

[54] PROGRAMMED VERTICAL TABULATING
DEVICE FOR TYPEWRITER

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DIG. 9

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[57] ABSTRACT

A vertical tabulating device for an electric typewriter including a carriage carrying a rotatable platen is described. The return movement of the carriage of the typewriter, with which the device is associated, is obtained by power-pulling a flexible member connected with the carriage of the typewriter. The device is characterized in that the rotational movement of the platen is actuated by a drum disposed on the carriage. The flexible member has one end fastened to the drum and normally has a section thereof wound about the aforementioned drum by resilient means. The drum actuates rotation of the roller through a transmission; movement of the roller is arrested by locking means controlled by a programming disk rotatable with the roller.

24 Claims, 6 Drawing Figures

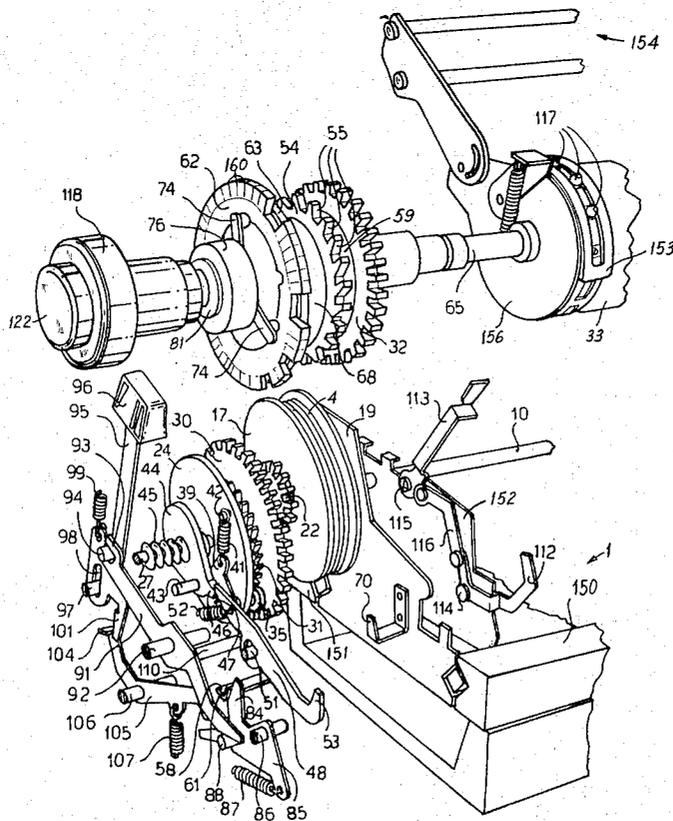
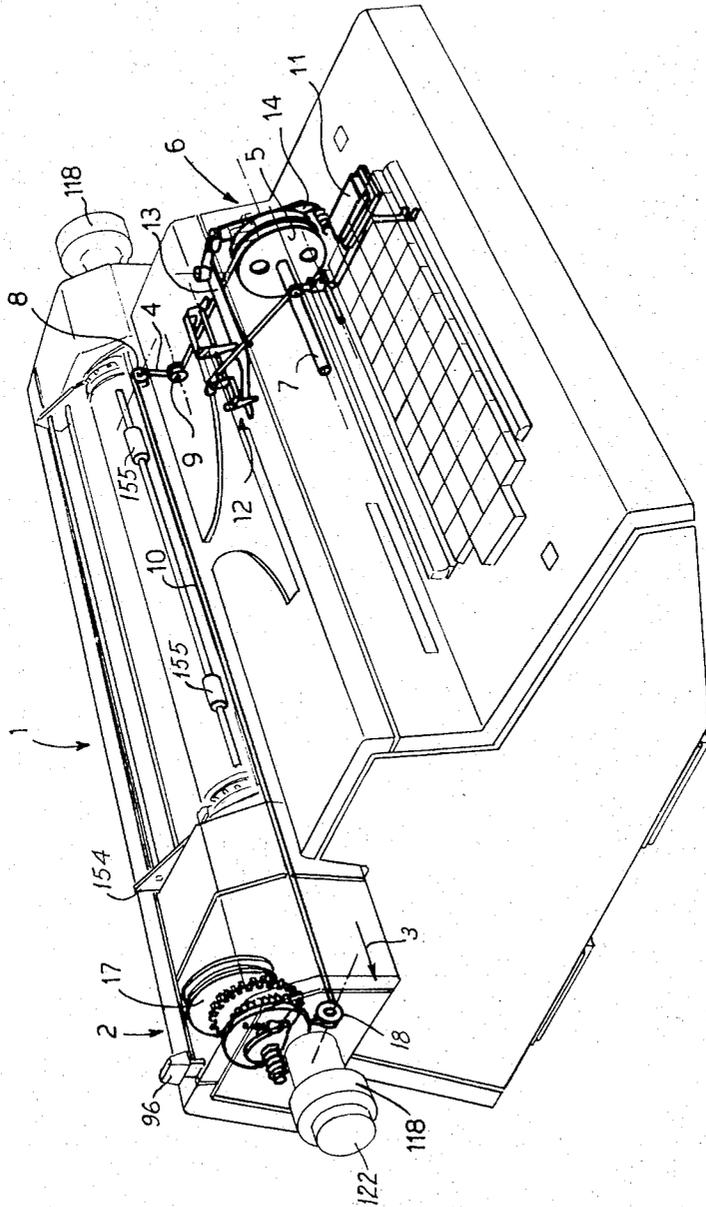
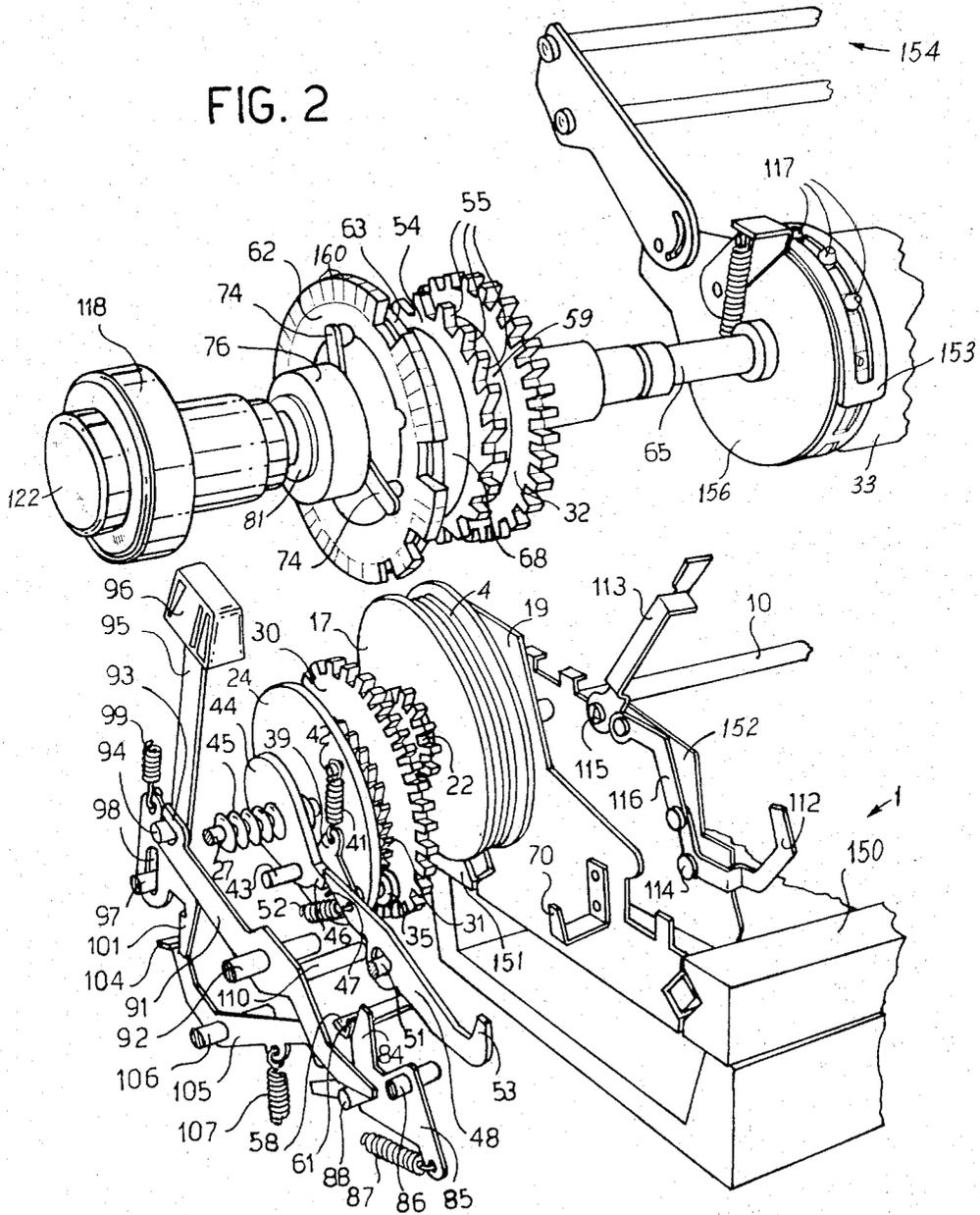


FIG. 1



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FIG. 2



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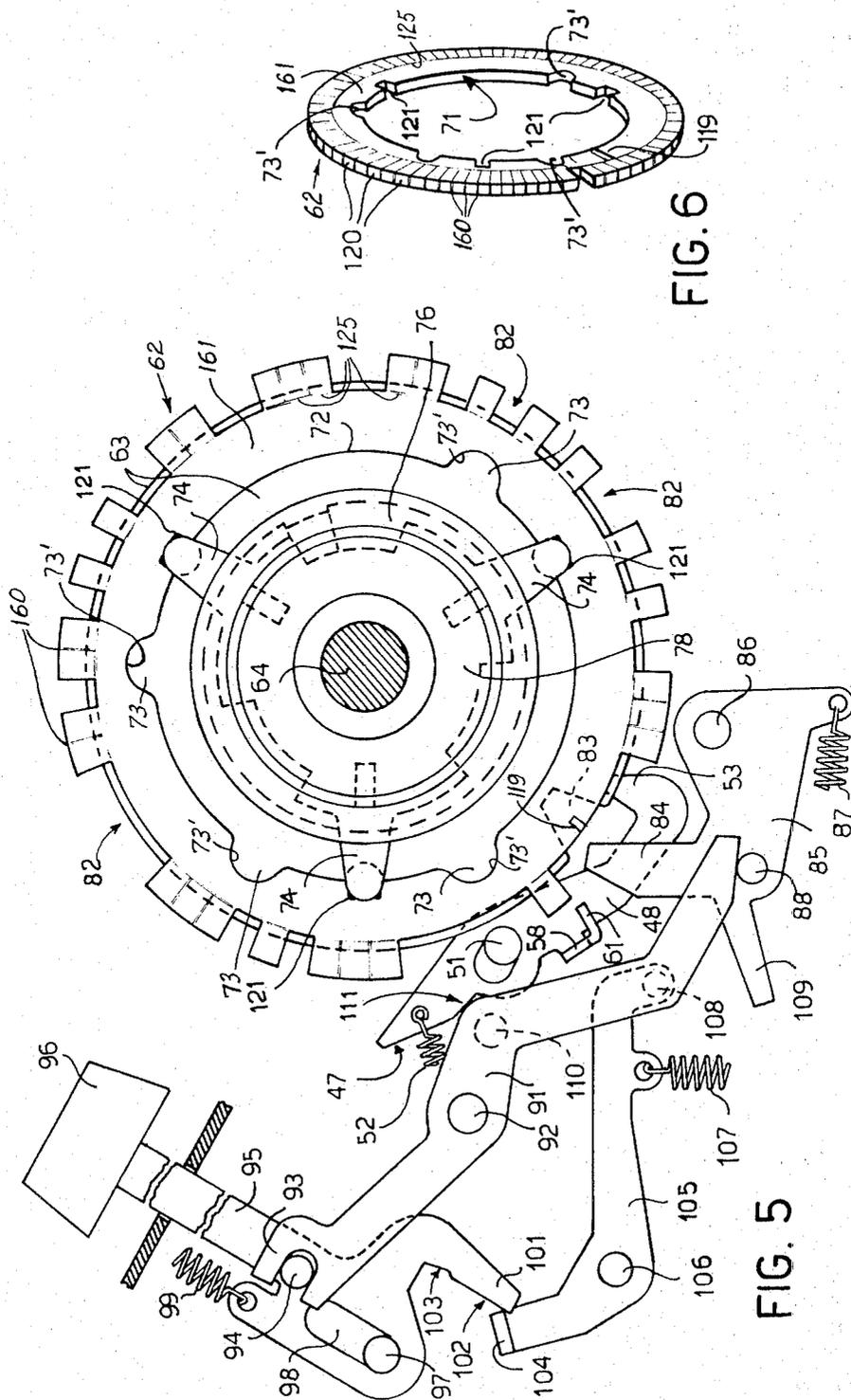


FIG. 6

FIG. 5

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PROGRAMMED VERTICAL TABULATING DEVICE FOR TYPEWRITER

BACKGROUND OF THE INVENTION

This invention relates to a vertical tabulating device for a typewriter by means of which, each time the carriage is brought back to the starting position to start a new line of writing, the roller or platen of the typewriter is rotated by a certain amount corresponding to the desired space or "lead" between two lines, in order to obtain, without any intervention by the operator, suitable spacing of the lines of the script according to a predetermined program.

As is well known, in an electric typewriter the line spacing is obtained when the carriage is returned to the starting position, by means of an appropriate device; its value can be set when the operator or typist starts typewriting, and chosen in a rather narrow range. If, during typewriting a line spacing different from that initially set is required, then the operator, in order to set a new line spacing, must manually act upon an appropriate control of the tabulating device.

Therefore, if the typescript comprises differently spaced lines, then the operator must intervene frequently in the operation of the device in order to vary the value of the spacing between the lines of the typescript. Moreover, when two lines must be spaced by a spacing greater than the maximum lead obtainable with the device (i.e., by the line space gauge), then the device must be acted upon a number of times. In both the above cases a considerably long time is required for typing the script.

Vertical tabulation devices are already known, which are apt to cause the roller of a typewriter to advance by desired amounts according to a predetermined program registered on a circular cam provided with slots. These devices comprise an electric motor for driving the typewriter roller in rotation, transmission means for connecting the motor with the roller and the cam, and a switch connected in the motor feeding circuit and controlled by a feeler which follows the contour of the aforementioned cam. Each value of the line spacing depends upon the duration of the interval of time during which the motor is fed with current, which duration is proportional to the distance between two slots in the cam.

The devices of this kind suffer from the drawback of being of rather complex construction, since they require an electric motor for their operation and a suitable electric circuit for the motor control.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided a vertical tabulation device for an electric typewriter, which obviates the disadvantages mentioned above. The return movement of the carriage of the typewriter, with which the device is associated, is obtained by power-pulling a flexible member connected with the carriage of the typewriter, which carries a rotatable platen roller. The device is characterized in that the rotational movement of the platen roller is actuated by a drum disposed on the carriage, the flexible member having one end fastened to the drum and normally having a section thereof wound about the aforementioned drum by resilient means.

BRIEF DESCRIPTION OF THE DRAWING

For a better understanding, an exemplary embodiment of the present invention is described with reference to the accompanying drawing, wherein:

FIG. 1 shows, diagrammatically and in a perspective view, a device constructed according to the invention mounted on an electric typewriter, as well as some other parts of the typewriter cooperating with the device;

FIG. 2 is a perspective view of the device of FIG. 1, and of a part of the platen roller and of the carriage of the typewriter on which it is mounted;

FIG. 3 shows a plan view, partially in section, of the device of FIG. 2;

FIG. 4 shows a section of the device of FIG. 3, taken along the lines IV—IV;

FIG. 5 shows a section of the device of FIG. 3, taken along the lines V—V;

FIG. 6 is a perspective view of a cam utilized in the device according to the invention.

DETAILED DESCRIPTION OF THE DRAWING

On the carriage 1 (FIG. 1) of an electric typewriter there is mounted a vertical tabulating device indicated at 2, constructed in accordance with the invention.

In the typewriter illustrated, the escapement movement to the left of the carriage 1 is effected in the usual manner by a suitable escapement spring schematically represented by an arrow 3. The return movement of the carriage 1 to its starting position is accomplished against the force of the escapement spring 3 by means of a flexible member 4, suitably a wire, ribbon or cord, one end of which is connected, in a manner to be described below, to the device 2. The opposite end of the member 4 is connected to a rotatable drum 5 of a clutch 6 driven by a shaft 7 of the typewriter. By means of a pair of small rollers, 8 and 9, whose axes are substantially orthogonal, the wire or cord 4 is given a configuration including a section 10 which is substantially horizontal and parallel to the axis of the carriage 1, which is slidable on guide rails 150, 151. The engagement and disengagement of the clutch 6, and therefore the rotation and the arrest of the drum 5, respectively, are actuated by means of a return key 11. Key 11, through an assembly of known kinematic mechanisms generally indicated at 12, causes a lever 13 to rotate; this lever 13, in turn, causes displacement of a plate 14 adapted to apply axial forces to the disks of the clutch 6.

The device 2 comprises (FIG. 4) a rotatable drum 17, to which one of the ends of the cord 4 is fastened; a section 10 of this cord 4 is guided onto the drum 17 on which the cord 4 is wound during operation of the device 2 by means of a pulley 18. The drum 17 is rotatably mounted between two plates 19 and 20 FIG. 3 integral with the carriage 1 (FIG. 2) of the typewriter. The drum 17 (FIG. 4) is rotated clockwise by a coil or helical spring 21 and is integral with a gear wheel 22 which meshes with another gear wheel 23 connected to a disk 24. Preferably, the connection between the gear wheel 23 and the disk 24 is provided by means of a sleeve 25 (FIG. 3) rotatably mounted on a spindle 27. The ends of the spindle 27 are fastened to the plate 20 as well as to a plate 28, which is also integral with the carriage 1 of the typewriter.

On the sleeve 25 also are rotatably mounted a gear wheel 30 and another toothed wheel 31 integral with gear wheel 30. The gear wheel 30 meshes with a gear wheel 32 which drives in rotation the platen 33 (FIG. 2) of the typewriter, with which it is integral. The toothed wheel 31, provided with a plurality of teeth of substantially trapezoidal shape 34, (FIG. 4) is adapted to cooperate with a pawl 35 carried by the disk 24. Pawl 35 is mounted on a pin 38 which passes through the disk 24 and connects it to a bell-crank lever 39, one of whose arms 40 is resiliently connected, by means of a coil spring 41, to a pin 42 carried by the disk 24.

A pin 43, protruding from the lever 39, can slide in a corresponding slot 49 of a cam 44. Cam 44 is formed with a nut screw coupled with a threaded section 45 of the spindle 27. A tooth 46 of the cam 44 is adapted for normally cooperating with an inclined plane 47 of a rocking lever 48. The rocking lever 48 oscillates about a pin 51 and is normally biased against the tooth 46 by a helical spring 52. At one end of the rocking lever 48 a tooth 53 is provided, which is adapted to cooperate with a toothed wheel 54. This wheel 54 is coupled by means of a friction clutch schematically indicated as 59 (FIG. 2) with the gear wheel 32 and, therefore, with the platen 33 of the typewriter. The teeth 55 of the toothed wheel 54 are of substantially trapezoidal shape. The tooth 53 of the rocking lever 48 (FIG. 4) has a profile fully corresponding to that of the hollow space comprised between two adjacent teeth 55 of wheel 54. A small wheel 56, carried by a lever 57, is normally held in a space between two teeth 55 of the toothed wheel 54 by the action of a spring (not shown) to provide a positioning means for the platen 33.

The rocking lever 48 is further provided with a tongue 58 (FIG. 4) protruding therefrom and parallel to pin 51 (See FIG. 2). A small tooth 61 is provided (FIG. 5) at the end of tongue 58, perpendicular to the tongue 58 and adapted to cooperate with a cam 62 mounted on a disk 63 (FIG. 3) coaxial with a shaft 65 of the platen. The disk 63 is idly mounted on a portion 64 of the shaft 65 and constitutes the support for an epicyclic train, generally indicated at 66. This epicyclic train 66, in the embodiment illustrated, comprises a pair of planetary gears 67' carried by pins 60, 60' integral with the disk 63 and coupled with both a stationary ring gear 68 (FIG. 4) and a sun wheel 69 integral with the toothed wheel 54. During the operation of the device 2, the ring gear 68 is held stationary by the action of a tooth 70 (FIG. 2), integral with the plate 19 of the carriage 1, which is inserted inside a corresponding recess 70' (FIG. 4) provided in the outer peripheral portion of said ring gear 68.

The cam 62 (FIG. 5) which is interchangeable on the disk 63, is centered thereon, thus coupling its inner hole 71 (FIG. 6) on the outer surface of a ring-shaped portion 72 (FIG. 5) of the disk 63. The cam 62 is entrained and positioned by means of three radial projections 73 of the ring-shaped portion 72, adapted to cooperate with corresponding recesses 73' (FIG. 6) of the inner hole 71 of the cam 62. In order to hold the cam 62 (FIG. 5) in position on the disk 63, three resilient arms 74 are provided, carried by a ring 75 (FIG. 3) which is biased axially towards the disk 63 by a bushing 76 acted upon by a spring 77. The ring 75, with its associated arms 74, is integral with the bushing 76. The spring 77 is housed inside a cylindrical recess 79 of the bushing 76 and the corresponding ends of the spring 77

rest upon the button of recess 79 and upon a ring 78 fixed to a sleeve 81 of the disk 63. This sleeve 81 is supported for rotation on the portion 64 of the shaft 65.

The cam 62 (FIG. 6) has a substantially circular outer profile, which can be interrupted by recesses 82 (FIG. 5). The width of the recesses 82, measured in the circumferential direction (for instance on the outer circumference of the cam 62 is a multiple of a basic width which represents the minimum width of a recess 82 realizable on the cam 62.

The disk 63 is further provided with a recess 83 adapted to cooperate with a corresponding tooth 84 carried by a lever 85 pivotally mounted by a pin 86 on the carriage 1 (FIG. 2) of the typewriter and normally biased in clockwise direction by a spring 87. A pin 88, protruding from the lever 85, coacts with one end of a lever 91 pivotally mounted, by means of a pin 92, on the carriage 1 of the typewriter. The opposite end of lever 91 is provided with a fork 93, whose inner space cooperates with a pin 94 carried by the stem 95 of a key 96. When the key 96 is pressed down, the stem 95 is guided by a pin 97 cooperating with an eyelet 98 provided in a portion integral with stem 95. Stem 95 is further normally held in its upper position, where the pin 97 cooperates with the bottom of the eyelet 98, by a spring 99. On a protruding end portion 101 of the stem 95, a support surface 102 (FIG. 5) and a narrow recess 103 are provided. The surface 102 cooperates normally with a tongue or tab 104 of a lever 105 pivotally mounted on the carriage 1 (FIG. 2) of the typewriter by means of a pin 106 and normally biased in clockwise direction by a spring 107. A pin 108 (FIG. 5), protruding from one end of the lever 105, is adapted to cooperate with a tooth 109 of the lever 85.

A long pin 110, protruding from the lever 91, is adapted to cooperate with a shoulder 111 of the rocking lever 48.

Preferably, but not necessarily, the platen 33 of the typewriter can be interchangeable on the carriage 1 of the typewriter, as shown in FIG. 2, where the platen 33 is shown separated from the carriage 1. In order to attain an easy assembling of the platen 33 on the carriage 1 of the typewriter, any device of known kind can be provided. For instance, a pair of levers 112 and 113, can be pivotally mounted at 114 and 115 respectively on a plate 152 of said carriage 1 and connected by means of a connecting rod 116. The rotational movement of the platen 33 is actuated by means of handles 118 (FIG. 1) fixed to the ends of the shaft 65 (FIG. 2). The handle 118 is provided with a button 122 which is connected, in a manner well known in the art, to the clutch 59. The button 122 when depressed releases the shaft 65 from the toothed wheel 32 in the usual manner.

In correspondence with the end parts of the platen 33, a plurality of pegs 117 of conventional kind are provided, adapted to cooperate with corresponding holes of the form which is prepared on the typewriter. Preferably, according to a well-known arrangement, the pegs 117 protrude from the platen 33 of the typewriter only in correspondence with an arc of desired length, namely in correspondence with slots provided on paper guide plates 153 disposed in the area of the platen 33 facing the operator or typist. The pegs 117 are pushed back inside the platen 33 by appropriate means, in correspondence with the remaining portion of said platen 33. These means (not shown) normally comprise cams

stationary relative to the carriage 1, which cooperate with parts of the pegs 117. The paper form is adapted to be held in contact with the platen 33 (FIG. 1) by conventional rollers 155 and, upon emerging from the guide plates 153, can be guided by a paper bail 154 supported by terminal plates 156 rotatably supported by the shaft 65 and fixable to the carriage 1.

The operation of the vertical tabulating device 2 in accordance with the invention is as follows.

A cam 62 (FIG. 3) is mounted on the tabulating device 2, prepared for carrying out a desired vertical tabulation program, in a manner to be described below. For the assembling operation, the cam 62, is passed over the corresponding handle 118 until it is in correspondence with the disk 63. By rotating the cam 62 in a suitable manner, the four inner recesses 73', provided on the cam 62, are brought into coincidence with the radial projections 73 of the disk 63. A reference mark 119 (See also FIG. 6) provided on the cam 62 (for instance a dash marked thereon) is brought into coincidence with a corresponding reference on the disk 63 (suitably the recess 83). In this manner, the cam 62 can rest upon the disk 63 and is correctly oriented angularly relative thereto. In order to lock the cam 62, it is rotated to bring the ends of the arms 74 (which initially rest upon the projections 73) to rest upon the cam 62. During this operation, the bushing 76 rotates on the sleeve 81 of the disk 63 and is pushed axially, together with the arms 74, by the helical spring 77 (FIG. 3). The relative positions of the aforementioned parts, when assembling of the cam 62 is completed, are as shown in FIG. 5.

A paper form can now be inserted in the typewriter in the usual manner. In fact, by using the handle 118, the platen 33 can be caused to rotate to insert the form; during this operation, the disk 63 remains stationary if the button 122 is pressed down, whereby the clutch 59 releases the toothed wheel 54 and the gear wheel 32.

During the rotational movement of the platen 33, the gear wheel 32 rotates the gear wheel 30 in mesh therewith and idly mounted, together with the toothed wheel 31, on the sleeve 25.

Subsequently, the tabulation work on the paper form can be started. When a typescript line is completed and the carriage 1 (FIG. 1) is displaced to the left relative to the typewriter, by pushing down the return key 11 the cycle of return of the carriage 1 is started. The kinematic mechanisms 12 for actuating the friction clutch 6 are activated, closing the clutch 6, so that the drive shaft 7 can entrain the drum 5 in rotation, thus causing the cord 4 to be wound thereon.

The rigidity of the helical spring 21 (FIG. 4), is chosen in such a manner that the force applied to the section 10 of the cord 4, which is necessary for causing the rotation of the drum 17 (in a direction opposite to that in which it is rotated by the action of the helical spring 21) is weaker than that force required by the escapement spring indicated at arrow 3 for displacing the carriage 1 of the typewriter to the right. In this manner, when the cord 4 (FIG. 1) is wound on the drum 5 of the friction clutch 6, the rotation of the drum 17 is started also, while the carriage 1 remains stationary.

As a result of this rotational movement, the gear wheel 22, which is integral with the drum 17 and meshes with the gear wheel 23, rotates the disk 24

clockwise (FIG. 4). Disk 24 is integral with wheel 23 by means of the sleeve 25.

Cam 44 is torsionally integral with the disk 24, by virtue of the connection established by the pin 38, the lever 39 and the pin 43. The cam 44 also starts to rotate clockwise, and its tooth 46 will become detached from the inclined plane 47 of the rocking lever 48, against which the tooth 46 was abutting before starting the aforementioned rotation. Therefore, the lever 39 can oscillate slightly, in a clockwise direction, relative to the disk 24 under the action of the spring 41. The pawl 35, which is integral with the lever 39 is thereby brought inside a space between two teeth 34 of the toothed wheel 31, entraining the latter in rotation together with the gear wheel 30. The gear wheel 30 in turn causes rotation of the platen 33.

Upon removal of the tooth 46 of the cam 44 from the inclined plane 47 of the rocking lever 48, the lever 48 counterclockwise under the action of the spring 52, until the small tooth 61 (FIG. 5) of the tongue 58 of the rocking lever 48 abuts against the circular contour of the cam 62. In this position, the tooth 53 of the rocking lever 48 is in close proximity with the teeth 55 (FIG. 4) of the toothed wheel 54.

During the rotation of the toothed wheel 32 and of the platen 33, which takes place in the manner described above, the sun wheel 69 of the epicyclic train 66 is entrained in rotation. Since the ring gear 68 of this train 66 is stationary, the sun wheel 69 which meshes with the planetary gears 67; 67' causes the gears 67, 67' to rotate on the ring gear 68. As a result the support pins 60, 60' of the gears 67, 67', the disk 63 and the cam 62 integral therewith, (i.e., the support of the epicyclic train 66) rotate about the axis of the shaft 65 of the platen 33 with an angular velocity which is considerably slower than that of the platen 33 depending upon the choice of the pitch diameters of the various gear wheels 67, 67', 68, 69 forming the epicyclic train 66. The rotation of the gear wheel 32, and therefore of the platen 33, continues until the small tooth 61 (FIG. 5) of the rocking lever 48 abuts against a recess 82 of the cam 62. The rocking lever 48 is allowed to rotate further, but in counterclockwise direction, by the action of the spring 52. As a result of this rotation, the tooth 53 of the rocking lever 48 (FIG. 4) engages a recess between two adjacent teeth 55 of the toothed wheel 54, arresting the rotation of the latter.

At this point, due to the locking action of the tooth 53 of the rocking lever 48, the kinematic chain comprising the toothed wheel 54, the gear wheels 32, 30, the toothed wheel 31, the pawl 35, the disk 24 and, finally, the gear wheels 23 and 22 is locked, thereby arresting the rotation of the drum 17. It will be noted that, during the period of time when the rotation of the cam 62 (FIG. 2) takes place corresponding to a small fraction of one revolution, and before the arrest of the toothed wheel 54, owing to the low gear ratio between the wheel 54 and the cam 62, the toothed wheel 31, and the disk 24 which is integral therewith, perform a number of complete resolutions unwinding from the tabulating drum 17 a corresponding section of cord 4. During this time the cam 44 is entrained in rotation; this cam 44, due to the threaded coupling with the section 45 of the spindle 27, is axially displaced thereon. The pitch of this threaded coupling is chosen so that, at the end of a complete revolution of the cam 44, the cam tooth 46 cannot interfere with the inclined plane

47 of the rocking lever 48, with which this tooth 46 was cooperating before starting the aforementioned rotation.

After locking of the toothed wheel 54 (FIG. 4) by tooth 53 of the rocking lever 48, the force generated by the winding of the cord 4 (FIG. 1) on the drum 5 of the clutch 6, is still applied to the section 10 of cord 4. Thus the carriage 1 is displaced to the right until it is arrested against the left margin stop (not shown in the drawing) to start a new line of typescript. When this position is reached, known means with which the machine is provided, acting upon the kinematic mechanisms 12 disengage the friction clutch 6, thereby disconnecting the winding drum 5 from the shaft 7. Under these conditions, the helical spring 21 of the drum 17 (FIG. 4) can cause the drum 17 to rotate in a clockwise direction, thereby rewinding thereon the cord 4 same section of cord 4 which has been previously unwound from the drum 17 and which is now wound on the drum 5 of the clutch 6. During this latter rotation, the disk 24 is caused to rotate in a counterclockwise direction (opposite to the preceding direction) and therefore the pawl 35 is released from the toothed wheel 31 which does not rotate. The platen 33 and the cam 62 (FIG. 2) remain in the angular position in which they were before starting the latter rotation of the drum 17. The cam 44, which now rotates counterclockwise with the disk 24, by displacing itself axially on the threaded section 45, returns to the rest position shown in FIG. 4, where it was initially. The rocking lever 48 is also brought back to its initial condition when, at the end of the aforementioned rotation, the tooth 46 abuts against the inclined plane 47 of the rocking lever 48. At this point, the device 2 is ready for a new working cycle which will start when, after another typescript line has been written, the return key 11 (FIG. 1) of the carriage 1 is pushed down.

It is apparent that the rotation of the platen 33, which takes place during the operation of the device 2, when the carriage 1 is brought back to its starting position is proportional to the width or angular extension of the smooth arc of a circle included between two recesses 82 of the cam 62 (FIG. 5). Since, as stated above, the extension is chosen to be a multiple of a basic extension to which a rotation of the platen 33 (FIG. 1) which produces a "lead" spacing between two lines corresponds, it is possible to cause the platen 33 to rotate by any desired number of "leads" each time it returns back to its starting position by providing on the cam 62 smooth sections of predetermined width.

It is also clear that, in the positions where the tooth 61 (FIG. 5) of the rocking lever 48 is not in correspondence with a recess 82 of the cam 62, or in the absence of said cam, 62 the device 2 is able to command a "lead" space obtained with an angular rotation of the platen 33 corresponding to the predetermined basic length. The cam 62 therefore carries out a vertical tabulation program which covers the whole length of the newspaper form.

In the case when, during the execution of a program, it is desired to bring the cam 62 to the program starting condition, the key 96 is depressed. Upon the downward displacement of the stem 95, the lever 91 is rotated counterclockwise; the pin 110 of the lever 91 engages the shoulder 111 of the rocking lever 48, thereby locking the same. Simultaneously upon removal of one end of the lever 91 from the pin 88, the lever 85 is rotated

by the action of spring 87 in a clockwise direction. During the actuation of the key 96, the tab 104 of the lever 105 slides on the support plane 102; upon the release of the key 96, when the stem 95 reaches the end of its downward stroke, the tab 104 engages the recess 103, thereby locking the stem 95.

Therefore, upon the rotation of the lever 85, the tooth 84 of the lever 85 rests upon the cylindrical surface of the disk 63. As soon as the return key 11 of the carriage 1 is depressed, since the rocking lever 48 is locked, the platen 33 is rotated until the tooth 84 snaps into the recess 83.

As soon as the tooth 84 snaps into the recess 83, as stated above, and the lever 85 rotates in a clockwise direction, the tooth 109 of this lever 85, strikes against the pin 108 of the lever 105. This causes the lever 105 to rotate counterclockwise, releasing the tab 104 from the recess 103 and allowing the key 96 to return to its upward end-of-stroke position. Upon this upward movement of the key 96, the initial conditions of the levers 91, 85 and 105 are reset, as shown in FIG. 5. Therefore, the rocking lever 48 is set free again and its tooth 53 can enter into one of the spaces between the teeth 55 of the toothed wheel 54 (FIG. 2), thereby locking the rotation of the platen 33 in the position where the cam 62 is in the initial position of the program.

As seen in FIG. 6, the cam 62, which is in the shape of a disk, can be provided with a plurality of short radial cutouts 160 substantially defining a plurality of sectors 120 constituting a crown. Each sector 120 of this crown is connected with the remaining part 161 of the cam 62 by means of sections 125 of lesser resistance. Thus it is possible to easily remove from the crown a desired number of sectors 120, to obtain, on the cam 62, a number of recesses 82 (FIG. 5) defining a desired program of vertical tabulation; from the cam 62 shown in FIG. 6, only one sector 120 has been removed. The aforementioned operation of removal of the sectors 120 can be performed by means of a suitable tool, such as pliers or the like, with which each sector 120 is bent to break free from the section of lesser resistance.

Preferably, on the cam 62, besides the recesses 73', other recesses 121 of smaller dimensions are provided. When the cam 62 is mounted on the disk 63 the ends of the arms 74 (FIG. 5) can be positioned inside of and snap into these recesses 12.

Obviously, many modifications and variations can be introduced in the embodiment of the present invention described above, concerning both the shape and the arrangement of the various parts and components, without departing from the scope of the invention.

What I claim is:

1. A programmed vertical tabulating device for an electric typewriter comprising a frame, a carriage advanceable on said frame, a platen rotatable on said carriage and return means for returning said carriage toward a starting position, said tabulating device comprising a tabulating member rotatably mounted on said carriage, a line spacing mechanism operatively connecting said return means with said tabulating member for rotation thereof, transmission means rotatably connecting said platen with said tabulating member so that the operative connection provided by said line spacing mechanism causes said return means to rotate said platen before the return means causes movement of

said carriage, locking means for stopping said rotation of said platen after a predetermined number of angular lead spacings, a programming disk rotatably supported by said carriage, said programming disk carrying programming elements associated with programmed lead spacings of said platen, means connecting said programming disk for rotation with said platen, and sensing means for sensing said programming elements of said programming disk, said sensing means controlling said locking means to cause said locking means to stop the rotation of said platen after rotation of said platen through a lead spacing corresponding to the sensed programming elements on said programming disk.

2. A device as claimed in claim 1, wherein said return means include an actuatable return drum and a flexible member windable on said return drum and having one end fixed to said return drum, said tabulating member comprising a tabulating drum fixing the other end of said flexible member, said line spacing mechanism including resilient means normally effective for winding a section of said flexible member about said tabulating drum, the force of said resilient means on said tabulating drum being weaker than the pulling force of said return drum when actuated by said return means, said transmission means including clutch means disconnecting said tabulating drum from said platen during the winding of said flexible member on said tabulating drum.

3. A device as claimed in claim 2 wherein said resilient means comprises a coil spring having one end connected to the tabulating drum and the other end connected to the carriage of the typewriter.

4. A device as claimed in claim 1, wherein said programming elements of said programming disk are formed of a plurality of recesses included in an outer contour of said programming disk, said locking means comprise a toothed wheel rotatable with said platen, and an oscillatable anchor including a tooth and a spring biasing said oscillatable anchor towards said toothed wheel, said oscillatable anchor tooth being insertable in one of a succession of spaces defined by teeth of said toothed wheel, said connecting means of said programming disk supporting said programming disk coaxially on said toothed wheel, said sensing means comprising a tab of said oscillatable anchor following the contour of said programming disk under the action of said spring so as to cause said tab to enter one of said recesses in said programming disk, thereby effecting a corresponding rotation of said oscillatable anchor so that said oscillatable anchor tooth snaps into said one space of said toothed wheel to lock the platen against rotation.

5. A device as claimed in claim 1, wherein said programming disk is coaxial with said platen, and wherein between the platen and said programming disk is disposed a reduction unit, comprising a stationary ring gear integral with the carriage of the typewriter, a sun wheel actuated by the platen, and a set of planetary gears rotatable on support pins fastened to a support for said programming disk, whereby the rotation of said platen produces a reduced rate of rotation of said programming disk.

6. A device as claimed in claim 2, wherein said clutch means normally disconnect said platen from said tabulating drum, said transmission means including setting means responsive to the rotation of said tabulating drum for actuating said clutch means to connect said

platen with said tabulating drum, said clutch means being such unidirectional type as to disconnect said platen from said tabulating drum when the direction of rotation of said tabulating drum is changed by said resilient means during winding of said flexible member on said tabulating drum.

7. A device as claimed in claim 2, wherein said transmission means include setting means responsive to the rotation of said tabulating drum by said flexible member under the action of said return means for engaging said clutch means, a spindle fixed to said carriage, a first gear wheel normally idle on said spindle, a second gear wheel constantly connected with said tabulating drum and rotatably supported by said spindle, and a third gear wheel normally integral with said platen and meshing with said first gear wheel, said clutch means having a driven portion integral with said first gear wheel and a driving portion integral with said second gear wheel, so that said clutch means, when engaged by said setting means causes said first and said second gear wheels to be made integral for rotating said third gear wheel and thereby said platen.

8. A device as claimed in claim 7, wherein said sensing means and said locking means are formed respectively of a tab and a tooth of a spring biased oscillatable anchor, and wherein said setting means of said transmission means comprise a control member cooperating with said oscillatable anchor and a connecting member rotatably connecting for rotation said control member with said driving portion of said clutch means, said control member being normally disposed in the plane of oscillation of the oscillatable anchor, said control member being mounted on a nut screw coupled with a threaded section of said spindle so that, during the rotation of said control member, said control member is axially displaced to bring said control member out of the plane of oscillation of the oscillatable anchor after complete revolution of said control member.

9. A device as claimed in claim 8, wherein said oscillatable anchor normally arrests said driving portion of said clutch means through said control member against the action of said resilient means, and said driven portion of said clutch means is constituted by a toothed wheel integral with said first gear wheel, said toothed wheel having teeth of substantially trapezoidal form having a right edge and inclined edges, said driving portion of said clutch means comprising a pawl, an intermediate member operatively connecting said pawl to said control member, supporting means of said pawl integral with said second gear wheel and spring means urging said pawl toward said teeth, the action of said resilient means exerted by said tabulating drum over said oscillatable anchor prevailing over the action of said spring means over said pawl so that said clutch means is normally disengaged and said return means, when operated, cause said spring means to engage said pawl between the right edge of one tooth and the inclined edge of another tooth contiguous to said one tooth and, simultaneously, said oscillatable anchor to rotationally move said tab in contact with the contour of said programming disk, whereby said return means positions said platen through the driving action of said pawl over said right edge of said tooth, said resilient means causing said pawl to slide over said inclined edges of said teeth disengaging said clutch means upon reversal of movement of said tabulating drum.

10. A device as claimed in claim 9, wherein said supporting means of said pawl comprise a transmission disk fixed to a sleeve integral with said second gear wheel and supported by said spindle, said first gear wheel and said toothed wheel being rotatable over said sleeve between said second gear wheel and said transmission disk, said toothed wheel being disposed between said transmission disk and said first gear wheel, and a pin passing through said transmission disk, said pin having one end protruding toward said toothed wheel and another end protruding parallel to said threaded section of said spindle, said one end of said pin fixing said pawl, and wherein said intermediate member and said connecting member are constituted by a small lever fixed to said other end of said pin and by a rod fixed to said small lever and parallel to said threaded portion of said spindle, said control member being provided with a slot slidable on said rod.

11. A device as claimed in claim 2 wherein said sensing means include a spring biased sensing lever and pivot means pivotally supporting said sensing lever on said carriage whereby said sensing lever may cooperate with said programming disk, the device further comprising a control member cooperating with said sensing lever, first connecting means rotatably connecting said control member with said tabulating drum in order to cause said control member to normally hold said sensing lever at a rest position under the action of said resilient means and to cause said sensing lever to cooperate with said programming disk in response to rotation of said tabulating drum by said return means, and second connecting means responsive to the rotation of said control member for displacing said control member parallel to said pivot means for disconnecting said sensing lever from said control member after a complete revolution of said control member, so that said tabulating drum rotates a plurality of turns without interference with the sensing lever, said control member returning said sensing lever to said rest position when said flexible member is completely wound on said tabulating drum.

12. A device as claimed in claim 1 also comprising manually operable positioning means for rotating said programming disk to a starting position in said tabulating device coincident with the start of a tabulating program registered on said programming disk, said positioning means comprising a member rotatable synchronously with said programming disk, an arrest member movable from an inoperative position to an operative position and cooperating with a corresponding portion of said rotatable member for arresting said programming disk at said starting position, and a key member manually shiftable in said carriage for jointly controlling said arrest member and said locking means to hold said locking means in an inoperative position and to move said arrest member to said operative position.

13. A device as claimed in claim 12, wherein said rotatable member comprises a support disk carrying said programming disk, said support disk being provided with a periphery having an arresting recess corresponding to said starting position and wherein said arrest member comprises a spring biased detent lever slidably insertable in said operative position on said support disk periphery into said arresting recess for locking said programming disk in said starting position.

14. A device as claimed in claim 2, wherein said sensing means and said locking means respectively com-

prise a tab and a tooth of an oscillatable anchor pivoted on said carriage parallel to said platen and biased by a spring, said programming disk being substantially coaxial with said platen, said spring biasing said oscillatable anchor to cause said tab to follow an outer contour of said programming disk and said tooth to be urged toward a toothed wheel integral with said platen, the device also including manually operated means for rotating the programming disk to an angular position coincident with the start of a vertical tabulating program comprising said programmed lead spacings registered on said programming disk, and a second rotatable support disk for said programming disk, said second rotatable support disk having a periphery including a start position recess therein, said manually operated means comprising an arrest member supported by said carriage and movable between a rest position and an operative position, and a detent lever so controlled by said arrest member so as to yieldingly cooperate with the periphery of said second rotatable support disk for engaging said start position recess, said arrest member in said rest position holding said detent lever in an inoperative position and, in said operative position, locking said oscillatable anchor in an inoperative position and said detent lever in cooperation with the periphery of said second rotatable support disk, so that, by operation of said return means and positioning of said arrest member in said operative position, said programming disk is locked in a predetermined starting position by the engaging of said detent lever in said start position recess.

15. A device as claimed in claim 14, wherein said arrest member comprises a first pin carried by a first key actuated lever pivoted on said carriage and cooperating with a shoulder of said oscillatable anchor to lock said oscillatable anchor, said detent lever being carried by a second spring biased lever pivoted on said carriage, said second spring biased lever carrying a second pin cooperating with an end of said first key actuated lever and biased by a spring normally urging said second spring biased lever toward the periphery of said second rotatable support disk so that, when the first key actuated lever is moved in said operative position, said first key actuated lever brings said first pin into cooperation with said oscillatable anchor shoulder, the end of said first key actuated lever moves away from said second pin of the second spring biased lever, whereby said detent lever being carried by said second spring biased lever slidably abuts against the periphery of said second rotatable support disk and thereby is slidably inserted into said support disk recess.

16. A device as claimed in claim 15 including a key stem depressably mounted on the carriage and connected with said first key actuated lever by a pin and fork coupling, and a third lever also pivoted on said carriage and including a second locking tab cooperating with a recess in said key stem to lock said key stem in the key actuated position, said second spring biased lever including a projection which upon the rotation of said second spring biased lever, during which the detent lever is inserted into the start position recess of the second rotatable support disk, abuts and rotates the third lever unlocking the second locking tab of said third lever from the recess of said key stem.

17. A device as claimed in claim 2 wherein said programming disk includes a circular contour including a central annulus and a crown comprising a plurality of

substantially radial cutouts, each pair of said cutouts defining a sector connected with said central annulus by a section of lesser resistance, each said sector being manually breakable away before the mounting of said programming disk thereby defining a recess of predetermined width in the contour of the programming disk.

18. A device as claimed in claim 17, wherein the number of said cutouts is equal to the maximum number of lead spacings between the lines that can be contained in the length of the form or sheet employed.

19. A device as claimed in claim 14 wherein said second rotatable support disk is rotatably mounted on a support shaft of said platen, one face of said second rotatable support disk including support pins for planetary gears of a reduction unit interposed between said platen and said programming disk and comprising an epicyclic gear integral with the carriage and a sun gear wheel integral with said support shaft, said planetary gears meshing with said epicyclic gear and with said sun gear wheel for rotation of said platen with said second rotatable support disk at a relatively reduced rate, and a second face of said second rotatable support disk including an annular projecting ridge on which the programming disk is removably mounted.

20. A device as claimed in claim 19 including a ring rotatable on a sleeve of said second rotatable support disk integrally carrying a plurality of arms for holding said programming disk against said second rotatable support disc, and spring means for biasing said ring toward said programming disk axially positioned on said second rotatable support disk, and wherein said annular projecting ridge includes radial projections cooperating with corresponding recesses in an annulus of the programming disk to entrain said programming disk in rotation.

21. A device as claimed in claim 20 wherein the ends of said arms terminate coaxially with said radial projections, so that the programming disk can be assembled on said second rotatable support disk when said arms are in correspondence with the radial projections.

22. A programmed vertical tabulating device for a typewriter comprising a platen, a supporting shaft for rotating said platen, a frame rotatably supporting said

supporting shaft, one portion of said supporting shaft protruding from said frame and fixing a handle for manually rotating said platen, said device comprising a programming disk, a supporting disk for said programming disk, means for removably fixing said programming disk on said supporting disk and a transmission device connecting said supporting disk with said supporting shaft, said transmission device comprising an epicyclic ring gear rotatably mounted on said shaft portion between said frame and said handle, said ring gear being held stationary relative to said frame, a sun gear integral with said supporting shaft, and a planetary gear rotatably supported on one face of said supporting disk and meshing with said ring gear and said sun gear, said supporting disk being rotatable on said shaft portion between said handle and said ring gear and thereby being rotated with said platen following the program on said programming disk, an other face of said supporting disk opposed to said handle supporting said programming disk, said programming disk having an axial hole larger than said handle, so that said programming disk may be fixed on said other face of said supporting disk by passing over said handle.

23. A device as claimed in claim 22, wherein said supporting disk has a sleeve integral therewith, said fixing means for said programming disk including a ring rotatable on said sleeve carrying a plurality of arms for holding said programming disk against said other face of said supporting disk, and spring means for axially biasing said ring toward said supporting disk, and wherein said axial hole in said programming disk includes radial recesses whereby said programming disk may pass over said arms.

24. A device as claimed in claim 23, wherein said other face of said supporting disk includes an annular projecting ridge on which said programming disk is removably mounted, said annular projecting ridge including radial projections cooperating with said radial recesses, each of said arms terminating with an end coaxial with said radial projections, so that the programming disk can be assembled on said supporting disk when said arms are in correspondence with the radial projections.

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