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G. BECCIO

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2 Sheets-Sheet 1

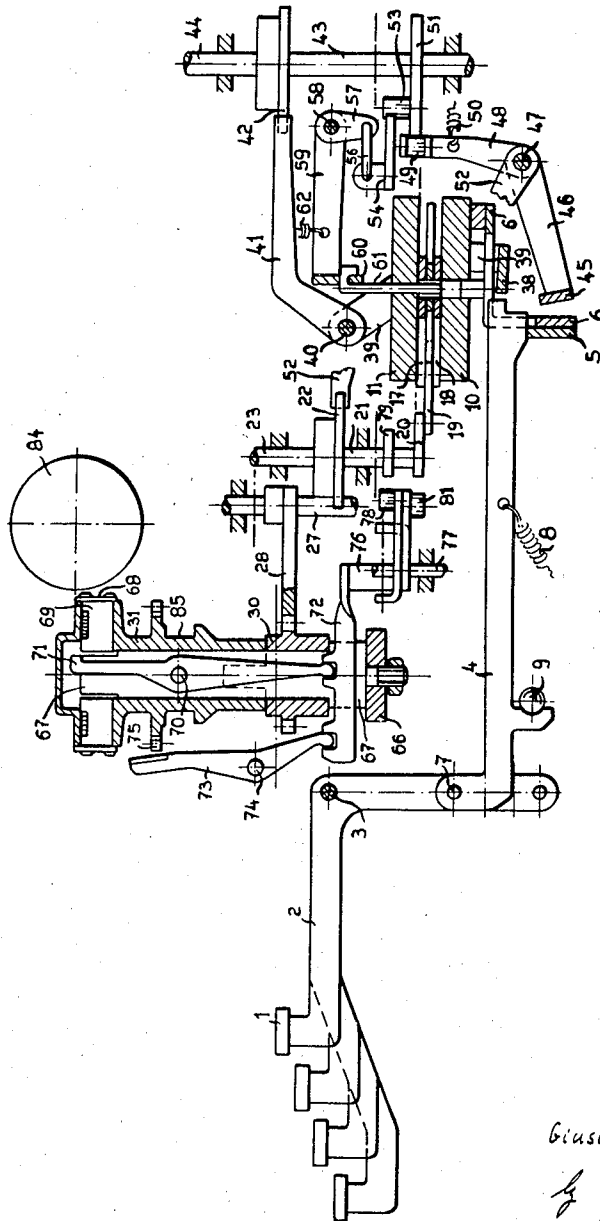


Fig. 1

Inventor:  
Giuseppe BECCIO  
by *J. M. F. F.*  
Attorney

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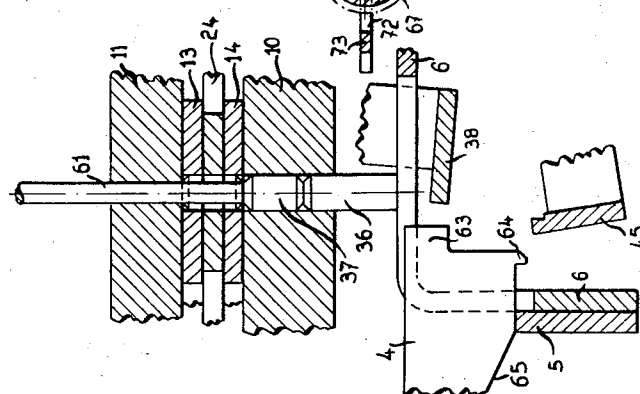
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# TYPE CARRIER ACTUATING MECHANISM FOR TYPEWRITING MACHINES

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Inventor:  
Giuseppe BECCIO  
by *[Signature]*  
Attorney

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## TYPE CARRIER ACTUATING MECHANISM FOR TYPEWRITING MACHINES

Giuseppe Beccio, Ivrea, Italy, assignor to Ing. C. Olivetti  
& C. S. p. A., Ivrea, Italy

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The invention relates to typewriters, printing telegraph apparatus and to typewriting machines in general, wherein a type carrier having a set of types thereon is rotatable through various angular distances to locate a selected one of said types at the printing point.

It was heretofore customary to arrest the type carrier in the selected angular position by means of a stop set into the path of a stop arm rotating with the type carrier. To reduce the angular distance through which the type carrier had to rotate, it was proposed to rotate the type carrier in opposite directions from a normal position, thereby reducing the maximum angle of rotation to 180°.

One of the greatest problems arising in connection with said types of type carrier actuating mechanisms is to reduce the shock and noise produced by the stop arm abruptly striking against the selected stop.

It has been, therefore, proposed to rotate the type carrier with gradual acceleration from rest position and with gradual deceleration to typing position, by imparting to the type carrier a motion which is fundamentally a harmonic motion.

To this end two power means or driving devices, one for each direction of rotation of the type carrier, and an actuating mechanism comprising a linkage having at least one variably settable stationary fulcrum were heretofore provided. However, the resulting construction was very intricate and expensive.

The principal object of the invention is to provide a typewriting machine of the class described, of economic manufacture and reliable and noiseless operation.

According to the invention, in a typewriting machine wherein a type carrier having a set of types thereon is rotatable through various angular distances to locate a selected one of said types at the printing point, having actuating means to variably rotate said type carrier in either direction from a normal position to a selected position according to a fundamentally harmonic motion, and a driving device for said actuating means, said actuating means comprising a linkage having a movable fulcrum, means are provided to vary said movable fulcrum.

Further objects and details will be apparent from the following description, when read in connection with the accompanying drawings, wherein:

Fig. 1 is a right hand sectional elevation of the machine;

Fig. 2 is a partial sectional top plan view of the machine;

Fig. 3 is an enlarged view of a detail of Fig. 1.

Referring now to Fig. 1, it will be seen that each key 1 is secured to a key-lever 2 pivoted on a transversal pivot shaft 3. On each key-lever 2 is pivoted, as at 7, a push bar 4 resting on a transversal bar 5 and guided in a slotted plate 6.

Upon depression of key 1 the push bar 4 is shifted backwards. Since the keys 1 are secured to the corresponding key-levers 2 at variable distances from the common pivot shaft 3, and since all keys are lowered an equal amount, the associated push bars 4 are pivoted on the key-levers 2 at proportional distances from the pivot bar 3,

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whereby all push bars 4 are shifted an equal amount, irrespective of the key depressed.

Each push bar 4 is urged forwards by a spring 8. For preventing the simultaneous depression of two or more keys, a ball type locking device 9, as known per se, is provided.

Above the backward end of the push bars 4 a plate 10 is provided, Figs. 1, 2 and 3. Above the plate 10 and spaced from this a second plate 11 is arranged. Fixed between the two plates and in central position therein is a pivot stud 12, Fig. 2, on which two equal bars 13 and 14, Figs. 2 and 3, are pivoted. These bars are rigidly secured to each other by means of studs 15 and 16, a space being left between the bars by the interposition of two interponent rings 15' and 16', respectively. A cage like frame, swingable about the pivot stud 12, is thus formed.

Each bar 13 and 14 is formed with an arm 17 and 18, respectively, between which one end of a connecting rod 19 is pivoted. The opposite end of the connecting rod 19 is pivoted on a crank 20 secured to a vertical shaft 21. Through a clutch 22, which may be of any type known in the art, the shaft 21 may be rotated one revolution or cycle by a continuously rotating shaft 23. In the normal position of Fig. 1, the link 19 and the arm 20 are in alignment.

It will be apparent that during each revolution of the shaft 21 the cage 13, 14 is swung forward and backwards through a constant angle, the motion thus imparted to the cage being fundamentally a harmonic motion.

Arranged in the space between the bars 13 and 14 is a T-shaped actuator lever 24, Fig. 2, pivoted at 25 on an arm 26 secured to a shaft 27. Further secured to this latter is a toothed sector 28, which is in a constant mesh with a hub 30, toothed as at 29. As will be described later, the hub 30 engages a rotatable type sleeve 31.

At rest, the actuator lever 24 is positioned by the pivot stud 12 engaging an aperture 32 in the lever. Projections 33 and 34 provided on the end of two arms of the actuator lever 24 are normally in contact with the interponent rings 15' and 16', respectively.

As seen hereinbefore, the set of push bars 4 is arranged below the plate 10. Above the set of push bars 4 is provided a set of thrust pins 36, Fig. 3, each thrust pin normally resting above a slot of the slotted plate 6 in correspondence with a push bar 4. As seen in Fig. 3, each thrust pin 36 is guided in the plate 10 and supports a fulcrum pin 37 guided as well in the plate 10 and capable of entering a corresponding hole of a set of holes 35, Fig. 2, formed in the cage 13, 14 and in the actuator lever 24.

The length of the fulcrum pins 37 is substantially equal to the space between the plates 10 and 11. Furthermore, the upper and lower corners of each fulcrum pin are rounded or beveled so that it may readily enter the corresponding hole.

It will be seen that, when lifting a thrust pin 36 by means of the corresponding push bar 4, in the manner hereinafter described, the corresponding fulcrum pin 37 is pushed into the hole 35. The actuator lever 24 is thereby fulcrumed to the swinging cage 13, 14 at a distance from the pivot stud 12 depending on the push bar 4 selected.

Behind the backward end of the push bars 4 is provided a universal bar 38, Fig. 1, supported by arms 39 secured to a shaft 40. Further secured to this latter is an arm 41, cooperating with a clutch 42 which may be of any type known in the art. Through this clutch a shaft 43 may be rotated one revolution or cycle by a continuously rotating shaft 44 driven by the motor cited hereinabove. Normally the arm 41 holds the shaft 43 declutched from the shaft 44 in a manner known per se.

Further provided below the backward end of the push bars 4 is a universal bar 45, supported by arms 46 se-

cured to a shaft 47. Secured to this latter is an arm 48 carrying a roller 49. A spring 50 urges the arm 48 clockwise (Fig. 1), whereby the roller 49 engages a cam disc 51 secured to the shaft 43 (Fig. 2).

An arm 52 (Fig. 1), secured to the shaft 47, cooperates with the clutch 22, in a manner known per se, by which the shaft 21 is normally held declutched from the shaft 23.

A roller 53 (Fig. 2) pivoted on the cam disc 51, cooperates with one end of a lever 54 pivoted at 55. The other end of the lever 54 is connected, through a link 56, to a crank 57, Fig. 1, secured to a shaft 58.

A universal bar 60, carrying a set of ejecting pins 61 guided in the plate 11, Figs. 1 and 3, is supported by arms 59 secured to the shaft 58. A spring 62 urges the arm 59, Fig. 1, clockwise. Normally, owing to the roller 53 engaging the lever 54, the ejecting pins 61 are held in their lower position as in Figs. 1 and 3.

Upon depression of a key 1, the corresponding push bar 4 is shifted backwards, Fig. 1. Its backward end encounters thereby the universal bar 38, which rotates with its arm 39 counterclockwise. The arm 41, thus lifted, releases the clutch 42, and the shaft 43 is clutched to the shaft 44.

The roller 53, in rotating counterclockwise with the cam disc 51, Fig. 2, releases the lever 54, permitting thereby the spring 62 to lift the universal bar 60. In the upper position of the universal bar 60, the lower face of the ejecting pins 61 is aligned with the lower face of the plate 11.

At the same time the cam disc 51 disengages the roller 49, permitting the arm 48, and thus the arm 46, to rock clockwise (Fig. 1). The universal bar 45, in moving upwards, engages the push bar 4 previously shifted backwards and pushes it upwards, thereby lifting the corresponding thrust pin 36. The fulcrum pin 37 corresponding to the key depressed is thus pushed into the hole 35 and the actuator lever 24 is fulcrumed to the swinging cage 13, 14.

It will be apparent that the actuator lever 24, thus fulcrumed to the cage 13, 14, forms an ideal connecting rod 37—25 of a four-bar linkage 27—12—37—25, comprising the ideal frame 27—12 and the ideal cranks 25—27 (arm 26) and 12—37 (cage 13, 14), the length of the connecting rod 37—25 and of the crank 12—37 being variable with the fulcrum pin 37 selected. Moreover, it will be seen that, if the fulcrum pin selected lies between the pivot stud 12 and the stud 15, the four bar linkage will be of the crossed type.

Since the arm 52 has been rocked clockwise with the shaft 47 upon disengagement of the roller 49, the clutch 22 is released and the shaft 21 is clutched to the shaft 23.

The cage 13, 14 being thereby swung about the pivot stud 12 in the manner described, the actuator lever 24 is moved by the cage and the arm 26 is rocked through an angle, the amplitude of which depends on the fulcrum pin 37 selected.

As the toothed sector 28 rocks bodily with the arm 26, the type sleeve 31, to be hereinafter described, is rotated to locate the selected type at the printing point.

The aperture 32 has the sole function of enabling the actuator lever 24 to move relatively to the pivot stud 12.

Unless in the meantime another key has been depressed, the arms 41 and 52 reengage the clutches 42 and 22, respectively, upon completion of one revolution of the corresponding shafts 43 and 21.

Various contrivances are provided to ensure a proper operation of the machine.

After having been lifted by the universal bar 45, the push bar 4 is locked in its upper position by the universal bar 38 slipping under its projection 63, Fig. 3, whereby the universal bar 38 is not operated a second time, irrespective of the duration of the depression of the key 1.

Furthermore, each push bar 4 is formed with a hook

shaped projection 64 and an inclined profile 65 enabling the push bar to slide on the bar 5 and to be engaged by the universal bar 45 immediately upon depression of the key 1, which may be released without delay. The device permits a second key to be depressed before completion of the machine cycle started by the previously depressed key, the push bar 4 corresponding to the second key being latched in its backward position and kept ready for being raised by the universal bar 45.

The type carrier and the printing mechanism will now be described.

Secured to the machine frame 66, Fig. 1, is a shaft 67, which is diametrically slotted, as seen in Figs. 1 and 2. Loosely mounted upon the shaft 67, is the hub 30, which rests on a radially enlarged portion of the shaft 67. By means of prismatic guides of any known type, the hub 30 engages in its rotation the type sleeve 31, loosely mounted upon the shaft 67 and readily detachable therefrom for being replaced by another type sleeve.

The type sleeve 31 is formed with a set of slots in radial arrangement equally spaced therearound, and in each slot a type pallet consisting of a type 68 secured to a shank 69 is slidably mounted.

Pivoted at 70 within the diametrical slot of the shaft 67 is a printing hammer 71, which at its lower end is engaged by an actuating rod 72 slidably mounted in said diametrical slot.

A positioning lever 73, pivoted at 74 and engaged by the actuating rod 72, is edged at its upper end to enter the slots of an index wheel 75 formed on the type sleeve 31, a slot being provided for each type 68. A positioning device is thereby provided to ensure correct positioning of the type sleeve 31 upon completion of the rotation described above.

The actuating rod 72 is pivoted on a lever 76, Fig. 2, secured to a shaft 77 and urged clockwise by a spring. A roller 78 pivoted on an arm of the lever 76 is engageable by a cam 79 secured to the shaft 21. A second roller, 81, pivoted on a crank 82 loosely mounted upon the shaft 77, is engageable by a cam 80 formed on the crank 20. Between the crank 82 and an arm of the lever 76 is arranged a compression spring 83.

As described hereinbefore, upon depression of a key 1 the crank 20 starts rotating from its dead center position of Fig. 2.

Assume now that the crank 82 is rigidly secured to the lever 76. A few degrees before completion of half a revolution of the crank 20, the cam 80 engages the roller 81, which is thereby moved counterclockwise. The lever 76, rotating counterclockwise with the crank 82, shifts the actuating rod 72 leftwardly, as seen in Fig. 2. Upon completion of half a revolution i. e. in the opposite dead center position of crank 20, the top of the cam 80 imparts the maximum throw to the actuating rod 72 and the printing hammer 71 strikes against the type pallet which is aligned therewith at the moment. At the same time, the positioning lever 73 positions the type sleeve 31 in the manner described.

The real mode of operation will be described, on account of the flexible connection 83 provided between the crank 82 and the lever 76. As stated hereinbefore, upon rotation of the crank 20 the cam 80 engages the roller 81, thereby rocking the arm 82 counterclockwise. The lever 76 is pushed counterclockwise by the compression spring 83, and normally the crank 82 and the lever 76 move bodily as if they were rigidly connected together. However, if at the moment at which the lever 73 is swung clockwise, Fig. 1, the type sleeve 31 has not yet completed its rotation, the lever 73 may be unable to enter a slot of the index wheel 75. The lever 76 is thereby arrested, whereas the crank 82 is further rotated, compressing the spring 83. At the moment at which the top of the cam 80 takes up the opposite dead center position, the type sleeve is correctly located and the actuat-

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ing rod 72 is enabled to suddenly move leftwards (Fig. 1) under the urge of the compressed spring 83.

The cam 79 engages thereupon the roller 78 and causes the parts to resume their position of Fig. 2.

As stated hereinabove, the motion of the cage 13, 14 is fundamentally a harmonic motion. Therefore, when the crank 20 takes up its opposite dead center position and the type sleeve 31 is located according to the type selected, its angular speed is zero. At this moment the printing hammer 71 strikes against the type pallet. This result has been achieved by arranging the printing cam 80 upon the same shaft which drives the type sleeve actuating mechanism.

As to the mechanisms for accomplishing the various functions which are customary in a typewriter, such as escapement, ink ribbon and like mechanisms, they may be of any conventional type and shall not be described.

It will be noted that the type sleeve 31 is formed with a circular slot 85 which is engageable by shifting means for vibrating the type sleeve 31 up and down before the platen roller 84. Said shifting means may comprise a pair of diametrically opposed rollers engaging the circular slot 85. The rollers are supported by one end of a variably fulcrumed lever the other end of which is imparted a constant throw, the fulcrum being variable for purposes of case shifting.

It will be apparent that the motion is transmitted from the toothed sector 28 to the hub 30 through a gear only by way of example. Furthermore, intermediate links may be arranged between the arm 26 and the toothed sector 28.

It may be further observed that the cage 13, 14 and the corresponding arms of the actuator lever 24 may be formed according to an arc, thereby enabling the ideal connecting rod 37—25 to have a constant length, irrespective of the distance of the selected fulcrum pin 37 from the pivot stud 12.

When embodying the invention in a printing telegraph apparatus, the push bars 4 are controlled by the usual set of combination bars permutable according to a permutation alphabet. In the case of a 5-unit alphabet a set of five combination bars is provided and a push bar 4 is selectable for each permutation of said set of combination bars.

Although specific embodiments of the features of the invention have been disclosed and described herein, it will be understood that the invention is not limited to such specific embodiments but is capable of modification, reorganization, rearrangement, and substitution of parts and elements without departing from the spirit of the invention and within the scope of the appended claims.

What is claimed is:

1. In a typewriting machine wherein a type carrier having a set of types thereon is rotatable through various angular distances to locate a selected one of said types at the printing point, an actuating mechanism for variably rotating said type carrier according to a fundamentally harmonic motion, a driving device for imparting a constant movement to said actuating mechanism, said actuating mechanism including a linkage operable to translate said constant movement into said variable rotation, said linkage comprising a number of movable linkage members capable of being so interconnected as to leave one grade of freedom to the linkage during its operation, and a set of differently located fulcrum elements selectively setttable for establishing a variable fulcrum between two consecutive movable linkage members to vary the rate of motion transmission between said two members.

2. In a typewriting machine wherein a type carrier having a set of types thereon is rotatable through various angular distances to locate a selected one of said types at the printing point, an actuating mechanism for variably rotating said type carrier according to a fundamentally harmonic motion, a driving device for imparting a constant

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movement to said actuating mechanism, said actuating mechanism including a linkage operable to translate said constant movement into said variable rotation, said linkage comprising a number of movable links and a plurality of connections for said links, said plurality of connections comprising a number of stationary fulcrums for certain of said links, a number of movable fulcrums each capable of interconnecting a pair of consecutive links with the exception of one pair of consecutive links which is left uninterconnected, and a set of differently located fulcrum elements selectively setttable for establishing a variable fulcrum between the links of said uninterconnected pair of links to vary the rate of motion transmission between said last named links, said linkage being left one grade of freedom upon establishment of said variable fulcrum.

3. In a typewriting machine wherein a type carrier having a set of types thereon is rotatable through various angular distances to locate a selected one of said types at the printing point, a machine frame, an actuating mechanism for variably rotating said type carrier according to a fundamentally harmonic motion, a driving device for imparting a constant movement to said actuating mechanism, said actuating mechanism including a linkage operable to translate said constant movement into said variable rotation, said linkage comprising a number of movable links and a plurality of connections for interconnecting said movable links and connecting them to said machine frame, said plurality of connections comprising a number of stationary fulcrums for certain of said links, said stationary fulcrums being located in fixed relation with said machine frame, a number of movable fulcrums each capable of interconnecting a pair of consecutive links with the exception of one pair of consecutive links which is left uninterconnected, and a set of differently located fulcrum elements selectively setttable for establishing a variable fulcrum between the links of said uninterconnected pair of links to vary the rate of motion transmission between said last named links, said linkage being left one grade of freedom upon establishment of said variable fulcrum.

4. In a typewriting machine wherein a type carrier having a set of types thereon is rotatable through various angular distances to locate a selected one of said types at the printing point, a machine frame, an actuating mechanism for variably rotating said type carrier according to a fundamentally harmonic motion, a driving device for imparting a constant movement to said actuating mechanism, said actuating mechanism including a four-bar linkage capable of translating said constant movement into said variable rotation, said linkage comprising two cranks each fulcrumed to said machine frame, a connecting rod fulcrumed to one of said cranks, and a set of differently located fulcrum elements selectively setttable for establishing a variable fulcrum between said connecting rod and the other crank to vary the relationship between the lengths of the connecting rod and said other crank.

5. In a typewriting machine wherein a type carrier having a set of types thereon is rotatable through various angular distances to locate a selected one of said types at the printing point, an actuating mechanism for variably rotating said type carrier according to a fundamentally harmonic motion, a driving device for imparting a constant movement to said actuating mechanism, said actuating mechanism including a linkage capable of translating said constant movement into said variable rotation, said linkage comprising a crank adapted to be cyclically driven by said driving device, an actuator for said type carrier and a set of differently located fulcrum elements selectively setttable for establishing a variable fulcrum between said crank and said actuator to vary the rate of motion transmission between the crank and the actuator.

6. In a typewriting machine wherein a type carrier having a set of types thereon is rotatable through various angular distances to locate a selected one of said types at

the printing point, an actuating mechanism for variably rotating said type carrier in either direction according to a fundamentally harmonic motion, a driving device for imparting a constant movement to said actuating mechanism, said actuating mechanism including a linkage capable of translating said constant movement into said variable rotation, said linkage comprising a lever rockable about a stationary fulcrum and adapted to be cyclically driven by said driving device, an actuator for said type carrier, and a set of differently located fulcrum elements selectively settable for establishing a fulcrum between said lever and said actuator at variable distances from said stationary fulcrum at either side thereof to vary the rate of motion transmission between the lever and the actuator and to determine the direction of rotation of the type carrier.

7. In a typewriting machine wherein a type carrier having a set of types thereon is rotatable through various angular distances to locate a selected one of said types at the printing point, an actuating mechanism for variably rotating said type carrier in either direction according to a fundamentally harmonic motion, a driving device for imparting a constant movement to said actuating mechanism, said actuating mechanism including a linkage capable of translating said constant movement into said variable rotation, said linkage comprising a lever rockable about a stationary fulcrum and adapted to be cyclically driven by said driving device, an actuator for said type carrier, a set of fulcrum elements one for each type to be selected, said fulcrum elements being located in juxtaposition to said lever and said actuator at both sides of said stationary fulcrum and at variable distances from same, and a set of setting devices one for each of the fulcrum elements for selectively setting said fulcrum elements to establish a variable fulcrum between said lever and said actuator in order to vary the rate of motion transmission between the lever and the actuator and to determine the direction of rotation of the type carrier.

8. A typewriting machine as claimed in claim 7, wherein means are provided to select said setting devices.

9. In a typewriting machine wherein a type carrier having a set of types thereon is rotatable through various angular distances to locate a selected one of said types at the printing point, an actuating mechanism for variably rotating said type carrier according to a fundamentally harmonic motion, a driving device including a one revolution shaft for imparting a constant movement to said actuating mechanism, said actuating mechanism including a linkage capable of translating said constant movement into said variable rotation, a crank mechanism driven by said shaft and normally resting in a dead center position, a printing mechanism, a positioning mechanism for positioning said type carrier substantially upon completion of rotation to a selected position, and actuating means operated by said crank mechanism to actuate both said printing mechanism and positioning mechanism substantially upon completion of half a revolution of said shaft.

10. A typewriting machine as claimed in claim 9, wherein resilient means are interposed between said crank mechanism and said actuating means.

11. In a typewriting machine, the combination of a type carrier having a set of radially slidable types thereon, said type carrier being rotatable through various angular distances to locate a selected one of said type at the printing point, a tubular support for said type carrier, and a printing hammer passing through said support and rockable about an axis perpendicular to the axis of rotation of the type carrier, said perpendicular axis intersecting said axis of rotation.

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