

W. ACKERMAN.  
TYPE CASTING AND COMPOSING MACHINE.  
APPLICATION FILED DEC. 28, 1905.

940,377.

Patented Nov. 16, 1909.  
3 SHEETS—SHEET 1.

Fig. 1.

		ROW																
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		
INDIVIDUAL	15	—	¶	L	F	'	%	"	é	j	\$	K	)	(	%	Q	a <sup>1</sup>	
	14	ff	‡	V	C	:	S	k	c	l	x	M	6	3	ff	Y	b <sup>1</sup>	
	13	&	I	N	A	!	q	n	s	:	v	H	9	2	J	B	c <sup>1</sup>	
	12	⅜	z	X	R	-	p	y	r	,	d	W	0	1	Z	P	d <sup>1</sup>	
	11	ff	?	O	T	'	b	o	t	f	u	U	7	4	ff	D	f <sup>1</sup>	
	10	œ	°	E	w	;	g	a	e	i	h	m	8	5	ff	G	e <sup>1</sup>	
	9	ff	?	O	T	'	b	o	t	f	u	U	7	4	ff	D	f	
	8	½	s	K	H		■	A	■	■	E	■	R	G	T	æ		
	7	⅜	]	E	w	;	g	a	e	i	h	m	8	5	ff	G	e	
	6	⅝	z	X	R	-	p	y	r	,	d	W	0	1	Z	P	d	
	5	&	I	N	A	!	q	n	s	.	v	H	9	2	J	B	c	
	4	ff	.	V	C	:	S	k	c	l	x	M	6	3	ff	Y	b	
	3	⅜	[	L	F	'	Q	"	*	j	\$	K	)	(	..	Q	a	
	2	¼	z	&	M		O	N	\$	I	C	W	D	P	U	fb		
	1	¾	J	£	@	'	Y	B	†	/	L	—	F	V	X			
		6	3	5	5	2	4	4	3	2	4	6	4	4	4	5		

Witnesses  
Francis S. Ober  
William H. Stein.

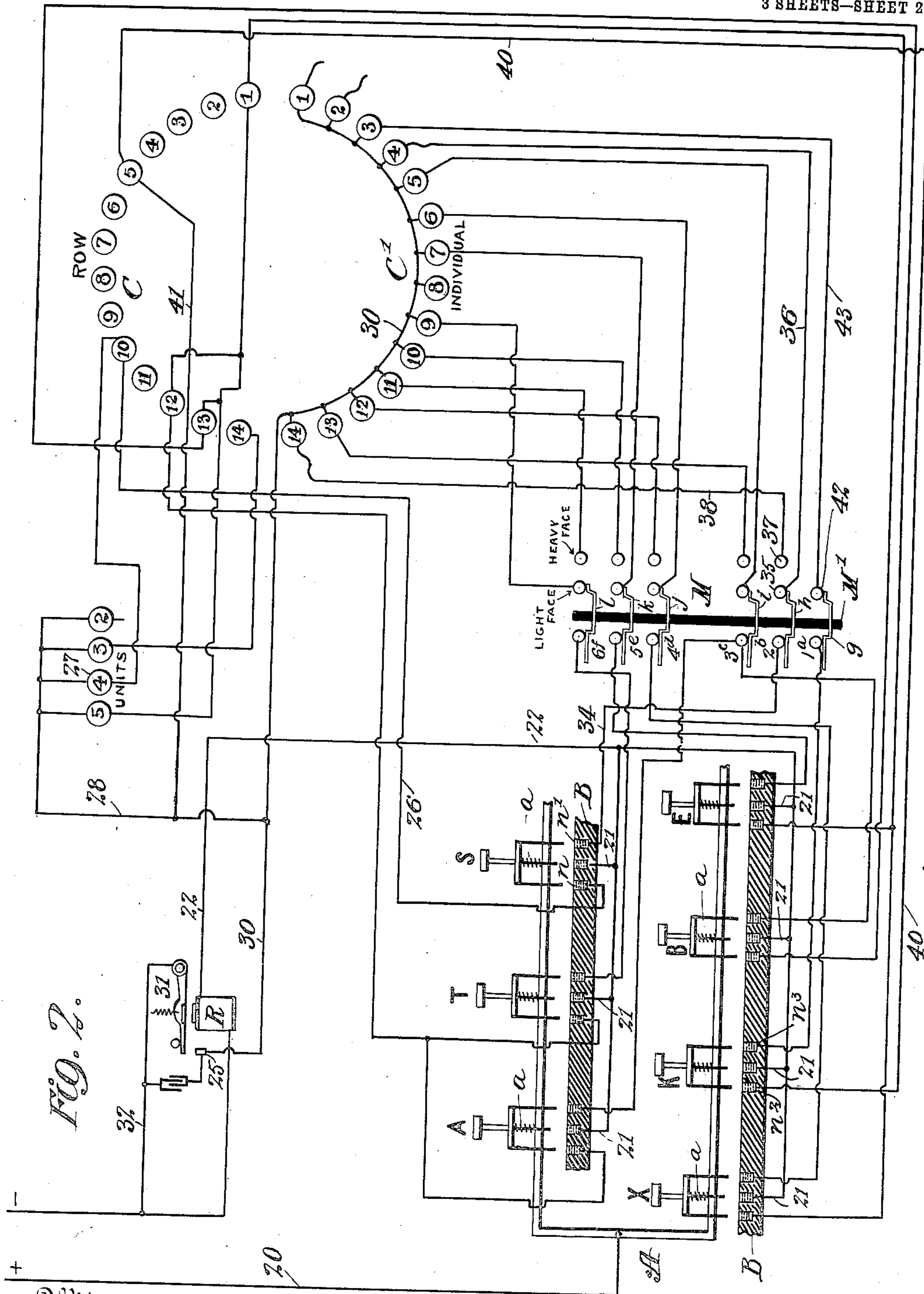
Inventor  
William Ackerman.  
By his Attorney  
Melrose Powell.

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3 SHEETS—SHEET 2.



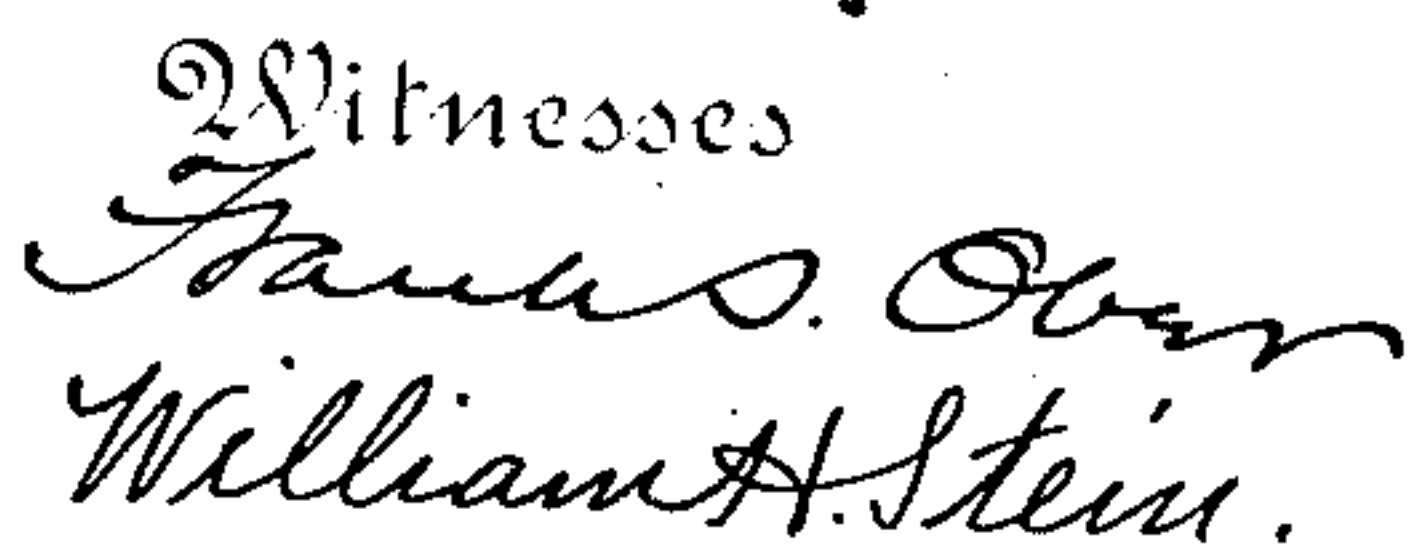
Witnesses  
Hans S. Ober  
William H. Stein.

Inventor  
William Ackerman  
By *Miller & Fowler*  
Attorney



940,377.

3 SHEETS—SHEET 3.



Inventor  
By *William Ackerman*  
*his Attorney*  
*Wilbur Forster*



# UNITED STATES PATENT OFFICE.

WILLIAM ACKERMAN, OF NEW YORK, N. Y., ASSIGNOR TO UNITED STATES GRAPHO-  
TYPE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

## TYPE CASTING AND COMPOSING MACHINE.

940,377.

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Application filed December 28, 1905. Serial No. 293,603.

*To all whom it may concern:*

Be it known that I, WILLIAM ACKERMAN, a citizen of the United States, residing in the borough of Manhattan, New York city, county and State of New York, have invented certain new and useful Improvements in Type Casting and Composing Machines, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to composing machines for use in connection with automatic type-casting and setting machines.

In what is known in this art as the "Goodson" system, there is employed a perforating device consisting of an organization of perforating magnets controlled by the keys on the keyboard of a typewriting machine, for producing upon a movable strip of flexible material successive groups of perforations representative of the matter to be set up; which strip is subsequently used to control the various mechanisms of the type-casting and setting machine proper, whereby the matter represented by the perforations will be reproduced in justified lines of individual type. A detailed description of such a composing machine is disclosed in U. S. Patent No. 606,007 dated June 21, 1898. In this system the type bodies are all cast in a single mold which is adapted to expand and contract in order to produce type of varying thicknesses, or, what is commonly known as "self-spacing type". The matrices for forming the type face are arranged upon an integral-font matrix block, in parallel lines extending in two directions, and are grouped according to the "unit" value of the running width of type face. In other words, the matrices representing characters of a common width of face are arranged in a common row and the control of the selecting means for such row is common with that of the control of the variable mold, so that the mold will adapt itself in width to correspond to the unit value of such row whichever individual character of the row is selected. There are several rows of the same width of face. This matrix block is impelled from a normal position or starting point and caused to travel in two directions until intercepted

by selecting stops adapted to be thrown into the path of the moving block, by magnets under the control of the perforated strip and bring said block to rest with one or the other of its matrices directly over the variable mold ready to receive the molten type metal. A detailed description of a casting and setting machine such as referred to is disclosed in U. S. Patent No. 530,481 dated Dec. 4, 1894. Heretofore, in this system there has been for each character or matrix on the matrix block a corresponding key on the keyboard of the composing machine; so that a matrix block containing, for instance, 15 rows of matrices with 15 matrices in each row, required 225 keys on the keyboard of the composing machine.

The object of the present invention is to provide means whereby with a given number of matrices fewer keys on the keyboard will be required to produce the same results as heretofore. The advantages of fewer keys, such as convenience of manipulation, economy of space, etc., are obvious.

The invention consists of a peculiar arrangement of electrical controlling circuits, and a novel switching mechanism under control of the operator together with other features to be set forth hereinafter, whereby certain finger keys of the composing machine may be caused to operate one or the other of two different combinations, sets, or groups of perforating magnets, and cause perforations to be made in the flexible strip representative of one or the other of two entirely different matrices on the matrix block.

In the accompanying drawings, Figure 1 is a diagram or chart illustrative of the manner of arranging the matrices on the matrix block. Fig. 2 is a diagram of the circuits. Fig. 3 is a detail in side elevation of my switching mechanism. Fig. 4 is an end view of a portion of the switch. Fig. 5 is a view similar to Fig. 4 showing the moving parts in another position. Fig. 6 is a detail of a moving part of the switch detached. Figs. 7 and 7<sup>a</sup> are details of stationary parts of the switch detached; and Fig. 8 is a plan of a portion of an insulating bed plate.

Referring first to Fig. 1, which is a chart or diagram and not a drawing of the matrix block itself, the characters inclosed within



small squares denote the matrices, which, it will be seen, are arranged in parallel lines running in two directions. Those lines of matrices arranged in vertical relation and designated by numerals 1 to 15 from right to left will be referred to hereinafter as "rows" while those arranged in horizontal relation and designated by the numerals 1 to 15 running from bottom to top of chart will be referred to as "individuals". Thus the location of any matrix may be definitely expressed. For instance, capital A (heavy face) is the 13th individual of row 12 and capital B (light face) is the 5th individual of row 1.

The numerals at the bottom of the chart designate the unit value of the matrices of the several rows, and it should be noted that all the matrices of a given row are of a common unit value.

It should be observed further that duplicates of certain characters occur in each row, and viewing the arrangement of matrices in horizontal lines it will be seen that such duplication may be carried out either partially or wholly in the lines. For instance, the line of matrices designated by the reference letter *b* is in many respects the same as that designated by *b'*, save for the fact that in one line the characters are heavy faced and in the other light faced. Similarly, the line at C corresponds in some respects with the line at *c'*, and so on, six lines being duplicated as to some of the characters.

Turning now to the diagram of circuits, Fig. 2, A represents the metallic keyboard of a composing machine, in which are mounted a number of keys representing characters on the matrix block. Seven keys are shown representing the large capitals A, T, S, X, K, B and E. Depending from each key are three metallic contact pins the middle pin being surrounded by a coiled spring *a*, which serves to hold the key in raised position. Each pin is arranged directly over, and is adapted to enter when the key is depressed, a mercury well or terminal in the insulating plate B, there being a group of three wells or terminals for each key.

C and C' represent two groups of perforating or selecting-magnets designated as "row" and "individual", respectively, which are adapted to operate in a manner fully set forth in the prior patents hereinbefore referred to, to produce perforations in the flexible strip. Both groups of magnets are numbered from 1 to 14 and correspond respectively to the rows and individuals similarly numbered on the chart Fig. 1. It will be noted, however, that there is no 15th selecting magnet in either group. Inasmuch as the 15th position of the matrix block in either direction of its move-

ment is an extreme position the same may be determined or controlled by a fixed stop requiring no selecting magnet to operate it.

At M I have shown a conventionalized form of the switching mechanism hereinbefore referred to whereby a single key may be caused to select, at the will of the operator, either of two different sets of perforating magnets and so produce in the strip, perforations representative of either one or the other of two entirely different characters or different styles of the same character as the case may be, it being understood that my scheme works just as well whether the characters in the so-called "duplicated" lines are different styles of the same characters or characters of altogether different identity.

$1^a$ ,  $2^b$ ,  $3^c$ ,  $4^d$ ,  $5^e$ , and  $6^f$ , denote a row of six fixed terminals which correspond to the six duplicated horizontal lines of characters on the chart Fig. 1. Each of such terminals is connected electrically with each of the keys representative of the characters appearing in such horizontal lines.

Adjacent the row of terminals  $1^a$ ,  $2^b$ ,  $3^c$ , etc. are two other rows of terminals designated by the titles "light face" and "heavy face" the former being connected electrically with certain of the individual perforating or selecting magnets and the latter with certain other of such magnets.

M' is a movable member carrying spring contact fingers *g*, *h*, *i*, *j*, *k* and *l*, insulated from each other and insulated from M' its function being to connect the terminals  $1^a$ ,  $2^b$ ,  $3^c$  etc. either with the corresponding terminals in the "light face" row or those in the "heavy face" row as desired.

A conductor 20 leading from a source of current supply represented by the signs + and - is connected with the metallic keyboard A, and the contact pins of all the keys on the board. The middle well of each group of mercury wells or terminals is connected by a wire 21 with a common return circuit 22 which includes a relay R. It should be noted that the middle contact pin is shorter than its fellows and makes contact with the middle mercury terminal only after contact between the other pins and their respective terminals has been fully established.

Now let us select one of the keys, say for instance, large capital letter S, trace its circuits and note what happens when said key is depressed. A glance at the chart Fig. 1 shows that this letter appears twice in row 10 and is the 4th individual in that row in light face type and the 14th individual in the same row in heavy faced type. As soon as the middle contact pin has made contact with its respective mercury terminal and completed the main circuit through the relay R, said relay is energized and draws



down its armature in contact with the stop 25, whereupon the current will divide at the key, and pass through mercury well  $n$  to conductor 26, thence to row perforating magnet 10, thence to the "4 unit" magnet 27 which registers the unit value on the counting machine thence to conductor 28, to return wire 30, to stop 25', armature 31, wire 32, and back to generator. This produces a row perforation which is the same whatever the position of the member  $M'$  of the switching mechanism. Simultaneously with this action current passes through well  $n'$  to conductor 34 to terminal 2<sup>b</sup> of the switching mechanism whence it may pass accordingly as the operator may place the member  $M'$ , either to terminal 35 thence by wire 36 to individual perforating magnet 4, to common return wire 30, and out; or to terminal 37, to wire 38, individual perforating magnet 14, and out by common return wire 30. This produces an "individual" perforation which will result in the selection of a light faced or heavy faced letter S according to the position of the switch.

As hereinbefore mentioned there will be 14 other keys corresponding to the characters appearing in horizontal line  $b$  of chart of Fig. 1, all having one mercury terminal thereof connected with the terminal 2<sup>b</sup> of the switch  $M$ . Similarly all of the keys corresponding to the characters appearing in line  $a$  of the chart, Fig. 1, will be connected with the terminal 1<sup>a</sup> of the switch and so on.

Consider now large capital letter K, which is the third individual of row 5, light face, and the 15th individual of the same row, heavy face, and assume that the switch is set for light faced characters. The K key being depressed will complete the main circuit in the same manner as before described and at the same time establish a branch circuit leading from one of the contact pins of the key to the mercury well  $n^2$ , thence by conductor 40 to row perforating or selecting magnet 5, thence by wire 41 to 30 and out; and another branch circuit leading from the other of said pins to mercury well  $n^3$  to the switch terminal 1<sup>a</sup>, to terminal 42, wire 43, individual perforating magnet 3 return wire 30 and out, resulting in the desired combination of row and individual perforations. Should the switch be set for heavy faced characters, however, and this key depressed, the row perforating magnets only would be operated, there being no 15th individual magnet for the reason already mentioned.

In Figs. 3 to 8 of the drawings, I show the preferred form of my switching mechanism in which  $G-G'$  represent two blocks of insulating material each carrying three U-shaped spring conductors  $g, h, i$  and  $j, k$  and  $l$ , secured to the underside thereof, and each having a vertically arranged push-rod  $J$

and  $J'$  guided in the frame  $L$  the stroke of the rods being limited by notches  $m$ . Located between the blocks  $G$  and  $G'$  and pivoted to the said frame at  $L'$  is a rocking arm  $L^2$  whose forked ends engage pins on said blocks in the manner shown, the arrangement being such that downward pressure on either of said push-rods will depress one block and raise the other.  $N$  and  $N'$  are channels of insulating material each supporting on opposite walls thereof fixed metallic contact strips, there being a single row of elongated strips on one wall and a double row of short strips spaced apart on the other, the U-shaped spring contacts before mentioned lying between the two walls and bridging said elongated strips with the upper or lower row of shorter strips accordingly as the insulating blocks  $G$  and  $G'$  are in raised or lowered position. The elongated strips 1<sup>a</sup>, 2<sup>b</sup>, 3<sup>c</sup>, etc. correspond to the switch terminals similarly designated in diagram Fig. 2. The upper row of short strips in channel  $N$  and the lower row of such strips in channel  $N'$  correspond to the "heavy face" row of terminals shown in said diagram and are similarly wired; while the lower row of shorter strips in channel  $N$  and the upper row of such strips in channel  $N'$  correspond to the "light face" row of terminals and are also similarly wired. By this arrangement it appears that the operator may set and re-set the switch by a simple downward pressure on one or the other of the push-rods  $J$  or  $J'$ , it being understood that one of such rods is always in up position and indicating to the operator whether light face or heavy face perforating magnets are in selective condition. To effect a change in results it is only necessary to depress said upstanding rod.

I find in practice that time can be saved and confusion avoided by providing for a certain uniformity of manipulation of the various parts of a composing machine and it is for this reason that I have devised the peculiar form of switch above described, it being obvious that a switch operable by pressure keys that move always in the same direction and resemble in forms and action all the other keys on the keyboard, will offer fewer hindrances to accurate and speedy work than one requiring peculiar and special manipulation. But it should be observed that while a rocking switch operable by keys or push-rods moved always in the same direction is my preferred form, I by no means limit myself to such form.

My invention broadly speaking comprehends the use of any form of switching mechanism by which a finger key may be electrically connected at will with one or another of different combinations or perforating devices.

For the convenience of assembling and in



order that the switching device as a whole may be removed where occasion requires without distributing any of the conducting wires, I provide each of the various fixed terminals or contact strips of the switch with depending metallic pins S, S', etc. adapted to enter and make electrical contact with mercury wells or terminals S', S' etc., located in the insulating plate B, hereinbefore referred to, the various conducting wires leading to and from these wells.

Having thus described my invention what I claim is:—

1. In a machine for registering upon a type-casting-machine-controller the composition to be cast in the casting machine, a key-board having groups of keys representing a plurality of lay-outs or fonts or parts thereof, selective means for registering upon the casting-machine-controller the several characters appearing in the several key-board groups, means for connecting the several key-board keys to the controller selective means, and means whereby said connections may be established for one key-board group and rendered inoperative from another key-board group.

2. In a machine for registering upon a type-casting-machine-controller the composition to be cast in the casting machine, a key-board having groups of keys representing a plurality of lay-outs or fonts or parts thereof, selective means for registering upon the casting-machine-controller the several characters appearing in the several key-board groups, means for connecting the several key-board keys to the controller selective means, and means whereby said connections may be simultaneously established for all the keys of one key-board group and rendered inoperative from the keys of another key-board group.

3. In a machine for registering upon a type-casting machine-controller the composition to be cast in the casting machine, a key-board having groups of keys representing a plurality of lay-outs or fonts or parts thereof, selective means for registering upon the casting machine-controller the several characters appearing in the several key-board groups, and means whereby one at a time of said key-board groups may be placed in operative connection with the controller registering means.

4. A machine for registering upon a type-casting-machine-controller the composition to be cast in the casting machine, a key-board having keys representing the characters adapted to be registered upon the controller, selective means for registering on the controller the several characters corresponding to the key-board keys, and means whereby a plurality but less than all of said character keys may be connected to the controller registering means.

5. A machine for registering upon a type-casting-machine-controller the composition to be cast in the casting machine, a key-board having keys representing the characters, selective means for registering on the controller the several characters corresponding to the key-board keys, and means whereby said keys may be interchangeably connected in groups to said controller registering means.

6. A machine for registering upon a type-casting-machine-controller the composition to be cast in the casting machine, a key-board having keys representing the characters adapted to be registered upon the controller, selective means for registering on the controller the several characters corresponding to the key-board keys, electrical circuits controlled by each of said keys, and means whereby said circuits may be interchangeably set in groups into operative relation to the controller registering means, for operating the latter when the keys are operated.

7. In composing machines of the character described the combination of a series of selecting magnets, finger keys each representative of two different groups or combinations of such magnets and included in an electric circuit with both of said groups or combinations and a manually operated switch for causing a key to actuate one or the other of said groups or combination of magnets as described.

8. In composing machines of the character described, the combination of a series of selecting magnets, finger keys each representative of a plurality of groups or combinations of such magnets, and a manually operated selecting switch electrically connected with said keys and said magnets whereby a magnet in a group or combination may be cut out of control of a key and another cut in.

9. In a composing machine of the character described, the combination of selecting magnets divided into two general groups, a series of terminals electrically connected to certain magnets in one of said groups, another series of terminals electrically connected with certain others of said magnets also in said group, and finger keys having electrical connections leading to certain magnets of the other of said groups and connections leading to a manually operated switch, the latter being adapted to connect said keys with one or the other of said series of terminals.

10. In a composing machine of the character described, the combination of selecting magnets divided into two general groups, a switch having two series of terminals, conductors connecting certain of the magnets of one of such groups with the terminals of one series and certain others of said magnets with the terminals of the other series, a



movable member having fingers adapted to contact with the corresponding terminals of one or the other of said series of terminals, and finger keys each adapted to distribute  
 5 current in branch lines one leading to a finger of said movable member and the other to a magnet of the other said general group.

11. The combination of selecting magnets, finger-keys for controlling the energizing of  
 10 the same, and a selecting switch comprising two sets of terminals insulated from each other, one set being in circuit with certain of said magnets and the other set in circuit with certain others of said magnets, and a  
 15 movable member carrying contact fingers in circuit with said keys, said movable member being adapted to connect the keys with one or the other set of said terminals.

12. The combination of selecting-magnets,  
 20 finger keys for controlling the same, a pair of channels of insulating material spaced apart and having electric terminals arranged on opposing walls thereof and connected respectively with said keys and certain of said  
 25 magnets, a rocking arm pivoted between said channels, and contact fingers arranged upon the ends of said arm and adapted to engage said terminals.

13. A selecting switch for the purpose described comprising a pivoted arm adapted to rock in a vertical plane, push-rods arranged  
 30 on the ends of the same, U-shaped contact fingers also carried by the ends of said arm, and electric terminals arranged on both sides  
 35 of both ends of said arm and adapted to be

engaged by said U-shaped contacts, the terminals on one side being arranged in two superposed insulated rows.

14. In a composing machine of the character described, the combination of a series of  
 40 selecting magnets divided into two general groups, a permanent key board, each key thereof being representative of certain groups or combinations composed of individuals of the magnets of both general  
 45 groups and in electric circuit with the same, and a manually operated switching device interposed in the circuit and adapted to cut out one of the magnets in a group or combination and cut in another. 50

15. In a composing machine of the character described, the combination of a series of selecting magnets divided into two general  
 55 groups, finger keys each representative of different groups or combinations of magnets composed of individual magnets from both of said general groups and adapted to distribute current over branch lines to both  
 60 of said groups, and a manually operated switching device located in one of said branch lines and adapted to cut out a magnet and substitute another therefor.

In testimony whereof, I have hereunto set my hand in the presence of the two subscribing witnesses.

WILLIAM ACKERMAN.

Witnesses:

W. NICHOLAS,

J. McCULLOCH.