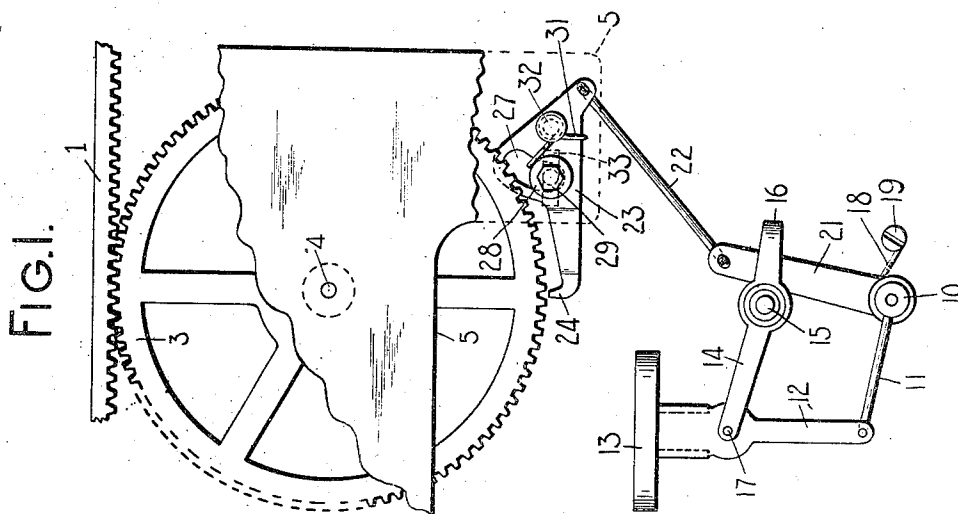
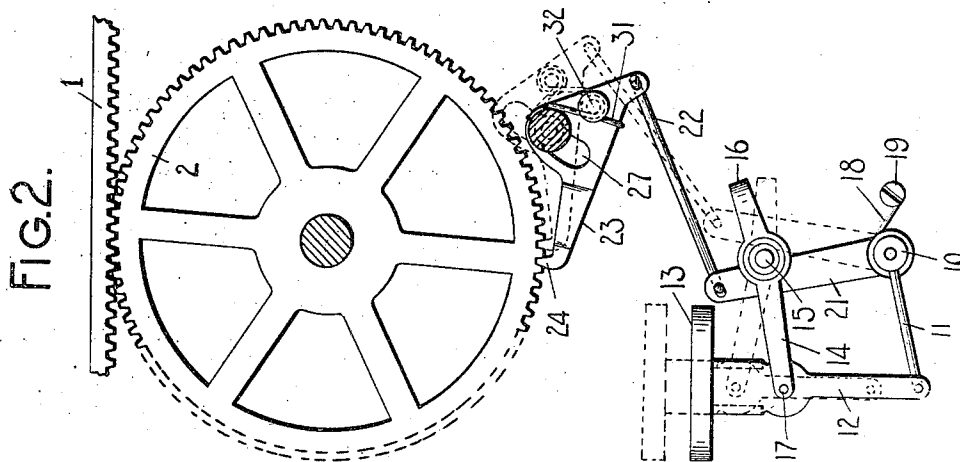


1,044,037.

H. C. FORD.
TYPE WRITING MACHINE.
APPLICATION FILED APR. 7, 1908.

Patented Nov. 12, 1912.
2 SHEETS—SHEET 1.



WITNESSES:

W. F. Hammel
R. H. Strother

INVENTOR.

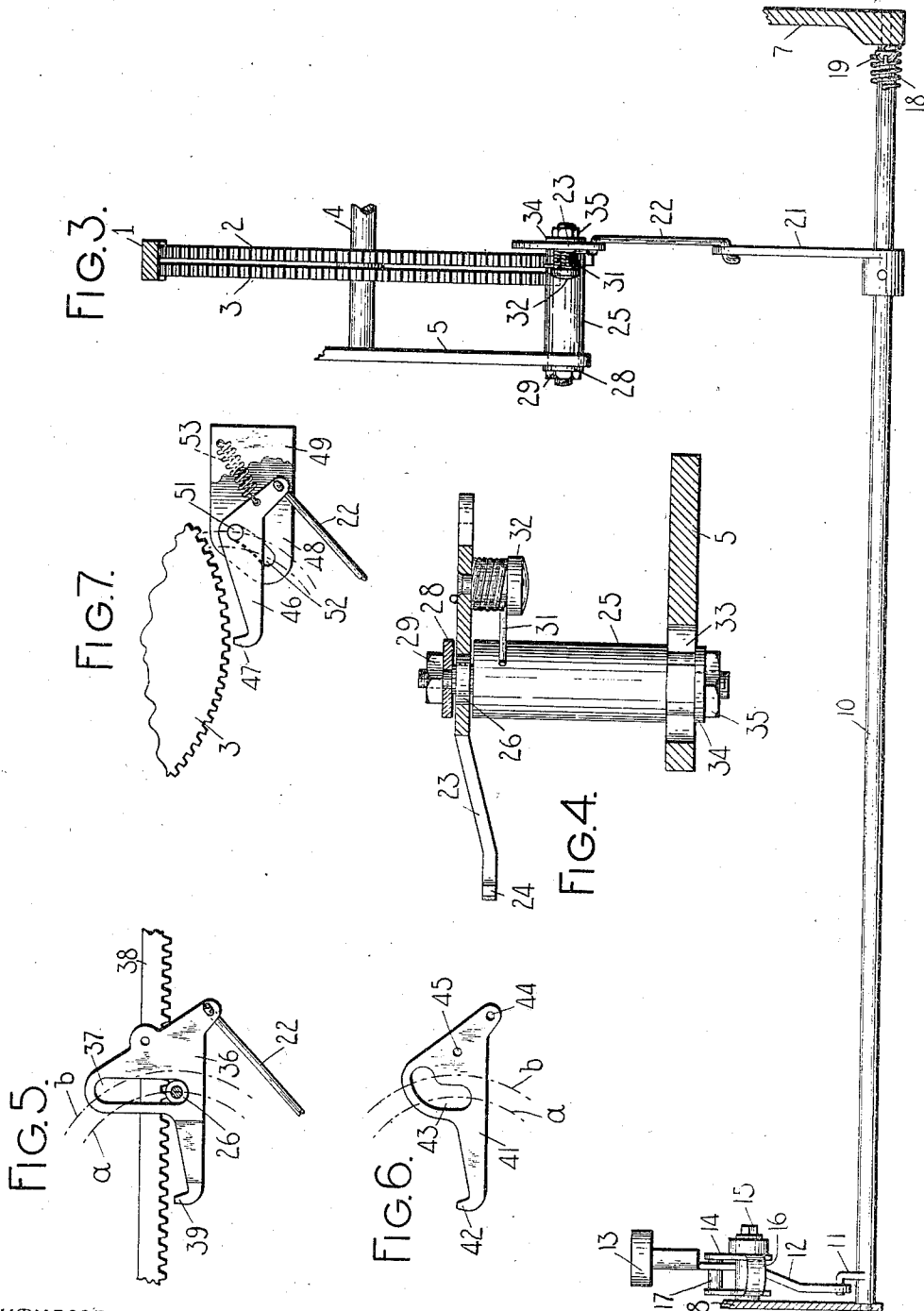
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2 SHEETS-SHEET 2,



WITNESSES.

Mr. F. Hannweber

R. H. Strother,

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UNITED STATES PATENT OFFICE.

HANNIBAL C. FORD, OF SYRACUSE, NEW YORK, ASSIGNOR TO UNION TYPEWRITER COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TYPE-WRITING MACHINE.

1,044,037.

Specification of Letters Patent.

Patented Nov. 12, 1912.

Application filed April 7, 1908. Serial No. 425,886.

To all whom it may concern:

Be it known that I, HANNIBAL C. FORD, citizen of the United States, and 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 typewriting machines and it has for its principal object to provide an improved back spacing device for the carriages of such machines.

My invention consists in certain features of construction and combinations and arrangements of parts, all of which will be fully set forth herein and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a fragmentary front elevation, partly broken away, of parts of a typewriting machine having my invention applied thereto, the back spacing device being shown in normal position. Fig. 2 is a view similar to Fig. 1 but with parts sectioned away and showing the back spacing key in its depressed position in full lines, and in broken lines showing the back spacing key slightly depressed below its normal position. Fig. 3 is a side elevation of the parts shown in Fig. 1, parts of the typewriting machine being shown in section and parts broken away. Fig. 4 is a horizontal sectional view on an enlarged scale through the back spacing pawl and parts on which said pawl is mounted. Fig. 5 is a fragmentary rear elevation showing a modification of the invention. Fig. 6 shows a modified form of the back spacer pawl. Fig. 7 is a fragmentary front elevation of another modification.

My invention is applicable to typewriting machines generally, but I have here shown it applied to that form of typewriter in which the key and type actions are mounted in the stationary framework and in which the paper is carried by a carriage that moves transversely across the machine. As the construction of these typewriters is well understood I have illustrated only so much thereof as is essential to an understanding of my invention.

Referring to Figs. 1 to 4 inclusive, I have shown a feed rack 1 which is mounted on or forms part of a paper carriage, which paper carriage may be of any known or suitable construction. Two large gears 2 and 3 mesh

with the rack 1 and one of said gears may be operatively connected with a driving spring for the carriage and the other with any suitable escapement mechanism so that one of said gears is a driving gear and the other is geared to the mechanism that controls the motion of the carriage. The escapement mechanism in machines of this character is commonly connected with the carriage in such a way that said carriage may move backward, which is usually from left to right, without affecting the escapement mechanism, the connections ordinarily including some form of ratchet clutch or of pawl and ratchet mechanism. The gears 2 and 3 are loosely mounted on a shaft 4 which in turn is supported at or near its ends by two frame plates 5 (Figs. 1 and 3), the forward end only of which is shown in the drawing. These frame plates may be supported in any suitable manner from the remainder of the stationary framework of the machine. Said framework also includes a base part having a back plate 7 and a front plate 8 (Fig. 3). A rock shaft 10 is pivoted at its rear and front ends respectively in the frame plates 7 and 8 and at its front end said shaft has projecting therefrom an arm 11 to which is pivoted the lower end of the stem 12 of the back spacer key 13. A guide arm or link 14, parallel with the arm 11, is pivoted to the upper part of the key stem 12 and is also pivoted on a stud 15 secured to the front plate 8. The arm 14 is here shown double, the two branches thereof being connected at one end by a yoke piece 16 and at the other end by a pin 17 by means of which the arm is pivoted to the key stem. This double formation of the guide arm is for the purpose of providing a wide bearing for said guide arm to prevent motion of the free end thereof in a front and back direction. At its rear end the shaft 10 has a returning spring 18 coiled about it and connected at one end to the shaft and at the other end to a screw 19 threaded into the frame plate 7, the tension of this spring being exerted to raise the key 13 to its normal position. An upright arm 21 is rigidly mounted on the rock shaft 10 and said arm has pivoted to its upper free end one end of a link 22, the other end of which is pivoted to a pawl 23 having a point or tooth 24 which normally stands directly beneath the notch between two of the teeth of the gear wheel 2, but out

of engagement with said gear wheel. The link 22 may be called a floating link, inasmuch as it is pivoted at both its ends to movable parts and it, therefore, has no power to guide the motion of the pawl 23. The pawl 23 has a pin and slot connection with a frame piece 25, which, in the present instance consists of a bracket or stud projecting toward the rear of the machine from the forward one of the frame plates 5. As shown in Fig. 4 this stud has its rear part reduced and a roller 26 is journaled on said reduced rear part and said roller plays in a slot 27 in the pawl. The rear end of the stud 25 is still further reduced to receive a washer 28 which retains the roller 26 and pawl 23 in place, and said washer is in turn retained in position by a nut 29 threaded on the reduced end of the stud 25. The pawl is normally maintained in the position shown in Fig. 1 by a spring 31 coiled about a stud or screw 32 secured to the pawl and one end of said spring is hooked under the pawl and the other end bears against the supporting stud or bracket 25. In order to provide for adjusting the pawl the forward end of the stud 25 is reduced to form a shoulder and the reduced end is flattened as shown in Fig. 4 to fit into an elongated horizontally disposed slot 33 formed in the forward frame plate 5, the construction being such that the stud may be moved to different positions in the slot. Said stud is retained in the position to which it is adjusted by a washer 34 and a nut 35, which nut is threaded onto the reduced forward end of the stud. The slot 27 is disposed at an angle to the line of motion of the point 24 of the pawl when said point is in engagement with the rack. The arrangement is such that this slot acts as a cam which cams the point of the pawl along after said point has engaged the rack. It will also be observed that the motion of the pawl at the pin and slot connection is of much greater extent than at the point of the pawl. The pawl acts as a sort of floating lever, its motion after the point of the pawl has moved into engagement with the rack being nearly what it would be if said pawl were pivoted at a point between the end 24 of the pawl and the shaft 4, with this difference, however, that this theoretical pivot point of the floating lever moves upward as the lever is operated, thus giving the point of the pawl an accelerated motion with relation to the link 22. When the key 13 is depressed the arm 21 is moved toward the left, turning the right-hand end of the pawl toward the left. When the key has been slightly depressed the parts are moved to the position shown in broken lines in Fig. 2. In this part of the motion the pawl 23 turns about the roller 26 as a pivot, the free end 24 of the pawl moving into the interdental space in the gear wheel 2. When the

pawl reaches this position, its free end 24 can not move upward any farther and during the remainder of the depression of the key, therefore, the pawl moves toward the left and pivots to some extent on its point 24, the motion of the pawl being guided by the gear 2 and the slot 27. When the end of the slot strikes the roller 26 the pawl can move no farther under the impulse of the key, but tends to pivot about the roller on the end of the stud 25. The pressure on the key at this instant tends to force the free end of the pawl into the interdental space in the gear wheel and thus prevents overthrow of the gear wheel and of the platen. By an inspection of Figs. 1 and 2 it will be seen that the motion of the pawl is resisted by the spring 31, which spring is flexed when the pawl is moved bodily and when the key is released this spring and the spring 18 restore the parts to their normal positions, the spring 33 holding the pawl in such a position that the lower end of the slot is in contact with the roller 26 and the free end of the pawl is out of engagement with the wheel. The slot 27 is so formed as to permit the pawl to move whatever distance is necessary in order to step the carriage back one letter space distance and to permit the escapement to catch it and to retain it in its stepped back position. The precise extent of movement necessary for this purpose will of course depend upon the character of the connections between the carriage and the escapement, but in most instances the motion would be a little more than a letter space distance. Moreover the slot 27 is so designed that the motion imparted to the carriage is an accelerated movement, the carriage starting off with a low velocity relative to that of the key 13 and the velocity increasing as the key is depressed. This acceleration in the motion of the carriage renders the touch on the key 13 easier and softer than it would be without such acceleration.

In Fig. 5 I have shown a pawl 36 connected to the link 22 and having a slot 37 in which the roller 26 is arranged. This figure shows the invention applied to the straight feed rack 38 of a typewriter. In this form of the invention the slot 37 is straight and is perpendicular to a line drawn from the point 39 of the pawl through the center of the roller 26 when said roller is in the lower end of the slot.

In Fig. 6 I have shown another form of the pawl 41 having a point 42 and a slot 43. The link 22 is designed to be connected with this pawl at 44 and a returning spring at 45. The slot 43 has its lower end nearly vertical and its upper end at an angle to the lower end.

In Figs. 5 and 6 I have drawn an arc *a* through the center of the lower end of the slot and an arc *b* through the center of the

upper end of the slot, each of these arcs having its center in the point of the pawl. It will be noted in each instance that the arc *a* at the lower end of the slot lies nearly in the same direction as the slot, whereas the arc *b* at the upper end of the slot lies at a considerable angle to the direction of the slot at that point. It results from this construction that when the point of the pawl first engages an interdental space in the gear or rack the first part of the motion of the pawl imparts only a very slow motion to the point of the pawl and to the rack, whereas in the latter part of the stroke this motion is more rapid, due to the greater angle between the slot and the arc *b*. In the form of the invention shown in Fig. 5 this change in velocity is gradual whereas in the form shown in Fig. 6 the change is more abrupt.

By an inspection of Figs. 1 and 2 it will be seen that the slot 27 shown in said figures is at its lower end more nearly at right angles to a line drawn from the lower end of said slot to the point 24 of the pawl than it is at its upper end to a line drawn from said upper end to the point of the pawl. It will be seen that this slot gives a gradual acceleration to the carriage.

In Fig. 7 I have shown another form of the invention to which the pawl 46 has a point 47 similar to the points of the other pawls but said pawl 46 is not slotted. In this instance the pin is secured to the pawl instead of to the framework and said pawl plays between two parallel stationary plates 48 and 49, the latter of which is shown broken away in order not to obscure the illustration of the pawl itself. The pawl 46 has a pin 51 projecting therefrom in both directions and said pin plays in a curved slot 52 in the plate 48 and in a similar slot in the plate 49. The pawl is provided with a returning spring 53 between the pin 51 and the point at which the link 22 is pivoted to said pawl. The slots 52 are so formed that when the pawl is operated it first turns about the pin 51 as a center until the point 47 moves into an interdental space in the rack and thereafter the pawl is moved endwise, carrying the rack with it.

It will be understood that, in a typewriting machine in which the key and type action move across a stationary platen, the rack 11 would probably be mounted on a relatively stationary part, and the pawl would be mounted on a frame piece of the carriage.

It will be noted that the back spacer pawl is mounted on a frame piece by a pin and slot connection and that said pawl has no other positive connection with the frame piece. In all prior back spacers of which I am aware the pawl was mounted on some other part which was itself movably mount-

ed on the framework, said other part usually consisting of a lever, or lever arm or other pivoted device. In some instances in the prior art these pawls have had a pin and slot connection with the framework for the purpose of guiding the free end of the pawl, but in my construction the pawl is mounted on the framework by a pin and slot connection instead of being mounted on some other part which is movably mounted on the framework. It will be perceived that my construction is simpler than those heretofore produced. Where in the claims I refer to the pawl as being mounted on a frame piece by a pin and slot connection, I mean to distinguish from those construction in which the pawl is mounted on some other movably mounted part and is merely guided by a pin and slot connection.

Various changes other than those described may be made in the details of construction and arrangement without departing from my invention.

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

1. In a back spacer for the carriage of a typewriting machine, the combination of a rack, a frame piece, a back spacer pawl mounted solely on said frame piece by a pin and cam slot connection, and means for actuating said pawl, the pawl at said pin and slot connection having an extent of motion greater than that imparted to the rack by the pawl, and said slot acting to cam the pawl along when said pawl is in engagement with the rack.

2. In a back spacer for the carriage of a typewriting machine, the combination of a rack, a frame piece, a back spacer pawl mounted solely on said frame piece by a pin and slot connection; said slot standing at an angle to the direction of motion of the point of the pawl when in engagement with said rack, and the pin normally standing in one end of the slot and acting as a pivot about which the pawl turns into and out of engagement with the rack, and means for actuating said pawl.

3. In a back spacer for the carriage of a typewriting machine, the combination of a rack, a frame piece, a back spacer pawl mounted solely on said frame piece by a pin and slot connection, and means for actuating said pawl, the slot being so disposed that the contact of the pin with one end of said slot arrests the pawl at the end of its positive stroke and jams said pawl into the rack to prevent overthrow.

4. In a back spacer for the carriage of a typewriting machine, the combination of a rack, a frame piece, a back spacer pawl mounted on said frame piece by a pin and slot connection, and means for operating said pawl, the pin normally standing in one end of the slot and acting as a pivot about

which the pawl turns into and out of engagement with the rack and said pin co-operating with the other end of the slot when the pawl is operated to jam the pawl into the rack to prevent overthrow of said rack.

5. In a back spacer for the carriage of a typewriting machine, the combination of a rack, a frame piece, a back spacer pawl mounted solely on said frame piece by a pin and slot connection, means for operating said pawl comprising a floating link pivoted to the pawl at such a point that the pin and slot connection is between said point and the tooth of the pawl, and a returning spring connected with the pawl between the pin and slot connection and said point at which the link is pivoted to the pawl.

6. In a back spacer for the carriage of a typewriting machine, the combination of a rack, a frame piece, a floating back spacer pawl mounted on said frame piece by a pin and cam slot connection, and means for operating said pawl, the slot lying at an angle to the direction of motion of the point of the pawl and being so formed as to cause said pawl to move said rack with an accelerated velocity.

7. In a back spacer for the carriage of a typewriting machine, the combination of a rack, a back spacer pawl having a cam slot therein, said slot extending at an angle to the line of motion of the point of the pawl, a back spacer key, connections between said key and said pawl including a floating link pivoted at one end to said pawl, and at the other end to a key operated part and a frame piece having a pin coöperating with said slot, the construction and arrangement of the parts being such that said pin and slot control the action of said pawl on said rack by a camming action when the key is depressed.

8. In a back spacer for the carriage of a typewriting machine, the combination of a rack, a back spacer pawl having a cam slot therein, a frame piece having a pin lying in said slot, said pin lying normally in one end of the slot and serving as a pivot about which the pawl turns into and out of engagement with the rack, a returning spring for said pawl, and a back spacer key and connections for operating said pawl, the slotted part of said pawl having a greater extent of motion than that imparted to the point of the pawl when in engagement with the rack.

9. In a back spacer for the carriage of a typewriting machine, the combination of a rack, a back spacer pawl having a cam slot therein, a frame piece having a pin lying in said slot, said pin lying normally in one end of the slot and serving as a pivot about which the pawl turns into and out of engagement with the rack; a returning spring for said pawl, and a back spacer key and connections for operating said pawl, said slot being so formed as to give an accelerated motion to said rack when said key is operated.

10. In a back spacer for the carriage of a typewriting machine, the combination of a rack, a frame-piece, a back spacer pawl mounted on said frame-piece by a pin and slot connection and having a point adapted to engage said rack, a back spacer key, and connections to said pawl, said connections including a floating link which acts directly on said pawl in such a way that at the first part of the key-depression said pawl turns about said pin with a motion wholly rotatory, said pawl acting during such first part of the key depression after the fashion of a lever of the first order to move said point into engagement with the rack and said slot thereafter acting in conjunction with said link to propel said pawl in a motion of translation whereby the rack is moved.

11. In a back spacer for the carriage of a typewriting machine, the combination of a rack, a frame-piece, a back spacer pawl mounted on said frame-piece by a pin and slot connection and having a point adapted to engage said rack, a returning spring for said pawl, a back spacer key, and connections to said pawl, said connections including a floating link which acts directly on said pawl in such a way that at the first part of the key-depression said pawl turns about said pin with a motion wholly rotatory, said pawl acting during such first part of the key depression after the fashion of a lever of the first order to move said point into engagement with the rack and said slot thereafter acting in conjunction with said link to propel said pawl in a motion of translation whereby the rack is moved.

Signed at Syracuse, in the county of Onondaga, and State of New York, this 2d day of April, A. D. 1908.

HANNIBAL C. FORD

Witnesses:

E. M. STORMS,
E. L. SNYDER.