

June 18, 1929.

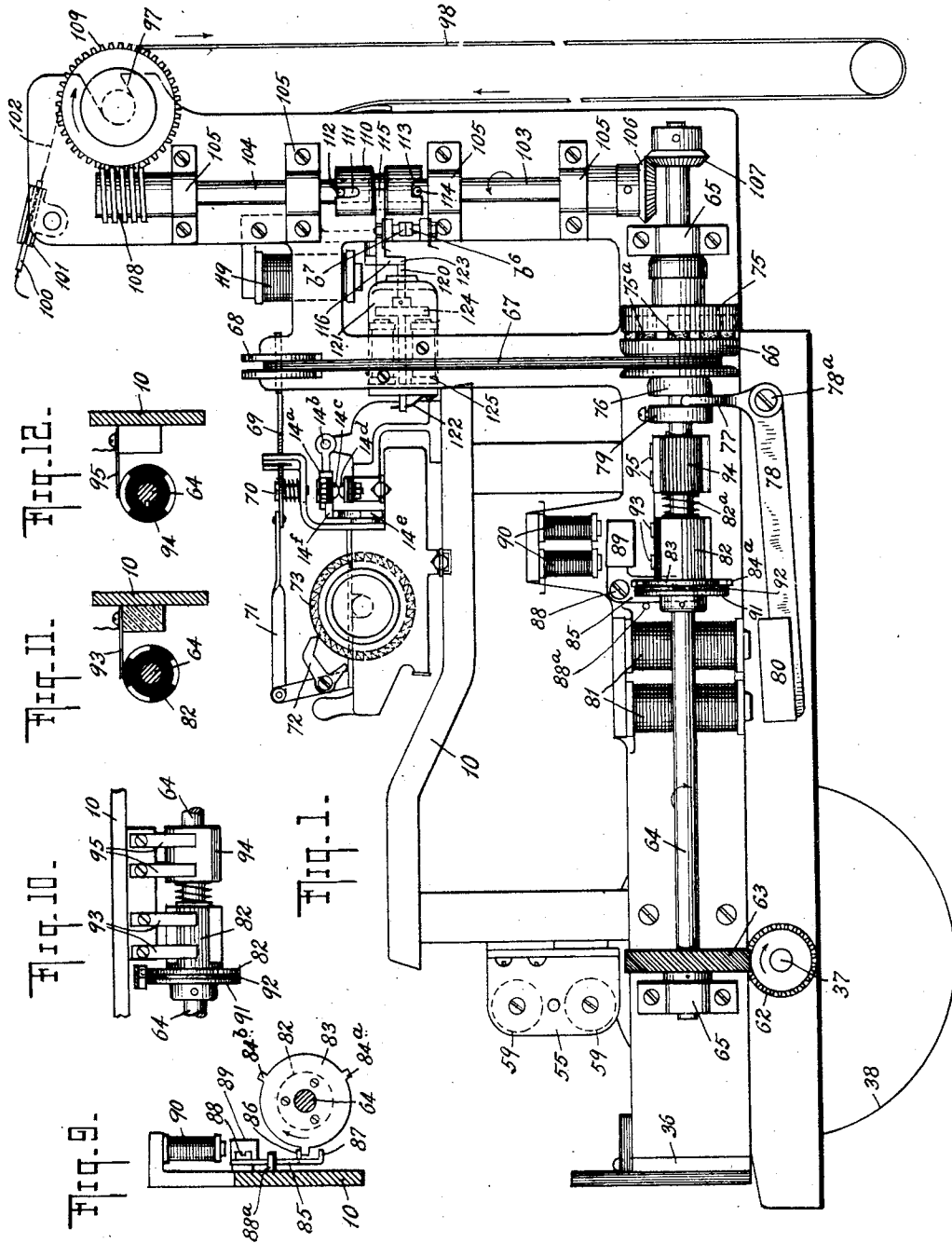
P. VON BOECKMANN

1,717,819

TYPEWRITER

Filed Nov. 22, 1923

5 Sheets-Sheet 1



WITNESS

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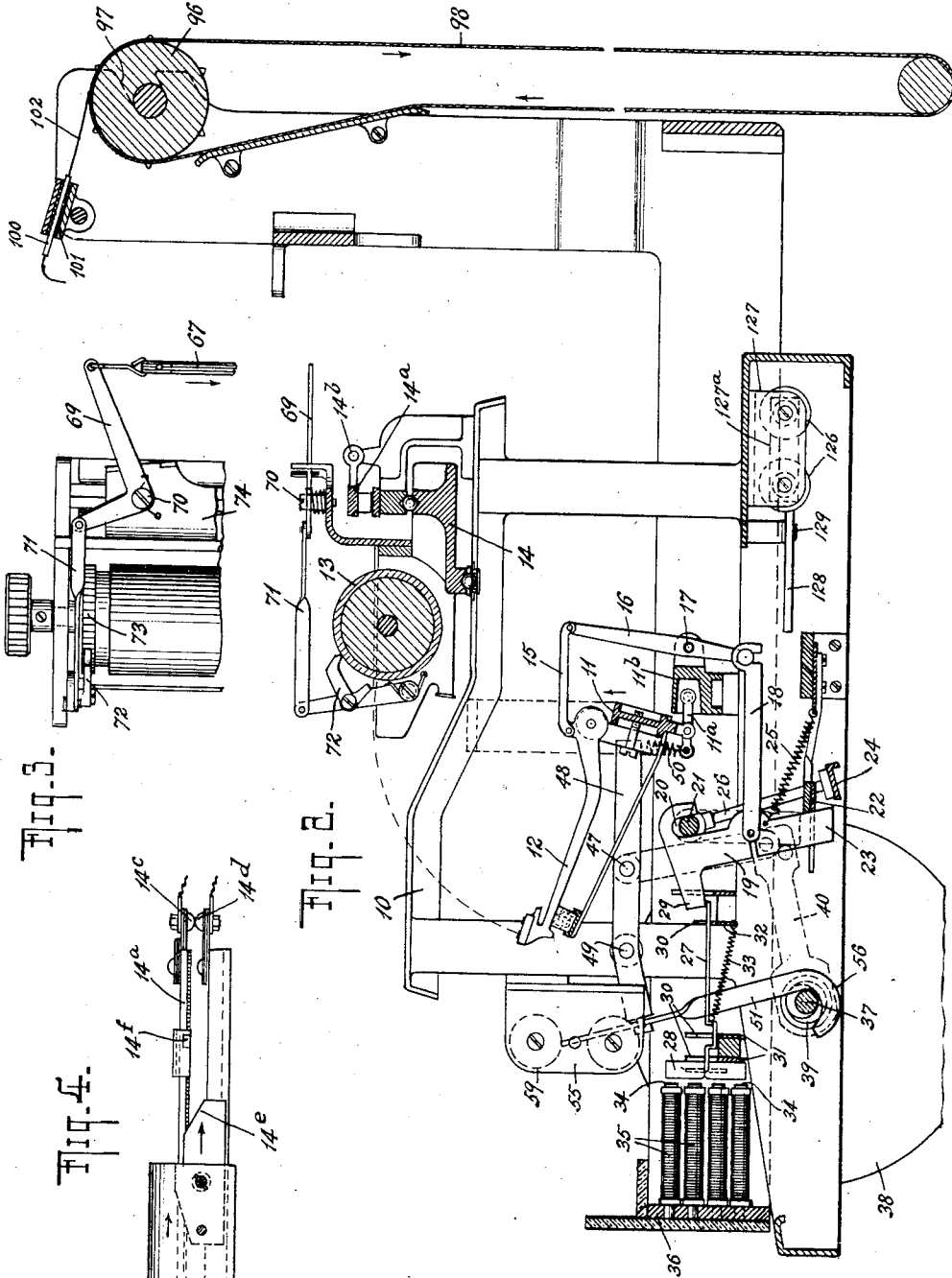
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TYPEWRITER

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5 Sheets-Sheet 2



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TYPEWRITER

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5 Sheets-Sheet 3

Fig. 6.

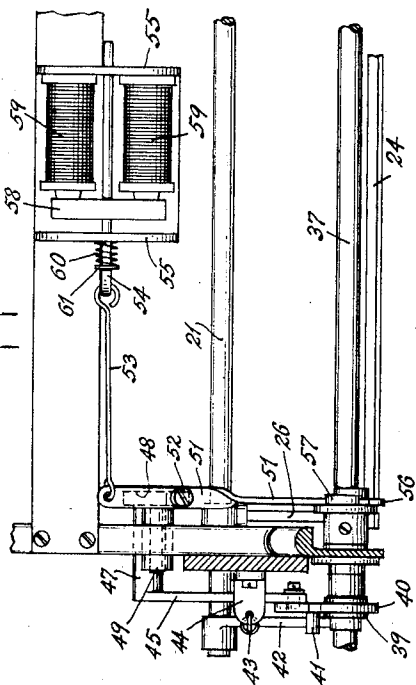
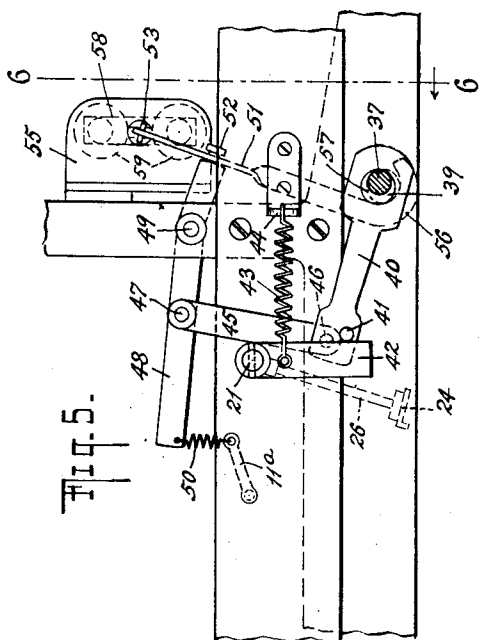


Fig. 5.



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Fig. 7.

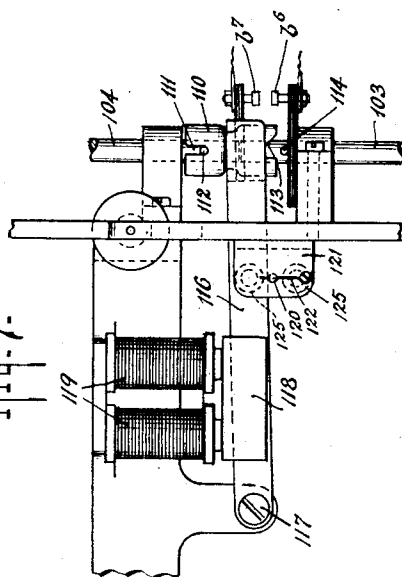
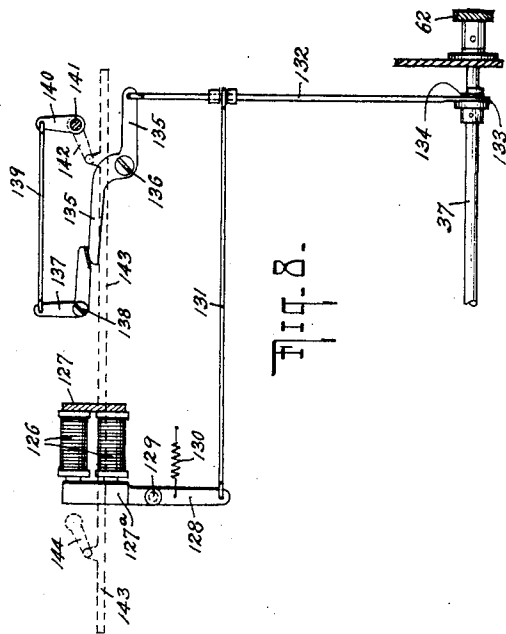


Fig. 8.



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Fig. 16.

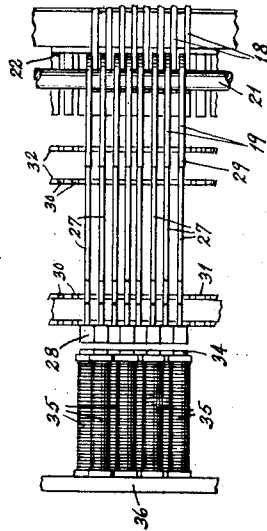


Fig. 17.

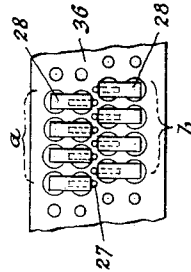


Fig. 18.

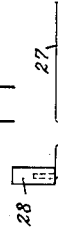


Fig. 19.



Fig. 13.

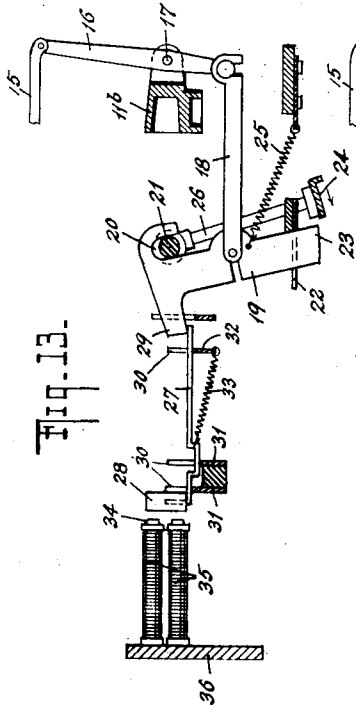


Fig. 14.

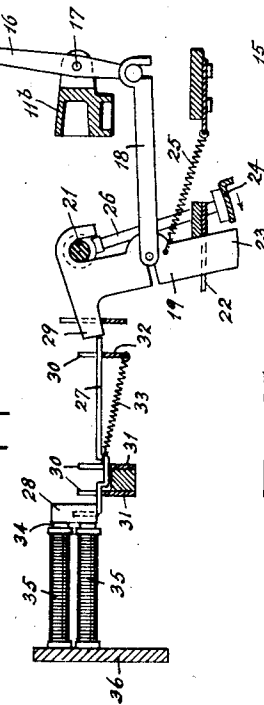
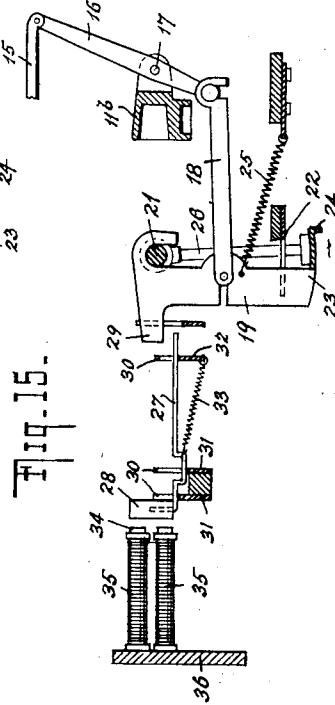


Fig. 15.



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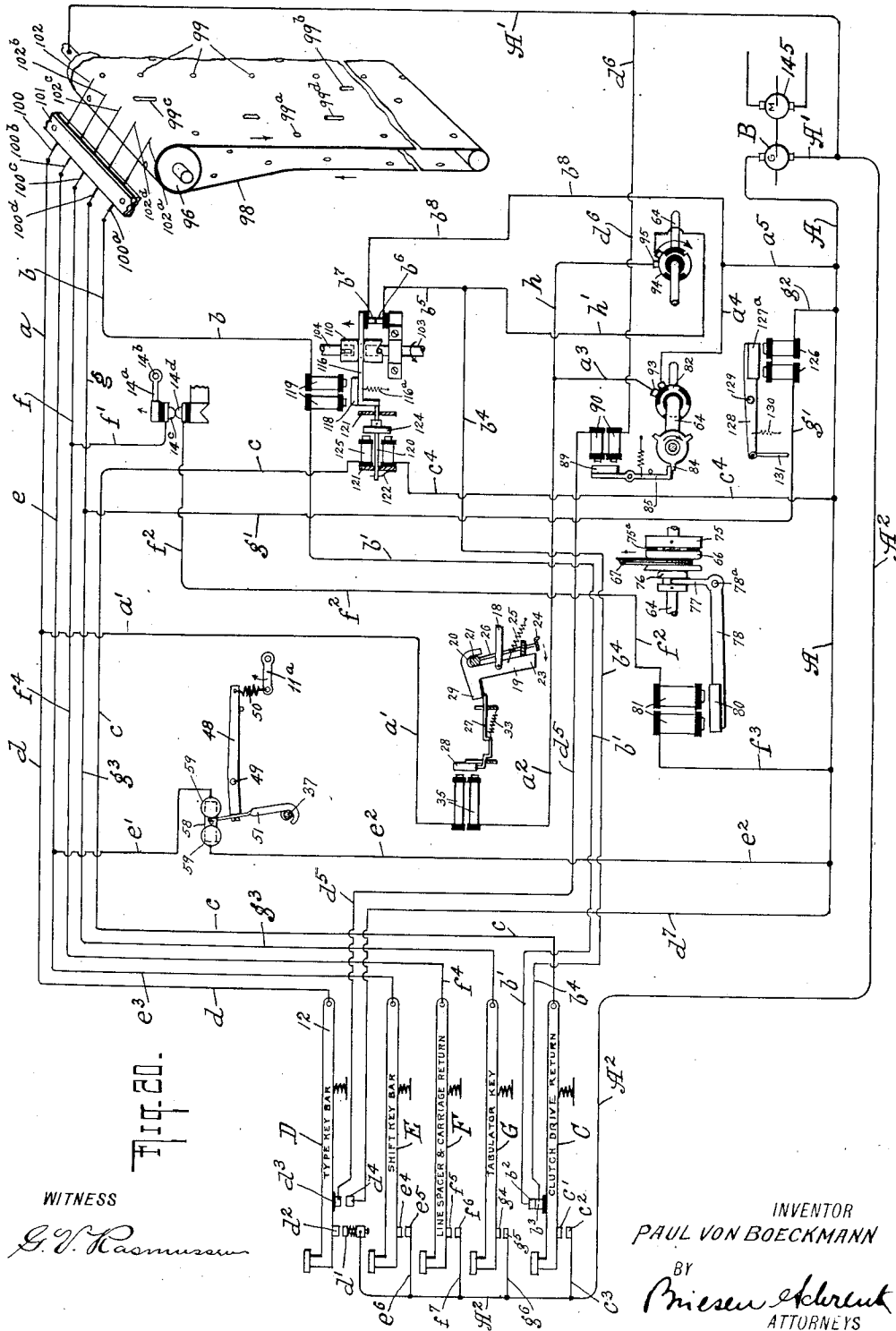
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TYPEWRITER

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UNITED STATES PATENT OFFICE.

PAUL VON BOECKMANN, OF NEW YORK, N. Y.

TYPEWRITER.

Application filed November 22, 1923. Serial No. 676,230.

My invention relates to typewriters, and has for its object to provide a simple and novel mechanism for automatically operating typewriters in an efficient manner, and further contemplates a construction in which said operating mechanism is itself automatically or manually controlled at will. Another object of my invention is to provide a simple and novel arrangement whereby the printing mechanism may be adjusted to produce impressions of uniform intensity and predetermined characteristics, and whereby the impacting force of the type bars may be varied to accord with the physical characteristics of the type and thereby produce uniform impressions. Other more specific objects of my invention will appear from the description hereinafter and the features of novelty will be pointed out in the appended claims.

In the accompanying drawings, which illustrate an example of the invention without defining its limits, Fig. 1 is a side elevation; Fig. 2 is a sectional elevation; Fig. 3 is a fragmentary plan view of the carriage; Fig. 4 is a detail view of a tripping mechanism effective to stop the carriage return; Fig. 5 a fragmentary side elevation looking in the opposite direction from Fig. 1; Fig. 6 is a detail section on the line 6—6 of Fig. 5; Fig. 7 is a detail view of the means for controlling the sheet operating mechanism; Fig. 8 is a diagrammatic view of the tabulating control; Figs. 9, 10, 11 and 12 are detail views illustrating circuit makers and breakers forming part of the mechanism; Figs. 13, 14 and 15 are detail views illustrating the type-bar actuating means in different positions; Figs. 16, and 17 are detail views showing the arrangement of electro-magnets and armatures for controlling the operation of the type-bars; Figs. 18 and 19 are detail views of the armature carrying rods and Fig. 20 is a diagrammatic view of the various electric circuits.

In the drawings, which show the invention applied to a type-writer of conventional form, 10 represents the frame having the customary segment 11 upon which type bars 12 are pivoted, in the well known way, for cooperation with the usual platen 13; the latter comprises part of the carriage 14 which is arranged to travel in the direction of its length in successive steps during the typing operation and to be rotated and returned to its initial position at the end of each printed line in a manner to be fully described hereinafter. In the illustrated example the segment 11 is pivotally mounted, by means of links 11^a upon a stationary section 11^b of the machine, so as to be capable of adjustment to bring the upper and lower case characters into printing position at will. As shown in the drawings, the type bars 12 are connected by means of links 15 with arms 16 pivotally mounted at 17 upon the section 11^b.

Each arm 16 is operatively connected, by means of a link 18, with a member 19 provided with a slot 20 whereby said member is mounted upon a shaft 21 so as to be capable of sliding and pivotal movements relatively thereto, as will be more fully set forth hereinafter, said shaft being journaled in suitable stationary bearings. The connection of the links 18 with the arms 16 and the members 19 preferably both comprise pins and open ended slots, so that said links 18 may be quickly and easily detached, if for any reason this should become necessary. The members 19 are so arranged that the end 23 thereof, in the operation of the mechanism, may be adjusted into the path of a constantly rocking bar 24 through the medium of a spring 25; the bar 24 is common to the ends 23 of all of the members 19 and is carried by arms 26 mounted upon the shaft 21. A trigger rod 27 at its one end carries an armature 28 and has its other end normally located beneath a lug 29 forming part of the member 19, said rod being slidably mounted in the slots 30 of fixed members 31 and 32 against one of which the armature 28 bears in the normal position of the parts. A spring 33 is connected with the rod 27 for restoring its armature 28 as well as associated parts, to their normal positions and for maintaining them therein. The armature 28 is located in co-operative relation to the cores 34 of electromagnets 35, which form part of a compound electrical circuit to be more fully described hereinafter. The spring 25 serves, in addition to its other functions, previously mentioned, to exert a pull upon the member 19 whereby the lug 29 thereof is maintained in engagement with the rod 27 when the parts occupy their normal positions, the pivotal movement of the member 19 in one direction being arrested by a stop bar 22.

It will be understood that the members 19, rods 27 and armatures 28, correspond in number to the number of typebars 12 included in the typewriter, and that the electromagnets 35 are of such number and so arranged

as to properly co-operate with each armature 28 to produce the desired operation; or in other words, that for each type bar 12 there is a mechanical operating unit consisting of the parts referred to above and their co-operating elements, one complete unit being illustrated in Fig. 2 and being shown in part in Figs. 13, 14, and 15. For the purpose of attaining the greatest simplicity in the grouping of the electromagnets 35 and in order to make the same and the co-related parts readily accessible, the arrangement shown in Figs. 2, 16, and 17 is preferred. As illustrated, the magnets are grouped in a plurality of tiers arranged in staggered formation upon a suitable supporting frame 36 which may be fixed in position upon the main support in any convenient manner. In the illustrated example the electro-magnets 35 are arranged in two tiers *a* and *b*, each tier containing two rows of magnets combined in pairs, each pair co-operating with one of the armatures 28 as shown in Fig. 17; with this arrangement the armatures which co-operate with the magnets 35 of the tier *a* project upwardly from the rods 27, while those armatures 28 which co-operate with the magnets 35 of the tier *b* extend downwardly from the rods 27 which carry them. The described arrangement permits easy inspection of the armatures and when necessary, permits any armature and its pulling rod to be completely removed from the machine by simply lifting the same upwardly out of the slots 30 of the members 31 and 32.

Any suitable means may be employed for rocking the bar 24 during an operative period of the machine; the speed of operation of said bar 24 being preferably at a rate which is greater than the speed at which a typewriter is manually actuated by an operator the purpose of which will appear more fully hereinafter; as shown by way of example in the drawings, this means may comprise a shaft 37 journaled in suitable bearings and rotated in any conventional manner, as by being provided with a pulley 38 connected by belt with an electric motor or the like. The shaft 37 carries an eccentric 39 which serves to reciprocate a member 40 which carries a pin 41 adapted to bear against an arm 42 fixed upon and depending from the shaft 21; a spring 43 has its one end connected with said arm 42 and its other end attached to a lug 44 fixed upon the frame 10 at a suitable point. With this arrangement the arm 42 is positively moved in one direction by the action of the pin 41 and in the return direction by the spring 43 and the shaft 21 and consequently the bar 24 is rocked to and fro. The member 40, in the illustrated example, is supported at its free end by means of a link 45 the one end of which is pivoted to said member 40 at 46 and the other end of which is pivoted at 47 to a lever 48; the latter

is fulcrumed at 49 upon a stationary part of the frame 10 and at one end is connected with a spring 50 which in turn is attached to the link 11^a whereby the segment 11 is mounted upon the stationary section 11^b. A shift actuating member 51 is pivoted at 52 upon the opposite end of the lever 48 and has its upper end connected by means of a wire or other rigid connection 53 or the like with a bar 54 slidably mounted in a support 55 fixed upon the frame 10. The lower end of the member 51 is formed with a hook 56 which extends about the shaft 37 and is adapted to be shifted into and out of co-operative relation with a cam 57 carried thereby as shown in Figs. 5 and 6. The aforesaid shifting of the hook 56 is accomplished by means of an armature 58 carried by the bar 54 and adapted to co-operate with a pair of electro-magnets 59 located upon the support 55 as shown in Fig. 6. A spring 60 surrounds the bar 54 and bears with one end against the support 55 and with its other end against a collar 61 on the bar 54 and by its action on said bar serves to maintain the armature 58 normally at a distance from the electro-magnets 59 and the hook 56 of the member 51 out of the path of the cam 57 as shown in Fig. 2. In Fig. 6 the parts mentioned above are shown in a position in which the hook 56 is in the path of said cam 57 so as to be operated thereby in the manner to be more fully set forth further on in the description.

During the operation of the type-keys in the manner to be more fully set forth hereinafter, the carriage 14 is advanced in steps by the customary carriage feed mechanism in the well known way until the end of a line is reached. To continue the writing, when this point has been reached, it is necessary to return the carriage 14 to its initial position and to rotate the platen 13 a distance corresponding to the line spacing of the matter being written. The mechanism whereby this return of the carriage and line spacing is brought about is shown, by way of example, in Fig. 1 of the drawings. As illustrated this mechanism comprises a pinion 62 secured upon the shaft 37 and meshing with a gear 63 carried by a counter-shaft 64 journaled in bearings 65 fixed upon the frame 10. A drum 66 is loosely mounted upon the counter-shaft 64 and is connected with a flexible band or tape 67 which passes over a pulley 68 on the frame 10, the free end of said band 67 being attached to a spring controlled bell-crank lever 69 pivoted at 70 upon the carriage 14; the lever 69 in turn is connected by means of a link 71, as shown in Fig. 3, with the pawl 72 which co-operates with the ratchet 73 to rotate the platen 13 periodically for line spacing the matter being written. A clutch 75 is fixed upon the shaft 64 and is provided with pads or the like 75^a arranged to co-

operate with the drum 66 and couple it to the shaft 64 at the proper time. The drum 66 is further provided with a hub 76 against which the forked end 77 of a bell-crank lever 78 bears as shown in Fig. 1, the return movement of said forked end 77 being arrested at a predetermined point by means of a collar 79 fixed upon the counter-shaft 64; at its free end the bell-crank lever 78, which is pivoted at 78^a upon the frame 10, carries an armature 80 arranged for co-operation with electro-magnets 81 mounted upon the frame 10 as shown in Fig. 1.

The machine includes a bar 14^a pivoted at 14^b upon the frame 10 and provided with a contact 14^c arranged for co-operation with a contact 14^d fixed upon said frame 10 as shown in Figs. 1 and 4; the contacts 14^c and 14^d are in electrical circuit with the electro-magnets 81 and comprise part of a means whereby the carriage return is arrested at a point and in a manner to prevent injury to the machine. As shown in Fig. 4 the carriage 14 is provided with a cam-member 14^e arranged to exert a lifting action on a lug 14^f carried by the bar 14^a and thereby separate the contacts 14^c and 14^d; it will be understood that the latter and the cam-member 14^e and lug 14^f are so located with respect to each other that the described separation of the contacts 14^c and 14^d will take place toward the finish of the return movement of said carriage.

Upon the counter-shaft 64 is loosely mounted a circuit maker and breaker 82 provided at one end with a clutch-disk 83 having spaced projections 84, 84^a and 84^b extending radially outward from its periphery as illustrated in Fig. 9. The disk 83 is arranged

for co-operation with a latch 85 which includes two spaced lugs 86 and 87 located in off-set relation with respect to each other and adapted to alternately and successively engage the projections 84, 84^a and 84^b of said disk for normally maintaining the circuit maker and breaker 82 against rotation. The latch 85 is in the form of a bell-crank lever pivoted at 88 and stopped in one direction by a pin 88^a and carries an armature 89 arranged for co-operation with electro-magnets 90 located upon the frame 10; when electrically engaged as will appear more fully hereinafter, the electro-magnets 90, by attracting the armature 89, swing the latch 85 to an

inoperative position in which the lug 86 is moved out of engagement for instance with the projection 84 and the lug 87 is moved into the path of the next succeeding projection 84^a. In this position of the parts the disk 83 and circuit maker and breaker 82 are free to rotate and are coupled to the counter-shaft 64 by means of a co-operating clutch-disk 91 preferably faced with felt or other friction material 92 as shown in Figs. 1 and 10, the rotation of the disk 83 and the circuit maker

and breaker 82 being finally stopped when the projection 84^a engages the lug 87. When the electromagnet 90 is deenergized, the armature 89 will drop and thereby swing the lug 87 out of engagement with the projection 84^a and at the same time adjust the lug 86 into the path thereof; as a result of this, the circuit maker and breaker 82 again rotates until stopped by engagement of the projection 84^a with the lug 86. From the above it will be clear that the energizing and deenergizing of the electromagnets 90 causes an oscillation of the latch 85 which, by shifting the lugs 86 and 87 into and out of the paths of the projections 84, 84^a, and 84^b brings about an intermittent rotative movement of the circuit maker and breaker 82 whereby electrical arcing and sparking is prevented. In order to maintain the circuit maker and breaker 82 against lengthwise movement on the counter-shaft 64 and to insure an efficient frictional engagement between the disks 83 and 91 at the proper time a coil spring 82^a may be provided upon the shaft 64. This spring bears with one end against the circuit maker and breaker 82 and with its other end against a fixed element on the shaft 64 and exerts a tension tending to force the disk 83 toward the disk 91. The circuit maker and breaker 82 co-operates with switch-tongues 93 fixed upon the frame 10 as illustrated in Fig. 10, said circuit maker and breaker 82 and switch-tongues 93 being in electrical circuit with the electro-magnets 35 and constituting a controlling means whereby interference with the intended actuation of the mechanism, particularly when manually operated, is prevented.

The counter-shaft 64 further carries a circuit-breaker and maker 94 mounted to rotate with said counter-shaft 64 and co-operating with a pair of switch-tongues 95 fixed upon the frame as shown in Figs. 1, 10, and 12; in addition to its other functions, the circuit-maker and breaker may constitute the fixed element against which the spring 82^a bears as shown in Fig. 1. The circuit-maker and breaker 94 and the tongues 95 are in electrical circuit with the electro-magnets 35 and serve to prevent electrical arcing or sparking during automatic operation of the machine, in the manner to be more fully described hereinafter.

The operation of the mechanism so far described is as follows, it being assumed that the shaft 37 is being continuously operated to rotate the eccentric 39 and thus reciprocate the member 40; the latter through the medium of the pin 41 and the co-operation of the spring 43 causes the arm 42 to be oscillated and thus rocks the shaft 21. This causes the arms 26 to be oscillated and consequently brings about a horizontal reciprocation of the bar 24, the speed of operation being preferably in excess of the speed at which a typewriter, generally

speaking, is manually operated. Under such conditions, if the electro-magnets 35 are electrically energized, the co-operating armature 28 will be attracted by the cores 34 and will accordingly exert a pull upon the rod 27 whereby its free end is withdrawn from beneath the lug 29 of the member 19 which is thus relieved from restraint. As soon as this happens, the member 19, by the action of the spring 25, is drawn downwardly in Fig. 2; if this downward movement of the member 19 occurs at a time when the bar 24 is anywhere between the extremes of its range of operation either during a forward or a backward movement, the end 23 of the member 19 will be drawn into surface engagement with said bar 24. The latter in continuing its operation will simply ride along said end 23 until it, the bar 24, reaches a position rearwardly or behind the member 19 whereupon the latter is shifted to a position in which its end 23 is in the path of the reciprocating bar 24 as shown in Fig. 14. In this condition, the first time the latter, in continuing its reciprocations, describes a forward movement, it will exert a forward pressure upon said end 23 whereby said member 19 is pivotally moved about the shaft 21 in a forward direction. Because of the fact that at this stage, the bar 24 and member 19 both move forwardly about the same centre, or in other words both have the shaft 21 as a pivot, there will be no relative surface movement or rubbing between the edge of the bar 24 and the end 23 of the member 19; as a result of this arrangement, friction between these elements is eliminated and wear and tear upon the same is reduced to a minimum.

The described actuation of said member 19 exerts a forward pull upon the link 18 and pivotally rocks the lever 16 on its pivot 17 and through the medium of the link 15, operates the type bar in the conventional manner. As the member 19 is brought to its extreme forward position shown in Fig. 15, the lug 29 thereof will be located at a point above the co-operating rod 27; because of the fact that at this stage, the electro-magnets 35 are de-energized, the restraint upon the armature 28 will be relieved and the particular rod 27 will be returned to its initial position and reset by the action of the spring 33; as the bar 24 and member 19 now move rearwardly, the member 19 will describe a pivotal rearward movement which has for its pivot the point of engagement between said lug 29 and the bar 27 and which member 19 is raised relatively to the shaft 21 and its end 23 consequently is withdrawn from the path of the bar 24. This operation is duplicated each time the electro-magnet 35, or any of them are energized and brings about a systematic operation of the typewriter, which is entirely automatic in its action.

During the writing with lower case characters, the hook 56 of the shift-actuating

member 51 is out of the path of the cam 57 on the shaft 37 and consequently is not affected thereby. At those points in the writing at which it is desired to write capital letters or other upper case characters the electro-magnets 59 are electrically energized and thus attract the armature 58 as shown in Fig. 6. This compresses the spring 60 and slidably moves the bar 54 toward the right in Fig. 6 and accordingly produces a pull in this direction upon the wire 53; this pull is transmitted to the shift-actuating member 51 and pivotally actuates the same in a manner to swing the hook 56 into the path of said cam 57 as illustrated in Fig. 6. As the cam 57 now rotates the shift-actuating member 51 will be drawn downwardly thereby and will rock the lever 48 upon its pivot 49 in a manner to cause it to exert a lifting action upon the spring 50 and links 11^a whereby the segment 11 is raised to a position in which the upper case characters are in the printing position. This rocking of the lever 48 will also lift the link 45 and consequently will shift the pin 41 along the arm 42 to a position nearer to the shaft 21; the point at which the pushing force of the member 40 is applied to the arm 42 being thus closer to the pivot thereof and the extent of pushing movement of said member 40 being unchanged, the pivotal swing of the arm 42 will be increased with the result that the upper case characters of the type-bars 12 will be brought into contact with the platen 13 or the paper thereon with greater force than the lower case characters. With this arrangement, the difference in impacting force which is required between the upper and lower case characters to produce uniform impressions thereof, is automatically taken care of. As soon as the printing of the upper case characters is to cease, the electro-magnets 59 are de-energized and the parts, shown in Figs. 5 and 6, are restored to their normal positions, in which the hook 56 is again out of registry with the cam 57.

During the operation of the type-bars 12, the carriage 14 is fed along in steps by means of the customary escapement mechanism and gradually unwinds the band 67 from the drum 66 which at this stage is capable of moving independently of the counter-shaft 64; this continues until the end of the line of typewriting is reached whereupon the electro-magnets 81 are energized and consequently attract the armature 80. This causes the bell-crank lever 78 to be pivotally swung in a direction to force the drum 66 into frictional engagement with the pads 75^a located upon the clutch member 75. In this way the drum 66 is coupled to the counter-shaft 64 and is accordingly rotated thereby in a direction to wind up the band 67 and exert a pull thereon; as the pull is applied to said band it is first transmitted to the bell-crank lever 69 and

causes the same to actuate the pawl 72 and thus rotate the platen 13 a distance corresponding to one line space. When this has been done, the continued pull upon the band 67, having moved the parts 69, 71 and 72 as far as they can be moved in this direction, will be transmitted to the carriage and consequently will pull the same back to its initial position. At a point near the end of the return movement of the carriage the cam member 14^e will engage and lift the lug 14^f whereby the contact 14^e is disengaged from the contact 14^d and the electrical circuit in which the electro-magnets 81 are located thus broken. As soon as this occurs, the armature 80 will be permitted to drop whereby the bell-crank lever 78 will be swung in a manner to disengage the drum 66 from frictional engagement with the pads 75^a of the clutch member 75. The latter being in this way uncoupled from the shaft 64, the pull upon the band 67 will cease and the carriage 14 will come to an easy stop. The purpose of the arrangement described above is to prevent the carriage 14 from being drawn into violent engagement with other parts of the machine, at the end of its return movement, and to obviate the possibility of injury to the mechanism, it being understood that the elements 14^e, 14^d, 14^c, and 14^f are so located as to bring this about.

The typewriter may be manually controlled for the purpose of writing special matter such as names and addresses or the like and automatically controlled for other purposes such as writing duplicates of a given letter, in the following novel ways: In the illustrated example, the automatic means consists of a metal drum 96 journaled in suitable bearings 97 on the frame 10 and over which a sheet 98 in the form of a band is adapted to travel, said sheet 98 being provided with perforations 99 located in predetermined arrangement for predetermined purposes, as will appear more fully hereinafter. Contact rods 100, corresponding in number to the number of type-bars 12 and each bearing an operative relation to one of said type-bars, are carried by and insulated from a support 101 mounted upon the frame 10, said contact rods 100 being provided with points 102 which bear upon the sheet 98 and are adapted to pass through the perforations 99 into contact with the drum 96, to control the electric circuit in which the electro-magnets 35 are located and thereby bring about an automatic operation of the type-bars 12 in the manner previously set forth. As shown diagrammatically in Fig. 20, the electric circuit referred to comprises wires $a-a'$ extending from the contact rod 100 to one pole of the electro-magnets 35, the other pole of which is connected by means of wires $a^2 a^3$ with one of the switch-tongues 93 of the circuit maker and breaker 82; the other switch-

tongue 93 of said circuit maker and breaker is connected by means of wires $a^4 a^5$ with a wire A which leads to one pole of a generator B. A wire A' leads from the other pole of said generator B to the drum 96 and completes the circuit; the generator B may be driven by means of an electric motor 145 as shown in Fig. 20. The mechanism whereby the drum 96 is operated, may, as shown, comprise a pair of aligning vertical shafts 103 and 104 journaled in bearing 105 upon the frame 10 as shown in Fig. 1. The shaft 103 is operatively connected with the counter-shaft 64 by bevel gears 106 and 107 and the shaft 104 is provided at its upper end with a worm gear 108 in mesh with a worm pinion 109 connected with the drum 96 as illustrated in Fig. 1. A clutch-sleeve 110 is permanently and slidably connected with the shaft 104 by means of a slot 111 and pin 112 and slidably fits over the shaft 103 with which it is detachably connected by means of a recess 113 and a pin 114, the clutch-sleeve 110 comprising a means whereby the shafts 103 and 104 may be connected and disconnected to control the operation of the drum 96. As shown in Fig. 2 the normal position of the clutch-sleeve 110 is such that the shafts 113 and 114 are connected and accordingly operate as a single shaft.

The purpose of the clutch-sleeve 110 is to permit the shaft 104 to be disconnected from the shaft 103 in order to arrest the operation of the drum 96 when for any reason this should be desired as for instance during the manual control of the typewriter for the purpose of writing special matter such as names and addresses and the like.

To effect an automatic disconnection of the shaft 104 from the shaft 103 at the time when the operation of the drum 96 is to be temporarily discontinued, the clutch sleeve 110 is connected with the forked end 115 of a lever 116 pivoted at 117 in a suitable manner upon the frame 10 as illustrated in Fig. 7. As this lever 116 is pivotally actuated, the clutch-sleeve 110 will be manipulated in a manner to connect and disconnect the shafts 113 and 114 as required. In the illustrated example the lever is electrically controlled and is provided with an armature 118 located in co-operative relation to one or more electro-magnets 119 mounted upon the frame 10 as shown in Figs. 1 and 7. These electro-magnets 119 are in electric circuit with a contact rod 100^a mounted upon the support 101 and having a point 102^a adapted to drop through perforations 99^a of the sheet 98; the perforations 99^a are so arranged upon the sheet 98 as to bring about an electrical energizing of the magnets 119 at the predetermined times where a discontinuance of the operation of the drum 96 is desired. That is to say, as the point 102^a drops through one of the perforations 99^a into contact with the drum 96 and thereby com-

pletes the aforesaid electric circuit whereby the electro-magnets 119 are energized, the armature 118 will be attracted and will pivotally lift the lever 116 and raise the clutch-sleeve 110. This will disengage the recess 113 from the pin 114 and disconnect the shaft 104 from the shaft 103 and thus arrest, temporarily, the operation of the drum 96. The circuit referred to comprises a wire b which leads from the contact rod 100^a to one pole of the electro-magnets 119, a similar wire b' leading from the other pole to a contact b^2 normally in engagement with a co-operating contact b^3 which, in turn, is connected by means of a wire b^4 with a wire b^5 . The latter is connected with a contact b^6 mounted upon the frame 10 and co-operating with a contact b^7 carried by the lever 116 from which a wire b^8 leads to the wire a^8 and by way of the wire A to generator B; from the latter the wire A' leads back to the drum 96 and completes the circuit.

In order that the disconnection of the shafts 103 and 104 may be maintained for a given period of time without requiring the electro-magnets 119 to be continuously energized throughout said period, it is desirable to lock the lever 116 in its raised position in such a manner that it may be readily released as soon as the connection of the shaft 104 with the shaft 103 is again desired. For this purpose the illustrated example of the invention includes a latch or locking member 120 slidably mounted in a support 121 located upon the frame 10 in operative relation to the lever 116 as shown in Fig. 1; a spring 122 serves to press the locking member toward the lever 116, which, as shown in Fig. 1, is provided with a depending lug 123 against which said locking member abuts in the normal position of the lever 116. The member 120 carries an armature 124 arranged, in operative relation to a pair of electro-magnets 125 fixed upon the support 121 and which constitute a part of the means whereby the locking member 120 is actuated to release the lever 116 and restore the connection between the shafts 103 and 104.

The electro-magnets 125 are in electric circuit with a key-lever C which carries the contact b^3 and serves to disengage the same from the contact b^2 and thereby break the circuit in which the electro-magnets 119 are located. That is to say, a wire c extends from one pole of the electro-magnets 125 to the key C which carries a contact c' adapted to co-operate with a contact c^2 ; the latter is connected by means of a wire c^3 with a main wire A² which connects with the wire A' leading to one side of the generator B. The wire A which leads from the other side of the generator B is connected with a wire c^4 which leads to the other pole of the electro-magnets 125 and completes the circuit.

From the foregoing it will be understood that as soon as the electric current through

the electro-magnets 119 is completed, in the manner set forth, the lever 116 will be lifted to discontinue the shafts 103 and 104 and will immediately be locked in this position by the locking member 120 and at the same time will at once arrest further movement of the drum 96 and sheet 98; that is as soon as the depending lug 123 rises above the member 120, the latter will be forced beneath the same by the action of the spring 122, whereby the lever 116 as well as the clutch-sleeve 110 will be held in the raised position. At the same time the described lifting of the lever 116 will raise the contact b^7 away from the contact b^6 and thus break the electric circuit whereby the electro-magnets 119 are energized and thus prevent the point 102^a from being burned.

During this period, that is while the shafts 103 and 104 are disconnected, the typewriter may be manually actuated for instance by a bank of master keys, to write special matter such as names, addresses and the like. The bank of keys referred to is diagrammatically represented by the key D in Fig. 20; as there shown this key D is electrically connected by means of a wire d with the wire a' and thus with one pole of the electro-magnets 35 and thereby becomes a part of the circuit a^2 , a^3 , a^4 , a^5 , A which leads from said generator. The wire A² is connected with a contact d' which is arranged for co-operation with a contact d^2 mounted upon the key D; the latter is further provided with a second contact d^3 adapted to engage a contact d^4 as shown in Fig. 20. The contact d^3 is connected by means of a wire d^5 with one side of the electro-magnets, from the other side of which a wire d^6 leads to the wire A' which, as previously stated, is connected with the generator B; the other contact d^4 is connected by means of a wire d^7 with the wire A which also leads to the generator B and completes the circuit in which the key D and the electro-magnets 90 are located.

With this arrangement as the key D is depressed the contact d^2 will engage the contact d' and thereby close the circuit through the key, the wires d and a' , the electro-magnets 35, wires a^2 and a^3 , circuit maker and breaker 82, wires a^4 , a^5 , and A, the generator B and the wires A' and A². At the same time, the contact d^3 will be brought into engagement with the contact d^4 and will thereby close the circuit through the wire d^5 , the electromagnets 90, the wires d^6 and A', the generator B and the wire A and d^7 . This causes an electrical energization of the coils 35 and 90 and brings about an operation of the type-bars 12 in the manner previously described. It will be understood that all of the master keys D are similarly connected and when operated produce the same actuation of the co-operating type-bars 12.

When the special matter being written by

the manipulation of the keys D has been completed and automatic operation of the typewriter is again desired, the key C is depressed, which brings about a separation of the contacts b^2 and b^3 . This breaks the circuit b' ; coils 119, wire b , contact bar 100^a, point 102^a, drum 96, wire A', generator B, wires A, a^5 , b^8 , contacts b^7 , b^6 , wires b^5 and b^4 , and obviates the possibility of any unintentional energization of the electro-magnets 119. Coincidentally with the separation of the contacts b^2 and b^3 , the contacts c^2 and c^3 are brought into engagement with each other and thus close the circuit comprising the wire c , the coils 125, the wires c^4 and A, generator B and the wires A', A² and c^3 . This results in an electrical energization of the electro-magnets 125 and causes the armature 124 to be attracted and to shift the locking-member 120 in a direction to release the lever 116. The latter by gravity or with the assistance of a spring 116^a drops to its initial position and restores the clutch-sleeve 110 to a position in which the recess 113 again engages the pin 113 and thus again connects the shafts 103 and 104. At the same time the contacts b^6 and b^7 are also returned into engagement with each other so that as soon as the key C is released and the contacts b^3 and b^2 are thereby again engaged, the circuit in which the electro-magnets 119 are located will be restored to its initial condition.

For the purpose of automatically energizing the electro-magnets 59 to bring about an automatic shifting of the mechanism for upper case writing a contact-bar 100^b is provided on the support 101 and has its point 102^b arranged to drop through apertures 99^b of the sheet 98 into contact with the drum 96 to complete an electric circuit whereby the coils 59 are energized each time an upper case character is to be written. The circuit referred to comprises a wire e leading from the bar 100^b and connected with a wire e' which leads to one pole of the electro-magnets 59; the other pole of the latter is connected by means of a wire e^2 with the wire A which leads to one side of the generator B. The said circuit is completed by the wire A' which connects the other side of the generator B with the drum 96. Thus each time an aperture 99^b comes into registry with the point 102^b the aforesaid circuit will be closed and the electro-magnets 59 will be energized and consequently will attract the armature 68; this will bring about an operation of the shift-actuating member 51 and of the co-operating elements to raise the segment 11 for upper case printing in the manner previously set forth. In order to permit this shifting of the segment 11 for writing upper case characters when the typewriter is being manually controlled by means of the master keys D, the circuit referred to includes a wire e^3 which leads to a shift key E as shown in Fig. 20.

The key referred to is provided with a contact e^4 arranged for co-operation with a similar contact e^5 which is connected by means of a wire e^6 with the wire A².

With this arrangement, as the key E is depressed, the contact e^4 will be brought into engagement with the contact e^5 and will accordingly close the circuit through the wires e^6 , A² and A', the generator B, the wires A and e^2 , the coils 59, the wire e' and the wire e^3 back to the key E. The electro-magnets 59 will accordingly be energized and will bring about an operation of the shifting mechanism in the same way as previously described.

In order to automatically operate the mechanism referred to hereinbefore whereby the platen 13 is rotated and the carriage 14 is returned to begin a new line, the sheet 98 is provided with apertures 99^c located thereon at the proper points and arranged to move into registry with the point 102^c of a contact-bar 100^c fixed upon the support 101. The bar 100^c is connected by means of wires f and f' with the contact 14^c located upon the carriage 14 and the co-operating contact 14^d which is fixed upon the frame 10 is connected by means of a wire f^2 with one side of the coils 81; the other side of said coils 81 is connected by means of a wire f^3 with the wire A which leads to the generator B, the particular circuit being completed by the wire A' leading from the generator B back to the drum 96.

Thus as an aperture 99^c comes into registry with the point 102^c and permits the latter to drop into contact with the drum 96 the circuit will be completed through the wires f and f' , the coils 81, the wires f^3 , and A, the generator B, the wire A' and the drum 96. This causes an electrical energization of the electro-magnets 81 which accordingly attract the armature 80 and shift the drum 66 into engagement with the clutch 75 and thereby bring about a rotation of the platen 13 and a return of the carriage in the manner previously set forth. As the carriage nears the end of its return movement, the cam 14^e will engage and lift the lug 14^f and the bar 14^a and thus will raise the contact 14^c away from the contact 14^d and break the aforesaid circuit; as previously stated the return movement of said carriage is thus arrested at a point and in a manner to prevent injury to the parts.

For the purpose of bringing about the described rotation of the platen and return of the carriage when the typewriter is under the manual control of the keys D, a wire f^4 leads from the wires f , f' to a control key F which is provided with a contact f^5 . The latter is arranged for co-operation with a contact f^6 which is connected by means of a wire f^7 with the main wire A². As the key F is depressed the contact f^5 will be brought into engagement with the contact f^6 and will close the circuit through the wires f^7 , A² and A', the generator B, the wires A and f^8 , the coils 81, the

wire f^2 , the contacts 14^a and 14^c , the wires f' and f^a back to the key F. The electro-magnets 81 will thus be operated in the same way as previously described to actuate the parts and to rotate the platen and return the carriage, the circuit being broken automatically by the separation of the contacts 14^c and 14^a in a corresponding manner.

In addition to the elements so far described, provisions are made for tabulating when this is required. In the illustrated example the tabulating means comprises a pair of electro-magnets 126 carried by a support 127 mounted upon the frame 10 for instance as shown in Fig. 2. An armature 127^a is located in operative relation to said electro-magnets 126 and is carried by a lever 128 pivoted at 129 upon the frame 10; a spring 130, indicated in Fig. 8, may be provided for shifting the lever 128 in a direction to move the armature 127^a away from the coils 126. The lever 128 is connected, by means of a link 131, with a member 132, the lower end 133 of which is hook-shaped and arranged to be shifted into and out of the path of a cam 134 mounted upon the shaft 37; as shown in Fig. 8 the arrangement is similar in construction and operation to the means shown in Figs. 5 and 6 whereby the segment 11 is shifted for upper case writing. The member 132 is pivotally connected with and depends from one end of a rocking lever 135 pivoted at 136 upon the frame 10 as illustrated diagrammatically in Fig. 8; the other end of said rocking lever 135 engages one arm of a bell-crank lever 137 pivoted at 138 upon the frame 10 of the machine. The other arm of said bell-crank lever 137 is connected by means of a link 139 with an arm 140 fixed upon a shaft 141; the latter is suitably journaled upon the frame 10 and carries a member 142 which is pivotally attached to the customary escapement rack 143, and supports one end portion thereof. A similar member 144 pivotally mounted upon the frame 10 supports the other end portion of said rack 143 as shown in Fig. 8.

The tabulating means is automatically controlled by the sheet 96 which includes apertures 99^a arranged to move into registry with the point 102^a of a contact-bar 100^a carried by the support 101. The bar 100^a is connected by means of wires, g and g' , with one pole of the electro-magnets 126, from the other pole of which a wire g^2 leads to the wire A. Thus when the point 102^a drops through one of the apertures 99^a into engagement with the drum 96, an electric circuit will be completed through the bar 100^a, the wires g and g' , the coils 126, the wires g^2 and A, the electric generator B and the wire A' back to the drum 96. This will energize the electro-magnets 126 which accordingly will attract the armature 127 and adjust the lever 128 and its associated parts into the positions shown in Fig. 8; this brings the hooked end 133 of the mem-

ber 132 into the path of the cam 134. As the latter is rotatably actuated a pull will be exerted upon the member 132 and transmitted to the rocking lever 135; the latter will, in this way, be rocked and in turn will rock the bell-crank lever 137 in a direction to lift the rack bar 143 clear of the escapement mechanism and thus permit the carriage to advance to the first tabulating stop, which, it will be understood is of the customary type and set in the conventional manner. As soon as the circuit is broken, by the passage of the particular aperture 99^a beyond the point 102^a, the lever 128 will be swung by the action of the spring 130, in a direction to move the armature 127 away from the coils 126 and to restore the associated elements to their initial positions.

For the purpose of permitting tabulation when the typewriter is manually controlled by the keys D, a tabulator key G is provided which is connected by means of a wire g^3 with the wires g and g' and thus with one pole of the electro-magnets 126; the key G carries a contact g^4 arranged to engage a contact g^5 which itself is connected by means of a wire g^6 with the main wire A² and thus by way of the generator B and the wires A and g^2 with the other pole of the electro-magnets 126. When the key G is depressed the contact g^4 is brought into engagement with the contact g^5 and the aforesaid circuit is accordingly closed; the electro-magnets 126 are thus energized and bring about an operation of the parts to release the rack 143 from the escapement as before.

The circuit maker and breaker 94, as previously stated is in electrical circuit, with the electro-magnets 35 to prevent electrical arcing and sparking for instance at contacts b^6 and b^7 ; that is one switch-tongue 95 is connected by means of a wire h' with the wires a^2 and a^3 while the other tongue 95 is connected by means of a wire h_2 with the wires b^4 and b^5 as shown in Fig. 20. The electrical generator B, in the illustrated example, may be operated by an electric motor 145 of conventional type or in any other suitable manner.

From the foregoing description it will be apparent that as the drum 96 is rotatably actuated to cause the sheet 98 to travel in the direction of its length, each time a perforation 99 is brought into registry with a point 102 of a contact-bar 100, that particular point will drop through said perforation into contact with the drum 96 and thus will complete an electrical circuit including one set of the electro-magnets 35. The latter will consequently be energized and will accordingly bring about an operation of a type bar 12 of the typewriter in the manner previously set forth. Thus, by simply arranging the contact-bars 100 to correspond with the type-bars of the typewriter and by perforating

the sheet 96 accordingly, the latter provides an accurate and efficient controlling medium whereby the typewriter is automatically operated to write letters or any other predetermined subject-matter. As soon as the point 102 of a given contact-bar 100 passes out of a perforation 99, due to the forward travel of the sheet 98, that particular circuit is broken and the co-operating set of electro-magnets 35 accordingly de-energized, with the result that the particular type-bar and associated parts, controlled by said magnet, will return to their normal positions. The previously mentioned circuit maker and breaker 82 serves to prevent electric arcing and sparking between the points of the contact arms and the drum 96, the arrangement being such that, as the contact points enter and leave the perforations of the sheet 98, the electrical circuits in which the contact bars are located will be temporarily open. In other words, the electrical circuits are closed only as the points traverse intermediate portions of the sheet perforations and are broken as the points enter and leave said perforations.

Manual control of the electro-magnets 35 to bring about a manual operation of the typewriter may as previously set forth be effected by means of the keys D which in such case control the previously mentioned electric circuit and the electro-magnets 35 included therein; it will be understood that suitable provision is made, as by means of springs, for restoring the keys D to their normal positions.

Shifting of the segment for upper case printing, rotation of the platen for line spacing and return of the carriage for beginning a new line, and adjustment of the carriage for tabulating work may likewise be automatically accomplished by means of the perforations of the sheet 98; at the same time manual control may be effected through the medium of control keys E, F, and G respectively and in the manner previously described. This manual operation may be accomplished regardless of the position of the sheet 98 with respect to the contact-bars 100 etc., it being obvious, however, that the sheet or, in other words, the automatic control is not in operation during the manual actuation set forth.

The various perforations 99, 99^a, 99^b, and 99^c, which control respectively the type-bars, the drum actuating mechanism, the segment shifting for upper case writing, the carriage return and the tabulating means are of suitable dimensions to bring about the desired results.

The automatic mechanism shown and described provides a simple and efficient means for automatically operating and controlling a typewriter by means of a perforated travelling sheet which may be perforated in accordance with any predetermined type of epistle or the like. The mechanism may be utilized

with advantage for many purposes, as for instance for writing duplicate letters and other documents.

Various modifications may be made within the scope of the claims without departing from the nature of my invention.

I claim:—

1. The combination of a typewriter including a series of type bars, a constantly reciprocating device, actuating members connected with said type bars and normally disconnected from said device, a series of electro-magnets, mechanism controlled by said electro-magnets for selectively coupling and uncoupling said actuating members with and from said reciprocating device, a travelling control device and means responsive thereto for controlling, in a predetermined manner, the circuits in which said electro-magnets are located.

2. The combination of a typewriter including a series of type bars, a constantly reciprocating device, actuating members connected with said type bars and normally disconnected from said device, a series of electro-magnets, tripping mechanism controlled by said electro-magnets for selectively coupling and uncoupling said actuating members with and from said reciprocating device, a travelling control device, means for automatically stopping said travelling device at a predetermined position, and means responsive to the control of the travelling device for controlling in a predetermined manner the circuits in which said electro-magnets are situated and for controlling the means for automatically stopping the travelling device at its predetermined stopping position.

3. The combination of a typewriter including a series of type bars and type bar operators, a constantly moving actuator, an electrically actuated tripping device including an electro-magnet in operative relation with each type bar operator for selectively coupling and uncoupling said type bar operators with and from said actuator, a travelling control device, means responsive thereto for controlling in a predetermined manner the operation of said electrically actuated tripping device, a series of contact keys for selectively controlling the circuits in which said electro-magnets are located, and means for automatically stopping the travelling device at predetermined positions.

4. The combination of a typewriter including a series of type bars, a constantly reciprocating device, actuating members connected with said type bars and normally disconnected from said device, a series of electro-magnets, mechanism controlled by said electro-magnets for selectively coupling and uncoupling said actuating members with and from said reciprocating device, a travelling control device, means responsive thereto for controlling the operation of said mechanism

in a predetermined manner, and a series of contact keys for selectively causing the closing and opening of the circuits in which said electro-magnets are located.

5 5. The combination of a typewriter including type bars and type bar operators, a constantly reciprocating actuator, electro-magnets, mechanism actuated by said electro-magnets for selectively coupling and uncoupling
10 said type bar operators with and from said actuator, a travelling control device, means responsive thereto for controlling in a predetermined manner the operation of said mechanism, a series of contact keys for selectively
15 controlling the circuits in which said electro-magnets are located, a circuit-making and breaking device, and means for maintaining open the circuit in which said circuit breaker is located, at the time when said travelling
20 device is not in motion.

6. The combination of a typewriter including type bar operators, a constantly moving actuator, electrically actuated devices including
25 an electro-magnet in operative relation to each type bar operator for selectively coupling and uncoupling said type bar operators with and from said actuator, a travelling control device, and means responsive thereto for
30 controlling in a predetermined manner the operation of said electrically operated devices, a series of contact keys for selectively closing and opening the electrical circuits in which said electrically actuated devices are
35 located, means whereby said travelling device is stopped automatically at predetermined positions and means for limiting said coupling and uncoupling to one cycle for each cycle of
40 closing and opening of the circuits in which said electro-magnets are located.

7. The combination of a typewriter including a series of type bars and type bar operators, a constantly moving actuator, electrically
45 actuated devices including a series of electro-magnets for selectively coupling and uncoupling said actuator with and from said operators, a travelling control device, and means responsive thereto for controlling, in a
50 predetermined manner, the operation of said electrically actuated devices, a series of keys capable of being depressed for controlling the circuits in which said electro-magnets are located and means whereby said coupling and
55 uncoupling is limited to permit one character only to be printed with each depression of one of said keys.

8. The combination of a typewriter including a type-bar action, a constantly reciprocating pivoted bar, a pivotally movable member
60 connected with said type-bar action, a device whereby said member is normally maintained out of the path of said bar, and means for actuating said device in a manner to permit said member to move into the path of said bar
65 whereby said type-bar action is operated thereby; said bar and member, during the

period of their engagement, having pivotal movements about a common pivot whereby relative rubbing movements between said bar and member are avoided.

9. The combination of a typewriter including a type-bar action, a constantly reciprocating
70 pivotal bar, a pivotally movable member connected with said type-bar action, a device whereby said member is normally maintained out of the path of said bar, and automatic means for actuating said device in
75 a manner to permit said member to move into the path of said bar whereby said type-bar action is automatically operated; said bar and member, during the period of their engagement, having pivotal movements about a
80 common pivot whereby relative rubbing movements between said bar and member are avoided.

10. The combination of a typewriter including a type-bar action, a constantly reciprocating
85 pivotal bar, a pivotally movable member connected with said type-bar action, a device whereby said member is normally maintained out of the path of said bar, means for actuating said device in a manner to permit
90 said member to move into the path of said bar whereby said type-bar action is operated, said bar and member, during the period of their engagement, having pivotal movements about a common pivot whereby relative rubbing
95 movements between said bar and member are avoided, and a traveling perforated sheet controlling the operation of said actuating means.

11. The combination of a typewriter including a type-bar action, a constantly reciprocating pivoted bar, a pivotally movable
100 member connected with said type-bar action, a device whereby said member is normally maintained out of the path of said bar, electrically operated means for actuating said device in a manner to permit said member to move into the path of said bar whereby said
105 type-bar action is automatically operated, said bar and member, during the period of their engagement, having pivotal movements about a common pivot whereby relatively rubbing movements are avoided, and a traveling
110 perforated sheet controlling the operation of said electrically operated means.

12. The combination of a typewriter, electrically actuated means for automatically
115 actuating the operating mechanism thereof, a drum in electrical circuit with said means, a member adapted to pass through the perforations of said sheet into contact with said drum to close said circuit, whereby the operation of
120 said electrically actuated means is controlled, a worm-gear connected with said drum, a worm-pinion in mesh with said worm-gear, a two-part drum shaft, a driving shaft connected therewith, a clutch device for operatively
125 connecting the parts of said drum-shaft

to operate said drum, and electrically actuated means controlled by said sheet for automatically actuating said clutch device to disconnect the parts of said drum-shaft and stop the operation of said drum.

13. The combination of a typewriter including a series of type bars, type carried by said bars, typewriter operating mechanism, a travelling control device, and means responsive thereto for controlling in a predetermined manner the operation of said mechanism, an electrically actuated device, and means controlled thereby for automatically causing a selectively varied impact force to be applied to selected type.

14. The combination of a typewriter, actuating mechanism for the type-bars of said typewriter, a device for increasing the potential impact force of said type-bars, and means under the control of a travelling perforated control sheet whereby the operation of said type-bars by said actuating mechanism is controlled and whereby the operation of said device is controlled in a predetermined manner.

15. The combination of a typewriter, actuating mechanism for the type-bars of said typewriter, an electrically actuated device for increasing the potential impact force of said type-bars, and means under the control of a travelling perforated control sheet whereby the operation of said type-bars by said actuating mechanism is controlled and whereby the operation of said device is controlled in a predetermined manner.

16. The combination of a typewriter, actuating mechanism for the type-bars thereof, a shift member for bringing about the printing of upper case characters, shift actuating means for operating said shift member, impact controlling means for increasing the potential impact force of said type-bars, and means under the control of a travelling perforated control sheet whereby the operation of said shift member is controlled, and whereby the adjustment of said impact controlling means to vary the impact force of said type-bars is effected coincidentally with the operation of said shift member.

17. The combination of a typewriter, a pivotally reciprocating bar for operating the type-bars of said typewriter, mechanism for reciprocating said bar, impact controlling means for increasing the potential impact force of said type-bars, and means under the control of a travelling perforated control sheet whereby the operation of said type-bars by said reciprocating bar is controlled and whereby the operation of said impact controlling means is controlled in a predetermined manner.

18. The combination of a typewriter, a pivotally reciprocating bar for operating the type-bars of said typewriter, an operating member for actuating said bar, means for adjusting said operating member relatively to

the pivot of said reciprocating bar during the operation of the typewriter to vary the potential impact force of the type-bars thereof, and means under the control of a travelling, perforated control sheet whereby the operation of said type-bars by said reciprocating bar is controlled, and whereby the operation of said means is controlled in a predetermined manner.

19. The combination of a typewriter, mechanism including a pivotally reciprocating bar for automatically operating the type bars of said typewriter, an operating member for actuating said bar, a shift member for bringing about the printing of upper case characters, means for operating the same, and a connection from said shift member to said operating member whereby the latter is adjusted toward the pivot of said reciprocating bar to increase the impact force of the type-bars of said typewriter coincidentally with the operation of said shift member.

20. The combination of a typewriter, mechanism including a pivotally reciprocating bar for automatically operating the type bars of said typewriter, an operating member for actuating said bar, a shift lever for bringing about the printing of upper case characters, a cam for operating the same, a shift actuating member connected with said shift lever and being normally outside of the operative path of said cam, an armature operatively connected with said shift actuating member, an electromagnet controlling said armature, and an electric circuit including said electromagnet and arranged to be closed whereby the electromagnet is energized and the armature is actuated to adjust the shift actuating member into the path of said cam and thereby operate said shift lever and at the same time adjust the operating member toward the pivot of said reciprocating bar to increase the impact force of the type-bars of the typewriter.

21. The combination of a typewriter including type-bars, members pivotally and slidably mounted and each connected with a type-bar, a pivotally reciprocating bar common to all of said members, trigger rods for normally maintaining said members out of the path of said bar, armatures connected with said trigger rods, electromagnets in operative relation to said armatures, and a traveling perforated sheet whereby the electrical energization of said armatures is controlled to operate said trigger rods and selectively release said members, whereby the latter are shifted into the path of said bar and said typewriter is automatically operated in a predetermined manner.

22. The combination of a typewriter including type-bars, members pivotally and slidably mounted and each connected with a type-bar, a pivotally reciprocating bar common to all of said members, trigger rods for

normally maintaining said members out of the path of said bar, armatures connected with said trigger rods, electromagnets located in banks in operative relation to said armatures, the electromagnets in one bank being staggered with respect to the electromagnets in an adjacent bank, a traveling perforated sheet, and members in electrical circuit with said electromagnets and arranged, by passing through the perforations of said sheet, to bring about an electrical energization of said electromagnets and a consequent operation of said trigger rods to selectively release said members, whereby the latter are shifted into the path of said bar and said typewriter is automatically operated in a predetermined manner.

23. The combination of a typewriter including a type-bar action, a constantly reciprocating bar, a member connected with said type-bar action, a trigger rod whereby said member is normally maintained out of the path of said bar and means for tripping said trigger rod to permit said member to move into the path of said bar whereby said type-bar action is operated thereby, said member, subsequently to its release, having a movement sufficient to prevent re-engagement with said trigger rod until after the aforesaid operation of the type-bar action has been completed.

24. The combination of a typewriter including a type-bar action, a constantly reciprocating bar, a member connected with said type-bar action, a trigger rod whereby said member is normally maintained out of the path of said bar and automatic means for tripping said trigger rod to permit said member to move into the path of said bar whereby said type-bar action is automatically operated, said member, subsequently to its release, having a movement sufficient to prevent re-engagement with said trigger rod until after the aforesaid operation of the type-bar action has been completed.

25. The combination of a typewriter including a type-bar action, a constantly reciprocating bar, a member connected with said type-bar action, a trigger rod whereby said member is normally maintained out of the path of said bar, means for tripping said trigger rod to permit said member to move into the path of said bar whereby said type-bar action is operated, said member, subsequently to its release having a movement sufficient to prevent re-engagement with said trigger rod until after the aforesaid operation of the type-bar action has been completed and a traveling perforated sheet controlling the operation of said tripping means.

26. The combination of a typewriter including a type-bar action, a movable device constantly movable to a periodically recurrent impact delivering position, and normally ineffective upon said type-bar action, elec-

trically actuated means whereby operative connection and disconnection between said type-bar action and movable device is automatically controlled, a travelling perforated sheet whereby the operation of said electrically actuated means is automatically controlled to automatically operate said typewriter and a circuit maker and breaker whereby the circuit in which said electrically actuated means is located is broken and closed at least once for the distance represented by a given perforation of said sheet.

27. The combination of a typewriter including a type-bar action, a movable device constantly movable to a periodically recurrent impact delivering position and normally ineffective upon said type-bar action, electrically actuated means whereby operative connection and disconnection between said type-bar action and movable device is automatically controlled, an electrical circuit including said electrically actuated means, a drum in said circuit, a contact member in said circuit and arranged, by engagement with said drum, to close said circuit, a travelling sheet passing over said drum and normally maintaining said contact member out of engagement with said drum, said sheet having perforations adapted to be brought into registry with said contact member to enable it to engage said drum and a circuit maker and breaker in said electrical circuit whereby the latter is broken as said contact member enters and leaves a given perforation and closed when said contact member is at an intermediate portion of said perforation.

28. The combination of a typewriter, mechanism for automatically operating the type-bars thereof, shifting means for bringing about the printing of upper case characters and cooperating means operated coincidentally with the operation of said shifting means to increase the impact force of said type-bars and a travelling perforated sheet for controlling the operation of said mechanism and for bringing about the operation of said shifting means and cooperating means.

29. The combination of a typewriter including a series of type-bars and type-bar operators, a constantly moving actuator, electrically actuated devices for normally maintaining said type-bar operators in inoperative positions, said devices being capable of being tripped for selectively coupling and uncoupling said type-bar operators with and from said actuator, a travelling device for controlling, in a predetermined manner, the operation of said electrically actuated devices, means whereby said travelling device is stopped automatically at predetermined points, and electrically actuated means to start said travelling device.

30. The combination of a typewriter including a series of type-bars and type-bar operators, a power-driver, a constantly mov-

ing actuator propelled by the power-driver, electrically actuated devices for selectively coupling and uncoupling said type-bar operators with and from said actuator, a travelling control device normally connected with said power-driver and means responsive to the travelling device for controlling, in a predetermined manner the circuits in which said electrically actuated devices are located, means whereby said travelling device is stopped automatically at predetermined positions, and means to start said travelling device.

31. The combination of a typewriter including a series of type-bars and type-bar operators, a power-driver, a constantly moving actuator propelled by the power-driver, electrically actuated devices for selectively coupling and uncoupling said type-bar operators with and from said actuator, a travelling device normally connected with said power-driver for controlling, in a predetermined manner, the operation of said electrically operated device, means whereby said travelling device is stopped automatically at predetermined positions, and a circuit breaker whereby the circuit in which said electrically actuated devices are located, is closed and opened at least once with each stroke of a type-bar.

32. The combination of a typewriter including a series of type-bars and type-bar operators, a power-driver, an actuator common to all of said type-bar operators propelled by said power-driver, electrically actuated devices including an electro-magnet in operative relation to each type-bar operator for selectively coupling and uncoupling said type-bar operators with and from said actuator, a travelling device normally connected with said power-driver for controlling, in a predetermined manner, the operation of said electrically operated devices, means whereby said travelling device is stopped automatically at predetermined positions, and means to start said travelling device.

33. The combination of a typewriter including a series of type-bars and type-bar operators, a power-driver, an actuator common to all of said type-bar operators propelled by said power-driver, electrically actuated devices, including an electro-magnet, in operative relation to each type-bar operator for selectively coupling and uncoupling said type-bar operators with and from said actuator, a travelling device normally connected with said power-driver for control-

ling, in a predetermined manner, the operation of said electrically operated devices, and a series of contact keys for selectively closing and opening the electrical circuits in which said electrically actuated devices are located.

34. The combination of a typewriter including a series of type-bars and type-bar operators, a power-driver, an actuator common to all of said type-bar operators propelled by said power-driver, electrically actuated devices including an electro-magnet in operative relation to each type-bar operator for selectively coupling and uncoupling said type-bar operators with and from said actuator, a travelling perforated sheet for controlling, in a predetermined manner, the operation of said electrically actuated devices, and a circuit maker and breaker whereby the circuit in which said electrically actuated devices are located is closed and broken at least once for the distance represented by a given perforation of said sheet.

35. The combination of a typewriter including a series of type-bars and type-bar operators, a power-driver, a constantly moving actuator propelled by the power-driver, electrically actuated devices for selectively coupling and uncoupling said type-bar operators with and from said actuator, a travelling device normally connected with said power-driver for controlling, in a predetermined manner, the operation of said electrically operated devices, and means for disconnecting and re-connecting said travelling device from and with said power-driver.

36. The combination of a typewriter including a series of type-bars and type-bar operators, a power-driver, a constantly moving actuator propelled by the power-driver, electrically actuated devices for normally maintaining said type-bar operators in inoperative positions, said devices being capable of being tripped for selectively coupling and uncoupling said type-bar operators with and from said actuator, a travelling device normally connected with said power-driver for controlling, in a predetermined manner, the operation of said electrically operated devices, and means for disconnecting and re-connecting said travelling device from and with said power-driver.

In testimony whereof I have hereunto set my hand.

PAUL VON BOECKMANN.