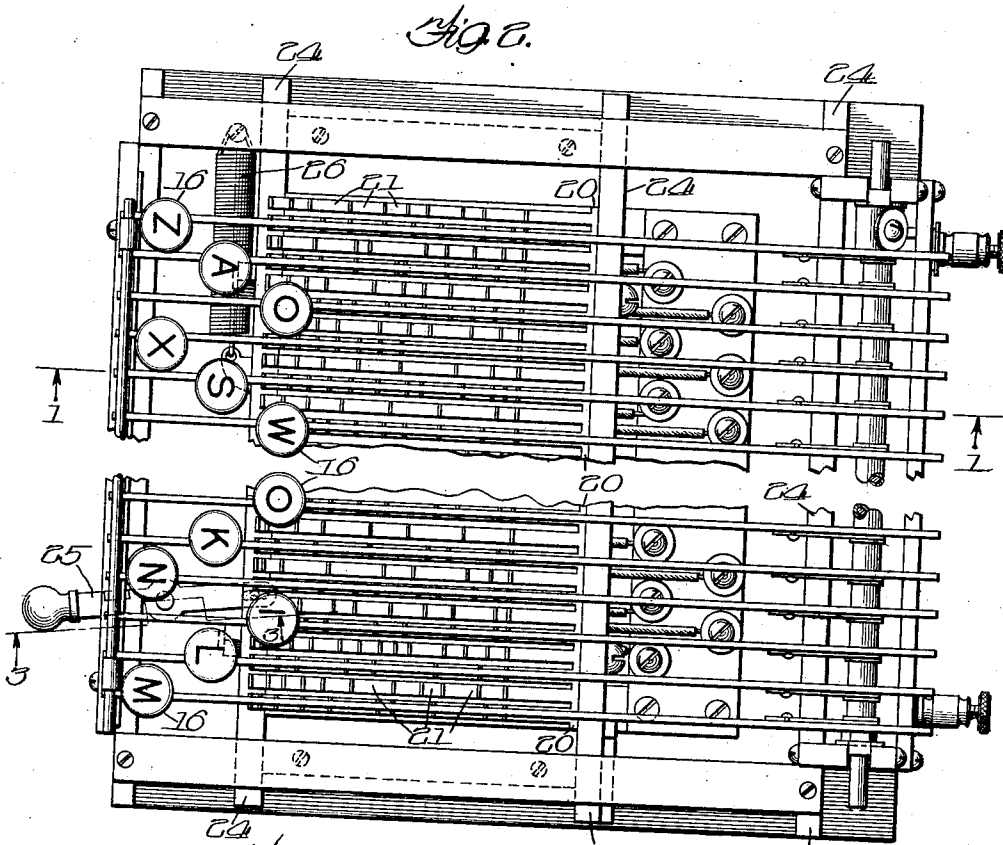
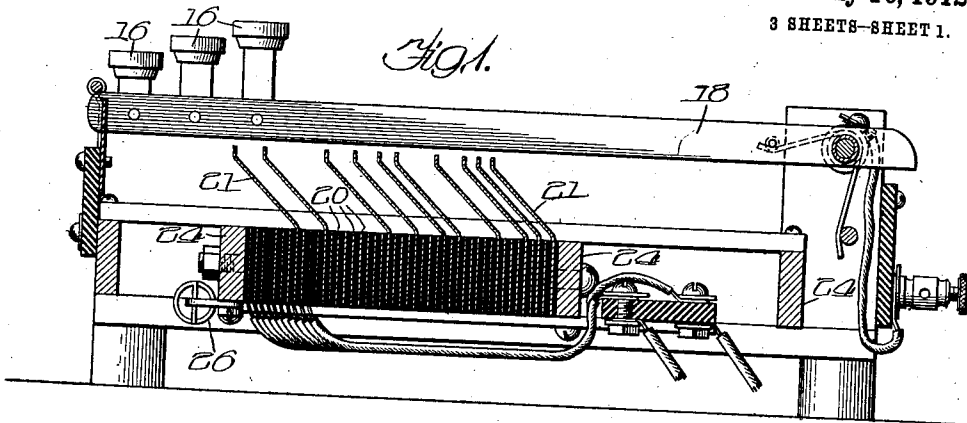


R. H. LITTLE.
TYPE CASTING MACHINE.
APPLICATION FILED OCT. 2, 1911.

1,033,024.

Patented July 16, 1912.
3 SHEETS—SHEET 1.



Witnesses:
Geo. B. Nelson
Edmund B. Nelson

Inventor:
Robert H. Little.

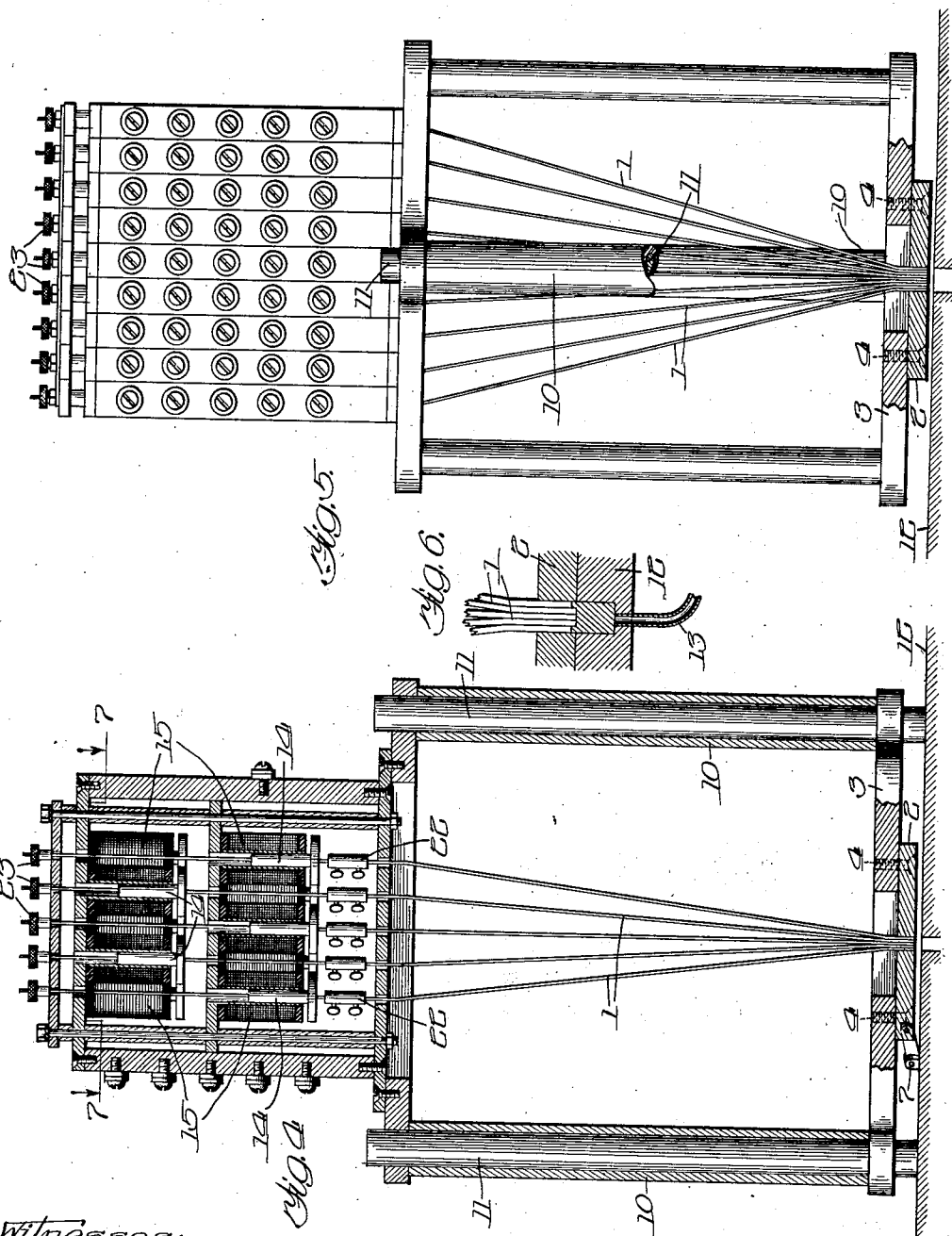
By *G. H. Grogg* Atty.

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3 SHEETS—SHEET 2.



Witnesses:
J. H. Nelson Jr.
C. H. Nelson

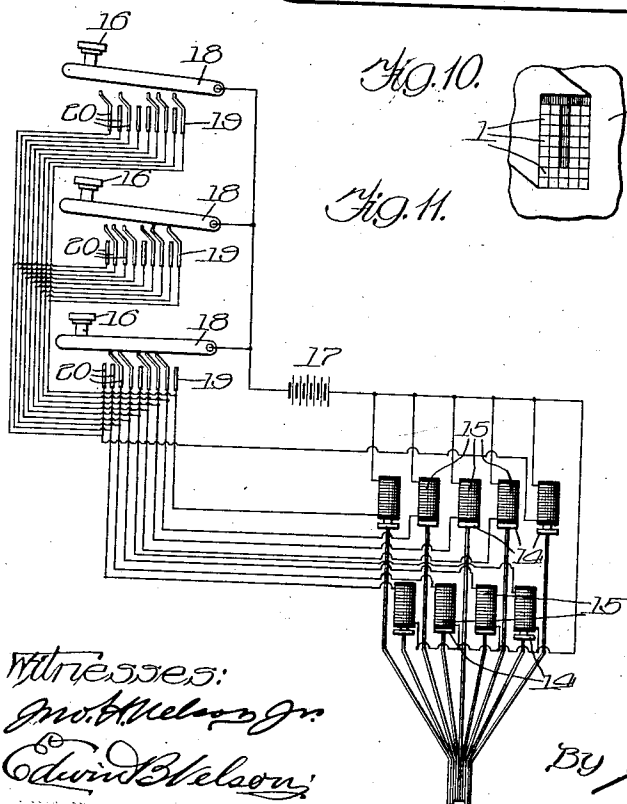
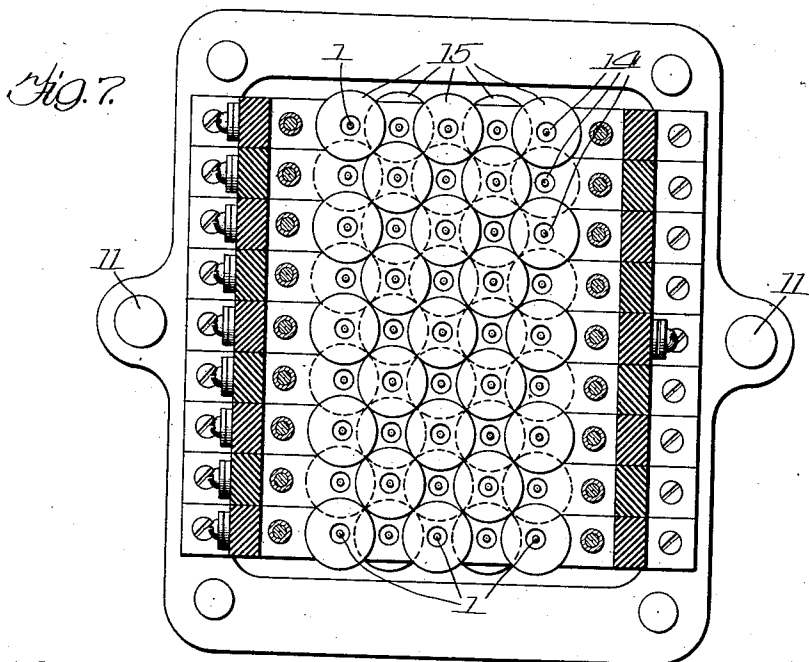
Inventor:
Robert H. Little.
By G. K. Grogg
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Patented July 16, 1912.

3 SHEETS—SHEET 3.



Witnesses:
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By H. K. Gragg, atty.

UNITED STATES PATENT OFFICE.

ROBERT H. LITTLE, OF CHICAGO, ILLINOIS.

TYPE-CASTING MACHINE.

1,033,024.

Specification of Letters Patent.

Patented July 16, 1912.

Application filed October 2, 1911. Serial No. 652,455.

To all whom it may concern:

Be it known that I, ROBERT H. LITTLE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Type-Casting Machines, 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 forming machines and has a number of objects and advantages in view.

In accordance with one feature of my invention I employ a set of character forming units certain of which are selected to form one character, certain others of which are selected to form another character, certain others to form still another character, etc., the selected combinations of the character forming units varying according to the characters to be produced. Each of the character forming units, in the embodiment of the invention being described (to which embodiment I do not wish to be limited) is provided with a motor magnet, and the motor magnets of the character forming units are included in circuits that are controlled by switches corresponding to the characters that are to be formed, these switches being associated with differing combinations of contacts that constitute terminals of individual motor magnets and which are distributed in association with the switches suitable to the characters to be formed whereby one switch, when actuated, will cause the energization of one group of motor magnets and the operation of the character forming units governed by this group of motor magnets to produce the character corresponding to the switch actuated, another switch, when actuated, will cause the operation of another group of motor magnets and the character forming units governed by this second group of motor magnets whereby the character corresponding to this second switch is produced and so on in connection with each of the switches entering into the structure.

It is to be understood that the motor magnets and the character forming units controlled thereby are in common association with many, if not all of the switches so that

many of the character forming units may individually take part in the formation of a large number of the characters that are to be produced. In other words I employ a minimum number of character forming units among which selections may be made to produce all of the characters within the capacity or design of the equipment, a large number of these units individually entering into the formation of many or most of the characters.

Apart from the electrical equipment which I prefer to employ, there is a feature of my invention that is of particular importance irrespective of the means that is employed for governing the operation of the character forming units, the feature of my invention now being referred to relating to the casting of type. The character forming units, in accordance with the present feature of my invention, constitute parts of a mold structure that is adapted to the casting of type, the character of the mold structure being changeable by the selection of various combinations of the character forming units whereby a given mold structure may, according to the adjustment of the character forming units, be adapted to the formation of a wide variety of characters.

In practising the present feature of my invention the character forming units are desirably in the form of wires that are rectangular or square in cross section, these wires being arranged in a plurality of rows and when in normal position filling a type metal receiving space. When the mold is to be adjusted to adapt it to the formation of a character, those character forming wires that will enable the formation of the character are partially withdrawn from the type metal receiving space to enable the molten type metal to be poured into the space portions that are vacated by the withdrawn wires.

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

Figure 1 is a sectional view, on line 1 1 of Fig. 2, of a character keyboard that includes in its formation motor magnet selecting switches; Fig. 2 is a plan view of the structure illustrated in Fig. 1, a part being

broken away owing to lack of space for its illustration; Fig. 3 is a detail of a shift key mechanism entering into the construction illustrated in Figs. 1 and 2, this view being taken on line 3 3 of Fig. 2; Fig. 4 is a view in sectional elevation of the motor magnet mechanism and the character forming wire units that are governed by the motor magnets, this view also illustrating a form of type mold that may be employed; Fig. 5 is a view in elevation, partially broken away, taken at right angles to the direction in which Fig. 4 is taken; Fig. 6 is a view, somewhat diagrammatic, illustrating the molding operation that occurs with the preferred form of my invention; Fig. 7 is a plan view on line 7 7 of Fig. 4; Fig. 8 is a bottom view of the mold structure; Fig. 9 is a sectional view on line 9 9 of Fig. 8; Fig. 10 illustrates, on a larger scale than Fig. 8, a bottom view of the character forming wire units, certain of these wire units being shaded to illustrate how a character may be formed by suitable selection; and Fig. 11 is a view, somewhat diagrammatic, illustrating a circuit arrangement that may be employed but to which I do not wish to be limited.

Like parts are indicated by similar characters of reference throughout the different figures.

As my invention is preferably practised, I employ a single group of character forming units 1 that are in the form of small wires that are square in cross section, as illustrated most clearly in Figs. 8 and 10. The lower or free ends of these units are closely approached so as to form a substantially imperforate mass of wires that are received within a rectangular space corresponding to the rectangular shape of said mass. Two of the adjacent walls of the space that receive the free ends of the character forming wires are desirably afforded by means of a plate 2 that is rigidly secured to a plate 3 as by means of screws 4. The remaining walls are desirably afforded by a sliding plate 5. This sliding plate is connected with one end of a swinging link 6, the other end of this swinging link 6 having a fixed fulcrum at 7. The plate 3 constitutes a carrier which may be elevated and lowered by mechanism or by hand and this carrier is, in the embodiment of the invention illustrated, constrained to move in a vertical direction by means of sleeves 10 that surround stationary posts or guides 11 and are in sliding engagement with the same. The space within the mold plate 2 that is filled by the character forming wires 1, when these wires are idle, is a type metal receiving space to which access is had by molten metal when selected character forming wires 1 are withdrawn.

Figs. 6 and 11 illustrate the withdrawal

of certain of these character forming wires and Fig. 10 also illustrates the withdrawal of a selected group of character forming wires so that type metal receiving space is afforded that conforms to the shape of the character to be produced. The embodiment of the invention illustrated is adapted for the casting of single type, though my invention is not to be thus restricted. When certain of the wires are to be withdrawn to form a character the parts are in the position illustrated in the lower portions of Figs. 4 and 5, in which position the plate 5 (see Figs. 8 and 9) is sufficiently withdrawn from the plate 2 to enable the character forming wires freely to be adjusted. After the wires have been adjusted to suit the character that is to be produced, the plates 2 and 3 are lowered so that the lower face of plate 2 is brought into contact with a mold plate 12 having a duct 13 leading to the space where the metal is to be cast and the type is to be formed, the molten metal being forced through the duct 13 to form the type as illustrated most clearly in Fig. 6 and in a manner which is well understood by those skilled in the art. When the parts are brought into the position illustrated in Fig. 6, the plate 5, owing to its connection with the link 6, is forced toward the character forming wires so that these character forming wires are very firmly held to avoid the presence of interstices between the engaging faces of the wires so that no type metal may be pressed upwardly beyond the space in which the type is to be cast. After the type is formed the plates 2 and 3 are raised by machinery or hand and the formed type is removed.

The type molding machine which I have specifically described preferably includes electro-magnetic mechanism governing the operation of the character forming units, but I do not wish to limit my invention to an organization that includes both the molding structure and the electro-magnetic mechanism for governing the operation of the character forming units as it is obvious that each of these features of my invention is of importance within itself.

As the invention is illustrated, each of the character forming wires 1 carries a solenoid core 14 entering the bore of a solenoid coil 15. I have illustrated forty-five wires, in Figs. 8 and 10, disposed in nine rows of five wires each and I have illustrated a corresponding group of forty-five solenoids arranged in nine groups having five solenoids per group. Each group of solenoids includes some arranged in a lower level and some arranged in an upper level as illustrated in Figs. 4 and 7, the lower level of a number of groups containing three solenoids while the balance of the groups of solenoids containing two solenoids in this

lower level, the sets of three solenoids alternating with the sets of two. A similar distribution of the solenoids in the upper level is effected, this distribution of the solenoids economizing space. As I prefer to use but one solenoid core per character forming wire and one solenoid coil for such wire, the solenoid coils themselves are adapted to be substantially simultaneously energized in various groupings, those solenoids being operated that correspond with the wires that are to be actuated for the formation of a given character. For the convenience of the operator I provide a number of character keys 16, each individual to a character to be formed, the keys 16 being arranged in bank preferably in a manner somewhat similar to a typewriter and as illustrated for example in Fig. 2.

As suggested by the diagram in Fig. 11, one terminal of each of the solenoids is permanently connected with one pole of a battery 17. The other pole of this battery is permanently connected with each of the key levers 18 that carry the keys 16. The other terminals of the solenoids are connected with contacts 19 that are provided for the switch arms 18, these latter terminals of the solenoids being electrically associated with those switch arms 18 that are to occasion, when actuated, the operation of those character forming wires that will enable the projection of the characters corresponding to the character keys carried by said switch arms. For reasons of mechanical construction, I desirably employ a terminal plate 20 for each solenoid and permanently connected with that solenoid terminal that is companion to that solenoid which is permanently connected with the battery 17. These terminal plates are extended transversely of and are disposed beneath all of the switch arms 18. Those terminal plates that are to be electrically connected with the switch arms are provided with projections 21 that constitute contacts. Thus one terminal plate may have a number of contacts 21 that underlie one collection of switch arms 18, another terminal plate may have another set of contacts 21 that underlie another collection of switch arms 18, etc., each of the switch arms overlying a different collection of contacts 21 so that each switch arm, when depressed, will occasion the energization of a collection of solenoids that differs from the collections of solenoids that are adapted to have circuit closed therethrough by the other switch arms. Thus the operation of the different character keys will cause the energization of differently physically related solenoids to occasion the elevation of different groupings of the character forming wires for the purpose above outlined or for other purposes within the capacity of the machine of my invention, the energization of each so-

lensoid causing the elevation of its core and the consequent elevation of the particular character forming unit 1 which is desirably coupled with the solenoid core through the agency of the coupling device 22, it being preferable to split the character forming wires 1 at the couplings 22 for purposes of assembly, disassembly, replacement and repair. The initial or idle vertical positions of the character forming wires are desirably adjustably determined by means of the adjusting nuts 23 screwed upon the rounded upper ends of the character forming wires.

Fig. 10 illustrates the bottom of the group of character forming wires 1 with certain of these wires withdrawn to enable the formation of the letter T. Each switch arm 18 desirably has a second group of contacts 21 that are normally located to one side of the switch arm associated therewith but which are adapted to be brought beneath the associate switch arm, in substitution for the contacts 21 that are normally located below such switch arm whereby each switch arm is capable of taking part in effecting the formation of two different characters, the groups of contacts 21 associated with each switch arm being different. The groups of contacts 21 located below the switch arms 18 and the remaining groups of contacts 21 that are not normally located below the switch arms, are together mounted upon a carrier 24 which may be laterally shifted by a shift key 25 for the purpose of bringing contacts 21 that are normally beneath the switch arms 18 to one side of the switch arms and bringing the remaining contacts 21 that are normally located to one side of the switch arms beneath the switch arms for the purpose which has been described. Thus the switch arms that correspond to the letters of the alphabet may, if desired, be employed for enabling the formation of capital and small letters and other switch arms may each be employed for forming two characters of other descriptions. A spring 26 normally keeps the carriage 24 in the position illustrated in Fig. 2, this spring yieldingly opposing the operation of the shift key 25.

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.

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

1. A type casting apparatus including an element having space for receiving molten type metal; a plurality of relatively adjustable character forming units entering said space and serving by their adjustment to shape the molten metal receiving space suited to the character to be formed, and mech-

anism for effecting the adjusting movement of said units whereby their adjustment may be varied to suit the character to be formed.

2. A type casting apparatus including an element having space for receiving molten type metal; a plurality of relatively adjustable character forming units that are rectangular in cross section and whose aggregate cross sectional area is substantially equal to said space, these character forming elements serving by their adjustment to shape the molten metal receiving space suited to the character to be formed, and mechanism for effecting the adjusting movement of said units whereby their adjustment may be varied to suit the character to be formed.

3. A type casting apparatus including an element having space for receiving molten type metal; a plurality of relatively adjustable character forming units arranged in a plurality of rows and serving by their adjustment to shape the molten metal receiving space suited to the character to be formed, and mechanism for effecting the adjusting movement of said units whereby their adjustment may be varied to suit the character to be formed.

4. A type casting apparatus including an element having space for receiving molten type metal; a plurality of relatively adjustable character forming units that are rectangular in cross section, these units being arranged in a plurality of rows and whose aggregate cross sectional area is substantially equal to said space, these character forming elements serving by their adjustment to shape the molten metal receiving space suited to the character to be formed, and mechanism for effecting the adjusting movement of said units whereby their adjustment may be varied to suit the character to be formed.

5. A type casting apparatus including a movable element having space for receiving molten type metal and a plurality of relatively adjustable character forming units arranged in a plurality of rows and serving by their adjustment to shape the molten metal receiving space suited to the character to be formed, said element having a portion that takes part in defining the type metal receiving space and which is movable toward and from the said character forming units whereby said character forming units may be firmly gripped when adjusted for the purpose of forming a character and may be released to permit of relative adjustment of the character forming units.

6. A type casting apparatus including a movable element having space for receiving molten type metal and a plurality of relatively adjustable character forming units that are rectangular in cross section, these units being arranged in a plurality of rows and whose aggregate cross sectional area is

substantially equal to said space, these character forming elements serving by their adjustment to shape the molten metal receiving space suited to the character to be formed, said element having a portion that takes part in defining the type metal receiving space and which is movable toward and from the said character forming units whereby said character forming units may be firmly gripped when adjusted for the purpose of forming a character and may be released to permit of relative adjustment of the character forming units.

7. A character forming apparatus including a plurality of character forming units from among which different combinations are to be effected for the production of selected characters; motor magnets for operating these units; and a plurality of motor magnet controlling switches corresponding to different characters, each switch controlling a group of motor magnet circuits, the different groups of motor magnet circuits including circuits that are not common to the groups.

8. A character forming apparatus including a plurality of character forming units from among which different combinations are to be effected for the production of selected characters; motor magnets for operating these units; and a plurality of motor magnet controlling switches corresponding to different characters, each switch controlling a group of motor magnet circuits, the different groups of motor magnet circuits including circuits that are not common to the groups, and also including circuits that are common to the groups.

9. A character forming apparatus including a plurality of wire like character forming units from among which different combinations are to be effected for the production of selected characters; motor magnets for operating these units; and a plurality of motor magnet controlling switches corresponding to different characters, each switch controlling a group of motor magnet circuits, the different groups of motor magnet circuits including circuits that are not common to the groups.

10. A character forming apparatus including a plurality of wire like character forming units from among which different combinations are to be effected for the production of selected characters; motor magnets for operating these units; and a plurality of motor magnet controlling switches corresponding to different characters, each switch controlling a group of motor magnet circuits, the different groups of motor magnet circuits including circuits that are not common to the groups, and also including circuits that are common to the groups.

11. A character forming apparatus including a plurality of wire like character

forming units having free ends that are arranged in a plurality of adjacent rows and which free ends enter into the formation of the selected characters; motor magnets for operating these units; and a plurality of motor magnet controlling switches corresponding to different characters, each switch controlling a group of motor magnet circuits, the different groups of motor magnet circuits including circuits that are not common to the groups.

12. A character forming apparatus including a plurality of wire like character forming units having free ends that are arranged in a plurality of adjacent rows and which free ends enter into the formation of the selected characters; motor magnets for operating these units; and a plurality of motor magnet controlling switches corresponding to different characters, each switch controlling a group of motor magnet circuits, the different groups of motor magnet circuits including circuits that are not common to the groups, and also including circuits that are common to the groups.

13. A character forming apparatus including a plurality of character forming units from among which different combinations are to be effected for the production of selected characters; motor magnets for operating these units; a plurality of motor magnet controlling switches corresponding to different characters, each switch controlling a group of motor magnet circuits, the different groups of motor magnet circuits including circuits that are not common to the groups; a plurality of motor magnet circuit terminals for each switch normally out of operative association with said switch and connected with a group of motor magnet circuits that is different from the group of motor magnet circuits that is normally associated with said switch; and means for bringing the switches into operative association with the supplemental groups of motor magnet circuit terminals that are normally out of operative association with such switches.

14. A character forming apparatus including a plurality of character forming units from among which different combinations are to be effected for the production of selected characters; motor magnets for operating these units; a plurality of motor magnet controlling switches corresponding to different characters, each switch controlling a group of motor magnet circuits, the different groups of motor magnet circuits including circuits that are not common to the groups, and also including circuits that are common to the groups; a plurality of motor magnet circuit terminals for each switch normally out of operative association with said switch and connected with a group of motor magnet circuits that is different

from the group of motor magnet circuits that is normally associated with said switch; and means for bringing the switches into operative association with the supplemental groups of motor magnet circuit terminals that are normally out of operative association with such switches.

15. A character forming apparatus including a plurality of wire like character forming units from among which different combinations are to be effected for the production of selected characters; motor magnets for operating these units; a plurality of motor magnet controlling switches corresponding to different characters, each switch controlling a group of motor magnet circuits, the different groups of motor magnet circuits including circuits that are not common to the groups; a plurality of motor magnet circuit terminals for each switch normally out of operative association with said switch and connected with a group of motor magnet circuits that is different from the group of motor magnet circuits that is normally associated with said switch; and means for bringing the switches into operative association with the supplemental groups of motor magnet circuit terminals that are normally out of operative association with such switches.

16. A character forming apparatus including a plurality of wire like character forming units from among which different combinations are to be effected for the production of selected characters; motor magnets for operating these units; a plurality of motor magnet controlling switches corresponding to different characters, each switch controlling a group of motor magnet circuits, the different groups of motor magnet circuits including circuits that are not common to the groups, and also including circuits that are common to the groups; a plurality of motor magnet circuit terminals for each switch normally out of operative association with said switch and connected with a group of motor magnet circuits that is different from the group of motor magnet circuits that is normally associated with said switch; and means for bringing the switches into operative association with the supplemental groups of motor magnet circuit terminals that are normally out of operative association with such switches.

17. A character forming apparatus including a plurality of wire like character forming units having free ends that are arranged in a plurality of adjacent rows and which free ends enter into the formation of the selected characters; motor magnets for operating these units; a plurality of motor magnet controlling switches corresponding to different characters, each switch controlling a group of motor magnet circuits, the different groups of motor magnet circuits

including circuits that are not common to the groups; a plurality of motor magnet circuit terminals for each switch normally out of operative association with said switch
 5 and connected with a group of motor magnet circuits that is different from the group of motor magnet circuits that is normally associated with said switch; and means for bringing the switches into operative association with the supplemental group of motor magnet circuit terminals that are normally out of operative association with such switches.
 10 18. A character forming apparatus including a plurality of wire like character forming units having free ends that are arranged in a plurality of adjacent rows and which free ends enter into the formation of the selected characters; motor magnets for
 15 operating these units; a plurality of motor magnet controlling switches corresponding to different characters, each switch controlling a group of motor magnet circuits, the different groups of motor magnet circuits
 20 including circuits that are not common to the groups, and also including circuits that are common to the groups; a plurality of motor magnet circuit terminals for each switch normally out of operative association
 25 with said switch and connected with a group of motor magnet circuits that is different from the group of motor magnet circuits that is normally associated with said switch; and means for bringing the switches into op-
 30 erative association with the supplemental

groups of motor magnet circuit terminals that are normally out of operative association with such switches.

19. A character forming apparatus including a plurality of character forming units from among which different combinations are to be effected for the production of selected characters; a switch and motor magnet circuit terminals arranged in groups having terminals that are not common to the motor magnet circuits; and switching mechanism common to these groups of terminals and adapted for operative association with either of the groups of terminals.
 40 45

20. A character forming apparatus including a plurality of character forming units from among which different combinations are to be effected for the production of selected characters; a switch and motor magnet circuit terminals arranged in groups having terminals that are not common to the motor magnet circuits and also terminals which are common to the motor magnet circuits; and switching mechanism common to these groups of terminals and adapted for operative association with either of the groups of terminals.
 50 55 60

In witness whereof, I hereunto subscribe my name this 28th day of September A. D. 1911.

ROBERT H. LITTLE.

Witnesses:

E. L. WHITE,
 G. L. CRAGG.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."