Feb. 12, 1946. C. WITTENMYER 2,394,733

AUTOMATIC TYPEWRITER

Filed March 3, 1944 5 Sheets-Sheet 1

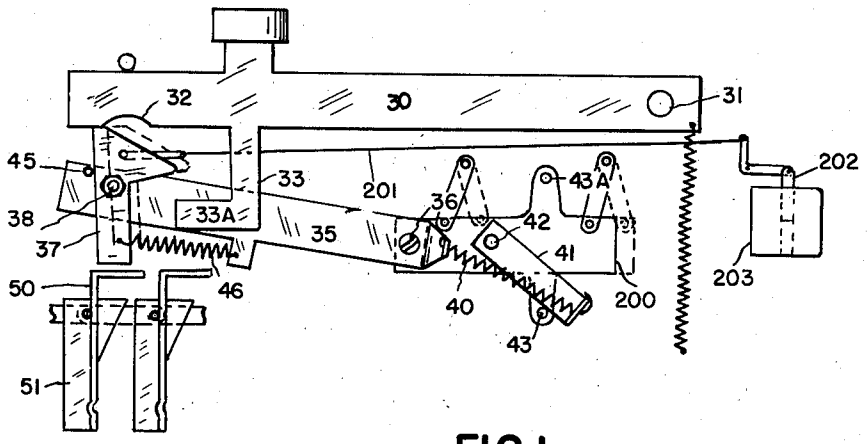
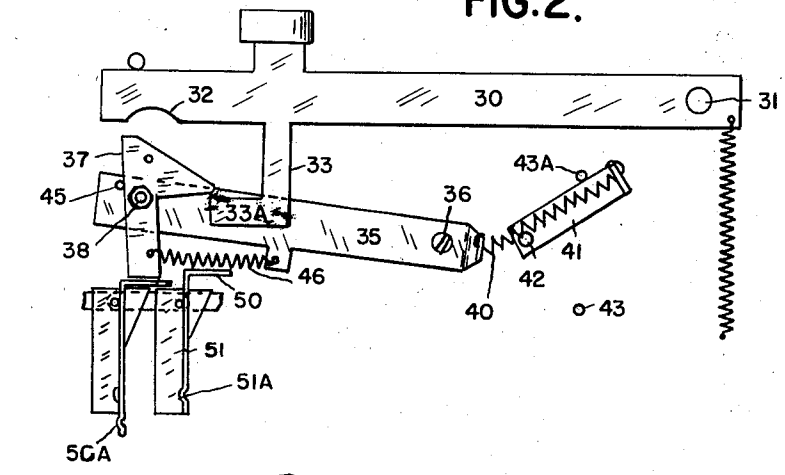


FIG.1.

FIG.2.



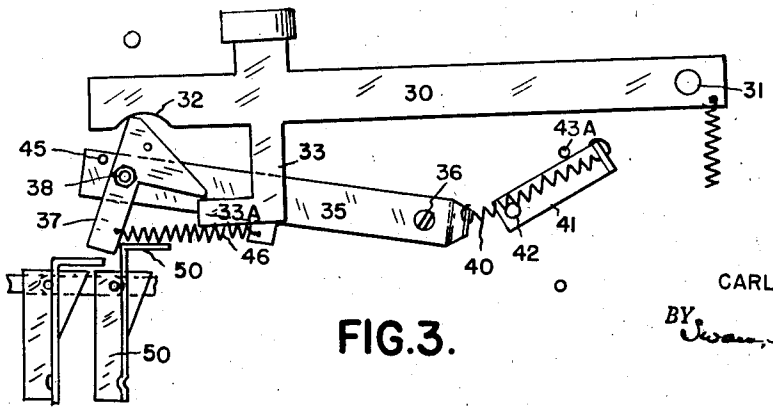


FIG.3.

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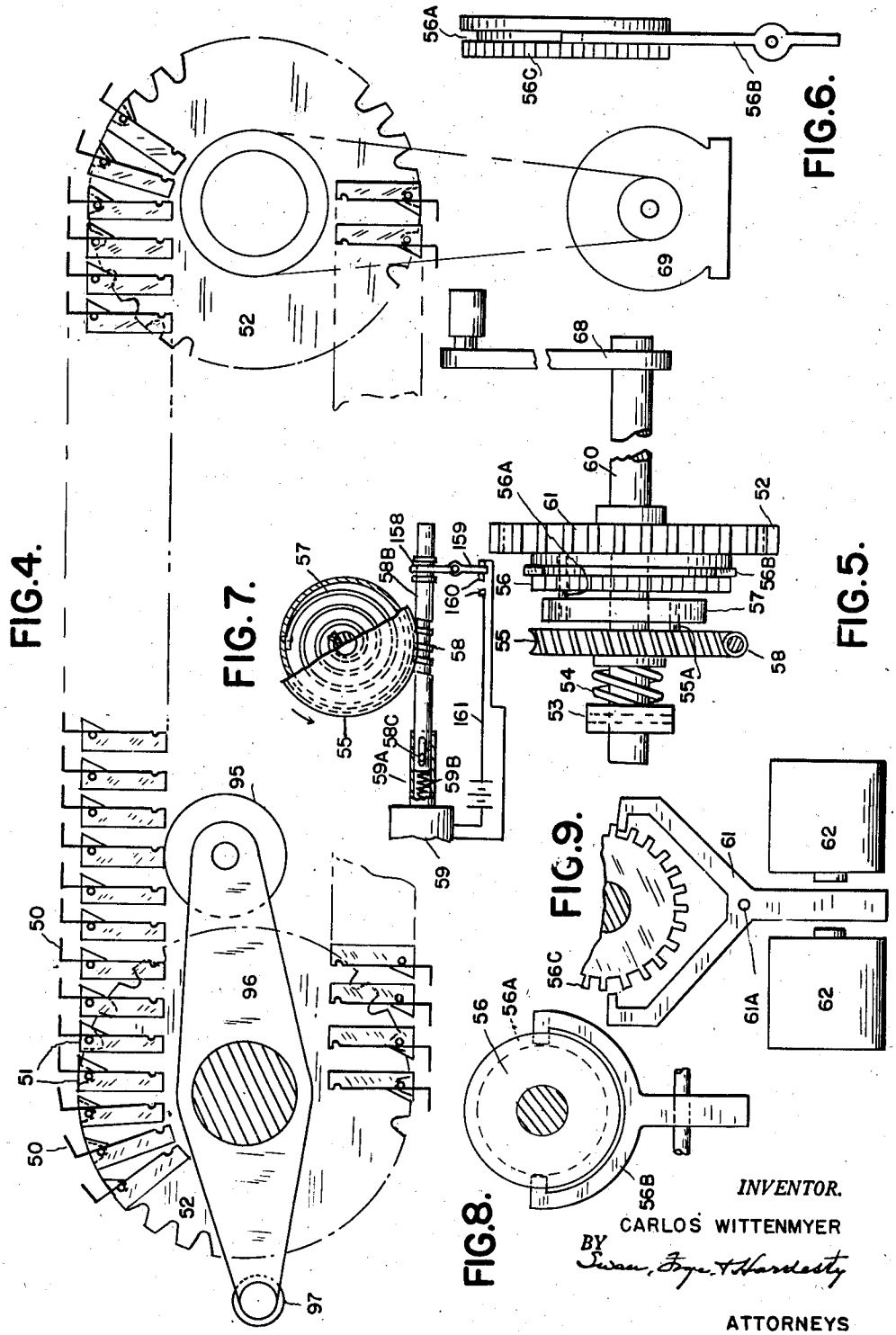
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AUTOMATIC TYPEWRITER

Filed March 3, 1944 5 Sheets-Sheet 2



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AUTOMATIC TYPEWRITER

Filed March 3, 1944 5 Sheets-Sheet 3

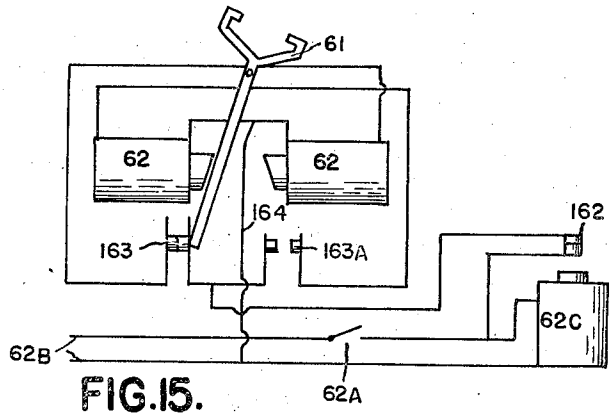


FIG.15.

FIG.16.

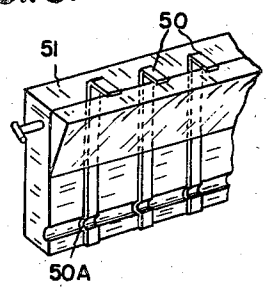


FIG.10.

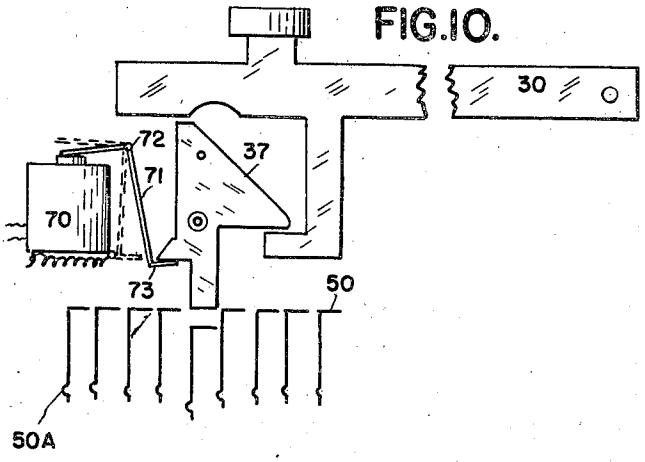
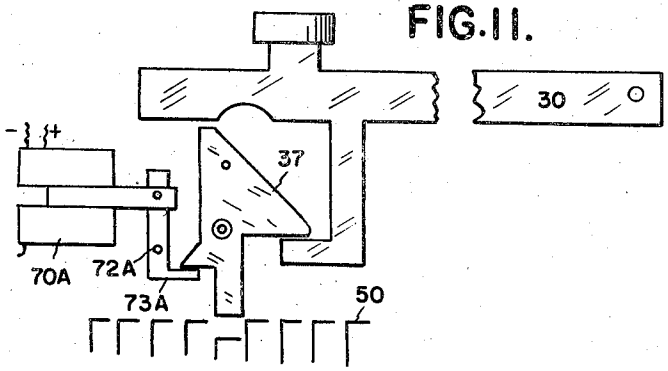


FIG.11.

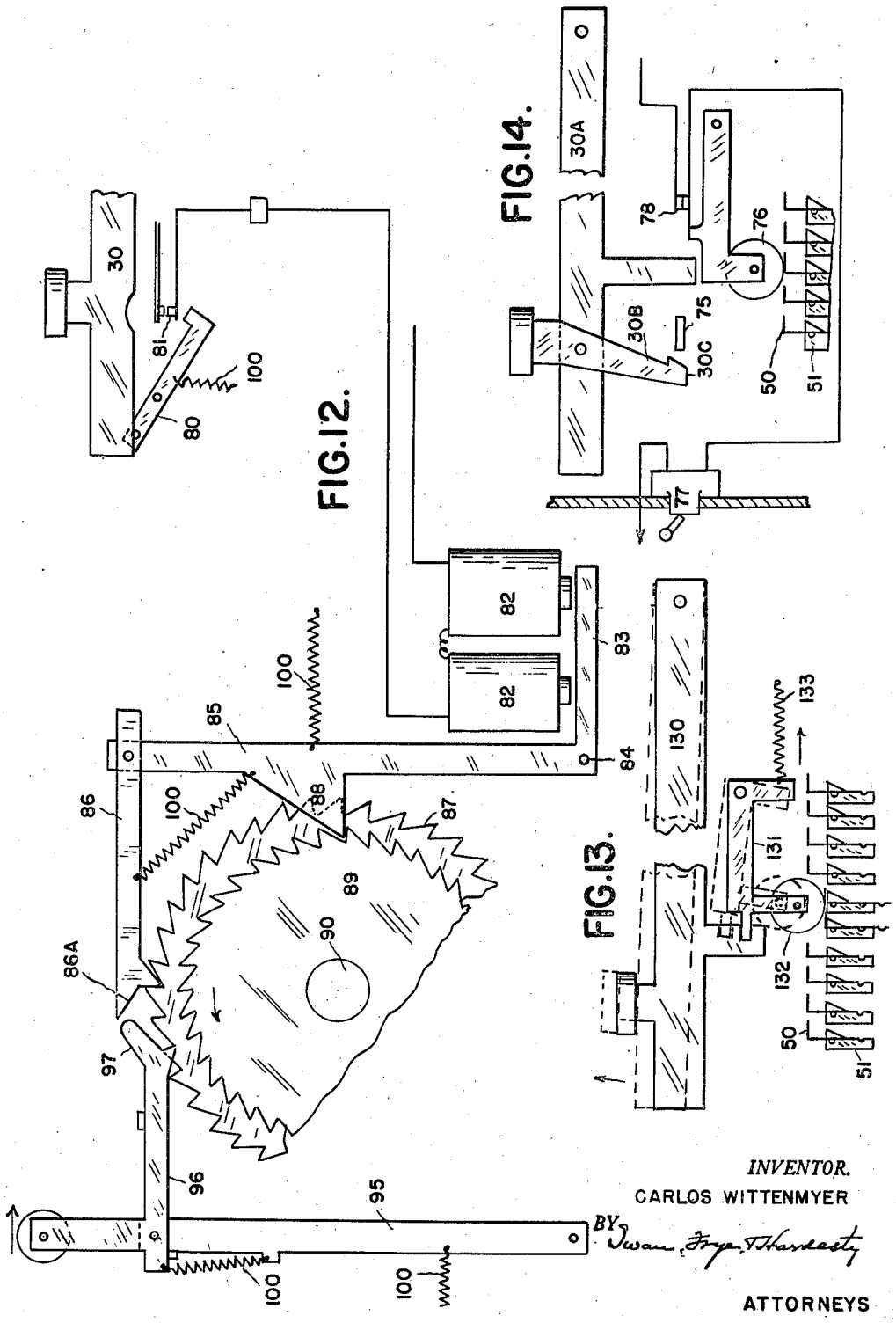


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AUTOMATIC TYPEWRITER

Filed March 3, 1944 5 Sheets-Sheet 4



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AUTOMATIC TYPEWRITER

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FIG.19.

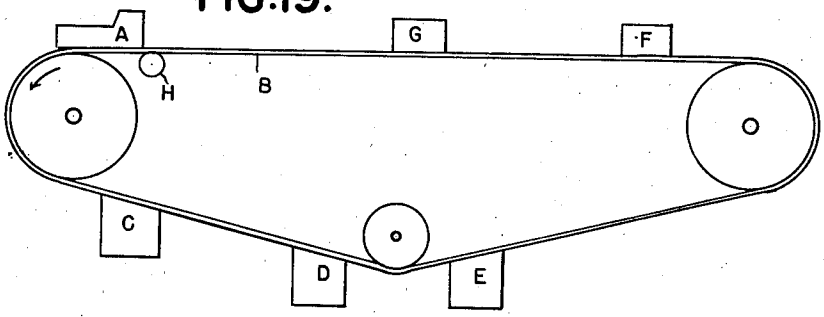


FIG.17.

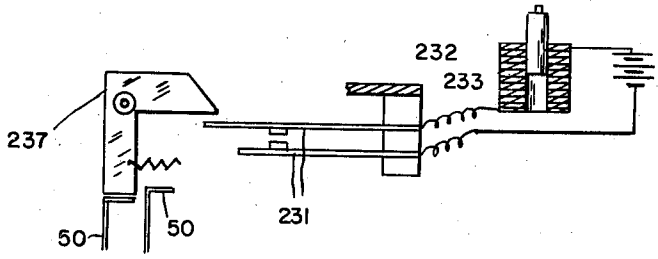
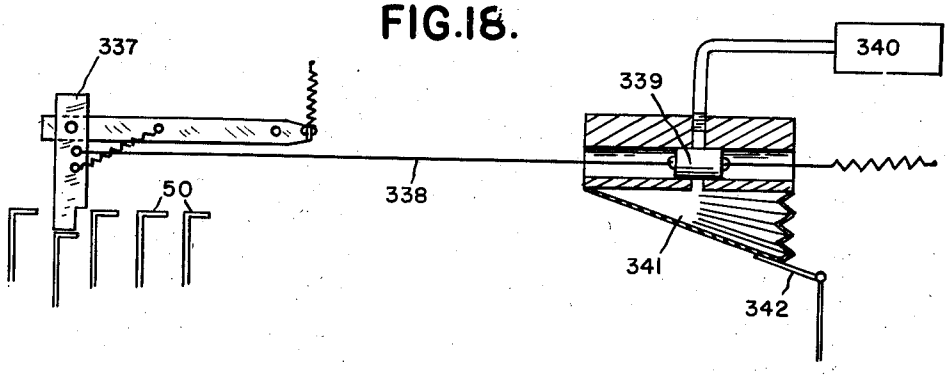


FIG.18.



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Patented Feb. 12, 1946 2,394,733

UNITED STATES PATENT OFFICE

2,394,733

AUTOMATIC TYPEWRITER

Carlos Wittenmyer, Mount Clemens, Mich.

Application March 3, 1944, Serial No. 524,876

8 Claims. (Cl. 197—19)

The present invention relates to typewriting machines and more specifically to means adjunct to electrically operated typewriters.

Among the objects of the invention is a means for the automatic reproduction of matter written on the typewriter.

Another object is a means of automatic reproduction of all or a selected part or parts of such matter.

Still another object is a means for recording or "storing" matter desired to be repeated later any desired number of times.

Another object is a means for recording or storing matter, that may be instantaneously put into or out of operation in conjunction with a typewriter so that the latter may be used also as an ordinary machine or for recording.

Still other objects will readily occur to those skilled in the art upon reference to the following description and drawings, in which

Figure 1 is a more or less diagrammatic view of the mechanism acting in conjunction with a typewriter key for recording or "storing" a key stroke, i. e., a typed character.

Figures 2 and 3 are similar views but with the parts in other positions.

Figure 4 is a side elevation of the storage means and means for clearing.

Figure 5 is a side elevation of the drive means for the storage means.

Figures 6 to 9 and 15 are detail views of the drive means of Figure 5.

Figures 10 and 11 show two forms of a means to lock all keys to prevent automatic writing.

Figure 12 shows mechanism for advancing the recording means step by step and also for back spacing.

Figure 13 shows the mechanism used to actuate the shift key.

Figure 14 illustrates mechanism for controlling automatic rewriting so as to reproduce predetermined sections of a record.

Figure 16 is an enlarged fragmentary view of a portion of the storage means.

Figure 17 shows more or less diagrammatically a modified form of take-off for reproducing.

Figure 18 shows still another form of take-off.

Figure 19 shows diagrammatically a proposed use of the invention.

Referring first to Figures 1, 2 and 3, the bar 30 pivoted at 31, represents the key bar of the typewriter, and, since the typewriter mechanism is not being in any way altered, none is being shown. It should be understood that, when a key bar is depressed, the corresponding character—letter, figure, or other—is printed in the usual fashion.

In each key bar 30, however, is a notch 32, provided for a purpose to be explained later and a hook or step 33, the horizontal portion 33A extending forward as shown.

Mounted on a suitable frame (indicated at 200 in Figure 1) under the key bars 30, are a plurality of levers 35, (one for each key bar) pivoted at 36 and extending forward to a point in front of the hook 33 and carrying a bell crank 37 pivoted as at 38.

To the other (rear) end of lever 35 is fixed one end of a spring 40 attached at its other end to an arm 41 swingable about a point 42 to a position against one of the stops 43—43A so as to be below or above a line through pivots 36 and 42 and thus tend to urge lever down or up as the case may be.

The bell crank 37 is so arranged that it is ordinarily maintained in the position of Figure 1 by means of a stop 45 and a spring 46, the latter being attached to the depending arm of the crank and to a suitable lug on the lever 35, and has its horizontal arm extending rearwardly over the hook 33A.

As shown in Figure 1, the bell crank 37 has its upper end provided with a flattened portion cooperating with the key bar 30 so that, when the latter is depressed, the bell crank 37 is also depressed, the depression being resisted by the spring 40 in the position shown.

As shown in Figures 1 to 3, directly beneath the mechanism just described and in alignment with the lower end of bell crank 37 is a depressible pin 50 which is a part of a recording or stroke storing element shown best in Figures 4 to 9 and 16.

This recording element is a belt-like assembly made up of a series of bars 51 of such length as to mount as many pins 50 as there are key bars 30 or other control keys, each pin in a bar 51 being located under one of the bell cranks 37. The bars 51 are linked together to form a belt or chain as shown in Figure 4 and pass over suitable sprockets 52.

The pins 50 are preferably L-shaped with the stem portion extending into suitable channels in the bars 51 and the horizontal portion extending rearwardly. Further, the stem portion and bar 51 are provided with means to hold the pin in its upward position, such as a small crook 50A at the end of the stem and a depression or groove 51A in the bar (see Figures 2 and 16). Since the pins are or should be of spring material, such means will releasably maintain them in either

elevated or depressed position. It is of course obvious that as the key bars 30 are depressed, and thereby the bell cranks 37, the pins 50 are also depressed.

In Figure 1 the parts are shown in the position occupied during the recording or storing operation.

In Figures 2 and 3 the parts are shown in the position occupied during the automatic printing operation and illustrate the printing action, as the conveyor moves.

In these two figures, the spring 40, through the movement of arm 41 against stop 43A, is biased to pull up the adjacent end of lever 35 and consequently tends to pull down the bellcrank 37. Therefore, when the conveyor travels, the lower end of the bellcrank will ride on the tops of the undepressed pins 50 until it comes to a depressed pin, whereupon the lower arm of the bell crank drops into the space as in Figure 2. The next undepressed pin 50 will thereupon swing the bellcrank 37 as in Figure 3 and, in so doing, the horizontal portion or nose of the bell crank, acting on the portion 33A of hook 33, pulls down the key bar 30, thus causing printing of the character.

The lower end of the bell crank then moves along the tops of undepressed pins 50 until another depressed pin is encountered.

In using the belt or recorder to set up a record of matter being written on the typewriter, each bar 51 can receive only a single letter or other character and, therefore, the belt must be moved the distance of one bar for each key stroke and means is shown in Figures 5 to 9 for producing such step by step movement.

In these figures, the shaft 60 has fixed to it one of the sprockets 52 and also a collar 53, the latter serving as an abutment for spring 54 which presses the parts between itself and sprocket 52 tightly against the latter.

Loosely mounted on the shaft 60 between the spring 54 and sprocket 52 is a large worm gear 55 and a clutch and escapement member 56 while between the gear 55 and member 56 is a coiled spring 57, the outer end of which is fixed to gear 55 as by pins 55A and the inner end to member 56 as by pins 56A, and meshed with gear 55 is a small driving worm 58 operated by suitable motor 59 to keep the spring 57 at its proper tension.

The element 56 is shown by itself in Figure 6 and consists of a thick disc grooved in its edge as at 56A to coact with a shifting fork 56B and provided with rectangular teeth 56C at one side of said groove. These teeth 56C coact with an escapement element 61 (see Figure 9) pivoted as at 61A and actuable by a pair of electromagnets 62. This element 56 is, further, provided on the face next to sprocket 52 with a suitable friction surface so that when the two are pressed tightly together a driving relation is maintained.

With this mechanism, as shown in Figure 5, the sprocket 52 is driven step by step by the spring 57 as the latter tends to unwind, the movement being controlled by the escapement mechanism of Figure 9.

Since, it is the spring 57 that drives the shaft 60, it is desirable that the tension of the spring be maintained near a suitable maximum at all times. Such means is shown in Figure 7.

In this figure the shaft 58B carrying the worm 58 is shown as driven through the coaction of a slotted sleeve 59A carried by the motor 59 and a pin 58C fixed in the shaft 58B, this arrangement being used to permit the shaft a small longitudinal movement.

The movement of shaft 58B toward the motor is resisted by a suitable spring 59B within the sleeve 59A.

With the parts as shown in Figure 7, the action of spring 59 B will be to maintain the shaft 58B in a position toward the right until the tension of spring 57 has increased to such a degree that it overcomes the spring 59B or, in other words, until the spring 59B can no longer maintain the shaft 58B at the right against the winding resistance.

When this point is reached, the shaft 58B moves to the left and a suitable switch will be operated to break the motor circuit.

This circuit breaking may be, for example, accomplished by providing a slip ring or groove 158 on shaft 58B and forked lever 159 actuating contacts 160 in the motor circuit indicated at 161.

When the tension of spring 57 drops the shaft 38B will again move to the right and the motor circuit re-made.

In order to permit hand operation, the shaft 60 may be provided with a suitable crank 68.

In the wiring diagram of Figure 15, the escapement operation is shown as being accomplished by the closing of a switch 62A, operable in any suitable manner by depression of a key 30, to close temporarily one of the normally open supply lines 62B. The closing of switch 62A energizes a suitable magnet 62C and at the same time completes a circuit through contacts 162, contacts 163, right hand magnet 62 and return lead 164 to the other side of the supply. Energization of right hand magnet 62 causes the armature end of the element 61 to swing over to the right, allowing contacts 163 to separate and closing contacts 163A, but as this takes place, magnet 62C breaks the circuit at contacts 162 and holds open the circuit through the magnet 62 until the switch 62A is opened.

The next closing of the latter energizes the left hand magnet 62 and swings element 61 back to the position shown.

The mechanism just described—Figures 5 to 9—is used during the production of the record and of course may be used during the automatic printing of the record so produced, but for the latter purpose, particularly for the printing of sections of the record, it is preferred to use a second motor 69 connected to drive the belt and controlled in any suitable manner.

The clearing of the record by elevating all of the pins may be accomplished by means of a suitable roller, such as is shown in Figure 4 at 95, mounted below the belt and adapted when lifted to roll over the lower ends of the pins 50 and push them up to undepressed position. For convenience, the roller 95 may be mounted on suitable levers 96 pivoted coaxially with a sprocket 52 and actuable from its free outer end 97 in any suitable manner.

In the preparation of a record of which only a part is to be automatically printed, for example, the writing of a number of letters having different headings or addresses, means is provided for locking all of the key bars 30 against movement except during the time of passage of that portion to be printed.

In order to accomplish this, each of the pin bars 51 will be provided with an additional pin or pins, depending upon how many sections it will be considered desirable to have, and one of these columns will be depressed alongside of the section of the record to be printed, and with suit-

able means, to be described, printing will be prevented except of that part of the record coincident with this depressed row.

Means for accomplishing this result is shown in Figures 10, 11 and 14.

In Figures 10 and 11 two alternate forms of locking means are shown, it being understood that either may be used as they are intended to prevent bellcrank 37 dropping between undepressed pins and operating key bars 30.

In Figure 10, adjacent the bellcrank 37 is a small electromagnet 70, the armature 71 of which is pivoted at 72 and carries a hook 73 which is swung under the bell crank 37 when the magnet is energized.

In Figure 11, a solenoid 70A is shown as actuating a swinging hook 73A about its pivot 72A to under the bell crank 37 when the solenoid is energized.

Either of these locks may be used with the mechanism shown in Figure 14 which shows the lock control for the section printing.

When the typist is preparing the record of that section which is to be automatically reproduced, the key bar 30A will be depressed and locked down. This action is provided for by the swinging key 30B having at its lower end a hook 30C adapted to coact with a stationary frame member 75.

The depression of bar 30A pushes down and holds down a roller 76 which then depresses its column of pins 50 as long as the key is down, and in the automatic reproduction of the record, the same roller 76 may be used to prevent printing of any portion of the record except that coincident with this depressed row of pins.

This is accomplished by providing an electric circuit such as is indicated in Figure 14. With the key bar 30A up, and as long as the roller 76 is held up by non-depressed pins 50, the circuit controlled by switch 77 is completed by the closed contacts 78. This circuit is through the locking magnets 70 or 70A which lock the bell cranks 37 against downward movement. When, however, the roller drops, due to reaching depressed pins 50, the circuit is broken at 78 and the bell cranks 37 released for printing. When the end of the row of depressed pins 50 is reached, the roller 76 is again elevated, the circuit re-established, and the bell cranks again locked.

It is of course obvious that there may be individual locks for the several bell cranks 37 or that all may be locked by a single magnet or solenoid.

In order to provide for shift key operation, and the printing of capitals or other shift key characters, another column of pins 50 is added to the bars 51 and the mechanism of Figure 13 used.

In this figure, the shift key bar 130 is shown as actuating an arm 131 carrying a roller 132 and spring pressed downwardly by a suitable spring 133. So long as the bar 130 is not depressed, the roller 132 is, of course, held up on undepressed pins 50, but in the printing operation, it drops down whenever it comes to depressed pins and, in so doing, actuates the shift mechanism.

In Figure 12 is shown another means which may be used for actuating the recording belt step by step and also means for back spacing.

In this figure, each key bar 30 is shown as actuating a lever 80 which, when the key bar is depressed, closes contacts 81 to complete a circuit through a pair of magnets 82. These then attract the armature 83 pivoted at 84 and carrying the upstanding arm 85, causing the latter to move toward the left. In so moving, the pawl arm 86 pivoted to the top of arm 85 moves the ratchet wheel 87 the distance of one tooth, being stopped from further movement by the detent 88 carried by arm 85 and acting in conjunction with the reverse ratchet wheel 89 fixed to wheel 87. Both wheels 87 and 89 are fixed to a shaft 90 which in turn actuates one of the sprockets 52. In this figure the parts are shown at the completion of the movement.

Back spacing is accomplished by moving the swinging arm 95 carrying the pawl 96. This pawl 96 is provided with a nose 97 which is of such length as first to lift the pawl 86 by striking the inclined surface 86A and then engaging one of the teeth in wheel 89.

Suitable springs 100 will be used to effect the reverse movements of the several parts just described.

As mentioned above, each of the key bars 30 is provided with a notch 32 immediately to the rear of the bell crank 37. This notch is to provide for the normal operation of the typewriter, and is put in use by moving the frame 200 (indicated only in Figure 1) carrying the pivots and consequently the elements 35, 37 and 41 a short distance rearwardly so as to bring the upper ends of the bellcranks 37 substantially opposite the centers of the notches as indicated by the dotted lines in Figure 1.

In this figure, there is also indicated means by which the present device may be actuated by remote control from another similarly equipped typewriter or other machine, each of the bell cranks 37 being connected mechanically, as by a wire or rod 201, to the armature 202 of a magnet or solenoid 203, the energization of which will cause the operation of a key 30.

In Figure 17 a modification of the structure of Figures 1 to 3 is shown. In this figure, showing only a take-off for reproducing a record already made, the bell crank 237 is tilted by one of the elements 50, as in Figures 1 to 3. However, as shown, tilting of crank 237 is utilized to move together a pair of spring electric contacts 231, mounted on a suitable support 232, and thus complete an electric circuit leading to a suitable solenoid 233 adapted to actuate a key or a corresponding element in a separate reproducing device.

Figure 18 shows another take-off which may be used. In this figure, the tilting element 337, actuable by an element 338 to a valve 339, which, in its idle or rest position, cuts communication between a source of suction or vacuum 340 and a bellows 341. The movable element 342 may be connected to any suitable mechanism for printing or other operation.

In Figure 19 is illustrated one of the many applications of the present invention. In this figure, at A for example, there may be arranged a typewriter equipped to make the record on the conveyor B, and as the record travels other take-off devices of any suitable kind operating mechanically, electrically, or pneumatically, may be placed at suitable locations such as C, D, E, F or G, and each take-off a portion or all of the record. Then as the conveyor passes back to the recording device at A, it may be cleared as by the clearing roll H and a new record made.

Now having described the invention and the preferred embodiment thereof, it is to be understood that the invention is to be limited, not to the specific details herein set forth, but only by the scope of the claims which follow:

I claim:

1. In combination with a typewriter having depressible keys, recording means comprising conveyor means carrying a plurality of depressible elements positioned beneath the said keys and means operably connecting said keys and elements, whereby depression of a key causes the depression of an element, said means consisting of a movable member positioned between said key and said element and acting to transmit the key movement to said element, means for retaining said element in its depressed position, and means for rendering said member inoperative to transmit such movement, whereby to prevent key depression movement being transmitted to said depressible elements.

2. In combination with the depressible keys of a typewriter, means for recording and reproducing the operations of said keys, said means consisting of a conveyor means adapted to be moved beneath said keys and provided with a plurality of rows of depressible elements, there being as many such rows as there are keys to be recorded and reproduced, a plurality of movement transmitting members positioned between said keys and said rows of depressible elements and each adapted to depress one of the elements when a key is depressed, spring means biased to urge said members toward said keys during recording and means for changing said bias to urge said members toward said elements during reproduction.

3. In combination with a depressible typewriter key, conveyor means carrying a row of depressible elements, a tiltable member positioned between said key and said row of elements and movable by the depression of said key to, in turn, depress one of said elements, means for intermittently moving said conveyor means whereby to present a succeeding element to said key after each operation, means biased to urge resiliently said member toward said key, means to change the direction of the bias to urge said member toward said elements and to thereby cause said member to move down upon a previously depressed element and be tilted by a succeeding undepressed element upon further movement of the conveyor means, and means carried by said key and member and cooperating to depress said key during the tilting of said member.

4. In combination with a depressible typewriter key, conveyor means carrying a row of depressible elements, a movable member positioned between said key and said row of elements and movable by the depression of said key to, in turn, depress one of said elements, means for intermittently moving said conveyor means whereby to present a succeeding element to said key after each operation, means biased to urge resiliently said member toward said key, means to change the direction of the bias to urge said member toward said elements and to thereby cause said member to move down upon a previously depressed element and be tilted by a succeeding undepressed element upon further movement of the conveyor means, and means carried by said key and member and cooperating to depress said key during the moving of said member.

5. In combination with a depressible typewriter key, a pivoted crank member positioned beneath the same, a series of depressible elements adapted to be moved beneath said member, means for resiliently supporting said member in position to transmit motion from said key to said elements whereby to depress the latter, means for lowering said crank member to a position wherein an undepressed element will swing it about its pivot, and a projection on said key adapted, when said member is so swung, to cooperate with a portion of said crank to produce depression of said key.

6. Key stroke recording means for use in conjunction with a typewriter, said means comprising conveyor means carrying rows of recording elements actuable by said keys, moving means including a spring motor tensioned to drive said conveyor means, escapement means between said motor and conveyor means whereby the latter may be caused to move intermittently, and means for maintaining the tension of said motor.

7. In recording means for the key strokes of a typewriter, conveyor means carrying elements actuable by said keys to record said strokes, and drive means therefor, said drive means consisting of a spring motor tensioned to drive said conveyor, escapement means between the conveyor and said motor and adapted to produce intermittent motion of said conveyor, means operably connecting said escapement means and said keys whereby to actuate said escapement means, means for maintaining the tension of said motor, and means for disconnecting said drive means from said conveyor whereby to permit continuous operation of the latter.

8. In recording means for the key strokes of a typewriter, conveyor means carrying elements actuable by said keys to record said strokes, and drive means therefor, said drive means consisting of a motor, escapement means between the conveyor and said motor and adapted to produce intermittent motion of said conveyor, means operably connecting said escapement means and said keys whereby to actuate said escapement means, means for maintaining the driving tension of said motor, and means for disconnecting said drive means from said conveyor whereby to permit continuous operation of the latter.

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