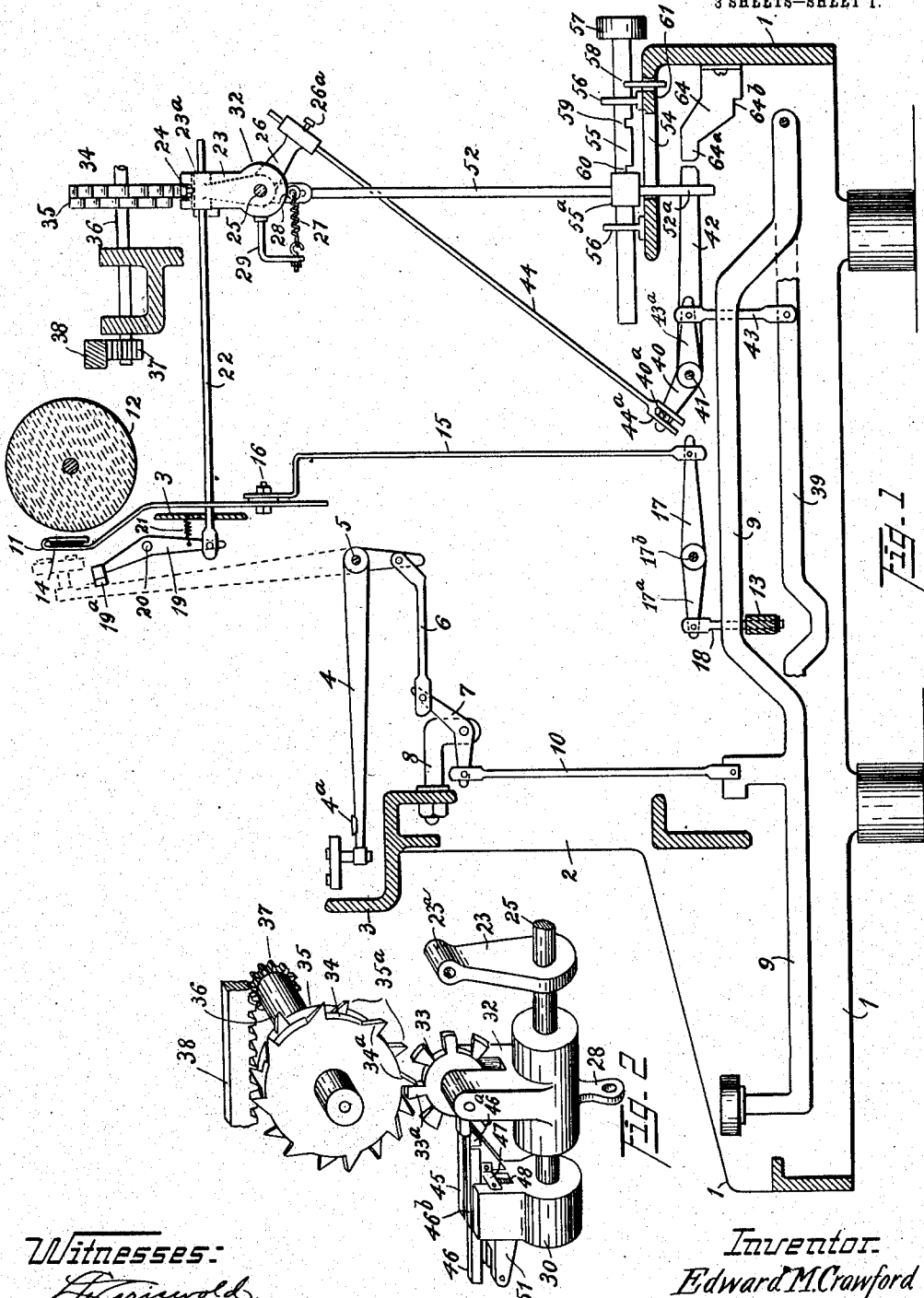


E. M. CRAWFORD.
TYPE WRITING MACHINE.
APPLICATION FILED MAY 3, 1911.

1,017,959.

Patented Feb. 20, 1912.

3 SHEETS—SHEET 1.



Witnesses:

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Inventor.

Edward M. Crawford

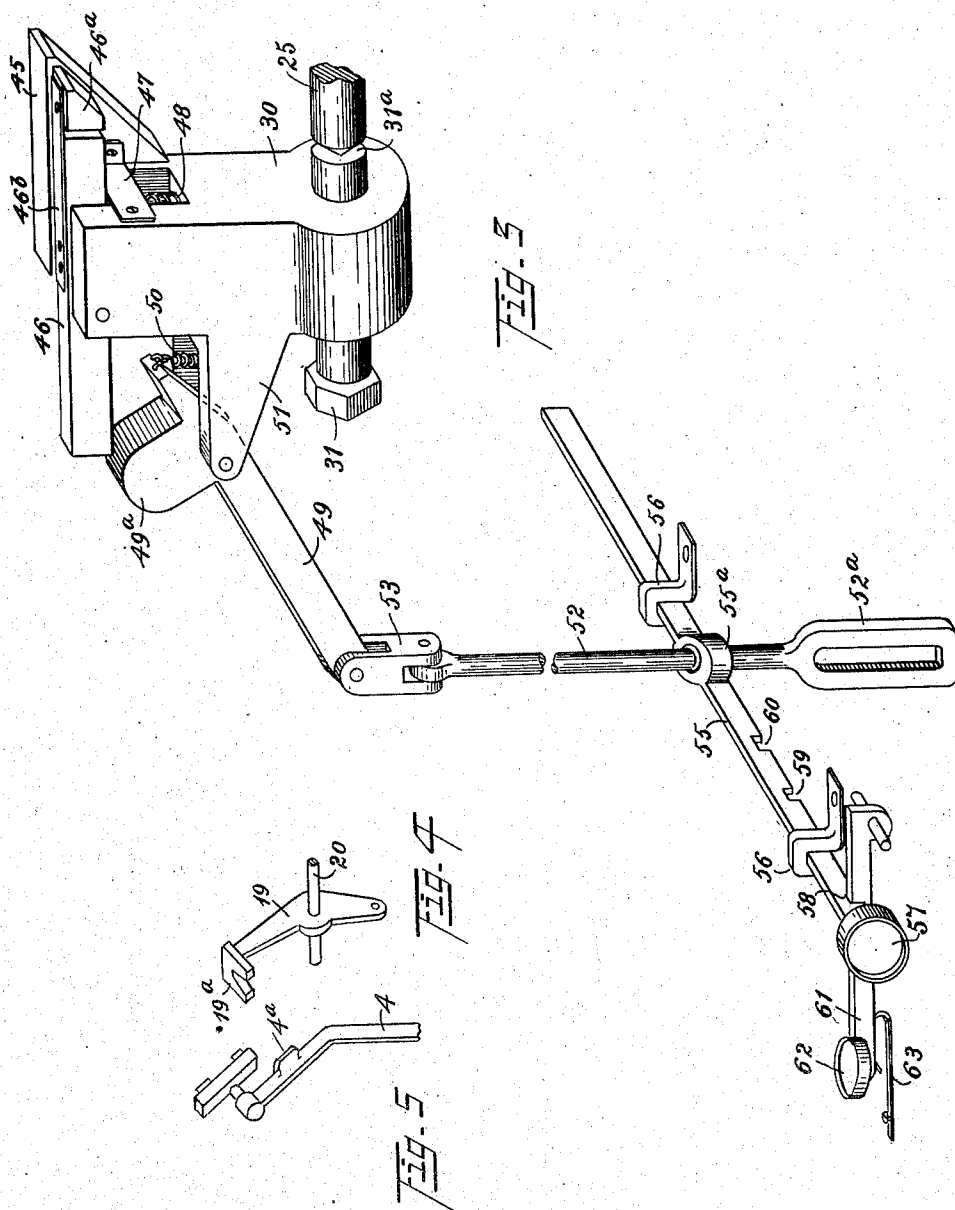
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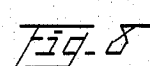
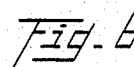
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1,017,959.

3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

EDWARD M. CRAWFORD, OF COROZAL, CANAL ZONE.

TYPE-WRITING MACHINE.

1,017,959.

Specification of Letters Patent.

Patented Feb. 20, 1912.

Application filed May 3, 1911. Serial No. 624,835.

To all whom it may concern:

Be it known that I, EDWARD M. CRAWFORD, a citizen of the United States, residing at Corozal, Canal Zone, in the Isthmus of Panama, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My invention relates to improvements in type-writing machines, and more particularly to the carriage feed and escapement mechanism for such machines, whereby the movement or travel of a work carrying member such as a type-writer carriage may not only be accomplished intermittently or step by step by simple, efficient, and durable mechanism, controlled and actuated by suitable key mechanism, but may be adjusted or regulated for the following purposes: First: By increasing the speed by providing means whereby the escapement mechanism will double space when the space bar is struck or depressed and providing means whereby the latter may be struck at the same moment and in unison with the last letter of a word, thus saving or eliminating the independent spacing operation necessarily employed for spacing between words in type-writing machines now in common use. Second: By providing means whereby the escapement mechanism will double space when either key or space bars are struck or depressed thereby double spacing between letters as well as between words. Third: By providing means whereby the escapement mechanism will intermittently move the carriage a single space when either key or space bars are struck or depressed as in the ordinary operation of type-writing machines now in common use. Fourth: To provide a highly sensitive or responsive mechanism such as will be highly efficient and exact in operation when the same is subjected to a high rate of speed by an operator.

My invention is applicable to various styles of type-writing machines but in the present embodiment I have shown the same applied to a machine of the front-strike type.

With the above mentioned and other objects in view, the invention consists in the novel construction, arrangement, and combination of parts, hereinafter described,

illustrated in one of its embodiments in the accompanying drawings, and particularly as pointed out in the appended claims.

Referring to the drawings, forming a part of this specification, Figure 1, is a vertical sectional view of a type-writer embodying the improvements of this application. Fig. 2, a detail perspective view of the escapement mechanism. Fig. 3, a perspective view of the stop or detent mechanism and the space control and regulating mechanism for cooperating therewith in regulating the intermittent spacing action given to the carriage by the carriage feed and escapement mechanism. Fig. 4, a detail perspective view of the type bar actuated universal bar connected to and cooperating with the carriage escapement mechanism. Fig. 5, a detail perspective view of the upper end of one of the type bars illustrating the manner in which it is adapted to cooperate with the universal bar shown in Fig. 4. Fig. 6, a rear view of a portion of the typewriter frame illustrating a modified form of space control and regulating mechanism for cooperating with the carriage feed and escapement mechanism shown in the preceding figures of the drawings. Fig. 7, a side elevation of the same; the rear portion of the typewriter frame being shown in vertical section. Fig. 8, a horizontal sectional view, illustrating the key operating mechanism at the rear base portion of the typewriter frame.

Similar numerals of reference designate like parts throughout all the figures of the drawings.

The improved carriage feed and escapement mechanism is applicable to any suitable form of type-writer such, for example, as one comprising a base frame 1, provided with vertical extensions or standards 2, supporting a second or upper frame of any suitable and convenient form, as for example,—including a segment 3, adapted to support the outer or free ends of the type bars 4, the latter being provided with suitable bearings 5, and supported in suitable hangers carried by the upper frame or type basket of the machine.

The type bars may be operated in any suitable and convenient manner, as for example,—by means of a plurality of connect-

ing links 6, connected to a plurality of bell crank members or levers 7, the latter being supported in suitable bearings or hangers 8, of the upper frame or segment 3, said crank lever members being connected to a plurality of key or lever bars 9, by means of link bars or rods 10.

The key bars 9, may be suitably mounted or fulcrumed at the rear of the base frame 1, and as a means for carrying the ribbon 11, in proper position in front of the platen 12, and directly in front of the printing point of the type carried by the type bars as the latter are operated, a universal cross bar 13, may be arranged beneath the key bars, said cross bar being adapted to support and move the ribbon by means of a ribbon holder 14, adjustably connected to a vertical bar or rod 15, through the medium of an adjusting bolt 16, said bar or rod being adapted to be oscillated by means of a mounted lever member 17, suitably connected to the cross bar 13, as for example, by means of a bearing standard or arm 18.

As a means for operating the feed and escapement mechanism hereinafter described, with each operation or oscillation of each type bar and just before the latter reaches the printing point on the platen, a universal bar or lever member 19, is mounted upon a pivot or bearing portion 20, carried by the upper frame portion 3, of the machine. The upper or free end of the universal bar or member 19, is provided with a strike or anvil portion 19^a, adapted to receive and be operated by the upper or free end portion of each individual type bar just before reaching the printing point. If desired, the strike or anvil portion 19^a, may be provided with a notch or bifurcation to receive a strike or guide projection 4^a, of each type bar, as illustrated most clearly in Figs. 4 and 5, of the drawings.

The universal bar or member 19, is normally held in the position indicated in Fig. 1, of the drawings, by means of a spring 21, connected to the frame portion 3, of the machine.

The universal bar or member 19, is connected to the carriage feed or escapement mechanism by means of a connecting rod or link 22, adjustably connected to a crank arm 23, by means of an adjusting screw or bolt 24, carried in a sleeve portion 23^a, of the crank arm, said crank arm being mounted on a rock shaft 25, mounted in suitable bearings at the rear of the frame portion 3, and carrying a second crank arm 26, adapted to be operated through the spacing lever or bar as hereinafter described. The rock shaft 25, with the parts carried thereby, together with the universal bar 19, are further held in the normal position indicated in Fig. 1, of the drawings, by means of a spring 27, connected at one end to an arm

or projection 28, extending from the rocker arm 32, said spring being connected at the other end to a bracket member 29, carried by the lug portion 30, of the machine frame.

The carriage feed or escapement mechanism comprises a stationary lug or block member 30, extending from the upper frame portion 3, and carrying one end of the rock shaft 25, by means of an adjusting bolt 31, forming a conical shaped bearing recess 31^a, for the conical shaped end of said rock shaft 25, as shown most clearly in Fig. 3, of the drawings. An escapement dog block or rocker member 32, is carried by the rock shaft 25, said dog block or rocker member carrying a dog wheel 33, provided with dog or detent members 33^a, adapted to be brought into alternate engagement with two rows of alternately arranged ratchet teeth 34^a, and 35^a, arranged, in the present instance, on companion ratchet wheels 34, and 35 respectively. It is obvious, however, that a single ratchet wheel provided with two rows of teeth 34^a, and 35^a, might be readily substituted. A shaft or spindle 36, is suitably mounted on the upper frame of the machine, said shaft or spindle being adapted to carry the ratchet wheels at one end, and being provided with a pinion 37, adapted to engage a rack 38, of the carriage.

As the rock shaft 25 is oscillated through the medium of the universal bar or lever member 19, and its connections as above described, it is apparent that the lateral or oscillatory movement of the rocker member 32, and dog wheel 33, will cause the detent members 33^a, to be thrown into and out of engagement with the ratchet teeth 34^a, and 35^a, whereby the ratchet wheel and shaft will be operated in a well known and understood manner at each printing stroke of a type bar.

As a means for operating the escapement mechanism through the medium of the spacer bar or lever 39, a crank lever member 40, is mounted upon a pivot member or shaft 41, said crank lever member 40, and shaft or pivot member 41, carrying a second lever 42, the latter lever being designed for use in causing the escapement mechanism to double space as hereinafter described. The crank lever shaft 41, is connected at the ends to the spacer bar 39, by means of connecting links 43, and the lever member 40 communicates with the second crank arm 26, on the rock shaft 25, through the medium of a connecting rod or link 44, one end of said rod or link being adjustably connected to the crank arm 26, through an adjusting screw or bolt 26^a. The lower end of the connecting rod or link 44, is provided with a slot or recess 44^a, taking over a guide pin 40^a, on one end of the crank lever 40, so that when the spacer bar or lever 39, is depressed or operated it will move said guide pin 40^a up-

wardly, carrying the connecting rod or link 44, in a similar direction thus operating the rock shaft 25, and rocker or dog member 32, in coöperative relation to the carriage feed 5 ratchet wheel and spindle as above explained. It will also be obvious that by reason of the arrangement of the slot or recess 44^a, with respect to the guide pin 40^a, on the crank lever 40, that the oscillation of the rock shaft 25, through the medium of the universal bar or member 19, will be independent of the crank lever 40, and its connections with the spacer bar 39, so that the latter will not be operated simultaneously 15 with said type bar actuated universal bar or lever member 19.

As a means for stopping and releasing the dog wheel 33, as well as providing means whereby in one adjustment the escapement 20 mechanism will double space when the space bar alone is struck or depressed, or whereby a second adjustment may be secured which will cause the escapement mechanism to double space when either a key or space bar 25 is struck or depressed, a stationary dog or detent 45, is provided on one side of the stationary lug or block member 30, and a movable dog or detent 46, is pivotally mounted and adapted to be normally held in alignment with the stationary dog or detent 45, 30 by resting on a stop plate 47, carried by the block member 30. During the normal or single spacing operation of the escapement mechanism the detent members 45 and 46, 35 are in alinement with each other so that during the oscillation of the escape block or rocker member 32, and dog wheel 33, the latter will not be revolved upon its pivot but be held in a stationary position as the detent member 33^a, is slidably moved on the upper face sides of the dogs or detents 45 and 46, and as the other dog or detent member 33 of the dog wheel is thrown into and out of engagement with the alternately ar- 40 ranged ratchet teeth 34^a and 35^a.

As a means for permitting the return movement of the carriage from left to right the movable dog or detent 46, is provided with a resilient tip portion 46^a, carried and 50 supported by means of a spring 46^b, so that when the detent members 33^a, of the dog wheel 33 are brought under the resilient tip portion 46^a in the opposite movement of the dog wheel, said tip portion 46^a 55 will be elevated against the resistance of the spring 46^b, to permit the detent members 33^a, to pass. The movable dog or detent 46, is held downwardly in alignment with the stationary dog or detent 45, 60 against the resistance of an expansion spring 48, by means of a lever member 49, having a cam head 49^a, taking over and engaging the free end of the movable dog or detent and normally held in engagement 65 therewith by the action of a coiled spring

50. The lever member 49, is pivotally mounted in bearing lugs 51, extending from the stationary block 30, and the free end of the stationary member 49, is connected to a vertically arranged link bar 52, through the 70 medium of a connecting link 53.

It will be obvious that if the free end of the lever member 49, is depressed, the removal of the cam head 49^a, from its supporting position in contact with the adjacent end 75 of the movable dog or detent 46 will cause the resilient tip portion 46^a, to be elevated by the action of the expansion spring 48, and consequently during the return of the detent member 33^a, of the dog wheel 33, 80 from the stationary dog or detent 45, said detent member will clear the free or resilient tip portion 46^a, passing under the latter and thus permitting the dog wheel 33, to escape or be moved rearwardly to next detent member 33^a, thus causing a double spacing action 85 to be imparted to the carriage feed or ratchet wheel and its connections.

As a means for adjusting the link bar 52, and its connections whereby to regulate the spacing through the escapement mechanism as above referred to, the lower end of the link bar is provided with an eye 52^a, extending through a slot 54 in the lower or 90 base frame of the machine, and as a means for shifting the lower or eye portion of the link bar for various adjustments the shift or key bar 55, is slidably mounted in brackets 56, and is provided with a sleeve portion 55^a, loosely surrounding the link 95 bar 52. One end of the shift bar 55, is provided with a key portion 57, and as a means for locking said shift bar 55, in various positions, notches 58, 59, and 60, are provided 100 on the lower side thereof, said notches being adapted to be engaged by a key lever bar 61, pivotally mounted at one end of the frame portion of the machine, and at the other or free end provided with a key 62, and a spring 63, adapted to elevate and normally 105 hold the key lever bar 61, in engagement with said notches of the shift key bar 55, when the latter is adjusted.

When the shift or key bar 55, is moved inwardly so that the key lever bar 61, is in engagement with the notch 58, said key bar 55, 115 has carried the slotted portion of the eye 52^a, of the link bar 52, under the free end of the lever 42, carried on the shaft member 41, so that when the space bar or lever 39, is depressed the free end of the lever 42, will likewise be depressed, thus pulling down the free end of the cam lever member 49, where- 120 by the escapement mechanism will double space when the space bar is struck as above explained. By shifting the shift or key bar 55, so as to bring the intermediate notch 59 into engagement with the key lever bar 61, it will be obvious that the slotted eye 52^a, 125 of the link bar 52, will be carried over the 130

projecting nose portion 64^a, of the stationary bracket 64, thus clearing the free end of the lever 42, so that the cam lever member 49, will remain in its normal position, and the escapement mechanism will intermittently move the carriage but a single space when either the key or space bars are struck or depressed as in the ordinary operation of type-writing machines now in common use.

By shifting the key bar 55, so that the notch 60, is brought into alinement with the key lever bar 61, the slotted portion of the eye 52^a, of the link bar 52, will be moved downwardly over the inclined portion of the stationary brackets 64, and rest or be seated on the notched portion 64^b, of the stationary bracket, thus depressing the lever member 49, and holding the latter in a permanent depressed position, whereby the escapement mechanism will double space when either key or space bars are struck or depressed.

Figs. 6, 7 and 8 show another form of the space control mechanism, as follows: As a means for permitting the return movement of the carriage from left to right, the movable dog 46 is provided with a resilient tip portion 46^a carried and supported by means of a spring 46^b so that when the detent members 33^a of the dog-wheel 33 are brought under the resilient tip portion 46^a, said tip portion will be elevated against the resistance of the spring 46^b to permit the detent members 33^a to pass. The movable dog 46, is held normally in alinement with the stationary dog or detent 45, against the resistance of an expansion spring 48, by means of a bar or rod 81, vertically mounted in an opening of the bracket 51 of the lug 30 and in an opening of the bracket 82 of the frame, the head of the rod 81 engaging the free end of the movable dog 46 and being normally held in engagement therewith by the action of an expansion spring 67 working between the cross-pin 66 in the rod 81 and the bracket 82 on the rear part of the main frame. It will be obvious that if the rod 81 is depressed, the downward movement of the rod from its supporting position in contact with the movable dog 46 at its under surface, will cause the resilient tip portion 46^a to be elevated by the action of the expansion spring 48, as the dog-wheel 33 slidably moves off the movable dog 46, and upon the return of the dog-wheel 33 to the movable dog 46 the said movable dog's detent portion 46^a being elevated it will therefore come over the detent member 33^a of the dog-wheel, and the next detent member 33^a will be forced against the upper surface of the detent member or resilient tip portion 46^a by the pressure of the carriage communicated by the ratchet wheel 34. As a means for adjusting the rod or bar 81 and its connections whereby to regulate the spacing through the escapement mechanism as above referred to, the lower

end of the bar 81 is provided with an adjustable extension piece 70, said extension piece being hollow at its upper extremity so as to receive the rod 81 to which it is fastened by the set screw 69^a. The upper end of the extension piece 70 is provided with a slotted arm 69, and the lower end of the extension piece 70 is provided with an adjustable arm 76, fastened to the extension piece 70 by a set screw 76^a, the normal position of said arm 76 being beneath the end of the lever 42 at 42^a. The extension piece 70 is passed through a sleeve cam 71 attached beneath a slot in the base of frame portion 1. The cam 71 is provided with an annular working face comprising about $\frac{3}{4}$ of its surface in a horizontal plane, $\frac{1}{4}$ of the remaining $\frac{1}{4}$ of its surface is also a horizontal plane forming its lower working surface, the distance between the two surfaces being connected by an inclined screw surface, and in the operation of cam 71 the pin 77 of the extension piece 70 moves along the $\frac{3}{4}$ surface and thence along the inclined screw surface on to the $\frac{1}{4}$ lower horizontal surface, thus pulling the rod 81 down, as hereinafter described. The horizontal slotted arm 69 of the upper end of the extension piece 70 engages a vertical rod or pin 68 in its slotted portion, the pin 68 being rigidly attached to a horizontal bar 74 slidably mounted in suitable brackets 72 and 73. One end of the bar 74 is racked so as to engage a pinion 78 from which pinion extends a spindle 79 to the front part of the machine, the spindle 79 being suitably supported where it enters the frame in the rear of the machine and where it exits from the frame in the front of the machine. The front end of the spindle 79 is provided with a crank arm 80, said crank arm being situated against the front frame of the machine and just above the keyboard where it can be easily set by the typewriter operator to its different positions marked "S", "C" and "D". By turning the crank arm 80 it is obvious that the spindle 79 with its pinion 78 will turn moving the racked bar 74, which through the pin 68 will move the horizontal slotted arm 69 thus turning the rod 81.

In adjusting the spacing mechanism the crank arm 80 is set on "C" in its upright position. The extension piece 70 is then slipped through the center of the cam 71 and the upper end of the extension piece is slipped on to the end of the rod 81 with the arm 69 extending out directly in the rear the slotted portion of arm 69 engaging the vertical pin 68, and then the set screw 69^a is fastened. The cam 71 is then set so that the pin 77 of the extension piece 70, is on the $\frac{3}{4}$ working surface of the cam 71 just at its junction with the inclined screw surface, the head of rod 81 being at the same time well up against the under surface of the mov-

able dog 46 holding it in alinement with the stationary dog 45. The arm 76 is then set on the end of the extension piece 70 so that its end comes directly below the end of the lever 42 at 42^a and slightly spaced therefrom, it is then fastened to the extension piece 70 by the set screw 76^a. In this position "C" it is now said to be set on its word spacing position, for it is obvious that if the space bar 39 is struck it will bring down the lever 42, its end 42^a engaging the lever 76 thus pulling the bar 81 down from its supporting position in contact with the movable dog 46 at the moment the dog-wheel 33 is clear of same thus allowing the resilient tip portion 46^a to be elevated and to clear one of the detent members 33^a of said dog-wheel, the spring 67 pulling up the rod 81 upon the release of the space bar and thus allowing the type keys to be struck while the movable dog is held in alinement with the stationary dog 45 a single spacing operation only occurring as long as the movable dog is in this position the detent member 33^a only sliding back and forth on the dogs 45 and 46.

By turning the crank arm 80 to the right and setting it on "D" the spacing mechanism will now be set permanently in the double spacing operation, for the pinion 78 in turning to the right moves the racked bar 74 in, which, by its vertical pin 68 engaging the slotted arm 69 moves said arm in and thus turning the bar 81 and its extension piece 70, the arm 76 of the extension piece 70 moving clear of the end of the lever 42 and the pin 77 of the extension piece 70 moving on to the inclined screw surface of the cam 71 and thence on to the lower horizontal surface of said cam thus locking it and preventing the bar 81 from returning to its supporting position in contact with the movable dog 46, for the pin 77 in moving along the inclined screw surface on to the lower horizontal surface of cam 71, pulls the bar 81 down, and it is obvious that with bar 81 permanently down and away from the movable dog 46, that the said movable dog 46 is free to elevate its resilient tip portion 46^a at every oscillation of the rocker arm 32, that is, whenever the keybars are struck or the space bar is struck, the space bar now operating the rocker arm through the medium of the link bar 44 as hereinbefore described.

When the crank arm 80 is turned to the left and set on "S", it is evident from the description of parts hereinbefore set forth that the racked bar 74 will be pulled to the right by the pinion 78 and in such movement it will carry the slotted arm 69 with it, thus turning the bar 81 and its extension piece 70 in the opposite direction as described when the crank arm was turned to the right and set on "D". In this opposite

movement the pin 77 will be carried away from the inclined screw surface of the cam 71 remaining on its $\frac{3}{4}$ upper horizontal surface thus not affecting the position of the bar 81, the head of which remains in contact with the movable dog 46 and supporting it, but in the turning movement of the extension piece 70 the arm 76 is carried away from the end of the lever 42 thus allowing the lever 42 to operate freely and not affecting the arm 76, wherefore it is seen that the movable dog 46 is thus held permanently in alinement with the stationary dog 45, and that at every oscillation of the rocker arm 32 none of the detent members 33^a will be released but said rocker arm with its dog wheel 33 and its detent member 33^a will slidably move back and forth and the escapement mechanism will intermittently move the carriage but a single space when either the key or space bar is struck or depressed as in the ordinary operation of type-writing machines now in common use.

Having thus described an embodiment of my invention, what I claim and desire to secure by Letters Patent is,—

1. In a type-writing machine, carriage feed and escapement mechanism including an escapement wheel having two rows of alternately arranged ratchet teeth, and a rocker carrying a dog wheel in coöperative relation to said ratchet teeth, and space control and regulating mechanism operatively connected therewith.

2. In a type-writing machine, the combination with the carriage feed and escapement mechanism thereof including an escapement wheel, and a rocker carrying a dog wheel in coöperative relation to said escapement wheel; of a space control and regulating mechanism operatively connected with said escapement mechanism.

3. In a type-writing machine, carriage feed and escapement mechanism, including an escapement wheel having two rows of alternately arranged ratchet teeth, and a rocker carrying a dog wheel in coöperative relation to said ratchet teeth, space control mechanism connected therewith, and means for regulating and operating said space control mechanism.

4. In a type-writing machine, the combination with carriage feed and escapement mechanism including an escapement wheel having two rows of alternately arranged ratchet teeth and a rocker carrying a dog wheel in coöperative relation to said ratchet teeth, and key and space bars operatively connected with said carriage feed and escapement mechanism; of means for causing said mechanism to double space when said space bar and one of said key bars are simultaneously operated.

5. In a type-writing machine, the combination with a carriage feed and escapement

mechanism including an escapement wheel having two rows of alternately arranged ratchet teeth and a rocker carrying a dog wheel in coöperative relation to said ratchet teeth, and a type-bar actuated universal bar and a space-bar operatively connected to said mechanism; of means for causing said mechanism to double space when said space-bar is actuated.

- 10 6. In a type-writing machine, the combination with the carriage feed and escapement mechanism including an escapement wheel having two rows of alternately arranged ratchet teeth and a rocker carrying
15 a dog wheel in coöperative relation to said ratchet teeth, and key and space-bars operatively connected with said mechanism; of space control mechanism operatively connected therewith, means for regulating said
20 space control mechanism, and means for connecting said space control mechanism with said space bar.

7. In a type-writing machine, the combination of a feed rack, a ratchet-wheel provided with a pinion meshing with said rack,
25 a rocker carrying a dog-wheel in coöperative relation to said ratchet-wheel, stop mechanism for said dog-wheel, means for oscillating said rocker and dog-wheel, and means
30 for regulating said stop mechanism.

8. In a type-writing machine, the combination of a feed rack, a ratchet wheel provided with a shaft having a pinion meshing with said rack, a rocker carrying a dog
35 wheel coöperating with said ratchet wheel, stop mechanism coöperating with said dog

wheel, and means for oscillating said rocker and dog wheel.

9. In a type-writing machine, a feed rack, a ratchet wheel, a shaft carrying said ratchet wheel and provided with a pinion meshing
40 with said rack, a rocker carrying a dog wheel adapted to coöperate with the teeth of said ratchet wheel, and detent members adapted to be engaged by said dog wheel.

10. In a typewriting machine, the combination with a feed rack, and a ratchet wheel coöperatively connected therewith; of a
45 rocker carrying a dog wheel adapted to coöperate with the teeth of said ratchet wheel, and stop mechanism in coöperative relation to said dog wheel.

11. In a type-writing machine, the combination with a feed rack, and a ratchet wheel operatively connected therewith; of a rocker
50 carrying a dog wheel, stop mechanism for said dog wheel, and means for oscillating said rocker and dog wheel.

12. In a type-writing machine, the combination with a feed rack, and a ratchet wheel and pinion connected therewith; of a rocker
60 carrying a dog wheel in coöperative relation to said ratchet wheel, stop mechanism for said dog wheel, and key and space bars operatively connected to said rocker and stop
65 mechanism.

In testimony whereof I have affixed my signature in presence of two witnesses.

EDWARD M. CRAWFORD.

Witnesses:

F. T. HAMLIN,
C. A. WICKHAM.