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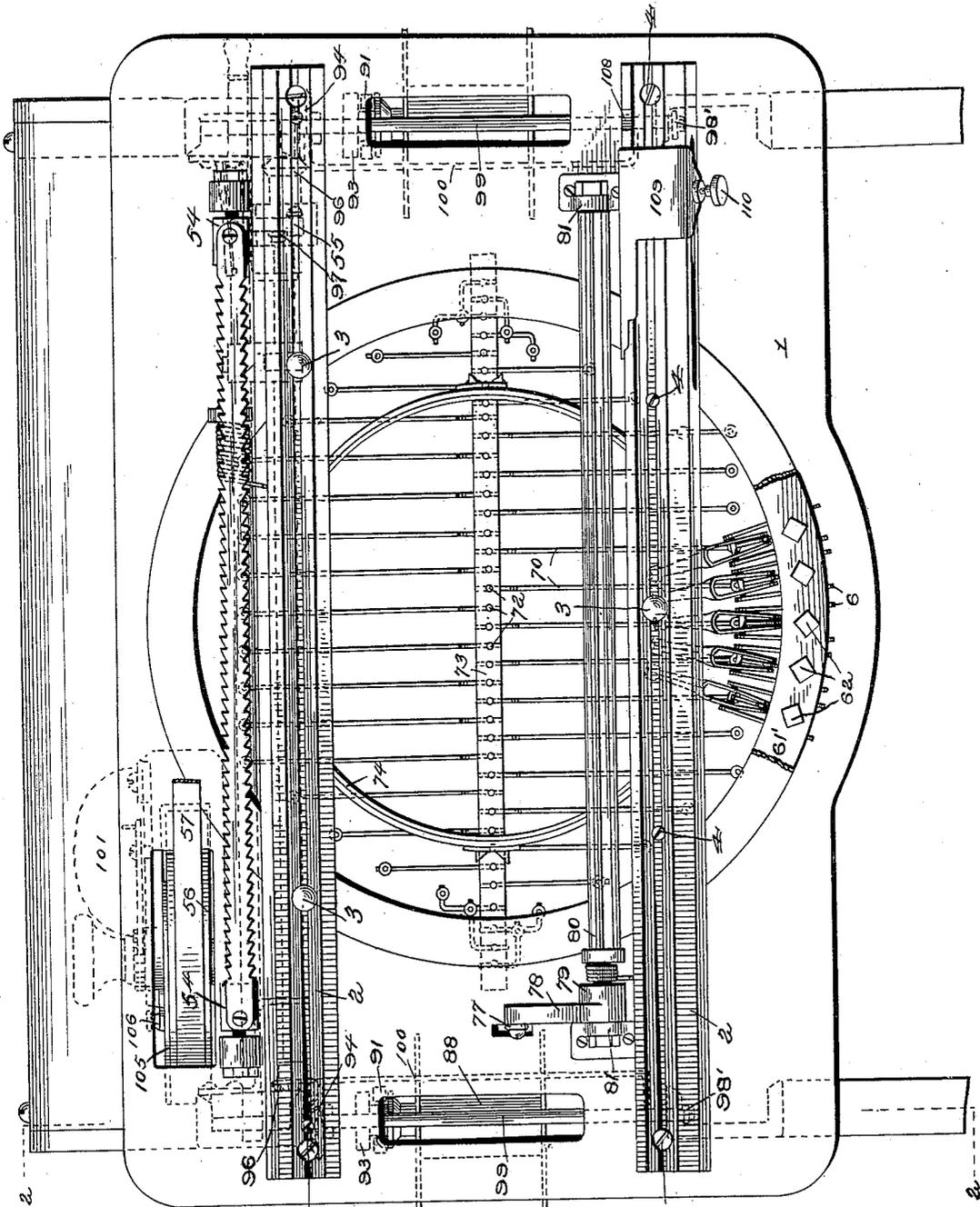
Patented Nov. 29, 1898.

W. R. FOX & G. J. BARRETT.
TYPE WRITING MACHINE.

(Application filed Oct. 19, 1896.)

(No Model.)

5 Sheets—Sheet 1.



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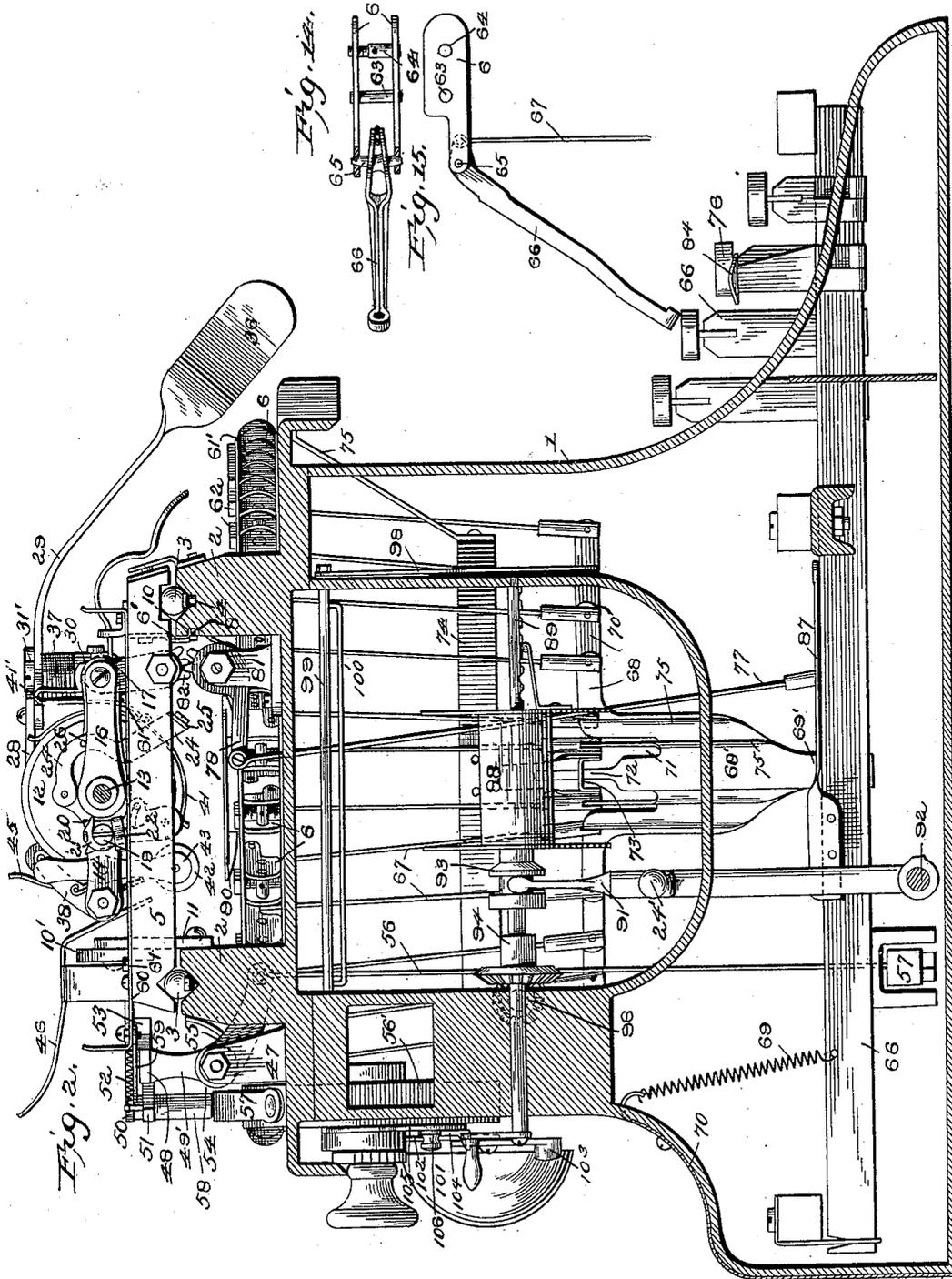
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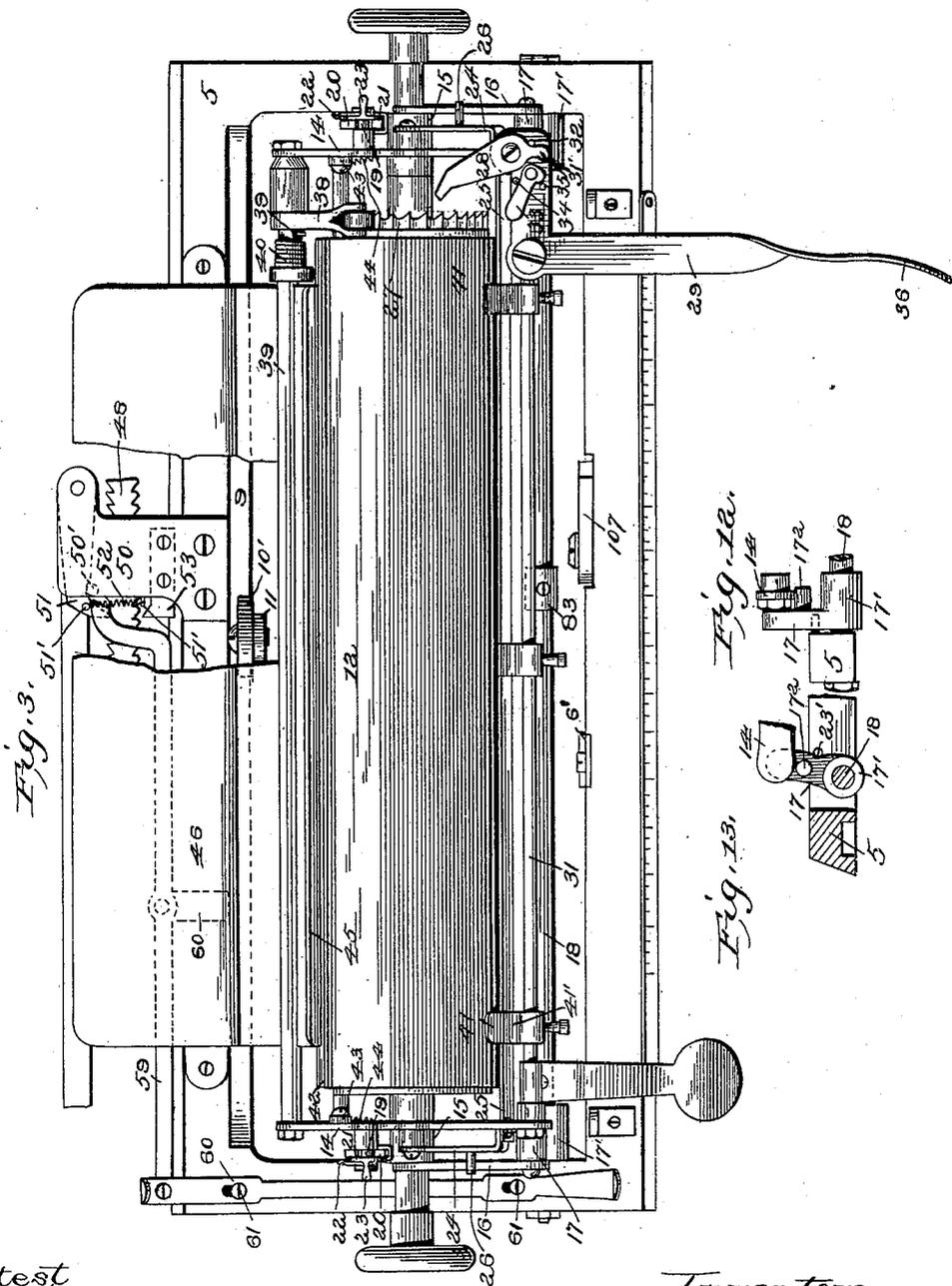
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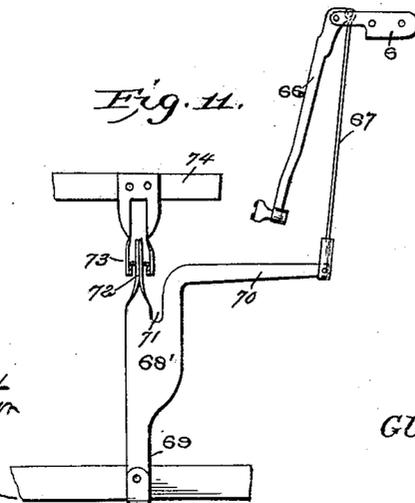
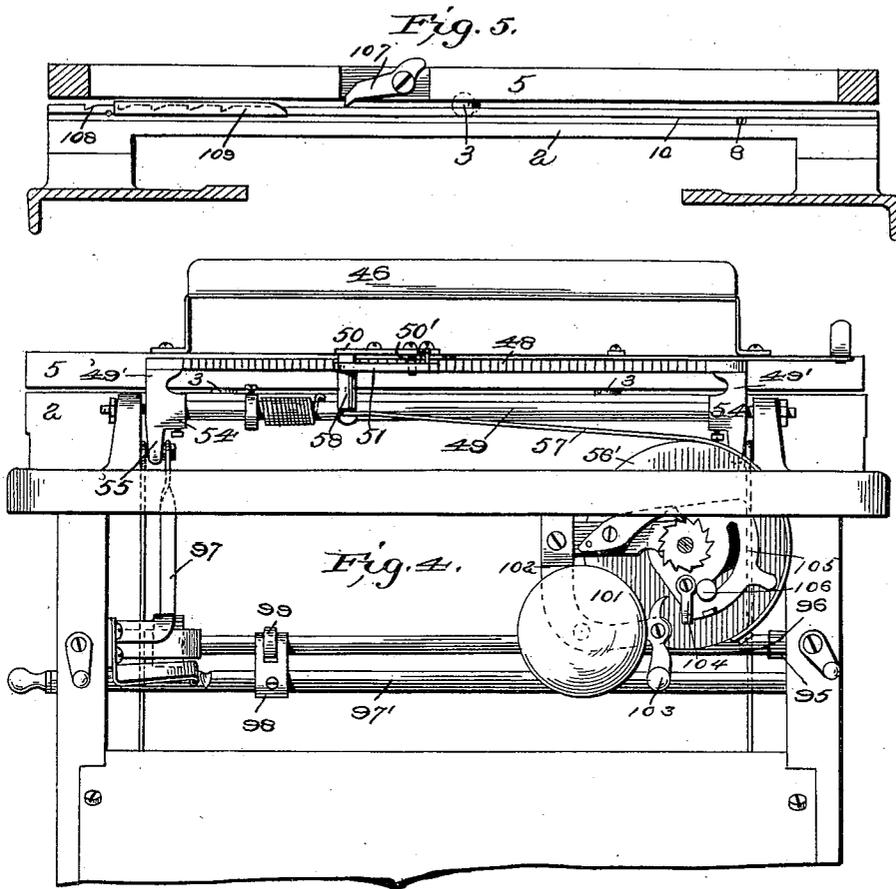
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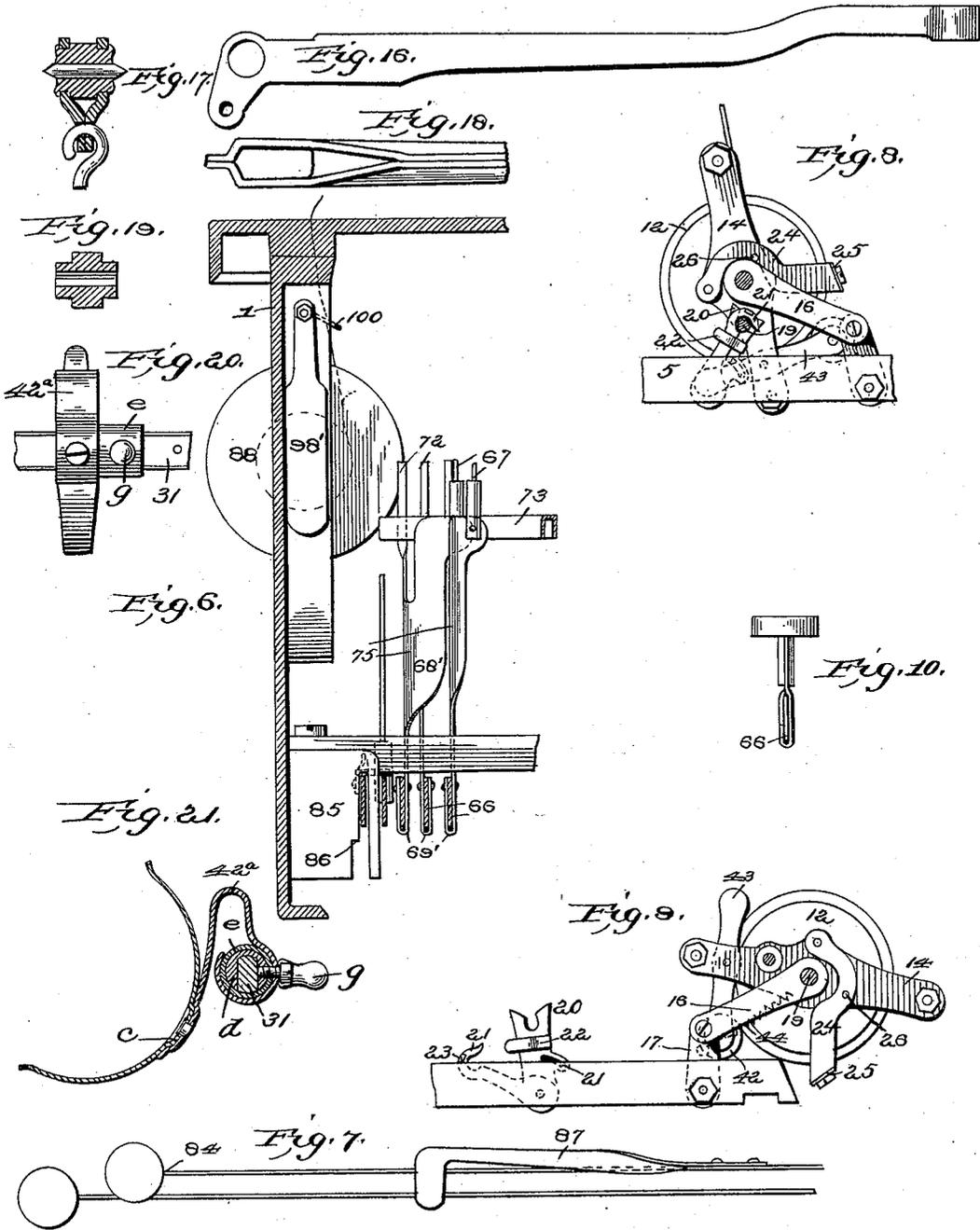
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(No Model.)

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UNITED STATES PATENT OFFICE.

WILLIAM R. FOX AND GLENN J. BARRETT, OF GRAND RAPIDS, MICHIGAN,
ASSIGNORS TO THE FOX MACHINE COMPANY, OF SAME PLACE.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 614,943, dated November 29, 1898.

Application filed October 19, 1896. Serial No. 609,332. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM R. FOX and GLENN J. BARRETT, citizens of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

Our invention relates to type-writing machines of that class in which pivoted key and type bars are employed and the type-bars are arranged in basket form.

The object of the invention is to improve the whole machine both in the manufacture and operation thereof.

The machine includes the particular arrangement and operation of the connection for securing the platen to the carriage.

It further includes the escapement mechanism and the link connections between the key-bars and the type-levers, and it also includes the arrangement of the writing-scale.

It further includes the details of construction, as will be hereinafter described, and particularly pointed out in the claims.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of the machine with the carriage removed therefrom. Fig. 2 is a section on line 2 2 of Fig. 1. Fig. 3 is a detail plan view of the carriage. Fig. 4 is a detail of a portion of the rear of the inner part of the machine, showing the bell and ribbon-feed mechanism. Fig. 5 is a detail front elevation showing the marginal stop device. Fig. 6 is a detail front sectional view of one end of the machine, showing the upper-case locking-plate, the semaphore, and part of the connecting-links between the key-levers and the type-bars. Fig. 7 is a detail view of the upper case and supplemental keys. Fig. 8 is a detail end view showing the platen raised for inspection of the work. Fig. 9 is a similar view showing the platen thrown forwardly of the front bar of the carriage to expose the type. Fig. 10 is a detail showing the connection between the horizontal and vertical parts of the key-levers. Fig. 11 is a detail side elevation of the key-lever,

type-bar, connecting-link between the same, the guide-bar for said link, and the bracket for supporting said bar. Figs. 12, 13, 14, and 15 are detail views. Figs. 16 to 21 are detail views of modifications.

The frame 1 is of substantially the ordinary form except that it has the parallel tracks 2 2 on the top thereof, these tracks being arranged near the front and rear edges of the frame and extending almost the entire length of the same. V-shaped ways are formed in the tracks to receive the balls 3, suitable stops 4 projecting into the ways to limit the movement of the same. The carriage 5 is of rectangular form, and the longitudinal bars thereof are recessed in their under faces to form ways for the balls 3, similar to those in the tracks, with the exception that a widened rectangular recess having a flat bottom wall is made in the front bar of the carriage instead of a V-shaped recess. The two rear recesses having the balls between thus aline the carriage when it is placed in position, the wider recess allowing a slight movement sufficient to compensate for any difference in alinement between the recesses in the tracks and those in the carriage. The carriage is wholly supported and movable on the balls. The front portion of the carriage is held down in place by a clip 6', secured in a recess in the rear side of the said front bar, having an inwardly-turned lower end that extends into a groove 10, running longitudinally of the rear side of the front track 2. A stop 8 is placed in this groove, against which the clip 6 strikes when the limit of the carriage movement to the left has been reached. The rear bar of the carriage has its upper face cut away at its front edge to form the inner way 9, along which a roller 10' rides as the carriage is reciprocated. This roller is journaled on a stud projecting from the rear face of a bracket 11, bolted to the intermediate front part of the front side of the rear track 2, and serves to hold the rear part of the carriage down in position.

The platen 12 has the shaft 13 extending from each end thereof, on which the plates 14 are fixed. Arms 16 are pivoted at one end to the shaft 13 and are separated from the plates

14 by suitable collars or space-blocks 15, carried by said shaft. The opposite ends of the arms 16 are pivotally connected to the ends of links 17, having enlarged bosses 17' journaled on a rod 18, running longitudinally of the carriage and fixed in end bars thereof. On these links and arms the platen is moved from its normal position from between the side bars of the carriage or in rear of the front bar to the position shown in Fig. 9, in front of the front bar. In the latter position the type are exposed and may then be cleaned. The links 17 have pins or lugs 17² extending inwardly therefrom, upon which the forward ends of the plates 14 rest when the platen is in normal position. The plates 14 have headed studs 19 extending therefrom and adapted to rest in the forked end of the links 20, pivoted to the inner faces of the end plates of the carriage, when the platen is in normal position. These links 20 have arch-shaped slots extending through them, which receive the pins 21, projecting from said end bars, and the links are thus limited in their movement and held at all times in approximately the position to receive the studs 19 in their forked ends. The studs 19 are held against accidental displacement by latches 21, pivoted on the same pin as the links 20, having hooked ends, which normally hold the studs in their seats in said links, flat springs 22, secured to the links, having inwardly-bent ends to engage and hold the latches in position. Pieces 23 project laterally from the top of the latches to provide ready means for throwing them back to permit the removal of the studs 19 from their seats when the platen is to be thrown into the position shown in Fig. 9, and these pieces 23 strike and rest against the upper faces of the said end bars of the carriage when thrown back, and thus hold the latches in such a position that they may be readily pushed into place again.

When the platen is raised or tilted on its shaft 13 to the position shown in Fig. 8, the links 16 and 20 are drawn toward each other. A stop 23' may be placed so as to project inward from the end bars of the carriage into the path of the link 20 to limit the movement of said link, and thereby the amount the platen may be tilted.

The plates 14, intermediate thereof, have offsets or enlargements near their upper edges, to which are pivoted the side bars 24, carrying the writing-scale 25. These bars have the central portions curved to pass around the shaft 13 and the collars fixed to the same, the radius of the curve on the edge nearest to the collars being about the same as the radius of the collars. Thus when the platen is raised, as shown in Fig. 8, the upper edge of the writing-scale will rest against the platen at the bottom of the printing-line, the curved part of the side bar resting on the collars on the shaft 13. When the platen is lowered, the scale is swung away from the platen by the pins 26, projecting outwardly from the

side bars, coming into contact with the upper edges of the arms 16. The scale is held about two line-spaces above the printing-point by these pins resting upon the arms when the platen is in normal position. The scale can be tilted to make erasures when the platen is raised.

The platen is rotated by a toothed wheel 27, fixed to one end thereof, which is engaged and turned step by step by a pawl 28, pivoted to a bell-crank lever 29, pivoted on a boss 30, fixed to a rod 31, extending between and fixed immovably in the ends of the plates 14. This pawl has an extension 31' in the rear of its pivot, that bears on its rear side against a pin 32, projecting upwardly from the face of the short arm of the bell-crank lever. The throw of this pawl is varied by an arm 33, pivoted to the bell-crank lever in proximity to the end 31, having a lateral extension adapted to be moved to or from the end 31'. The pawl engages and follows the toothed wheel when the bell-crank lever is tilted until the end 31' strikes the arm 33, when said pawl is locked and prevented from moving further. When the lateral extension is moved away from the end 31', the pawl is enabled to follow the toothed wheel until thrown out by said end 31' striking the side of said lateral extension and the greatest amount of movement is given the platen; but when the end 31' strikes the end of the lateral extension the pawl is thrown out earlier than in the former case and the movement of the platen is lessened. Pins 34 35 project up from the short arm of the bell-crank lever on opposite sides of the arm 33 to limit the movement thereof. The long arm of the bell-crank lever is given a quarter-turn and flattened near its end to present a finger-piece 36, that may be readily grasped. A spiral spring 37 is provided to normally hold the bell-crank lever retracted and the pawl carried thereby out of engagement with the toothed wheel.

The platen is held in position when moved by an elastic roller bearing on the toothed wheel, this roller being journaled in the forked end of an arm 38, journaled on a rod 39, extending between the rear ends of the plates 14. A spring 40 is coiled around said rod and secured at one end to the arm 39 to hold the roller against the toothed wheel.

Paper-guide clips 41 are arranged along the platen, these clips being pressed into engagement by the flat springs 41', secured to the rod 31 at one end and pivotally connected at their opposite ends to ears bent out of the intermediate part of the clip. This intermediate connection and pressure of the springs insures an even pressure of the clips from end to end of the platen.

The frictional paper-roll 42 is journaled in the ends of arms 43, pivotally connected to the plates 14 and held into contact with the platen by light spiral springs 44, interposed between the arms and plates. The paper-support is formed in two parts, one part, 45,

being fixed to the rod 39 and the other part, 46, being pivoted to the top of the rear bar of the carriage.

Short vertical standards 47, extending upward from the top of the frame 1 in rear of the rear track 2, support the rack-bar 48, which is fixed to a rock-shaft 49 by extensions 49' of the collars 54, said bar running longitudinally of the frame parallel to the track. Both edges of this rack are toothed, the apices of the teeth on the edge nearest to said track being beveled off in a direction opposite to the main bevel of the teeth, thus forming reversely-beveled teeth. To the upper face of the rear bar of the carriage, intermediately thereof, a plate 50 is secured, which extends out over and beyond the rack. A pawl 51 is pivoted to the under side of this plate, near its outer edge, this pawl having a beveled end, which is held into engagement with the teeth on the rear edge of the rack-bar by a spiral spring 52, connected at one end to a pin projecting from the edge of said plate 50 and at its other end to a pin 51', projecting from the upper side of said beveled end, the inward movement of said end being limited by a pin 50', depending from the plate 50. A stationary pawl 53 is screwed to the under side of the plate 50 on the opposite side of the rack-bar, and this pawl is adapted to engage with the reversely-beveled tooth when the bar is rocked in that direction, which occurs on every depression of a key. Each of the collars 54 is fixed to the rock-shaft 49 and has a laterally-extending arm 55, and to one of these arms a link 56 is connected, the opposite end of which is secured in a cross-bar 57, extending beneath the key-bar. On every depression of a key the key-bar depresses this cross-bar, which draws down on the arm 55 and rocks shaft 49. This draws the toothed bar out of engagement with the pawl 51 and allows the carriage to slip forward one step, the stationary pawl riding over the reverse bevel on the tooth and engaging therewith. Thus as soon as the escapement begins to take place the pull of the carriage forces the rack-bar onto the pawl 51, which has a slight adjustment. The carriage is drawn forward by a spiral spring incased in and connected at one end to a drum 56', which it tends to rotate rearwardly, a strap 57 being connected at one of its ends to the periphery of this drum and at its opposite end to a lug 58, depending from the plate 50. To move the carriage forward independently of the key-levers, a lever 59 is pivoted to a bracket 60, projecting from the rear bar of the carriage, this lever having a laterally-bent cam-shaped end, which rides against the pin 51' and pushes the pawl 51 out of engagement with the rack-bar when the arm 60, pivotally connected to the opposite end of the lever 59, is drawn forward.

The arm 60 is held to the upper face of the end bar of the carriage by headed screws 61,

fixed in said end and extending through slots in the arm into said bar. The ends of these arms are turned upwardly to present projections that can be easily engaged by the finger to shift the same. A central opening is made in the top of the frame 1, around which the hangers 6 are arranged, being held in place by a ring 61', that rests on the upper edges thereof, bolts 62 extending through the ring and between the sides of the hangers into the top of the frame to secure the hangers in place. Each hanger comprises two side plates held together by a pivot 63, extending through the center of the same. A hole is made in each plate near the rear end, and one hole in each pair of plates is threaded to receive the threaded end of a bolt 64, having its opposite end held against transverse movement on the opposite side plate and a suitable opening made in its body to permit of the insertion of a tool for turning the same. Each plate is provided with a forward extension of reduced width, and when placed in position the reduced extensions of one pair are arranged in staggered relation to those of the next pair. In the ends of these extensions conical openings are made to receive the ends of the pivot-pins 65 of the type-bars 66. These pins are journaled in each pair of plates, the ends being conical to correspond to the opening. The conical sockets are pressed onto or off of the ends of pin 65 by turning the bolt 64, which will force the rear ends of the pair of side plates apart or draw them together, according to the amount and direction of the movement given said bolt. This provides means for effectually taking up wear on the pivot-pins and hangers. The type-bars are connected to the key-levers 66 by a link which is formed in two parts, the upper part 67 being a wire rod and the lower part 68 being formed of sheet metal and being connected to the parts 67 and key-lever in a novel manner, as will be described hereinafter. The key-levers 66 are supported by spiral springs 69, connected to the intermediate part of the key-levers at one of their ends and at their opposite ends to the turned-in edge of the plate 70, secured to the rear standard of the frame 1. These levers have V-shaped notches on their rear ends, into which extends the edge of plate 71, on which said levers are pivoted. The vertical ends of the levers which carry the keys have their lower portion split centrally, the two parts thus formed embracing opposite sides of the horizontal portion. The extreme ends of these two parts extend below the said horizontal part and are bent up around the same to embrace the opposite side thereof. The lower parts 68 of the links are all pivotally connected to the same point on all the key-levers. This gives each of the key-levers exactly the same dip—that is to say, they all require the same pressure on the keys to depress the same. To accomplish this result, it necessitated a peculiar form and

arrangement of connecting-link, and we have devised the form shown herein. This consists of a sheet-metal plate having a lower extension 69', that is bent at its lower end to embrace opposite sides of the key-lever to which it is pivoted, a body portion 68', and a lateral extension 70, the extreme end of which is pivotally connected to the section 67 of the link, an elongated opening 71 extending between the lateral extension and the upper part of the body portion. This upper part is compressed to form a cylindrical extension 72, that slides in an opening in the face of a guide-bar 73, extending across the machine and supported in brackets depending from each side of the ring 74, supported from the top of the frame 1 by arms 75. The lateral extensions are arranged in pairs and extend alternately on each side of the guide-bar 73. The extensions near each end of the guide-bar 73 are shortened as they connect with the type-bars at the sides of the machine. The plates that connect with the type-bars directly at the sides of the machine are given a right-angular bend, as shown at 75, and the extension thereof extends parallel to the guide-bar. The extensions of the two end pairs of plates pass through the openings 71 in the succeeding pairs. In the present case there are two pairs of these angularly-bent plates at each side of the machine.

The upper-case key 76 is connected by a link 77 to the arm 78, extending from the collar 79, fixed to the shaft 80, that is journaled on the short vertical standards 81, extending from the top of the frame 1. This shaft has two integral teeth or ribs extending along its full length, which mesh with the teeth 82, projecting from the collar 83, fixed to the rod 18. It will thus be seen that each depression of the upper-case lever will depress the arm 78 and rock the shaft 80 rearwardly and the collar 83 and rod 18 in an opposite direction, thus throwing the links 17 and arms 16, pivotally connected thereto, forwardly, and as the opposite ends of said arms are connected to the shaft of the platen said platen will also be drawn forwardly. A supplemental key 84 is provided for depressing the upper-case key, and a plate 85, secured to the side standard of the frame 1, has a slit therein, in which this key-lever is guided. A shoulder or offset 86 is made in this plate, beneath which the key-lever is pressed to hold the same depressed when several upper-case characters are to be printed in succession. The supplemental key has a plate 87 riveted thereto, and the end of this plate has a flat horizontal extension overlapping the upper-case key-lever, so that while the upper-case key may be operated independently of the supplemental key the supplemental key will necessarily operate the upper-case key whenever it is itself operated.

The ribbon-spools 88 are carried on a shaft 89, journaled in the side standards of the frame 1. This shaft has a part thereof flat-

tened, and the bearing in the spool is correspondingly flattened, so that while the spool may be shifted longitudinally of the shaft it can have no independent rotary movement. The ribbon is shifted transversely of the ribbon-guides 90 (these guides not being shown in Fig. 1) by forked arms 91, carried by a rock-shaft 92, journaled in the sides of the frame 1, the forks engaging the grooved collars 93, fixed to said ribbon-spool. A knob 24' extends from one of said arms to provide means for shifting the same.

The shafts 39 carry bevel-gears 94, which are adapted to mesh with either of the gears 95, carried on opposite ends of the shiftable shaft 96, to first cause one of the spools to wind up the ribbon and then the opposite one. This shaft 96 is rotated by a pinion fixed thereto, which is moved by a pawl 97, pivotally connected to the arm 55 of the collar 54, before mentioned, which is fixed to the rock-shaft 49 and is operated on every depression of a key. The shaft 96 is shifted by means of the shaft 97', having a forked plate 98 secured thereto, a collar 99 on the shaft 97 resting in said fork.

To indicate to the operator when the end of the ribbon has been reached, a semaphore 98' is arranged at each side of the machine. These semaphores are rigidly fixed to the ends of the shafts 99, journaled in the side standards of the frame 1, from which wire loops 100 extend inwardly. The ribbon passes between the shaft 99 and the loop 100. The ribbon is secured to the tape that is permanently fixed to the spools in such a manner that the end of the tape of either spool will strike and raise said loop on the side nearest thereto when the ribbon has become wholly unwound from its spool, thus raising the semaphore on that side. The bell 101 for indicating when the side of the paper is reached is secured to an arm 102, which has the hammer-arm 103 intermediately pivoted to the end of the same. This hammer is operated by a hanger 104, pivoted to a disk 105, journaled on the shaft of the drum 56 and adjustably held thereto by a thumb-nut 106, extending through an arc-shaped slot in said disk into the face of said drum. The hanger 104 has a weighted beveled laterally-extending end that engages with the upper end of the hammer-arm as the drum rotates and tilts the same and then releases it and the drum continues to rotate, the weight of the hammer on the end of said arm causing it to then swing against the bell and ring.

We have provided means for regulating the return of the carriage after it has been fed forward, and thereby the width of the margin that is left along the edge of the paper. This consists of a pawl 107, pivoted in a recess in the rear face of the front bar of the carriage, that is adapted to engage with one of a series of teeth 108, made in the face of the front track 2. This pawl drops into the first tooth it engages, and the further return movement

of the carriage is then prevented. To vary this movement, a plate 109 is provided which slides on the upper face of the track 2 and is designed to cover any number of these teeth.

5 This plate is adjustable and is held in place by a thumb-screw 110, which extends through a lateral part thereof into a groove in the beveled face of the front track 2.

The type-bars while of an ordinary general shape are of novel construction. We make these of pressed metal, and the body of the bar and the socket for the type-shank are of one piece. The stem of this bar is made tubular by pressing the longitudinal edges thereof together, and the rear end thereof is forked, the end of each fork extending at an angle to the main body of the bar.

A modification of the paper-clip is shown in Figs. 20 and 21. This clip has an elongated boss *c* at the central portion thereof, over which a socket formed by pressing a corresponding boss out of the spring 41^a fits. A rivet extends through these bosses and secures the parts together. A short cylinder *d*, adjustable on the bar 31 and having a rectangular slot to receive the same, carries a tube *e*, which is encircled by the curved end of the spring 42^a. A screw extends through this spring and through the tube *e* into the cylinder *d* to hold the parts together. A handle *g* is provided for shifting these parts, this handle having a shank which also projects through the tube and into the cylinder *d*. These connections are made in duplicate, and only two clips are used, one being placed near each end of the bar 31. In addressing envelopes or the like either one or the other of the clips can be moved toward the center, suitable stop-pins being preferably projected from the rod 31 to limit the movement thereof. The advantage of this arrangement is that if there are a number of cards or the like to be addressed it is not necessary to make a separate adjustment for each card.

45 In Figs. 16 to 19 a modification is shown of the type-bar and pivoted pin. In this form alining openings are made in the forked ends of the type-bars, into which a shouldered bushing is fitted, the ends thereof projecting out beyond the sides of the forks and being upset to force the metal onto the forks to clamp and securely lock the same together. The pivoted pin extends through and is held in this bushing, and the metal of the bushing is also forced against the pin to hold it against displacement when its ends are upset. The angularly-extending parts of the forked ends are brought together, as shown at *b*, and an opening made therein to receive the hooked end of the link 67.

We claim—

1. In combination in a type-writer, a frame, a non-tilting carriage held against shifting movement from front to rear, and a platen with means connecting the same to the carriage, said platen having a limited lateral shifting movement to change from capitals

to small letters and having an additional lateral movement so that it may be displaced from over the type entirely to one side of the basket to leave the same with all the type completely exposed, substantially as described.

2. In combination, the carriage, the platen, pivotal connections between the same and the carriage to permit the platen to shift from upper to lower case, said platen having also an upward and a turning movement to expose the printing and an additional lateral movement to expose the type, substantially as described.

3. In combination, the frame, the non-tilting carriage, a movable platen, a front and rear connection between the same and the carriage, one of which is detachable said platen being adapted when said connection is detached to be displaced from over the type-basket and to rest directly upon the carriage to one side of said basket in its displaced position, said connection retaining said platen thereon, substantially as described.

4. In combination in a type-writer, a frame, a non-tilting carriage, a revoluble laterally-shiftable platen and the front and rear pivoted supports therefor between the platen and the carriage, the shifting of the platen changing the printing from upper to lower case, substantially as described.

5. In combination the carriage, a platen, pivotal connections between said platen and said carriage to permit the platen to have lateral shifting movement to change from upper to lower case, the said platen having also turning movement on said supports to expose the printing, said turning actuating said connections to raise the platen in relation to the carriage substantially as described.

6. In combination the carriage, a platen, pivotal connections between said platen and said carriage to permit the platen to have limited lateral shifting movement, said connections comprising a detachable portion to permit the platen to have an additional movement to displace the same from over the type, substantially as described.

7. In combination in a type-writer, a frame, a non-tilting carriage non-shiftable thereon, the laterally-shiftable platen, to change from upper to lower case plates fixed thereto, the link pivotally secured to said carriage and to said plates, the pivoted arms and the links pivotally connected to said arms and to said carriage, substantially as described.

8. In combination the frame, the non-tilting carriage non-shiftable thereon, the shiftable platen, the shaft thereof, the plates fixed to said shaft, the supporting-arms pivoted thereon at one of their ends the links connecting the opposite ends to said frame, the studs extending from said plates, and the links pivoted to said carriage having seats for said studs, substantially as described.

9. In combination the frame, the non-tilting carriage non-shiftable thereon, the shiftable platen, the shaft thereof, the plates rigidly

idly secured thereto, the supporting-arms pivoted at one of their ends on said shaft, the links pivotally connecting the opposite ends to said carriage, the studs extending from said plates, the links pivotally connected to said carriage and having seats for said studs and means for locking said studs in said seats, substantially as described.

10. In combination, the frame, the non-tilting carriage, the platen, the shafts thereof, the plates fixed thereon, the supporting-arms pivoted on said shaft, the links connected to the ends of the arms and pivotally secured to the carriage, the studs projecting from the plates, the links having seats therein to receive the studs, and the pivoted latches for locking the studs in position, substantially as described.

11. In combination, the frame, the carriage, the platen, the shiftable support therefor for removing the platen from over the type, and a pivotal connection between the carriage and said support to permit the platen to have limited lateral movement independent of the carriage, said connection being detached from said support when said platen is moved from over the type, substantially as described.

12. In combination, the carriage, the platen, supporting means for the platen comprising a link pivoted to the carriage and pivotally connected to one side of the axis of the platen, an arm pivoted on the platen-shaft at one end and pivotally supported at its other end, the said link and arm being arranged so that upon turning the platen the upper end of the link will swing under the platen-shaft and the platen will be lifted, substantially as described.

13. In combination, the carriage, the platen, supporting means for the platen comprising a frame with the end plates 14 on the platen-shaft, the links connected with the carriage and pivoted to the plates eccentrically of the platen and the arms pivoted axially of the platen at one end and pivotally supported at the other end, whereby upon turning the platen the upper ends of the links will swing under the platen-shaft and the platen will be lifted, substantially as described.

14. In combination, the carriage, the platen, supporting means for the platen comprising a frame with the end plates 14 on the platen-shaft, the links connected with the carriage and pivoted to the plates eccentrically of the platen, and the arms pivoted axially of the platen at one end and pivotally supported at the other end, whereby upon turning the platen the upper ends of the links will swing under the platen-shaft and the platen will be lifted, and the handle secured to the platen, supporting means adapted to be manually operated to turn the platen whereby the same is lifted, substantially as described.

15. In combination, the carriage, the laterally-shifting platen, the eccentrically-arranged link supporting the platen from the carriage, the axially-pivoted arm and the link

connecting the said arm pivotally with the carriage whereby the platen may have laterally-shifting movement relative to the carriage and by turning the platen the eccentric link will swing under the platen-shaft to elevate the platen, substantially as described.

16. In combination, the carriage, the platen, a pair of swinging supports for each end of the platen, one member of each pair being pivoted axially of the platen and the other member being pivoted eccentrically thereof whereby on turning the platen it will be lifted to expose the printing, said eccentric connection being detachable whereby the platen may be swung from front to rear, substantially as described.

17. In combination, the frame, the carriage, the platen, the connections between the same and the carriage, the end plates and the scale carried thereby controlled by said connections independent of the platen, substantially as described.

18. In combination, the frame, the carriage, the platen, the link connecting the same to said carriage, and the freely-suspended scale automatically and positively controlled by said link, substantially as described.

19. In combination, the frame, the carriage, the platen, the shaft thereof, the plates thereon, the writing-scale having its side bars pivotally connected thereto in proximity to the platen-shaft, said bars being intermediately curved and adapted to rest on said shaft when the platen is raised, substantially as described.

20. In combination, the frame, the carriage, the platen, the plate 14, the supporting-arm 16, the pivoted scale having its end bars centrally curved and pivotally connected to the plates or bars, and the projection extending from said bars adapted to rest upon the arm 16 to support the scale away from the platen, substantially as described.

21. In combination the frame, the carriage, the platen and shaft, the writing-scale freely suspended having lateral ends pivotally connected to said platen and adapted to extend across the said shaft, said ends being adapted to rest thereon when the platen is lifted to position said scale, substantially as described.

22. In combination, the frame, the non-shifting carriage, the platen, the frame carrying the same consisting of the end plates 14 and the rods connecting the plates, the link connections between the platen and the carriage to permit the shifting and the raising of the platen, and the line-space mechanism comprising a bell-crank lever pivoted to the platen-frame, and adapted to move in a horizontal plane, the ratchet on the platen, the horizontally-moving pawl pivoted to the bell-crank lever and the regulator carried by the bell-crank lever adapted to have a variable engagement with the pawl, substantially as described.

23. In combination the frame, the carriage, the platen, the plates 14, the toothed wheel, the rod carried by said plates, the boss on said

rod, the bell-crank lever under spring tension pivotally connected to said boss, the long member of the lever extending at right angles to the platen and a pawl freely pivoted to the end of the short member having an extension to the rear of its pivot, a pin arranged as a stop on one side thereof, a pivoted arm having a lateral extension adapted to have variable engagement with the opposite side of the pawl and the pin for limiting the movement of said pivoted arm, substantially as described.

24. In combination with the frame, the shiftable carriage, the platen, the toothed wheel carried thereby, the horizontally-arranged bell-crank lever carrying a motion-limiting pawl pivoted thereto and also moving horizontally and adapted to engage with said wheel, said lever being adapted to be moved in a horizontal plane to feed the platen and return the carriage, substantially as described.

25. In combination, the frame, the carriage, the platen carrying the wheel with lateral teeth, a pivoted bell-crank lever having a horizontally-extending part, and a horizontally-extending pawl pivoted thereto to move across the lateral face of the toothed wheel and the limiting means for said pawl carried directly by the bell-crank lever, substantially as described.

26. In combination the frame, the tracks, the carriage, alining recesses of the same width in one edge of said carriage and one of said tracks, the balls interposed between said recesses, and a second set of alining recesses in the opposite track and edge of the carriage with balls interposed, the recesses of said second set being of different widths, substantially as described.

27. In combination, the frame, the V-shaped way thereon, the carriage, the ways in the front and rear bars thereof, the way in one of said bars being of inverted-V shape and the way in the other bar being rectangular, and the balls interposed between said ways, the rectangular way providing free play for the self-alinement of the carriage substantially as described.

28. In combination the frame, the track secured thereto, the groove in the rear side of the front track, the carriage, and the clip rigidly held thereto having an end projecting into the groove, and the stop located in said groove, substantially as described.

29. In combination the frame, the reciprocating carriage, means for exerting a tension thereon to draw it forward, a rocking rack-bar having teeth on opposite sides and the pivoted and rigid pawls carried by said frame adapted to be engaged with and be released from said rack-bar, the said pivoted pawl being arranged parallel to said rack to receive the impact thereof longitudinally substantially as described.

30. In combination the frame, the carriage with means for exerting a tension thereon to draw it forwardly, the single rocking rack-bar having its opposite edges toothed and the

stationary and pivoted pawls carried by said carriage and adapted to engage with opposite sides of said rack-bar, both of said pawls extending substantially parallel to the rack-bar to receive the impact longitudinally substantially as described.

31. In combination, the frame, the carriage with means for exerting a tension thereon to draw it forwardly, the rocking rack-bar horizontally arranged in the rear of the carriage and having teeth on its opposite edges, the plate fixed to said carriage and extending rearwardly and horizontally over said rack-bar, the stationary pawl secured thereto on one side of the rack-bar, the pawl pivoted to the plate on the opposite side of said bar, the spring for holding the pivoted pawl into engagement with the rack, means for limiting the movement of said pawl, and means for rocking the rack-bar on each depression of a key-lever, substantially as described.

32. In combination the carriage under tension, the frame, the rack-bar mounted thereon having its opposite longitudinal edges toothed, the teeth on the front edge of the bar being reversely beveled, the pivoted pawl adapted to engage the teeth on the rear edge of said bar, the stationary pawl on the opposite side of said bar, means for rocking said rack-bar to disengage the teeth on the rear edge thereof from said pivoted pawl and to bring the reversely-beveled part of the teeth on the front edge against said stationary pawl, substantially as described.

33. In combination, the frame, the carriage under spring tension, the rocking rack-bar, the stationary pawl adapted to engage therewith when the bar is rocked, the pivoted pawl normally in engagement therewith, and the pusher for disengaging the pivoted pawl, said pusher operating directly on the free end thereof, substantially as described.

34. In combination the frame, the carriage under tension, the rocking rack-bar, the stationary pawl, the pivoted pawl and the pivoted lever having a laterally-bent end adapted to engage the free end of said pawl to push same rearwardly when the lever is operated, substantially as described.

35. In combination, the frame, the carriage under tension, the rocking rack-bar, the stationary pawl adapted to engage therewith when said bar is rocked, the pivoted pawl normally in engagement with said bar, the projection carried thereby, the lever pivotally connected to the side of said carriage, the laterally-curved end of the lever being adapted to extend into proximity to said projection, and the sliding arm secured to the end of the carriage, said arm being pivotally connected to the end of the lever whereby when the arm is shifted forwardly the lever will be tilted and the curved end thereof pressed against the projection on said pivoted pawl to press the same out of engagement with the rack-bar, substantially as described.

36. In combination, the frame having a cen-

tral opening, the hangers arranged around the edge of the same, the type-bars pivoted therein, the key-levers and keys, and the sectional connecting-links, the bottom section
5 of each link having its lower end pivoted to the key-levers and its upper end split, one part thereof being compressed to form a cylindrical extension, and the other part being bent laterally and connected at its end to
10 the upper section of the link and a guide for said upper extension, substantially as described.

37. In combination the frame having a central opening therein, the hangers, the type-bars pivoted therein, the key-levers, and the sectional connecting-links between said type-bars and key-levers, and the horizontal bar having the guiding-opening therein, the bottom sections of the links being pivoted to the
20 key-levers and having upward extensions guided in the opening in the horizontal bar, and lateral extensions pivoted to the upper section of said links, substantially as described.

38. In combination the frame having the central opening in the top thereof, the hangers arranged around said opening, the type-bars pivoted therein, the key-levers, the sectional links, between the key-levers and
30 type-bars, the buffer-ring supported from the frame, the bracket depending therefrom, and the horizontal bar having guiding-openings therein supported in said brackets, the lower section of said links having upward extensions guided in said openings and lateral extensions projecting alternately on each side of
35 said bar and connected to the upper sections of said links, substantially as described.

39. In combination the frame having a central opening, the hangers arranged around the same, the type-bars pivoted in said hangers, the key-levers, the sectional links, and the horizontal bar having the guiding-openings therein, the bottom section of said links
40 having upward extensions guided in said openings, and lateral extensions connected to the upper sections of the links, the lateral extensions of the end bottom sections extending at an angle to the extensions of the intermediate bottom sections, substantially as described.
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40. In combination the frame having a central opening in the top thereof, the hangers, the type-bars pivoted therein, the key-levers, the sectional connecting-links, and the horizontal bar having the openings therein, the bottom sections of the links being made of sheet metal of flat and angular form, each of said sections having an extension guided in
50 said opening in the horizontal bar, and a lateral extension connected to the upper section of the link, the lateral extension of the end angularly-bent sections overlapping the succeeding bottom sections, substantially as described.
65

41. In combination in a type-writer, the

pivoted key-levers, the sectional links, the lower sections being connected to said key-levers in the same vertical plane transversely of the machine with means for guiding said
70 lower sections to move vertically, said lower sections having lateral extensions pivotally connected with the upper sections, substantially as described.

42. In combination, the frame, the carriage, the platen, the shiftable supporting means therefor to move the same forwardly in substantially a horizontal plane said means being secured to a rocking bar, a second rocking bar supported in the frame and engaging
80 the first bar, and means for rocking the second bar operated from the keyboard whereby the first bar is rocked and the platen drawn forward, substantially as described.

43. In combination, the frame, the carriage, the platen, the arms connected therewith, the links connected to said arms, the rod carrying the links, the toothed collar fixed to said rod, a second rod journaled in standards in the frame said rod having ribs or teeth running
90 longitudinally thereof and interlocking with the teeth on the collar, the collar fixed on the second shaft having a lateral extension or arm, and the link between said arm and the upper-case key-lever, substantially as described.
95

44. In combination, the frame, the carriage, the platen, the arms connected therewith, the links connected to said arms, the rod carrying the links, the toothed collar fixed to the rod, a second rod journaled in standards in the frame, said rod having ribs or teeth running
100 longitudinally thereof and interlocking with the teeth on the collar, the collar fixed on the second shaft having a laterally-extending arm, and the link between said arm and the upper-case key-lever, and a spring for returning the toothed rod to normal position when said upper-case key is depressed, substantially as described.
105

45. In combination the frame, the carriage, the platen, the upper-case key-lever, the connection between the same and the platen, the supplemental key for operating the upper-case key-lever, and the plate extending from the frame transversely of the keys having a guiding-groove therein and a shoulder to one side of the groove, said supplemental key being adapted to be pressed laterally beneath said shoulder substantially as described.
110

46. In combination, the frame, the carriage, the platen, the upper-case key-lever, and the key for operating the same, the connection between said lever and the platen, and the supplemental key-lever carrying a projection for depressing the upper-case key-lever when the supplemental key is depressed, substantially as described.
115

47. In combination, the frame, the carriage, the platen, the upper-case key-lever, the connection between the same and the platen, the supplemental key and key-lever, and the
130

plate secured thereto having a laterally-bent end projecting over said upper-case key-lever, substantially as described.

48. In combination, the frame, the carriage, the platen, the ribbon-spools, the ribbon-feed, the horizontal shafts mounted in the side standards of the frame above the ribbon-spool, the semaphores secured to the ends of the same, the loops secured to said shafts, the ribbon being adapted to pass between said shaft and the loops, the tape for securing the ribbon to the spools having its ends projecting and adapted to raise the loops when the end of the ribbon passes there-through and thereby move the semaphores inwardly and upwardly, substantially as described.

49. In combination, the frame, the carriage, the platen, the drum, the connection between the same and the carriage, the bracket secured to the frame, the bell fixed thereto, the hammer pivoted on the end of said bracket, in proximity to the bell, the hanger freely pivoted on the drum and depending therefrom, the lower end of said hanger being adapted to engage the upper end of the hammer and to tilt and release the same as the drum rotates, substantially as described.

50. In combination, the frame having a toothed portion, the shiftable carriage, the pawl carried thereby for engaging said teeth, and the plate adapted to cover said teeth, substantially as described.

51. In combination, the frame having tracks thereon, the teeth formed in one of said tracks, the shiftable carriage, the pawl carried thereby adapted to engage with said teeth, and the shiftable plate slidable on said track and adapted to cover said teeth, substantially as described.

52. In a type-writer, a pivoted type-bar, said bar having a type-socket in the front end thereof, and a rear bifurcated extension, the stem of said bar being cylindrical and the type-socket forming an unbroken continuation thereof, said stem, socket and extension being integral and pressed out of sheet metal, substantially as described.

53. In a type-writer, a hanger for the type-bar formed of flat side pieces connected by a central rivet and having sockets to receive the type-bar pivot-pin in its front end, and a bolt extending at right angles to said side plates between the same, said bolt being adapted to be turned to spread or contract said ends, substantially as described.

54. In a type-writer a pivoted type-bar and a hanger therefor, said hanger having flat side pieces intermediately held together by a horizontal rivet and having a conical bearing for the pivot-pins of said type-bars in the forward ends thereof, and openings in the rear parts of said plates, one of said openings being threaded and a bolt having a threaded end fitted to said threaded opening and having its opposite end held against movement transversely of the said plates in

the opposite opening, said bolt being adapted to be turned to spread or contract the rear and forward ends of said side plates, substantially as described.

55. In combination, the frame having ways therein, the non-tilting carriage mounted thereon and having ways at the front and rear thereof, the ball-bearings guided in and between said ways in the frame and carriage, the rear guideways forming a four-point bearing and the front ways forming a three-point bearing, substantially as described.

56. In a type-writer, a type-bar having a type-socket in the front end thereof, and a rear forked extension, the forks having alining openings therein, the independent bushing fitted in said opening, and the pivot-pin carried by said bushing, substantially as described.

57. In a type-writer, a type-bar having a type-socket in the front end thereof, and a rear forked extension, the forks having alining openings therein, the shouldered bushing extending between the forks and through the openings, and the pivot-pin held in the bushing, said bushing being adapted to be struck up on the outside of the fork to clamp the same and hold the pivot-pin, substantially as described.

58. In a type-writer, a type-bar having a type-socket in the front end thereof and a rear angular forked extension at the opposite end, and a pivot-pin extending through the forks at the apices of said angle, the ends of the forks being brought together and having an opening to receive the end of the connecting-link, substantially as described.

59. In combination in a type-writer, the frame, the carriage, the rectangular rod 31, the cylinder having a slot to receive the rod, said cylinder being slidable thereon, the tube fitted to the cylinder, and the paper-clip carried by the tube, said tube having an extension to one side of said clip and a knob for adjusting the same fixed therein, substantially as described.

60. In combination in a type-writer, the frame, the carriage, the paper-clip having a central boss thereon, the rod 31 and the spring secured thereto at one end and having its opposite end fitted and secured to said boss, substantially as described.

61. In a type-writer, the combination with the flat type-lever, of a flat type-support having a split end, the members of the split portion embracing the said key-lever, substantially as described.

62. In a type-writer, in combination the flat type-lever, the key-support extending at right angles thereto, the end of said support being centrally split, the members formed by said split embracing opposite sides of said lever and having their ends bent around and embracing the edge of said lever, substantially as described.

63. In combination the frame, the non-tilting carriage mounted thereon, the platen

adapted to be raised and lowered, and line-spacing mechanism comprising a pivoted lever and pawl, said mechanism being movable with the platen to maintain its engagement therewith, substantially as described.

5 64. In combination the carriage, the platen and connecting means between the platen and carriage including a detachable portion which when detached will permit the platen to be
10 laid to one side of the type-basket where it

will be held by the attached portion of the connecting means, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

WILLIAM R. FOX.
GLENN J. BARRETT.

Witnesses:

JNO. DUFFY,
FANNIE C. GORHAM.