tensioned coiled spring connecting said supports normally tending to swing the same about their axes to urge the feed rolls toward the platen, and cast-off means for forcing said supports away from the platen.

10. In a paper feed mechanism, the combination of a rotatably supported platen, a front feed roll support mounted to swing relatively to the platen about an axis extending longitudinally of the platen, a rear feed roll support mounted on the front feed roll support to swing about a different axis extending longitudinally of the platen, feed rolls on said supports, constantly tensioned spring means connecting said supports and urging the feed rolls toward the platen, and a single manually operable cam for rocking said supports in opposite directions about their pivotal axes against the resistance of said spring means to cast off the feed rolls.

11. In a paper feed mechanism, the combination of a rotatably supported platen, front and rear feed rolls associated with the platen, means for rotatably supporting the rolls pivotally mounted to swing up and down relatively to the platen, spring means connecting said roll supporting means and normally urging the same in opposite directions about their pivots to force the rolls toward the platen, and a manually operable device adapted to be forced between the roll supporting means to cast off the feed rolls, the rear roll supporting means being pivotally supported on the front roll supporting means, and said device being arranged to engage between said two supporting means in the rear of the pivotal axes thereof.

12. In a paper feed mechanism, a rotatably supported platen, a paper table extending under the platen, means supporting the table intermediate its front and rear edges to rock fore-and-aft relatively to the platen, a front feed roll journalled on the table forward of its point of support, a rear feed roll back of the point of support of the table, supporting means for the rear roll pivotally held to the table at a point forward of said rear roll to swing up and down, and springs connecting said rear roll support with the table back of the point of support of the table and the pivotal axis of the rear roll support and normally holding the rolls against the platen with the rear roll support spaced from the table back of its pivotal axis.

13. In a paper feed mechanism, a rotatably supported platen, a paper table extending under the platen, means supporting the table intermediate its front and rear edges to rock fore and aft relatively to the platen, a front feed roll journalled on the table forward of its point of support, a rear feed roll back of the point of support of the table, supporting means for the rear roll pivotally held to the table at a point forward of said rear roll to swing up and down, springs connecting said rear roll support with the table back of the point of support of the table and the pivotal axis of the rear roll support and normally holding the rolls against the platen with the rear roll support spaced from the table back of its pivotal axis, and manually operable cast-off means adapted to exert a lifting force on the table back of its point of support and a depressing force on the rear roll support back of its pivotal axis to cast off the feed rolls.

14. In a paper feed mechanism, a rotatably supported platen, a paper table extending under the platen, means supporting the table intermediate its front and rear edges to rock fore-and-aft relatively to the platen, a front feed roll journalled on the table forward of its point of support, a rear feed roll back of the point of support of the table, supporting means for the rear roll pivotally held to the table at a point forward of said rear roll to swing up and down, springs connecting said rear roll support with the table back of the point of support of the table and the pivotal axis of the rear roll support and normally holding the rolls against the platen with the rear roll support spaced from the table back of its pivotal axis, and a manually operable wedge arranged to exert a lifting force on the table back of its point of support and a depressing force on the rear roll support back of its pivotal axis to cast off the feed rolls.

15. In a paper feed mechanism, a rotatably supported platen, a paper table extending under the platen, means supporting the table intermediate its front and rear adges to rock fore-and-aft relatively to the platen, a front feed roll journalled on the table forward of its point of support, a rear feed roll back of the point of support of the table, supporting means for the rear roll pivotally held to the table at a point forward of said rear roll to swing up-and-down, springs connecting said rear roll support with the table back of the point of support of the table and the pivotal axis of the rear

roll support and normally holding the rolls against the platen with the rear roll support spaced from the table back of its pivotal axis, and a manually operable wedge arranged to exert a lifting force on the table back of its point of support and a depressing force on the rear roll support back of its pivotal axis to cast off the feed rolls, said wedge being constructed and mounted to exert said forces on both the table and support at both sides of the fore-and-aft medial lines of the table and support.

16. In a paper feed mechanism, a rotatably supported platen, means supporting the table intermediate its front and rear edges to rock fore and aft relatively to the platen, a front feed roll journalled on the table forward of its point of support, a rear feed roll back of the point of support of the table, supporting means for the rear roll pivotally held to the table at a point forward of said rear roll to swing up and down, springs connecting said rear roll support with the table back of the point of support of the table and the pivotal axis of the rear roll support and normally holding the rolls against the platen with the rear roll support spaced from the table back of its pivotal axis, a rockably supported cast-off shaft, a rock arm for rocking the shaft, a second arm on said shaft, and a wedge pivotally held to said second arm to swing up and down and having a nose shiftable between the table and rear roll support back of the point of support of the table and the pivotal axis of the rear roll support.

17. In a paper feed mechanism, a rotatably supported platen, a paper table extending under the platen, means supporting the table intermediate its front and rear edges to rock fore and aft relatively to the platen, a front feed roll journalled on the table forward of its point of support, a rear feed roll back of the point of support of the table, supporting means for the rear roll pivotally held to the table at a point forward of said rear roll to swing up and down, springs connecting said rear roll support with the table back of the point of support of the table and the pivotal axis of the rear roll support and normally holding the rolls against the platen with the rear roll support spaced from the table back of its pivotal axis, a rockably supported cast-off shaft, a rock arm for rocking the shaft, a second arm on said shaft, a wedge pivotally held to said second arm to swing up and down and having a nose shiftable between the table and rear roll support back of the point of support of the table and the pivotal axis of the rear roll support, and means for insuring entrance of the nose of the pivoted wedge between said table and support.

18. In a paper feed mechanism, a rotatably supported platen, a paper table extending under the platen, means supporting the table intermediate its front and rear edges to rock fore-and-aft relatively to the platen, a front feed roll journalled on the table forward of its point of support, a rear feed roll back of the point of support of the table, supporting means for the rear roll pivotally held to the table at a point forward of said rear roll to swing up and down, springs connecting said rear roll support with the table back of the point of support of the table and the pivotal axis of the rear roll support and normally holding the rolls against the platen with the rear roll support spaced from the table back of its pivotal axis, a rockably supported cast-off shaft, a rock arm for rocking the shaft, a second arm on said shaft, a wedge pivotally held to said second arm to swing up and down and having a nose shiftable between the table and rear roll support back of the point of support of the table and the pivotal axis of the rear roll support, and means for limiting the extent of upward swinging movements of the wedge.

19. In a typewriting machine, the combination of a platen carriage having base and end members, a platen journalled in the end members of the carriage, a paper table extending between the platen and the base member of the carriage, means forming a rocking connection between the paper table and the base member permitting fore-and-aft rocking of the table, a front feed roll shaft mounted on the table forward of said rocking connection, a front feed roll on said shaft, a rear feed roll shaft normally spaced below the table back of said rocking connection, a pair of transversely spaced rear feed rolls on said rear shaft, the table being formed to permit all the rolls to project above the same, supporting means for said rear shaft located under the table and pivotally held to said table forward of the rear shaft to swing up and down, springs connecting said supporting means with the table back of the pivotal axis of the supporting means to yieldably urge the rollers toward the platen, and manually operable means shiftable between the table and the rear roll shaft and adapted to force the rear roll shaft downwardly and to rock the table in a direction to depress the front roll.

20. In a typewriting machine, the combination of a platen carriage having base and end members, a platen journalled in the end members of the carriage, a paper table extending between the platen and the base member of the carriage, means forming a rocking connection between the paper table and the base member permitting fore-and-aft rocking of the table, a front feed roll shaft mounted on the table forward of said rocking connection, a front feed roll on said shaft, a rear feed roll shaft back of said

rocking connection, a pair of transversely spaced rear feed rolls on said rear shaft, the table being formed to permit all the rolls to project above the same, supporting means for said rear shaft pivotally held to the table forward of the rear shaft to swing up and down under the table, constantly tensioned springs connecting said supporting means with the table back of the pivotal axis of the supporting means, and manually operable means shiftable between the table and the rear roll shaft and adapted to depress the rear roll shaft and its frame and rock the table to depress the front roll, said means comprising a wedge having parallel upper and lower faces back of its tapered nose movable between the table and rear roll shaft after depression of the rolls.

21. In a typewriting machine, the combination of a platen carriage having base and end members, a platen journalled in the end members of the carriage, a paper table extending between the platen and the base member of the carriage, means forming a rocking connection between the paper table and the base member permitting fore-and-aft rocking of the table, a front feed roll shaft mounted on the table forward of said rocking connection, a front feed roll on said shaft, a rear feed roll shaft normally spaced below the table back of said rocking connection, a pair of transversely spaced rear feed rolls on said rear shaft, the table being formed to permit all the rolls to project above the same, supporting means for said rear shaft pivotally held to the table forward of the rear shaft to swing up and down under the table, constantly tensioned springs connecting said supporting means with the table back of the pivotal axis of the supporting means, and manually operable means shiftable between the table and the rear roll shaft and adapted to depress the rear roll shaft and frame and to rock the table in a direction to depress the front roll, said means comprising a relatively wide wedge arranged to engage the table and the rear roll shaft between the two rear rolls at opposite sides of the fore-and-aft medial lines of the table and shaft.

22. In a typewriting machine, the combination of a platen carriage having base and end members, a platen journaled in the end members of the carriage, a paper table extending between the platen and the base member of the carriage, means forming a rocking connection between the paper table and the base member permitting fore-and-aft rocking of the table, a front feed roll shaft mounted on the table forward of said rocking connection, a front feed roll on said shaft, a rear feed roll shaft normally spaced below the table back of said rocking connection, a pair of transversely spaced rear feed rolls on said rear shaft, the table being formed to permit all the rolls to project above the same, supporting means for said rear shaft pivotally held to the table forward of the rear shaft to swing up and down under the table, constantly tensioned springs connecting said supporting means with the table back of the pivotal axis of the supporting means and said rocking connection, a shaft journalled on the carriage, a handle for rocking said shaft, an arm on said shaft back of the rear roll shaft, and a broad wedge held to said arm to swing up and down and tilt laterally and having a forwardly extending nose portion adapted to be forced between the table and rear roll shaft when the shaft is rocked in one direction to cast off the feed rolls.

23. Cast-off means for spreading apart a pair of feed roll carrying members, comprising, in combination, a one-piece sheet metal shaft having an integral arm adjacent one end and an integral handle piece adjacent its opposite end, said arm having a threaded aperture therein the axis of which extends lengthwise of the shaft, a one-piece sheet metal wedge approximately U-shaped in plan having its side arms tapered at their outer ends and straddling said arm on the shaft, and a pivot having a reduced threaded shank portion screwed into said aperture in the shaft arm and an enlarged non-threaded shank portion projecting beyond said shaft arm and terminating in a screw head, one side arm of said wedge being confined between said screw head and shaft arm and having an aperture through which the non-threaded shank portion of said pivot extends.

24. Cast-off means for spreading apart a pair of feed roll carrying members comprising, in combination, a one-piece sheet metal shaft having an integral arm adjacent one end and an integral handle piece adjacent its opposite end, said arm having a threaded aperture therein the axis of which extends lengthwise of the shaft, a one-piece sheet metal wedge approximately U-shaped in plan having its side arms tapered at their outer ends and straddling said arm on the shaft, and a pivot having a reduced threaded shank portion screwed into said aperture in the shaft arm and an enlarged non-threaded shank portion projecting beyond said shaft arm and terminating in a screw head, one side arm of said wedge being confined between said screw head and shaft arm and having an aperture through which the non-threaded shank portion of said pivot extends, said side arms of the wedge having parallel edges back of their tapered ends and forward of said pivot.

25. In a typewriting machine, a platen carriage having base and end plates, a platen having a shaft journalled in said end plates, a curved sheet metal paper table extending

between the platen and base plate having transversely aligned rounded bosses pressed downward therefrom and each provided with an aperture in the bottom thereof, transversely aligned screws threaded in the base plate having cylindrical heads projecting loosely through the boss apertures, said bosses resting on the base plate, a front roll shaft mounted on the table to shift therewith, a rear roll shaft back of the bosses, a rear roll shaft support pivotally connected with the table forward of the rear roll shaft to swing up and down under the table, feed rolls on said shafts, and springs connecting the support and table and yieldably urging the rolls toward the platen, said table being cut away to permit the upper parts of the rolls to be projected above the table by said springs.

26. In a typewriting machine, a platen carriage having base and end plates, a platen having a shaft journalled in said end plates, a curved sheet metal paper table extending between the platen and base plate having transversely aligned rounded bosses pressed downward therefrom, and each provided with an aperture in the bottom thereof, transversely aligned screws threaded in the base plate having cylindrical heads projected loosely through the boss apertures, said bosses resting on the base plate, a front roll shaft mounted on the table to shift therewith, a rear roll shaft back of the bosses, a rear roll shaft support pivotally connected with the table forward of the rear roll shaft to swing up and down under the table, feed rolls on said shafts springs connecting the support and table and yieldably urging the rolls toward the platen, said table being cut away to permit the upper parts of the rolls to be projected above the table by said springs, a paper scale held to the table forward of the front roll, and manually operable cast-off means for tilting the table forwardly and swinging the rear roll support downwardly to move the rolls and scale away from the platen.

In testimony whereof I hereunto affix my signature.

FRANK H. ARMSTRONG.