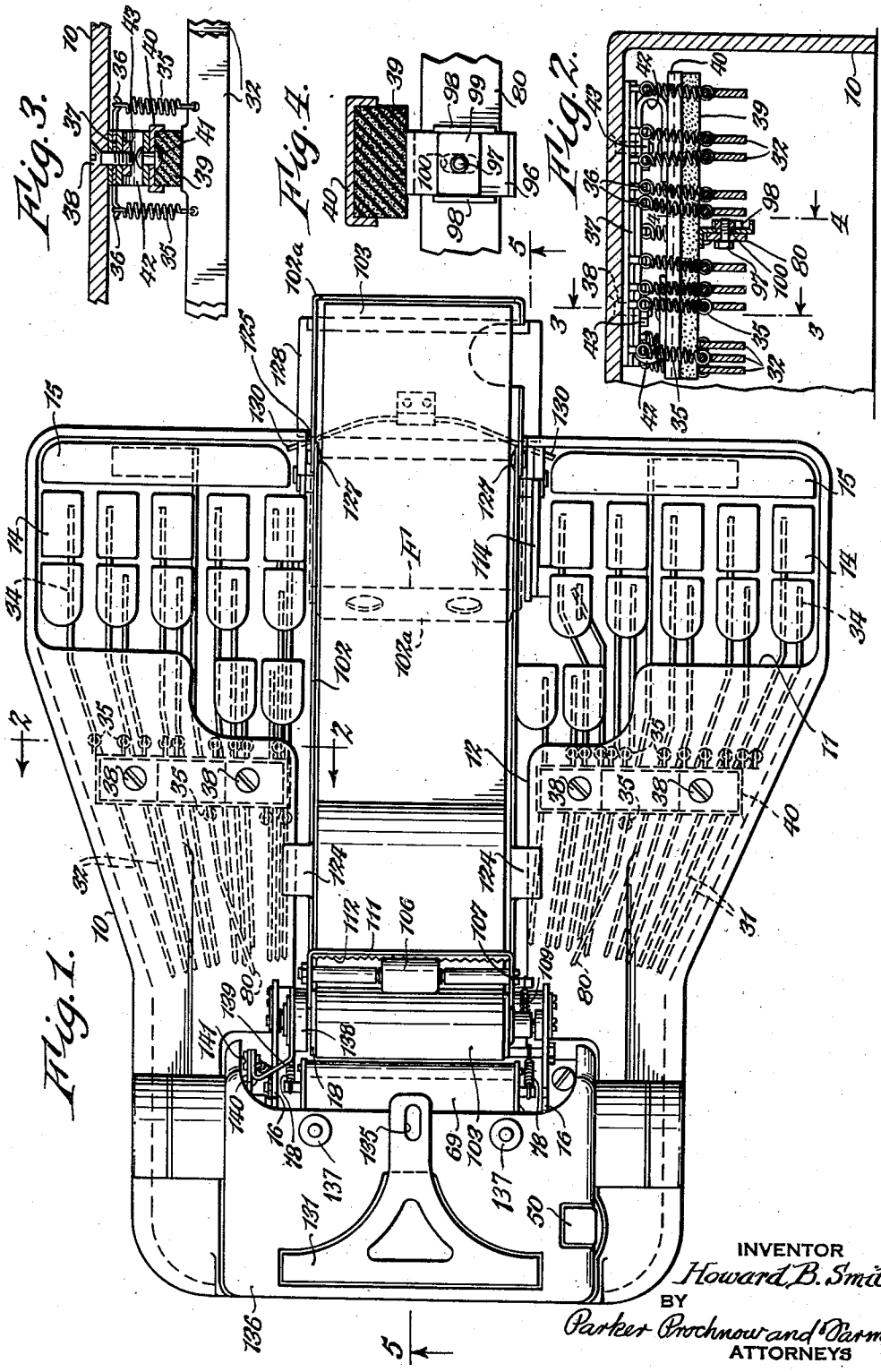
May 19, 1942. H. B. SMITH 2,283,235

TYPEWRITING MACHINE

Filed March 4, 1938 5 Sheets-Sheet 1



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TYPEWRITING MACHINE

Filed March 4, 1938 5 Sheets-Sheet 2

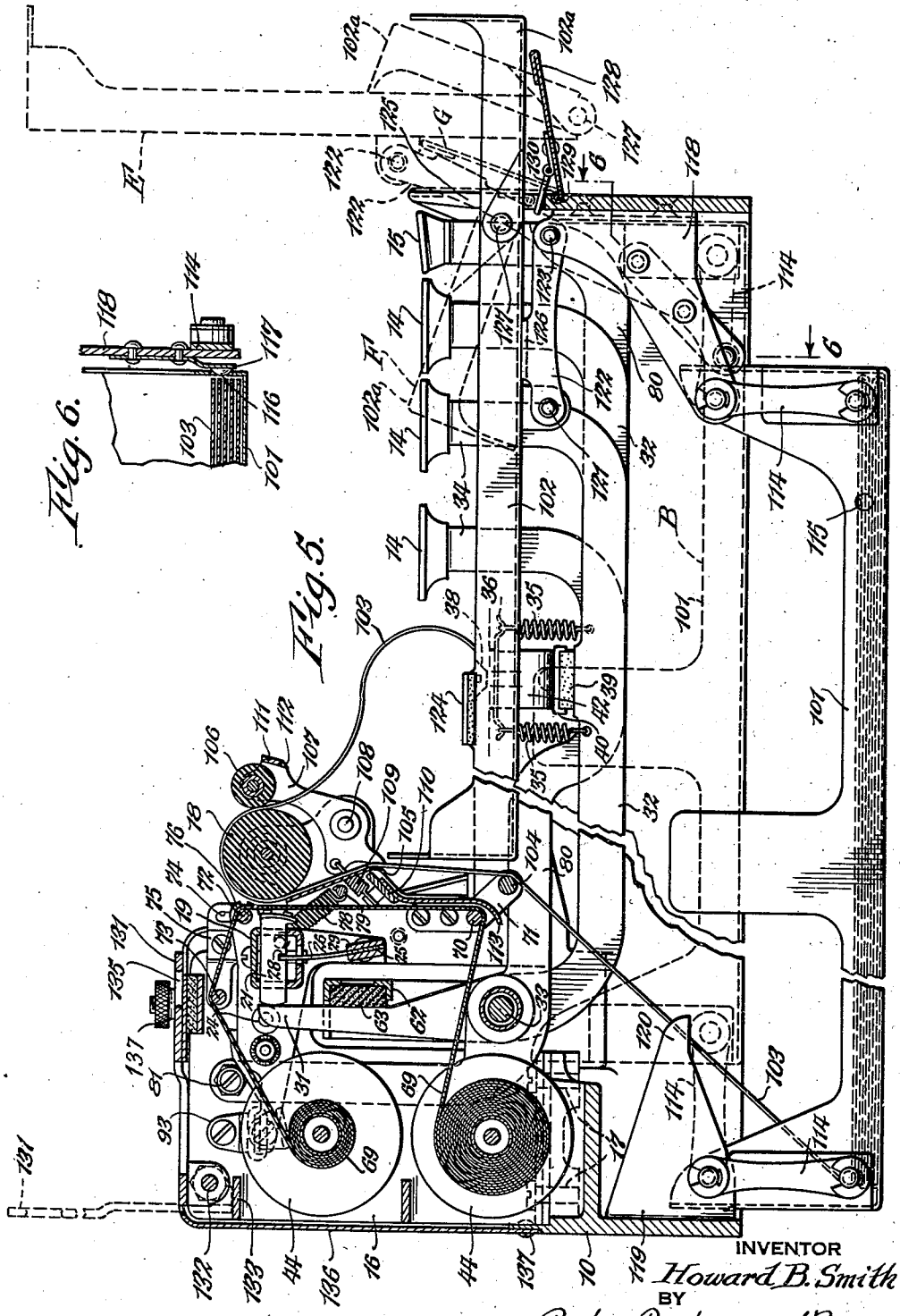


Fig. 6.

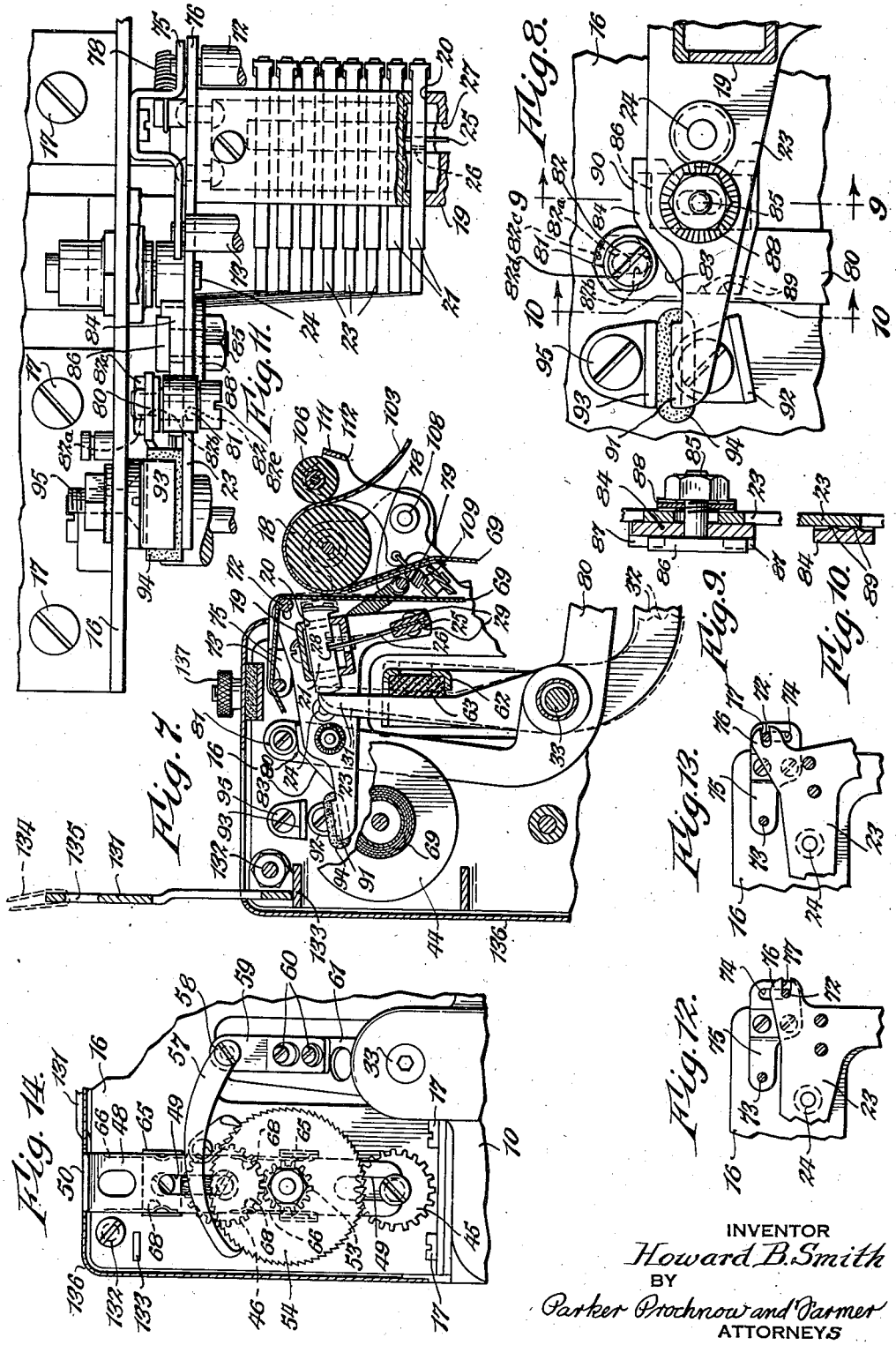
Fig. 5.

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TYPEWRITING MACHINE

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TYPEWRITING MACHINE

Filed March 4, 1938 5 Sheets-Sheet 4

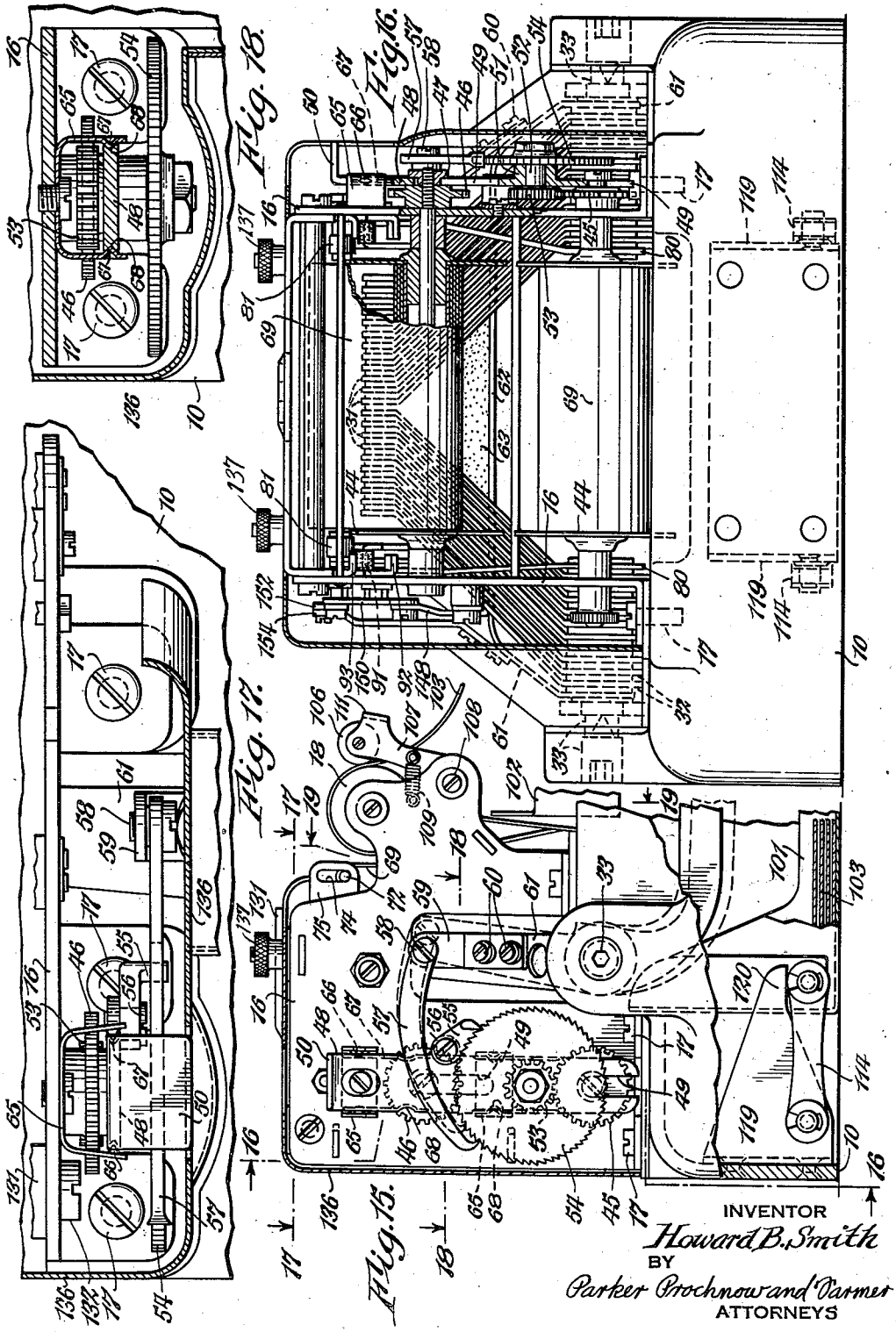


Fig. 18.

Fig. 16.

Fig. 17.

Fig. 15.

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TYPEWRITING MACHINE

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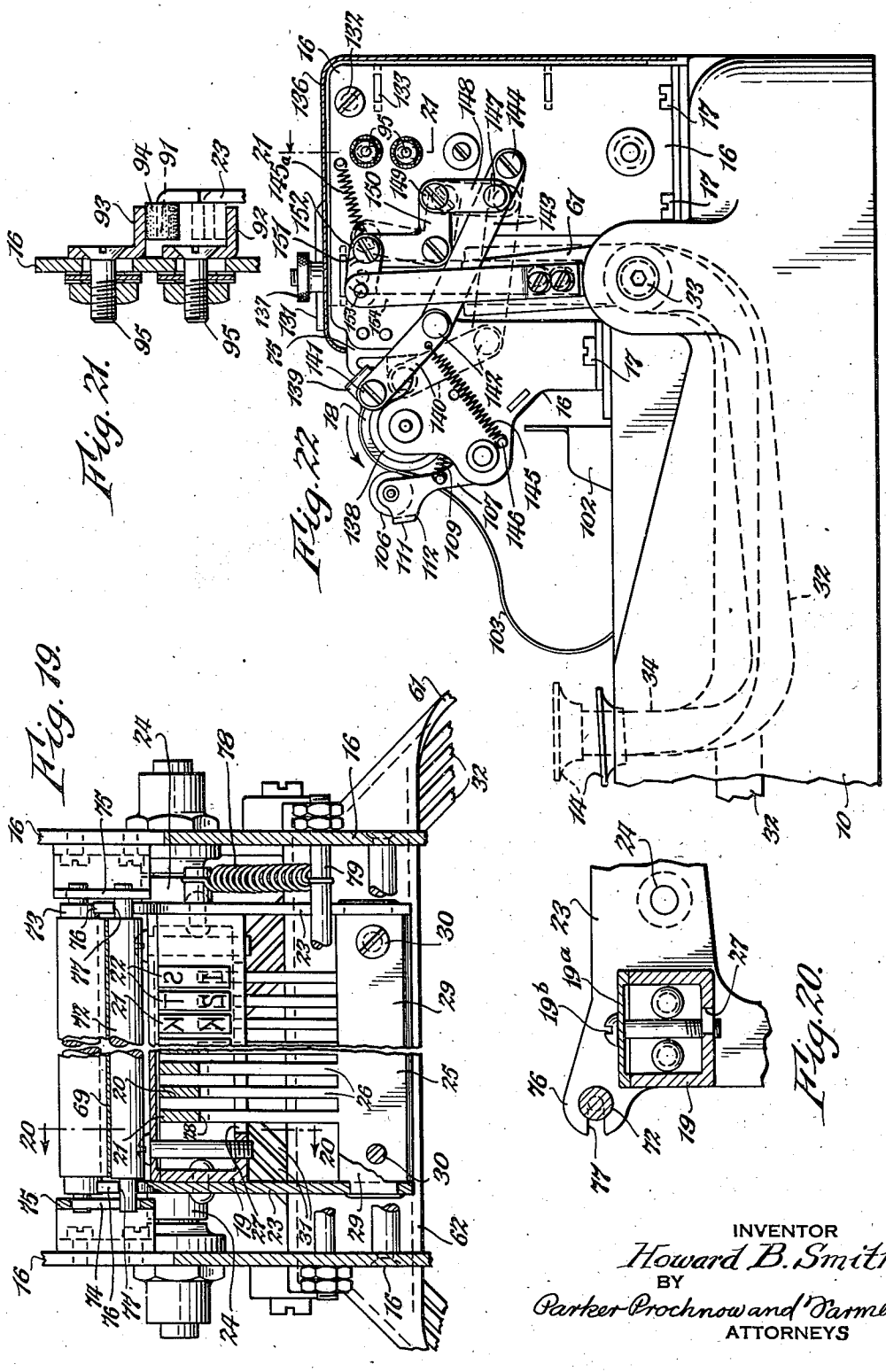


Fig. 21.

Fig. 22.

Fig. 19.

Fig. 20.

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UNITED STATES PATENT OFFICE

2,283,235

TYPEWRITING MACHINE

Howard B. Smith, Washington, D. C.

Application March 4, 1938, Serial No. 193,974

12 Claims. (Cl. 197—9)

This invention relates to typewriting machines and has for an object to provide improved and simple mechanism by which characters may be printed in succession upon a paper sheet or web.

Another object of the invention is to provide an improved typewriter of the type in which the platen is advanced at each operation of the printing mechanism to position a new zone of the paper sheet or web for printing; with which the number of characters to be printed may be increased without any increase in the number of type bars; with which the printing by type bars may be effected in a simple, quiet and practical manner; with which uniformity and accuracy in the positions of the characters in printing positions may be insured; with which the key actuated means which cause the printing operations will have uniform strokes for all of the different characters to be printed; and which will be relatively simple, compact, practical and inexpensive.

Another object of the invention is to provide an improved typewriting machine in which each type bar may carry a plurality of printing characters; with which the type bars may be positioned to print any characters thereof in a simple and practical manner; with which the printing ribbon will be maintained in proper printing position and fed through printing position without smudging of the paper or undue rubbing of the ribbon on the printing characters; and with which the printing ribbon will be guided through printing position by guiding means disposed as closely as possible to the platen and maximum visibility of the freshly printed paper obtained.

Another object of the invention is to provide improved, simple and inexpensive means for causing an increment of movement of the platen and paper after each printing operation so as to position a new zone of the paper in printing position.

Another object of the invention is to provide an improved typewriting machine having improved means for storing a supply of paper, feeding it through printing position on a platen and then receiving and holding the portion of the paper passing printing position; with which the portion passing the platen may be easily torn off in a simple manner; with which the threading of the paper through the machine preparatory to a printing operation may be accomplished in a simple and convenient manner; with which the storage means for the paper may be made easily accessible for the insertion and removal of paper; with which the paper may be fed through printing position with a minimum of mechanism; with which maximum and immediate visibility of the paper surface after passing printing position may be obtained; and with which its over-all dimensions may be condensed for packing.

Another object of the invention is to provide an improved typewriting machine having improved printing mechanism; and with which replacement of the type bars may be easily and rapidly accomplished in a simple and practical manner.

Another object of the invention is to provide an improved means for feeding the ribbon through printing position in opposite directions and with which the direction of travel of the ribbon may be reversed in a simple and convenient manner.

Another object of the invention is to provide an improved typewriting machine which may be carried by the operator while in use; and with which the keys will be conveniently accessible for operation by the person carrying the machine while the machine is being carried.

Another object of the invention is to provide an improved typewriting machine which will have improved paper feeding means; which will have fewer parts and operate with less noise, friction and effort; which may be operated while being carried about or supported in one's lap; which will permit of rapid and convenient manipulation in use; which may be stored in an exceptionally compact package when not in use; with which the paper, after being printed upon, will be constantly exposed to the view of the operator and conveniently accessible for reading; which requires no stand, desk or table; which can be operated with equal facility while the operator is sitting, standing or walking; which is convenient for reporting work; with which the printing point will be in a natural reading position under the eyes of the operator and close enough to be easly read; with which the printed portion of the paper will fall between the hands when the hands are in writing positions, so as to be always accessible for immediate reading; with which the operator's hands will fall naturally to writing position on the keyboard; which will require a minimum of applied force to make printing impressions; with which maximum speed in writing is possible; with which the ribbon and paper are fed in the same direction through printing positions; with which the life of the ribbon will be increased; with which the ribbon will not wrinkle or come off the guides; and which will be convenient, portable, compact and inexpensive.

Various other objects and advantages will be apparent from the following description of one embodiment of the invention, and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

In the accompanying drawings:

Fig. 1 is a plan of a typewriting machine constructed in accordance with this invention;

Fig. 2 is a sectional elevation through a portion of the same, the section being taken approximately along the line 2—2 of Fig. 1;

Fig. 3 is another sectional elevation through a portion of the same, the section being taken approximately along the line 3—3 of Fig. 2;

Fig. 4 is another sectional elevation through a portion of the machine, the section being taken approximately along the line 4—4 of Fig. 2;

Fig. 5 is a longitudinal, sectional elevation through the machine, the section being taken approximately along the line 5—5 of Fig. 1, but with the lower paper carrier in depending position which it may occupy during use, depending on whether a pad of paper of ordinary size or large size is used;

Fig. 6 is a sectional elevation through a portion of the same, the section being taken approximately along the line 6—6 of Fig. 5;

Fig. 7 is a longitudinal sectional elevation through a portion of the machine and similar to that shown in Fig. 5, but with the parts thereof in different operative positions from the positions shown in Fig. 5;

Fig. 8 is a sectional elevation through a portion of the machine shown in Fig. 5, but with the parts on a larger scale than shown in Fig. 5;

Fig. 9 is a sectional elevation through the portion of the machine shown in Fig. 8, the section being taken approximately along the line 9—9 of Fig. 8;

Fig. 10 is another sectional elevation through the portion of the machine shown in Fig. 8, the section being taken approximately along the line 10—10 of Fig. 8;

Fig. 11 is a plan of part of the mechanism shown in Fig. 7, but with the cover removed and certain other parts broken away to show other parts otherwise concealed thereby;

Fig. 12 is a sectional elevation through a portion of the mechanism shown in Fig. 11, to show the manner in which the shifting of the type bars to print from a different row of characters shifts a ribbon guide in a manner to keep the ribbon in the same plane;

Fig. 13 is a similar sectional elevation after the type bar carrier has been shifted to position the type bars to print from a different row of characters;

Fig. 14 is a sectional elevation through a portion of the machine to show the ribbon feeding and reversing means;

Fig. 15 is a partial sectional elevation through the same end of the machine and taken approximately along the same section line, but showing the parts in a different ribbon feeding position from that shown in Fig. 14;

Fig. 16 is a transverse sectional elevation of the machine, with the section taken approximately along the line 16—16 of Fig. 15;

Fig. 17 is a sectional plan of a portion of the machine shown in Fig. 15, and with the section being taken approximately along the line 17—17 of Fig. 15;

Fig. 18 is a sectional plan of a portion of the machine, the section being taken approximately along the line 18—18 of Fig. 15;

Fig. 19 is a transverse sectional elevation of a portion of the machine shown in Fig. 15, the section being taken approximately along the line 19—19 of Fig. 15;

Fig. 20 is a longitudinal sectional elevation through a part of the portion of the machine shown in Fig. 19, the section being taken approximately along the line 20—20 of Fig. 19;

Fig. 21 is a sectional elevation through a small portion of the machine, the section being taken approximately along the line 21—21 of Fig. 22; and

Fig. 22 is a longitudinal sectional elevation through another part of the machine and showing the paper feeding mechanism.

This invention is in the nature of an improvement upon my prior Patent No. 1,954,834, issued April 17, 1934, in which the typewriting machine selected to illustrate that invention was of the shorthand typewriting type. Some of the features of the present invention are particularly valuable in shorthand typewriting machines, and for that reason I have illustrated the invention as embodied in a shorthand typewriting machine, but it will be understood that various features of the invention are not necessarily limited to that type of machine, but are capable of use in other types of typewriting machines.

In the illustrated embodiment of the invention, the frame 10 (Figs. 1 and 2) is somewhat box-like in form and may for convenience be a die casting of light metals, so as to give maximum lightness with sufficient strength and rigidity. This frame 10 is open at its bottom face and its upper face is cut away as at 11 to provide spaces in which the keyboard is disposed. The frame 10 is further cut away in its upper face as at 12, to provide a space for receiving the paper web or sheet after being printed upon. The keyboard has its keys 14 divided into two groups disposed on opposite sides of the cut-away portion 12 in the upper face of the frame 10. Also disposed in the cut-away portions 11 at each side of the paper receiving zone is a character selecting or shifting key or bar 15. It will be noted that the cut-away portions 11 for the keys 14 and character shifting bars 15 are at the forward edge of the frame, and upon the rear portion of the frame is mounted an upstanding superstructure 16 (Figs. 16 and 19) which serves as a frame to support some of the mechanism, this superstructure being secured to the upper face of the frame 10 in any suitable manner such as by cap screws 17 (Figs. 5, 16 and 22).

Mounted between side plates in the superstructure or frame 16 is a cylindrical printing platen 18 (Figs. 1, 5 and 15). This platen is mounted in a horizontal position in the frame 16 for rotation about its longitudinal axis in any suitable manner, such as is usual in typewriting machines. This platen is of the usual slightly resilient material common to the platens of all typewriting machines. Alongside of the platen, but slightly spaced therefrom, is a tubular type bar holder 19 (Figs. 5, 7, 11, 19 and 20). This holder 19 is formed of a channel with a plate 19a (Fig. 20) disposed across the opening of the channel to close the same, the plate being removably confined to the channel in any suitable manner such as by screws 19b, the shanks of which pass through the plate 19a and are threaded into the bottom of the channel. The sides of the channel are provided with a plurality of pairs of alined slots 20 (Figs. 7 and 11) which extend downwardly from the open face of the channel in a

direction approximately at right angles to the axis of the platen, and in each pair of alined slots is mounted a type bar 21. This alignment of the slots is in the opposite sides of the channel, with the type bar entirely supported and guided in one pair of aligned slots. Each type bar thus extends through the front and rear faces of the holder 19 and is guided thereby for reciprocation endwise of itself toward and from the platen. On the end towards the platen, each type bar is provided with one or more printing characters 22 (Fig. 19) and where two or more characters are provided on each type bar they are spaced vertically so that the upper characters on the type bars will form one horizontal row or group, and the lower characters will form other horizontal rows or groups.

The tubular holder 19, as shown in Fig. 19, is disposed between, and at its ends is connected to, the side plates of a rocking frame 23 (Fig. 19) which is pivoted at 24 (Figs. 5, 7 and 8) to the frame 16 for rocking movement also about a horizontal axis. The tubular holder 19 is disposed between the pivots 24 and platen, and thus when the frame 23 is rocked about its pivotal supports the type bar holder 19, with the type bars carried thereby, will be shifted angularly from a normal position such as shown in Fig. 5 in which the upper row of characters on the type bars is in printing position along the platen, to a position such as shown in Fig. 7 in which the lower row of printing characters on the type bars will be in printing position along the platen. Because of this angular rocking movement, the forward ends of the type bars which carry the printing characters are made arcuate or cylindrically convex, with the centers of curvature of the arcuate ends approximately at the axis of the pivots 24 for the carrier, so that when the carrier is rocked to shift any row of printing characters of the type bars into printing position, the printing characters will always be approximately the same distance from the platen, thereby providing a uniform space between the characters and the platen in which the printing ribbon and paper may be disposed.

A comb-like stamping 25 of spring metal is secured in any suitable manner to the rocking frame 23 below the holder 19, and is provided with individual spring fingers or whisker springs 26 which project upwardly like the teeth of a comb through a slot 27 in the bottom of the holder 19 and into notches or slots 28 (Figs. 5, 7 and 19) provided in the lower edges of the type bars, it being understood that there will be an individual spring finger or whisker spring 26 for each type bar, so that each spring finger individually shifts its connected type bar resiliently in a direction away from the platen, but yields when the type bars are forced forwardly against the platen during a printing operation. While this comb or stamping 25 with whisker springs 26 may be mounted in any suitable manner, it is preferably removably clamped between plates 29 (Fig. 19) by screws 30, one or both of the plates 29 being extended between or connecting the side members of the carrier 23. The rear end of each type bar is convexly rounded for rocking engagement with upstanding ends 31 of key levers 32, which are pivoted on a common fulcrum 33 extending through the frame 16.

The levers 32 extend forwardly in groups at opposite sides of the frame 10, and at their forward ends terminate in upstanding stems 34 carrying the buttons or keys 14 on the upper ends thereof. Thus when any button or key 14 is depressed it will rock its lever 32 about its fulcrum 33, and carry its upstanding end 31 at the rear thereof forwardly against the convex rear end of a related type bar and force that type bar against the platen in a printing operation. Helical tension springs 35 (Fig. 5) connect the levers 32 individually to projecting arms 36 (Figs. 1 to 4) of a plate 37 which is secured in any suitable manner such as by screws 38 (Figs. 1 and 3) to the under face of the top of the frame 10. Because of the relatively close spacing of the levers 32, some of the springs 35 may be disposed along opposite side edges of the plate 37 from the others. These springs 35 continuously and resiliently urge the levers 32 upwardly at their key bearing ends, until the levers engage against a sound cushioning pad or stop bar 39 supported across that group of key levers 32, and mounted in a channel 40 which is secured by rivets 41 or other suitable means to curved depending arms 42 (Fig. 2) which are clamped to the under face of the plate 37 by the screws 38 (Fig. 3) which pass through both the plate 37 and the arms 42 and are threaded into nuts 43.

The sound deadening bar or stop 39 thus serves as a limit stop for the levers 32, and through the upstanding ends 31 thereof determines the retracted positions of the type bars 21. No limit stop is necessary to regulate printing strokes of the keys, because the engagement of the type bars with the platen limits the printing movements of the levers. Because of the convex arcuate rear ends of the type bars 21 they will rockingly engage with the upstanding ends 31 of the key levers in the different angular positions into which the type bars are rocked with the carrier 23, as will be observed by the different positions of the type bars shown in Figs. 5 and 7.

The printing ribbon is connected at its ends to a pair of ribbon spools 44 (Figs. 5 and 16) which at their ends are rotatably mounted in the frame 16, with one spool disposed above the other. The spindles of the spools extend at each end through the frame 16. On the extending spindle of the lower spool 44 at one side of frame 16 is fixed a gear 45 and on the extending spindle of the upper spool on the same side of frame 16 is fixed a gear 46. The gear 46 (Fig. 16) may be confined on a reduced threaded end of the spindle of the upper spool 44 by a nut 47 which is threaded upon the reduced threaded end of the spindle so as to clamp the gear 46 against a shoulder on the spindle and the gear 45 on the lower spool spindle may be similarly confined on that spindle. A plate 48 (Figs. 15 to 18) extends vertically past the gears 45 and 46 and is provided with slots 49 which slidingly straddle reduced zones on the inner ends of the nuts 47, so as to be slidingly guided and confined by the spindles of the two spools. The plate 48 may have an outwardly flanged upper end 50 which serves as a handle to shift the plate 48 vertically. The plate 48, at a point between the gears 45 and 46, is provided with a bearing boss 51 (Fig. 16) in which is rotatably mounted a short stub shaft or spindle 52. Upon the inner end of the shaft 52 is fixed a pinion 53 (Fig. 16), and upon the outer end of the shaft 52 is fixed a ratchet wheel 54. Thus when the plate 48 is shifted vertically it will shift the ratchet wheel 54 and pinion 53 as a unit with it vertically.

The pinion 53 is disposed in alinement with the gears 45 and 46, so that when the plate 48 is

shifted endwise it will shift the pinion **53** alternately into meshing engagement with the gears **45** and **46**, and thus provide a driving connection between the ratchet wheel and the gears **45** and **46** alternately, depending upon the position of the plate **48**. A holding dog or pawl **55** is pivoted at **56** to the plate **48** and engages with the teeth of the ratchet wheel **54** (Fig. 14) to limit rotation of the ratchet wheel **54** to one direction. The ratchet wheel **54** is given forward increments of rotation by a driving pawl **57** which is pivoted at **58** to a lug **59** secured in any suitable manner, such as by screws **60**, to a universal bar lever **61** which is also pivoted on the common key lever pivot or spindle **33**. The universal bar lever **61** includes arms pivoted on the pivot **33** at opposite sides of the machine and these arms are connected to one another by a channel shaped portion or bar **62** (Figs. 7 and 16).

In this channel is a resilient buffer bar or pad **63** which extends crosswise of the bank of upstanding key lever ends **31** so that when any key lever **32** is operated, its upstanding end **31** will engage the pad **63** of the cross bar **62** and thus rock the universal bar **61** forwardly and thus carry the driving pawl **57** forwardly. This drives the ratchet wheel **54** through a given increment of rotary movement. When the actuated key lever is released, it will be returned to its normal position by its spring **35**, and in doing so the universal bar **61** will be released and will thereupon be returned to its normal position against the entire bank of upstanding ends **31** by a suitable spring **64**. This will carry the pawl **57** back to a position ready for a new driving movement of the ratchet wheel **54**. The rotation of the ratchet wheel **54**, by small increments of movement, will be transmitted through the stub shaft **52** to pinion **53** (Fig. 16). The pinion **53** will drive whichever spool **44** it is geared to through one of the gears **45** or **46**.

In order to hold the plate **48** in different adjusted positions, I provide a pair of U-shaped spring members **65** (Figs. 14 to 18) which are secured to the frame **16** in a position to straddle or embrace the side edges of the plate **48** and yieldingly bear upon those edges. For example, two of such spring members **65** may be employed at different heights along the plate **48**. The arms of spring members **65** which bear against the edges of the plate **48** are provided with projections **66** (Fig. 18) which normally run in grooves **67** provided in the side edges of the plate **48**, and snap into notches **68** (Fig. 14) provided at intervals in the edges of the plate **48**. The notches **68** are so positioned in the plate **48**, with respect to the members **65**, that the arms of member **65** will snap into the lower set of notches **68** when the plate **48** is in its lower position connecting the pinion **53** to the gear **45** (as shown in Fig. 15), and will snap into the other or upper set of notches **68** when the plate **48** is raised to carry the pinion **53** into meshing engagement with the upper gear **46**. Thus the plate **43** will be yieldingly held in the two positions in which the pinion **53** is meshed with gear **45** or **46**.

It will be noted that the holding pawl **55** moves with the ratchet wheel and plate **48**, and the driving pawl **47** by reason of its pivot will also move vertically with the ratchet wheel, since it is free to ride by gravity on the upper edge of the ratchet wheel and remain in engagement with the ratchet wheel at all times. Thus by shifting the plate **48** vertically, one may cause one or the other spools **44** to be driven to wind the ribbon thereon, the ribbon of course unwinding from the other spool which is not so driven, and which is then free to rotate and retard the unwinding of the ribbon therefrom only by its own friction. A suitable frictional brake (not shown) may be applied to both drums if desired, but such friction brakes are very common and have been omitted in the interest of clarity, since they are not essential to the successful operation of the machine.

The ribbon **69** which is wound upon the spools, is guided from the lower spool **44** (Fig. 5) forwardly and around a horizontal guide roller **70** which is rotatably supported in a frame **71** removably attached to the frame **16**; and from this roller **70** the ribbon **69** passes upwardly through the space between the character bearing ends of the type bars and the platen, thence over a horizontally disposed roller **72**, thence rearwardly over another roller **73** and thence to the upper spool **44**. Thus the ribbon will be fed through printing position in front of the type bars in one direction or the other depending upon the position of the plate **48**.

It is important that the guide roller **72** be disposed as nearly as possible to the type bars and the platen, in order that the zone of the paper on the platen on which the printing is done be made visible, as quickly as possible after the printing thereon, to the operator while the machine is being carried and used. Provision must be made, however, for the rocking of the carrier **23** so as to shift the type bars as a group to position different rows of characters thereon in printing position. At the same time the ribbon should be so positioned that in being fed to printing position it does not rub against the printing characters on the type bars or against the paper to smudge the same, because the paper and the ribbon do not always move at the same linear rate of travel through printing position. Accordingly the ends of the guide roller **72** are received in slots **74** (Figs. 12 and 13) of brackets **75** which are secured to the side members of the frame **16**, with the slots **74** extending vertically, that is, parallel to the plane of the zone of the ribbon in printing position.

The carrier **23** carries arms **76** each with a slot **77** extending approximately radially of the axis of rocking of the carrier **23**, and the slots **77** straddle or embrace the ends of the roller **72**. Thus, as the carrier **23** is rocked from the position shown in Fig. 12 to the position shown in Fig. 13, which is also from the position shown in Fig. 5 to the position shown in Fig. 7, to bring the lower row of figures on the type bars into printing position, the slots **77** will force the roller **72** vertically along the slots **74**, and thus the roller **72** will move vertically and parallel to the plane of the zone of the ribbon in printing position, and will not change in any manner the angular position of the zone of the ribbon in printing position. By reason of the arcuate ends of the type bars which carry the printing characters, the characters will not rub against the ribbon which remains in the same plane in printing position, and the roller **72** is so positioned that the ribbon will not engage and smear the paper in printing position as it is fed along, regardless of whether the carrier **23** is in the position of Fig. 5 or of Fig. 7.

The carrier **23**, with the type bars mounted thereon, is urged resiliently into the normal po-

sition shown in Fig. 5 by a spring 78 (Figs. 5, 7 and 19), one end of the spring being connected to the carrier 23 (as shown in Fig. 19) and the other end being connected to a cross rod 79 passing between the side members of the frame 16.

Also pivotally mounted on the common pivot spindle 33 of the key levers 32 are a pair of character shifting levers 80 (Figs. 1, 2, 5 and 7), one being disposed with each group of keys at each side of the frame, and these levers extend forwardly and have upstanding ends carrying broad finger engaging portions or key surfaces 15, one at each side of the machine, that is, one for each group of keys. These levers 80 are independently rockable on the common pivot 33, and each has a vertical leg at the rear end of the frame which extends to a position above the end of the carrier 23. Each upstanding arm or leg of a lever 80, at its upper end carries a cam roller 81, which is rotatably secured on the lever 80 by an eccentric body 82 of a bolt 82*a*, the threaded shaft or stud of this bolt passing through a vertical slot 82*b* in the lever 80 and carrying a nut 82*c*. The end face of the head of the bolt 82*a* is provided with a screw driver slot 82*e*. By holding the eccentric head by means of a screw driver inserted in slot 82*e*, the nut 82*c* may be loosened by the application thereto of a wrench, and the bolt 82*a* then moved up or down in the slot 82*b* and turned by means of the screw driver engaging the head, until the cam roller is adjusted to proper position on a cooperating cam surface 83 (Figs. 7 and 8) provided on a cam plate 84 at that side of the carrier 23. Each plate 84 is secured to the carrier 23 in any suitable manner such as by a bolt 85. The head 86 (Fig. 9) of this bolt is rectangular in shape and is received between ears 87 on the cam plate 84, and a lock washer 88 is provided between the nut of the bolt and the opposite face of the frame plate of carrier 23. The lugs 87 keep the head 86 of the bolt from turning, and thus the angular position of the plate 84 on the carrier 23 may be adjusted to some extent by first loosening the bolt 85, adjusting the plate 84, and then tighteniong the bolt 85.

The inner face of each plate 84, that is, the face which abuts against the adjacent plate of the carrier 23, may be provided with projections or prong 89 (Fig. 10) which bite into the carrier 23 slightly when the bolt 85 is tightened, so as to prevent accidental rocking of the plate 84. The inclined cam surface 83 of each plate 84 terminates at the end nearest the pivot 24 of the carrier 23, in a dwell 90 upon which the roller 81 may ride when it reaches the end of the inclined zone 83. This will be after the carrier 23 has been rocked into the proper position to position the lower row of printing characters on the type bars in printing position. Since each cam roller 81 engages the carrier at the opposite side of the pivot 24 from the side which is attached to the spring 78, it follows that when either roller 81 is moved forwardly by depression of a character shifting bar or key 15, that roller will climb or ride upon the related cam surface 83 and rock the carrier 23 into the position shown in Fig. 7, and after the desired rocking of the carrier has occurred, any further depression of the operated character shifting key 15 will merely force that roller 81 along the dwell without any further rocking of the carrier 23.

Depression of either key 15 will cause a rocking of the carrier 23 through the action of a roller 81, and such rocking movement may be limited by the engagement of flanges or lugs 91 on the side plates of the carrier 23, with lugs 92 on the side plates of the frame 16. Movement of the carrier 23 in the opposite direction under the action of its spring 78 will be limited by the engagement of the same flanges or lugs 91 on the carrier 23 with lugs 93 also provided on the side plates of the frame 16. To make the machine noiseless, the flanges 91 on the carrier 23 may be encased with a band of sound deadening material such as resilient rubber 94 (Fig. 8). The lugs 92 and 93 at each side of the machine are secured to the side plates of the frame 16 in any suitable manner, such as by bolts 95 which pass through vertically extending slots in the side plates of the frame 16. The levers 80 are returned from depressed position by springs 35 in the same manner as the key levers 32. Each lever 80 (Figs. 1 to 4) passes beneath the stop cushions or pads 39 which limit the elevation of the key levers 32.

An adjustable stop plate 96 is secured, such as by a bolt 97, to each lever 80 beneath a pad 39. The plate 96 has a laterally flanged upper edge which engages with the under face of the adjacent stop pad 39, so as to provide a broad surface of contact with the stop pad, and lugs or ears 98 on the sides of the plate 96 engage with a rectangular shaped nut 99 on the bolt 97, so as to prevent rotation thereof. The plate 96 has a vertically elongated slot 100 through which the bolt 97 passes, so that the plate 96 may be adjusted vertically to some extent to limit the return movement of that lever 80. Thus the plates 96 may be adjusted so that each key will fully release the carrier 23 before it reaches its retracted or return position, and the carrier 23 will thus be limited in its return movement by the stops 93.

As in my prior Patent No. 1,954,834, the paper is conveniently of the folded type which is stored in one tray, fed through printing position and then received in another tray. Accordingly, between the groups of keys within the cut-away portion 12 of the frame 10, I dispose a lower tray 101 which carries a supply of paper to be printed upon, and above it an upper or paper receiving tray 102 which receives the paper after being printed upon. The paper web 103 (Fig 5) from the tray 101 is guided upwardly by a roller 104 also carried on the brackets 71, and then is conducted in front of the ribbon to a guiding and feeding plate 105 immediately below the platen, which feeds and guides the paper web 103 upwardly toward the printing position on the platen, thence the paper goes around the platen 18 and then downwardly to the upper tray 102. The plate 105 guides the paper web to printing position in front of the ribbon and in alinement with the type bars, and the paper web is confined to the platen by a pressure roller 106 which is rotatably mounted in arms 107 which are pivoted at 108 to the side plates of the frame 16.

Springs 109 are connected between suitable parts of the frame 16 and the arms 107, so as to urge the latter in directions to force the roller 106 against the platen and confine the paper thereto at the side of the platen approximately opposite from the printing position or printing zone, as shown in Fig. 5. The upper ends of the arms 107 are connected by a bar 111, so that the two arms 107 and bar 111 form a bail and move as a unit. The lower edge of the bar 111 is provided with serrations or teeth 112 which serve as

a tearing off edge for the paper web. Thus by pressing the descending zone of the paper web as it leaves the platen, against the under edge of the tear-off bar 111, the excess paper, which has fallen into the upper tray, may be torn off, the tearing being aided by the teeth on the tearing off edge. A guide plate 113 (Fig. 5) is supported by the cross bar 110 in a position to extend vertically along the strip of the ribbon which passes upwardly between the rollers 70 and 72, so as to keep the paper from striking the ribbon as the paper moves from the lower paper tray up to the platen. Ink on the paper before it reaches the printing point would reduce legibility.

The lower tray 101 is preferably mounted in any suitable manner to move vertically to some extent, so as to accommodate different sizes of pads of paper. While the mounting of the tray 101 for vertical movement may utilize merely guides for the ends of the tray, in the example illustrated, the tray 101 (Fig. 5) is suspended at both ends by parallel links 114 from the lower part of the frame, as shown by full lines in Fig. 5, the links 114 being pivoted to both tray and frame, so as to guide the tray between the dotted and full line positions shown in Fig. 5. The sides of the tray 101 are provided with apertures or cavities 115 adjacent one end thereof, and as the tray 101 is swung upwardly into a position within the frame 10, which is from the full line to the dotted line position in Fig. 5, the apertures 115 will become alined with and engaged by pins 116 (Fig. 6), provided on spring arms 117 that are carried by bearing brackets 118 projecting inwardly from the forward edge of the frame 10. The pins 116 are semi-spherical at their free ends so that they will easily snap into the apertures 115 and yieldingly hold the tray 101 in its elevated position within the frame 10, but yet will yield and release the tray 101 when one desires to pull it downwardly into the suspended position shown in Fig. 5. The links 114 suspending the lower tray 101 are hinged to brackets 118 at the forward end of the frame 10, and to bearing brackets 119 at the rear of the frame. The bearing brackets 119 have projecting ends 120 which, by engagement with the pivotal connections between the tray 101 and the lower ends of the links 114 at the rear of the frame, limit the upward swinging movement of the tray 101 as the latter swings upwardly into the dotted line position in Fig. 5. In ordinary use, when using a pad of paper of ordinary size, the lower paper tray 101 is in the up position, but when the operator desires to use a large pad of paper, as for example, when he is reporting a court case that requires several hours of steady work without stopping to renew the paper, he pulls down the lower tray 101 and inserts a large pad of paper.

The upper tray 102 (Fig. 5) is hinged, intermediate of its ends and at opposite sides thereof, by pins 121 to links 122, which in turn are hinged at 123 to the bearing brackets 118. The tray 102 is also provided with laterally extending ears 124, near the inner end thereof, which rest upon the upper surface of the frame 10 at the sides of the slot 12, and thus support the inner end of the tray at the proper level and position. When the tray 102 is supported in an approximately horizontal position in this manner, the links 122 are approximately horizontal, as shown in Fig. 5. When one desires to obtain access to the lower tray 101, such as for the purpose of inserting a new supply of paper therein, the tray 102 may be lifted and swung upwardly and forwardly, that is, away from the frame 10 such as into the dotted line position E in Fig. 5. During this movement, the links 122 carry the outer end of this upper tray 102 upwardly and forwardly, and since the inner end of this tray has previously been resting merely upon the upper face of the frame 10, this inner end may be swung upwardly into a vertical position as shown by the dotted lines E in Fig. 5. After a paper web has been inserted and threaded up to and around the platen, the tray 102 may be swung back into the full line or horizontal position of Fig. 2.

The frame 10 is notched in its upper vertical edge at the front of the machine, the notch being designated 125 in Fig. 5, and is alined with the tray 102. The links 122 may have flanges 126 (Fig. 5) extending toward one another so as to engage with the under face of the tray 102 and form a support therefor, when the tray is in its full line position shown in Fig. 5. The outer end 102a of the tray 102, which extends through and outwardly from the notch or slot 125 is hinged to the remainder of the tray by pins 127, so that when the machine is not in use, this outwardly projecting end 102a may be swung from the full line position in Fig. 5 upwardly and over upon the rest of the tray into the dotted line position F in Fig. 5. Thus, when the machine is not in use this tray 102 may be contracted in over-all length so that the machine may be stored within a relatively small carrying case (not shown).

The notch 125 is normally closed by a door 128 which is hinged at its lower edge to the frame 10 by a pintle 129, it being noted that the pintle is disposed in a recess or cavity somewhat below the lower edge of the notch or slot 125, and this door 128 swings outwardly and downwardly to enable the hinged end 102a of tray 102 to be swung outwardly into extended position shown in full lines in Fig. 5. A spring wire or rod 130 is secured to the inner face of the door 128 at a short distance from its pivoted edge, and this spring rod or wire 130 extends in both directions from its anchorage to the inner face of the door 128, so as to engage against the inner face of the frame 10 at both sides of the notch 125, and extend past the sides of the notch for a substantial distance. When the door 128 is swung outwardly and downwardly, such as into the position shown by full lines in Fig. 5, the spring rod 130 will flex, with its ends continuing to project angularly through the notch 125 of the frame into the interior of the frame, and then when the door 128 is released and is free to move, this spring rod 130 as it attempts to straighten itself, will retract the door 128 into closed vertical position.

It will be noted that when the tray 102 is in its normal, horizontal position, the links 122 are approximately horizontal and hinged to the tray at a substantial distance from the outer end. Thus, when the tray 102 is swung upwardly to the dotted line position E in Fig. 5, the joint between the sections will move upwardly and over the top of the door 128 without pushing the door very far in an opening direction, and then the tray can be swung into the vertical position E shown by the dash lines in Fig. 5, at which time the tray will pass down the outer face of the door, and the links 122 will extend along the inside of the door 128. The position of the door at this time is shown by the dash line position G in Fig. 5. The tray and its links 122 thus straddle the door at its upper edge, so that the

door 128 never is forced open any further than is shown by the full lines in Fig. 5, and the wire 130 will never be pulled entirely out of the notch 125.

It frequently happens that the operator desires to operate the machine while standing or walking about, and therefore I provide a bail or hanger 131 (Figs. 1, 5 and 7) which is hinged at 132 to the upper end of the superstructure frame 16, preferably adjacent the rear edge thereof. This hanger 131 engages with an abutment 133, when swung into vertical position as shown in Fig. 7, and this limits further rotation of the hanger. The hanger may be then supported about the operator's neck in any suitable manner, such as by a strap 134 (Fig. 7) which passes through an eye or loop 135 in the hanger and around the operator's neck, or the strap may be fastened to some part of the operator's clothing. The machine is preferably supported from the operator's person at approximately the waist level, so that the operator's arms will extend nomally in an approximately horizontal direction with the hands over the keyboard. If one is sitting, the frame may be supported on one's lap, and in that event or when the machine is not in use, the hanger 131 may, if desired, be swung down upon the top of the machine, as shown in Fig. 1. This position is also shown in Fig. 5 by the full lines, and in the suspending position by the dash lines. The mechanism supported within the superstructure frame 16 may be enclosed, on its top, rear and sides, by a casing 136 which is secured at its top to the frame 10 in any suitable manner such as by thumb screws 137.

The means for rotating the platen by increments of angular movement so as to feed the paper through printing position will next be described. At one end of the platen is attached a suitable clutch 138 (Figs. 1 and 22) and I have found that a one-way roller clutch is particularly suitable for this purpose. This type of clutch is well known in the art and hence is shown only generally. The movable member of the clutch, by which it is operated to feed the platen through increments of movement, is, in the illustrated example, an arm 139 projecting therefrom radially to the longitudinal axis of the platen. A link 140 is pivoted at one end by pivot pin 141 to the arm 139, and at its other end is pivoted by a pin 142 to one end of another link 143, and the latter is pivoted at its other end by pin 144 to the frame 10. It will be noted that the links 140 and 143 form a toggle linkage connected between the pivot 144 and the arm 139 of the one-way roller clutch, and when the toggle is straightened out or moves into or toward dead center position, the arm 139 will be moved annularly, and through the clutch will give the platen a given angular increment of rotation. When the toggle is broken, the arm 139 will be pulled backwardly, ready for a new feeding operation of the platen.

A spring 145 is connected to the toggle linkage, such as to the lever 140, and also to a suitable pin 146 on the frame, so as to apply a continued resilient force to the toggle linkage tending to break it, that is, carry it out of dead center position to one side thereof, as shown in Fig. 22. One of the links, such as the link 143, is pivotally connected by a pin 147 to a link 148, the other end of which is pivotally connected by pin 149 to one arm of a bell crank lever 150. The one arm of the bell crank lever 150 is pivotally connected by a pin 151 to one end of a link 152, the other end of that link being pivotally connected by a pin 153 to an arm 154. The arm 154 is carried by the universal bar 61 at the opposite end from the arm 59 which is attached to the driving pawl 57.

When the universal bar 61 (Fig. 22) is rocked forwardly, such as by the actuation of any one of the keys 14, not only is the pawl 57 operated to feed the ribbon a step, but the arm 154, which also rocks forwardly with the universal bar, acts through the link 152, bell crank lever 150 and link 148 to rock the toggle formed by the links 140 and 143 toward the dead center or straight position which causes the arm 139 of the ball clutch to move forwardly in the direction of the arrow in Fig. 22 and feed the platen a given increment of movement, and this movement of the platen feeds or moves the paper ahead a given distance. As soon as any key 14 is released, the universal bar will be released and the spring 145 will break the straight or dead center position of the toggle and in doing so retract the arm 139 and return the universal bar to its normal position. If desired a spring 145a (Fig. 22) may be connected directly to link 152 which is in turn connected to the universal bar for aiding in this return movement.

In the operation of this typewriting machine, the bail or hanger 131 may be swung into upright position, such as shown by full lines in Fig. 7, and suspended from the neck or other part of the operator at approximately the operator's waist line, so that the operator's arms will lie along opposite sides of the machine with the hands over the keyboard convenient for manipulation of the keys. The lower tray 101 is preferably, although not necessarily, swung downwardly into the position shown in full lines in Fig. 5, and the hinged end 102a of the upper tray is swung outwardly into the position shown in full lines in Fig. 5. Assuming that the ribbon and paper have been fed through printing positions along the platen, the operator merely has to manipulate the keys 14, and the latter through the key levers 32 will force the type bars individually toward the platen, and through the ribbon will print upon the paper carried in printing position on the platen. The whisker springs 26 retract the type bars individually as soon as they are released.

When one desires to print from another or the lower row of characters on the type bars, it is merely necessary to depress one of the character shifting keys 15, which will be found at the extreme forward edge of the keyboard, and this causes the roller 81 connected with that lever to ride up the adjacent inclined cam surface 83 and rock the carrier 23 from the position shown in full lines in Fig. 5 to the angular position shown in Fig. 7. When this position is reached, the roller 81 will ride along the dwell 90 on the cam surface, and this dwell 90 preferably has a center of curvature approximately at the common pivot 33 for both of the levers 80, so that an increase in movement of the character shifting lever 80 will not carry the lower row of type bars past printing position. This printing position will be also determined by the engagement of the tail of the carrier 23 with the lower stop 92. The contact of a roller 81 with the adjacent dwell 90 acts to lock the carrier in this other position where printing is solely from the lower row of printing characters on the type bars.

When one desires to set the mechanism to print again from the upper row of printing char-

acters on the type bars, the lever 80 is returned to its former position, during which the roller 81 of that key again rides down the inclined cam surface 83 and releases the carrier 23, whereupon the spring 78 returns the carrier 23 to the position shown in full lines in Fig. 5, which position is determined by the engagement of the buffer 94 on the tail of the carrier 23 with a stop 93. As each key 14 is operated, it will operate the universal bar 61, and the latter, through the pawl 57, will rotate the ratchet wheel 54 and thus one of the ribbon spools in a direction to wind the ribbon thereon to a slight extent, thus feeding the ribbon past the printing position on the platen by a small increment of movement. At the same time the toggle mechanism connected to the other end of the universal bar, which is shown in Fig. 22, is shifted into dead center position and in doing so gives the platen a small angular turn which feeds the paper ahead.

The paper is of course confined against the platen so as to be fed therewith by the resilient pressure of the roller 106 against the paper and under the action of the spring 109. The paper leaving the platen will be directed downwardly where it will normally fall into the upper tray, but the falling section may, if desired, be torn off along the lower edge of the tear bar 111. It will be noted that immediately after the paper is printed upon, it will move over the top of the platen where it is easily and immediately visible to and readable by the operator, and it will be further noted that when the carrier 23 is rocked, the ribbon guide roller 72 is moved vertically slightly to provide clearance for the type bars, by the mechanism shown in Figs. 12 and 13, which makes it possible to position the roller 72 normally very close to the platen and to the printing type bars, and yet properly position the ribbon in printing position at all times so that the ribbon will not rub against the printing characters on the type bars or against the paper as it is fed forwardly by the ribbon feeding mechanism. After the ribbon has been fed in one direction nearly as far as it will go, the operator should move the plate 48 vertically in one direction or the other so as to connect the ratchet 54 drivingly to the other ribbon spool and thus wind the ribbon in the other direction through similar increments of movement.

It will be understood that various changes in the details and arrangements of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention, as expressed in the appended claims.

I claim as my invention:

1. In a typewriting machine, a frame, a platen cylinder mounted in said frame for rotation about its longitudinal axis, a type bar holder disposed parallel to and slightly spaced from said platen, type bars extending through said holder and guided thereby for individual reciprocation toward and from said platen, whisker springs engaging said type bars and urging them individually in a direction away from said platen, each type bar having a plurality of printing characters on the end thereof adjacent the platen and arranged in vertically spaced relation on the type bar, a carrier mounting said holder and pivoted for vertical rocking movement to carry the type bars vertically past the platen to a limited extent, whereby when the carrier is rocked, different horizontal rows of characters on the type bars will be carried into printing position opposite the platen, and key actuated means individually and rockably abutting said type bars for actuating them individually towards the platen for causing printing movements of said type bars.

2. In a typewriting machine, a frame, a platen cylinder mounted in said frame for rotation about its longitudinal axis, a type bar holder disposed parallel to and slightly spaced from said platen, type bars extending through said holder and guided thereby for individual reciprocation toward and from said platen, whisker springs engaging said type bars and urging them individually in a direction away from said platen, each type bar having a plurality of printing characters on the end thereof adjacent the platen and arranged in vertically spaced relation on the type bar, a carrier mounting said holder and pivoted for vertical rocking movement to carry the type bars vertically past the platen to a limited extent, whereby when the carrier is rocked, different horizontal rows of characters on the type bars will be carried into printing position opposite the platen, key actuated means individually and rockably abutting said type bars for actuating them individually towards the platen for causing printing movements of said type bars, said carrier having a cam surface, a roller riding on said cam surface and camming said carrier positively in one direction when the roller moves in one direction along the cam surface and releasing it when the cam roller moves in the opposite direction along the cam surface, means for yieldingly urging said carrier in the direction opposite from the movement caused by said cam roller thereon, and means for operating said cam roller in a prescribed path in said one direction to cause rocking movements of said carrier.

3. In a typewriting machine, a frame, a platen cylinder mounted in said frame for rotation about its longitudinal axis, a type bar holder disposed parallel to and slightly spaced from said platen, type bars extending through said holder and guided thereby for individual reciprocation toward and from said platen, whisker springs engaging said type bars and urging them individually in a direction away from said platen, each type bar having a plurality of printing characters on the end thereof adjacent the platen and arranged in vertically spaced relation on the type bar, a carrier mounting said holder and pivoted for vertical rocking movement to carry the type bars vertically past the platen to a limited extent, whereby when the carrier is rocked, different horizontal rows of characters on the type bars will be carried into printing position opposite the platen, key actuated means individually and rockably abutting said type bars for actuating them individually towards the platen for causing printing movements of said type bars, said carrier having a cam surface, a roller riding on said cam surface and camming said carrier positively in one direction when the roller moves in one direction along the cam surface and releasing it when the cam roller moves in the opposite direction along the cam surface, means for yieldingly urging said carrier in the direction opposite from the movement caused by said cam roller thereon, means for operating said cam roller in a prescribed path in said one direction to cause rocking movements of said carrier, and stops disposed to limit the rocking movements of the carrier to positions in which the

printing characters are disposed in proper printing positions opposite the platen.

4. In a typewriting machine, a frame, a platen cylinder mounted in said frame for rotation about its longitudinal axis, a type bar holder disposed parallel to and slightly spaced from said platen, type bars extending through said holder and guided thereby for individual reciprocation toward and from said platen, whisker springs engaging said type bars and urging them individually in a direction away from said platen, each type bar having a plurality of printing characters on the end thereof adjacent the platen and arranged in vertically spaced relation on the type bar, a carrier mounting said holder and pivoted for vertical rocking movement to carry the type bars vertically past the platen to a limited extent, whereby when the carrier is rocked, different horizontal rows of characters on the type bars will be carried into printing position opposite the platen, key actuated means individually and rockably abutting said type bars for actuating them individually towards the platen for causing printing movements of said type bars, means for feeding a ribbon between the type characters and the platen, said carrier having a cam surface, a roller riding on said cam surface and camming said carrier positively in one direction when the roller moves in one direction along the cam surface and releasing it when the cam roller moves in the opposite direction along the cam surface, means for yieldingly urging said carrier in the direction opposite from the movement caused by said cam roller thereon, means for operating said cam roller in a prescribed path in said one direction to cause rocking movements of said carrier, said ribbon feeding means including a guide disposed adjacent the platen and over which the ribbon passes after passing printing position, means supporting said guide for movement in a direction parallel to the plane of the ribbon while in printing position, and means acting between said carrier and said guide for forcing said guide in said direction during the rocking movements of the carrier, whereby the said guide may be positioned in close proximity to said platen and printing characters and will be shifted when necessary to permit the shifting of the groups of printing characters into printing position and will position the ribbon normally out of contact with said type characters and paper in both positions of the carrier.

5. In a typewriting machine, a cylindrical platen, a type bar holder disposed along said platen, individual type bars extending through and supported entirely by said holder for individual reciprocation endwise of themselves toward and from the platen, each type bar having on its end adjacent the platen a pair of spaced printing characters, means rockably mounting said holder so as to shift all of the type bars as a unit to carry the characters of said pairs alternately into printing position along the platen, key operated means individually operable against said type bars and free of any support of said bars to urge them towards said platen, means for individually retracting each type bar when released by said key operated means, and means selectively operable for rocking said holder to determine which of the characters of each pair on each type bar will be in printing position.

6. In a typewriting machine, a cylindrical platen, a type bar holder disposed along said platen, individual type bars extending through and supported entirely by said holder for individual linear reciprocation endwise of themselves toward and from the platen, each type bar having on its end adjacent the platen a pair of spaced printing characters, which characters together form two rows running approximately parallel with the platen, means mounting said holder for movement to carry said rows of printing characters alternately into printing positions along said platen, and individual, key operated means free of any support of said bars and engageable with said type bars for urging the same individually toward and from the platen to print in both positions of said holder.

7. In a typewriting machine, a platen, a tubular type bar holder disposed alongside said platen and having an approximately horizontal channel member disposed with its open face on top and a removable top plate normally closing said open face, with slots in opposite arms of said channel member and extending downwardly from said open top face, with those in one channel arm alined with those in the opposite arm, a plurality of type bars extending transversely through said holder and disposed in said alined slots and confined in said holder by said removable top plate, said bars being guided by the slots for endwise, individual reciprocation toward and from said platen, whisker springs engageable individually with said type bars for urging said bars individually away from said platen, printing characters on the ends of said type bars towards said platen, and key actuated means operable individually on said type bars for urging them individually toward said platen to print thereon.

8. In a typewriting machine, a platen, a tubular type bar holder disposed alongside said platen and having an approximately horizontal channel member disposed with its open face on top and a removable top plate normally closing said open face with slots in opposite arms of the channel member extending downwardly from said open top face, with those in one channel arm alined with those in the opposite arm, a plurality of type bars extending transversely through said holder and disposed in said aligned slots and confined in said holder by said removable top plate, said bars being guided by the slots for endwise, individual reciprocation toward and from said platen, whisker springs engageable individually with said type bars for urging said bars individually away from said platen, printing characters on the ends of said type bars towards said platen, a carrier mounting said holder, each type bar having a plurality of printing characters thereon and spaced vertically from one another so as to provide a plurality of rows of printing characters on the group of type bars, which rows are parallel to said platen, means selectively operable for shifting said carrier and through it said holder and the group of type bars into different positions in which different rows of said characters will be operable to print against said platen upon reciprocation of any type bars, and key actuated means operable on said type bars for urging them individually toward said platen to print thereon.

9. In a typewriting machine, a platen, a tubular type bar holder disposed alongside said platen and having an approximately horizontal channel member disposed with its open face on top and a removable top plate normally closing said open face with slots in opposite arms of the channel member extending downwardly from said open top face, with those in one channel arm alined with those in the opposite arm, a plurality of type bars extending transversely through said holder

and disposed in said alined slots and confined in said holder by said removable top plate, said bars being guided by the slots for endwise, individual reciprocation toward and from said platen, whisker springs engageable individually with said type bars for urging said bars individually away from said platen, printing characters on the ends of said type bars towards said platen, a carrier mounting said holder, each type bar having a plurality of printing characters thereon and spaced vertically from one another so as to provide a plurality of rows of printing characters on the group of type bars, which rows are parallel to said platen, means rockably mounting said carrier so as to rock said group of type bars as a unit past the platen so as to position different rows of printing characters thereon successively in printing positions, said type bars reciprocating toward and from approximately the axis of rocking of said carrier, and having arcuate, convex surfaces, and key actuated means having rocking engagement with said convex surfaces of said type bars for forcing the latter individually and selectively towards said platen in all rockable positions of said carrier.

10. In a typewriting machine, a frame, a platen mounted on said frame to rotate about a horizontal axis, printing means disposed adjacent one side of the platen at approximately a horizontal plane through said axis and operable toward and from the platen to print thereon, a keyboard on the opposite side of the platen from said printing means, and operable on said printing means, means for guiding a strip of paper upwardly between said printing means and said platen and then towards said keyboard, means engageable with a side of the platen diametrically opposite from the printing means and also disposed approximately at said horizontal plane through said axis for confining against said platen the paper strip after passing the printing means, and guiding it downwardly from the platen, and a tear-off bar having a tearing edge disposed just beyond said confining means, along which edge the strip may be torn off after leaving said confining means and the platen, whereby the paper strip will be in full unobstructed view for a maximum travel after passing the printing means.

11. In a typewriting machine, a frame, a horizontally extending roller platen, a type bar holder disposed at one side of the platen and running in a direction generally parallel thereto, a plurality of type bars arranged side by side and mounted in and entirely supported and guided by said holder for individual linear reciprocation toward and from said platen, key operated levers having operating ends disposed at the rear of said holder with each lever engaging and operating an individual type bar, whereby each type bar is driven toward the platen by operation of its related key operated lever, each of said type bars having a notch in its lower edge, and a support extending beneath said type bar holder and having a plurality of leaf whisker springs extending upwardly therefrom and individually engaging in said notches for retracting said type bars in a direction away from said platen.

12. In a typewriting machine, a platen, a tubular type bar holder disposed alongside said platen and having slots in its front and rear faces with those in the front aligned with those in the rear and the aligned slots arranged in a row along the length of the holder, a plurality of type bars disposed one in each pair of aligned slots and entirely supported and guided thereby for linear individual reciprocation toward and from said platen, said holder being open along its lower side, a support disposed below and running in a direction generally parallel to said holder and having individual whisker springs extending through the open bottom part of said holder and engageable individually with said type bars for urging said bars individually away from said platen, a printing character on the end of each type bar towards the platen, and key actuated means operable individually on said type bars for urging them individually towards said platen to print thereon.

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