T. M. LILLEBERG.

MACHINE FOR PRODUCING CHARACTERS.

APPLICATION FILED DEC. 15, 1911.

1,063,363.

Patented June 3, 1913.

4 SHEETS—SHEET 1.

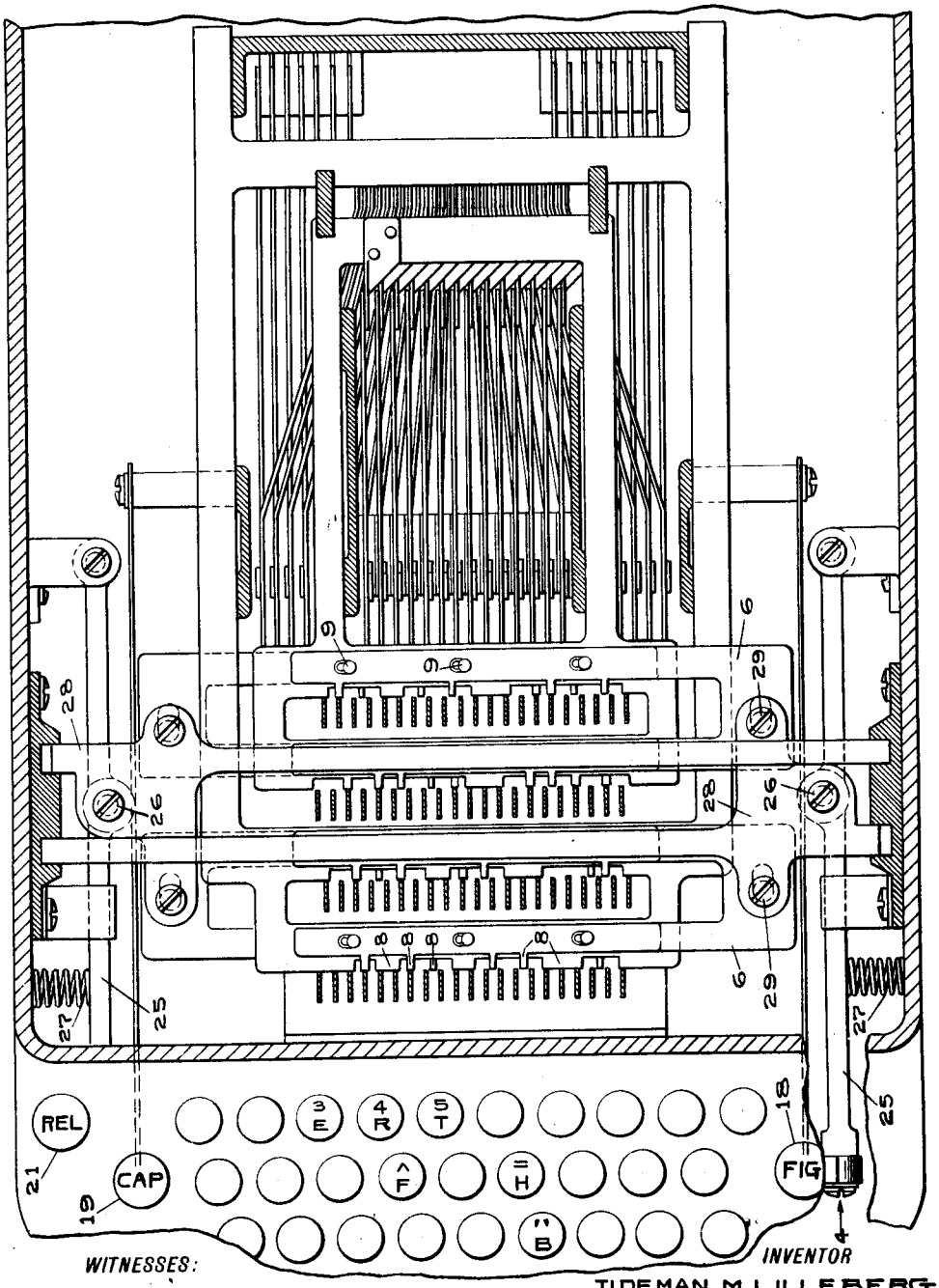

FIG. 1

WITNESSES:

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Edward Evans

INVENTOR

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BY G. L. Grogg

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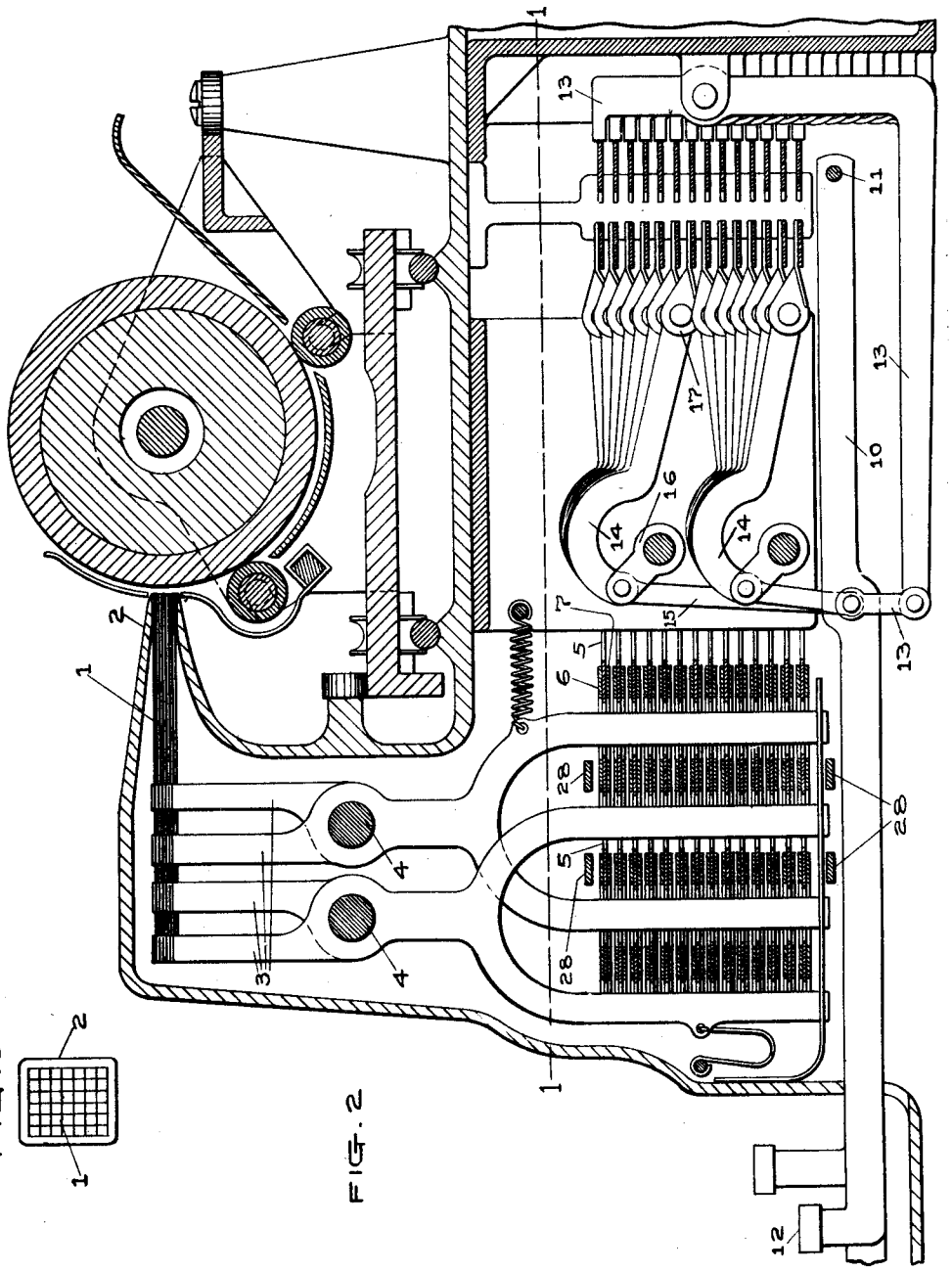

FIG. 2

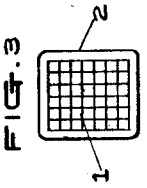

FIG. 3

WITNESSES:

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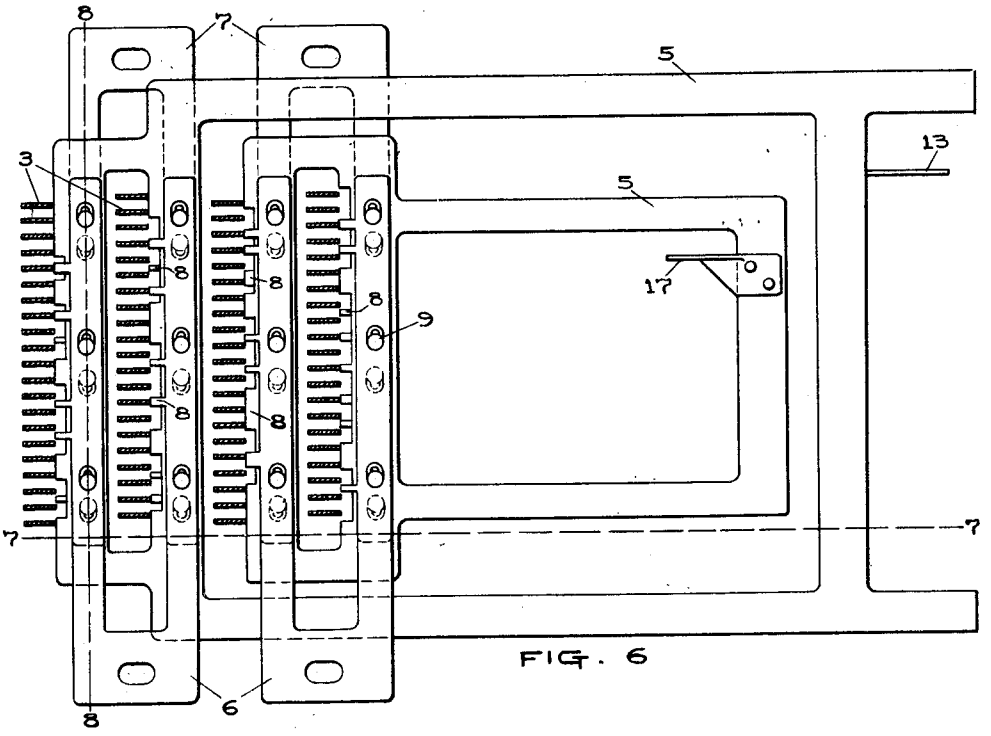

FIG. 6

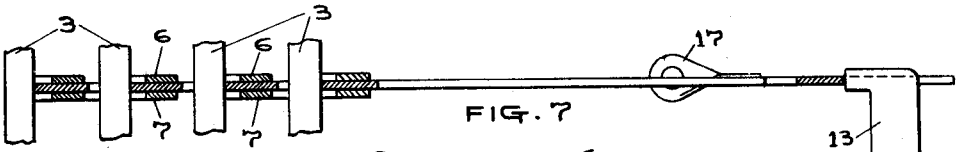

FIG. 7

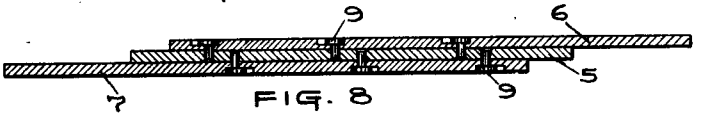

FIG. 8

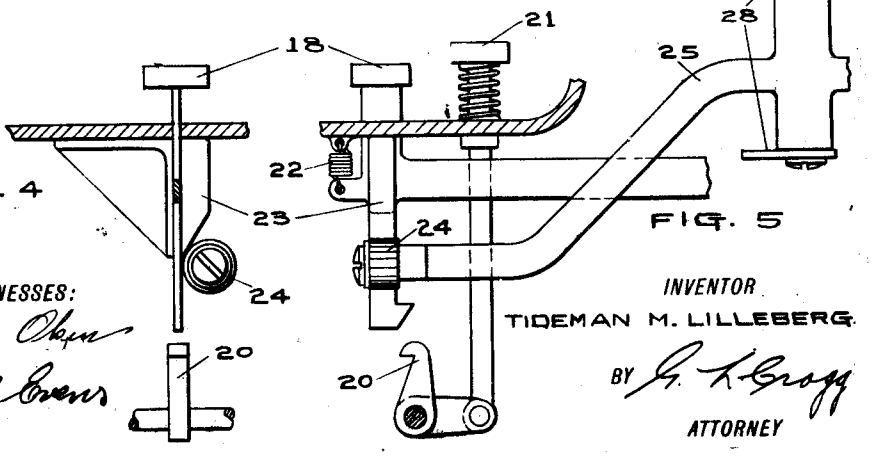

FIG. 4

FIG. 5

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4 SHEETS—SHEET 4.

FIG. 9

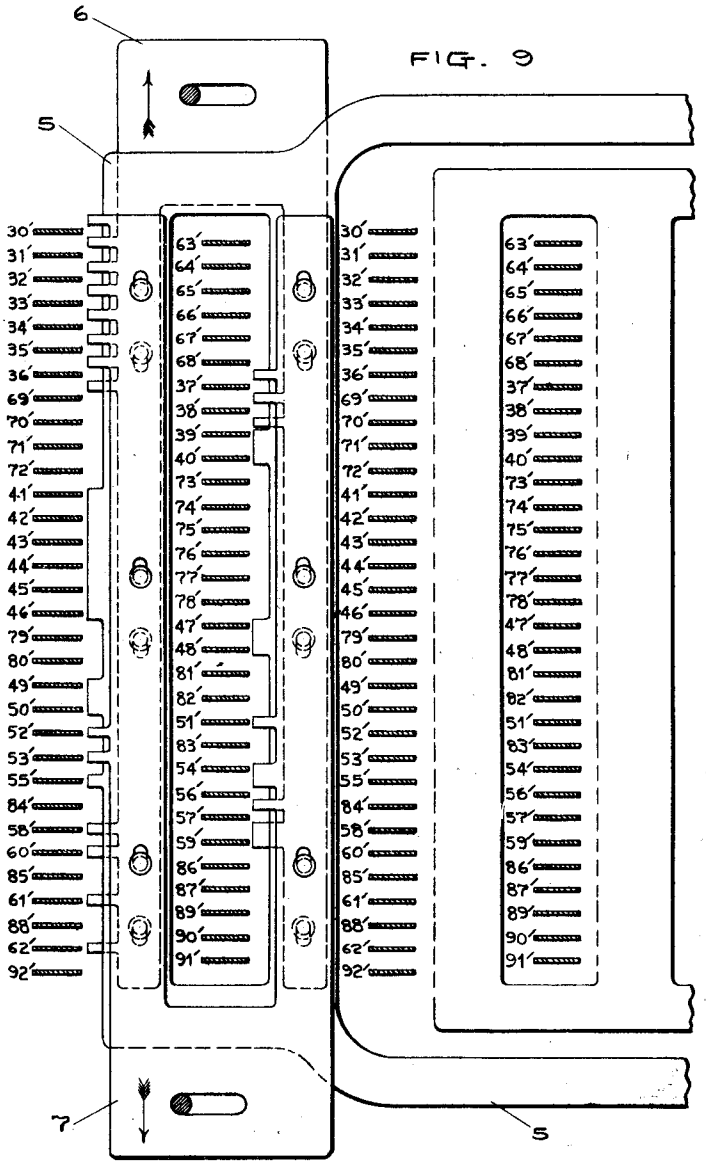

FIG. 10

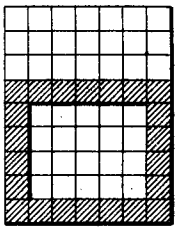

FIG. 11

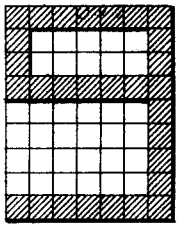

FIG. 12

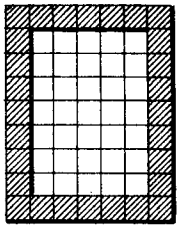

FIG. 13

30	31	32	33	34	35	36
57	63	64	65	66	67	37
56	68	69	70	71	72	38
55	58	59	60	61	62	39
54	73	74	75	76	77	40
53	78	79	80	81	82	41
52	83	84	85	86	87	42
51	88	89	90	91	92	43
50	49	48	47	46	45	44

WITNESSES

Etta L White

Dwight B Cheever

INVENTOR

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BY G. L. Gregg

ATTORNEY

UNITED STATES PATENT OFFICE.

TIDEMAN M. LILLEBERG, OF WOODSTOCK, ILLINOIS.

MACHINE FOR PRODUCING CHARACTERS.

1,063,363. Specification of Letters Patent. Patented June 3, 1913.

Application filed December 15, 1911. Serial No. 635,931.

To all whom it may concern:

Be it known that I, TIDEMAN M. LILLEBERG, citizen of the United States, residing at Woodstock, in the county of McHenry and State of Illinois, have invented a certain new and useful Improvement in Machines for Producing Characters, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to character producing machines and has for its general object the provision of means whereby restricted numbers of character forming elements may be selectively associated in composite groups for the purpose of producing selected characters.

My invention, in its preferred embodiment, is an improvement upon the machine set forth in my co-pending application, Serial No. 623,517, filed April 26, 1911, though I do not wish to be limited to embodiments of my present invention that are mere improvements upon the machine of my said co-pending application.

In my prior machine I employed a plurality of character forming wires whose ends directly formed the characters, these character producing ends being closely approached, the wires spreading from these ends toward their opposite ends where they were connected with individual pivoted character forming levers, selecting bars individual to different groups of the levers for effecting their operation and keys individual to the selecting bars and serving to operate the selecting bars to cause them to operate the groups of levers to which they are individual whereby selected groups of wires are actuated to produce different characters.

The machine of my present invention, in its preferred embodiment may be somewhat similarly described, but in addition to the elements which my former machine had I provide means for adjusting the grouping of the teeth of the bars so that each bar itself is capable of selecting different groups of character forming levers according to the grouping of its teeth. In the preferred embodiment of the invention I cause the selecting bars to operate supplemental lever actuating bars, which supplemental bars are not themselves directly operated by the key levers but are only operated by the key levers through the intermediation of the main bars. I further provide shifting mechanism for adjusting the relative positions of the main and supplemental bars to vary the grouping of the bar teeth. By this arrangement I am enabled to reduce the number of bars that are directly operated upon by the key levers, each key lever, according to my present invention, being adapted to operate a plurality of relatively adjustable bars (the main and supplemental bars) whereas each key lever in my prior device was capable of operating one bar only. When my invention is embodied in a typewriter structure I am enabled substantially to reduce the number of main bars and the number of keys employed for operating the bars to about one-third of the number which I previously employed, though the extent of the reduction in the number of key levers will vary according to the nature of the machine and the nature of the characters it is to form.

I will explain my invention more fully by reference to the accompanying drawings showing the preferred embodiment thereof as employed in typewriting machines and in which drawings—

Figure 1 is a sectional plan view on line 1 1 of Fig. 2; Fig. 2 is a view in sectional elevation of the structure; Fig. 3 is a front view showing the grouping of the character forming wires; Fig. 4 is a view taken in direction of arrow 4 of Fig. 1; Fig. 5 is a view at right angles of the portion of the mechanism illustrated in Fig. 4; Fig. 6 is a plan view of certain parts of the structure, other parts being omitted for the sake of clearness; Fig. 7 is a sectional view on line 7 7 of Fig. 6; and Fig. 8 is a sectional view on line 8 8 of Fig. 6; Fig. 9 is a view on a larger scale showing the mechanical interrelation of certain parts of the structure; Figs. 10, 11 and 12 illustrate, by the cross hatching lines, the wires that may be selected respectively to form the small letter *o* the figure 9 and the capital O; and Fig. 13 illustrates the group of character forming wires, the individual wires being marked with the distinguishing reference characters.

Like parts are indicated by similar characters of reference throughout the different figures with the exception of Figs. 9 and 13

where some of the reference characters are peculiar to these two figures alone, as these figures are somewhat diagrammatic.

The character producing wires 1 are desirably square in cross section, at least at the free ends of the wires, though I do not limit myself to any particular shape of the wires. I have illustrated a plurality of wires whose character forming ends are arranged in a rectangular throat 2 as illustrated in Fig. 2. The machine desirably includes more character forming wires than I have illustrated, but the illustration of additional character forming wires has been omitted since the additional wires would render the illustration of the invention too complicated. In practice I desirably employ one hundred wires arranged in ten rows, ten wires to a row. The wires are attached at their front ends to the upper ends of operating levers 3 intermediately pivoted at 4, each lever being connected with but one wire. As the machine is illustrated the lower ends of the levers are adapted each to be engaged by a set of operating bars, each set of operating bars including a main bar 5 and supplemental bars 6, 7 between which the main bar is sandwiched. The forward edges of the main and supplemental bars are provided with teeth 8 for engaging certain of the lower bifurcated ends of the character forming levers 3, the teeth of each set of bars, when the bars of such set are normally relatively positioned, coöperating to actuate one group of character forming levers 3, the grouping of these teeth being altered when the upper bar 6 is shifted with respect to its companion to enable another group of character forming levers to be operated, while still another redistribution of the teeth may be effected by shifting the lower bars 7 to enable these teeth which are all carried by the main bar to operate still another group of character forming levers. To the end that these results may be accomplished, the main bar 5 of each group has a fixed line of travel while the supplemental bars 6 and 7 between which the main bar is sandwiched, have pin and slot connection 9 with the main bar so that the supplemental bars may be moved transversely of the main bar to effect the redistribution of the teeth jointly presented by a set of bars to the character forming levers.

It will be seen that I have mounted a supplemental toothed bar upon and adjustable with respect to each main toothed bar 5 whereby the groupings of the levers which are operated by each main bar may be altered to suit the characters such levers are to take part in forming, and while I prefer to adjust the teeth that are thus capable of distribution in different groups for operating different groups of character forming levers, by means of bars which supplement the main bar, I do not wish to be limited to such an arrangement. I therefore claim broadly the bar, which I have termed the actuating bar, having means for re-distributing the teeth which it presents to the character forming levers.

The machine is made up of a multiplicity of main bars 5 that are provided with supplemental bars 6 and 7, the distinctions between the sets of bars composed of the elements 5, 6 and 7 residing, aside from mere geometrical formation, in the number, location, size and distribution of the teeth 8 whereby the character producing machine may be adapted to form all of the characters for the formation of which it is planned.

Each main bar 5 is individual to a key lever 10, having fixed fulcrum at 11 (the fulcrum axis being common to all of the key levers) and terminating in a key 12. As illustrated most clearly in Fig. 6, the group of main bars 5 which operate the two foremost lower ends of the character producing levers 3 inclose another group of main bars 5 which operate the remaining lower ends of the character forming levers 3. The bars of the inclosing group of main bars 5 are individually associated with corresponding key levers 10 through the intermediation of supplemental lever and link mechanism 13 whereby the bars of the inclosing group of main bars 5 are pushed upon when they are operated to take part in the formation of characters. The inclosed or inner group of main bars 5 are operatively associated with the key levers to which they are individual by means of goose necks 14, each individual to such inner bar 5, and each attached at its rear end to a bar 5, the forward end of such goose neck being in link connection with the key lever to which the bar 5 connected with the same goose neck is individual. The connection of the goose neck with the key lever to which it is individual is desirably effected by means of a link 15, the united ends of the link and goose neck being guided in their travel by means of a swinging arm 16 individual thereto. When a key lever to which a goose neck is individual is depressed, the inner main bar 5 individual to such key lever and goose neck is pulled upon by the goose neck and thereby moved forwardly to perform its function, owing to the attachment of the rear end of such goose neck to such bar. The means by which each goose neck 14 is connected with the main bar 5 to which it is individual desirably resides in an ear 17 in swinging connection with the rear end of the corresponding goose neck.

In Fig. 9 I have shown on a larger scale the interrelationship of the main and supplemental bars 5, 6 and 7 and the relation-

ship of these bars to the bifurcated levers which, in this figure, are numbered 30′ to 92′, the branches of each bifurcated lever having similar characters, these levers respectively corresponding to the wires marked 30 to 92 inclusive in Fig. 13. It will be seen from these figures how the main bar may be said to constitute a bar provided with teeth that are relatively adjustable whereby the relationship of these teeth with the bifurcated levers may be changed in accordance with the characters to be produced. The bars shown in Fig. 9 are adapted to the formation of the three characters shown in Figs. 10, 11 and 12, namely, small *o*, figure 9 and capital O. The other bars of the machine have their teeth so distributed as to form other characters. For the formation of some of the characters the teeth remain in normal relative position whereas for the formation of other characters readjustment of such teeth is necessary. Each main bar itself carries teeth that are integral therewith for operating the wires that are employed in common for the formation of all the characters that are to be formed by the teeth of such main bar in their various relative positions, the balance of the teeth carried by the main bars being integrally formed with the supplemental bars that are themselves carried by the main bars.

The invention is illustrated as being embodied in a typewriting machine, to which however I do not wish to limit myself, and when so embodied I desirably adjust the teeth of the bars by means of shift keys that shift the positions of the supplemental bars 6 and 7 with respect to the bars 5. A shift key 18 operates to shift the supplemental bars 6 while the key 19 serves to shift the supplemental bars 7. The machine may be so designed that when both of the keys 18 and 19 are in normal or idle position, the machine will be adapted to form the small letters of the alphabet; that when the key 19 is operated the machine will be adapted to the formation of capital letters (the key 18 remaining normal); and when the key 18 is depressed (the key 19 remaining normal) the machine will be adapted to the formation of numerals and miscellaneous characters such as the dollar sign, punctuation marks, etc. The shift key mechanisms associated with the shift keys 18 and 19 are similar and may be of any well known or desired design, one such design being illustrated in Figs. 4 and 5 where the lower end of the shift key is provided with a catch that engages a holding pawl 20, which holding pawl is adapted to be released upon the depression of a release key 21 whereby a coiled spring 22 will operate to restore the shift key to normal position. An intermediate portion of each shift key is provided with a cam element 23 that is pressed upon a roller 24 when such shift key is depressed. This roller 24 is carried upon the forward end of a lever 25 whose other end is pivoted. An intermediate portion of the lever 25 is in link connection at 26 with all of the supplemental bars 6 in the case of the shift key 18, while the intermediate portion of the lever 25 belonging to key 19 is in link connection with all of the supplemental bars 7. When a shift key is depressed, its associate lever 25 is moved outwardly against the force of a restoring spring 27 whereby all of the supplemental bars with which it is connected (the bars 6 or the bars 7 according to the actuated shift key) are operated to effect the re-distribution of the teeth that are presented to the character forming levers upon the operation of the main bars 5. The link connections effected at 26 between the levers 25 and the groups of supplemental bars 6 and 7 are desirably effected by means of tie bars 28 that are confined to transverse lines of travel and which tie bars 28 are therefore in pin and slot connection 29 with their associate supplemental bars 6 or 7, which pin and slot connection is of such a character as to permit the forward and backward movements of the supplemental bars while forcing transverse movement of the supplemental bars when the tie bars 28 are moved transversely. The pin and slot connections 9 permit of transverse movement of the supplemental bars 6 and 7 with respect to the main bars 5 but force movement of the supplemental bars forward and back upon corresponding movements of the main bars.

In the specification and claims I have used the term "wire" in the broad sense of elongated character producing elements irrespective of their shapes in cross section and whether or not they are completely metallic.

While I have herein shown and particularly described the preferred embodiment of my invention, I do not wish to be limited to the precise details of construction shown as changes may readily be made without departing from the spirit of my invention, but

Having thus described the invention I claim as new and desire to secure by Letters Patent the following:—

1. Apparatus of the character described including a plurality of relatively movable character forming wires; a toothed member for selecting and moving wires from among the said plurality of wires to form a character; and means for re-grouping the teeth of said toothed member to enable the selection of wires of another grouping for the production of another character.

2. Apparatus of the character described including a plurality of relatively movable character forming wires; and a toothed member for selecting and moving wires from among the said plurality of wires to

form a character, the teeth of said member being adapted to be changed in their relative positions thereby to enable the selection of wires of another grouping for the production of another character.

3. Apparatus of the character described including a plurality of relatively movable character forming wires; a toothed member for selecting and moving wires from among said plurality of wires to form a character; and lever operated mechanism for re-grouping the teeth of said toothed member to enable the selection of wires of another grouping for the production of another character.

4. Apparatus of the character described including a plurality of relatively movable character forming wires; and a toothed member for selecting and moving wires from among said plurality of wires to form a character, said toothed member including relatively adjustable toothed bars whereby the re-grouping of the teeth of said toothed member may be effected to enable the selection of wires of another grouping for the production of another character.

5. Apparatus of the character described including a plurality of relatively movable character forming wires; a toothed member for selecting and moving wires from among said plurality of wires to form a character, said toothed member including relatively adjustable toothed bars whereby the re-grouping of the teeth of said toothed member may be effected to enable the selection of wires of another grouping for the production of another character; key mechanism for moving said toothed member to cause it to actuate character forming wires; and shifting mechanism for shifting the bars comprising said toothed member with respect to each other to change the grouping of the teeth of the toothed member.

6. Apparatus of the character described including a plurality of relatively movable character forming wires; a toothed member for selecting and moving wires from among said plurality of wires to form a character, said toothed member including relatively adjustable toothed main and supplemental bars whereby the re-grouping of the teeth of said toothed member may be effected to enable the selection of wires of another grouping for the production of another character; key mechanism in actuating relation with the main bar for moving said toothed member to cause it to actuate character forming wires; and shifting mechanism for relatively shifting the bars comprising said toothed member to change the grouping of the teeth of the toothed member.

7. Apparatus of the character described including a plurality of relatively movable character forming wires; and an actuating bar provided with teeth in actuating relation with certain of said wires to enable the formation of a character, said teeth being adapted to be changed in their relative positions thereby to enable the selection of wires of another grouping for the production of another character.

8. Apparatus of the character described including a plurality of relatively movable character forming wires; an actuating bar provided with teeth in actuating relation with certain of said wires to enable the formation of a character, said teeth being adapted to be changed in their relative positions thereby to enable the selection of wires of another grouping for the production of another character; and shifting mechanism for changing the relative positions of the teeth for the purpose stated.

9. Apparatus of the character described including a plurality of relatively movable character forming wires; an actuating bar provided with teeth in actuating relation with certain of said wires to enable the formation of a character, said teeth being adapted to be changed in their relative positions thereby to enable the selection of wires of another grouping for the production of another character; and key mechanism for moving said bar to effect the movement of the selected character forming wires.

10. Apparatus of the character described including a plurality of relatively movable character forming wires; an actuating bar provided with teeth in actuating relation with certain of said wires to enable the formation of a character, said teeth being adapted to be changed in their relative positions thereby to enable the selection of wires of another grouping for the production of another character; shifting mechanism for changing the relative positions of the teeth for the purpose stated; and key mechanism for moving said bar to effect the movement of the selected character forming wires.

In witness whereof, I have hereunto subscribed my name this 9th day of December A. D., 1911.

TIDEMAN M. LILLEBERG.

Witnesses:

EDWARD ERENS,

INGVALD OLSEN.