Sept. 13, 1938. C. W. CRUMRINE 2,129,650

TYPEWRITING MACHINE

Original Filed Sept. 18, 1935

FIG.1.

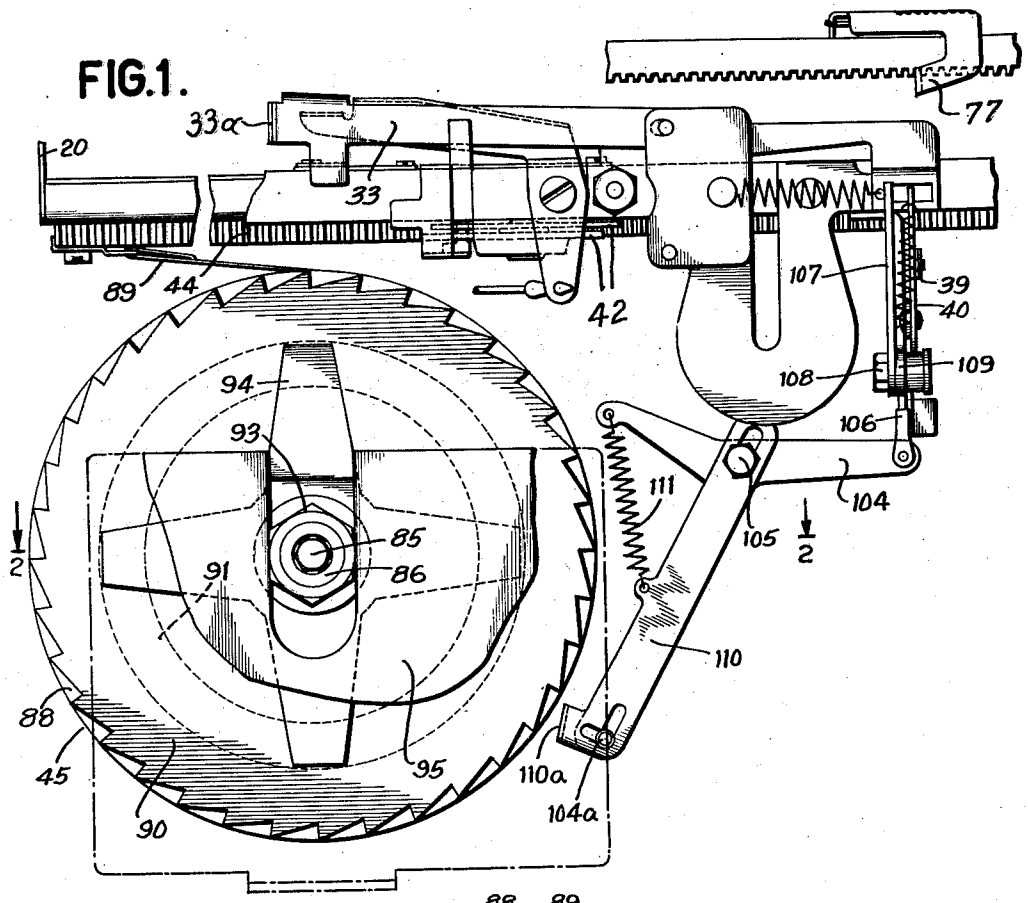
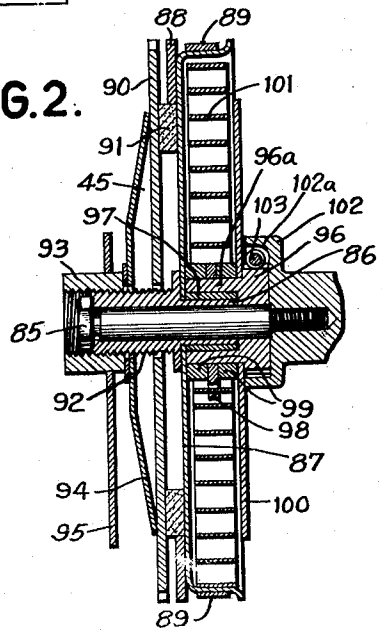


FIG.2.



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TYPEWRITING MACHINE

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8 Claims. (Cl. 197—64)

This invention relates to improvements in governors or brakes used in typewriting machines and other machines having carriages.

The present application is a division of copending application Serial No. 41,021 filed September 18, 1935, by Chester W. Crumrine.

The primary object of the present invention is to provide an improved carriage brake or governor in which the braking or retarding force is automatically varied according to the displacement of the carriage.

Other objects, advantages, and features of the invention will be particularly pointed out in the following description and claims or will be obvious from a study of the description, claims, and drawing.

In the drawing:

Fig. 1 is a large scale rear elevation showing the governor attached to the machine.

Fig. 2 is a horizontal section on the line 2—2 in Fig. 1.

Purely as a matter of convenience, the present invention will be described in connection with the well-known "Electromatic" typewriter and accordingly has been shown in this machine. It is desired to point out, however, that the present invention may be used with other typewriting machines, whether power-driven or manually operated, and may also be used in statistical record card punching machines, or other machines wherein carriages are used.

In the ordinary typewriter, the tension of the power-spring which causes the letter spacing and tabulating movements varies considerably between the limits of the carriage travel. The power-spring must have sufficient tension to move the carriage rapidly near the end of the line but when its tension is adjusted to produce this result the spring will have too much tension for moving the carriage at the beginning of a line. This variation in tension of the power-spring has little harmful effect on the escapement mechanism but has a harmful effect on the parts of the tabulating mechanism, such as the tabular stop, column stops, and parts which support these stops. The excessive tension of the power-spring at the beginning of a line causes the carriage to move too fast with the result that some of the column stops strike the tabular stop lever with a considerable shock.

Attempts to avoid this shock during tabulating operations usually take the form of dash-pots or centrifugal governors which are only partially successful since they have a fixed setting which does not vary from one end of the line to the other. When adjusted to reduce or prevent shocks at the beginning of a line they are apt to make the carriage move too slowly at the end of a line. On the whole, present forms of governors for typewriter and like carriages are still far from being completely satisfactory.

The present invention provides an automatic counterbalancing or tension equalizing governor which compensates for the variation in tension of the carriage power-spring so that tabulating and other movements of the carriage may be effected smoothly and with little shock regardless of the length of such movements or whether they occur near the beginning or end of a line. This governor is built into the usual power-spring unit generally designated with the reference numeral **45** in the drawing.

Rotatably mounted on a screw stud **85** carried by a fixed part of the framework is a hub **86** to which is secured a flanged disc **87**. A ring **88** is welded or brazed to disc **87** and co-operates with an axial flange and a low radial flange formed in disc **87** to provide a shallow guide-way or channel for a tape **89** which is removably attached to the disc **87** and also to the carriage **20**. A brake disc in the form of a ratchet wheel **90** is loosely mounted on hub **86** adjacent disc **87** and a ring **91** of suitable friction material, such as composition brake lining or clutch facing, is interposed between the ratchet wheel **90** and disc **87**, the ring **88** holding the ring **91** concentric with hub **86**. The hub **86** is provided with screw threads **92** on which a nut **93** is threaded.

Interposed between nut **93** and ratchet wheel **90** is a multi-prong spring member **94** having four spring prongs which tend to press the ratchet wheel **90** and ring **91** toward disc **87**. Nut **93** is held against rotation by a slot in a plate **95** secured to a fixed part of the machine frame.

The entire assembly comprising the parts **86** to **94**, with the exception of nut **93**, is rotatable on stud **85**. It is plain that rotation of this assembly causes nut **93** to travel along hub **86** and thereby vary the tension of spring **94**. This has the effect of varying the frictional force which must be exerted in order to rotate disc **87** relative to the ratchet wheel **90**. The parts are so designed that the tension of spring **94** and hence the braking force between disc **87** and ratchet wheel **90**, increases as the carriage moves toward the position determined by left-hand marginal stop **77** and decreases with movement in the opposite direction.

Rotatably mounted on stud **85** is a worm wheel **96** having a recessed portion **96a** which fits over

a collar 97 loose on hub 86. The recessed portion 96a is slightly loose on hub 86. The recessed portion 96a is slightly flattened to fit in oblong holes in a spring hook 98 and a pair of spacing washers 99 which hold the hook in the center of the recessed portion 96a. A large disc 100 is also provided with an oblong hole to fit the recessed portion 96a, and the worm wheel 96, spring hook 98, washers 99, and disc 100 are all secured together as a unit by staking or otherwise securing the left-hand washer 99 (Fig. 2) to the recessed portion 96a. This assembly is rotatable on stud 85. The power spring 101 is anchored at its inner end to spring hook 98 while its outer end is secured to the inside of the axial flange of disk 87.

The frame carrying the stud 85 has a flange 102 enclosing the worm wheel 96. The flange is nearly circular but is shaped to form a pocket 102a the walls of which have a pair of slots or notches. Housed in this pocket and journaled loosely in the notches, is a worm 103 meshing with worm wheel 96. The worm may have a slotted head (not shown) whereby it may be turned with a screw driver or other instrument to regulate the tension of the power spring.

Normally the ratchet wheel 90 is free to rotate with disc 87 and there is no braking effect on the latter although nut 93 oscillates back and forth on hub 86 during line writing and carriage return operations of the carriage. The tabulating mechanism is adapted to control the governor through means shown in Fig. 1.

A three-armed lever 104 is pivotally mounted on a stud 105 carried by the framework. One arm of lever 104 is connected by a link 106 to one arm of a bell crank 107 pivoted on a stud 108 carried by a bracket 109. As explained in Patent No. 1,935,436, bracket 109 also provides a mounting for the arm 40. The other arm of bell crank 107 has a rectangular slot or notch loosely embracing the lever 33 adjacent arm 40.

One arm of lever 104 extends downwardly close to ratchet disc 90 and has a pin 104a loosely fitting in an L-shaped slot in one end of a pawl 110. The other end of pawl 110 is slotted to embrace a shoulder in stud 105. A spring 111 connects pawl 110 to the third arm of lever 104 and tends to hold pawl in the position shown in Fig. 2 with pin 104a in the apex of the L-shaped slot. Pawl 110 has a bent-over lug 110a adapted to engage the teeth in ratchet wheel 90.

The operation of the above parts will now be explained in detail.

When the usual tabulating key is depressed, a cam unit associated therewith operates lever 33 as described in the above patent, through a link 39 and an arm 40, causing the left-hand end of lever 33 in Fig. 1 to move forwardly. This causes bell-crank 107 to be rocked in a direction to push link 106 downwardly. As a result lever 104 is rocked clockwise in Fig. 1 carrying lug 110a into engagement with the teeth of ratchet wheel 90.

The carriage now starts to move to the right in Fig. 1 under the force of power spring 101, the escapement pawls 42 having been released in the usual way, with the result that ratchet wheel 90 will rotate clockwise and pawl 110 will be drawn longitudinally downward against the tension of spring 111. Eventually the pin 104a and stud 105 will prevent further longitudinal movement of pawl 110. At this point the ratchet wheel 90 will be held positively against further clockwise movement but spring 101 will continue to rotate the disc 87 and move the carriage until one of the column stops strikes the lug 33a in tabular lever 33.

The amount of braking effect between the ratchet wheel 90 and disc 87, and hence the speed of the carriage, will depend on the position of nut 93 on hub 86. If the carriage movement commences near the beginning of a line, that is, when the carriage is at its extreme right-hand position (which is the extreme left-hand position in Fig. 1), the tension of spring 101 will be a maximum while nut 93 will be close to disc making the braking force a maximum.

At the other limit of carriage travel, both the tension of spring 101 and the braking force will be a minimum because the nut 93 will then occupy the position farthest from disc 87.

It may happen that the depression of the tabulating key occurs at a time when one of the teeth in ratchet 90 is almost directly opposite the lug 110a. This is possible because the teeth in ratchet 90 do not have the same spacing as the teeth in rack 44 and therefore may at times prevent full movement of pawl 110. If the lug 110a were integral with lever 104, the obstruction of its movement by ratchet wheel 90 would have the effect of wholly or partly blocking movement of lever 33 and arm 40, thereby jamming the cam unit which operates arm 40 against the power roller and preventing proper operation of the tabulating mechanism. The L-shaped slot in pawl 110 permits the lever 104 to move the required amount regardless of any obstruction offered by the teeth of ratchet wheel 90.

The slotted mounting of pawl 110 also allows the carriage to move a few letter spaces before any braking action takes place. The ratchet wheel 90 has approximately half as many teeth as the escapement rack 44, whereas the latter has half as many teeth as there are letter spaces of movement. It follows, therefore, that approximately four letter spaces of movement of the carriage take place for each tooth space on ratchet wheel. The slots in pawl 110 are such length that approximately five letter spaces of movement of the carriage take place before ratchet wheel 90 is positively arrested. During this movement the only retarding force offered to movement of the carriage is the negligible force exerted by spring 111.

The above feature of the governor mechanism enables short tabulating movements to be effected without the sluggishness of response often experienced with common forms of carriage governors.

A feature of the governor is that it is not limited to use in connection with tabulating mechanism but may be used generally as a means for equalizing the tension of the power spring for the purpose of obtaining a more uniform tension throughout the travel of the carriage. This may be done by fixing the ratchet wheel 90 against rotation or simply by using a fixed disc not provided with teeth. This would have the effect of automatically compensating for variation in the tension of the power spring by subjecting the carriage at all times to a braking force which varies according to the tension of the power spring. This feature would be particularly useful on machines equipped with very wide carriages. On carriages of extreme width, such as the twenty-inch carriages often used on machines for accounting and statistical work, for example, the variation in tension of the power spring is quite great with the result that letter

spacing and tabulating movements are apt to be sluggish near the end of a line of writing.

While a specific form of the invention has been described herein for the purpose of illustrating the principles on which its operation depends, it is apparent that the invention may be changed in details or parts thereof may be omitted to adapt the invention to requirements of service without departing from such principles. It is desired, therefore, that the following claims be limited only by the state of the prior art.

What is claimed is:

1. A carriage governor comprising a disc rotatable in proportion to movement of the carriage, a brake disc co-operating with the first-named disc, spring means urging the brake disc into braking relation with the first-named disc, a traveling member operable in two directions to increase and decrease the tension of the spring means, and means operated by the first disc for moving the traveling member in one direction or another according to the direction of movement of the carriage and in proportion to carriage movement.

2. A carriage governor comprising a member rotated in proportion to movement of the carriage including a threaded hub rotatable with said member, a brake member co-acting with the rotatable member and loosely mounted on the hub, a nut carried by the hub, means for preventing rotational movement of the nut while permitting it to move axially of the hub, and a brake spring on said hub between said nut and said brake member, said nut being operative to increase or decrease the tension of the spring automatically according to the direction of rotation of the rotatable member.

3. In combination with a carriage, a brake comprising two coacting elements both moved when the carriage moves, tabulating mechanism, means connected with the tabulating mechanism for preventing movement of one of said elements upon an operation of the tabulating mechanism whereby to render the brake effective, and means movable in proportion to movement of the carriage for varying the braking effect of one brake element on the other.

4. In combination with a carriage, a pair of brake discs movable with the carriage, tabulating mechanism, means operative during an operation of the tabulating mechanism to prevent movement of one of the brake discs whereby to render the brake effective, and means moved in proportion to movement of the carriage for varying the brake pressure between said discs.

5. In combination with a carriage, a carriage brake comprising two coacting rotatable brake discs, means connected to the carriage for rotating one of said discs, spring means to urge the other disc into engagement with the carriage moved disc whereby both discs normally rotate in proportion to movement of the carriage, means to arrest the second disc to render the brake effective, and means whereby the effect of the urging means is regulated in proportion to carriage movement.

6. In combination with a carriage, a pair of brake discs, means to rotate one of said discs in proportion to movement of the carriage, means to engage the second disc with the first disc whereby both discs normally rotate in proportion to carriage movement, means movable in proportion to carriage movement for varying the effect of the engaging means, and means to arrest the movement of the second disc to render the brake effective.

7. In combination with a carriage, a brake disc having a connection to the carriage so as to be rotated in proportion to carriage movement, a second disc co-axial with the first disc, spring means for engaging one of the discs with the other, a traveling member movable in two directions to increase and decrease the tension of the spring means, and connections between the carriage and the traveling member for operating the latter according to the direction of carriage movement.

8. In combination with a carriage, a carriage brake including a pair of brake members each movably mounted independently of the carriage, means to move one of said members in proportion to movement of the carriage, means to engage the second brake member with the first member whereby both brake members normally move with the carriage, means movable in proportion to movement of the carriage for controlling the engaging means to vary the engaging pressure between the brake members in accordance with the position of the carriage, and means to prevent movement of the second brake member to thereby render the brake effective.

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