

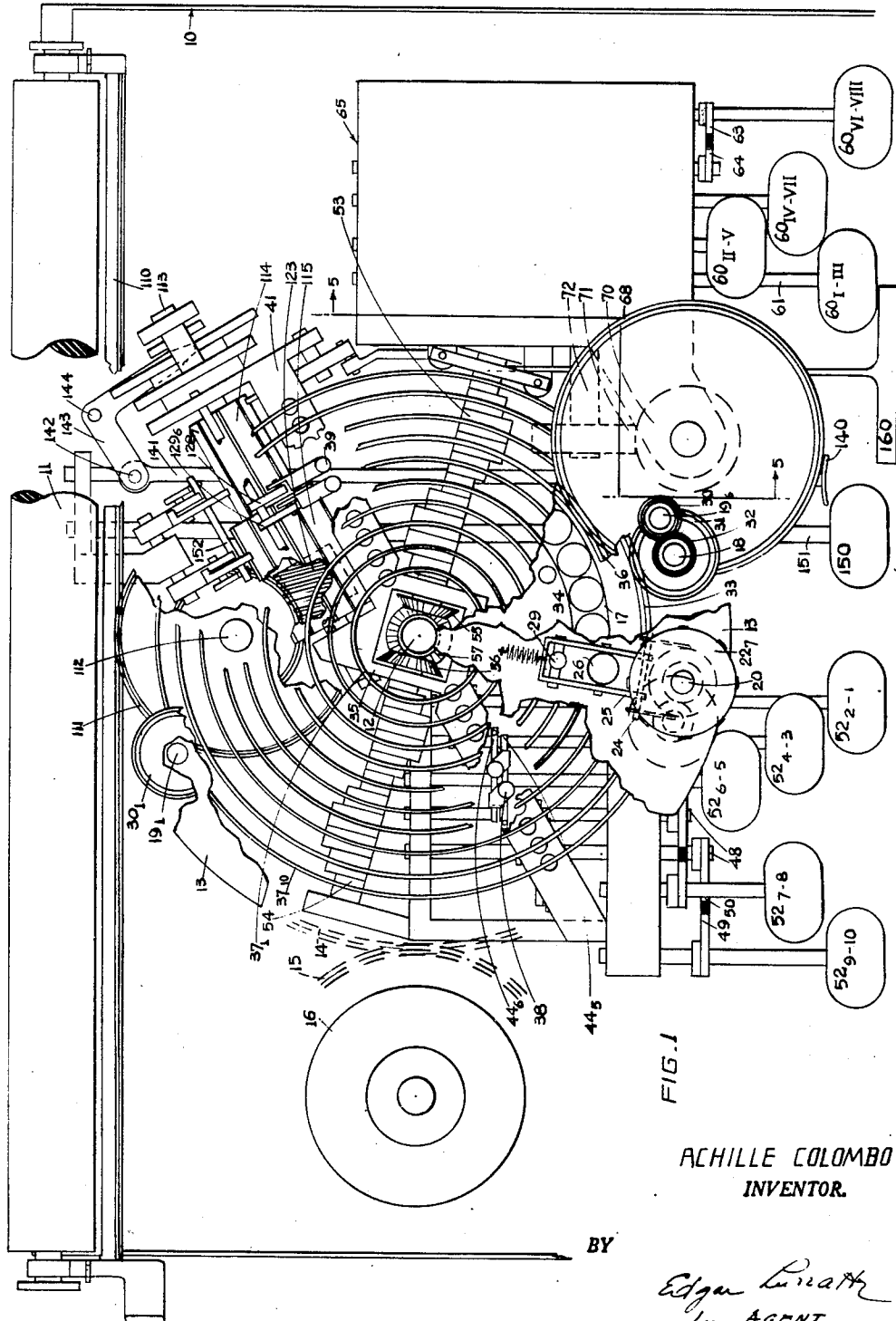
July 19, 1949.

A. COLOMBO
TYPEWRITING MACHINE

2,476,841
7443+0

Filed April 28, 1947

5 Sheets-Sheet 1



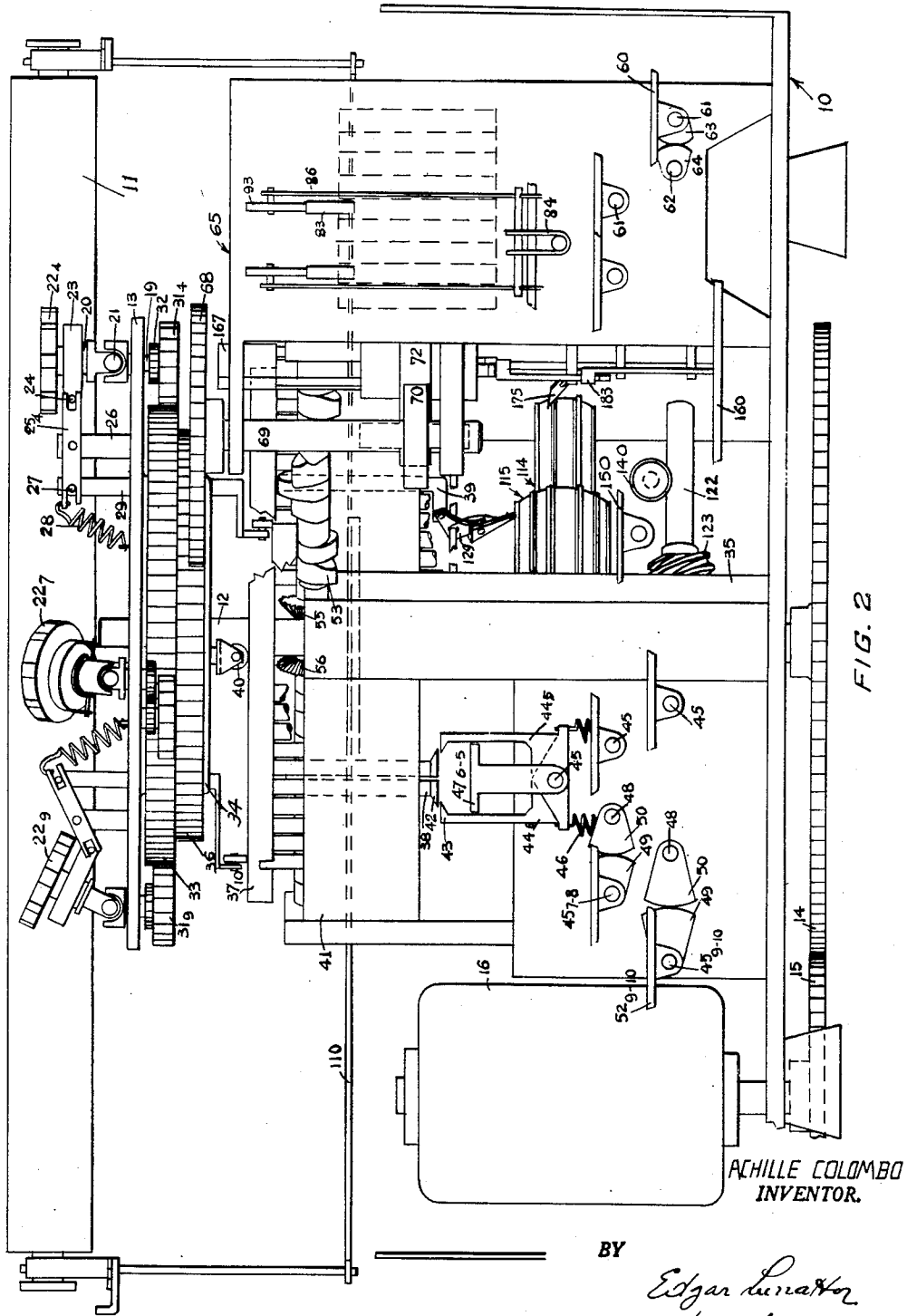
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A. COLOMBO
TYPEWRITING MACHINE

2,476,841

Filed April 28, 1947

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July 19, 1949.

A. COLOMBO

2,476,841

TYPEWRITING MACHINE

Filed April 28, 1947

5 Sheets-Sheet 3

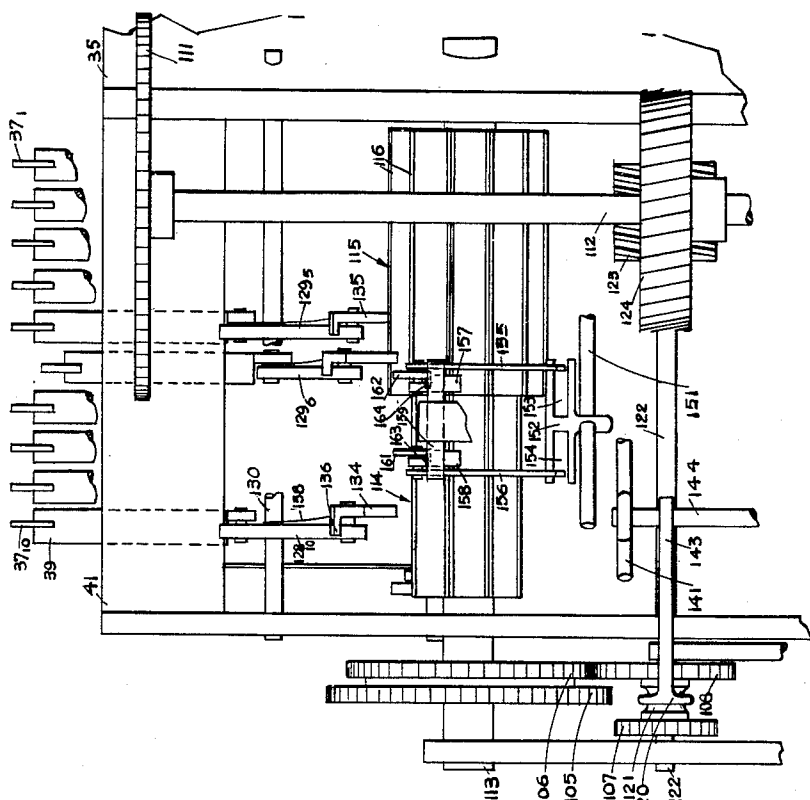


FIG. 3

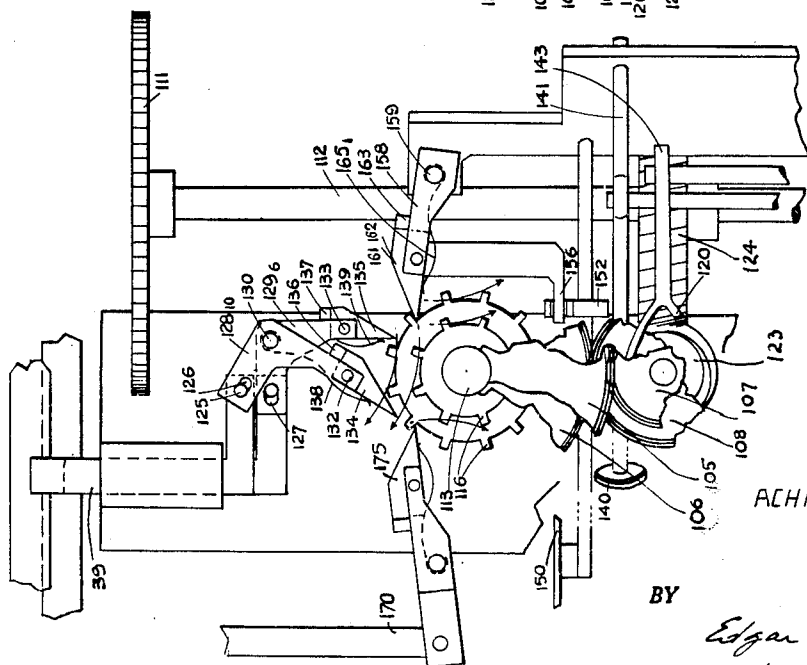


FIG. 4

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July 19, 1949.

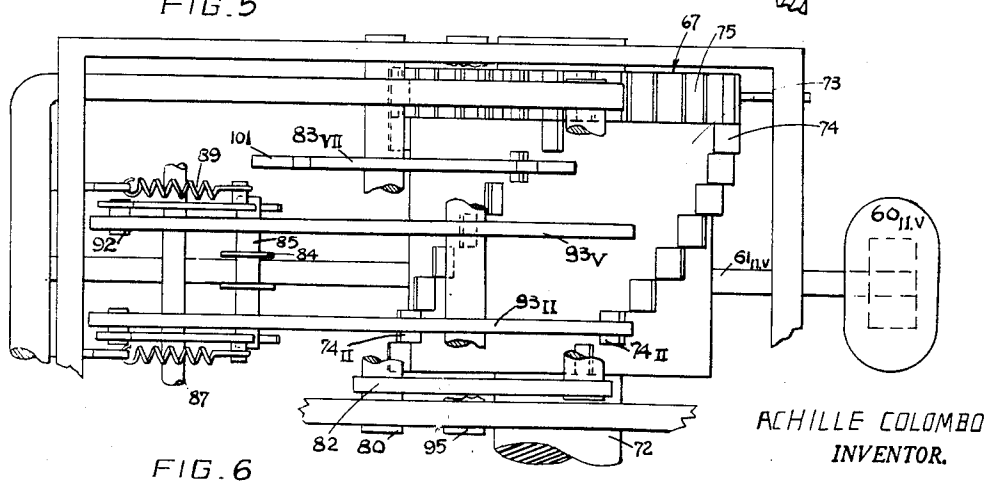
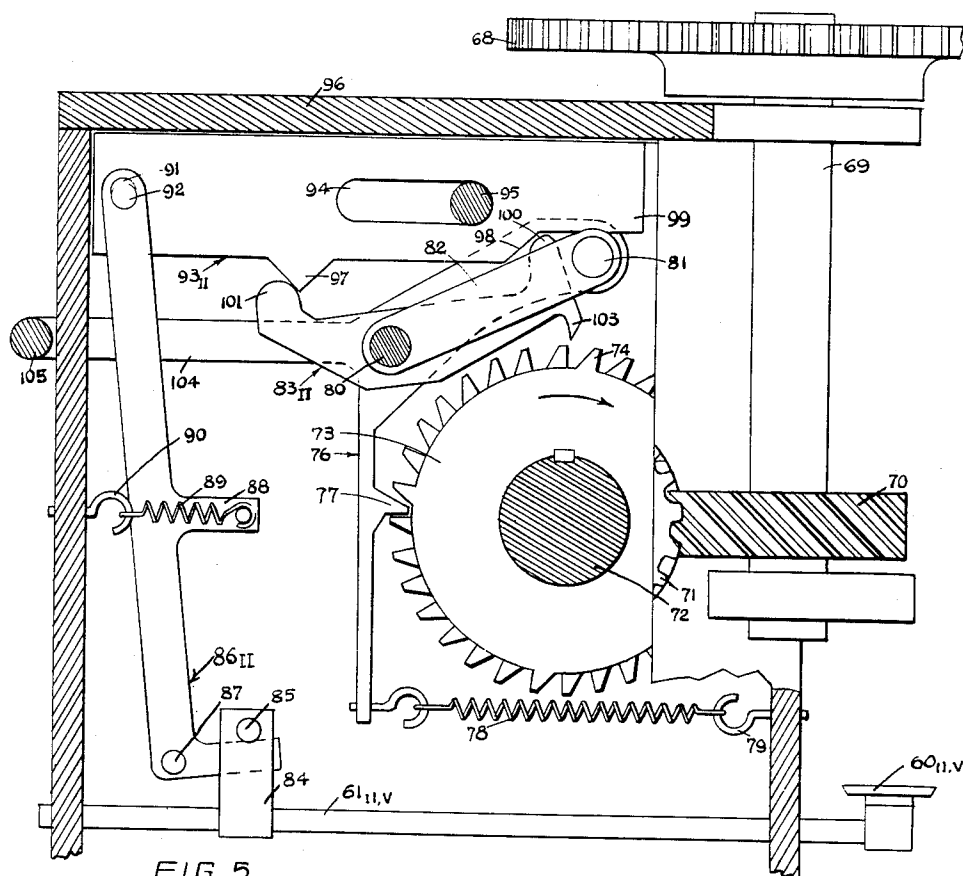
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TYPEWRITING MACHINE

Filed April 28, 1947

5 Sheets-Sheet 4



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2,476,841

TYPEWRITING MACHINE

Filed April 28, 1947

5 Sheets-Sheet 5

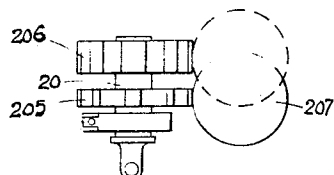


FIG. 10

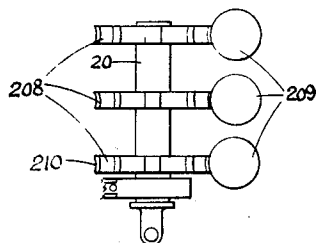


FIG. 11

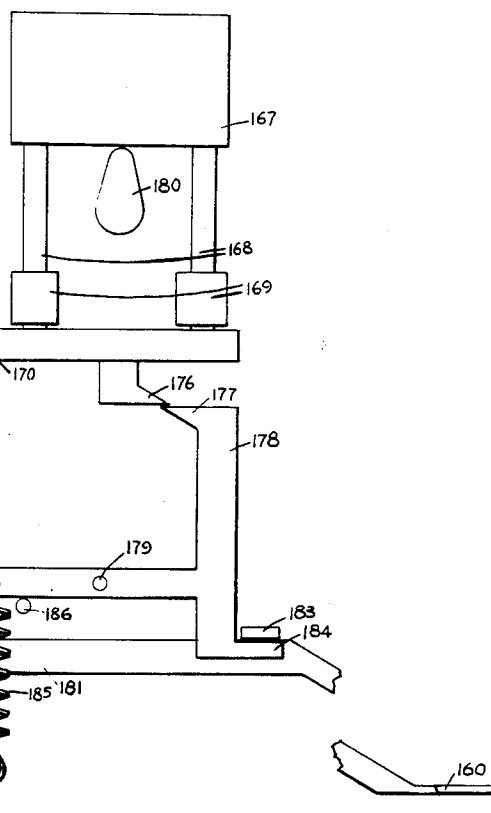
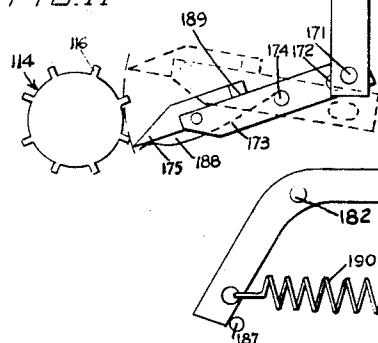


FIG. 7

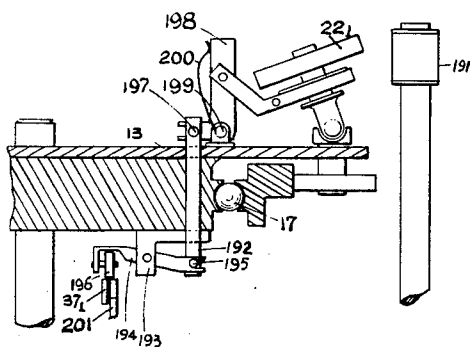


FIG. 8

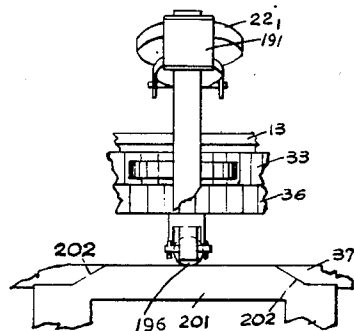
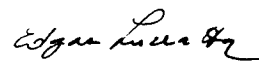


FIG. 9

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UNITED STATES PATENT OFFICE

2,476,841

TYPEWRITING MACHINE

Achille Colombo, New York, N. Y.

Application April 28, 1947, Serial No. 744,340

24 Claims. (Cl. 197—18)

1

This invention relates to a noiseless typewriting machine of the class of power driven typewriters with a planetary motion of the types and a rolling impression of the types on the paper. The general principles of machines of this class have already been disclosed in my U. S. Patent #2,285,018, and may be summarized as follows.

In order to obtain a rolling action of the types on the paper, each type is caused to follow a cycloidal path; each type is fastened on a surface adapted to roll over, for a suitable period and with the desired contact pressure, on a paper carrying roller. Said surface must therefore be integral with a planetary member having a rolling motion caused by a driving means and suitable kinematic connections, and touching the paper carrying roller only at the point of impression.

The aforementioned kinematic connections are so arranged that the fixed polar curve of any one rolling type is tangent to the paper carrying roller at the single typing point. Typewriting machines of this class may differ according to the type of kinematic connections used for obtaining the rolling action; however all have in common the feature consisting in that the typing unit is always in movement, being connected to a driving shaft rotating continuously in one direction.

The present invention has for its object the provision of a new and improved machine of the general class above described. In this machine, a plurality of types are carried at the periphery of each of a number of type wheels, which are the planetary members hereinbefore mentioned. The typing operation comprises two stages: selection and actuation. The theory of selection and actuation has been set forth in my U. S. Patent 2,311,737, to which reference is made for a detailed explanation and definition of the specific nomenclature herein employed. Briefly, selection means the determination of which among the several types carried by each wheel will be "in phase," that is ready to write, and actuation means the shifting of the wheel carrying the desired type from an inoperative to a writing position. The said two stages of typing may be manually controlled through two separate cooperating keyboards, as in the machine described and claimed in my U. S. Patent 2,311,737, or through a single keyboard embodying substantially the same keys used in standard typewriters, as in the machine described and claimed in my U. S. Patent 2,399,788, or through any convenient keyboard or combination of keyboards. The particular preferred embodiment which I have

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chosen to describe and illustrate hereinafter is of the double type, but differs from that of my aforementioned U. S. Patent 2,311,737 in that its keys and key-shafts are of a new and improved type, whereby they can be rendered even fewer in number than in my aforementioned previous patent. However this must not be taken as a limitation, inasmuch as in other embodiments of this invention a different keyboard or combination of keyboards could be adopted.

The general object of this invention is to provide certain novel improvements in typewriting machines of the character described.

A more specific object is to provide a typewriting machine of the character described wherein the mechanism effecting the selection is power-actuated, preferably from the same source of power which actuates the type wheels, and key-controlled means manually actuated by the operator determine the beginning and the end of such power actuation, that is release and lock the selector mechanism, whereby there is eliminated the necessity of exerting any manual pressure or effort on said key-controlled means.

Another object is to provide in a typewriting machine of the character described means for power-actuating the paper-carrying platen to move the same forward at each stroke, that is at the writing of each character and at each space, preferably from the same source of power which actuates the type wheels.

A further object is to provide means according to the foregoing object, which means are controlled by and are operatively connected to the mechanism for actuating the type wheels.

A still further object is to provide in a typewriting machine of the character described means for varying the forward stroke of the paper-carrying platen according to the character that is to be typed, that is to provide a number of different strokes related to the different widths of the characters in order to improve the appearance of the typescript by assigning to the wider characters a wider space, that is by effecting what may be called "proportional spacing."

A still further object is to provide in a typewriting machine of the character described means for power-actuating the platen, preferably from the same power means which actuate the type wheels, in its return stroke when a back space key is depressed.

A still further object is to provide in a typewriting machine of the character described with proportional spacing and power actuation of the return stroke of the platen, means for rendering

said return stroke of the same length as the last forward stroke, that is for rendering the back space "proportional."

A still further object is to provide in a type-writing machine of the character described a novel and improved type and arrangement of keys and key-shafts, whereby the number of said keys and key-shafts can be reduced from that of a standard single keyboard or of a double keyboard such as that of my aforementioned U. S. Patent 2,311,737, and preferably can be cut approximately in half with respect to the latter.

A still further object is to provide in a type-writing machine of the character described an eraser of an abrasive, chemical, or other suitable type, mounted on a planetary member similar in structure and operation to the type wheels, but conveniently differentiated in its kinematic connections whereby any character typed may be erased by suitably depressing a key and maintaining the same depressed for a sufficient length of time.

A still further object is to provide a new and improved actuating mechanism for shifting the type wheels from an inoperative to a writing position, which is considerably simplified and more efficient with respect to those disclosed in my aforementioned previous patents.

A still further object is to provide means operatively connecting the selector to the actuating mechanism for neutralizing the latter while the former is in motion, whereby no type wheels will be actuated until the desired type is in phase.

Other related and ancillary objects of this invention will clearly appear as the description proceeds.

In the drawings:

Fig. 1 is a plan view of a typewriting machine according to one preferred embodiment of the invention with the casing removed to show the operating parts and various other parts partially broken off, as hereinafter set forth, for the sake of clarity.

Fig. 2 is a front elevation of the same machine, with the casing and certain other parts removed.

Fig. 3 is a rear elevation, on a larger scale, of a part of the same machine, and precisely of the proportional spacing mechanism.

Fig. 4 is an end elevation of the mechanism of Fig. 3.

Fig. 5 is a vertical section taken on the line 5—5 of Fig. 1, illustrating another part of the same machine, and precisely the selector mechanism.

Fig. 6 is a plan view of the mechanism of Fig. 5.

Fig. 7 is a detail of the same machine, particularly showing the blank spacing mechanism.

Fig. 8 is a fragmentary vertical section illustrating another detail of the same machine, and precisely the eraser wheel and associated parts.

Fig. 9 is a front elevation of the assembly of Fig. 8.

Figs. 10 and 11 are fragmentary elevations illustrating two modifications of the type wheels and platens.

In the drawings the parts of the machine which do no substantially differ from those disclosed in my aforementioned previous patents are only partially shown, and will be correspondingly briefly described. It is to be understood that such design features as the number of characters on each type wheel, the number of wheels, the number of teeth and the relationship of the various gearing connections, the number of different spacings provided and their ratios, the number and arrangement of keys and key-shafts, and so

on, are matters of judicious choice, are herein-after specified only by way of example, and could be conveniently modified with the exercise of no more mechanical skill. Broadly, the machine comprises: a frame, a paper-carrying platen, a type wheel assembly, a selector mechanism including a selector keyboard, an actuating mechanism including an actuating keyboard, a spacing mechanism including means for the proportional spacing and the back spacing, a number of special keys, and power driving means. The frame 10 and the platen 11 may be of any preferred construction. Wherever reference is made to the frame 10, the same is regarded as including any and all stationary elements rigidly interconnected, which do not participate in any of the several motions occurring during the operation of the machine. The type wheel assembly comprises a shaft 12 to which there is keyed a disc 13, said shaft being maintained in continuous rotation while the machine is in operation, through a driven gear 14 keyed thereto and a meshing driving gear 15, by a motor 16 on the shaft of which said gear 15 is mounted, or by any other suitable power and transmission means. Freely mounted at the periphery of the disc 13 are a number of wheel shafts 19. In this embodiment, there are ten wheels, one of which however mounts an eraser while the other nine are properly type wheels; hence the shafts and all the elements associated with each wheel will be identified by affixing to the numeral identifying the element a second numeral, comprised between 1 and 10, identifying the particular wheel to which the element appertains. Thus the shafts will be 19₁, 19₂ . . . 19₁₀. The shafts have at their upper ends universal joints 21₁ . . . 21₁₀ which connect them to wheel spindles 20₁ . . . 20₁₀, to which there are keyed or otherwise rigidly connected wheels 22₁ . . . 22₁₀. The type wheels, which are numbered from 2 to 10, are controlled as follows. On each type wheel spindle 20 there is freely mounted a forked collar 23 embodying a pin 24 engaging recesses in a member 25, herein disclosed as consisting of two parallel rigid bars, which is pivoted to an upright 26 rigid with the disc 13. The end of each pivoted member 25 opposite the corresponding type wheel 22 also is recessed and engaged by another pin 27 attached to a stud 29. Each of these latter is vertically reciprocable with respect to the disc 13. A resilient member 28, herein disclosed as a tension spring attached to the disc 13 and the pivoted member 25, or any other suitable means, constantly urges each wheel to its outermost or operative position. It is to be noted that in the embodiment herein illustrated, when a wheel is in its operative position, the corresponding spindle is vertical and hence the types carried by the wheel are also vertical. Such a relationship however is only optional. The above mounting arrangement of the wheels 22 is of course only a preferred one, and could be varied in a great number of ways without departure from the invention. In fact the eraser wheel, which is wheel 22₁, is controlled in a somewhat different manner which will be later set forth and is illustrated in Fig. 8 for reasons of design convenience.

The cycloidal motion of the type wheels 22₂ to 22₁₀ is effected by keying to each shaft 19 at the lower end thereof a pinion 30 meshing with a pinion 32 keyed to a spindle 18 freely rotatable with respect to the disc 13, which spindle 18 also mounts a planetary pinion 31. The planetary

pinions 31₂ . . . 31₁₀ all mesh with a sun gear 33. However the pinion 30₁ mounted on the shaft of the eraser wheel meshes directly with said sun gear 33, and there are only nine spindles 18. The sun gear 33 is freely mounted, through the interposition of a ball bearing 17 or other friction reducing element on a block 34 rigid with the disc 13 and the main shaft 12. A portion of this latter is enclosed in a square box 35 rigid with the frame of the machine. Another gear 36 is rigid with the sun gear 33 and forms the connection thereof with the selector mechanism, as will be set forth later.

To avoid complicating the drawings, only one wheel, and precisely 22₇, has been shown in Fig. 1. The parts of the disc 13 not adjacent said wheel have been broken off to show the pinions associated with the type wheel 22₈ and with the eraser wheel 22₁ and their engagement with the sun gear 33. The portions of the sun gear not underlying the two last mentioned wheels have been broken off to show the operative portion of the gear 36, and, below this latter, the remaining operative mechanism of the machine. In Fig. 2 there are shown type wheels 22₄, 22₇, and 22₉. Wheel 22₄ is shown in its writing position and 22₇ and 22₉ in their inoperative positions.

Normally the sun gear 33 is prevented from rotating by the selector mechanism later to be described; therefore the planetary pinions 31 and the pinion 30₁ rotate about their axes as well as revolve with the disc 13 about the main shaft 12. The planetary pinions 31 cause rotation of the pinions 30 and hence of the type wheels 22₂ . . . 22₁₀, while the eraser wheel rotates in a direction opposite to that of the type wheels. Whenever the sun gear is set free by the selector mechanism, it is set in motion by the planetary pinions 31 and the pinion 30₁ rotates at the same speed as the disc 13, and the wheels, while still revolving with the disc 13, no longer rotate about their axes, until the sun gear is again stopped.

Mounted below the sun gear 33, in the preferred embodiment of Figs. 1 to 8, are ten rings 37₁ . . . 37₁₀, one for each wheel. These rings have been numbered from the inside to the outside so that the first ring, associated with the eraser wheel, is the smallest and innermost. Such a relationship however has been set forth merely by way of example, and can be changed as desired. Each ring is rigidly attached to two diametrically opposed studs 38, 39. The studs 38 have the function of supporting the rings, and will be called "supporting studs," while the studs 39 are associated with the mechanism for the advancement of the platen and will be called "spacing studs." Each stud 29 is associated with the ring 37 corresponding to the wheel to which said stud 29 is associated, and has rigid with the lower end thereof a horizontal portion carrying a free tangential roller 40 which rides on the corresponding ring 37 during the revolution of the disc 13, as the rings themselves are stationary. The studs 38 and 39 of each ring 37 are freely slidable up and down in corresponding bores of a perforated bar 41 fixed to the frame, which bar 41, in the embodiment illustrated, is solid with the box 35. Each stud 38 terminates with a wedge-shaped foot 42 resting on an inversely wedge-shaped head 43 of a lever 44 pivoted at 45 to the frame 10 and normally maintained in the position shown in the drawing and urged to that position when displaced therefrom by a spring 46. The levers 44 are associated in couples the components of which are substantially symmetrically shaped and face

each other, but are in different planes, as shown in the case of levers 44₈ and 44₉ in Figs. 1 and 2. Between the two levers 44 of each couple there is positioned a T-shaped element 47 which is thick enough to engage either lever 44 of the couple when it is swung in one or the other direction. Thus each element 47 is identified by affixing thereto the two numerals corresponding to the two levers 44 with which it cooperates. Only one such element, and precisely 47_{8,5} has been illustrated in Figs. 1 and 2. Two of said elements, and precisely 47_{9,10} and 47_{7,8} are rigidly attached each to a shaft 48 pivoted in the frame 10. Each shaft 48 has rigid therewith a toothed sector 50 meshing with another toothed sector 49 mounted on a shaft 45. The remaining T-shaped elements 47, and precisely 47_{6,5}, 47_{4,3}, and 47_{2,1} are directly attached to the corresponding shafts 45. All shafts 45 also carry the actuating keys 52, which are wider than conventional typewriter keys, and are rotated in one or the other direction by depressing the left or the right side of the corresponding key. It is seen that the shafts 45 take the place of conventional key-levers, and will therefore be designated as key-shafts; and the reason why two of them in this embodiment (their number could of course be varied) do not directly mount the T-shaped elements 47 but control them through the aforementioned toothed sectors and shafts 48 is to allow of a more widely spaced distribution of the actuating keys about the actuating keyboard, which permits of a more convenient fingering of the keyboard. Since each actuating key and the corresponding shafts 45 and 48 and element 47 are associated with two type wheels, they have been identified by affixing to their numeral the two numerals appertaining to the two wheels associated therewith, the first affixed numeral pertaining to the wheel actuated by depressing the wheel to the left. It is seen that upon depressing one side of an actuating key, the corresponding T-shaped element 47 will swing clockwise or counterclockwise, will engage one of the levers 44, will disengage the wedge-shaped head 43 thereof from the foot 42 of a stud 38, and hence will allow the corresponding ring 37 to fall. Therefore the corresponding roller 40 and stud 29, being no longer supported by the ring, will fall, the pivoted member 25 will swing to the position indicated in the case of 25₄ in Fig. 2 and the corresponding wheel will swing outwardly about its universal joint to go into the operative or writing position, the power for such motion being furnished by resilient members 28.

The return of the rings 37 to their uppermost position, and hence of the wheels 22 to their inoperative position, is effected automatically as follows. Two camshafts 53 and 54 are disposed underneath the rings 37 along a diameter of the same. Each camshaft has integral or rigid therewith one cam for each ring, so that two diametrically opposite cams are associated with each ring. Each camshaft is journaled in the frame 10 of the machine and carries a bevel gear 55, 56 meshing with a bevel gear 57 keyed to the main shaft 12 of the machine. Hence the camshafts 53, 54 are maintained in continuous rotation, each cam exactly touching the corresponding ring 37, if this latter is in its uppermost position, once at every revolution of the shaft 12; and if a ring 37 is in its lowermost position due to actuation of the corresponding wheel, the two diametrically opposite cams will return said ring to its uppermost position, wherein it will be held by the

renewed engagement of the wedge-shaped head 43 of a lever 44 with the corresponding wedge-shaped foot 42 of the stud 38 of the ring, under the action of a spring 46. The actuating keys 52 and the corresponding shafts 45 and 48 are returned to their inoperative positions, when released, by the springs 46.

The selector mechanism includes keys 60 with key-shafts 61 similar to the corresponding elements already described of the actuating keyboard. Some of those keys may likewise be provided with auxiliary shafts 62 controlled through toothed sector couplings 63, 64 as in the case of the actuating keyboard, to permit more convenient distribution and spacing of the selector keys. In the embodiment illustrated, only one such auxiliary shaft has been provided. Since the principle of operation of the selector mechanism has been set forth at length in my aforementioned U. S. Patent 2,311,737 it will not be repeated here. It is noted that the number of actions of the selector keyboard equals the number of type characters carried on each type wheel, which in the case of the embodiment illustrated, has been set by way of example at eight. The type of key herein illustrated produces a double action, since it can be depressed on either side; hence four selector keys will suffice. Each type on a wheel will be identified by a Roman numeral, hence each key 60 will be identified by two Roman numerals, those which correspond to the two types it can put in phase, the numeral of the type put in phase by depressing the key to the left being written first. In the particular embodiment shown in the drawings, there are four selector keys 60_{I,III}, 60_{II,V}, 60_{IV,VII}, 60_{VI,VIII}. Generally speaking, the selection, that is the putting in phase of one particular type on the wheel to be actuated, is carried out by causing the sun gear 33 to rotate by a limited amount, such that, multiplied by whatever gear ratio obtains in the connection between the sun gear and the wheel shafts 19, it will cause each wheel to rotate by the angle between the character last typed and that which is to be typed. All of these angles are obviously multiples of an elementary angle, corresponding to the distance of two adjacent types and which in this embodiment is 45°, since there are eight types to a wheel. In my aforementioned previous patents means have been described for manually rotating the sun gear by depressing a selector key. This invention follows a different principle. The selector mechanism, which is generally indicated at 65 in Fig. 1, is shown in detail in Figs. 5 and 6. The gear 36 rigid with the sun gear 33 meshes with a gear 68 keyed to a shaft 69 freely mounted in the frame 10. Keyed to the same shaft 69 is a spiral gear 70 meshing with another spiral gear 71 keyed to a selector shaft 72 which is at right angles to the shaft 69. Keyed to the shaft 72 is also a selector drum 73, illustrated in Fig. 6. This drum has formed or rigidly mounted in the peripheral surface thereof a number of selector teeth 74. The teeth which are disposed in the same circumference of the drum, that is in the same plane perpendicular to the selector shaft, will be considered as constituting a "set." Then each set has four teeth angularly offset from one another by 90°, and there are as many sets as there are types on each wheel, that is in this case eight. As shown in Fig. 6, any two successive sets occupy adjacent portions of the length of the drum, are angularly offset by one eighth of 90°, that is by 11° 15', and are other-

wise identical. The first and last set are relatively offset by the same angle. Formed in the right hand side of the drum (as viewed in Fig. 6), or rigid therewith is a lock wheel 67 embodying as many lock teeth 75 as all the selector teeth of the eight sets combined, that is in this case thirty-two in all, the angular interval of adjacent lock teeth 75 being 11° 15'. The teeth are all shaped as illustrated in Fig. 5 to provide locking engagement with other elements which will presently be described. It may be said that the lock wheel is substantially equivalent to a selector drum the sets of teeth of which are not spaced longitudinally or staggered, but are arranged on the same circumference. The precise angular relationships above set forth are of course changeable and a matter of judicious design.

The selector drum, and hence the sun gear 33, is normally held stationary by a latch lever 76 pivoted to a rod 80 fixed to the frame 10 and provided with a stop lug 77 suitably shaped to engage any of the lock teeth 75 and normally maintained in engagement with one of them by the action of a resilient element herein disclosed as a tension spring 78 attached to the end of latch lever 76 and, at 79, to a member rigid with the frame 10. The latch lever has the shape of a bell crank lever, the branch thereof not carrying the stop lug 77 being connected to a rod 81, which is supported by said lever 76 and by an auxiliary link 82 also pivoted to rod 80. Further there are pivoted to rod 80 a number of anchor levers 83_I . . . 83_{VII}, (of which only two, 83_{II} and 83_{VII} are shown in the drawings) and precisely as many as there are character types on each wheel, that is eight in the particular embodiment herein illustrated. Each anchor lever corresponds to one set of selector teeth 74, that is, is disposed in the same plane perpendicular to the axis of the selector, and is therefore capable of engaging one of the four teeth of the corresponding set when the selector is in one of four predetermined angular positions angularly offset by 90° with respect to one another. Since, as will be seen presently, each set of four selector teeth is associated with the types having the same Roman numeral on the wheels 22, the four teeth of each set will be identified by the same Roman numeral.

Each of the selector keys 60 is operatively associated with two anchor levers 83 by means of the following link mechanism. Each keyshaft 61 (or auxiliary shaft 62 as the case may be) has rigidly attached thereto a strap 84 to which is attached a pin 85. Each end of this latter bears on the short branch of a bell crank lever 86, all of said levers 86 being pivoted to a rod 87 fixed to the frame 10. Each lever 86 has a portion 88 to which there is attached a tension spring 89 which is also connected at 90 to a member fixed to the frame 10. The end of the long branch of each bell crank lever 86 has therein a slot 91 in which rides a pin 92 fixed to a slide 93. Each slide 93 is guided for reciprocable motion by the engagement of a slot 94 therein with a pin 95 fixed to the frame 10 as well as by a guide member 96 rigid with the frame 10. Each slide 93 is provided with a lug 97 and a shoulder 98 followed by a stepped-down end portion 99.

When it is desired to operate the selector, a key 60 is depressed to the right or left as desired. Let us suppose that it is desired to bring in phase on the type wheels 22 those types the position of 75 which is identified by the Roman numeral II.

Then the key 60_{II,V} indicated in Figs. 5 and 6 will be depressed to the left. The keyshaft 61_{II,V} rotates also to the left, the left end of pin 85 is depressed, and the bell crank lever 86_{II} is swung clockwise, as viewed in Fig. 5, from the position wherein it is normally held by spring 89_{II}. This causes slide 93_{II} to move to the right as viewed in Fig. 5. The proportions of the slide are such that it may move by a small space before its shoulder 98_{II} engages the heel 100_{II} of the anchor lever 83_{II}. By this small displacement the lug 97_{II} is brought out of engagement with the head 101_{II} of the anchor lever, so that as the slide 93_{II} proceeds to the right and its shoulder engages the heel of the anchor lever, this latter is free to swing clockwise as viewed in Fig. 5. By so swinging the anchor lever reaches a position wherein a stop lug 103_{II} formed therein opposite the heel 100_{II} would engage one of the four selector teeth 74_{II} in one of four angular positions of the selector drum 73 offset by 90° with respect to one another. Normally however the selector drum 73 will not be in any of said four angular positions at the moment the anchor lever 83_{II} is lowered, the exception occurring when the character last typed was one of those which occupy the same angular position on the respective wheels 22 as the character to be typed occupies on its wheel, that is in this case the position identified by the Roman numeral II. After the anchor 83_{II} has been completely swung as set forth, the slide 93_{II} continues to move to the right, and after a certain time the shoulder 98_{II} engages the rod 81 and depresses it. As a result, the latch lever 76 is swung clockwise, as viewed in Fig. 5, about the pivot rod 80, and its stop lug 77 goes out of engagement with the lock teeth 75. Now the selector drum is free to rotate. Hence the sun gear 33 is also free, and it is immediately drawn into rotation by the planetary pinions 31 and the pinion 30_I which cease to rotate about their own axes, but continue to revolve with the disc 13. Rotation of the sun gear 33 causes a change of the types in phase, as fully explained in my aforementioned U. S. Patent 2,311,737, and this rotation continues until one of the four selector teeth 74_{II} comes into engagement with the stop lug 103_{II} of the anchor lever 83_{II}. The rotation of the selector drum 73 is therefore at the most 90°. The total gear ratio of the various couplings between said drum and the sun gear is suitably calculated, in relation to the gear ratio between the sun gear and planetary pinions, and between these latter and the pinions 30, so that when one of the four selector teeth 74_{II} engages the stop lug 103_{II} and the drum 73 stops, all of the character types identified by the numeral II will be in phase, and the same relationship will obtain for all other Roman numerals. The determination of such gear ratios is merely a matter of judicious design. When the key 60_{II,V} is released, the above described motions are reversed under the action of the springs 78 and 89_{II}. The latch lever 76, which had been the last to be actuated during the operative stroke of the slide 93_{II}, is the first to be released during the return stroke thereof, so that the stop lug 77 engages once again one of the lock teeth 75 to lock the selector drum 73 and hence the sun gear 33 in the position they have assumed until another selector key is manually actuated. As set forth hereinbefore the number and pitch of the lock teeth 75 is such that a positive engagement will occur no matter which of its possible positions the selector drum has assumed. Thereafter the shoulder 98_{II} is brought slightly to the left of the

heel 100_{II} of the anchor lever and the lug 97_{II} engages the head 103_{II} of the anchor lever and swings this latter counterclockwise, as viewed in Fig. 5, to its inoperative position until the heel 100_{II} contacts the stepped down portion 99_{II} of the slide 93_{II}, whereby the anchor lever 83_{II} is brought entirely out of the path of the selector teeth 74, and another anchor lever may be actuated if so desired to rotate the selector drum once again and bring another set of characters in phase. Any rotation of the selector drum by 90° or a multiple thereof would cause one or more complete rotations of all type wheels 22 about their axes, and can therefore be disregarded.

It is to be noted, however, that since the speed of the shaft 12 is high and a complete revolution thereof is accomplished in a very short time, the typist has no way of knowing at what point of said revolution he or she depresses a selector key. Should the selector drum be in motion at the time the type wheel that has been actuated passes the writing point, said wheel would not be rotating about its axis to make rolling contact with the paper, and the typewritten impression would be blurred. To avoid this, an extension 104 is formed integral or rigidly connected with latch lever 76, and said extension carries a bar 105 which extends below all the rings 37. As soon as the latch lever releases the selector drum said bar 105 rises to contact the underside of each ring 37 at one point, and during the brief instant in which the selector drum rotates, said rings cannot fall and no type wheel can be actuated.

Attached to the platen there is a rack 110, the number and pitch of the teeth whereof is so chosen that any of the desired spacings in the advancement of the platen will be a multiple of said pitch. In the embodiment illustrated, two different spacings are contemplated in the ratio of 2:3, hence they can be achieved for instance by displacing the platen by two and three teeth respectively. Both spacings can be increased by shifting a clutch, as hereinafter set forth, in which case the displacements may be by 4 and 6 teeth respectively. The rack 110 meshes with a gear 111 keyed to a shaft 112 freely journaled in the frame of the machine. The shaft 112 is in turn power-actuated under control of the actuating mechanism of the machine in the following manner. A shaft 113 is freely journaled in the frame 10 and mounts two cylinders 114, 115, of different diameter the surface of which is cut to provide a plurality of longitudinal peripheral ribs such as 116 or to which such ribs are attached in any convenient manner. Two gears 105, 106 are keyed to shaft 113, and are adapted to mesh with gears 107, 108 respectively. Each gear coupling can be established by means of a fork 120 acting on a collar 121 which is located between gears 107, 108 and is rigid therewith, the assembly of collar and gears being keyed to but slidable longitudinally with respect to a shaft 122 freely mounted in the frame 10, which shaft mounts a worm 123. Said worm meshes with worm gear 124 mounted on shaft 112. Attached to the lower end of spacing studs 39 are pins 125 which engage slots 126, 127 in one end of bell crank levers 128, 129 which are pivoted to a rod 130 fixed to the frame. The bell crank levers and the associated elements are divided into two sets indicated by different numerals because some of them cooperate with the smaller cylinder 114 and some with the larger cylinder 115. Correspondingly and for easier reading even and odd numerals are used. To the other end of bell crank levers

128, 129 there are attached pins 132, 133. Pivoted to pins 132, 133 are pawls 134, 135 provided with lugs 136, 137 normally held against levers 128, 129 by springs 138, 139. When the rings 37 are in their uppermost position corresponding to the inoperative position of the associated type wheels, the bell crank levers 128, 129 and associated elements are positioned as 128₁₀ and 129₅ in Fig. 3 and 128₁₀ in Fig. 4. When a certain wheel is to be actuated and the associated ring 37 drops to its lowermost position, the corresponding bell crank lever rotates counterclockwise, as viewed in Fig. 4, and it and its associated elements assume the position shown in Figs. 3 and 4 in the case of lever 129. During this motion the pawl 134 or 135 rides over the rib 116 of the cylinder 114 or 115 which rib happens to be next to the pawl at the moment the action takes place. In so doing, the pawl rotates somewhat in a clockwise direction as viewed in Fig. 4 while the corresponding spring 138 or 139 yields somewhat. As soon as the pawl is past the rib, the spring snaps it back to where its lug 136 or 137 bears against the corresponding lever. Thereafter before one revolution of the shaft 12 has been completed, the ring 37 which had been actuated is raised again by the action of the camshafts 53, 54. The corresponding wheel 22 is brought back to its inoperative position, inasmuch as the desired character impression has already been completed. As the ring 37 is raised, the bell crank lever 128 or 129 rotates in a clockwise direction, as viewed in Fig. 4, and the pawl attached thereto engages the rib 116 over which it has previously ridden and rotates the cylinder 114 or 115 thereby rotating the shaft 113 by an angle corresponding to the peripheral distance between two consecutive ribs. The rotation of the shaft 113 causes advancement of the platen 11 through the gear connections hereinbefore described. This advancement will correspond to the larger or the smaller spacing contemplated in the machine according to whether it was the cylinder 114 or the cylinder 115 that was acted upon. Hence all the type characters for which a larger spacing is desired will be grouped on the type wheels the rings 37 of which are operatively associated with the cylinder 114, and the characters for which a smaller spacing is desired will be grouped on the wheels the rings 37 of which are operatively associated with the cylinder 115.

The overall gear ratio of the connections between shaft 113 and rack 110 may be changed by acting on the fork 120 to shift the clutch collar 121 to establish the gear coupling 105-107 or 106-108 as desired. This will change both the larger and the smaller spacing proportionally and leave the ratio between the two spacings unvaried to achieve a script more or less compact but with the same balance between wider and narrower characters. A special push-key 140 is provided for this purpose which is rigid with a rod 141 pivoted at 142 to one branch of a bell crank lever 143 pivoted at 144 to the frame 10, the other branch of said lever 143 being solid or rigid with the fork 120. It is clear that if desired more than two overall gear ratios could be provided and established through means similar to those described. Also instead of two different spacings, more could be provided by having more than two cylinders like the cylinders 114, 115 and associated elements, and by grouping the characters on the wheels and the rings 37 accordingly. Any such multiplications of the devices herein described would not involve departure from this invention.

A back space key 150 is also provided, which is of the same type as the actuating keys hereinbefore described, except that in the embodiment shown it has been found convenient to attach to its key-shaft 151 a T-shaped lever 152 which is not perpendicular to the key-shaft but is at a slant with respect therewith. The wings of said T-shaped lever have therein seats 153, 154 engaged by links 155, 156 pivoted to levers 157, 158 pivoted on a rod 159 fixed to the frame. Said levers 157, 158 have pawls 161, 162 which carry lugs 163, 164 respectively maintained against said levers by springs 165, 166. Said pawls cooperate with cylinders 115, 114 in the same manner as the pawls 134, 135 respectively, except that they cause rotation of the shaft 113 in a direction opposite to that caused by the last mentioned pawls, and thus produce back spacing. A larger or smaller back spacing is produced by depressing the key 150 to the right or left, according to whether the character last typed was one of the wider or narrower group.

In view of the construction of the machine, it is a simple matter, requiring no skill on the operator's part, to change all of the types and insert types of a different size and/or style. For instance, the type wheels may be connected to their spindles through a conventional key and key-way arrangement and locked thereon by set screws or other locking means. The operator may loosen said locking means, and replace all of the type wheels bodily without interfering with any other parts of the device. Thus the two gear ratios for the advancement of the platen hereinbefore described will permit use of two different sizes of types with the same proportion of typescript, or will produce more compact or more sparse typescript with one size of types. Two different typescripts can also be obtained from the same machine without changing any parts, by the arrangement of Fig. 10, that is by providing on each type wheel spindle 20 two type wheels 205 and 206 carrying the same characters but in two different sizes and/or styles. Means may be provided for selecting which of the two wheels will be operative, and said means may be, for instance, analogous to the shift mechanism of a conventional typewriter whereby a shiftable platen 207 may be shifted from the full line position of Fig. 10, wherein it cooperates with wheel 205, to the phantom line position, wherein it cooperates with wheel 206. Concurrently with the shifting of the platen, if the two alphabets differ in size, the spacing may be changed. In another modification, shown in Fig. 11, each wheel spindle 20 carries a number (as herein disclosed, three) of identical type wheels 208, each cooperating at all times with a platen 209 of reduced size. Due to the smaller size of the platens, the type wheels are concave at the periphery, as indicated at 210, and the types are correspondingly shaped. A continuous roll of paper, conveniently perforated for separation, may be caused to run over all the platens. Thus the machine will produce a number of identical originals or a number of equal-sized originals in different alphabets at the same time.

In the embodiment illustrated, as will be obvious from an inspection of the drawings, the four outer rings 37, numbered 10 to 7, are associated with the smaller cylinder 114; hence these four rings will be associated with the type wheels carrying the characters to which a wider spacing is assigned. The six inner rings numbered 1 to 6 are associated with the larger cylinder 115

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and therefore with the type wheels carrying the smaller spacing characters, with the exception of ring 37₁ which is associated with the eraser wheel. The stud 39₁ attached to ring 37₁ is not provided with any element corresponding to pins 125, and likewise there are no elements associated with ring 37₁ corresponding to levers 128, 129 and pawls 134, 135. Thus ring 37₁ when returned to its uppermost or inoperative position does not cause advancement of the platen, permitting of a prolonged erasing action.

A blank space can be obtained in the line of typing by depressing a key 160. This latter produces only one width of spacing in the embodiment herein described, though it could be modified to produce more than one width of spacing. The spacing mechanism controlled by said key 160 comprises, as illustrated in detail in Fig. 7, a yoke piece 167 supported by two spaced studs 168 vertically slidable in guides 169 fixed to the frame 10 of the machine. To the lower end of studs 169 there is attached a link 170 carrying a pin 171 which engages a slot 172 in a lever 173 pivoted to the frame 10 at 174. Pivoted to the lever 173 near the end thereof opposite the slot 172 is a pawl 175, similar to the pawls 134, 135 previously described and which similarly cooperates with the smaller cylinder 114. The link 170 has a wedge-shaped foot 176 normally resting on a wedge-shaped head 177 of a member 178 pivoted at 179 to the frame 10. A cam 180 rigid with the camshaft 53 in the rotation of this latter exactly touches the underside of the yoke 167. The key 160 is attached to a key-lever 181 pivoted at 182 to the frame 10 and having a lug 183 adapted to engage a portion 184 of the member 178. This latter is normally maintained in the position of Fig. 7 by a spring 185 attached to the frame 10 which causes a portion of the member 178 to bear against a fixed stop 186, while the key-lever 181 bears against a fixed stop 187. When the key 160 is depressed, the key-lever 181 swings downwardly, depressing the portion 184 of the lever 178 and causing this latter to swing clockwise as viewed in Fig. 7. Then the head 177 no longer supports the foot 176, and the yoke 167 is allowed to drop carrying therewith the link 170 while the studs 168 slide in the guides 169. The pin 170 then causes the lever 173 to swing clockwise, as viewed in Fig. 7, and to assume the position shown therein in broken lines. In so doing the pawl 175 rides over one of the ribs 116 of the cylinder 114, swinging somewhat about its pivot, but as soon as the pawl is past said rib a spring 188 snaps it back to its normal position. Subsequently, as the camshaft 53 rotates, the cam 180 engages the underside of the yoke 167 and lifts the same, with its attached parts, to the normal uppermost position, where it becomes locked by the fact that the head 177 is brought by the spring 185 once again under the foot 176. Meanwhile the lever 173 is returned to the position indicated in full lines, carrying with it the pawl 175 which cannot swing counterclockwise because it engages the lever 173 at 189, and therefore said pawl engages the rib 116 and rotates the cylinder 114 by an angle corresponding to the interval of its adjacent ribs. Rotation of the said cylinder causes advancement of the platen 11 in the manner already set forth. As soon as the key 160 is released, a spring 190 returns it to its inoperative position. In the embodiment illustrated, the key 160 can only advance the platen by a distance equal to the wider of the two typing intervals

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provided, but if the pawl 175 were to engage the cylinder 115 instead, the advancement of the platen would correspond to the narrower interval. It would be possible to provide two spacing keys, or a single double action key controlling two pawls engaging each one of the two aforementioned cylinders, whereby both spacing intervals could be obtained at will, or even a greater number of intervals could be obtained in an analogous manner, and such duplication or multiplication would not involve departure from the invention.

It has already been stated that there are 10 type wheels, and that only nine of them, in the instant embodiment, carry types, while the first one carries instead an eraser. The eraser may be of a conventional type, that is may operate by abrasion, or it may comprise an absorbent carrying a suitable chemical agent, in which latter case means may be provided for automatically supplying the agent to the eraser wheel. The particular kind of eraser is immaterial as far as the invention is concerned. Wheel 22₁ is controlled in the same general manner as the other wheels. However in the embodiment illustrated, the eraser is understood to comprise an abrasive substance constituting the periphery of the wheel 22₁, and this necessitates some structural differences in the control of this wheel. In correspondence to the wheel 22₁ (see Fig. 8), a stud 192 is mounted for vertical reciprocation in the disc 13 similarly to the studs 29 hereinbefore described. A bracket 193 is rigidly attached to the underside of the disc, and has pivoted thereto a lever 194 one end of which has a forked recess engaged by a pin 195 attached to stud 192, while the other end carries a free tangential roller 196 which rides on ring 37₁. To the upper end of stud 192 there is attached another pin 197 engaging a recess in a bell crank lever 198 pivoted at 199 to the disc 13 and constantly urged to swing clockwise from the position of Fig. 8 by a resilient element 200.

When the ring 37₁ is allowed to fall, due to actuation of the key 52_{2,1} to the right, the resilient element 200 swings the lever 198 clockwise, while the stud 192 rises and the roller 196 follows the ring 37₁. Thus the eraser wheel 22₁₀ is swung outwardly to its operative position. Since as already set forth wheel 22₁ preferably rotates about its axis in a direction opposite to that of the type wheels, when the eraser constituting the periphery of wheel 22₁ contacts the paper at the typing point, it does not roll thereon but on the contrary exerts a rubbing action which produces erasure of any character which may have been typed at that point of the paper. It is immaterial which types are in phase when the eraser wheel is actuated, since the eraser occupies the entire periphery of the wheel; hence no selector key need be depressed when erasing. The machine is provided with a means for coating the types, prior to their rolling contact with the paper, with ink or a suitable paste or other composition whereby said types may leave their impression on the paper. In the instant embodiment an ink pad 191 has been provided, which is kept supplied with ink in any convenient manner, and which is positioned closely to the point of typing and preceding the same in the direction of rotation of the disc 13. When a type wheel is actuated, the type in phase thereon rolls over the ink pad 191 immediately before contacting the paper, and thus picks up a coating of ink. In place of an ink pad, a roller could be used, and

means could be provided for rotating said roller stepwise every time it is contacted by a type wheel. For instance, the ink roller could be idle and be rotated by contact with a type wheel. At any rate, a peripheral portion of the ink roller could penetrate into a reservoir of ink and pick up a supply of the same as the ink roller rotates stepwise. The ink could be of any suitable thickness, ranging from extreme fluidity to the consistency of a paste. It is to be noted that a regular typewriter ribbon could be employed, if so desired, in place of an ink pad or roller, without departure from this invention. The ribbon would rise in front of the paper platen at the point and moment of typing and be pressed by the actuated type wheels against the paper to leave thereon the desired typing impression, and could be advanced stepwise in synchronism with the platen by any suitable means as are already known in the typewriter art. When using a conventional ribbon, erasure of the type herein described would be rendered possible, simply by preventing the ribbon from rising to the point of typing when the eraser wheel is actuated.

When using an ink pad or roller, it is necessary to prevent the ink pad 191 from contacting, picking up a coating of ink, and smearing the paper. One preferred way of achieving this result is illustrated in Figs. 8 and 9. A bridge 201 is provided fixed to the frame 10 and extending circumferentially for a sufficient space parallel to the ring 371 in correspondence of the ink pad 191. The roller 196 is made thick enough as to engage both the ring 371 and the bridge 201. Normally the ring 371 is at the same height as the bridge 201. However, when said ring falls due to actuation of the eraser key, the roller 196 also falls below the level of the bridge. This latter is provided with ramps 202 leading from its level to the lowermost level that is assumed by the ring 371. Therefore when the eraser wheel approaches the position of the ink pad, the roller 196 rises following the leading ramp 202 and remains at an inoperative level, corresponding to the inoperative position of the eraser wheel 221 until this latter is past the ink pad and can be safely allowed to swing outwardly to its operative position.

While I have described a preferred embodiment of my invention by way of illustration, it is understood that I am not limited to the particular devices and structures and arrangements of parts herein set forth, and that many changes, modifications, and variations may be made therein without departing from the spirit of the invention or exceeding the scope of the appended claims.

I claim:

1. In a typewriting machine of the character described, in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, a plurality of wheels operatively connected to said planetary pinions, each of a number of said wheels carrying a plurality of types and being movable between an inoperative and a writing position, and means for selectively moving any one of said wheels into the writing position; means for normally maintaining said sun gear stationary in any one of a number of angular positions whereby said planetary pinions are forced to rotate about their axes and drive said wheels with a planetary motion so that when one of the type carrying

wheels is moved into the writing position a type selectively determined among the several types carried thereby by the angular position of said sun gear will leave its impression upon the paper, and means for temporarily releasing said sun gear whereby said planetary pinions will cease to rotate about their axes and will rotate said sun gear about its axis by a pre-selected angle.

2. In a typewriting machine of the character described, in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, a plurality of wheels operatively connected to said planetary pinions, each of a number of said wheels carrying a plurality of types and being movable between an inoperative and a writing position, and means for selectively moving any one of said wheels into the writing position; means for normally maintaining said sun gear stationary in any one of a number of angular positions whereby said planetary pinions are forced to rotate about their axes and drive said wheels with a planetary motion so that when one of the type carrying wheels is moved into the writing position a type selectively determined among the several types carried thereby by the angular position of said sun gear will leave its impression upon the paper, means for temporarily releasing said sun gear whereby said planetary pinions will cease to rotate about their axes and will rotate said sun gear about its axis, and means for temporarily locking said sun gear when the same has reached a pre-selected angular position until said means for normally maintaining said sun gear stationary become once more effective.

3. In a typewriting machine of the character described, in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, a plurality of wheels operatively connected to said planetary pinions, each of a number of said wheels carrying a plurality of types and being movable between an inoperative and a writing position, and means for selectively moving any one of said wheels into the writing position; a selector shaft, means for operatively connecting said sun gear to said selector shaft, first means for normally locking said selector shaft in any one of a number of angular positions, whereby said sun gear is also locked and said planetary pinions are forced to rotate about their axes and drive said wheels with a planetary motion, so that when one of the type carrying wheels is moved into the writing position a type selectively determined among the several types carried thereby by the angular position of said selector shaft will leave its impression on the paper, means for releasing said first locking means whereby said planetary pinions will cease to rotate about their axes and will drive said sun gear and therefore said selector shaft into rotation, second means for locking said selector shaft when the same has reached a pre-selected angular position, key-controlled means for actuating said releasing means and said second locking means, and means for rendering said first locking means once more effective and said second locking means inoperative upon release of said key-controlled means.

4. In a typewriting machine of the character

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described, in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, a plurality of wheels operatively connected to said planetary pinions, each of a number of said wheels carrying a plurality of types and being movable between an inoperative and a writing position, and means for selectively moving any one of said wheels into the writing position; a selector shaft, means for operatively connecting said sun gear to said selector shaft, a lock wheel operatively connected to said selector shaft, latch means normally engaging said lock wheel to lock said selector shaft whereby said sun gear is also locked and said planetary pinions are forced to rotate about their axes and drive said wheels with a planetary motion, so that when one of the type carrying wheels is moved into the writing position a type selectively determined among the several types carried thereby by the angular position of said selector shaft will leave its impression upon the paper, means for disengaging said latch means from said lock wheel whereby said planetary pinions will cease to rotate about their axes and will drive said sun gear and therefore said selector shaft into rotation, a selector member operatively connected to said selector shaft and carrying a plurality of sets of selector elements, a plurality of stop members each associated with one of said sets and actuable to an operative position wherein it is engageable by the elements of the associated set, means for selectively actuating any one of said stop members to its operative position, and means for returning the actuated stop member to its normal inoperative position after said latch means have re-engaged said lock wheel.

5. In a typewriting machine of the character described, in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, a plurality of wheels operatively connected to said planetary pinions, each of a number of said wheels carrying a plurality of types and being movable between an inoperative and a writing position, and means for selectively moving any one of said wheels into the writing position; a selector shaft, means for operatively connecting said sun gear to said selector shaft, a wheel operatively connected to said selector shaft and carrying a plurality of lock teeth, latch means, resilient means urging said latch means into engagement with said lock teeth to maintain said selector shaft in an angular position determined by the particular lock tooth thus engaged, whereby said sun gear is also locked and said planetary pinions are forced to rotate about their axes and drive said wheels with a planetary motion, so that when one of the type carrying wheels is moved into the writing position a type selectively determined among the several types carried thereby by the angular position of said selector shaft will leave its impression upon the paper, a selector cylinder operatively connected to said selector shaft and carrying a plurality of longitudinally spaced sets of selector teeth, a plurality of stop members each associated with one of said sets and actuable to an operative position wherein it is engageable by the selector teeth

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of the associated set, resilient means urging said stop members to an inoperative position, and key-controlled means for disengaging said latch means from said lock teeth and for actuating a pre-selected stop member to its operative position, whereby said planetary pinions cease to rotate about their axes and drive said sun gear and therefore said selector shaft into rotation until the actuated stop member is engaged by one of the selector teeth of the associated set, said latch means engaging a lock tooth and the actuated stop member returning to its inoperative position upon release of said key-controlled means.

6. In a typewriting machine of the character described, in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, a plurality of wheels operatively connected to said planetary pinions, each of a number of said wheels carrying a plurality of types and being movable between an inoperative and a writing position, and means for selectively moving any one of said wheels into the writing position; a selector shaft, means for operatively connecting said sun gear to said selector shaft, a wheel operatively connected to said selector shaft and carrying a plurality of lock teeth, latch means, resilient means urging said latch means into engagement with said lock teeth to maintain said selector shaft in an angular position determined by the particular lock tooth thus engaged, whereby said sun gear is also locked and said planetary pinions are forced to rotate about their axes and drive said wheels with a planetary motion, so that when one of the type carrying wheels is moved into the writing position a type selectively determined among the several types carried thereby by the angular position of said selector shaft will leave its impression upon the paper, a selector cylinder operatively connected to said selector shaft and carrying a plurality of longitudinally spaced sets of selector teeth, the total number of selector teeth being equal to the number of lock teeth and each selector tooth corresponding to a lock tooth, a plurality of stop members each associated with one of said sets and actuable to an operative position wherein it is engageable by the selector teeth of the associated set, resilient means urging said stop members to an inoperative position, and key-controlled means for disengaging said latch means from said lock teeth and for actuating a pre-selected stop member to its operative position, whereby said planetary pinions cease to rotate about their axes and drive said sun gear and therefore said selector shaft into rotation until the actuated stop member is engaged by one of the selector teeth of the associated set, said latch means engaging the lock tooth corresponding to the selector tooth engaging the actuated stop member and the actuated stop member returning to its inoperative position upon release of said key-controlled means.

7. In a typewriting machine of the character described, in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, a plurality of wheels operatively connected to said planetary pinions, each of a number of said

wheels carrying a plurality of types and being movable between an inoperative and a writing position, and means for selectively moving any one of said wheels into the writing position; a selector shaft, means for operatively connecting said sun gear to said selector shaft, a wheel operatively connected to said selector shaft and carrying a plurality of lock teeth, latch means, resilient means urging said latch means into engagement with said lock teeth to maintain said selector shaft in an angular position determined by the particular lock tooth thus engaged, whereby said sun gear is also locked and said planetary pinions are forced to rotate about their axes and drive said wheels with a planetary motion, so that when one of the type carrying wheels is moved into the writing position a type selectively determined among the several types carried thereby by the angular position of said selector shaft will leave its impression upon the paper, a selector cylinder operatively connected to said selector shaft and carrying a plurality of longitudinally spaced sets of selector teeth, a plurality of stop members each associated with one of said sets and actuable to an operative position wherein it is engageable by the selector teeth of the associated set, a plurality of control members each associated with one of said stop members and movable between an inoperative and an operative position, resilient means urging said control members to their inoperative position, and key-controlled means for selectively actuating any one of said control members to its operative position, said control member when so actuated actuating the associated stop member to its operative position and subsequently disengaging said latch means from said lock teeth whereby said planetary pinions cease to rotate and drive said sun gear and therefore said selector shaft into rotation until the actuated stop member is engaged by one of the selector teeth of the associated set, said control member when returned to its inoperative position upon release of said key-controlled means allowing said latch means to engage a lock tooth and subsequently returning the actuated stop member to its inoperative position.

8. In a typewriting machine of the character described, in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, a plurality of wheels operatively connected to said planetary pinions, each of a number of said wheels carrying a plurality of types and being movable between an inoperative and a writing position, and means for selectively moving any one of said wheels into the writing position; a selector shaft, means for operatively connecting said sun gear to said selector shaft, a wheel rigidly mounted on said selector shaft and carrying a plurality of lock teeth, a latch lever, resilient means urging said latch lever into engagement with said lock teeth to maintain said selector shaft in an angular position determined by the particular lock tooth thus engaged, whereby said sun gear is also locked and said planetary pinions are forced to rotate about their axes and drive said wheels with a planetary motion, so that when one of the type carrying wheels is moved into the writing position a type selectively determined among the several types carried thereby by the angular position of said selector

shaft will leave its impression upon the paper, a selector cylinder rigidly mounted on said selector shaft and carrying a plurality of longitudinally spaced sets of selector teeth, the angle between successive selector teeth of the same set corresponding to a complete rotation of the aforementioned wheels about their axis, the total number of selector teeth being equal to the number of lock teeth and each selector tooth corresponding to a lock tooth, a plurality of stop levers each associated with one of said sets and actuable to an operative position wherein it is engageable by the selector teeth of the associated set, a plurality of slides each associated with one of said stop levers and reciprocable between an inoperative and an operative position, resilient means urging said slides to their inoperative positions, and key-controlled means for selectively actuating any one of said slides to its operative position, said slide when so actuated engaging the associated stop lever and swinging the same to its operative position and subsequently acting upon a member connected to said latch lever to disengage this latter from said lock teeth whereby said planetary pinions cease to rotate and drive said sun gear and therefore said selector shaft into rotation until the actuated stop lever is engaged by one of the selector teeth of the associated set, said slide when returned to its inoperative position upon release of said key-controlled means allowing said latch lever to engage the lock tooth corresponding to the selector tooth engaging the actuated stop lever and subsequently returning the actuated stop lever to its inoperative position.

9. In a typewriting machine of the character described, in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, a plurality of wheels operatively connected to said planetary pinions, each of a number of said wheels carrying a plurality of types and being movable between an inoperative and a writing position, and means for selectively moving any one of said wheels into the writing position; a selector shaft, means for operatively connecting said sun gear to said selector shaft, first means for normally locking said selector shaft in any one of a number of angular positions, whereby said sun gear is also locked and said planetary pinions are forced to rotate about their axes and drive said wheels with a planetary motion, so that when one of the type carrying wheels is moved into the writing position a type selectively determined among the several types carried thereby by the angular position of said selector shaft will leave its impression on the paper, means for releasing said first locking means whereby said planetary pinions will cease to rotate about their axes and will drive said sun gear and therefore said selector shaft into rotation, second means for locking said selector shaft when the same has reached a pre-selected angular position, key-controlled means for actuating said releasing means and said second locking means, means for rendering said first locking means once more effective and said second locking means inoperative upon release of said key-controlled means, and means for maintaining said means for moving the wheels into writing position inoperative while said sun gear rotates.

10. In a typewriting machine of the character

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described, in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, a plurality of wheels operatively connected to said planetary pinions, each of a number of said wheels carrying a plurality of types and being movable between an inoperative and a writing position, and means for selectively moving any one of said wheels into the writing position; a selector shaft, means for operatively connecting said sun gear to said selector shaft, a lock wheel operatively connected to said selector shaft, latch means normally engaging said lock wheel to lock said selector shaft whereby said sun gear is also locked and said planetary pinions are forced to rotate about their axes and drive said wheels with a planetary motion, so that when one of the type carrying wheels is moved into the writing position a type selectively determined among the several types carried thereby by the angular position of said selector shaft will leave its impression upon the paper, means for disengaging said latch means from said lock wheel whereby said planetary pinions will cease to rotate about their axes and will drive said sun gear and therefore said selector shaft into rotation, a selector member operatively connected to said selector shaft and carrying a plurality of sets of selector elements, a plurality of stop members each associated with one of said sets and actuable to an operative position wherein it is engageable by the elements of the associated set, a plurality of shafts each associated with two of said stop members and rotatable by a limited amount in either direction, the rotation of each shaft in one direction actuating one of the two associated stop members to its operative position and the rotation of the same shaft in the other direction similarly actuating the other associated stop member, a plurality of keys each mounted on one of said shafts and depressable to rotate the same in either direction, and means for returning the actuated stop member to its normal inoperative position after said latch means have re-engaged said lock wheel.

11. In a typewriting machine of the character described in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, means for selectively determining the angular position of said sun gear, and a plurality of wheels operatively connected to said planetary pinions, a number at least of said wheels carrying a plurality of types and being movable between an inoperative and a writing position; a number of elements associated with said wheels and actuable between an inoperative and an operative position corresponding respectively to the inoperative and writing positions of said wheels, means for selectively actuating any one of said elements to the operative position, means for returning any actuated element to the inoperative position, and means actuated by said elements for advancing the paper carrying roller when any actuated element is returned to the inoperative position.

12. In a typewriting machine of the character described in combination with a paper carrying roller, a continuously rotating shaft, a rotating

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member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, means for selectively determining the angular position of said sun gear, and a plurality of wheels operatively connected to said planetary pinions, a number at least of said wheels carrying a plurality of types and being movable between an inoperative and a writing position; a number of elements associated with said wheels and actuable between an inoperative and an operative position corresponding respectively to the inoperative and writing positions of said wheels, means for normally holding said elements in their inoperative position, means for selectively actuating any one of said elements to the operative position, means operatively connected to said continuously rotating shaft for returning any actuated element to the inoperative position, and means actuated by said elements for advancing the paper carrying roller when any actuated element is returned to the inoperative position.

13. In a typewriting machine of the character described in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, means for selectively determining the angular position of said sun gear, and a plurality of wheels operatively connected to said planetary pinions, a number at least of said wheels carrying a plurality of types and being movable between an inoperative and a writing position; a number of elements associated with said wheels and actuable between an inoperative and an operative position corresponding respectively to the inoperative and writing positions of said wheels, means for normally holding said elements in their inoperative position, means for selectively actuating any one of said elements to the operative position, means operatively connected to said continuously rotating shaft for returning any actuated element to the inoperative position, a rotatable shaft, at least one rotatable member operatively connected to said shaft and having projections provided at the periphery thereof, a plurality of pawls operatively connected to said elements and being actuated thereby when said elements are returned from the operative to the inoperative position to engage said projections and rotate said rotatable member and shaft by a predetermined angle, and means for operatively connecting said rotatable shaft to said paper carrying roller to advance this latter by an amount controlled by the rotation of said rotatable shaft.

14. In a typewriting machine of the character described in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, means for selectively determining the angular position of said sun gear, and a plurality of wheels operatively connected to said planetary pinions, a number at least of said wheels carrying a plurality of types and being movable between an inoperative and a writing position; a number of elements associated with said wheels and actuable between an inoperative and an operative position corresponding respectively to the inoperative and writing positions of said

wheels, means for normally holding said elements in their inoperative position, means for selectively actuating any one of said elements to the operative position, means operatively connected to said continuously rotating shaft for returning any actuated element to the inoperative position, a rotatable shaft, at least one rotatable member operatively connected to said shaft and having projections provided at the periphery thereof, a plurality of pawls operatively connected to said elements and being actuated thereby when said elements are returned from the operative to the inoperative position to engage said projections and rotate said rotatable member and shaft by a predetermined angle, means for operatively connecting said rotatable shaft to said paper carrying roller to advance this latter by an amount controlled by the rotation of said rotatable shaft, and gear shift means for varying the ratio between said rotation and the corresponding advancement of said paper carrying roller.

15. In a typewriting machine of the character described in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, means for selectively determining the angular position of said sun gear, and a plurality of wheels operatively connected to said planetary pinions, a number at least of said wheels carrying a plurality of types and being movable between an inoperative and a writing position; resilient means constantly urging said wheels to the writing position, a number of elements each associated with one of said wheels and actuatable between a restraining position wherein it holds the corresponding wheel in its inoperative position and a released position wherein it allows one of said resilient means to actuate said wheel to the writing position, locking means associated each with one of said elements for normally holding the same in the restraining position, key-controlled means for releasing any one of said locking means and thereby the corresponding element, means operatively connected to said continuously rotating shaft for returning the released element to its restraining position, means effective upon operation of the last mentioned means and release of said key-controlled means to render said locking means once again operative, and means operatively connected to said elements for advancing the paper carrying roller when any one of said elements is returned to its restraining position.

16. In a typewriting machine of the character described in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, means for selectively determining the angular position of said sun gear, and a plurality of wheels operatively connected to said planetary pinions, a number at least of said wheels carrying a plurality of types and being movable between an inoperative and a writing position; resilient means constantly urging said wheels to the writing position, a number of elements each associated with one of said wheels and actuatable between a restraining position wherein it holds the corresponding wheel in its inoperative position

and a released position wherein it allows one of said resilient means to actuate said wheel to the writing position, locking means associated each with one of said elements for normally holding the same in the restraining position, key-controlled means for releasing any one of said locking means and thereby the corresponding element, means operatively connected to said continuously rotating shaft for returning the released element to its restraining position, means effective upon operation of the last mentioned means and release of said key-controlled means to render said locking means once again operative, a rotatable shaft, at least one rotatable member operatively connected to said shaft and having projections provided at the periphery thereof, a plurality of levers operatively connected to said elements, a plurality of pawls each pivoted to one of said levers, resilient means urging each pawl to a normal position with respect to the corresponding lever and yielding when the corresponding element is released to allow the corresponding pawl to ride freely over said projections, said pawl engaging one of said projections when said element is returned to its restraining position to rotate said rotatable member and shaft by an angle corresponding to the distance between successive projections and means for operatively connecting said rotatable shaft to said paper carrying roller to advance this latter by an amount controlled by said angle.

17. In a typewriting machine of the character described in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, means for selectively determining the angular position of said sun gear, and a plurality of wheels operatively connected to said planetary pinions, a number at least of said wheels carrying a plurality of types and being movable between an inoperative and a writing position; a number of elements associated with said wheels and actuatable between an inoperative and an operative position corresponding respectively to the inoperative and writing positions of said wheels, means for normally holding said elements in their inoperative position, means for selectively actuating any one of said elements to the operative position, means operatively connected to said continuously rotating shaft for returning any actuated element to the inoperative position, first means actuated by any one of a number of said elements upon the return thereof to its inoperative position to advance the paper carrying roller by a predetermined amount, and second means actuated in the same manner by the remaining elements to advance the paper carrying roller by a different predetermined amount.

18. In a typewriting machine of the character described in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, means for selectively determining the angular position of said sun gear, and a plurality of wheels operatively connected to said planetary pinions, a number at least of said wheels carrying a plurality of types and being movable between an inoperative and a writing position; a number of elements associated with said wheels and actu-

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able between an inoperative and an operative position corresponding respectively to the inoperative and writing positions of said wheels, means for normally holding said elements in the inoperative position, means for selectively actuating any one of said elements to the operative position, means operatively connected to said continuously rotating shaft for returning any actuated element to the inoperative position, and a plurality of sets of means each actuated by any one of a number of said elements upon the return thereof to the inoperative position to advance the paper carrying roller by an amount determined by the particular set of means which is actuated.

19. In a typewriting machine of the character described in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, means for selectively determining the angular position of said sun gear, and a plurality of wheels operatively connected to said planetary pinions, a number at least of said wheels carrying a plurality of types and being movable between an inoperative and a writing position; resilient means constantly urging said wheels to the writing position, a number of elements each associated with one of said wheels and actuatable between a restraining position wherein it holds the corresponding wheel in its inoperative position and a released position wherein it allows one of said resilient means to actuate said wheel to the writing position, locking means associated each with one of said elements for normally holding the same in the restraining position, key-controlled means for releasing any one of said locking means and thereby the corresponding element, means operatively connected to said continuously rotating shaft for returning the released element to the restraining position, means effective upon operation of the last mentioned means and release of said key-controlled means to render said locking means once again operative, a rotatable shaft, a cylinder operatively connected thereto and having at least two portions of different diameter, all of said portions having equally spaced projections provided at the periphery thereof, at least two groups of pawls each associated with one of said portions, each pawl being operatively connected to one of said elements and being actuated thereby when the same is returned to the restraining position to engage a projection of the associated portion of said cylinder and rotate said cylinder and rotatable shaft by an angle depending on the particular portion to which the engaged projection appertains, and means for operatively connecting said rotatable shaft to the paper carrying roller to advance this latter by an amount controlled by said angle.

20. In a typewriting machine of the character described in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, means for selectively determining the angular position of said sun gear, and a plurality of wheels operatively connected to said planetary pinions, a number at least of said wheels carrying a plurality of types and being movable between an inoperative and a writing position; resilient means

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constantly urging said wheels to the writing position, a number of elements each associated with one of said wheels and actuatable between a restraining position wherein it holds the corresponding wheel in its inoperative position and a released position wherein it allows said resilient means to actuate said wheel to its writing position, locking means associated each with one of said elements for normally holding the same in the restraining position, a number of shafts each associated with two of said locking means and being rotatable by a limited amount in either direction, the rotation thereof in one direction releasing one of the two associated locking means and thereby the corresponding element and the rotation thereof in the other direction releasing the other associated locking means and thereby the corresponding element, a number of keys each mounted on one of said shafts and depressible to rotate the same in either direction, means operatively connected to said continuously rotating shaft for returning the released element to its restraining position, means effective upon operation of the last mentioned means and release of said keys to render said locking means once again operative, and means operatively connected to said elements for advancing the paper carrying roller when any one of said elements is returned to its restraining position.

21. In a typewriting machine of the character described in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, means for selectively determining the angular position of said sun gear, and a plurality of wheels operatively connected to said planetary pinions, a number at least of said wheels carrying a plurality of types and being movable between an inoperative and a writing position; a number of elements associated with said wheels and actuatable between an inoperative and an operative position corresponding respectively to the inoperative and writing positions of said wheels, means for normally holding said elements in the inoperative position, means for selectively actuating any one of said elements to the operative position, means operatively connected to said continuously rotating shaft for returning any actuated element to the inoperative position, means actuated by said elements for advancing the paper carrying roller when any actuated element is returned to the inoperative position, an additional element not associated with any wheel and actuatable between two positions, key-controlled means for actuating said additional element from a normal to a displaced position, means operatively connected to said continuously rotating shaft for subsequently returning said additional element to its normal position, and means operatively connected to said element for advancing the paper carrying roller when said element is returned to its normal position, whereby a blank space is produced in the line of typing.

22. In a typewriting machine of the character described in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, means for selectively determining the angular position of said sun gear, and a plurality of wheels oper-

actively connected to said planetary pinions, a number at least of said wheels carrying a plurality of types and being movable between an inoperative and a writing position; a number of elements associated with said wheels and actuable between an inoperative and an operative position corresponding respectively to the inoperative and writing positions of said wheels, means for normally holding said elements in the inoperative position, means for selectively actuating any one of said elements to the operative position, means operatively connected to said continuously rotating shaft for returning any actuated element to the inoperative position, a rotatable shaft, at least one rotatable member operatively connected to said shaft and having projections provided at the periphery thereof, a plurality of pawls operatively connected to said elements and being actuated thereby when said elements are returned to the inoperative position to engage said projections and rotate said rotatable member and shaft by a predetermined angle in one direction, at least one additional pawl actuable to engage said projections and rotate said rotatable member and shaft by a predetermined angle in the opposite direction, lever means for actuating said additional pawl, and means for operatively connecting said rotatable shaft to the paper carrying roller to displace this latter in either direction in correspondence to the direction of rotation of said rotatable shaft by an amount controlled by said rotation.

23. In a typewriting machine of the character described in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, means for selectively determining the angular position of said sun gear, a plurality of type wheels carrying each a plurality of types, an eraser wheel, each of said wheels being operatively connected to a planetary pinion and being movable between an inoperative and an operative position, and an ink dispensing member contactable by said wheels at a predetermined point in the rotation of said member when said wheels are in the operative position; a number of elements associated with said wheels and actuable between an inoperative and an operative position corresponding respectively to the inoperative and operative positions of said wheels, means for normally holding said elements in the inoperative position, means for selectively actuating any one of said elements to the operative position, means operatively connected to said continuously rotating shaft for returning any

actuated element to the inoperative position, and means for returning the element associated with the eraser wheel to its inoperative position when said element has been actuated to its operative position before the eraser wheel reaches the point wherein it would contact said ink dispensing member, said last mentioned means becoming inoperative after said point has been passed.

24. In a typewriting machine of the character described, in combination with a paper carrying roller, a continuously rotating shaft, a rotating member rigid with said shaft, a sun gear coaxial with said member, a plurality of planetary pinions rotatably mounted at the periphery of said member and meshing with said sun gear, means for selectively determining the angular position of said sun gear, and a plurality of wheels operatively connected to said planetary pinions, a number of said wheels carrying a plurality of types and being movable between an inoperative and a writing position; a number of elements associated with said wheels and actuable between an inoperative and a writing position corresponding respectively to the inoperative and writing positions of said wheels, at least one additional set of type carrying wheels each associated with one of the first mentioned type carrying wheels, carrying the same characters, but in a different size, as the associated wheel and being movable therebetween with between an inoperative and an operative position, said paper carrying roller being shiftable into any one of at least two positions in one of which it cooperates with the first mentioned type carrying wheels and in another of which it cooperates with the type carrying wheels of said additional set, means for selectively actuating any one of said elements to its operative position, means for returning any actuated element to its inoperative position, means actuated by said elements for advancing the paper carrying roller when any actuated element is returned to the inoperative position, and means for varying the amount by which the paper carrying roller is so advanced in the same proportion for all of said elements, whereby when the position of the paper carrying roller is shifted the spacings in the line of typing may be varied to correspond to the size of the types carried by the wheels with which the paper carrying roller is caused to cooperate.

ACHILLE COLOMBO.

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