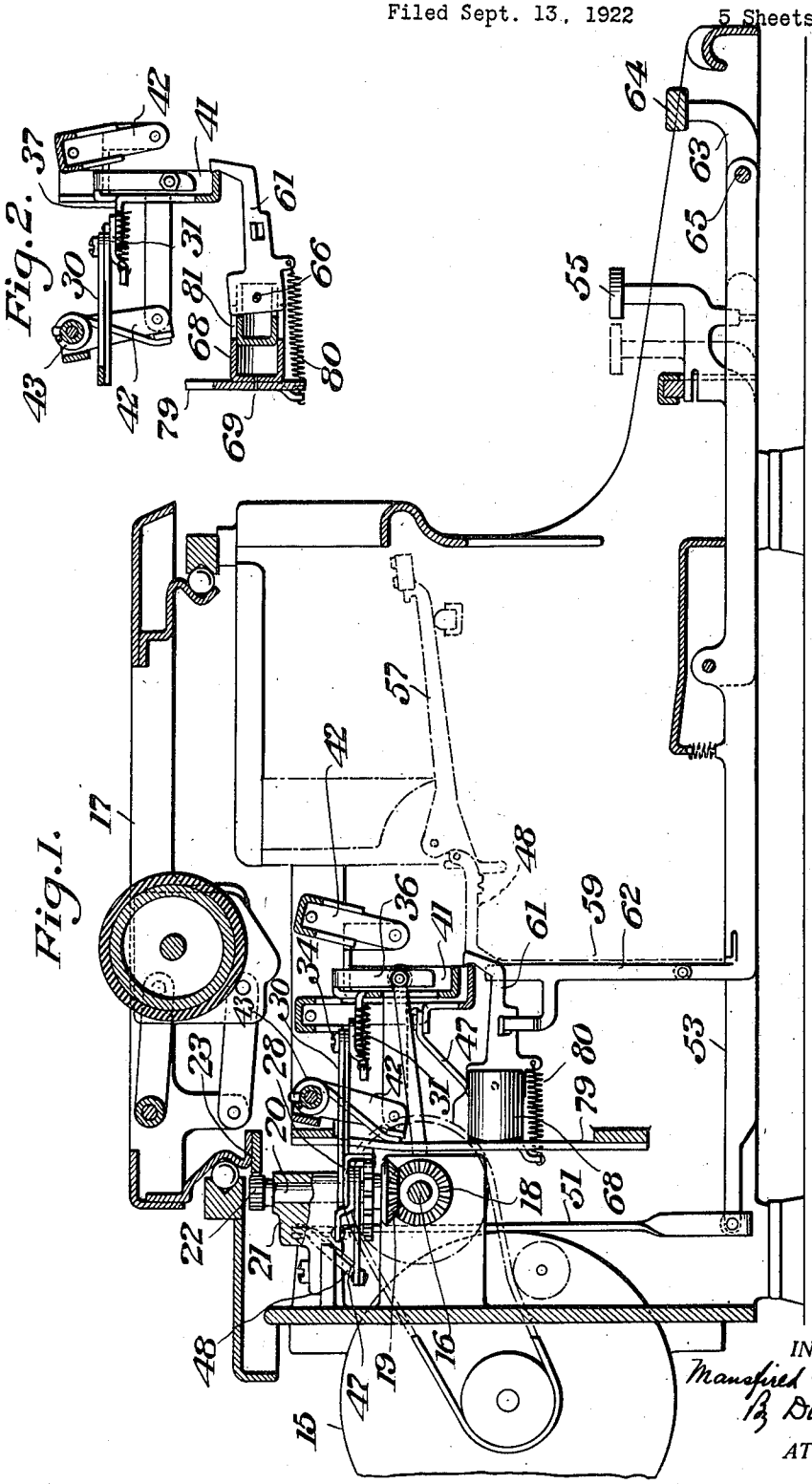
Oct. 9, 1923. 1,469,778

M. C. CRAWLEY.

TYPEWRITING MACHINE

Filed Sept. 13, 1922 5 Sheets-Sheet 1



INVENTOR
Mansfield C. Crawley
By Davis & Davis
ATTORNEYS

Oct. 9, 1923. 1,469,778

M. C. CRAWLEY

TYPEWRITING MACHINE

Filed Sept. 13, 1922 5 Sheets-Sheet 2

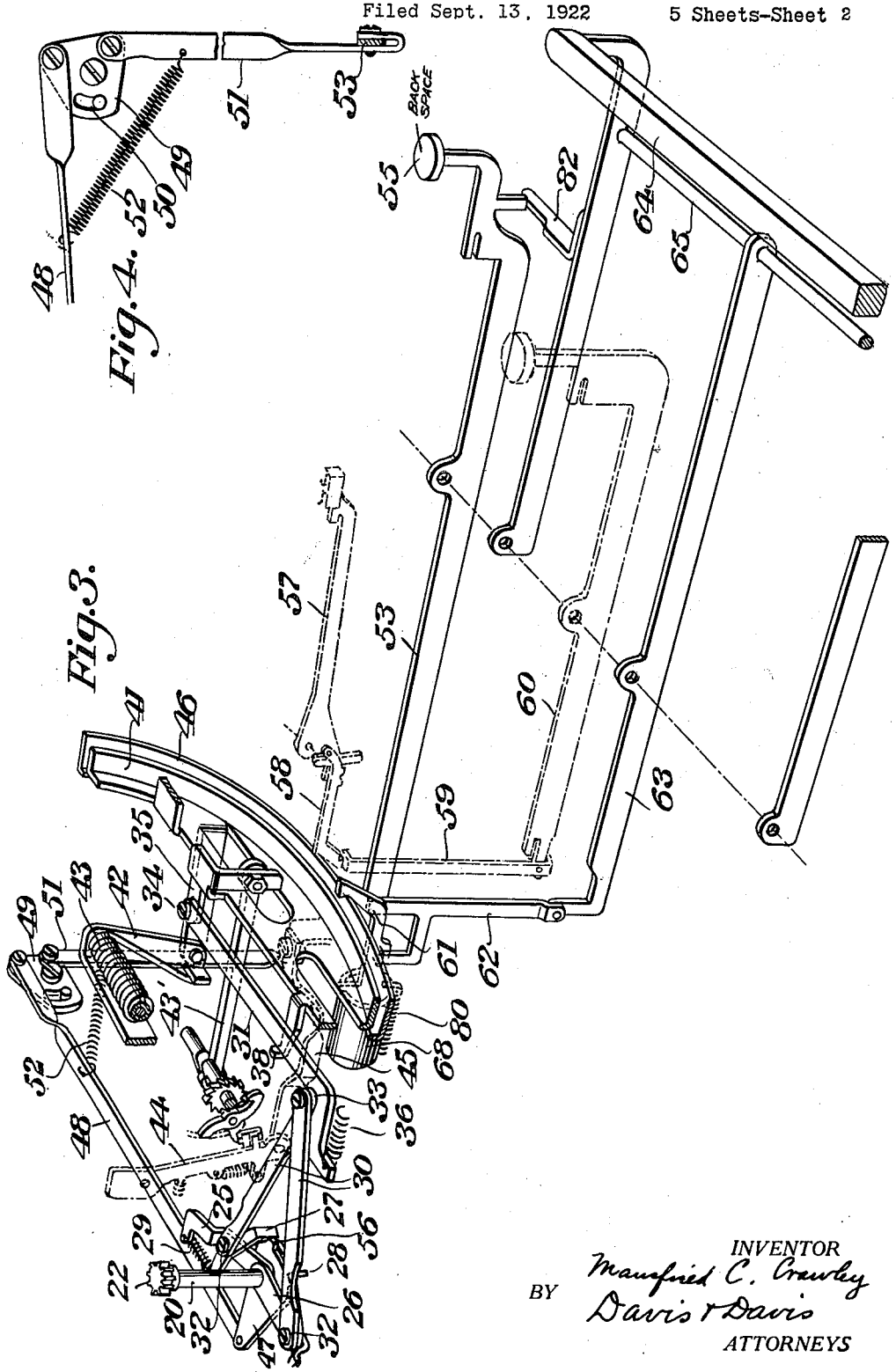


Fig. 4.

Fig. 3.

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TYPEWRITING MACHINE

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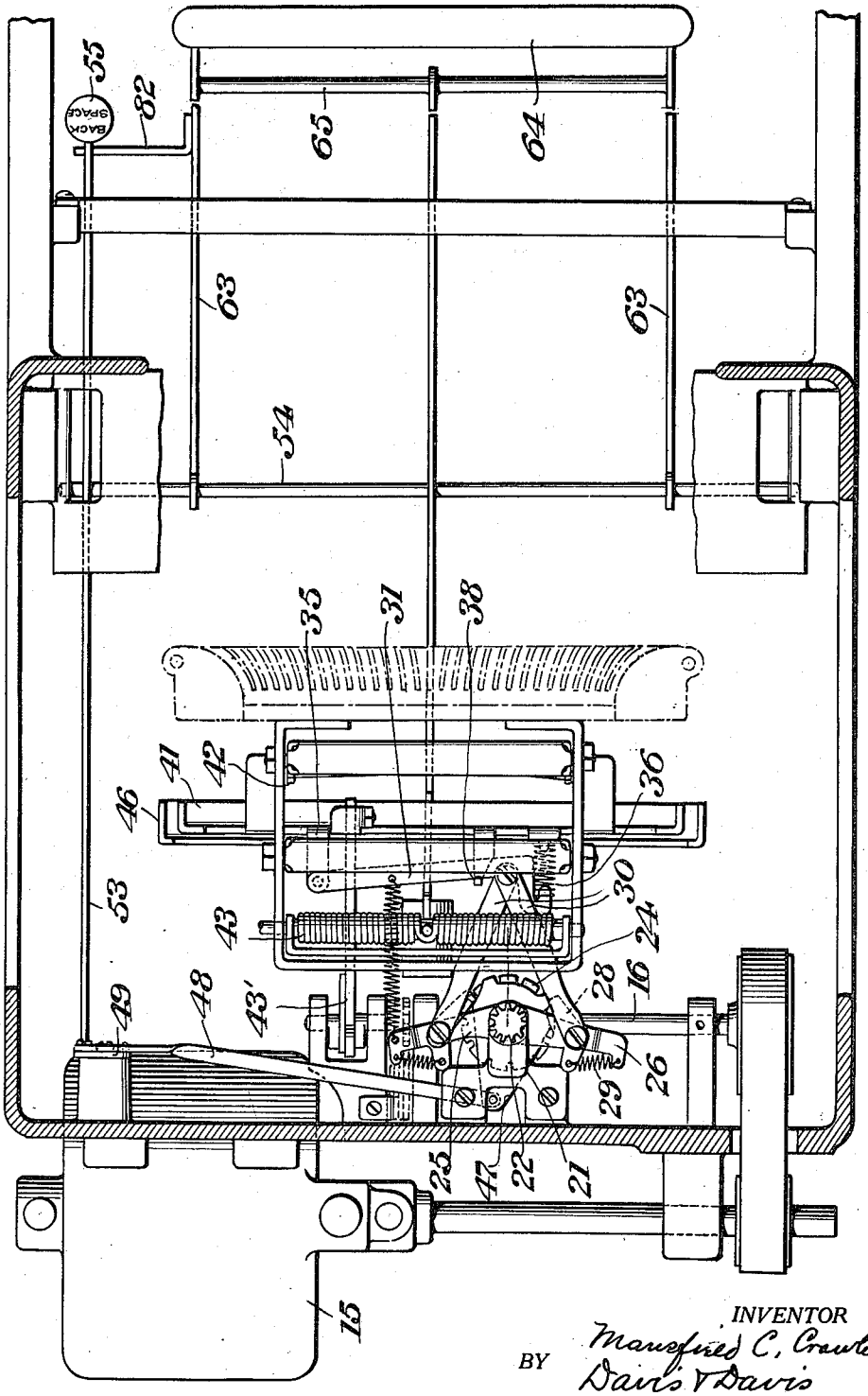
Fig. 5.



INVENTOR

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Oct. 9, 1923. 1,469,778

M. C. CRAWLEY

TYPEWRITING MACHINE

Filed Sept. 13, 1922 5 Sheets-Sheet 4

Fig. 7.

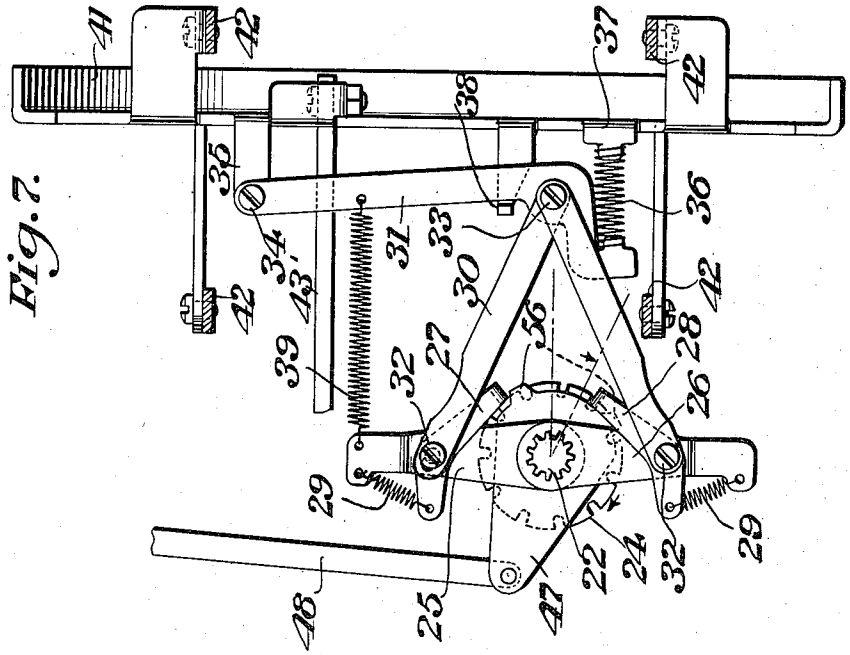
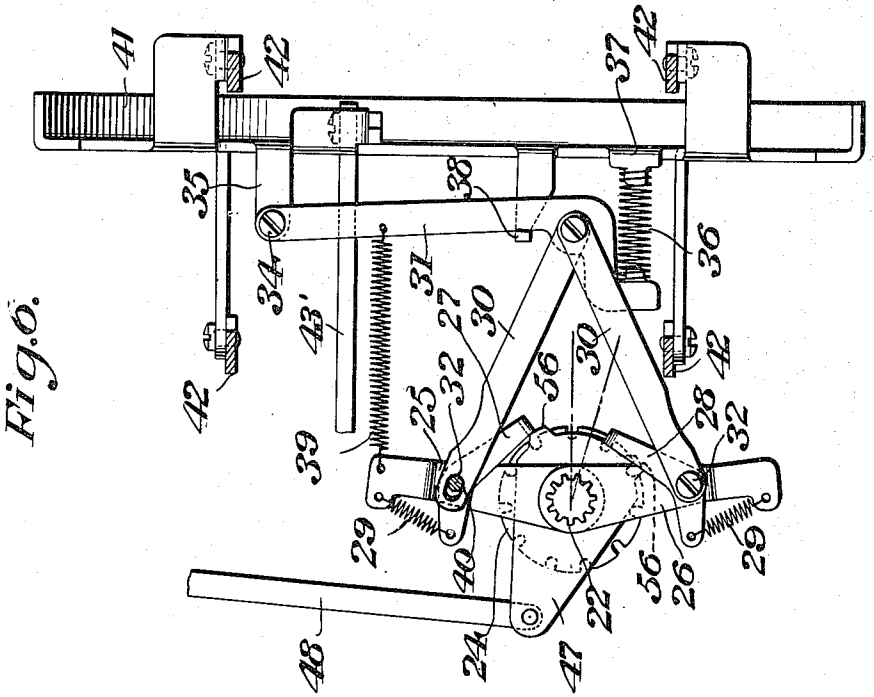


Fig. 6.



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TYPEWRITING MACHINE

Filed Sept. 13, 1922 5 Sheets-Sheet 5

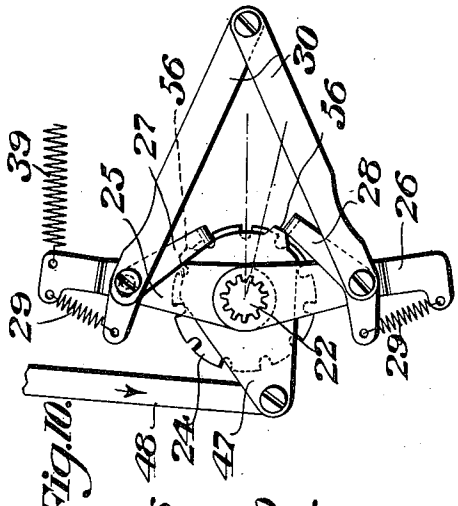

Fig. 10.

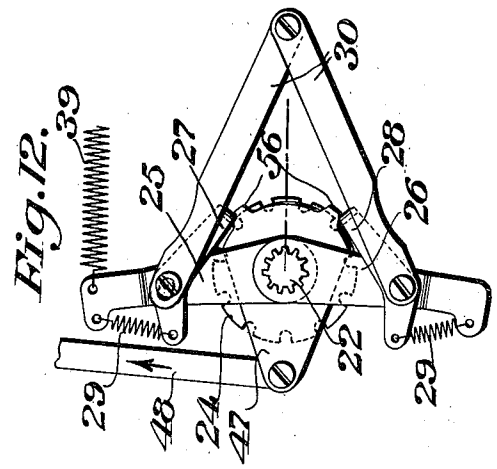

Fig. 12.

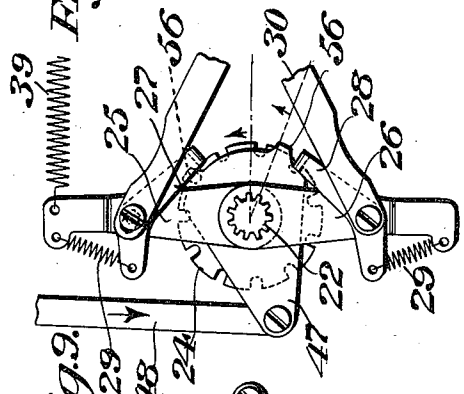

Fig. 9.

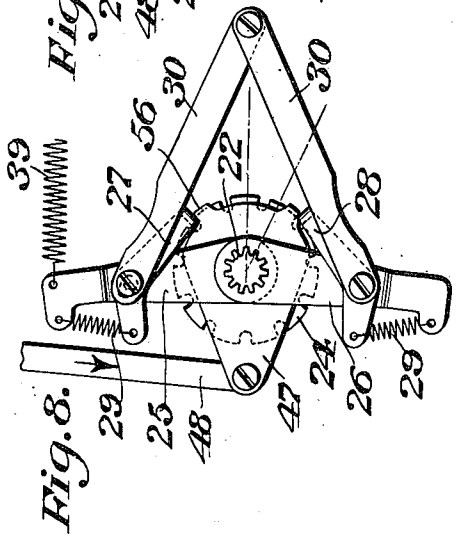

Fig. 8.

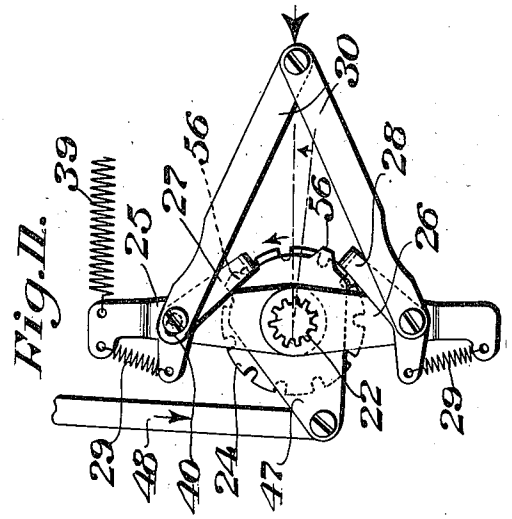

Fig. 11.

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Patented Oct. 9, 1923. 1,469,778

UNITED STATES PATENT OFFICE.

MANSFIELD C. CRAWLEY, OF GROTON, NEW YORK, ASSIGNOR TO ADDOGRAPH COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

TYPEWRITING MACHINE.

Application filed September 13, 1922. Serial No. 588,046.

To all whom it may concern:

Be it known that I, MANSFIELD C. CRAWLEY, a citizen of the United States of America, and a resident of Groton, in the county of Tompkins and State of New York, have invented certain new and useful Improvements in Typewriting Machines, of which the following is a specification.

This invention has special reference to the mechanism for letter feeding the carriage, and the mechanism I have chosen for illustrating my invention is especially adapted for that type of motor-operated machine covered by my Patent No. 1,156,061, dated October 12, 1915, in which a universal type-bar actuator is impelled on its working stroke by means of a spring and is retracted by a continuously-running motor, means being provided for latching the actuator at the end of its back stroke and for controlling the release of this latch through the medium of the printing and space keys, as more fully hereinafter set forth.

In the drawing—

Fig. 1 is a vertical sectional view of a typewriter machine embodying my invention;

Fig. 2 is a detail vertical sectional view showing the retarder for the space-key feed;

Fig. 3 is a detail perspective view showing the general arrangement of the feed mechanism and the control key levers;

Fig. 4 is a detail view of part of the back-spacer mechanism;

Fig. 5 is a plan view of the machine shown in Fig. 1;

Figs. 6 to 12 are plan views showing different positions of the feed device.

In the drawing, 15 designates an electric motor mounted on the rear wall of the machine and belted to a counter-shaft 16 journaled on the rear wall of the machine. The carriage 17 of the machine is adapted to have imparted to it a running movement in either direction through the medium of gearing driven from the shaft 16. In this application, I have shown two of these gears, numbered 18 and 19, this mechanism being fully disclosed in my co-pending application Serial No. 588,045, filed September 13, 1922. The gear 19 is affixed to a vertical shaft 20 journaled in a bracket 21 affixed to the rear wall of the frame of the machine, and at its upper end it is provided with a pinion 22 meshing with a rack 23 affixed to the carriage. The letter-feeding takes place through the same pinion 22 that is employed for giving a running movement to the carriage.

Affixed to the shaft 20 is a notched feed-wheel 24, and pivotally mounted, so as to swing fore-and-aft in a horizontal plane, on said shaft 20 is a pair of oppositely-projecting arms numbered respectively 25 and 26. Pivotally mounted on the arm 25 is a pawl or dog 27, and pivotally mounted on the other arm 26 is a similar pawl or dog 28, the toothed ends of these pawls being normally swung into engagement with the notches in the feed-wheel by means of retractile springs 29 connecting their rearwardly-extending arms to the outer ends of the respective arms 25 and 26. The two arms 25 and 26 are connected by a pair of forwardly-converging links 30 to a lever 31 mounted on the type-bar actuator. The connection of these links 30 to the arms 25 is through the medium of the pivots 32 of the dogs, and connection of these arms to the lever 31 is through the medium of a single pivot 33. One end of the lever 31 is connected by a pivot 34 to a rearwardly-extending lug 35 carried by the type-bar actuator, and the free end of this lever 31 is normally forced rearwardly by means of an expansible coil-spring 36 interposed between a lug 37 carried by the type-bar actuator and the rearwardly-bent end of said lever 31, an upstanding lug 38 being provided on the type-bar actuator for limiting the rearward movement of the lever 31. A contractile spring 39 connects the lever 31 to the outer end of the arm 25 and serves to normally pull said arm forwardly to hold the pivot 32 at the forward end of a slot 40 formed in the link 30 for the purpose of providing a slight lost-motion between the link 30 and the pivot 32, for the purpose hereinafter set forth.

The type-bar actuator is constructed substantially as disclosed in my co-pending application Serial No. 577,362, filed July 25, 1922. It consists generally of a curved type-bar actuator-bar 41 pivotally mounted on and forming part of a frame adapted to swing fore-and-aft, this frame consisting in part of depending arms 42, a coil-spring

43 being provided for throwing the actuator forwardly when the same is released for a type-bar actuation. The type-bar actuator is pulled back to inactive position by means of a pull-back link 43, this pull-back mechanism being operated by the motor in the manner set forth in the aforesaid application. The pull-back mechanism is latched by means of a latch 44 which is connected to the type-bar actuator by a release link 45, this release link being pivotally connected at its forward end to the curved release-bar 46 arranged concentrically with the type-bar actuator-bar 41. The operation of one of the printing-keys or the space-key forces the release-bar 46 rearwardly and thus pushes the latch 44 to release position, thereby permitting the spring 43 to throw the type-bar actuator forwardly on its working stroke. At the end of its working stroke, the pull-back mechanism is brought into action to thus retract the type-bar actuator to cause it to be re-latched in its back position.

Pivotally mounted on the pinion shaft 20, just above the feed-wheel 24 and below the dog-carrying arms 25—26, is a plate 47 whose rearwardly-extending end is pivotally connected by means of a link 48, extending to the right side of the machine, to a rocking plate 49 pivotally mounted on the frame of the machine and restricted in its rocking movement by a pin-and-slot device 50. This rocking plate is connected also to another link 51 which is connected to the link 48 by a contractile spring 52 and at its lower end is pivotally connected to the rear end of a back-space key-lever 53 pivotally supported on a transverse rod 54 mounted on the frame of the machine and having a back-space-key 55 at its forward end. The plate 47 is provided, at a point forward of the pinion shaft 20, with a pair of forwardly-extending cam-lugs 56 which extend forwardly slightly beyond the edge of the feed-wheel 24, these lugs being so spaced as to cooperate respectively with the two dogs 27—28.

The parts are shown in their normal, at rest, position for feeding leftward, in Fig. 5. In this position, the right-hand dog or pawl 27 rests in one of the notches of the feed-wheel and the other dog 28 rests on top of its companion cam-lug 56. Upon the forward stroke of the actuator, the dog 27 pushes the feed-wheel around until the dog rides up the adjacent beveled edge of its companion cam-lug 56 and is thus disconnected from the feed-wheel; this action feeds the carriage a half step, and while this half step feeding action is taking place, the other dog 28 rides off its companion cam-lug 56 and drops into the next succeeding notch of the feed-wheel, the parts being then in the position shown in Fig. 6. The rearward stroke of the type-bar actuator completes the feed action by making an additional half-step feed, as follows: The rearward movement of the dog 28 pulls the feed-wheel the remaining half step, this action being shown in Fig. 7. As this rearward movement is completed, the dog 28 rides up on its companion cam-lug 56 and thus releases the feed-wheel, while the other dog 27 makes an idle stroke backwardly and then drops into the next succeeding notch, ready for another operation.

In view of the fact that both the forward and the rearward strokes of the actuator are accomplished very quickly by power mechanism, it is desirable to thus divide up the feed action into two half steps, thereby greatly reducing shock, noise and strain on the parts. The printing action takes place approximately at the point of reversal of the actuator, that is, at the point where one dog quits working and the other dog takes up the work of pulling the feed-wheel the remainder of the distance needed for one step. At this point, there is a rest of the movement of the platen, altho in actual practice, in view of the great rapidity of movement of the actuator, this stopping of the platen is hardly more than a theoretical matter. The impression will therefore be entirely without blurring, and this would be the case even tho the type struck the paper either slightly before or slightly after the moment of reversal, since the actuator is moving very slightly near the point of reversal because at that time the crank operating the pull-back link 43 is passing over center.

It is desirable also, in order to still further eliminate noise, jar and strain on the parts, to cushion both the first half of the step and the last half of the step. This is accomplished by springs 36 and 39. The spring 36 cushions the rearward stroke by slightly compressing during the initial part of said stroke, while the spring 39 cushions the forward stroke, by being slightly distended during the initial part of the forward stroke, the lost-motion provided by the slot 40 in link 30 permitting a slight independent forward movement of the link 30 connected to dog-carrying arm 25 as said arm and pawl 27 take up the work of advancing the carriage. It will be understood that in normal position, the spring 39 will hold the pivot 32 at the forward end of the slot 40, as shown in Figs. 5 and 7, and that after overcoming the inertia of the carriage during the first part of the forward stroke the spring 39 will again contract sufficiently to take up the lost motion in slot 40. That is to say, the spring 39 is strong enough to pull arm 25 forwardly on its working stroke while the link 30 serves to return said arm.

I have shown in dotted lines in Figs. 1 and 3 one of the printing-key-levers and its associated type-bar. The type-bar is indicated at 57, its associated push-coupler at 58, the selector rod for lifting the push-coupler into action at 59 and the key-lever at 60. It will be understood that when the push-coupler 58 is raised, its rear cam-edge cams back the release-bar 46 and thus releases the type-bar actuator, the push-coupler having been raised high enough to lie in the path of the type-bar actuator-bar 41 so as to be actuated thereby on the forward stroke of the type-bar actuator. The release-bar is actuated in the same manner from the space-key by means of a cam-hook 61 adapted to be raised and lowered by means of a rod 62 pivotally connected at its lower end to the rear end of one of the space-key-levers 63, these levers being connected together at their forward ends by means of a space-bar 64 and also by means of a rod 65 and being pivotally supported on the rod 54 heretofore referred to in connection with the back-spacing key-lever 53. By pressing down the space-bar 64, the cam-hook 61 is raised far enough to release the actuator by pressing back the release-bar 46, and the upper end of the hook is brought into alinement with the type-bar actuator 41 so as to be pulled forward thereby on the forward stroke.

The cam-hook 61 is pivotally mounted on a pivot 66 carried by a piston 67 working backwardly and forwardly in a dash-pot 68, a bleed opening 69 being provided in the bottom of the dash-pot and the dash-pot being rigidly attached to a stationary member 79 of the frame of the machine. A retractile spring 80, connecting the cam-hook 61 with the frame-bar 79, tends to normally hold the cam-hook down out of operative position and also to hold the piston 67 toward the bottom of the dash-pot. For convenience of manufacture, both the piston and the dash-pot are desirably formed by cupping pieces of sheet metal, and for maintaining the cam-hook in its vertical edgewise position, I pivot the rear end of the hook in a slot in the wall of the piston, the wall of the pot being also similarly slotted at 81. When the type-bar actuator-bar 41 carries the cam-hook 61 forwardly, this movement will be retarded by the dash-pot, thus lightly loading the type-bar actuator on this stroke to make it correspond as nearly as possible in character with the working stroke of the type-bar actuator when it actuates a type-bar. That is to say, the actuating spring 43 of the type-bar actuator is tensioned to impart to the actuator the proper speed and force for properly actuating the type-bar, and, in view of the fact that when the actuator is put into action through the medium of the space-bar its operation is entirely an idle one except for feeding the carriage, it is desirable to interpose a sufficient resistance to make the speed of operation accord with the regular type-bar operation. I accomplish this by means of the dash-pot arrangement described, and it will be understood that a dash-pot retarder is advantageous over a spring alone in that with a dash-pot the retardation is uniform, whereas with a spring the resistance starts light and increases with the tension of the spring.

It will be observed that the construction and operation of my feed mechanism is such that I can convert it into a back-spacing mechanism by simply shifting the position of the cam-lugs 56 so as to reverse the action of the dogs 27, 28, making dog 27 a puller instead of a pusher and dog 28 a pusher instead of a puller. This shifting of the cams 56 may be accomplished by simply depressing the back-space-key 55 and holding it down. When this is done, the cam-carrying plate 47 swings in the direction shown by the arrow in Fig. 8, until the cams are shifted far enough to have the dog 27 rest on top of its companion cam-lug and the dog 28 resting in the notch to the rear of its companion cam-lug. When the parts are shifted and held in this position by the depression of the back-space-key, the actions of the dogs are reversed when the type-bar actuator is operated. In Fig. 9, the position of the dogs is shown when the actuator is about midway on its forward stroke, and in Fig. 10 the devices are shown at the position they assume at the end of the forward stroke. In Fig. 11 they are shown in the position they occupy when about midway of the return stroke. In Fig. 12, the back-space-key has been released by the operator and the parts are in the act of returning to position for normal letter-spacing.

As it is always desirable to actuate the spacing-key whenever the back-space-key-lever is actuated, I provide simple means whereby when the back-space-key is depressed the space-lever will also be depressed. I do this by providing a lug 82 on one of the space-bar-levers 63 and extend this lug laterally to a point under the back-space-lever, as shown in Figs. 3 and 5.

The construction described not only, as stated, cushions the initial movement of the feed on both strokes of the actuator, but also serves to positively lock the carriage against momentum movement at the end of each half-step feed, this resulting, as is obvious, from the fact that at the moment one of the cam-lugs 56 disengages the working dog from the feed-wheel to thus free the feeding mechanism so far as that dog is concerned, the other dog has dropped into a notch in the feed-wheel and thus become interlocked therewith, positively preventing

any further movement of the feed-wheel until the type-carrier actuator begins its movement in the reverse direction. In this way, unison of movement between the type-carrier actuator and the carriage is positively maintained, and also a positive locking of the carriage is maintained at all times.

What I claim is:

1. In a typewriting machine, a power-driven type-carrier actuator, a carriage-feeding mechanism operable to feed the carriage in either direction, and means positively connecting said mechanism to the actuator whereby the operation of the actuator will positively actuate the feeding mechanism.

2. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, a carriage-feeding mechanism operable to feed the carriage in either direction, and means positively connecting said mechanism to the type-carrier actuator whereby the latter feeding mechanism will be positively operated by the reciprocation of the actuator.

3. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, and a carriage-feeding mechanism actuated therefrom embodying means whereby the carriage will be positively fed a half step on the working stroke of the actuator and the remaining half step on the return stroke of the actuator, whereby the power for driving the type-carrier-actuator is utilized to feed the carriage positively by half steps.

4. In a typewriting machine, a reciprocatory type-carrier actuator, a motor for driving the actuator on its working stroke and another motor for driving it on its return stroke, and a carriage-feeding mechanism positively connected to the actuator embodying means whereby the carriage will be positively fed a half step on the working stroke of the actuator and the remaining half step on the return stroke of the actuator, said mechanism including a notched feed-wheel and a pair of reversed dogs, whereby the power of one motor is utilized to feed the carriage a half step and the power of the other motor is utilized to feed the carriage another half step.

5. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, and a carriage-feeding mechanism embodying means whereby the carriage will be fed a half step on the working stroke of the actuator and the remaining half step on the return stroke of the actuator, said mechanism including a notched feed-wheel, a pair of oppositely-extending swinging arms, and a pair of reversed dogs.

6. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, and a carriage-feeding mechanism embodying means whereby the carriage will be fed a half step on the working stroke of the actuator and the remaining half step on the return stroke of the actuator, said mechanism including a notched feed-wheel, a pair of reversed dogs normally tending to engage the notches of the feed-wheel, one or the other of said dogs always having positive interlocking engagement with the feed-wheel, and means connected to the actuator for simultaneously reciprocating the dogs in the same direction.

7. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, and a carriage-feeding mechanism embodying means whereby the carriage will be fed a half step on the working stroke of the actuator and the remaining half step on the return stroke of the actuator, said mechanism including a pair of reversed dogs and means for reciprocating them from the actuator, and devices for disengaging one dog on the forward stroke and disengaging the other dog on the rearward stroke of the actuator.

8. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, and a carriage-feeding mechanism embodying means whereby the carriage will be fed a half step on the working stroke of the actuator and the remaining half step on the return stroke of the actuator, said mechanism including a notched feed-wheel, a pair of reversed dogs normally tending to engage the notches of the feed-wheel, means for simultaneously reciprocating both dogs from the actuator, and a pair of cams for alternately disengaging the dogs from the feed-wheel.

9. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, and a carriage-feeding mechanism embodying means whereby the carriage will be fed a half step on the working stroke of the actuator and the remaining half step on the return stroke of the actuator, said mechanism including a feed-wheel, a pair of oppositely-extended pivotal arms carrying reversed pivoted dogs normally tending to engage notches in the feed-wheel, a pair of forwardly-converging links connecting said arms to the actuator to thereby simultaneously reciprocate the arms and the dogs, and a cam device associated with each dog for alternately disengaging the dogs from the notches of the feed-wheel.

10. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, and a carriage-feeding mechanism positively connected to said actuator embodying means whereby the carriage will be fed a half step on the working stroke of the actuator and the remaining half step on the return stroke of the actuator, said mechanism including a rack on the carriage, a shaft carrying a pinion engaging said rack and also carrying a notched feed-wheel, and

means actuated from the actuator for positively rotating the feed-wheel, whereby the power for operating the actuator is utilized to positively feed the carriage.

11. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, and a carriage-feeding mechanism embodying means whereby the carriage will be fed a half step on the working stroke of the actuator and the remaining half step on the return stroke of the actuator, said mechanism including a rack on the carriage, a shaft carrying a pinion engaging said rack and also carrying a feed-wheel, a pair of oppositely-extending arms pivotally mounted on said shaft, a pair of spring-actuated dogs carried by said arms, a pair of links connecting said arms to the actuator, and a pair of cams for alternately disengaging the dogs from the feed-wheel.

12. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, and a carriage-feeding mechanism connected thereto and actuated therefrom and embodying devices whereby the carriage is positively fed a half step on the forward stroke of the actuator and the remaining half step on the rearward stroke of the actuator and locked against momentum movement at the end of each half step.

13. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, means actuated thereby for feeding the carriage, and means for cushioning the action of the actuator upon said feeding mechanism, said cushioning means consisting of a spring for cushioning the forward stroke and another spring for cushioning the rearward stroke of the actuator.

14. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, and means actuated thereby for power-feeding the carriage, said means acting to cushion the force of the type-carrier actuator on the feeding mechanism on both strokes of the actuator.

15. In a typewriting machine, a power-actuated reciprocatory type-carrier actuator, and means actuated therefrom to power-feed the carriage a half step at each stroke of the actuator, said means embodying a spring acting as a cushion on the forward stroke of the actuator and another spring acting as a cushion on the rearward stroke of the actuator.

16. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, and means actuated thereby for feeding the carriage, said means embodying a tensile spring for cushioning one stroke of the actuator and a compression spring for cushioning the other stroke of the actuator.

17. In a typewriting machine, a power-driven reciprocatory type-bar actuator, and carriage-feeding mechanism including feed-dog carriers actuated therefrom embodying a pivoted lever mounted on the actuator, a pair of links pivotally connecting said lever to feed-dog-carriers, a compression spring interposed between said lever and the actuator, and a tensile spring connecting said lever to one of the dog-carriers.

18. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, and means actuated therefrom to feed the carriage embodying a lever pivoted at one end to the actuator, a spring interposed between the lever and the actuator tending to swing the lever rearwardly, a stop for limiting the movement of this lever, and means connecting the lever to the feed devices.

19. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, and means actuated therefrom for feeding the carriage embodying a feed-wheel, a pair of oppositely-extending arms carrying reversed dogs normally engaging the feed-wheel, a pivoted lever mounted on the actuator, a pair of pivotal links connecting this lever to the said respective arms, a tensile spring connecting the lever to one of the arms, and a compression spring arranged between the lever and the actuator.

20. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, mechanism actuated therefrom for feeding the carriage embodying a pair of reversed dogs and a feed-wheel, cams for alternately disengaging the dogs from the feed-wheel, and means for simultaneously shifting said cams for the purpose of back-spacing.

21. In a typewriting machine, a power-actuated carriage-feed mechanism normally positioned to feed the carriage in one direction, and means for reversing the action of the feed to cause it to feed in the opposite direction, said means being adapted to be held temporarily in position by depression of one of the keys for use in back-spacing.

22. In a typewriting machine, a power-actuated carriage-feeding mechanism embodying a feed-wheel, a pair of reversed dogs, key-controlled power-driven means for reciprocating the dogs, means whereby reciprocation of the dogs will turn the feed-wheel in one direction, and manually-operable means for reversing the action of the dogs to thus cause them to feed the carriage in the opposite direction.

23. In a typewriting machine, a power-actuated carriage-feeding mechanism embodying a pair of reversed dogs and key-controlled power-driven means for reciprocating them, cam devices cooperating with the dogs, manually-operable means for shifting the cam devices to thereby reverse the action of the dogs and cause them to feed the carriage in the opposite direction.

24. In a typewriting machine, power-driven mechanism for feeding the carriage

embodying a notched feed-wheel, a pair of reversed dogs normally tending to engage the notches in the feed-wheel, a pivoted plate carrying a pair of cams one associated with each dog, power-driven means for actuating the dogs controlled by the character keys of the machine, and means operable from the keyboard at will for swinging said plate to thus reverse the action of the cams on the dogs to cause a feed of the carriage in the reverse direction.

25. In a typewriting machine, a power-driven carriage-feeding mechanism embodying a notched feed-wheel, a pair of reversed dogs normally tending to engage the notches in the feed-wheel, power-driven means for reciprocating the dogs upon actuation of the character and spacing keys of the machine to turn the feed-wheel, a plate carrying a pair of cams normally positioned to cause a half-step feed by each dog, and keyboard means for temporarily shifting the position of the cams to cause a similar feed in the opposite direction.

26. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, space-key means for releasing the actuator to permit it to perform its forward working stroke, means for feeding the carriage from the actuator normally positioned to feed the carriage leftward, a back-space key-lever and means actuated thereby for reversing the feed means, and means whereby an actuation of the back-space key-lever will simultaneously actuate the space-key means, for the purpose set forth.

27. In a typewriting machine, a power-driven reciprocatory type-carrier actuator, a carriage-feeding mechanism embodying a notched feed-wheel and a pair of positively-acting reversed dogs to actuate the same, and means connected to the actuator for simultaneously reciprocating the dogs.

28. In a typewriting machine, a spring-actuated type-carrier actuator and carriage-feeding means actuated thereby, and key-controlled means for releasing the actuator to make its working stroke, embodying a space-key and devices actuated thereby for putting a drag on said actuator when the space-key is operated.

29. In a typewriting machine, a spring-actuated type-carrier actuator and carriage-feeding means actuated thereby, and key-controlled means for releasing the actuator to make its working stroke, embodying a space-key and devices actuated thereby for putting a drag on said actuator when the space-key is operated, said devices embodying a release or trip member adapted to be positioned in the path of the actuator when it actuates the release.

30. In a typewriting machine, a spring-actuated type-carrier actuator and carriage-feeding means actuated thereby, and key-controlled means for releasing the actuator to make its working stroke, embodying a space-key and devices actuated thereby for putting a drag on said actuator when the space-key is operated, said devices embodying a member adapted to be placed in the path of the actuator to be struck thereby, and means connected to the member for resiliently retarding it.

31. In a typewriting machine, a spring-actuated type-carrier actuator and carriage-feeding means actuated thereby, and key-controlled means for releasing the actuator to make its working stroke, embodying a space-key and devices actuated thereby for putting a drag on said actuator when the space-key is operated, said devices embodying a member adapted to be struck by the actuator and moved thereby, and a dash-pot arrangement connected to the member.

32. In a typewriting machine, a spring-actuated type-carrier actuator and carriage-feeding means actuated thereby, and key-controlled means for releasing the actuator to make its working stroke, embodying a space-key and devices actuated thereby for putting a drag on said actuator when the space-key is operated, said devices embodying a pivoted vertically-movable hooked trip member, a spring for normally holding it out of action, and a dash-pot arrangement connected to the member.

33. In a typewriting machine, motor-actuated feed means for letter-spacing the carriage either toward the right or toward the left controlled by the printing instrumentalities and normally positioned to feed leftward, and manually-controlled means normally held out of action for reversing the feed means at any point in the travel of the carriage, so that subsequent operation of the feed means will actuate the carriage rightward.

34. In a typewriting machine, a spring-actuated type-bar actuator and a motor device for retracting the actuator against the tendency of the spring, carriage-feeding mechanism operated by the movement of said actuator, and means whereby the operator may at will reverse the direction of feed at any point in the travel of the carriage.

35. In a motor-operated typewriting machine, a motor driven letter-space feeding mechanism, and a manually-operable space-bar in the keyboard for controlling the operation of the same, said mechanism embodying devices whereby the direction of letter-spacing may be reversed at any point in the travel of the carriage, a key-lever for setting said reversing devices, and means whereby when this key-lever is operated the space-bar will also be operated.

36. In a typewriting machine, a power-driven shaft and means whereby the power from this shaft is utilized to actuate the

printing instrumentalities and also feed the carriage, said means embodying a spring-actuated type-bar actuator and a cushioning device arranged between the same and said carriage-feeding device, for the purpose set forth.

37. In a typewriting machine, the combination of a traveling platen carriage, a platen thereon, a normally locked reciprocably mounted type-bar actuator, character-key-operated means for releasing the actuator, spring means for driving said actuator in one direction when released to move type bars toward the platen, independent constantly-operating power means for returning the actuator, a letter space feed wheel connected to move the carriage transversely of the machine, a pair of feed dogs connected with said actuator to reciprocate therewith, and dog-controlling means causing one dog to drive the feed wheel during the type-bar-moving stroke only of the actuator by power derived from said spring means to advance the carriage a part of one letter space and for causing the other dog to drive the feed wheel in the same direction during the return stroke only of the actuator by power derived from said constantly operating means to advance the carriage the remaining part of a letter space.

38. In a typewriting machine, the combination of a traveling platen carriage, a platen thereon, a normally locked reciprocably mounted type-bar actuator, character-key-operated means for releasing the actuator, spring means for driving said actuator in one direction when released to move type bars toward the platen, independent constantly-operating power means for returning the actuator, a letter space feed wheel connected to move the carriage transversely of the machine, a pair of feed dogs connected with said actuator to reciprocate therewith, dog-controlling means causing one dog to drive the feed wheel during the type-bar-moving stroke only of the actuator by power derived from said spring means to advance the carriage a part of one letter space and for causing the other dog to drive the feed wheel in the same direction during the return stroke only of the actuator by power derived from said constantly operating means to advance the carriage the remaining part of a letter space, a space-key mechanism for releasing the actuator, and a back-space-key mechanism for actuating the space-key mechanism and shifting the dog-controlling means to cause the dogs to act on reverse strokes of the actuator and thereby back-space the carriage one letter space at each operation of the back-space-key mechanism.

39. In a typewriting machine, the combination of a traveling platen carriage, a platen thereon, a notched feed wheel connected to traverse the carriage, a pair of feed dogs each adapted to engage in notches in said wheel and prevent independent rotation of the wheel in either direction, reciprocably mounted character-key-controlled power-driven means for moving the dogs back and forth in unison, and dog-controlling means for causing one dog to drive the feed wheel as the power-driven means moves in one direction to advance the carriage one-half a letter space and the other dog to drive the wheel as the power-driven means moves in the opposite direction to advance the carriage one-half a letter space, said controlling means being so constructed that one or the other of said dogs is always engaged in a notch in said wheel.

40. In a typewriting machine, the combination of a traveling platen carriage, a platen thereon, a notched feed wheel connected to traverse the carriage, a pair of feed dogs each adapted to engage in notches in said wheel and prevent independent rotation of the wheel in either direction, reciprocably mounted character-key-controlled power-driven means for moving the dogs back and forth in unison, dog-controlling means for causing one dog to drive the feed wheel as the power-driven means moves in one direction to advance the carriage one-half a letter space and the other dog to drive the wheel as the power-driven means moves in the opposite direction to advance the carriage one-half a letter space, said controlling means being so constructed that one dog locks the carriage against both advance and return movements at the completion of each full letter-space feed movement of the carriage and the other dog locks the carriage against both advance and return movements at the completion of the first half of each full letter-space movement of the carriage, and type bars selectively connectible with said power-driven means by the character keys and movable by said power-driven means to strike the platen when the carriage has traveled the first half of a letter-space movement.

In testimony whereof I hereunto affix my signature.

MANSFIELD C. CRAWLEY.