No. 779,407. PATENTED JAN. 10, 1905

A. T. BROWN.

TYPE WRITING MACHINE.

APPLICATION FILED OCT. 16, 1902.

5 SHEETS—SHEET 1.

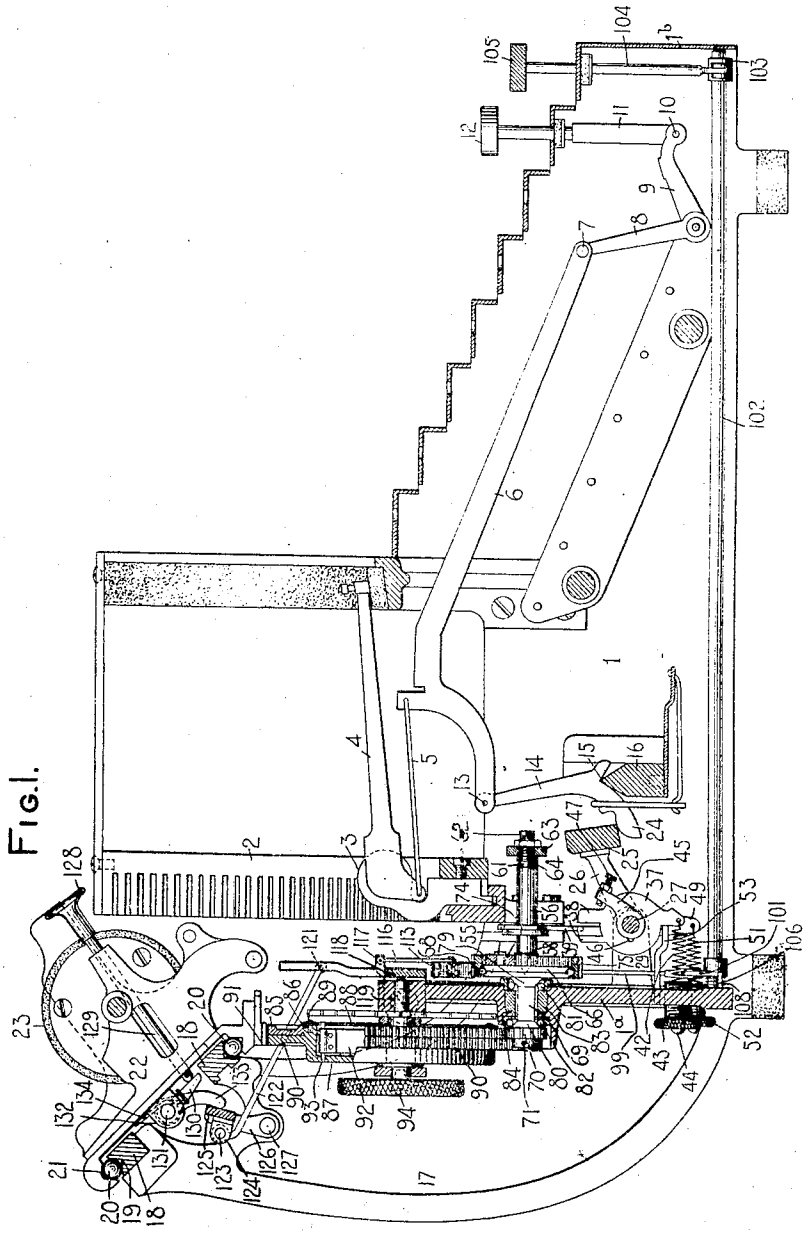

FIG. 1.

WITNESSES.

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5 SHEETS—SHEET 2.

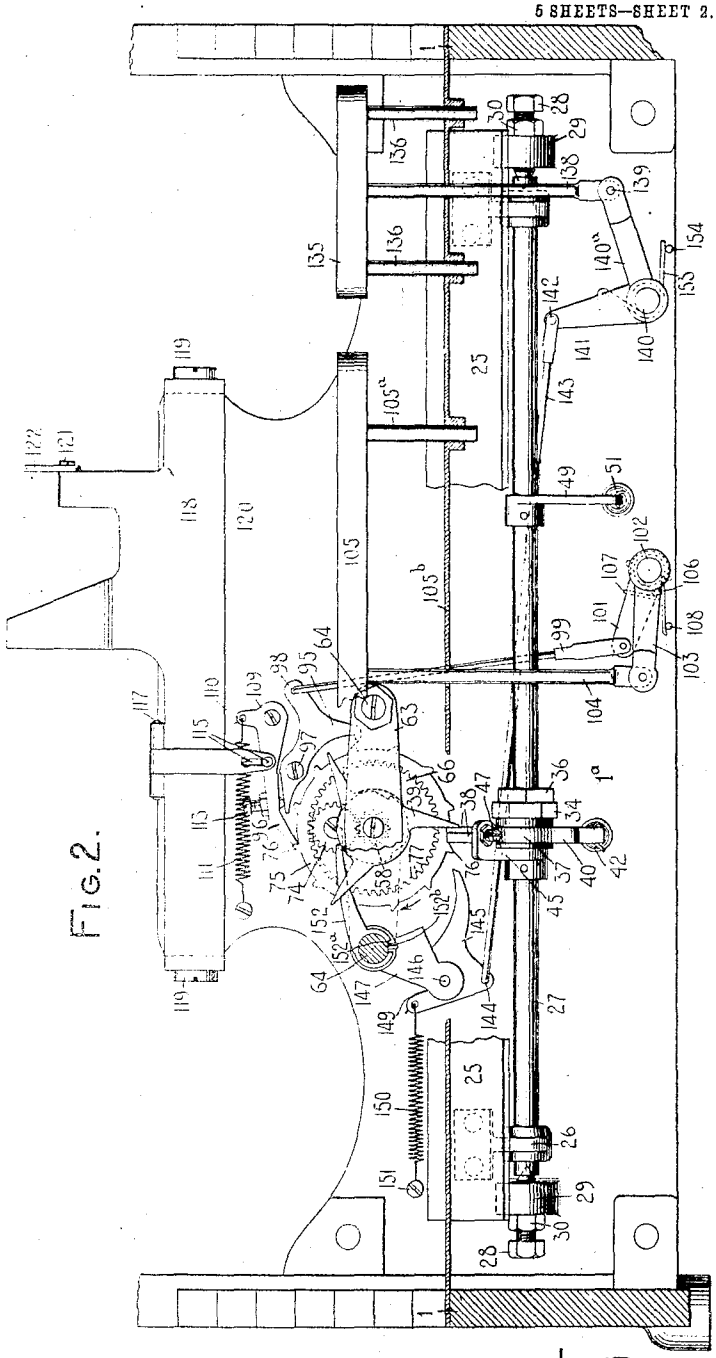

FIG. 2.

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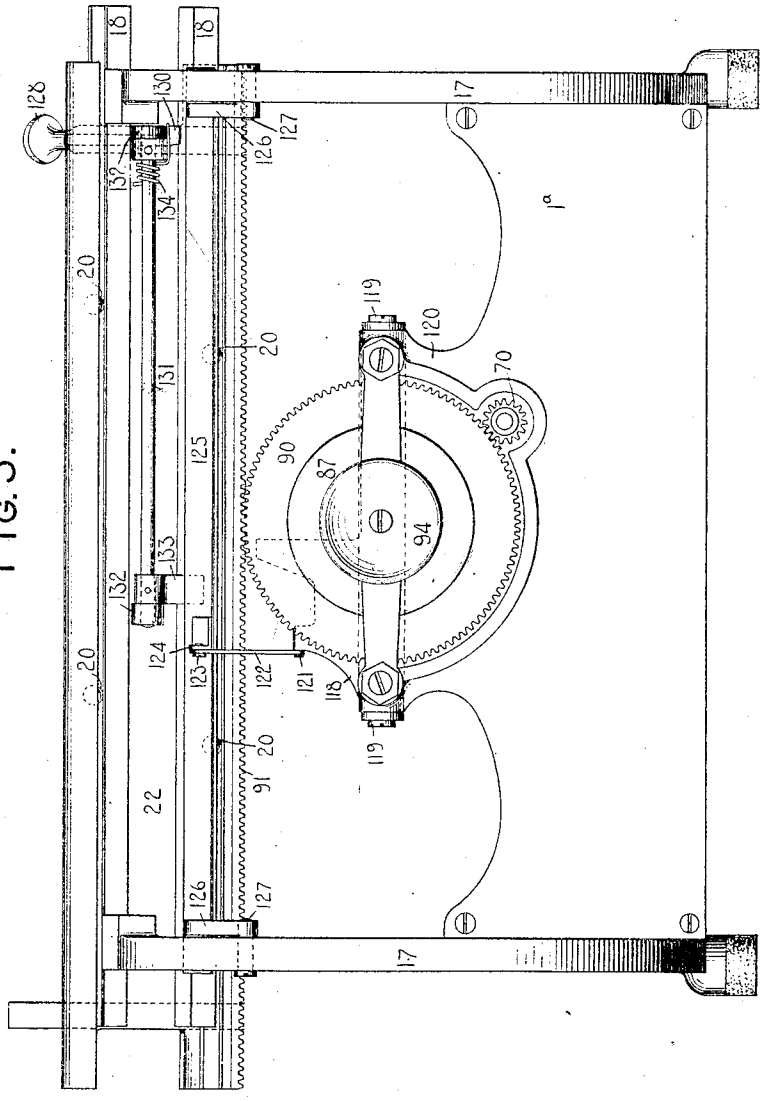
5 SHEETS—SHEET 3.

FIG. 3.



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6 SHEETS—SHEET 4.

FIG. 8.

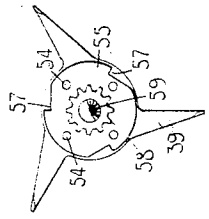


FIG. 7.

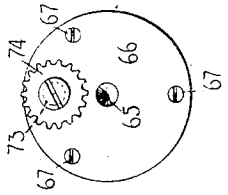


FIG. 6.

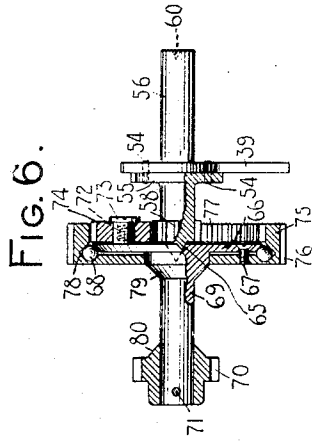


FIG. 5.

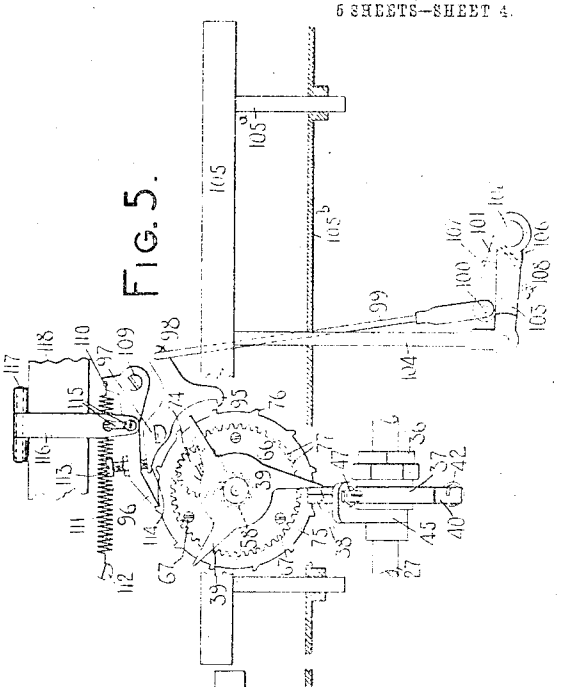
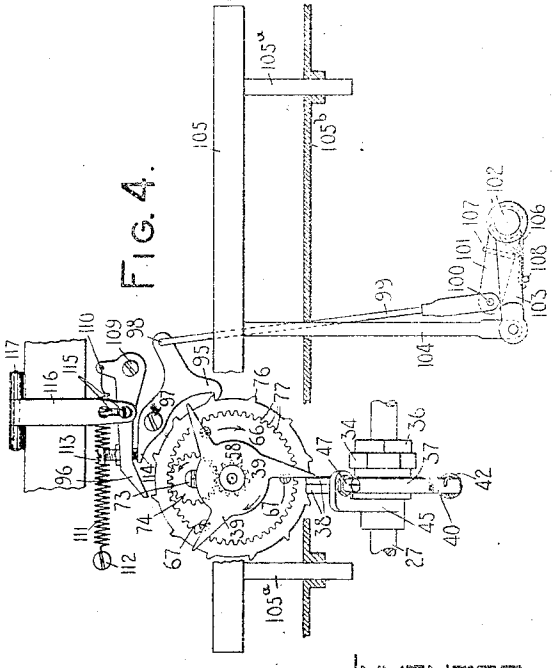


FIG. 4.



WITNESSES.

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5 SHEETS—SHEET 5.

FIG. 13.

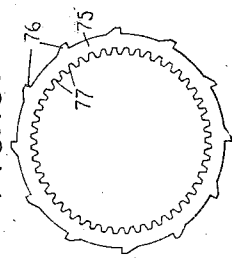


FIG. 14.

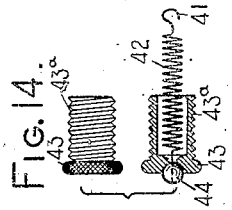


FIG. 12.

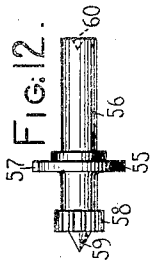


FIG. 11.

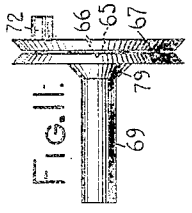


FIG. 9.

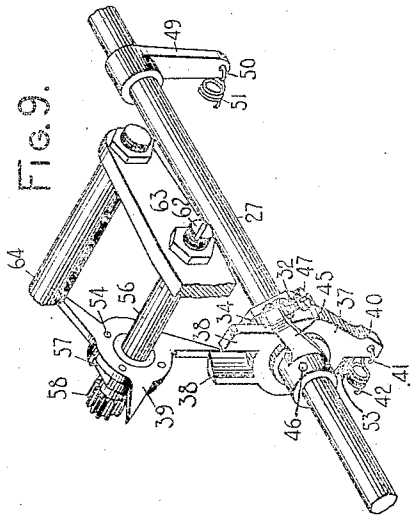
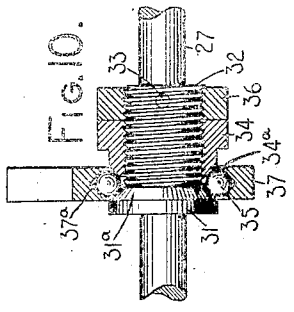


FIG. 10.



WITNESSES.

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by Jacob Felbel

HIS ATTORNEY

No. 779,407. Patented January 10, 1905.

UNITED STATES PATENT OFFICE.

ALEXANDER T. BROWN, OF SYRACUSE, NEW YORK.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 779,407, dated January 10, 1905.

Application filed October 16, 1902. Serial No. 127,537.

To all whom it may concern:

Be it known that I, ALEXANDER T. BROWN, a citizen of the United States, and a resident of Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My invention relates to carriage-feed mechanism for type-writing machines; and one of the objects of said invention is to provide rapid and efficient mechanism of the character specified.

Another object of my invention is to provide an efficient escapement or carriage-feed mechanism by which the carriage may be fed one or more letter-space distances for each imprint of a character.

A still further object of the invention is to provide an efficient gig-back mechanism for the carriage or mechanism for affording a step-by-step backward feed of the carriage.

To these and other ends, which will hereinafter appear, my invention consists in the features of construction, arrangements of parts, and combinations of devices to be hereinafter described and claimed.

In the accompanying drawings, wherein like reference characters indicate corresponding parts in the various views, Figure 1 is a vertical front-to-rear sectional view of one form of type-writing machine embodying my invention. Fig. 2 is an enlarged front elevation of portions of the escapement and gig-back mechanism. Fig. 3 is a rear elevation of the machine, showing the carriage feed-rack and the gear meshing therewith. Fig. 4 is a fragmentary front elevation of a portion of the escapement mechanism, the parts being shown in the positions they assume when the space-key is depressed. Fig. 5 is a like view of the same with the parts in the normal positions. Fig. 6 is a transverse sectional view with parts broken away of portions of the escapement mechanism to be hereinafter more fully described. Fig. 7 is a front view of the planetary pinion and the disk or carrier on which it is supported. Fig. 8 is a detail rear view of the primary escapement-wheel and the parts connected thereto. Fig. 9 is a fragmentary perspective view of the primary escapement-wheel and feed-dogs. Fig. 10 is an enlarged detail transverse sectional view of the bearing for the dog-rocker of the primary escapement mechanism. Fig. 11 is a detail side view of the supporting-disk and shaft for the planetary pinion and secondary escapement-wheel. Fig. 12 is a detail side view of the shaft for the primary escapement-wheel with the pinion and back-stop ratchet-wheel thereon. Fig. 13 is a detail face view of the secondary escapement-wheel. Fig. 14 shows in side view and section the tension-adjusting devices to be hereinafter described.

While I have illustrated my invention in its application to a front-strike type-writing machine, it should be understood that the invention may be adapted to various characters of writing-machines and that to this end various modifications may be made without departing from the spirit of my invention.

The frame 1 of the machine supports a segment 2, in which hangers 3 are mounted. Pivoted in the hangers are type-bars 4, which are actuated by draw-links 5, that are connected at their forward ends to links 6, that are adapted to oscillate fore and aft of the machine, and the forward end of each of which is pivotally connected at 7 to an upright arm 8 of a bell-crank lever, whereas the other arm 9 of each bell-crank lever is pivoted at 10 to a key-stem 11, provided with a finger-key 12 at the upper end thereof. The rear end of each link 6 is pivoted at 13 to an oscillating lever 14, that is supported upon a scale or knife-edge 15 of the fulcrum-bar 16, that extends transversely across the machine and is secured to the frame 1 thereof. The rearwardly-extending projections 17 of the frame support tracks 18, that are grooved upon opposite faces, as indicated at 19, for the reception of antifriction-balls 20, which are likewise received in grooved faces 21 of a carriage 22, that supports a platen 23, adapted to revolve therein. The various levers 14 are provided with extensions 24, that bear against the under side of a universal bar 25, provided with upwardly-extending arms 26, connected to a rock-shaft 27. The rock-shaft 27 extends transversely of the machine and is supported at its ends by bearing-screws 28, which ex-

tend through threaded openings in lugs 26, that project forwardly from the rear plate 1ᵇ of the frame. Lock-nuts 30 may be employed upon the bearing-screws 28 to prevent them from creeping during the oscillation of the rock-shaft 27.

Upon reference to Fig. 10 it will be seen that the rock-shaft 27 is provided with a bearing-collar 31, that surrounds the shaft and has a threaded extension 32 projecting therefrom. This collar and threaded sleeve are secured to the shaft 27 by a pin 33, that extends through the threaded collar and shaft. An internally-threaded nut 34 is received upon the threaded collar and is provided on its inner face with an inclined face 34ª and constitutes a ball or roller bearing surface which coöperates with the inclined bearing-surface 31ª on the collar 31 to form a V-shaped raceway for antifriction balls or rollers 35. A lock-nut 36 may be employed to prevent an accidental rotation of the nut 34. A feed-dog carrier 37 has an annular eye portion that surrounds the raceway formed by the nut and collar and is provided with an internal V-shaped raceway 37ª, that is adapted to coöperate with the balls 35, thus forming ball-bearing surfaces for supporting the dog-carrier in place. The nut 34 being adjustable provides for an adjustment of the bearing-surfaces or the ball-race. The dog-carrier 37 is provided with upwardly-extending feed-dogs 38, rigidly secured thereto or formed integrally therewith and which coöperate with an escapement-wheel 39, (shown in the present instance with three teeth thereon.) The dog-carrier has a depending portion 40, to which one end 41 of a contractile spring 42 is secured. The opposite end of this spring 42 passes through a hollow thumb-nut 43 and is provided with an enlargement 44, so that the thumb-nut may be turned relatively to the spring. The threaded stem 43ª of the thumb-nut is received within an internally-threaded bearing in the rear plate 1ᵇ of the machine, so that by turning the thumb-nut 43 in its bearing the tension of the spring 42 may be varied.

Adjacent to the feed-dog carrier 37 is an arm 45, which projects from a collar secured by a pin 46 to the rock-shaft 27, (see Fig. 9,) and the outer end of the arm 45 is bent laterally to align with the feed-dogs and is tapped to receive the stem of a screw 47, which extends through the tapped opening in the arm and is adapted to bear at its rear end on the forward dog 38. The rock-shaft 27 is likewise provided with a depending arm 49, which is connected at 50 to one end of a contractile spring 51, which at its opposite end is connected to a thumb-screw 52, that is similar to the screw 43, hereinbefore described, and the connection between the spring 51 and the screw 52 is the same as previously described with reference to the spring 42, so that the tension of the spring 51 upon the rock-shaft may be regulated by the screw 52. The feed-dog carrier 37 being loosely mounted upon the rock-shaft 27 is normally maintained against a fixed stop 53, which projects forwardly from the rear plate 1ᵇ of the frame, whereas the arm 45 of the rock-shaft is normally maintained in the position represented in Figs. 1 and 9, where the screw-stop 47 is out of contact with the dogs. A depression of a finger-key 12 causes the arm 8 of the associated bell-crank lever to be rocked toward the front of the machine, thereby moving the link 6 forwardly and causing the associated type-bar to be moved to the printing-point. During the same movements of the parts the associated lever 14 is rocked forwardly, thereby elevating the universal bar 25, which causes the rock-shaft 27 to be turned, thereby bringing the screw-stop 47 into contact with the forward dog, thus turning the dog-carrier on its ball-bearings and moving the dogs toward the rear of the machine, so that the normally inactive dog is brought into the path of the teeth of the escapement-wheel 39 and the normally active dog is forced out of engagement with the tooth of the escapement-wheel which was engaged thereby. When the finger-key 12 is released, the parts will be restored to the positions illustrated in Fig. 1, the normally active dog being again brought into the path of the oncoming tooth of the escapement-wheel to arrest further movement thereof, thus affording a letter-space feed of the carriage on each depression of a character-key 12, as will hereinafter more clearly appear.

The escapement-wheel 39 is rigidly secured by pins 54 to a collar 55, that is integral with the rock-shaft 56 and the periphery of which has indentures 57 therein that form ratchet-teeth to prevent a reverse rotation of the escapement-wheel 39. The shaft 56 has a pinion 58 and a coned bearing 59 at one end thereof, whereas the opposite end of the shaft is recessed at 60 for the reception of the coned end 61 of a bearing-screw 62, which takes in a threaded opening in a bracket or cross-bar 63, which is supported by rods 64, that extend forwardly from the rear plate 1ª of the frame. The coned bearing 59 on the end of the shaft 56 is seated in an opening 65 in a supporting disk or carrier 66, which is preferably formed of two disks united by headed screws 67, the stems of which pass through openings in one of the disks and take in tapped openings in the other disk in order that an adjustment may be afforded the disks to and from each other. The peripheries of the disks are beveled toward each other, so as to form ball-bearing surfaces thereon or a V-shaped raceway for the reception of antifriction-balls 68. The forward disk is provided with a rearwardly-extended shaft 69, which extends through a central opening in the companion disk, and is provided at its rear end with a

pinion 70, which is connected to the shaft by a pin 71. The disk or carrier 66 carries at its forward face a forwardly-extending stud or pintle 72, that is tapped in its outer end for the reception of a headed screw 73. The pintle 72 constitutes a pivot or pin upon which a pinion 74 is adapted to revolve, whereas the head of the screw 73 prevents the pinion from being displaced from its pintle. Surrounding the disk or carrier 66 and the pinion 74, carried thereby, is a ring-like so-called "secondary" escapement-wheel 75, which is provided with external ratchet-teeth 76 and internal gear-teeth 77. The inner portion of the escapement wheel or ring likewise has a V-shaped channel or ball-bearing raceway 78 for coöperation with the antifriction-balls 68, hereinbefore referred to. It will thus be understood that the carrier 66 supports the secondary escapement-wheel upon antifriction-balls interposed between the disk or carrier and the escapement-wheel. The disposition of the pinion 74 on the disk is such that when the parts are assembled it meshes with the internal gear 77 on the secondary escapement-wheel and with the pinion 58 on the shaft of the so-called "primary" escapement-wheel 39. The shaft 69 and the pinion 70 are provided with oppositely-disposed ball-bearing faces 79 and 80, respectively, (see Fig. 1,) with which antifriction-balls 81 and 82, respectively, coöperate. The balls 81 are likewise received in a channel contained in the head of a screw 83, which takes in a threaded opening in the rear plate 1^a of the frame. The balls 82 are also received in a channel of a cup-like plate or bearing 84, which is seated in an opening in the rear of the plate 1^a of the frame. By these means an efficient ball or roller bearing is provided for the shaft 69 and one which may be adjusted to take up the wear upon the parts.

The pinion 70, hereinbefore referred to, meshes with the teeth of a gear 85, which is loosely disposed upon a collar or flange 86 that projects forwardly and is formed integral with a spring-drum 87. The plate 88 is secured on the forward face of the drum by screws 89, and the periphery of this plate overlaps the gear 85 and prevents a forward displacement thereof from its bearing. The spring-drum is likewise provided with a companion gear 90, that is preferably formed integral therewith and is the same size and has the same number of teeth as the gear 88. These two gears rest side by side, as represented in Fig. 1, and both of them are constantly in mesh with a feed-rack 91, which is carried by the carriage. The drum 87 contains a carriage-driving spring 92, that is secured at its outer end 93 to the drum and at its inner end to a spindle normally maintained against rotation and provided with a head or finger-wheel 94, by means of which the tension of the spring may be adjusted. It will thus be seen that the tension of the spring 92 is exerted through the gear 90, rigidly secured to the drum, to move the carriage in the direction of its feed by the meshing engagement with the rack 91 and that the gear 85, which is loosely mounted in place upon the drum, normally prevents the movement of the carriage through the connection of the gear 85 with the escapement mechanism. When, however, the escapement mechanism is released, it enables the gear 85, together with the gear 90, to rotate in order to move the carriage in the direction of its feed. It follows from the foregoing that there is resistance afforded to the rotation of the gear 85 by the escapement mechanism, whereas the gear 90 is under tension of the spring 92 and is prevented from moving by the rack 91 being maintained against movement by the gear 85 and the escapement mechanism. The tendency of the gear 90 to move and the gear 85 to resist such movement exerts a pressure on the teeth of both gears in engagement with the rack and tends to move them away from each other, thus taking up any space or lost motion that may exist between the teeth of the two gear-wheels 85 and 90 and the carriage feed-rack 91.

Coöperating with the ratchet-teeth 76 on the secondary escapement-wheel are feed-dogs 95 and 96 that vibrate on independent pivots toward and away from the escapement-wheel and in the plane thereof. The feed-dog 95 is normally maintained out of engagement with the teeth of the ratchet-wheel, as represented in Fig. 5, and is pivoted at 97 to vibrate into and out of the path of said teeth on the escapement-wheel. Connected at 98 to the feed-pawl 95 is a downwardly-extending link 99, which is pivoted at its lower end 100 to a crank-arm 101, that projects from a rock-shaft 102, extending fore and aft of the machine and which is received within bearings in the rear plate 1^a of the frame of the machine and the front plate 1^b thereof. The forward end of this rock-shaft is provided with a similar crank-arm 103, to which is pivoted the stem 104 of a space key or bar 105, that has depending guiding-stems 105^a, that pass through openings in a guide-plate 105^b. Surrounding the rear end of the rock-shaft 102 is a coiled spring 106, that is secured thereto at one end 107 and at its opposite end bears against a fixed pin 108, so that the tension of the spring is normally exerted to maintain the space key or bar 105 in the elevated position and the pawl or dog 95 out of the path of the teeth 76 on the secondary escapement-wheel, as represented in Fig. 5. The feed-dog 96 is pivoted at 109 to a fixed portion of the machine and is connected at 110 to a contractile spring 111, that has its opposite end secured to a fixed pin 112, and the pressure of this spring is exerted to maintain the nose of the pawl in engagement with the ratchet-teeth of the escapement-wheel, as represented in Fig. 1. A screw-stop 113 ex-

tends through a tapped opening in the dog 96, and the lower end thereof coöperates with an extension 114 of the feed-dog 95, so that a movement of the feed-dog 95 into engagement with the escapement-wheel will cause the dog 96 to be thrown out of such engagement, as represented in Fig. 4. The provision of the screw-stop 113 enables the timing or relative movement of the dog 96 by the movement of the dog 95 to be nicely regulated. The dog 96 is connected by a pin-and-slot connection 115 to a depending arm 116, that is pivoted at 117 to a frame 118, that is in the nature of a bail or yoke which is bent rearwardly at its ends and is pivoted upon screw-pivots 119, that project therethrough and extend into a fixed bearing 120, secured to or forming part of the rear plate 1^a of the frame of the machine. The frame, bail, or yoke 118 has pivoted thereto at 121 an upwardly-extending link 122, that is pivoted at its rear end 123 to an ear 124, projecting rearwardly from the swinging bar 125, that extends transversely across from side to side of the machine and is provided with depending arms 126, which are pivoted at 127 to the side plates of the machine. The carriage 22 is provided with a finger-piece 128 at the top of a plunger or push-rod 129. The lower end of this rod bears against a crank-arm 130, which projects from a rock-shaft 131, adapted to turn in bearings 132 on the under side of the carriage. A second crank-arm 133 projects from the rock-shaft and is adapted to bear upon the face of the cross-bar 125. The spring 134 bears at one end against the under side of the carriage, and the opposite end thereof is connected to the crank-arm 130, so that the tension of the spring is exerted to normally maintain the parts in the position shown in Fig. 1 of the drawings. A depression of the finger-piece 128 will cause the cross-bar to swing on its pivots 127, thereby swinging the yoke or frame 118 upon its pivots, thus elevating the link 116 and disengaging the feed-dog 96 from the teeth of the secondary escapement-wheel 75, which will entirely disengage the carriage from its escapement mechanism, as will hereinafter more clearly appear.

Upon reference to Fig. 2 it will be observed that an auxiliary key 135 extends to the right of the space-key 105 and is provided with guide-pins 136, that are received in openings in a guide-plate 105^b. This key is likewise provided with a depending arm 138, which is pivoted at 139 to a crank-arm 140^a, that projects from a rock-shaft 140, which extends from front to rear of the machine and parallel with the rock-shaft 102, hereinbefore described, and is received at its ends within bearings in the front and rear plates 1^c and 1^b, respectively, of the machine-frame. Another arm 141 extends from the rock-shaft at the rear of the machine and to which is pivoted at 142 one end of a link 143, that has its opposite end connected at 144 to a gig-back pawl or dog 145. The dog 145 is pivoted at 146 to a carrier 147, which is adapted to vibrate upon one of the fixed spindles or rods 64, hereinbefore referred to, and which constitutes one of the supports for the bracket or cross-plate 65. The gig-back pawl has an upwardly-extended arm 149, which is connected to one end of a contractile spring 150, the opposite end of said spring being connected to a fixed pin or screw 151, secured to the rear plate 1^a of the frame. Pivoted upon this same spindle 64 is a gravity-pawl 152, the nose of which is adapted to rest upon the periphery of the collar 55 and to engage the teeth 57 thereon, and thus prevent or limit the reverse rotation of the primary escapement-wheel. The collar of this gravity-pawl 152 is slotted at 152^a for coöperation with a pin 152^b, that extends from the spindle 64, on which the pawl is mounted. Thus the gravity-pawl cannot be forced from the position where it cannot be carried by its own weight back into engagement with the teeth 57 on the collar. A spring 153 surrounds the rock-shaft 140 and is connected at one end to the crank-arm 141 and bears at its opposite end upon a pin 154, so as to restore the parts to the position represented in Fig. 2 when the key 135 is released.

Having described the various features of construction, I will now describe the operation thereof. The terms "primary escapement-wheel" and "secondary escapement-wheel" are used to distinguish them, and the pinion 74 will be referred to herein as a "planetary" pinion.

It will be observed that the train of gears between the primary and secondary escapement-wheels and between said escapement-wheels and the disk or carrier 66 constitute planetary gearing and that when one of the character-keys 12 is depressed an imprint of a character will be made by throwing the associated type-bar to the printing-point, and at the same time the feed-dogs 38 will be vibrated toward the rear of the machine. When the finger-key is released, the dogs will be vibrated back to the normal position represented in Fig. 1, when the primary escapement-wheel 39 will be permitted to move the distance between two teeth thereof. This rotation of the primary escapement-wheel causes the planetary pinion 74 to be rotated on its pintle 72 and at the same time, by reason of the fact that it meshes with the teeth of the secondary escapement-wheel, which is relatively fixed at this time, the pinion will receive a rolling action around the pinion 58, thereby moving the disk or carrier 66 with the planetary pinion thereon from the position shown in Fig. 4 to that represented in Fig. 5, for instance. This movement of the carrier 66 transmits a corresponding movement to the pinion 70 on the shaft thereof, and from the pinion 70 a movement of the

gear-wheels 85 and 90 is afforded under tension of the spring 92 to permit the carriage to move in the direction of its feed a letter-space distance. This actuation is repeated on the depression of any character-key.

A depression of the space-key 105 will cause the feed-dog 95 to be forced into the path of a tooth 76 on the secondary escapement-wheel before it has the opportunity to move. This movement of the feed-dog 95 throws the dog 96 out of engagement with the tooth 76 engaged thereby, as represented in Fig. 4. When the space-key is released, the parts are restored to the normal position represented in Fig. 5, and during the movement of restoration of the parts the dog 96 is forced into the path of the oncoming tooth 76 of the secondary escapement-wheel, thereby affording a letter-space feed movement of the secondary escapement-wheel. This movement of the escapement-wheel 75 is effective to roll the planetary pinion 74 around the pinion 58 as a center by reason of intermeshing of the planetary pinion with the internal gear-teeth 77 on the secondary escapement-wheel. The planetary pinion therefore receives a bodily movement with the disk or carrier to which it is connected from the position represented in Fig. 4 to that indicated in Fig. 5, for instance, and a corresponding movement will be transmitted to the pinion 70 and afford a letter-space movement of the carriage through the gears 85 and 90. It will thus be seen that the space and character keys are independently operable, the space-key actuating the secondary escapement-wheel independently of the primary escapement-wheel, whereas the character-keys afford an actuation of the primary escapement-wheel independently of the secondary escapement-wheel. Should the operator desire to provide a double space as the last letter of a word is being written, for example, in order that the machine may be at once operated to begin writing the next word, it is merely necessary to simultaneously depress a character-key and the space-key, thereby imprinting the desired character, and when said keys are released a double-space movement of the carriage will be given and the next word may immediately be written.

Should the operator desire to gig-back the carriage through any desired number of letter-space distances in order to bring the carriage to the desired point for the insertion of a letter or the like, it is merely necessary to depress the finger-key 135, which will cause the gig-back pawl 145 to engage the teeth 76 on the secondary escapement-wheel and to turn it in a direction opposite to that indicated by the arrow in Fig. 2. This reverse rotation of the secondary escapement-wheel is effective to turn the pinion 74 around the pinion 58 as a center and in a direction reverse to that previously described, or from right to left, so that the pinion 74 and carrier 66, to which it is pivoted, receive a bodily movement around the axial center of the shaft 56, thus turning the shaft 69, to which the disk is connected, and the pinion 70 on said shaft will transmit a reverse rotation to the gears 85 and 90, thereby feeding the carriage from left to right or in a direction reverse to its ordinary feed movement. The gig-back mechanism thus affords a step-by-step backward movement of the carriage, the carriage being moved a letter-space distance at each depression of the key 135.

From an examination of Fig. 2 it will be observed that the primary escapement-wheel 39, secondary escapement-wheel 75, the pinion 58, and the internal gear 77 revolve upon the same center and that the so-called "planetary" pinion 74 is intermediate the pinion 58 and gear 77 and receives a planetary movement around the pinion 58 when either escapement-wheel is actuated, so as to afford a movement of the disk or carrier 66, and thereby afford a step-by-step movement of the carriage, whether the movement of the carriage be in a forward or backward direction. Furthermore, it will be seen that either escapement-wheel may be actuated independently of the other by independent key-actuated means to afford a single-spacing movement of the carriage; that the carrier 66 may either be moved with or independently of the secondary escapement-wheel by key-actuated mechanism; that the secondary wheel may be moved backwardly or forwardly independently of the primary escapement-wheel, and that both escapement-wheels and the carrier may be simultaneously moved to afford a double-spacing movement of the carriage.

Various changes may be made without departing from the spirit of my invention, and certain features may be employed without the others.

Certain of the features shown in the accompanying drawings are not claimed herein, but constitute the subject-matter of separate applications filed by me herewith or embodied in applications previously filed by me.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a type-writing machine, the combination of an escapement device, one or more keys controlling said escapement device, a second escapement device and independent key-controlled means for actuating said second escapement device, whereby either or both escapements may be employed to afford a feed in one direction.

2. In a type-writing machine, the combination of a carriage, an escapement device therefor, character-keys controlling said escapement device, a second escapement device, and a space-key controlling said second escapement device.

3. In a type-writing machine, the combina-

tion of two escapement devices, an actuation of either of which affords a given extent of feed movement, a character-key controlling one of said escapement devices, and a space-key controlling the other escapement device, whereby a separate depression of a character or space key will afford one extent of feed movement and the simultaneous depression of a character-key and space-key will afford a greater extent of feed movement.

4. In a type-writing machine, the combination of a carriage, two independently-operable sets of feed-dogs therefor, and means cooperating with the dogs to effect a given extent of feed movement of the carriage on the actuation of either set of feed-dogs and double the extent of feed movement when both sets of feed-dogs are simultaneously actuated.

5. In a type-writing machine, the combination of a carriage, two escapement-wheels, and means coöperating with the escapement-wheels to afford a given extent of feed movement of the carriage on the actuation of either escapement-wheel and to afford double that extent of feed movement when both escapement-wheels are simultaneously actuated.

6. In a type-writing machine, the combination of a carriage, two independently-actuated escapements for affording a feed movement of the carriage in one direction, and independent key-actuated mechanism for each escapement, whereby the escapements may be separately or simultaneously operated.

7. The combination with an escapement-wheel, of a set of feed-dogs therefor, character-keys for actuating said feed-dogs, a second set of feed-dogs for actuating said escapement-wheel, and a space bar or key for actuating said second set of feed-dogs, all of said parts coöperating to feed the carriage in one direction.

8. The combination of an escapement-wheel, two pairs of feed-dogs therefor, and means for operating one pair of said feed-dogs independently of the other pair, all of said parts coöperating to feed the carriage in one direction.

9. The combination of an escapement-wheel, two pairs of feed-dogs therefor, and independent means for operating either pair of said feed-dogs independently of the other pair, whereby the simultaneous actuation of both pairs of feed-dogs will afford twice the amount of spacing that one pair will.

10. The combination of character-keys, a spacing bar or key, independent escapement-racks to afford a feed in one direction, and escapement devices that coöperate with said racks and are independently operable, one by the spacing bar or key and the other by the character-keys.

11. In a type-writing machine, the combination of two escapement-wheels, an escapement-pinion, operative connections between said wheels and the escapement-pinion, and feed-dogs coöperating with said wheels, to afford a feed movement in one direction.

12. In a type-writing machine, the combination of a primary escapement-wheel, a secondary escapement-wheel which is rotated independently of the primary escapement-wheel and both of which escapement-wheels coöperate with the same mechanism to afford a movement of the carriage, and a separately-operable set of feed-dogs for each escapement-wheel.

13. In a type-writing machine, the combination of a primary escapement-wheel, a secondary escapement-wheel which is rotated independently of the primary escapement-wheel, a series of character-keys which controls the actuation of the primary escapement-wheel, and a space key or bar which controls the actuation of the secondary escapement-wheel.

14. In a type-writing machine, the combination of a carriage, a primary escapement-wheel, a secondary escapement-wheel which is rotated independently of the primary escapement-wheel, a separately-operable set of feed-dogs for each escapement-wheel, and hand-actuated means for throwing the dog that normally engages the secondary wheel out of engagement, thus releasing the carriage from the escapement mechanism.

15. In a type-writing machine, the combination of a primary escapement-wheel, a secondary escapement-wheel and differential gearing between said primary and secondary escapement-wheels.

16. In a type-writing machine, the combination of a primary escapement-wheel, a secondary escapement-wheel, and planetary gearing between the primary and secondary escapement-wheels.

17. In a type-writing machine, the combination of a carriage, a primary escapement-wheel, a secondary escapement-wheel, said escapement-wheels having different extents of movement, and intermediate gearing between said escapement-wheels and the carriage whereby either escapement-wheel may rotate independently of the other to effect a movement of the carriage.

18. In a type-writing machine, the combination of a carriage, a primary escapement-wheel, a secondary escapement-wheel having teeth that are a multiple of those on the primary escapement-wheel, and intermediate gearing between the escapement-wheels and the carriage.

19. In a type-writing machine, the combination of a carriage, a primary escapement-wheel, a secondary escapement-wheel having teeth that are a multiple of those on the primary escapement-wheel, said wheels having different extents of movement, intermediate operative connections between the escapement-wheels and the carriage which affect a movement of the latter by a movement of either escapement-wheel and enable the es-

capement-wheels to rotate independently of each other.

20. In a type-writing machine, the combination of a carriage, a primary escapement-wheel, a secondary escapement-wheel, said escapement-wheels having different extents of feed movement, intermediate gearing between said escapement-wheels and between the escapement-wheels and carriage, whereby either escapement-wheel effects a movement of the carriage and the escapement-wheels may rotate independently of each other, and independent key-actuated means for affording an operation of either of said escapement-wheels.

21. In a type-writing machine, the combination of a carriage, a primary escapement-wheel, a secondary escapement-wheel having teeth that are a multiple of those on the primary escapement-wheel, said wheels having different extents of movement, intermediate operative connections between the primary and secondary escapement-wheels and between the escapement-wheels and carriage, and which affords a movement of the latter by a movement of either escapement-wheel and enables them to rotate independently of each other, a spacing-key for affording an actuation of the secondary escapement-wheel, and character-keys for affording an actuation of the primary escapement-wheel.

22. In a type-writing machine, the combination of a carriage, an escapement-wheel, a shaft therefor, a second shaft that is operatively connected to the carriage, and intermediate planetary gearing between said shafts.

23. In a type-writing machine, the combination of a carriage, an escapement-wheel, a shaft therefor, a second shaft that is operatively connected to the carriage, intermediate planetary gearing between said shafts, and a second escapement-wheel operatively connected to the planetary train, and independent key-actuated means for effecting the operation of said second shaft through the second escapement-wheel.

24. In a type-writing machine, the combination of a carriage, a primary escapement-wheel, a secondary escapement-wheel, both of which are operatively connected to the carriage, a key for affording a movement of the carriage through the secondary escapement-wheel, and a series of independent keys for effecting a movement of the carriage in the same direction through the primary escapement-wheel.

25. In a type-writing machine, the combination of a carriage, a primary escapement-wheel, a secondary escapement-wheel, both of which are operatively connected to the carriage, a train of planetary gears between said escapement-wheels which enables said escapement-wheels to move independently of each other and to afford a movement of the carriage by a rotation of either escapement-wheel.

26. In a type-writing machine, the combination of a gear operatively connected to the carriage, an escapement-wheel connected to said gear, key-actuated means for affording a step-by-step movement of the carriage through said escapement-wheel, and means independent of said escapement-wheel for affording a step-by-step feed movement of the carriage in the same direction.

27. In a type-writing machine, the combination of a carriage, a gear operatively connected to the carriage, an escapement-wheel connected to said gear, key-actuated means for affording a step-by-step movement of the carriage through said escapement-wheel, and key-actuated means independent of said escapement-wheel for affording a step-by-step movement of the carriage in either direction.

28. In a type-writing machine, the combination of a gear operatively connected to the carriage, a primary escapement-wheel connected to said gear, key-actuated means for affording a step-by-step movement of the carriage through said primary escapement-wheel, a secondary escapement-wheel operatively connected to the carriage, key-actuated means for affording a step-by-step feed movement of the carriage through said secondary escapement-wheel, and independent key-actuated means for intermittently rotating said secondary escapement-wheel in an opposite direction to effect a step-by-step backward movement of the carriage.

29. In a type-writing machine, the combination of a carriage, an escapement-wheel therefor, means for affording a step-by-step feed movement of the escapement-wheel in either direction to effect either a forward or back step-by-step feed of the carriage at will.

30. In a type-writing machine, the combination of a power-driven carriage, an escapement-wheel therefor, key-actuated feed-dogs which coöperate with said wheel to afford a forward feed thereof, and a separate independently key-actuated dog which coöperates with said wheel to afford a reverse movement thereof and a step-by-step back feed of the carriage.

31. In a type-writing machine, the combination of a carriage, two escapement-wheels which are rotated independently of each other, feed-dogs which coöperate with said escapement-wheels, and an independently-actuated back-stepping pawl which coöperates with one of the escapement-wheels to effect a step-by-step backward movement of the carriage.

32. In a type-writing machine, the combination of a carriage, a primary escapement-wheel, a secondary escapement-wheel which is rotated independently of said primary escapement-wheel, independently-operable escapement devices for each of said escapement-wheels, and an independently-actuated back-stepping pawl coöperating with said secondary escapement-wheel to effect a step-by-step backward movement of the carriage.

33. In a type-writing machine, the combination of an escapement-rack, a pair of feed-dogs that vibrate into and out of engagement with the rack in the same plane as said rack and one of which dogs is moved by the other, and adjustable means for regulating the movement of one dog by the other.

34. In a type-writing machine, the combination of an escapement-wheel, a pair of independently-pivoted feed-dogs that vibrate into and out of engagement with the rack in the same plane as said rack and one of which dogs is moved by the other, and adjustable means carried by one dog for contact with the other in order to regulate the movement of one dog by the other.

35. In a type-writing machine, the combination of an escapement-wheel, a pivoted dog that vibrates in the plane of the escapement-wheel, a spring which presses said dog toward the wheel, a second pivoted dog that vibrates in the plane of the wheel, key-actuated means for operating said second dog, and adjustable means for affording a movement of the spring-pressed dog by the key-actuated dog.

36. In a type-writing machine, the combination of a carriage, a pinion that is operatively connected to the carriage, and two escapement-wheels which afford a movement in the same direction, both of said escapement-wheels being operatively connected to said pinion.

37. In a type-writing machine, the combination of a carriage, a pinion that is operatively connected to the carriage, primary and secondary escapement-wheels, and intermediate mechanism between said escapement-wheels and pinion which enables the primary wheel to afford a movement of the pinion and permits the secondary wheel to afford a movement of the pinion independently of the primary escapement-wheel.

38. In a type-writing machine, the combination of a carriage, a pinion that is operatively connected to the carriage, primary and secondary escapement-wheels, intermediate mechanism between said escapement-wheels and pinion which enables the primary wheel to afford a movement of the pinion and permits the secondary wheel to afford a movement of the pinion independently of the primary escapement-wheel, and independently-operated gig-back mechanism which coöperates with said secondary escapement-wheel to effect a step-by-step backward movement of the carriage.

39. In a type-writing machine, the combination of a carriage, two escapement-wheels therefor, one of which is independent of the other, and means for effecting a movement of one of said wheels in either direction to effect a movement of the carriage in either direction.

40. In a type-writing machine, the combination of a carriage that is power-driven in the direction of its forward feed, an escapement-wheel which is movable in either direction to effect a step-by-step movement of the carriage in either direction, and means coöperating with said wheel to afford said step-by-step movement in either direction.

41. In a type-writing machine, the combination of a carriage that is power-driven in the direction of its feed, an escapement-wheel which is movable in either direction to effect a step-by-step movement of the carriage in either direction, key-actuated escapement devices coöperating with said escapement-wheel for affording a movement of the escapement-wheel in the direction of its feed, and independently-operated key-actuated mechanism coöperating with the escapement-wheel to intermittently rotate it in an opposite direction.

42. In a type-writing machine, the combination of escapement devices, a dog-rocker, a rock-shaft on which said dog-rocker is loosely mounted, bearing-rollers between said dog-rocker and rock-shaft, and means for actuating said dog-rocker.

43. In a type-writing machine, the combination of escapement devices, a dog-rocker, a rock-shaft on which said dog-rocker is loosely mounted, bearing-rollers between said dog-rocker and rock-shaft, adjustable bearings for said bearing-rollers, and means for actuating said dog-rocker.

44. In a type-writing machine, the combination of escapement devices, a dog-rocker, a key-actuated rock-shaft on which said dog-rocker is loosely mounted, bearing-rollers between said dog-rocker and rock-shaft, adjustable bearings for said bearing-rollers, and an arm on said rock-shaft which is adapted to move the dog-rocker in one direction.

45. In a type-writing machine, the combination of escapement devices, a spring-restored dog-rocker, an independently spring-restored rock-shaft on which said dog-rocker is mounted, bearing-rollers interposed between the dog-rocker and rock-shaft, an arm rigidly connected to the rock-shaft, and an adjustable abutment carried by said arm and which is adapted to abut against the dog-rocker to move it in one direction.

46. In a type-writing machine, the combination of escapement devices, a universal bar, a rock-shaft to which said universal bar is connected, an arm on said rock-shaft, loosely-mounted feed-dogs which are independent of but are actuated by the arm on said rock-shaft, and means for affording a timing of the movement of the dogs by said arm.

47. In a type-writing machine, the combination of escapement devices, a universal bar, a rock-shaft to which said universal bar is connected, an arm fixed to said rock-shaft, feed-dogs loosely mounted on the rock-shaft and which are independent of but are actuated by the arm on said rock-shaft, and a set-screw interposed between the arm and dogs for affording a timing of the movement of the dogs by said arm.

48. In a type-writing machine, the combina-

tion of a rock-shaft, roller-bearings on said rock-shaft, a universal bar rigidly connected to said rock-shaft, and escapement devices mounted on said roller-bearings, and escapement devices which coöperate with said first-mentioned escapement devices.

49. In a type-writing machine, the combination of a key-actuated rock-shaft, roller-bearings on said rock-shaft, a universal bar directly connected to and supported by said rock-shaft, feed-dogs carried by the roller-bearings on said rock-shaft, and an escapement-wheel coöperating with the feed-dogs.

50. In a type-writing machine, the combination of a rock-shaft, a spring for restoring the rock-shaft to the normal position, a feed-dog carrier loosely mounted on the rock-shaft, an independent spring for restoring the feed-dog carrier to the normal position, means carried by the rock-shaft but which are disconnected from the feed-dog carrier for actuating it, and a universal bar for actuating the rock-shaft.

51. In a type-writing machine, the combination of a rock-shaft, a spring for restoring the rock-shaft to the normal position, a feed-dog carrier loosely mounted on the rock-shaft, an independent spring for restoring the feed-dog carrier to the normal position, independent means for adjusting the tension of each of said springs, adjustable means carried by the rock-shaft but disconnected from the feed-dog carrier for actuating it, so that the relative movement of the rock-shaft and feed-dogs may be regulated, and a universal bar for actuating the rock-shaft.

52. In a type-writing machine, the combination of a movable part, a contractile spring connected at one end thereto, a hollow thumb-screw through which one end of the spring extends and an enlargement on the spring to operatively connect it to the thumb-screw.

53. In a type-writing machine, the combination of a carriage, a feed-rack carried by said carriage, a spring-drum, fixed and loose gear-wheels on said drum and which mesh with said feed-rack, a main carriage-spring contained within the drum, and escapement mechanism which controls said loose gear-wheel and resists the pressure of said spring.

54. In a type-writing machine, the combination of a carriage, a feed-rack carried by said carriage, a spring-drum, fixed and loose gear-wheels on said drum and which mesh with said feed-rack, a main carriage-spring contained within the drum, and a pinion meshing with said loose gear-wheel.

55. In a type-writing machine, the combination of a carriage, a universal bar, feed-dogs actuated thereby, an escapement-wheel coöperating with said feed-dogs, intermediate gearing between said escapement-wheel and the carriage a second escapement-wheel operatively connected to the intermediate gearing, a second set of feed-dogs for said second escapement-wheel, and independent key-actuated means for the second set of feed-dogs.

56. In a type-writing machine, the combination of a carriage, a universal bar, feed-dogs actuated thereby, an escapement-wheel coöperating with said feed-dogs, intermediate planetary gearing between said escapement-wheel and the carriage, a second escapement-wheel operatively connected to the intermediate planetary gearing, and adapted to operate independently of the first-named escapement-wheel, a second set of feed-dogs for said second escapement-wheel, and a spacing-key operatively connected to the second set of feed-dogs.

57. In a type-writing machine, the combination of a carriage, a universal bar, feed-dogs actuated thereby, an escapement-wheel coöperating with said feed-dogs, intermediate gearing between said escapement-wheel and the carriage, a second escapement-wheel operatively connected to the intermediate gearing, a second set of feed-dogs for said second escapement-wheel, independent key-actuated means for the second set of feed-dogs, a finger-piece on the carriage, and means controlled thereby for throwing the second set of feed-dogs out of operative engagement with their coöperating escapement-wheel and thus releasing the carriage.

58. In a type-writing machine, the combination of a power-driven carriage, a universal bar, feed-dogs actuated thereby, character-keys for actuating said universal bar, an escapement-wheel coöperating with said feed-dogs, intermediate planetary gearing between said escapement-wheel and the carriage, a second escapement-wheel operatively connected to the intermediate planetary gearing and adapted to operate independently of the first-named escapement-wheel, a second set of feed-dogs for said second escapement-wheel, and a spacing-key operatively connected to the second set of feed-dogs.

59. In a type-writing machine, the combination of a carriage, a feed-rack carried thereby, gearing in constant mesh with said rack, two escapement-wheels operatively connected to said gearing and either or both of which control the movement thereof in one direction, and independent means for affording a movement of said escapement-wheels.

60. In a type-writing machine, the combination of a carriage, a feed-rack carried thereby, gearing in constant mesh with said rack, two escapement-wheels operatively connected to said gearing and either or both of which control the movement thereof in the direction of its feed, independent means for affording a feed movement of said escapement-wheels, and key-actuated means for effecting a reverse movement of one of said escapement-wheels to effect a step-by-step backward movement of the carriage.

61. In a type-writing machine, the combination of a carriage, a feed-rack carried thereby, gearing in constant mesh with said rack, two escapement-wheels operatively connected to said gearing and either or both of which control the movement thereof, character-keys for affording a movement of one escapement-wheel, and a space-key for affording a movement of the other escapement-wheel, whereby when the space-key and a character-key are simultaneously depressed a double-space-feed movement of the carriage will be afforded.

62. In a type-writing machine, the combination of a carriage, two escapement-wheels therefor, intermediate planetary gears between said escapement-wheels, and ball-bearings for the escapement-wheels and planetary gears.

63. In a type-writing machine, the combination of a carriage, an escapement-wheel therefor, a shaft for said escapement-wheel, a pinion on said shaft, a revolving disk, a pinion mounted thereon and which engages the pinion on the shaft, a gear which meshes with the pinion on the disk, means for operatively connecting the disk with the carriage, and means independent of said escapement-wheel for affording a movement of said gear-wheel.

64. In a type-writing machine, the combination of a carriage, an escapement-wheel therefor, a shaft for said escapement-wheel, a pinion on said shaft, a revolving disk, an eccentrically-mounted pinion carried by said disk and which engages the pinion on the shaft and is adapted to be revolved thereby and to revolve around it and independent thereof, a gear which meshes with the pinion on the disk, means for operatively connecting the disk with the carriage, and means independent of said escapement-wheel for affording a movement of said gear-wheel.

65. In a type-writing machine, the combination of a carriage, a primary escapement-wheel therefor, a shaft for said escapement-wheel, a pinion on said shaft, a revolving disk, a pinion mounted thereon, and which engages the pinion on the shaft, a gear which meshes with the pinion on the disk, means for operatively connecting the disk with the carriage, a secondary escapement-wheel rotatable independent of said primary escapement-wheel for affording an independent movement of said gear-wheel, and independent key-actuated means for controlling each of said escapement-wheels.

66. In a type-writing machine, the combination of a carriage, a primary escapement-wheel therefor, coöperating feed-dogs, a pinion connected to said escapement-wheel, a planetary pinion meshing with said first-named pinion, a carrier for said planetary pinion, an internal gear which coöperates with the planetary pinion, a secondary escapement-wheel connected to said gear, feed-dogs coöperating with said secondary wheel, and means for operatively connecting said carrier to the carriage.

67. In a type-writing machine, the combination of a carriage, a primary escapement-wheel therefor, coöperating feed-dogs, a pinion connected to said escapement-wheel, a planetary pinion meshing with said first-named pinion, a carrier for said planetary pinion, an internal gear which coöperates with the planetary pinion, a secondary escapement-wheel connected to said gear, feed-dogs coöperating with said secondary escapement-wheel, means for operatively connecting said carrier to the carriage, and hand-operated means for throwing the dogs of the secondary escapement-wheel out of coaction therewith to release the carriage.

68. In a type-writing machine, the combination of a carriage, a primary escapement-wheel, feed-dogs therefor, a pinion connected to said escapement-wheel, a revolving carrier that revolves on the same center as said escapement wheel, an eccentrically-mounted pinion on said carrier, a secondary escapement-wheel, feed-dogs therefor, and a gear which is controlled by said secondary escapement-wheel and meshes with the pinion on said carrier.

69. In a type-writing machine, the combination of a carriage, a primary escapement-wheel, feed-dogs therefor, character-keys which actuate said feed-dogs, a pinion connected to said escapement-wheel, a revolving carrier that revolves on the same center as said escapement-wheel, an eccentrically-mounted pinion on said carrier, a secondary escapement-wheel, feed-dogs therefor, a pinion which revolves on the same center as the primary escapement-wheel and is controlled by said secondary escapement-wheel and meshes with the pinion on said carrier, and a space-key that controls the feed-dogs of the secondary escapement-wheel.

70. In a type-writing machine, the combination of a carriage, a primary escapement-wheel, feed-dogs therefor, keys for actuating said feed-dogs, a pinion connected to said escapement-wheel, a revolving carrier that revolves on the same center as said escapement-wheel, an eccentrically-mounted pinion on said carrier and which meshes with the pinion on said escapement-wheel, a secondary escapement-wheel, feed-dogs therefor, an internal gear formed on the secondary escapement-wheel and which revolves on the same center as the primary escapement-wheel and meshes with the pinion on said carrier, and an independent key that controls the feed-dogs of the secondary escapement-wheel.

71. In a type-writing machine, the combination of a primary escapement-wheel, a secondary escapement-wheel, with coöperating escapement devices for both of said wheels, and intermediate bearing-rollers between said escapement-wheels.

72. In a type-writing machine, the combination of escapement devices, a coöperating key-controlled escapement-wheel, a disk, and intermediate bearing-rollers between said disk and said escapement-wheel.

73. In a type-writing machine, the combination of escapement devices, a coöperating key-controlled escapement-wheel formed with a roller-bearing, a disk with a roller-bearing surface, and intermediate bearing-rollers between said disk and escapement-wheel.

74. In a type-writing machine, the combination of a carriage, an escapement-wheel, a disk for supporting said escapement-wheel, feed-dogs for the escapement-wheel, and means independent of said dogs for affording a movement of the carriage through a revolution of said disk.

75. In a type-writing machine, the combination of a carriage, an escapement-wheel formed with a roller-bearing therein, a disk with a roller-bearing surface thereon, intermediate bearing-rollers between said disk and escapement-wheel, feed-dogs for the escapement-wheel, and means independent of said dogs for affording a movement of the carriage through a revolution of said disk.

76. In a type-writing machine, the combination of a carriage, an escapement-wheel formed with a roller-bearing therein, a disk with a roller-bearing surface thereon, intermediate bearing-rollers between said disk and escapement-wheel, a second escapement-wheel, operatively connected to said disk for affording a movement of the disk and carriage, and independent feed-dogs for said second escapement-wheel.

77. In a type-writing machine, the combination of a carriage, an escapement-wheel, operatively connected to the carriage and formed with a roller-bearing therein, a disk with a roller-bearing surface thereon, intermediate bearing-rollers between the roller-bearings of the escapement-wheel and disk, and means for affording a movement of the carriage in either direction through said escapement-wheel.

78. In a type-writing machine, the combination of a carriage, an escapement-wheel operatively connected to the carriage, a carrier that is movable with and independently of said escapement-wheel, and means for affording a movement of the carriage in either direction through said escapement-wheel.

79. In a type-writing machine, the combination of a carriage, a secondary escapement-wheel therefor formed with a roller-bearing therein, a disk with a roller-bearing surface thereon, intermediate bearing-rollers between the said bearings of the escapement-wheel and disk, a pinion pivoted on said disk, a gear with which said pinion meshes, a primary escapement-wheel, and a pinion connected thereto and which meshes with said pinion on the disk.

80. In a type-writing machine, the combination of a power-driven carriage, a secondary escapement-wheel therefor, formed with a roller-bearing therein, a disk with a roller-bearing surface thereon, intermediate bearing-rollers between the said bearings of the escapement-wheel and disk, a pinion pivoted on said disk, a gear with which said pinion meshes, a primary escapement-wheel, a pinion connected thereto and which meshes with said pinion on the disk, both of said escapement-wheels, the disk and said gear revolving on the same center, and separate sets of independently-operable feed-dogs coöperating with said escapement-wheels.

81. In a type-writing machine, the combination of a power-driven carriage, a secondary escapement-wheel therefor formed with a roller-bearing therein, a disk with a roller-bearing surface thereon, intermediate bearing-rollers between the said bearings of the escapement-wheel and disk, a pinion pivoted on said disk, a gear with which said pinion meshes, a primary escapement-wheel, a pinion connected thereto and which meshes with said pinion on the disk, separate sets of independently-operable feed-dogs coöperating with said escapement-wheels, and independent gig-back mechanism which coöperates with said secondary escapement-wheel to afford a step-by-step backward movement of the carriage.

82. In a type-writing machine, the combination of a carriage, an escapement-wheel therefor which has an internal gear and external ratchet-teeth, and escapement devices coöperating with the internal gear and the external teeth.

83. In a type-writing machine, the combination of a carriage, an escapement-wheel in the form of a ring and having internal gear-teeth and external ratchet-teeth, feed-dogs coöperating with the ratchet-teeth, an escapement-controlled means coöperating with said gear-teeth and operative connections between said escapement-controlled means and the carriage.

84. In a type-writing machine, the combination of a carriage, an escapement-wheel in the form of a ring and having internal gear-teeth and external ratchet-teeth, feed-dogs coöperating with the ratchet-teeth, an escapement-controlled planetary pinion coöperating with said gear-teeth and operative connections between the planetary pinion and the carriage.

85. In a type-writing machine, the combination of a carriage, an escapement-wheel in the form of a ring and having internal gear-teeth and external ratchet-teeth, feed-dogs that cooperate with said ratchet-teeth, a revolving disk around which said escapement-wheel revolves, operative connections between the disk and carriage, a pinion carried by the disk and meshing with the internal gear-teeth, and escapement devices operatively connected to said pinion.

86. In a type-writing machine, the combination of a carriage, an escapement-wheel in the

form of a ring and having internal gear-teeth, and external ratchet-teeth, feed-dogs that cooperate with said ratchet-teeth, a revolving disk which supports said escapement-wheel and around which it revolves, operative connections between the disk and carriage, through which the carriage may be moved in either direction step by step, a pinion carried by the disk and meshing with the internal gear-teeth, escapement devices operatively connected to said pinion, and independent means cooperating with said gear-wheel to effect a reverse or backward movement thereof to give a step-by-step backward movement of the carriage.

87. In a type-writing machine, the combination of a carriage, a disk, operative connections between the disk and carriage, roller-bearings on said disk, a ring-like escapement-wheel having bearings therein, antifriction-rollers between said bearings of the escapement wheel and disk and which support the escapement-wheel on the disk, and escapement devices cooperating with said escapement-wheel.

88. In a type-writing machine, the combination of a carriage, a disk, operative connections between the disk and carriage, roller-bearings on said disk, a ring-like escapement-wheel having roller-bearings therein and with internal gear-teeth and external ratchet-teeth, antifriction-rollers between said bearings of the escapement-wheel and disk and which support the escapement-wheel on the disk, a pinion pivoted eccentrically on the disk and meshing with the internal gear-teeth of the escapement-wheel, a second escapement-wheel operatively connected to said pinion, and two independently-operable sets of feed-dogs for said escapement-wheels.

89. In a type-writing machine, the combination of a carriage, a disk, operative connections between the disk and carriage, roller-bearings on said disk, a ring-like escapement-wheel having roller-bearings therein, and with internal gear-teeth and external ratchet-teeth, antifriction-rollers between said bearings of the escapement-wheel and disk and which support the escapement-wheel on the disk, intermediate gears between the disk and carriage, a pinion pivoted eccentrically on the disk within the escapement-wheel and meshing with the internal teeth thereof, a pinion mounted to revolve on the same center as the disk and meshing with the pinion on the disk and having an escapement-wheel connected thereto, and feed-dogs which cooperate with said escapement-wheels.

90. In a type-writing machine, the combination of a carriage, an escapement-wheel therefor, key-actuated means for affording an actuation of said escapement-wheel, a carrier operatively connected to the carriage and a movement of which is afforded by the escapement-wheel, and key-actuated means for moving said carrier independently of the escapement-wheel.

91. In a type-writing machine, the combination of a carriage, an escapement-wheel therefor, key-actuated means for affording an actuation of said escapement-wheel, a carrier operatively connected to the carriage and movable independently of the escapement-wheel to afford a forward feed of the carriage and a movement of which is afforded by the escapement-wheel, and independent key-actuated means for affording a simultaneous movement of the carrier and escapement-wheel.

92. In a type-writing machine, the combination of a carriage, an escapement-wheel therefor, key-actuated means for affording an actuation of said escapement-wheel, a carrier operatively connected to the carriage and a movement of which is afforded by the escapement-wheel and key-actuated means for affording a movement of the carrier independently of the escapement-wheel.

93. In a type-writing machine, the combination of a carriage, an escapement-wheel therefor, key-actuated means for affording an actuation of said escapement-wheel, a carrier operatively connected to the carriage and a movement of which is afforded by the escapement-wheel, key-actuated means for affording a movement of the carrier in either direction independently of the escapement-wheel.

95. In a type-writing machine, the combination of a carriage, an escapement-wheel therefor, key-actuated means for affording an actuation of said escapement-wheel, a carrier operatively connected to the carriage and a movement of which is afforded by the escapement-wheel, key-actuated means for affording a movement of the carrier independently of the escapement-wheel, and key-actuated means for affording a backward movement of the escapement-wheel.

96. In type-writing machines, a plural escapement, in combination with series of character-keys, each having operative connection with said plural escapement, independent releasing members forming parts of said escapement, and gears connecting the escapement to the carriage of the machine.

97. In type-writing machines, the combination with the carriage and feed mechanism, of a primary single-space escapement, a secondary escapement forming a locking means between the first escapement and the carriage-shifting mechanism, and an independent releasing member for said escapements.

98. In a type-writing machine, the combination with the carriage, of a plurality of step-by-step feed devices for said carriage, and means whereby either of said step-by-step feed devices may be operated separately or whereby a plurality of said step-by-step feed devices may be operated simultaneously to feed the carriage.

99. In a type-writing machine, the combination with the carriage, of a plurality of step-by-step feed devices for said carriage, means whereby either of said step-by-step feed devices may be operated separately or whereby a plurality of said feed devices may be operated simultaneously, and means whereby the simultaneous operation of a plurality of said feed devices results in a greater feed movement of the carriage than the operation of either of said feed devices separately.

100. In a type-writing machine, the combination with the carriage, of a plurality of step-by-step feed devices for said carriage, and an epicycloidal gear-train connecting said feed devices.

101. In a type-writing machine, the combination with the carriage, of a plurality of step-by-step feed devices, and an epicycloidal gear-train connecting said feed devices with one another and with the carriage.

102. In a type-writing machine, the combination with the carriage, of a rotary member connected with said carriage and a plurality of step-by-step feed devices having connections with said rotary member, such that if said rotary member will be turned a greater distance when a plurality of said feed devices are operated at once than when only one of said feed devices is operated; and key-controlled means for operating said feed devices either one at a time or simultaneously.

Signed at Syracuse, in the county of Onondaga and State of New York, this 2d day of October, A. D. 1902.

ALEXANDER T. BROWN.

Witnesses:
CHARLES J. TONER,
A. G. BODELL.