

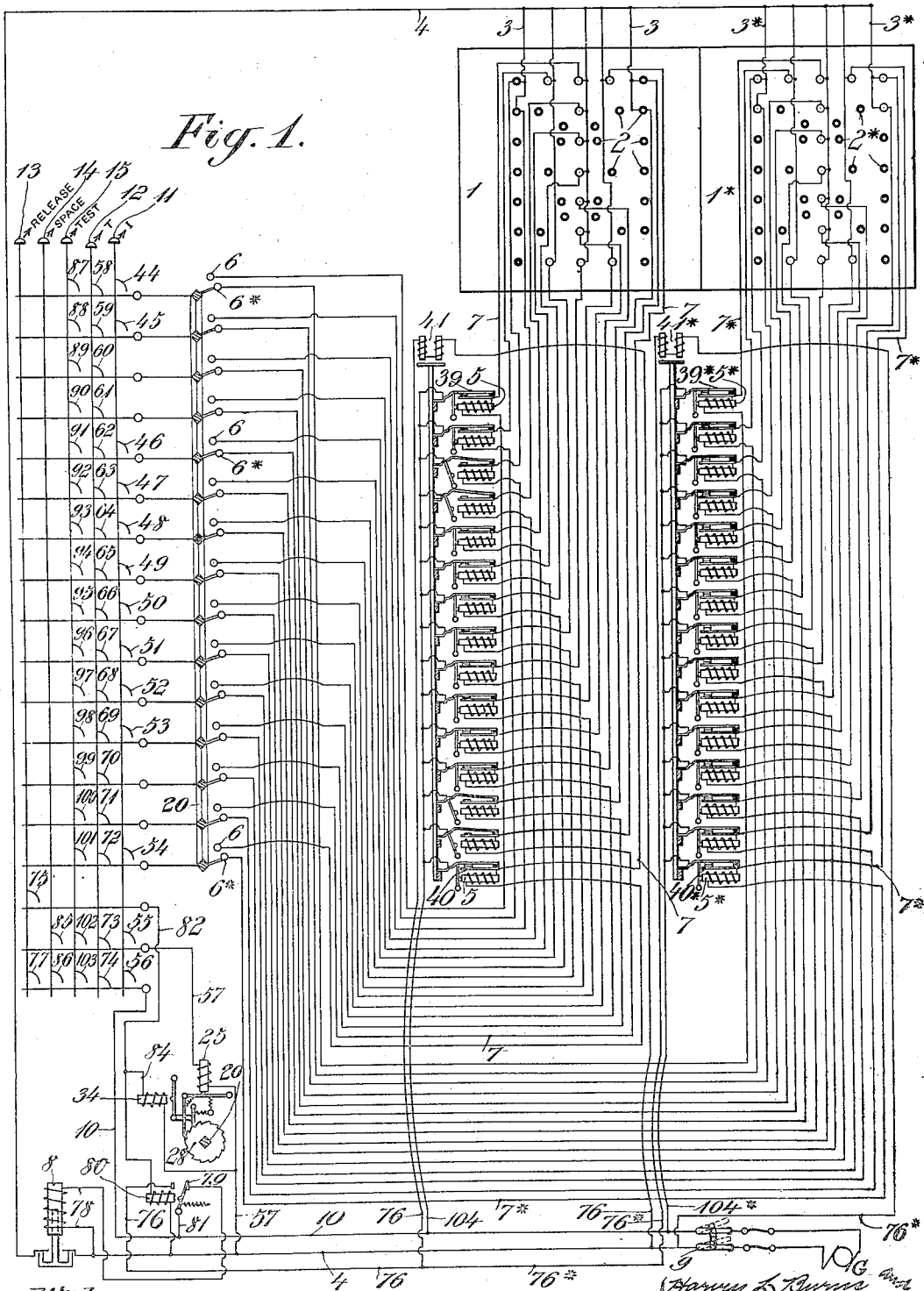
H. L. BURNS & S. B. WILLIAMS, JR.
ELECTRIC SIGN SYSTEM.

APPLICATION FILED AUG. 24, 1909.

Patented Nov. 3, 1914.

4 SHEETS—SHEET 1.

1,116,007.



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4 SHEETS—SHEET 2.

Fig. 2.

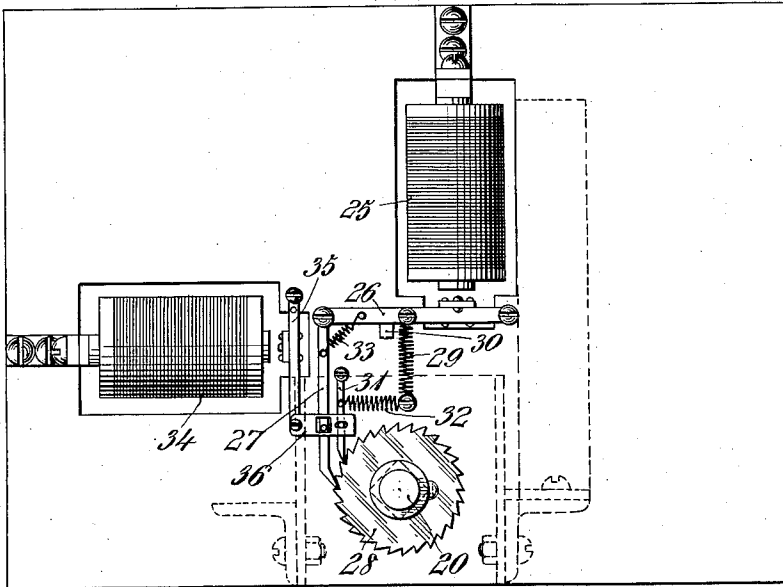
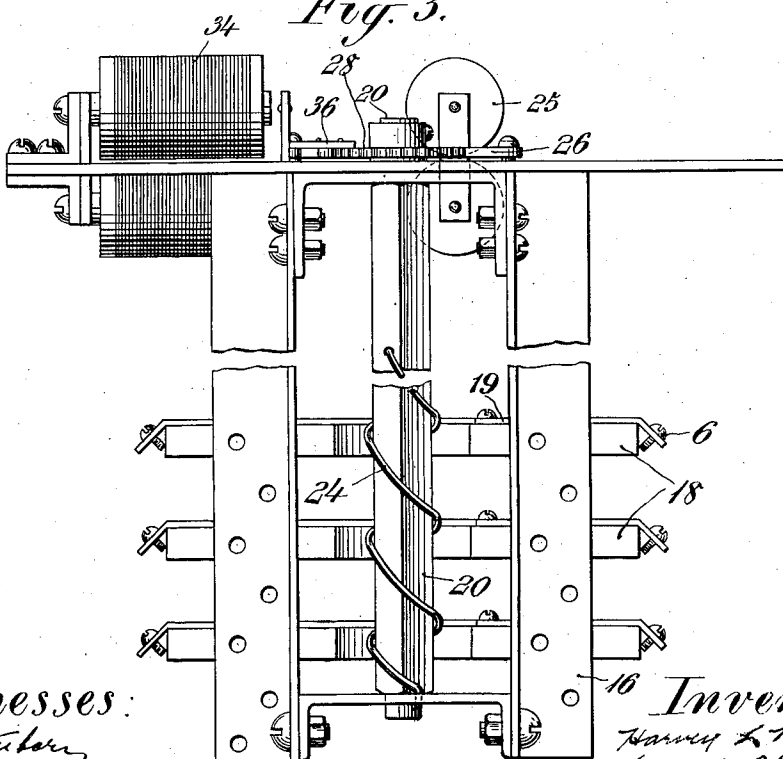


Fig. 3.



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4 SHEETS—SHEET 3.

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Fig. 4.

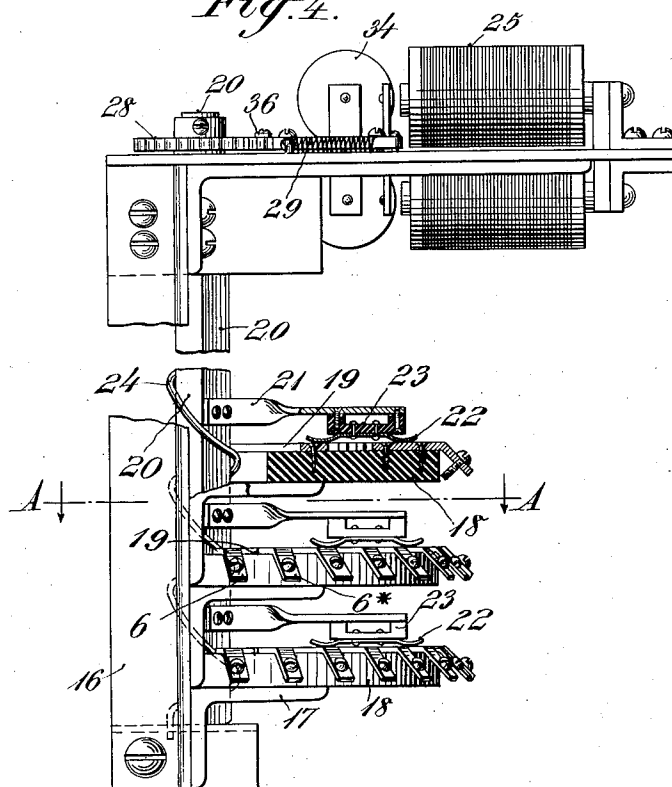
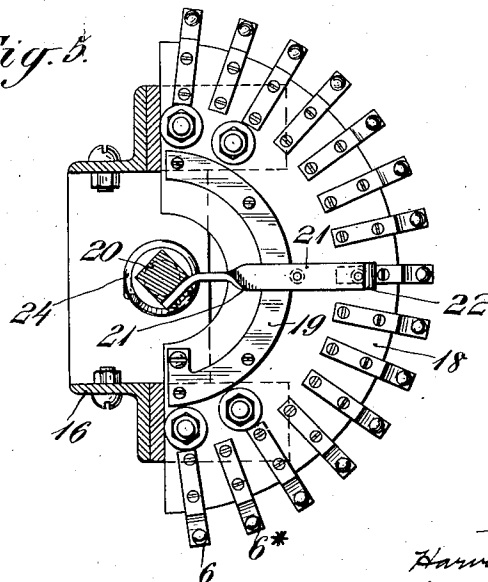


Fig. 5.



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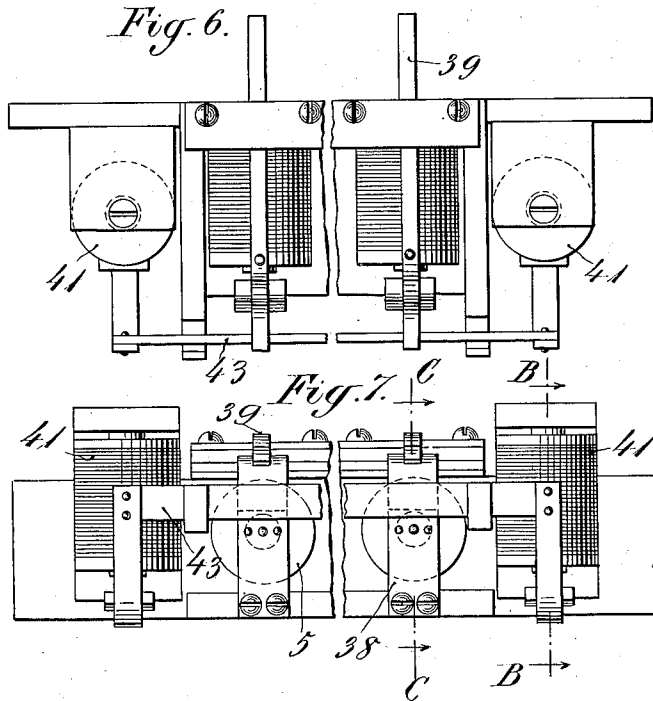
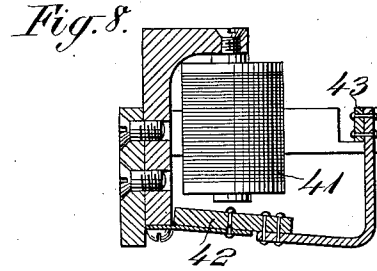
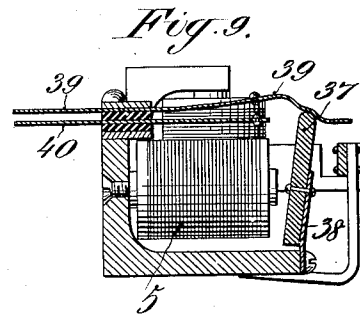
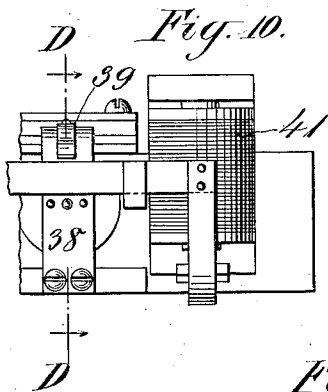
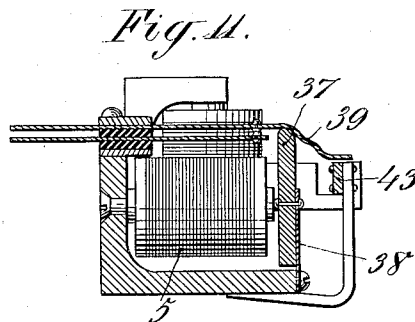
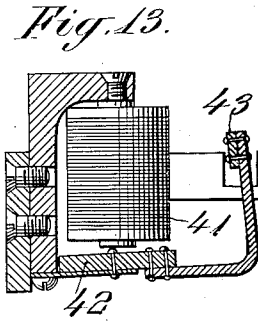
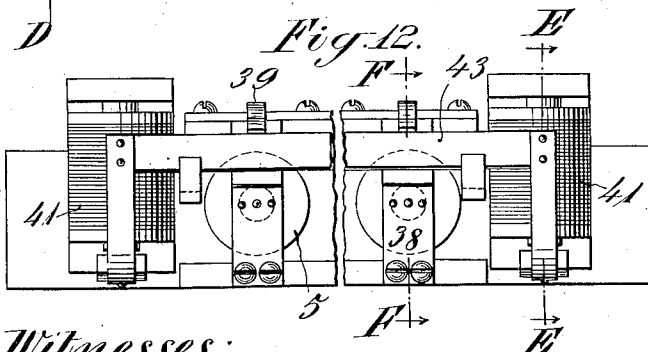
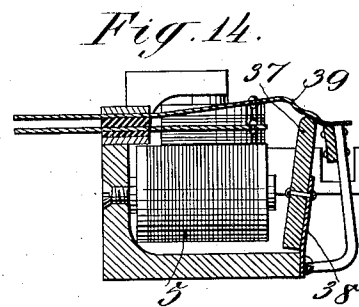
H. L. BURNS & S. B. WILLIAMS, JR.
ELECTRIC SIGN SYSTEM.

APPLICATION FILED AUG. 24, 1909.

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4 SHEETS—SHEET 4.

1,116,007.



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ELECTRIC SIGN SYSTEM.

1,116,007.

Specification of Letters Patent.

Patented Nov. 3, 1914.

Application filed August 24, 1909. Serial No. 514,410.

To all whom it may concern:

Be it known that we, HARVEY L. BURNS and SAMUEL B. WILLIAMS, Jr., citizens of the United States, and residents, respectively, of Newark, in the county of Essex and State of New Jersey, and the borough of Manhattan in the city and State of New York, have invented a new and useful Improvement in Electric Sign Systems, of which the following is a specification.

Our invention relates to electric sign display systems and has for its object to provide certain improvements in the construction, form and arrangement of the several parts of the system whereby any symbol or combination of symbols may be displayed in a simple and effective manner by the manipulation of one or more keys of a single key-board.

Our invention contemplates the use of a sign board composed of a plurality of units each having a plurality of electrically operated signals so arranged that different symbols may be displayed thereby by the energization of different combinations or groups of electrically operated signals under the control of different keys of the keyboard.

Our invention further contemplates the use of a novel form of stepping device so arranged as to automatically bring succeeding sign board units under the control of the single key-board, the movement of the stepping device taking place after an operated key is released and is independent of the length of time which a key is operated, a release key being provided on the key-board which will, when operated, cause the stepping device to be returned to its normal position to bring the electrically operated signals of the first sign board unit under the control of the key-board.

Our invention still further contemplates the use of a relay device arranged to maintain the electrically operated signals of several sign board units in their displayed condition independent of the further energization of any of the relay magnets until released by the operation of the release key. A space key is also provided in the key-board for operating the stepping device to cause it to skip one or more sign-board units at pleasure, to form spaces between different symbols or combinations of symbols. The key-board is also provided with a test key for testing all of the electrically oper-

ated signals at any time for visual examination as to their efficiency.

A practical embodiment of our invention is represented in the accompanying drawings in which,

Figure 1 is a diagrammatic view illustrating two sign board units, a release key, a space key, a test key, two symbol keys and the electric circuit connections between the two symbol keys and their corresponding lamps in the two sign board units; the view also including diagrammatic representations of the stepping device, the relay device and the main current wires. Fig. 2 is a top plan view of the stepping device. Fig. 3 is a detail rear view of the same. Fig. 4 is a detail side view of the stepping device, partially in section. Fig. 5 is a horizontal section taken in the plane of line A—A of Fig. 4, looking in the direction of the arrows, and shows one of the semicircular contact plates. Fig. 6 is a detail plan view of the relay device. Fig. 7 is a detail front view thereof. Fig. 8 is a section taken in the plane of the line B—B of Fig. 7, looking in the direction of the arrows, and shows the release magnet with its armature in its non-operated position. Fig. 9 is a section taken in the plane of the line C—C of Fig. 7, looking in the direction of the arrows, and shows a relay magnet with its armature in its non-operated position. Fig. 10 is a detail front view showing the position which the parts assume when the holding magnets are energized. Fig. 11 is a section taken in the plane of the line D—D of Fig. 10, looking in the direction of the arrows, and shows a relay magnet with its armature in its operated position. Fig. 12 is a detail front view showing the position which the parts assume when the release magnets are energized. Fig. 13 is a section taken in the plane of the line E—E of Fig. 12, looking in the direction of the arrows, and shows the release magnet with its armature in its operated position, and Fig. 14 is a section taken in the plane of the line F—F of Fig. 12, looking in the direction of the arrows, and shows the release bar lifting the contact springs of a relay magnet.

In the accompanying drawings, electrically operated signals are shown in the form of incandescent lamps, but it is understood that any form of electrically operated signals which will, when electric current is

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passing through it, so change its condition as to give a distinct signal, may be used. Furthermore, the construction of the stepping device and of the relay device need not necessarily take the form shown so long as the elements of our invention are embodied therein.

In the accompanying drawings and the following description, we have chosen to illustrate and explain our system in connection with two sign board units and two symbol keys of a key board, and only those lamps of the sign board units which are necessary for forming the letters I and T of the key board symbols are shown electrically connected up, and only those relays which are necessary for operating the lamps which are connected up are shown, it being understood that in the complete system a relay magnet is provided for each of the lamps of each sign board unit and that numerous symbol keys may be provided on the key board for illuminating the lamps of each unit to display numerous different symbols.

The display sign comprises a plurality of units each unit bearing a number of lamps so arranged that symbols of various kinds, such, for instance, as letters and numerals, may be displayed by illuminating certain series or groups of lamps. For a clear understanding of this invention, two of these display sign units and their electrical connections are shown and described, only those lamps of each unit being connected up as will display the two letters I and T. These two sign units are denoted by 1, 1* and the lamps are denoted by 2, 2*. One side of each lamp 2 of the sign unit 1, is connected by a wire 3 to the main line wire 4, and one side of each lamp 2* of the sign unit 1* is connected by a wire 3* to the said main line wire 4. The other side of each lamp 2 of the sign unit 1, is connected through a relay 5 to the contact 6 of the stepping device by a wire 7, and similarly, the other side of each of the lamps 2* of the sign unit 1* is connected through a relay 5* to a second contact 6* of the stepping device by a wire 7*.

The line wire 4 leads through an electro-magnetic switch 8 and a manually operated switch 9, which switch 9 also opens and closes the second main line wire 10. Current is furnished to the main line wires 4 and 10 from any suitable source of electric energy, such as a generator G. The key of the keyboard for illuminating the lamps of either of the sign units 1, 1* to display the letter I, is denoted by 11 and the key for illuminating the lamps of either of the said units for displaying the letter T, is denoted by 12. The release key of the keyboard is denoted by 13, the space key by 14 and the test key by 15.

Proceeding to describe the particular

form of stepping device illustrated in detail in Figs. 2 to 5 inclusive, a suitable frame 16 is provided with a series of brackets 17 each supporting a semicircular plate 18, which plate carries a series of contacts 6, 6*, etc. the number of contacts on each plate 18 corresponding to the number of units in the display sign. The number of these plates 18 and their series of contacts 6, 6*, etc. corresponds to the number of lamps in each sign unit. Each plate 18 is further provided with a common conducting strip 19. This conducting strip 19 is insulated from the contacts 6, 6* etc. and the said contacts are insulated from one another, in the present instance, by providing the plate 18 of insulating material.

A vertically arranged rotary shaft 20 is suitably mounted in the frame 16, which shaft is provided with a series of arms 21, each arm in turn being provided with a bridge plate 22 arranged to bring any one of the contacts 6, 6*, etc. into electric connection with the strip 19, according to the rotative position of the shaft 20. This bridge plate 22 is insulated from the shaft 20, as for instance, by providing a block 23 of insulating material interposed between the bridge plate 22 and the arm 21. A tension spring 24 serves to return the shaft 20 to its normal position with the bridge plate 22 connecting the contact 6 with the strip 19.

The means which we employ for rotating the shaft 20 step by step to bring the respective bridge plates 22 successively into position to permit the illumination of lamps in successive sign units, is as follows: An electro-magnet 25 has its armature 26 provided with a pawl 27 arranged to engage the teeth of a ratchet wheel 28 fixed to the shaft 20 of the stepping device. A spring 29 serves to normally hold the pawl at the limit of its forward movement and the armature away from its magnet against a stop 30. A lock pawl 31 is provided for preventing the accidental reverse movement of the ratchet wheel 28, a spring 32 being provided for holding the pawl in engagement with the said ratchet wheel. A spring 33 serves to hold the pawl 27 in engagement with the said ratchet wheel 28.

The means which we have shown for releasing the ratchet wheel 28 for permitting the shaft 20 of the stepping device to return to its normal position, comprises an electro-magnet 34 the armature 35 of which has a lost motion connection with the pawls 27 and 31, so that when the electro-magnet 34 is energized, the movement of the armature 35 will withdraw the pawls 27 and 31 from their engagement with the ratchet wheel 28. This lost motion connection between the armature 35 and the pawls 27 and 31 is shown in the present instance, as a plate 36 carried by the armature 35 and so

connected to the pawls 27 and 31 as not to interfere with their action upon the ratchet wheel 28 when the electro-magnet 34 is de-energized.

5 The means which we employ for maintaining the lamps of preceding sign units in their illuminated condition, while lamps in succeeding units are being illuminated for completing a complete combination of sym-
10 bols, and the means which we employ for permitting all of the lamps to be extinguished at a single operation, is shown herein as constructed and arranged as follows: The armatures 37 of the relay magnets 5 are
15 held normally away from the said magnets by springs 38. Each of these armatures holds the plate 39 of a pair of plates 39, 40, out of contact with the plate 40. When the relay magnet 5 is energized, the inward
20 movement of the armature 37 against the tension of the spring 38, will permit the plate 39 to spring down into electric contact with the plate 40. The plate 39 is so formed that it will hold the armature 37 in its op-
25 erated position when once drawn up and the armature 37 cannot return to its normal position until the plate 39 is raised by the cross bar 43 in a manner described below. Thus the signals are maintained in their displayed
30 condition independently of the relay-magnets. In other words, the circuit is closed through the elements and is kept closed by the contacts 39 and 40 independently of the further energization of the relay magnets 5.
35 A similar arrangement is provided for the armatures 37* of the relay magnets 5* and their plates 39*, 40*.

A pair of electro-magnets 41 have their armatures 42 provided with a cross bar 43
40 arranged in position to engage and raise all of the plates 39 out of electric connection with the plates 40, when the electro-magnets 41 are energized. This raising of the plates 39 will permit the springs 38 to return the
45 armatures 37 of the relay magnets 5 to their normal position for holding the plate 39 out of electric connection with the plate 40 when the relay magnets are deenergized. It is to be understood that a similar pair of
50 electro-magnets 41* and their armatures 42* and bar 43* are provided for the group of relay magnets 5* of the second sign unit 1*. If the relays 5 or 5* are arranged in more than one strip, then a pair of release electro-
55 magnets 41 or 41* must be provided for each strip.

Each of the several keys of the keyboard is provided with two or more contacts electrically connected, which contacts are ar-
60 ranged to open and close certain circuits as follows. The I symbol key 11 is provided with contact points 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, arranged to be brought into and out of electric connection with certain
65 of the conducting strips 19 of the stepping

device. This I symbol key 11 is further provided with contacts 55, 56, for operating the stepping device, the contact 55 being arranged to be brought into and out of electric connection with a wire 57 leading 70 through the electro-magnet 25 of the stepping device to the main line wire 4. The contact 56 is arranged to be brought into and out of electric connection with the main line wire 10. 75

The T symbol key 12 is provided with con-
tacts 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68,
69, 70, 71, 72, arranged to be brought into
and out of electric connection with the sev- 80
eral conducting strips 19 of the stepping de-
vice. This T symbol key 12 is further pro-
vided with contacts 73, 74, for operating the
stepping device, the contact 73 being ar-
ranged to be brought into and out of elec- 85
tric connection with the wire 57 and the
main line wire 4, and the contact 74 being
arranged to be brought into and out of elec-
tric connection with the main line wire 10.
This release key 13 is provided with con- 90
tacts 75, 77, the contact 75 being arranged to
be brought into and out of connection with a
wire 82 which leads to the main line wire 4
through an electro-magnet 80 and the con-
tact 77 being arranged to be brought into
and out of electric connection with the main 95
line wire 10. A branch line wire 78 leads
from the main line wire 4, through the elec-
tromagnetic switch 8 and from thence to a
contact point engaged by the armature 79 of
the electro-magnet 80, when the electro-mag- 100
net is deenergized, and from the armature 79
through the wire 81 to the main line wire 10.
A wire 76 leads from a contact point en-
gaged by the armature 79, when the electro-
magnet 80 is energized, through the release 105
magnet 41 of the relay device 5, to the main
line wire 4. The wire 76* leads from the
wire 76, through the release magnet 41* of
the relay device 5*, to the main line wire 4.
A spring tends to hold the armature 79 of 110
the said electro-magnet 80 in such position
that the branch line wire 78 is in electric
connection with the main line wire 10, when
the electro-magnet 80 is deenergized and the
circuit thereby completed through the elec- 115
tromagnetic switch 8, for energizing said
electromagnetic switch to cause it to close
the break in the main line wire 4. A branch
line wire 84 leads from the wire 82 through
the electro-magnet 34, to the wire 57 and 120
from thence to the main line wire 4. The
space key 14 is provided with contacts 85, 86,
for operating the stepping device, the con-
tact 85 being arranged to be brought into
and out of electric connection with the wire 125
57 and main line wire 4 and the contact 86
being arranged to be brought into and out
of electric connection with the main line 10.

The test key 15 is provided with contacts
87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 130

100, 101, arranged to be brought into and out of electric connection with their respective conducting strips 19. This test key 15 is also provided with contacts 102, 103, for operating the stepping device, the contact 102 being arranged to be brought into and out of electric connection with the wire 57 and main line wire 4, and the contact 103 being arranged to be brought into and out of electric connection with the main line wire 10. It is to be understood that in actual practice this test key will have contacts corresponding to the number of conducting strips 19 which, in turn, correspond in number to the number of lamps in each sign unit. In the present instance, the test key is only shown as provided with contacts for testing the lamps which are shown connected up to form the letters I and T, and the contacts for operating the stepping device. The main line wire 10 is electrically connected to the plates 39 of the relay magnets 5, through a wire 104, and with the plates 39* of the relay magnets 5*, through a wire 104*.

In operation, presupposing the arms 21 of the shaft 20 of the stepping device are in such a position that the contacts 6 are in electric connection with the conducting strip 19, through the bridge plate 22:—As the I symbol key 11 is depressed its contacts 44—54 will be brought into electric connection with the contacts 6. Also, its contacts 55, 56, will be brought into electric connection with the main line wires 4 and 10, respectively. A circuit is also normally completed through the electromagnetic switch 8, through the wires 78, armature 79 and wire 81, the electromagnetic switch being energized and thus closing the break in the line wire 4. A circuit will be completed through each lamp in the display sign unit 1, corresponding to the contacts 44—54 of the I symbol key 11, from one side of each lamp, through the wire 3 to the line wire 4, and from the other side of each lamp through the wire 7, windings of the relay electromagnets 5, contacts 6, conducting strips 19 and contacts on the key to the other main line wire 10. This will cause the energization of the required relay magnets 5, thus moving the armatures 37 into position to allow the pairs of plates 39, 40, to come into electric connection, and complete a parallel circuit through the plates 39, wires 104 to the main line wire 10, which will short circuit the key contacts 44—54 and deenergize the relay magnets 5, so that when the key is released practically no current will have to be broken by the contacts 44—54.

The depression of the I symbol key 11, furthermore, causes its contacts 55, 56, to energize the electromagnet 25, thus withdrawing the pawl 27 carried by the armature 26, a distance of one tooth on the ratchet wheel 28 of the shaft 20 of the stepping de-

vice. As the I symbol key 11 is released, the circuit through the electromagnet 25 will be broken, the magnet deenergized and the tension spring 29 will then be permitted to exert its pull upon the pawl 27 to turn the shaft 20 one step. The relay magnets 5 will maintain the lamps in the display sign unit 1 in their illuminated condition for displaying the letter I, while the shaft 20 has been rotated one step for bringing the arms 21 into position to cause the bridge plates 22 to electrically connect the contacts 6* with the conducting strips 19. The apparatus is now ready for producing the display of a symbol on the display sign unit 1*. The T symbol key 12 may be then depressed, as shown in Fig. 1. This will bring its contacts 58—72 into electric connection with the contacts 6*. The contacts 73, 74, of the symbol key 12 will act in the same manner as the contacts 55, 56, of the symbol key 11, for energizing the electromagnet 25 of the stepping device. The several circuits are completed through the lamps of the sign unit 1* and their relays as described with reference to the lamps of the sign unit 1.

When it is desired to extinguish the lamps and have the stepping device returned to its normal condition, the release key 13 of the keyboard is depressed. Its contact 77 is brought into electric connection with the main line wire 10 and its contact 75 is brought into electric connection with the main line wire 4, through the wires 82, 84. The current passing through the wire 84 will energize the electromagnet 34 and the current passing through the wire 82 will energize the electromagnet 80. This will move the armature 79 to first break the circuit through the electromagnetic switch 8, thereby deenergizing the electromagnetic switch and causing a break in the line wire 4 and extinguishing all of the illuminated lamps of the sign. As soon as the armature 79 makes contact with the wire 76, a circuit will be established through the release magnets 41, 41* of the relays 5, 5*. The energization of the electromagnet 34 causes its armature to draw the pawls 27 and 31 out of engagement with the ratchet wheel 28 of the stepping device, thus permitting the spring 24 to return the shaft 20 back to its normal position with the bridge plates 22 in position to electrically connect the contacts 6 with their respective conducting strips 19. The energization of the magnets 41, 41* causes their armatures 42, 42*, through their bars 43, 43*, to break the electric connection between the plates 39, 40 and 39*, 40*, and at the same time permit the armatures 37, 37* of the groups of relay magnets 5, 5* to fall away from their magnets into position to hold the plates 39, 39* out of electric connection with their plates 40, 40*.

The space key 14 is provided with the con-

tacts 85, 86, corresponding to the contacts 55, 56, of the I symbol key 11 and the contacts 73, 74, of the T symbol key 12 for completing a circuit through the electro-magnet 25 of the stepping device when the space key is depressed and breaking the circuit when the key is raised for advancing the stepping device one step to skip a display sign unit without illuminating any of the lamps thereof, for forming a space between the characters or groups of characters.

The test key 15 is provided with contacts corresponding to all of the lamps in each sign unit, which test key, when depressed, will illuminate all of the lamps which are in proper working order, so as to give a visual indication of the condition of the lamps in each of the display sign units. This test key is also provided with the contacts 102, 103 for operating the stepping device, for bringing the test key successively into position to test the lamps of each unit of the sign.

What we claim is:

1. In an electric display sign system, a source of electrical energy, a keyboard, switches selectively controlled thereby, a display sign composed of units, each unit composed of elements selectively controlled by their respective switches, a stepping device controlled by the operation of the keys of the keyboard, said stepping device comprising members corresponding to the elements of the units and connections for bringing the elements of the successive sign units into direct connection with the members of the stepping device as the stepping device is operated and thence to the keyboard switches, connections from said source to the switches and to said elements and a single electro-magnet for operating the stepping device.

2. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, a display sign composed of units, each unit composed of elements selectively controlled by their respective switches, a stepping device controlled by the operation of the keys of the keyboard, said stepping device comprising members corresponding to the elements of the units and connections for bringing the elements of the successive sign units into direct connection with the members of the stepping device as the stepping device is operated and thence to the keyboard switches, a single electro-magnet connected to said source for operating the stepping device, connections from said source to said keyboard switches and to said elements, connections from said switches to said single electro-magnet, a separate electro-magnet, and means controlled by said separate electro-magnet for returning the stepping device to its normal condition.

3. In an electric display sign system, a single source of electrical energy, a key-

board, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements comprising electrically operated signals, said elements connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, a stepping device controlled by the operation of the keys of the keyboard, said stepping device comprising members corresponding to the elements of the units and connections for bringing said elements and relay magnets of successive sign units into controllable connection with the keys of the keyboard as the stepping device is operated, a suitable circuit including said source, said switches, said relay magnets, said elements and said stepping device for operating said relay magnets and said elements, and means by the operation of said relay magnets for bringing said signals into direct connection with said source of electrical energy.

4. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements comprising electrically operated signals, said elements connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, a stepping device controlled by the operation of the keys of the keyboard, said stepping device comprising members corresponding to the elements of the units and connections for bringing said elements and relay magnets of successive sign units into controllable connection with the keys of the keyboard as the stepping device is operated, a suitable circuit including said source, said switches, said relay magnets, said elements and said stepping device for operating said relay magnets and said elements, and means controlled by the operation of said relay magnets for bringing said signals into direct connection with said source of electrical energy for short circuiting that part of the energizing circuit from and including said relay magnets to said source of electrical energy.

5. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements comprising electrically operated signals, said elements connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, a suitable circuit including said source, said switches, said relay magnets and said elements for operating said relay magnets and elements of successive sign units, and means controlled by

said relay magnets for maintaining said signals in their displayed condition independently of said relay magnets.

6. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements comprising electrically operated signals, said elements connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, means for bringing said elements and relay magnets of successive sign units into controllable connection with the keys of the keyboard, a suitable circuit including said source, said switches, said relay magnets, said elements and said means for operating said relay magnets and elements, and means controlled by said relay magnets for maintaining said signals in their displayed condition independently of said relay magnets.

7. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements comprising electrically operated signals, said elements connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, means for bringing said relay magnets and elements of successive sign units into controllable connection with the keys of the keyboard, a suitable circuit including said source, said switches, said relay magnets, said elements and said means for operating said relay magnets and said elements, and means controlled by the operation of said relay magnets for bringing said signals into direct connection with said source of electrical energy, for short circuiting that part of the energizing circuit from and including said relay magnets to said source, for maintaining said signals in their displayed condition independently of said relay magnets.

8. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements comprising electrically operated signals, and connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, means by the operation of a single electro-magnet controlled by the operation of the keys of the keyboard for bringing the said relay magnets and elements of successive sign units into controllable connection with the keys of the keyboard, a suitable circuit including said source, said switches, said means, said relay magnets and said ele-

ments for operating said relay magnets and elements, and means controlled by the operation of said relay magnets for bringing said signals into direct connection with said source of electrical energy, for short circuiting that part of the energizing circuit from and including said relay magnets to said source, for maintaining said signals in their displayed condition independently of said relay magnets.

9. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, relay armatures adapted to be attracted by said relay magnets, pairs of springs normally electrically connected and adapted to be withheld from such electrical connection when their respective relay armatures are in their normal unattracted position, a suitable circuit including said source, said switches, said relay magnets, said elements and said pairs of springs for operating said relay magnets and elements of successive sign units, and means for holding said relay armatures in their attracted position after being attracted by their respective relay magnets independently of said relay magnets.

10. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, means for bringing said relay magnets and elements of successive sign units into controllable connection with the keys of the keyboard, relay armatures adapted to be attracted by said relay magnets, pairs of springs normally electrically connected and adapted to be withheld from such electrical connection when their respective relay armatures are in their normal unattracted positions, a suitable circuit including said source, said switches, said means, said relay magnets, said elements and said pairs of springs for causing said relay magnets to attract their armatures and for operating said elements, and means for holding said relay armatures in their attracted position independently of said relay magnets.

11. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements connected to said relay magnets, said elements and relay magnets being selectively

controlled by their respective keyboard switches, means by the operation of a single electro-magnet controlled by the keys of the keyboard for bringing said relay magnets and elements of successive sign units into controllable connection with the keys of the keyboard, relay armatures adapted to be attracted by said relay magnets, pairs of springs normally electrically connected and adapted to be withheld from such electrical connection when their respective relay armatures are in their normal unattracted position, a suitable circuit including said source, said switches, said relay magnets, said elements, said means and said pairs of springs for causing said relay magnets to attract their respective armatures and for operating said elements so as to bring said elements into direct connection with said source, and means for holding said armatures in their attracted position independently of said relay magnets for maintaining said direct connection between said source and said elements.

12. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements comprising electrically operated signals, said elements connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, relay armatures adapted to be attracted by said relay magnets, pairs of springs normally electrically connected and adapted to be withheld from such electrical connection when their respective relay armatures are in their normal unattracted position, a suitable circuit including said source, said switches, said relay magnets, said elements, and said pairs of springs for bringing said elements into direct connection with said source by causing said armatures to be attracted by their respective relay magnets, and means for holding said relay armatures in their attracted positions independently of said relay magnets, for maintaining said direct connection between said elements and said source, for maintaining said signals in their displayed condition.

13. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements comprising electrically operated signals, said elements connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, means for bringing said elements and relay magnets of successive sign units into controllable connection with the keys of the keyboard, relay armatures adapt-

ed to be attracted by said relay magnets, pairs of springs normally electrically connected and adapted to be withheld from such electrical connection when their respective relay armatures are in their normal unattracted position, a suitable circuit including said source, said switches, said elements, said relay magnets, said means, said relay armatures and said pairs of springs for bringing said elements into direct connection with said source by causing said armatures to be attracted by their respective relay magnets, and means for holding said relay armatures in their attracted positions independently of said relay magnets, for maintaining said direct connection between said elements and said source, for maintaining said signals in their displayed condition.

14. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements comprising electrically operated signals, said elements connected to relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, means by the operation of a single electro-magnet for bringing said elements and relay magnets of successive sign units into controllable connection with the keys of the keyboard, relay armatures adapted to be attracted by their respective relay magnets, pairs of springs normally electrically connected and adapted to be withheld from such electrical connection when their respective relay armatures are in their normal unattracted position, a suitable circuit including said source, said switches, said elements, said relay magnets, said means controlled by said single electro-magnet, and said pairs of springs for bringing said elements into direct connection with said source by causing said armatures to be attracted by their respective relay magnets, and means for holding said relay armatures in their attracted position, independently of said relay magnets, for maintaining said direct connection between said elements and said source of electrical energy, for maintaining said signals in their displayed condition.

15. In an electric display sign system, a single source of electrical energy, a keyboard, switches electrically controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements comprising electrically operated signals, said elements connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, means controlled by the operation of a single electro-magnet for bringing said elements and relay magnets of successive sign units into controllable connection

tion with the keys of the keyboard, means controlled by said relay magnets for maintaining said signals in their displayed conditions independently of said relay magnets, electro-magnets for controlling the release of said relay magnets, a suitable circuit including said source, said switches, said elements, said relay magnets, said means for bringing said elements and relay magnets into controllable connection with the keys of the keyboard, said means for maintaining said signals in their displayed condition, and said electro-magnets for operating said elements and relay magnets, and means controlled by said electromagnets for permitting said relay magnets to return to their normal condition.

16. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements comprising electrically operated signals, said elements connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, a stepping device, said stepping device comprising members corresponding to said elements and relay magnets of successive sign units into controllable connection with the keys of the keyboard as the stepping device is operated, means controlled by the operation of said relay magnets for maintaining said signals in their displayed condition independently of said relay magnets, electro-magnets, means controlled by the operation of said electro-magnets for permitting said relay magnets to return to their normal condition, a separate electro-magnet, a suitable circuit including said source of electrical energy, said keyboard switches, said relay magnets, said elements, said stepping device and all said electro-magnets for operating said elements and relay magnets and said stepping device, and means controlled by said separate electromagnet for returning said stepping device to its normal condition.

17. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements comprising electrically operated signals, said elements connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, means controlled by a single electro-magnet for bringing said elements and relay magnets of successive sign units into controllable connection with the keys of the keyboard, means controlled by the operation of said relay magnets for maintaining said signals in their displayed condition

independently of said relay magnets, a suitable circuit including said source of electrical energy, said keyboard switches, said elements, said relay magnets and said means controlled by said single electro-magnet for operating said elements and relay magnets, and an electromagnetic switch for breaking the circuit of said signals for permitting them to return to their normal condition.

18. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements comprising electrically operated signals, said elements connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, means controlled by a single electro-magnet for bringing said elements and relay magnets into controllable connection with the keys of the keyboard, means controlled by said relay magnets for maintaining said signals in their displayed condition independently of said relay magnets, means for breaking the circuit of said signals at a single point, electro-magnets, means controlled by said electro-magnets, for permitting said relay magnets to return to their normal condition, a suitable circuit including said source of electrical energy, said keyboard switches, said relay magnets, said elements, said means controlled by said single electro-magnet, said means for breaking the circuit of said signals and said electro-magnets for operating said elements and relay magnets and for operating said electro-magnets, and means controlled by the operation of a single key of the keyboard for operating said means for breaking the circuit at a single point before operating said electro-magnets for permitting said relay magnets to return to their normal condition.

19. In an electrical display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements comprising electrically operated signals, said elements connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective switches, a stepping device controlled by the keys of the keyboard, said stepping device comprising members corresponding to said elements and relay magnets of said units for bringing said elements and relay magnets of successive sign units into controllable connection with the keys of the keyboard as the stepping device is operated, a single electro-magnet for operating said stepping device, means controlled by the operation of said relay magnets for maintaining said signals in their displayed condition inde-

pendently of said relay magnets, electro-magnets, means controlled by the operation of said electro-magnets for permitting said relay magnets to return to their normal condition, means for breaking the circuit of said signals at a single point, a separate electro-magnet, means controlled by said separate electro-magnet for returning the stepping device to its normal condition, a suitable circuit including said source of electrical energy, said keyboard switches, said relay magnets, said elements, said stepping device, said single electro-magnet for operating said stepping device, all of said electro-magnets, and said means for breaking the circuit of said signals at a single point for operating said elements, and for returning said signals to their normal condition, and means controlled by a single key of the keyboard for operating said means for breaking the circuit of said signals at a single point before operating said electro-magnets for permitting said relay magnets to return to their normal condition, for operating said separate electro-magnet for returning said stepping device to its normal condition.

20. In an electric display sign system, a single source of electrical energy, a keyboard, switches selectively controlled thereby, relay magnets, a display sign composed of units, each unit composed of elements comprising electrically operated signals, said elements connected to said relay magnets, said elements and relay magnets being selectively controlled by their respective keyboard switches, a stepping device comprising members corresponding to said elements of said units, for bringing said elements and relay magnets of successive sign units

into controllable connection with the keys of the keyboard, a single electro-magnet controlled by the keys of the keyboard for operating said stepping device, means controlled by the operation of said relay magnets for maintaining said signals in their displayed conditions independently of said relay magnets, electro-magnets, means controlled by said electro-magnets for permitting said relay magnets to return to their normal condition, an electro-magnetic switch for breaking the circuit of said signals at a single point, a separate electro-magnet, means controlled by said separate electro-magnet for returning said stepping device to its normal condition, a suitable circuit including said source of electrical energy, said keyboard switches, said relay magnets, said elements, said stepping device, said single electro-magnet for operating said stepping device, all said electro-magnets and said electro-magnetic switch for operating said elements and for returning said signals to their normal condition, and means controlled by a single key of the keyboard for releasing said electro-magnetic switch before operating said electro-magnets for permitting said relay magnets to return to their normal condition, for operating said separate electro-magnet for returning said stepping device to its normal condition.

In testimony, that we claim the foregoing as our invention, we have signed our names in presence of two witnesses, this twentieth day of August, 1909.

HARVEY L. BURNS.

SAMUEL B. WILLIAMS, Jr.

Witnesses:

F. GEORGE BARRY,

HENRY THIEME.