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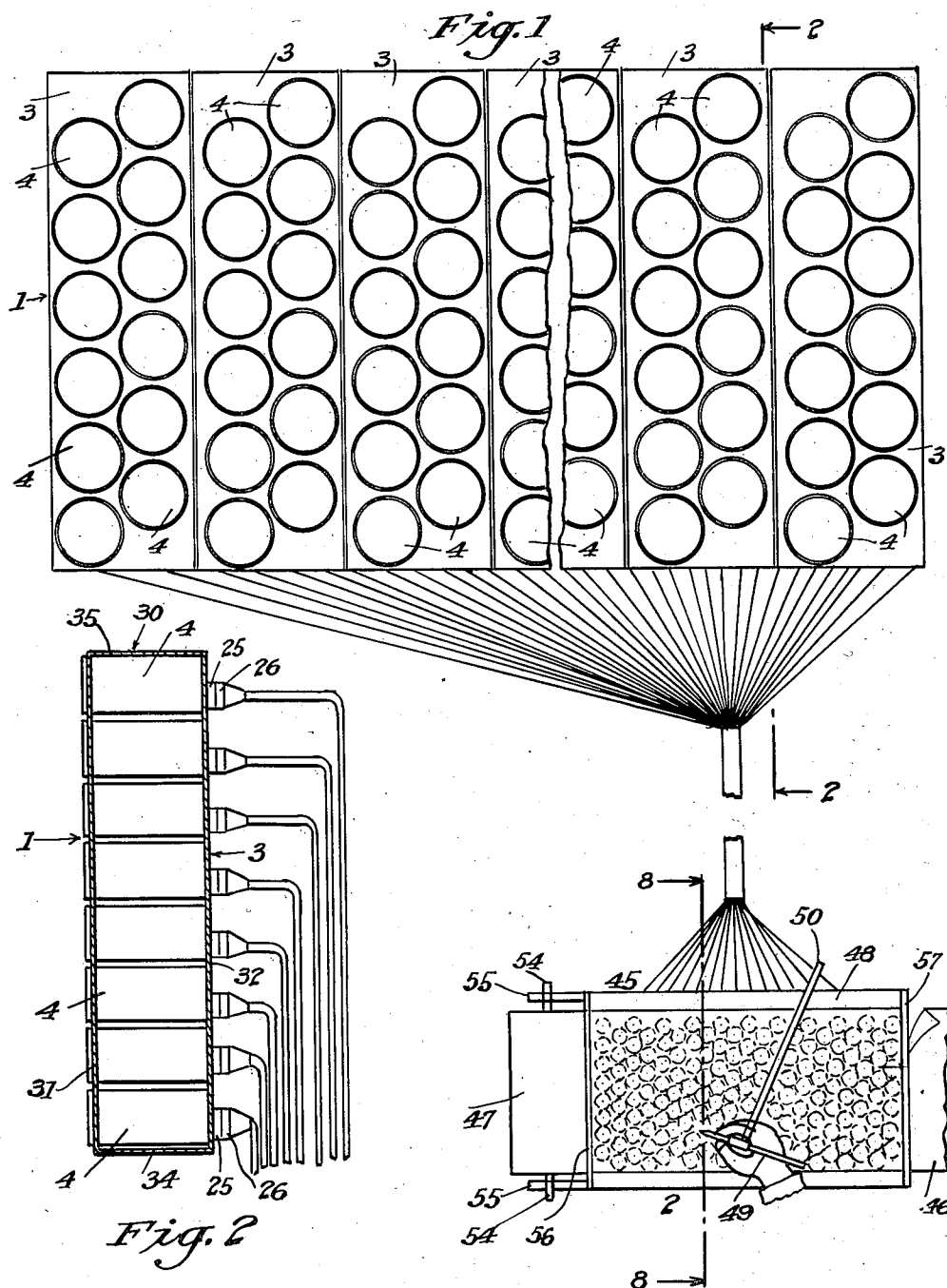
L. L. PRUYN ET AL

2,340,559

MULTIPLE-COLOR ELECTRIC SIGN

Filed June 9, 1941

4 Sheets-Sheet 1



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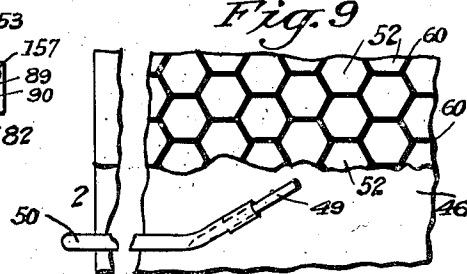
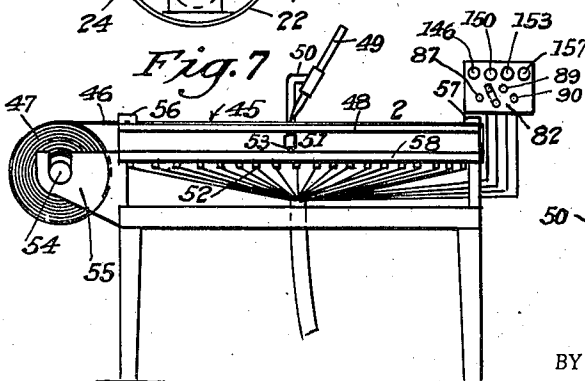
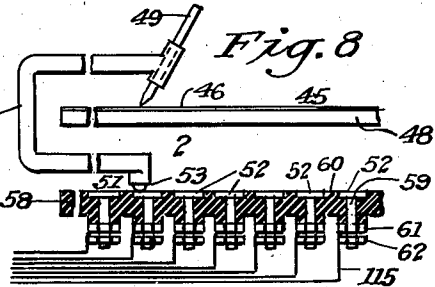
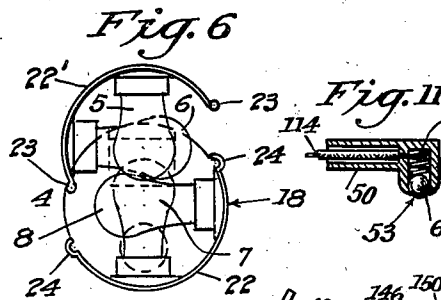
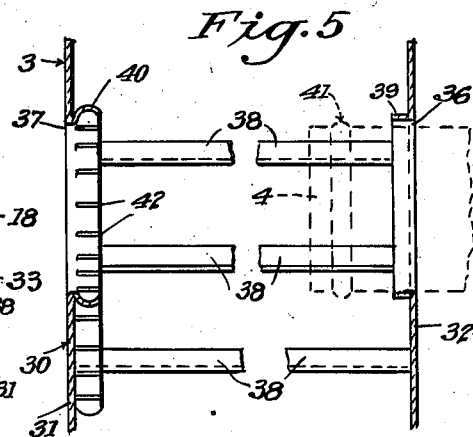
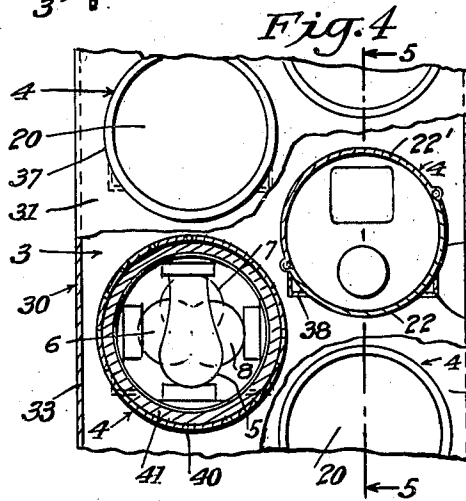
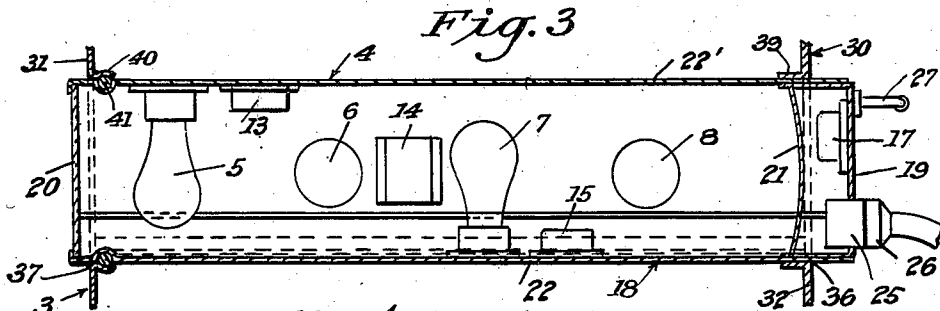
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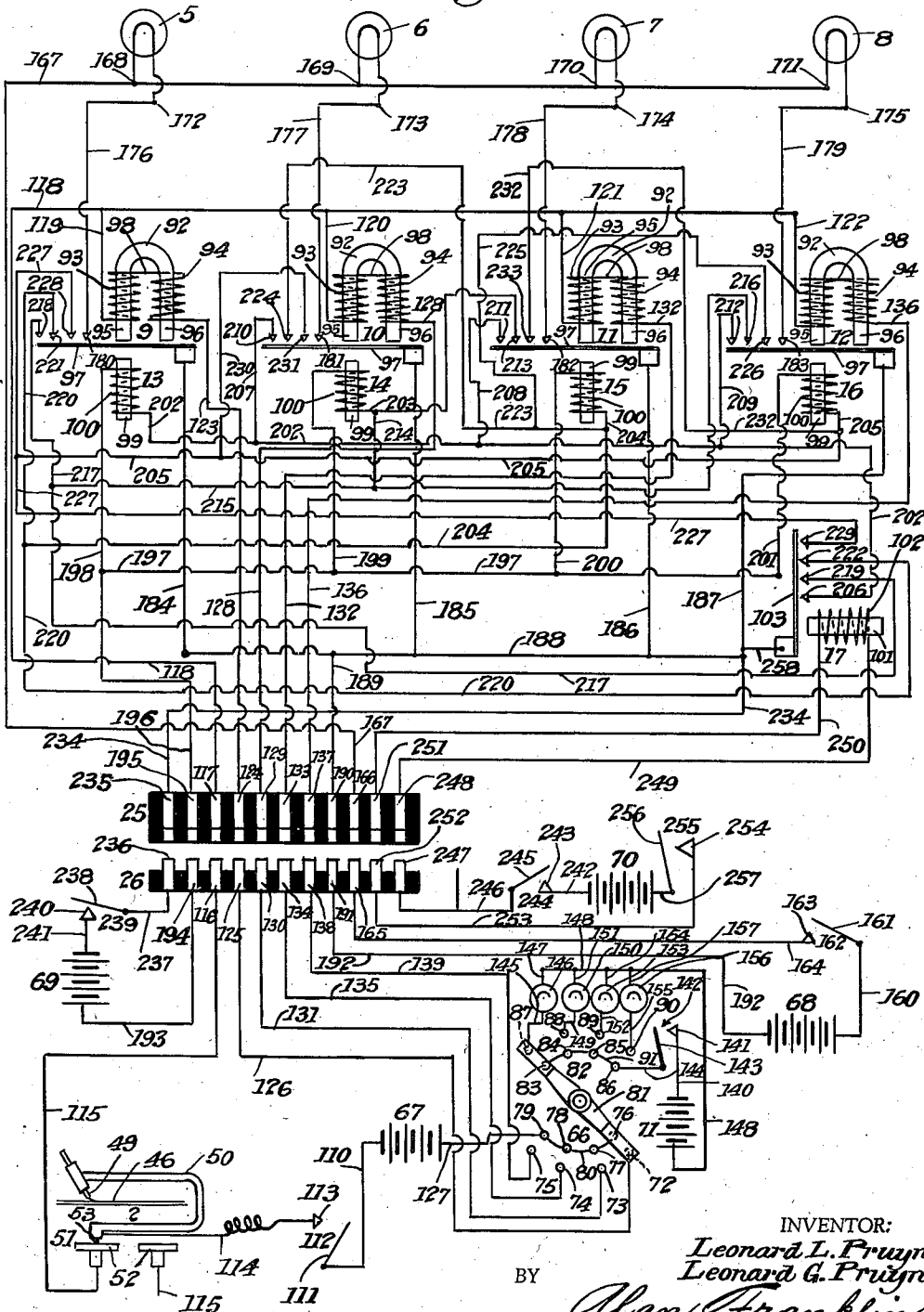
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Fig. 10



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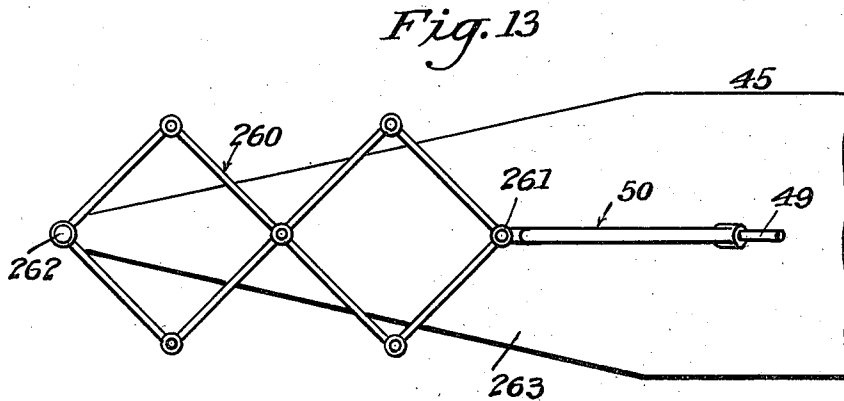
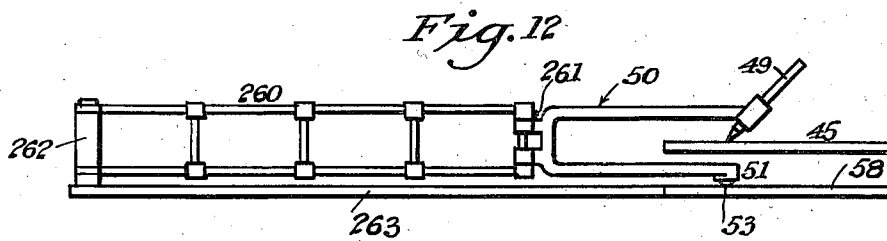
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UNITED STATES PATENT OFFICE

2,340,559

MULTIPLE-COLOR ELECTRIC SIGN

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Application June 9, 1941, Serial No. 397,164

1 Claim. (Cl. 177-346)

This invention relates to electrical sign writing and more particularly to a multiple-color electric sign.

The general object of the invention is to provide an apparatus for writing electrical signs in different colors.

A more particular object is to provide an apparatus for writing an electric sign in one or more colors.

Another object is to provide an apparatus for writing electrical signs in different colors, so that when a sign is written in one color it may be re-written in another color, with the first color fading out as the second color appears.

Other objects and advantages will appear hereinafter as the specification progresses.

The invention is illustrated in the annexed drawings which form a part of this specification and in which

Fig. 1 is a front elevation of our invention.

Fig. 2 is a transverse vertical section of the sign board of our invention taken on line 2-2 of Fig. 1.

Fig. 3 is a longitudinal section of one of the sign-board light cells.

Fig. 4 is a fragmentary front view, partly broken away, of one of the sign-board light units.

Fig. 5 is a fragmentary longitudinal vertical section of said sign-board light unit taken on line 5-5 of Fig. 4.

Fig. 6 is an end view of one of the light cells of the sign board.

Fig. 7 is an elevation of the sign-writing apparatus.

Fig. 8 is a transverse vertical section of the sign writing apparatus taken on line 8-8 of Fig. 1.

Fig. 9 is a fragmentary plan view on an enlarged scale of the sign-writing apparatus, showing the writing pencil resting upon a sheet of paper on the writing table, and the stationary contacts of the writing switch which are engaged by the movable contact of said switch for writing light signs on the sign board.

Fig. 10 is a diagram of the electrical circuit of our multiple-color electric sign including one of the electric light cells of the sign board.

Fig. 11 is a fragmentary longitudinal section of the lower end of the writing arm.

Fig. 12 is a side elevation of the writing arm and the means for operatively supporting said arm.

Fig. 13 is a plan view of Fig. 12.

Referring more particularly to the drawings, in which corresponding parts are designated by

the same reference characters in all of the figures, my invention includes generally an electric sign board 1 and a sign-writing apparatus 2. The sign board is composed of a plurality of light units 3 and a plurality of electric light cells 4 in each of said units.

In each light cell 4 are mounted a plurality of electric lights 5, 6, 7 and 8 of different colors, relays 9, 10, 11 and 12 for controlling said lights, respectively, release magnets 13, 14, 15 and 16 for releasing said relays, respectively, and a black-out relay 17. Each light cell 4 includes a tubular casing 18, enclosing said electric lights, relays, and release magnets, the rear end of which casing is closed by a cap 19 in which the black-out relay 17 is mounted and enclosed, and the front end of which casing is closed by a glass plate 20. A polished concave reflector 21 is positioned in the casing 18 near the rear end thereof for reflecting the light of the lights 5, 6, 7 and 8 forwardly out of the front end of the casing through the glass plate 20 to produce an electric sign in the manner hereinafter more fully described. The inner surface of the wall of the tubular casing 18 is polished and also forms a reflector for reflecting the light of the lights 5, 6, 7 and 8 through the front end glass wall 20. The tubular casing 18 is made in two longitudinal semi-circular sections 22 and 22' which are detachably held together by the engagement of beads 23, along the longitudinal edges of the section 22', with channel members 24 along the longitudinal edges of the section 22. The lights 5 and 6, relays 9 and 10, and release magnets 13 and 14 are mounted in the section 22 and the lights 7 and 8, relays 11 and 12 and relay release magnets 15 and 16 are mounted in the section 22', while the relay 17 is mounted in the rear end cap 19 of the casing 18. A terminal socket 25 is mounted in the cap 19 of each cell 4, to which socket are connected the electrical elements in the cell and into which socket may be plugged a terminal plug 26 which is connected to other electrical elements outside of the cell, but included within the cell circuit. A handle 27 is secured on the cap 19 of each cell 4 to be gripped for introducing the cells into the units 3 or for removing the cells from said units.

Each light unit 3 of the sign board 1 includes a casing 30 formed with a front wall 31, rear wall 32, side walls 33, bottom wall 34 and top wall 35, there being openings 36 in said rear wall and openings 37 in said front wall aligned with said openings 36, respectively, and angle-iron tracks 38 extend between the lower sides of

aligned openings 36 and 37 and are secured at their ends to said front wall 31 and rear wall 32, respectively, whereby the cells 4 may be introduced through the openings 36 in the rear wall 32 and moved along the tracks 38 until the front ends of the cells extend through the aligned openings 37, respectively, in the front wall 31, into operative position in the unit 3, as illustrated in Fig. 5 of the drawings. The rear wall 32 is formed with inturned straight flanges 39 around the openings 36, respectively, while the front wall 31 is formed with inturned internally grooved spring flanges 40 around the openings 37 respectively, to spring over annular beads 41 on the forward ends of the cells 4, respectively, for holding said cells in position in the unit 3, the grooved flanges 40 being split at intervals at 42 to give said flanges resiliency, so that they will readily spring over the beads 41 on the cells 4, when the cells are introduced into the unit 3.

The sign-writing apparatus 2 includes a writing table 45, a sheet of writing paper 46 unwound from a roll 47 over the surface of the top 48 of said table, a pencil 49 for writing on said sheet of paper while resting upon said table, a U-shaped writing arm 50 on one end of which said pencil is mounted, and a variable writing switch 51 comprising a plurality of stationary contacts 52 and a movable contact 53 which is mounted on the other end of said writing arm 50, so that when the operator writes a sign with the pencil 49 on the sheet of paper 46 said movable contact 53 will be moved over certain of the stationary contacts 52, which are connected, respectively, to one light in each of certain cells 4, for reproducing said written sign, on the sign board 1, by lighting said lights in said cells, in the manner hereinafter more fully described. The roll of paper 47 is wound upon a spindle 54 journaled in brackets 55 extending from one end of the writing table 45, and guide bars 56 and 57 extend across the surface of the top 48 of said table at the ends thereof, respectively, under which guide bars extends the sheet of paper 46, whereby said sheet is guided over said top of said table, when said sheet is drawn off the roll 47. The stationary contacts 52 of the switch 51 are mounted in a plate 58 of insulation which is mounted in the table 45 in spaced relation below the top 48 of the table. Said contacts 52 are countersunk in the upper side of said insulation plate 58 in spaced relation, and are formed with depending shanks 59 which extend downwardly through said plate. The contacts 52 are preferably hexagonal so that the adjoining sides of adjoining contacts may be brought close together with narrow portions 60 of the insulation plate 58 extending between and insulating said adjoining sides of said contacts one from the other. A pair of nuts 61 and 62 are threaded on the lower end of the shank 59 of each stationary contact 52, the nut 61 engaging the lower end of the insulation plate 58 and securing the contact in position in said plate, and the nut 62 being adapted to clamp a circuit wire against the nut 61 for connecting said wire to the contact shank 59. The movable contact 53 may be in the form of a metal ball 63 mounted in an inverted socket bearing 64 on the lower end of the writing arm 50 and bearing against the lower end of a spring 65 in said socket bearing, whereby said contact is cushioned in its engagement with the stationary contacts 52 and is enabled to travel freely and smoothly over said stationary contacts. The U-shaped writing arm 50, on the ends of which

are mounted the pencil 49 and movable switch contact 53, respectively, extends outwardly around the rear edge of the table top 48, and is of such dimensions that the pencil 49 may be moved over the entire surface of the sheet of paper 46 on the table top, and the movable switch contact 53 may be moved over all of the stationary contacts 52.

The electrical circuit of one of the light cells 4, which is illustrated in Fig. 10 of the drawings, is controlled by the sign-writing apparatus 2, and more particularly by the variable switch 51 of said apparatus, and also by a light-color switch 66, and said circuit is supplied with electric current by a relay generator 67, a light generator 68, a relay release generator 69, a black-out generator 70, and a pilot-light generator 71. The light-color switch 66 comprises contacts 72, 73, 74 and 75, and contacts 76, 77, 78 and 79 connected by a wire 80, and a switch arm 81, and a pilot-light switch 82 comprises said switch arm 81 and contacts 83, 84, 85 and 86, and contacts 87, 88, 89 and 90, which former contacts are connected by a wire 91. Each of the relays 9, 10, 11 and 12 comprises a horseshoe-shaped core 92, two coils 93 and 94 surrounding the two core members 95 and 96, respectively, of said horseshoe-shaped core, and an armature 97 adjacent the ends of said core members, said coils 93 and 94 being connected together at their inner ends by a wire 98. Each of the relay release magnets 13, 14, 15 and 16 comprises a core 99 and a coil 100 surrounding said core, one end of said core extending near the armature 97 of one of the relays 9, 10, 11 or 12. The black-out relay 17 comprises a core 101, a coil 102 surrounding said core, and an armature 103 near one end of said core.

From one pole of the relay generator 67 extends a lead 110 to the movable contact 111 of a switch 112, and from the stationary contact 113 of said switch extends a lead 114 to the movable contact 53 on the sign writing arm 50 of the variable sign writing switch 51. From one of the stationary contacts 52 of said variable switch 51 extends a lead 115 to one of the contacts 116 in the plug 26, and from one of the contacts 117 in the socket 25 extends a lead 118, and from said lead 118 extend leads 119, 120, 121 and 122 which connect to the outer ends of the coils 93 of the relays 9, 10, 11 and 12, respectively. From the outer end of the coil 94 of relay 9 extends a lead 123 to a contact 124 of the socket 25, and from a contact 125 of the plug 26 extends a lead 126 to the contact 72 of the light-color switch 66. A lead 127 extends from the contact 79 of said light-color switch to the other pole of the relay generator 67 opposite the pole to which the lead 110 is connected. A lead 128 extends from the outer end of the coil 94 of relay 10 to a contact 129 of socket 25, and from a contact 130 of plug 26 extends a lead 131 to the contact 73 of the light-color switch 66. A lead 132 extends from the outer end of the coil 94 of relay 11 to a contact 133 of the socket 25, and from a contact 134 of the plug 26 extends a lead 135 to the contact 74 of the light-color switch 66. A lead 136 extends from the outer end of the coil 94 of the relay 12 to a contact 137 of socket 25, and from a contact 138 of the plug 26 extends a lead 139 to the contact 75 of the light-color switch 66.

From one pole of the pilot-light generator 71 extends a lead 140 to the stationary contact 141 of a controlling switch 142 of the pilot-light cir-

cuit, and from the movable contact 143 of said switch extends a lead 144 to the contact 86 of the pilot-light switch 82. From the contact 87 of said pilot-light switch extends a lead 145 to one terminal of a pilot light 146, and from the other terminal of said pilot light extends a lead 147 to a lead 148, which extends to the other pole of the pilot light generator 71. From the contact 88 of the pilot-light switch 82 extends a lead 149 to one terminal of a pilot light 150, and from the other terminal of said pilot light extends a lead 151 to the generator lead 148. From contact 89 of pilot-light switch 82 extends a lead 152 to one terminal of a pilot light 153 and from the other terminal of said pilot light extends a lead 154 to the generator lead 148. From contact 90 of the pilot-light switch 82 extends a lead 155 to one terminal of a pilot light 156, and from the other terminal of said pilot light extends a lead 157 to the generator lead 148. The pilot lights 146, 150, 153 and 156 are of different colors, for example white, red, green and blue, respectively, corresponding to the colors of the sign lights 5, 6, 7 and 8, respectively.

From one pole of the light generator 68 extends a lead 160 to the movable contact 161 of a light-controlling switch 162, and from the stationary contact 163 of said switch extends a lead 164 to a contact 165 of the plug 26, and from a contact 166 of the socket 25 extends a lead 167 to one of the terminals 168, 169, 170 and 171 of the lights 5, 6, 7 and 8, respectively. From the other terminals 172, 173, 174 and 175 of said lights, respectively, extend leads 176, 177, 178 and 179 to contacts 180, 181, 182 and 183, respectively, adjacent the armatures 97 of the relays 9, 10, 11 and 12, respectively. From said armatures of said relays, respectively, extend leads 184, 185, 186 and 187 to a lead 188, and from said lead 188 extends a lead 189 to a contact 190 of socket 25. From a contact 191 of plug 26 extends a lead 192 to the other pole of the light generator 68.

From one pole of the relay release generator 69 extends a lead 193 to a contact 194 of the plug 26, and from a contact 195 of the socket 25 extends a lead 196 to a lead 197, and from said lead 197 extends leads 198, 199, 200 and 201 to one end of the coils 100 of the release magnets 13, 14, 15 and 16, respectively, the other end of which coils are connected to leads 202, 203, 204 and 205 respectively. The lead 202 extends to a contact 206 adjacent the armature 103 of the black-out relay 17, and leads 207, 208 and 209 extend from the lead 202 to contacts 210, 211 and 212 adjacent the armatures 97 of the relays 10, 11 and 12, respectively. The lead 203 extends from the coil 100 of relay release magnet 14 to a contact 213 adjacent the armature 97 of the relay 11, and a lead 214 extends from the lead 203 to a lead 215, which extends in one direction to a contact 216 adjacent the armature 97 of the relay 12, and in the other direction to a lead 217, which in turn extends in one direction to a contact 218 adjacent the armature 97 of relay 9, and in the other direction to a contact 219 adjacent the armature 103 of the black-out relay 17. The lead 204 extends to a lead 220, which extends in one direction to a contact 221 adjacent the armature 97 of the relay 9, and in the other direction to a contact 222 adjacent the armature 103 of the black-out relay 17. A lead 223 extends from the lead 204 to a contact 224 adjacent the armature 97 of the relay 9, and a lead 225 extends from the lead 223 to a contact

226 adjacent the armature 97 of the relay 12. The lead 205 extends to a lead 227, which extends in one direction to a contact 228 adjacent the armature 97 of the relay 9, and in the other direction to a contact 229 adjacent the armature 103 of the black-out relay 17. A lead 230 extends from the lead 205 to a contact 231 adjacent the armature 97 of the relay 10, and a lead 232 extends from the lead 205 to a contact 233 adjacent the armature 97 of the relay 11. A lead 234 extends from the lead 188 to a contact 235 of the socket 25 and from a contact 236 of the plug 26 extends a lead 237 to the movable contact 238 of a relay release switch 239, the stationary contact 240 of which is connected by a lead 241 to the return pole of the relay release generator 69. From one pole of the black-out generator 70 extends a lead 242 to the stationary contact 243 of a control switch 244, and from the contact 245 of said switch extends a lead 246 to a contact 247 of the plug 26. From a contact 248 of the socket 25 extends a lead 249 to one end of the coil 102 of the black-out relay 17, and from the other end of said coil extends a lead 250 to a contact 251 of the plug 25. From a contact 252 of the plug 26 extends a lead 253 to the stationary contact 254 of a black-out switch 255, and from the movable contact 256 of said switch extends a lead 257 to the return pole of the black-out generator 70. From the armature 103 of the black-out relay 17 extends a lead 258 to the lead 187.

The wiring leading into the plug 26 for each light cell is connected to the same generators and switches and in the same manner as shown in Fig. 10 of the drawings.

In Figs. 12 and 13 is shown the writing arm 50 and the means for operatively supporting said arm in position for writing electric signs. The writing arm 50 is pivotally mounted at its rear end on the forward end of a conventional pantograph 260, as indicated at 261, the rear end of which pantograph is pivotally mounted on a post 262 upstanding from a bracket 263 extending from the contact plate 58 of the sign-writing table 45. The pantograph 260 movably supports the sign-writing arm 50, so that the pencil 49 on said arm may be moved to any position on the writing table 45 for writing an electric sign in the manner hereinafter more fully described.

The operation of our invention is as follows:

When it is desired to write a sign in white light the arm 81 of the light-color switch 66 and pilot-light switch 82 is turned until one end of said arm bridges the contacts 72 and 76 of said light-color switch and the other end of said arm bridges the contacts 83 and 87 of said pilot-light switch, as shown in Fig. 10 of the drawings, and the pilot-light control switch 142 being closed electric current passes from the pilot-light generator 71 through lead 140, control switch 142, lead 144, contact 86, wire 91, contact 83, arm 81 and contact 87 of the pilot-light switch 82, lead 145, white pilot light 146, lead 147, and lead 148 back to the pilot-light generator 71, whereupon the white pilot light 146 is lighted and indicates that a sign is being written in white light on the sign board 1. The operator holding the pencil 49 writes a sign with said pencil on the sheet of paper 46, as shown in Fig. 1 of the drawings, and moves the writing arm 50 so that the movable switch contact 53, on the lower end of said arm, travels over certain of the stationary contacts 52, of the variable switch 51 of the sign-writing apparatus 2, in the same direction

as the direction of movement of the pencil 49, and as said movable contact 53 passes over each of said stationary contacts 52 a white light 5 in a light cell 4 in the sign board 1 is lighted by an electric circuit shown in Fig. 8 of the drawings, in the manner which will now be described. Electric current passes from the relay generator 67 through lead 110, closed switch 112, lead 114, movable contact 53 and a stationary contact 52 of the variable sign-writing switch 51, lead 115, plug contact 116 and socket contact 117 of the plug 26 and socket 25, respectively, lead 118, lead 119, relay coil 93, lead 98 and coil 94, of relay 9, lead 123, contacts 124 and 125 of the socket 25 and plug 26, respectively, lead 126, contact 72, arm 81 and contact 76 of light-color switch 66, wire 80 and contact 79 of said switch and lead 127 back to the relay generator 67, whereupon the armature 97 of relay 9 is drawn by the cores 95 and 96 of said relay against the contact 180, and the contacts 228, 221 and 218, and an electric current passes from the light generator 68 through lead 160, closed light switch 162, lead 164, contacts 165 and 166 of the plug 26 and socket 25, respectively, lead 167 to the light terminal 169, white light 5, which is thereby lighted, terminal 172, lead 176, contact 180, armature 97 of relay 9, leads 184, 188 and 189, contacts 190 and 191, of socket 25 and plug 26, and lead 192 back to the light generator 68. As long as the light color switch 66 remains in the position shown in Fig. 10 of the drawings with the arm 81 engaging contacts 72 and 76 only white lights 5 will be lighted by the sign-writing apparatus 2, and the sign on the sign board 1 will be written in white lights, each of which remaining lighted when its circuit is closed, during the writing of said sign, by the engagement of an armature 97 of a relay 9 with a contact 180, because the residual magnetism of said relay will hold said armature in engagement with said contact until said armature is released by the relay-release magnet 13 in the manner hereinafter described.

As the white-light circuits are closed for writing a white-light sign as above described the red, green and blue light circuits are held open to prevent writing of a sign in any of said colors by circuits controlled by the engagement of the armature 97 of relay 9 with contacts 218, 221 and 228, which circuits will now be described. The engagement of armature 97 of relay 9 with contact 218 closes a circuit from the relay release generator 69 through lead 241, closed switch 239, lead 237, contacts 236 and 235 of plug 236 and socket 235, respectively, leads 234, 188 and 184, armature 97 of relay 9, contact 218, leads 217, 215 and 214, coil 100 of relay release magnet 14, leads 199, 197 and 196, contacts 195 and 194 of socket 25 and plug 26, respectively, and lead 193 back to the relay release generator 69, whereupon the relay-release magnet 14 is energized and it holds the armature 97 of relay 10 away from the magnets 95 and 96 of said relay and out of engagement with the contacts 181, 231, 224 and 219, so that no current can pass from said armature through said contact 181 to light the red light 6, and said light remains dark. The engagement of the armature 97 of the relay 9 with the contact 221 closes a circuit from generator 69 through lead 241, closed switch 239, lead 237, contacts 236 and 235, leads 234, 188 and 184, armature 97 of relay 9, contact 221, leads 220 and 204, coil 100 of relay release magnet 15, leads 200, 197 and 196, contacts 195 and 194, and lead 193 back to generator 69, whereupon

said relay release magnet 15 is energized and it holds the armature 97 of relay 11 away from the magnets 95 and 96 of said relay and out of engagement with the contacts 182, 233, 213 and 211, so that no current can pass from said armature through said contact 182 to light the green light 7, and said light remains dark. The engagement of the armature 97 of the relay 9 with the contact 228 closes a circuit from generator 69 through lead 241, closed switch 239, lead 237, contacts 236 and 235, leads 234, 188 and 184, armature 97 of relay 9, contact 228, leads 227 and 205, coil 100 of relay release magnet 16, leads 201, 197 and 196, contacts 195 and 194, and lead 193 back to said generator 69, whereupon said relay release magnet 16 is energized and it holds the armature 97 of relay 12 away from the magnets 95 and 96 of said relay and out of engagement with the contacts 183, 226, 216 and 212, so that no current can pass from said armature through said contact 183 to the blue light 8, and said light remains dark.

To close red-light circuits for writing a red-light sign the switch arm 81 of the light-color switch 66 and pilot-light switch 82 is turned to the right until said arm engages contacts 73 and 77, and contacts 82 and 88. Current passes from the pilot-light generator 71 through lead 140, closed switch 142, lead 144, contact 86, wire 91, contact 84, arm 81 and contact 88 of the pilot-light switch 82, lead 149, red pilot light 150, lead 151 and lead 148 back to said generator 71, whereupon the red pilot light 150 is lighted and indicates that a sign is being written in red light on the sign board 1. The operator writing with the sign-writing apparatus 2 closes the variable sign-writing switch 51, and electric current passes from the relay generator 67 through lead 110, closed switch 112, lead 114, movable contact 53 and a stationary contact 52 of the variable sign-writing switch 51, lead 115, contacts 116 and 117 of the plug 26 and socket 25, respectively, lead 118, lead 120, relay coil 93, lead 98 and relay coil 94 of relay 10, lead 128, contacts 129 and 130, lead 131, contact 73, arm 81 and contact 77 of the light-color switch 66, wire 80 and contact 79 of said switch and lead 127 back to the relay generator 67, whereupon the armature 97 of relay 10 is drawn by the cores 95 and 96 of said relay against the contact 181 and the contacts 231, 224 and 210, and electric current passes from the light generator 68 through lead 160, closed light switch 162, lead 164, contacts 165 and 166, lead 167 to the light terminal 169, red light 6, which is thereby lighted, light terminal 173, lead 177, contact 181, armature 97 of relay 10, leads 185, 188 and 189, contacts 190 and 191, and lead 192 back to the light generator 68. As long as the light-color switch 66 remains in position with its arm 81 engaging its contacts 73 and 77 only red lights 6 will be lighted by the sign-writing apparatus 2, and the sign on the sign board 1 will be written in red lights, each of which remaining lighted when its circuit is closed, during the writing of said sign, by the engagement of an armature 97 of a relay 10 with a contact 181, because the residual magnetism of said relay will hold said armature in engagement with said contact until said armature is released by the relay-release magnet 14 in the manner hereinafter described.

As the red-light circuits are closed for writing a red-light sign, as above described, the white, green and blue light circuits are held open, to

prevent writing of a sign in any of said colors, by circuits controlled by the engagement of the armature 97 of relay 10 with contacts 231, 224 and 210, which circuits will now be described. The engagement of said armature 97 of relay 10 with contact 210 closes a circuit from the relay release generator 69 through lead 241, closed switch 239, lead 237, contacts 236 and 235, leads 234, 188 and 185, armature 97 of relay 10, contact 210, leads 207 and 202, coil 100 of relay release magnet 13, leads 198 and 196, contacts 195 and 194, and lead 193 back to the relay-release generator 69, whereupon the relay-release magnet 13 is energized and it holds the armature 97 of relay 9 away from the magnets 95 and 96 of said relay and out of engagement with contacts 180, 228, 221 and 218, so that no current can pass through said contact 180 and lead 176 to light the white light 5, and said light remains dark. The engagement of the armature 97 of the relay 10 with the contact 224 closes a circuit from generator 69 through lead 241, closed switch 239, lead 237, contacts 236 and 235, leads 234, 188 and 185, armature 97 of relay 10, contact 224, leads 223 and 204, coil 100 of relay-release magnet 15, leads 200, 197 and 196, contacts 195 and 194, and lead 193 back to generator 69, whereupon the relay-release magnet 15 is energized and it holds the armature 97 of relay 11 away from the magnets 95 and 96 of said relay and out of engagement with contacts 182, 233, 213 and 211, so that no current can pass through said contact 182 and lead 178 to green light 7, and said light remains dark. The engagement of armature 97 of relay 10 with the contact 231 closes a circuit from generator 69 through lead 241, closed switch 239, lead 237, contacts 236 and 235, leads 234, 188 and 185 to armature 97 of relay 10, contact 231, leads 230 and 205, coil 100 of relay-release magnet 16, leads 201, 197 and 196, contacts 195 and 194, and lead 193 back to generator 69, whereupon the relay-release magnet 16 is energized and it holds the armature 97 of relay 12 away from the magnets 95 and 96 of said relay and out of engagement with contacts 183, 226, 216 and 212, so that no current can pass through said contact 183 and lead 179 to the blue light 8, and said light remains dark.

To close the green-light circuits for writing a green-light sign on the sign board 1, the switch arm 81 of the light-color switch 66 and the pilot-light switch 82 is turned so that it engages the contacts 74 and 78 of said switch 66 and the contacts 85 and 89 of said switch 82. Current passes from the pilot-light generator 71 through lead 140, closed switch 142, lead 144, contact 86, wire 91, contact 85, arm 81 and contact 89 of pilot-light switch 82, lead 152, green light 153, and leads 154 and 148 back to said generator 71, whereupon the green pilot light 153 is lighted and indicates that a sign is being written in green lights on the sign board 1. The operator writing with the sign-writing apparatus 2 closes the variable sign-writing switch 51 and electric current passes from the relay generator 67 through lead 110, closed switch 112, lead 114, movable contact 53 and stationary contact 52 of the variable sign-writing switch 51, lead 115, contacts 116 and 117, lead 118, lead 121, relay coil 93, lead 98 and relay coil 94 of relay 11, lead 132, contacts 133 and 134, lead 135, contact 74, arm 81 and contact 78 of the light-color switch 66, wire 80, contact 79 and lead 127 back to relay generator 67, whereupon the armature 97 of relay 11 is drawn by the cores 95 and 96 of said relay against the contact 182

and the contacts 233, 213 and 211, and electric current passes from light generator 68 through lead 160, closed switch 162, lead 164, contacts 165 and 166, lead 167 to light terminal 170, green light 7, which is thereby lighted, light terminal 174, lead 178, contact 182, armature 97 of relay 11, leads 186, 188 and 189, contacts 190 and 191, and lead 192 back to generator 68. As long as the light-color switch 66 remains in position with its arm 81 engaging its contacts 74 and 78 only green lights 7 will be lighted by the sign-writing apparatus 2, and the sign on the sign board 1 will be written in green lights, each of which remaining lighted when its circuit is closed, during the writing of said sign, by the engagement of an armature 97 of a relay 11 with a contact 182, because the residual magnetism of said relay will hold said armature in engagement with said contact until said armature is released by the relay-release magnet 15 in the manner hereinafter described.

As the green-light circuits are closed for writing a green-light sign, as above described, the white, red and blue light circuits are held open, to prevent writing of a sign in any of said colors, by circuits controlled by the engagement of armature 97 of relay 11 with contacts 233, 213 and 211, which circuits will now be described. The engagement of said armature 97 with contact 211 closes a circuit from the relay release generator 69 through lead 241, closed switch 239, lead 237, contacts 236 and 235, leads 234, 188 and 186, armature 97 of relay 11, contact 211, leads 208 and 202, coil 100 of relay release magnet 13, leads 198 and 196, contacts 195 and 194, and lead 193 back to generator 69, whereupon the relay-release magnet 13 is energized and it holds the armature 97 of relay 9 away from the magnets 95 and 96 of said relay and out of engagement with contact 180 and contacts 228, 221 and 218, so that no current can pass through said contact 180 and lead 176 to light the white light 5, and said light remains dark. The engagement of the armature 97 of relay 11 with contact 213 closes a circuit from generator 69 through lead 241, closed switch 239, lead 237, contacts 236 and 235, leads 234, 188 and 186, armature 97 of relay 11, contact 213 and 203, coil 100 of relay-release magnet 14, leads 199, 197 and 196, contacts 195 and 194, and lead 193 back to generator 69, whereupon the relay-release magnet 14 is energized and it holds the armature 97 of relay 10 away from the magnets 95 and 96 of said relay and out of engagement with contact 181 and contacts 231, 224 and 210, so that no current can pass through said contact 181 and lead 177 to the red light 6, and said light remains dark. The engagement of the armature 97 of relay 11 with the contact 233 closes a circuit from generator 69 through lead 241, closed switch 239, lead 237, contacts 236 and 235, leads 234, 188 and 186, armature 97 of relay 11, contact 233, leads 232 and 205, coil 100 of relay-release magnet 16, leads 201, 197 and 196, contacts 195 and 194 and lead 193 back to generator 69, whereupon the relay-release magnet 16 is energized and it holds the armature 97 of relay 12 away from the magnets 95 and 96 of said relay and out of engagement with contact 183 and contacts 226, 216 and 212, so that no current can pass through said contact 183 and lead 179 to the blue light 8, and said light remains dark.

To close the blue-light circuits for writing a blue-light sign on the sign board 1, the switch arm 81 of the light color switch 66 and the pilot-light switch 82 is turned so that said arm engages the contacts 75 and 79 of said switch 66 and the

contacts 86 and 90 of said switch 82. Current passes from the pilot-light generator 71 through lead 140, closed switch 142, lead 144, contact 86, arm 81 and contact 90 of the pilot-light switch 82, lead 155, blue light 156, lead 157 and lead 148 back to said generator 71, whereupon the blue pilot light 156 is lighted and indicates that a sign is being written in blue lights on the sign board 1. The operator writing with the sign-writing apparatus 2 closes the variable sign-writing switch 51 and electric current passes from the relay generator 67 through lead 110, closed switch 112, lead 114, movable contact 53 and stationary contact 52 of the variable sign-writing switch 51, lead 115, contacts 116 and 117, lead 118, lead 122, relay coil 93, lead 98 and coil 94 of relay 12, lead 136, contacts 137 and 138, lead 139, contact 75, arm 81 and contact 79, of the light-color switch 66, and lead 127 back to said relay generator 67, whereupon the armature 97 of relay 12 is drawn by the cores 95 and 96 of said relay against the contact 183 and the contacts 228, 216 and 212, and electric current passes from light generator 68 through lead 160, closed switch 162, lead 164, contacts 165 and 166, lead 167 to light terminal 171, blue light 8, which is thereby lighted, light terminal 175, lead 179, contact 183, armature 97 of relay 12, leads 187, 188 and 189, contacts 190 and 191, and lead 192 back to the light generator 68. As long as the light-color switch 66 remains in position with its arm 81 engaging its contacts 75 and 79 only blue lights 8 will be lighted by the sign-writing apparatus 2, and the sign on the sign board 1 will be written in blue lights, each of which remaining lighted when its circuit is closed, during the writing of said sign, by the engagement of an armature 97 of a relay 12 with a contact 183, because the residual magnetism of said relay will hold said contact until said armature is released by the relay-release magnet 16 in the manner hereinafter described.

As the blue-light circuits are closed for writing a blue-light sign, as above described, the white, red and green light circuits are held open, to prevent writing of a sign in any of said colors, by circuits controlled by the engagement of armature 97 of relay 12 with contacts 228, 216 and 212, which circuits will now be described. The engagement of said armature 97 with contact 212 closes a circuit from the relay-release generator 69 through lead 241, closed switch 239, lead 237, contacts 236 and 235, leads 234 and 187, armature 97 of relay 12, contact 212, leads 209 and 202, coil 100 of relay release magnet 13, leads 198 and 196, contacts 195 and 194, and lead 193 back to said generator 69, whereupon the relay-release magnet 13 being energized holds the armature 97 of relay 9 away from the magnets 95 and 96 of said relay and out of engagement with contacts 180 and contacts 228, 221 and 218, so that no current can pass through said contacts 180 and lead 176 to white light 5, and said light remains dark. The engagement of the armature 97 of relay 12 with contact 216 closes a circuit from the relay-release generator 69 through lead 241, closed switch 239, lead 237, contacts 236 and 235, leads 234 and 187, armature 97 of relay 12, contact 216, leads 215, 214 and 203, coil 100 of relay-release magnet 14, leads 199, 197 and 196, contacts 195 and 194, and lead 193 back to generator 69, whereupon the relay-release magnet 14 being energized holds the armature 97 of relay 12 away from the magnets 95 and 96 of said relay and out of engagement with contact 181 and

contacts 231, 224 and 210, so that no current can pass through said contact 181 and lead 177 to the red light 6, and said light remains dark. The engagement of the armature 97 of relay 12 with contact 228 closes a circuit from relay-release generator 69 through lead 241, closed switch 239, lead 237, contacts 236 and 235, leads 234 and 187, armature 97 of relay 12, contact 228, leads 225, 223 and 204, coil 100 of relay-release magnet 15, leads 200, 197 and 196, contacts 195 and 194, and lead 193 back to generator 69, whereupon the relay-release magnet 15 being energized holds the armature 97 of relay 11 away from the magnets 95 and 96 of said relay and out of engagement with contact 182, and contacts 233, 213 and 211, so that no current can pass through said contact 182 and 178 to the green light 7, and said light remains dark.

All lights 5, 6, 7 and 8 of each cell 4, and all signs written on the sign board 1 may be blacked out by closing the black out switch 255, which causes electric current to flow from black-out generator 70 through lead 242, closed switch 244, lead 246, contacts 247 and 248, lead 249, coil 102 of black-out magnet 17, lead 250, contacts 251 and 252, lead 253 and black-out switch 255 back to generator 70, whereupon the black-out armature 103 is drawn by the black-out magnet 17 into engagement with contacts 206, 219, 222 and 229 for closing the black-out circuits which will now be described. The engagement of armature 103 with contact 206 closes a circuit from generator 69 through lead 241, closed switch 239, lead 237, contacts 236 and 235, leads 234, 187 and 258, armature 103 and contact 206, lead 202, coil 100 of relay-release magnet 13, leads 198 and 196, contacts 195 and 194 and lead 193 back to said generator 69, whereupon said magnet 13 draws the armature 97 of relay 9 away from the magnet cores 95 and 96 of said relay, and disengages said armature from the contact 180 and the contacts 228, 221 and 218, which breaks the circuit, including the white light 5, between said armature 97 and contact 180, and blacks out said white light. The engagement of armature 103 with contact 219 closes a circuit from generator 69 through lead 241, closed switch 239, lead 237, contacts 236 and 235, leads 234, 187 and 258, armature 103 and contact 219, leads 217, 215 and 214, coil 100 of relay-release magnet 14, leads 199, 197 and 196, contacts 195 and 194, and lead 193 back to said generator 69, whereupon said magnet 14 draws the armature 97 away from the relay magnet cores 95 and 96 of relay 11 and disengages said armature from contact 181 and contacts 231, 224 and 210, which breaks the circuit, including the red light 6, between said armature 97 and said contact 181 and blacks out said red light. The engagement of the armature 103 with contact 222 closes a circuit from generator 69 through lead 241, closed switch 239, lead 237, contacts 236 and 235, leads 234, 187 and 258, armature 103 and contact 222, leads 220 and 204, coil 100 of relay-release magnet 15, leads 200, 197 and 196, contacts 195 and 194 and lead 193 back to said generator 69, whereupon said magnet 15 draws said armature 97 away from the magnets 95 and 96 of relay 11 and disengages said armature from contact 182 and contacts 233, 213 and 211, which breaks the circuit, including the green light 7, between said armature 97 and said contact 182 and blacks out said green light. The engagement of the armature 103 with the contact 229 closes a circuit from generator 69 through lead 241, closed switch 239, lead 237, contacts

236 and 235, leads 234, 187 and 258, armature 103 and contact 229, leads 227 and 205, coil 100 of relay-release magnet 16, lead 201, 197 and 196, contacts 195 and 194 and lead 193 back to said generator 69, whereupon said magnet 16 draws the armature 97 away from the magnet cores 95 and 96 of relay 12 and disengages said armature 97 from contact 183 and contacts 226, 216 and 212, which breaks the circuit, including the blue light 8, between said armature 97 and said contact 183, and blacks out said blue light.

When a sign is written on the sign board 1 in one color it remains until it is blacked out by one of the circuits actuated by the black-out switch 255, or, until another identical sign in another color is written over it, by the sign-writing apparatus 2, with the movable contact 53 of the sign writing switch 51 passing over the same stationary contacts 52 that it traveled over to write the first sign.

With our invention it is possible to write a sign completely in lights of one color, or to write a sign in sections in lights of different colors by operating the light-color switch 66 to close the circuits of lights of a selected color when a sec-

tion of the sign has been written in lights of another color.

We claim:

In a multicolor electric light sign, a plurality of lights of different colors, a circuit for each of said lights, a relay included in and controlling each of said light circuits, the residual magnetism of which relay being sufficient to retain the armature of the relay when said relay is deenergized, a light-color switch for closing any one of said light circuits, a sign-writing switch for closing any one of said light circuits, a relay-release magnet adjacent the armature of each of said relays, circuits controlled by each of said relays for energizing the relay-release magnets adjacent the armatures of the other relays, respectively, for overcoming the residual magnetism of said other relays and withdrawing the armatures of said other relays, for breaking the light circuits including said other relays and for blacking out the lights in the circuits of the other relays, when any of said light circuits is closed by its relay and the light in said closed circuit is lighted.

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