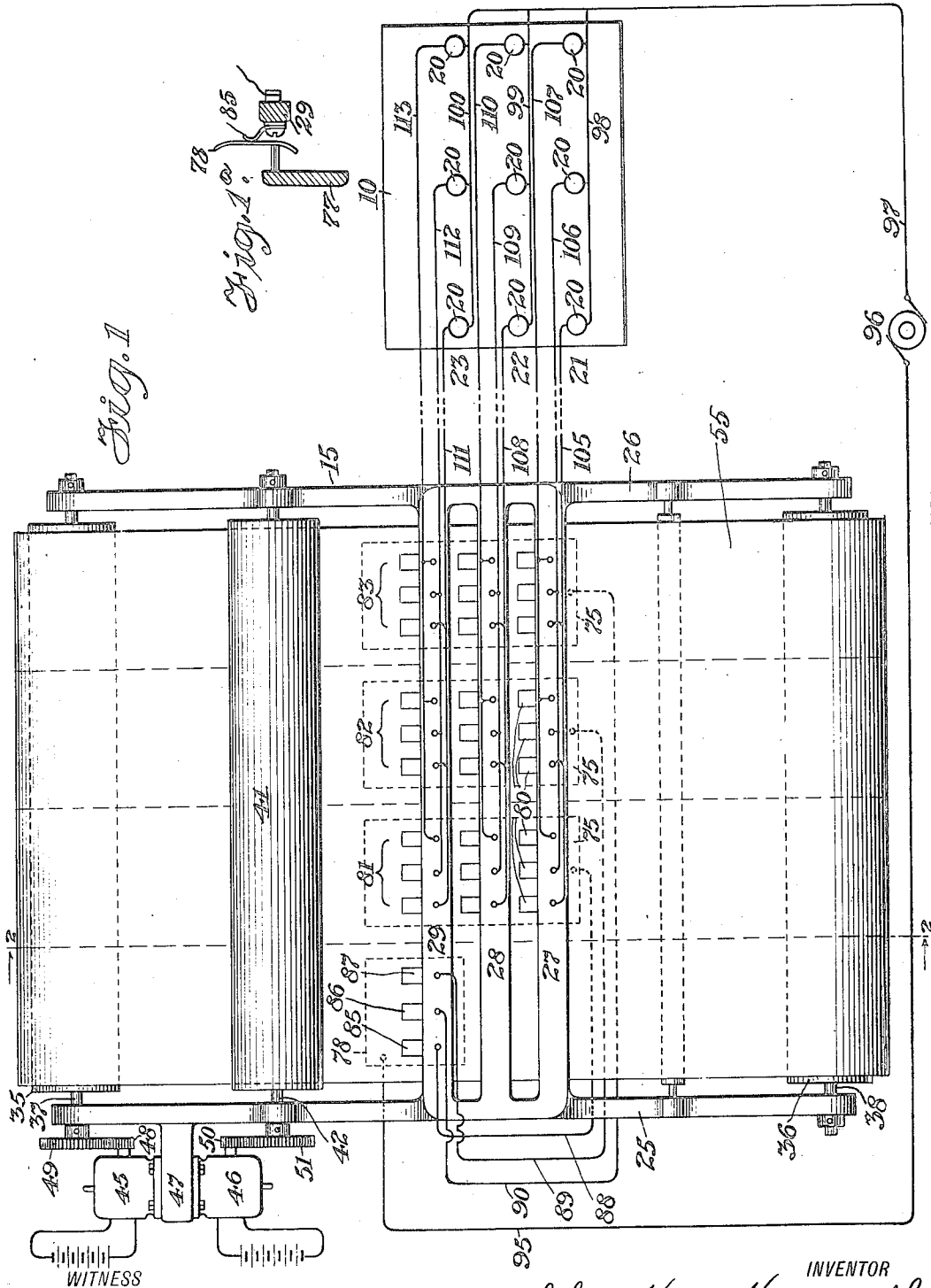


J. H. HAMMOND, JR.
ELECTRIC LIGHT DISPLAY SYSTEM.
APPLICATION FILED DEC. 27, 1916. RENEWED OCT. 1, 1921.

1,419,256.

Patented June 13, 1922.

4 SHEETS—SHEET 1.



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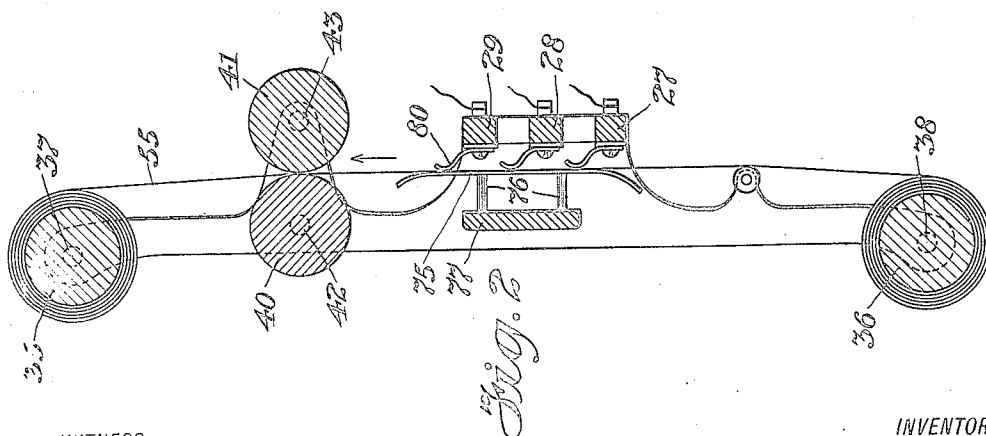
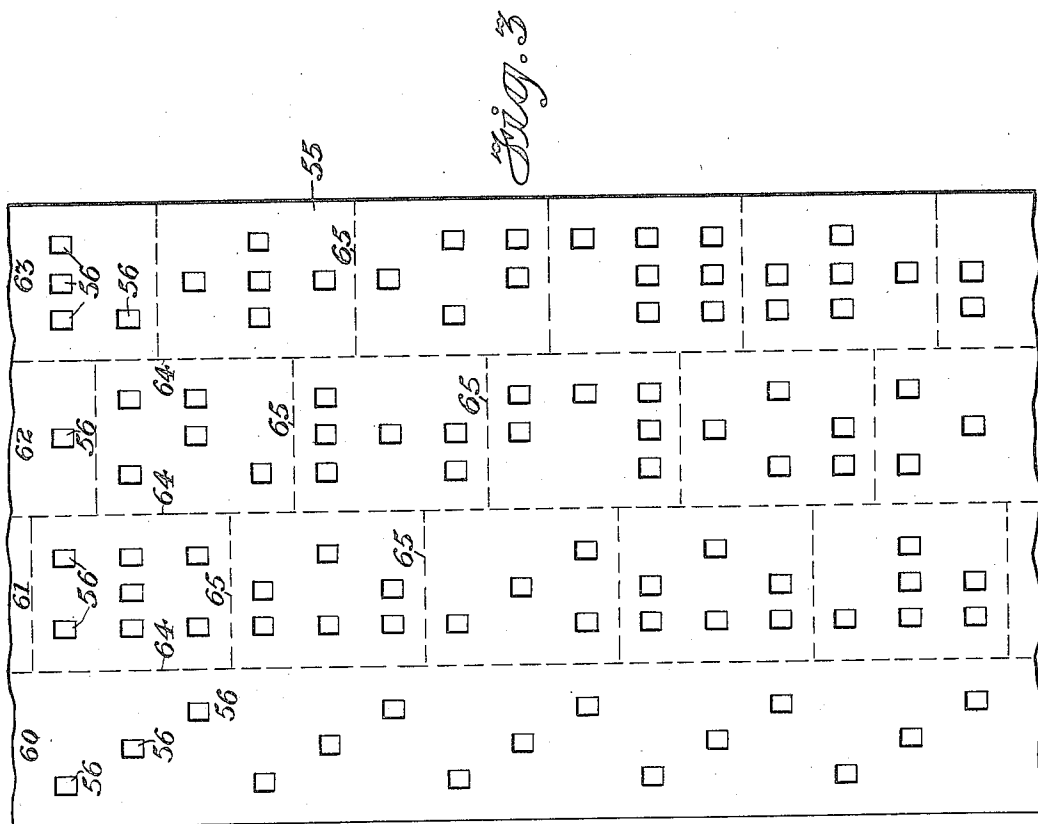
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 6

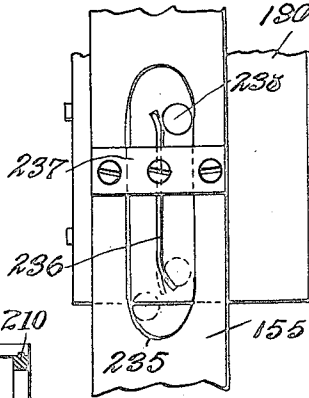
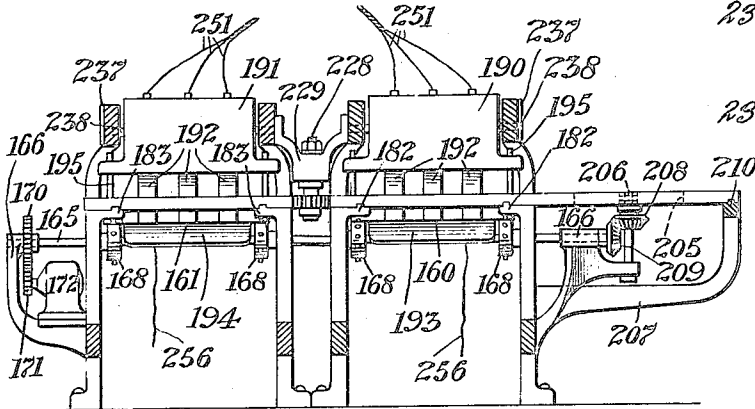


Fig. 5a

Fig. 4

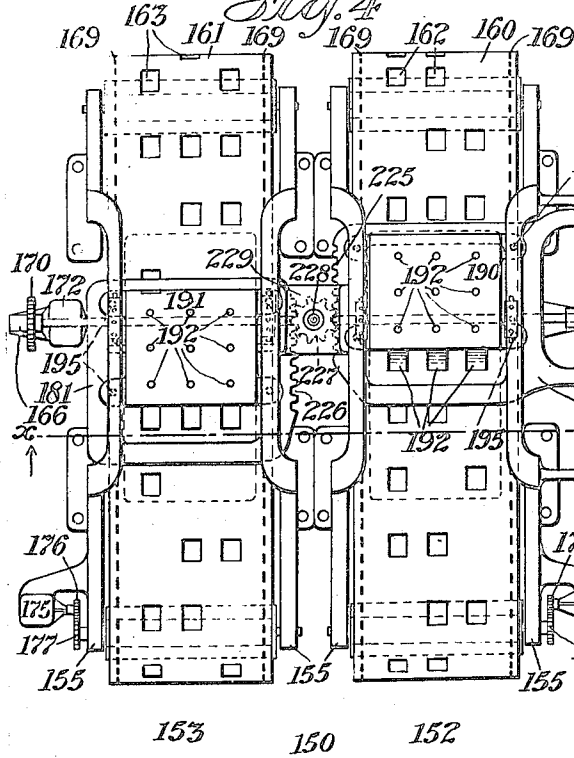
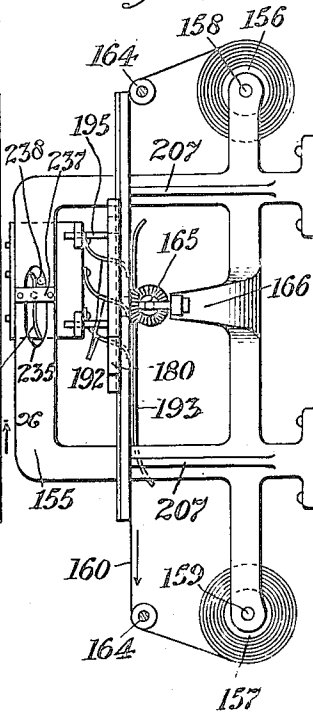


Fig. 5



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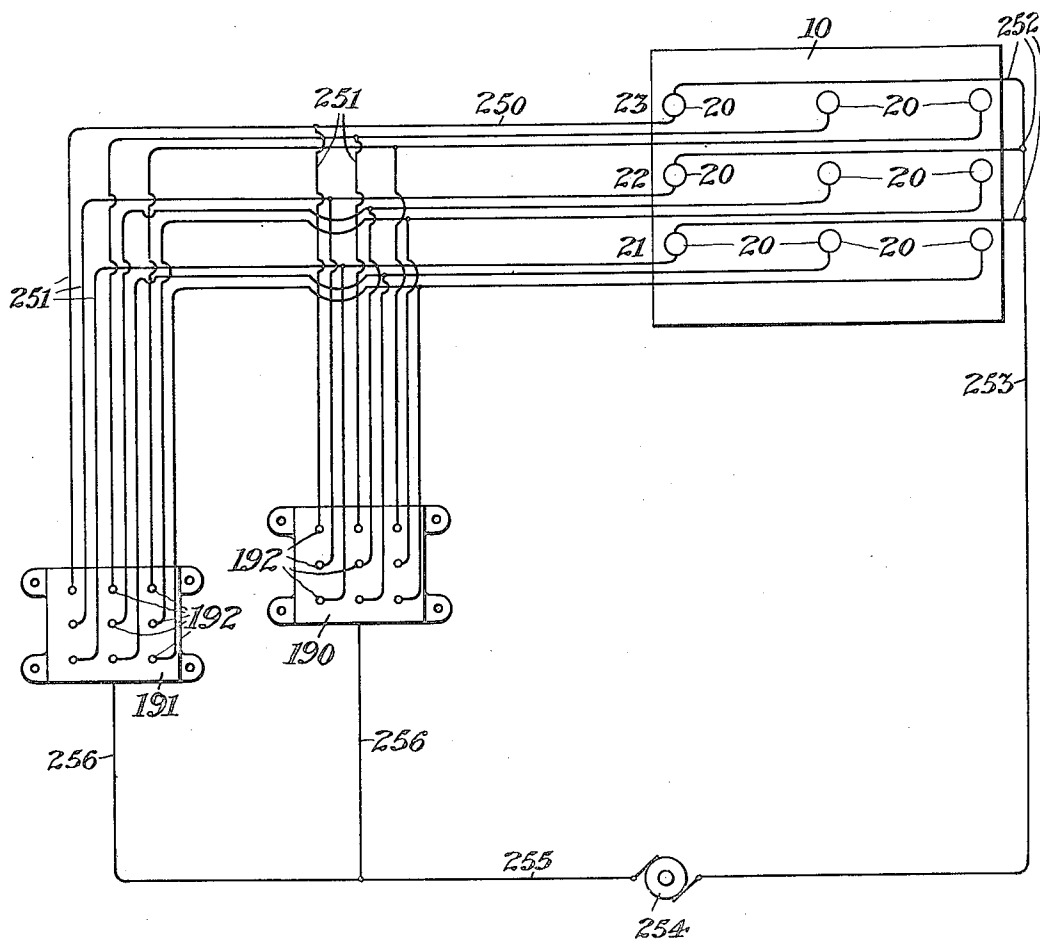
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4 SHEETS—SHEET 4.

Fig. 7



WITNESS

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UNITED STATES PATENT OFFICE.

JOHN HAYS HAMMOND, JR., OF GLOUCESTER, MASSACHUSETTS.

ELECTRIC-LIGHT DISPLAY SYSTEM.

1,419,256.

Specification of Letters Patent. Patented June 13, 1922.

Application filed December 27, 1916, Serial No. 139,226. Renewed October 1, 1921. Serial No. 504,732.

To all whom it may concern:

Be it known that I, JOHN HAYS HAMMOND, Jr., a citizen of the United States, and a resident of Gloucester, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Electric-Light Display Systems, of which the following is a specification.

Some of the objects of this invention are to provide an improved system to produce the effect of moving pictures delineated in electric lights; to provide an improved system for controlling an electric light display board or sign in such a manner as to produce in rapid succession a plurality of predetermined illuminated delineations in such a manner as to produce the effect of moving pictures; and to provide other improvements, as will appear hereinafter.

In the accompanying drawings, Fig. 1 is a diagrammatic top plan view of an electric light display system constructed in accordance with this invention; Fig. 1^a represents a detail of the contact construction; Fig. 2 is a longitudinal vertical section of the same on line 2—2 of Fig. 1; Fig. 3 a fragmentary top plan view of a perforated sheet of material forming a part of this invention; Fig. 4 a top plan view of a modified form of electric light controlling mechanism constructed in accordance with this invention; Figs. 5 and 6 are a side elevation and an end elevation respectively of the mechanism shown in Fig. 4; Fig. 5^a represents a detail of the brush plate mechanism, and Fig. 7 is a diagrammatic plan view showing the electric light board and connections as arranged in the system shown in Figs. 4, 5 and 6.

Referring to the drawings, and particularly to Figs. 1, 2 and 3, one embodiment of this invention comprises an electric light display system including an electric light display board or sign 10, and a machine or controlling device 15 for controlling the display board 10. The display board 10 is provided with a plurality of electric lamps 20, for instance, with nine lamps arranged in three vertical series or sets 21, 22 and 23, having three lamps 20 in each set.

The machine or controlling device 15 comprises a rigid frame having two vertical rigid parallel side plates 25 and 26 which are fixedly secured to any suitable foundation. These side plates 25 and 26 are rigidly

connected at their upper edges by three transversely extending parallel bars 27, 28 and 29 which are arranged in a horizontal plane and which are either integral with or rigidly secured to the side plates 25 and 26. The machine 15 is also provided with two parallel reels 35 and 36 which are coaxial with and rigidly secured to two shafts 37 and 38 arranged transversely at opposite ends of the machine respectively, and in a horizontal plane. The ends of these shafts 37 and 38 extend snugly but rotatably through openings provided therefor in the side plates 25 and 26 and are held against longitudinal movement therein in any suitable manner. The machine 15 is also provided with a pair of parallel transversely extending cylindrical rollers 40 and 41 which are coaxial with and rigidly secured to two parallel horizontal transversely extending shafts 42 and 43, the longitudinal axes of which are arranged in vertical alinement, and the ends of which extend snugly but rotatably through the fixed plates 25 and 26 respectively.

For rotating the shaft 37 of the reel 35 and the shaft 42 of the roller 40, a pair of electric motors 45 and 46 are fixedly secured to a rigid bracket 47 which projects laterally from and is rigid with the fixed side plate 25 of the frame. One, 45, of these motors, is arranged to rotate a pinion 48 which engages a gear 49 which is fixed upon the outer end of the shaft 37 which rotates the reel 35, and the other motor 46 is arranged to rotate a pinion 50 which engages a gear 51 which is fixed upon the outer end of the shaft 42 which rotates the roller 40.

A flexible sheet or strip 55 of tough paper or fabric or any other suitable material is carried by the two reels 35 and 36 and is snugly pressed between the two rollers 40 and 41, and extends horizontally and longitudinally of the machine beneath the transverse bars 27, 28 and 29. This sheet 55 is provided with a plurality of rectangular perforations 56 arranged in four parallel series 60, 61, 62, 63, extending longitudinally of the strip 55, each series being arranged to form three parallel sets of aligned perforations extending longitudinally of the strip. The perforations in the series 60 which is arranged along one edge of the strip 55 are equispaced longitudinally of the strip and are arranged in parallel groups of

three perforations in each group extending obliquely of the strip 55, so as to cause the three other series 61, 62 and 63 of perforations 56 to become successively effective, as will appear hereinafter.

The perforations in the latter three series 61, 62 and 63 are arranged in overlapping groups, as indicated by the broken lines 64 extending longitudinally of the strip 55, and by the shorter broken lines 65 extending transversely of the strip, these groups being arranged in predetermined relationship to the perforations 56 of the outer series 60, and the area of the strip allotted to each group being, in the form of the invention illustrated, sufficient to contain a maximum of nine perforations. It is to be noted that the transverse broken line 65, which separates any two succeeding groups of perforations of the series 61, is in advance of the adjacent transverse broken line 65, separating the two groups of perforations of the series 62, a distance equal to one-third of the distance between successive transverse broken lines 65, and the transverse broken line 65 separating two successive groups of the series 62 is in advance of the adjacent transverse broken line 65, separating two groups of the series 63 a distance equal to one-third the distance between the successive broken lines 65. The contours of the figures or delineations which are to be successively illuminated upon the electric light board as a result of the cooperative action of any particular perforated flexible strip 55 are predetermined by a suitable arrangement of the perforations in the flexible strip, and any desired number of differently perforated flexible strips 55 may be used selectively to produce any desired results, as will appear hereinafter.

Beneath the sheet 55 are three stationary oblong rectangular spaced contact plates 75, the major portions of which are arranged in a substantially horizontal plane to engage against the under surface of the flexible strip 55 beneath the three consecutive series of perforations 61, 62 and 63 respectively and the opposite ends of the contact plates are curved downwardly so as to avoid tearing the strip. The contact plates 75 are fixedly secured upon the upper ends of vertical insulating posts 76, the lower ends of which are rigidly secured to a rigid horizontal beam 77 extending transversely of the machine and which is terminally secured rigidly to the fixed side plates 25 and 26 respectively. A fourth rectangular contact plate 78 is similarly supported by and insulated from the beam 77 in such a manner as to contact against the under surface of the strip 55 beneath the fourth series 60 of perforations, and the opposite ends of this contact plate 78 are bent downwardly to avoid tearing the strip 55.

Secured to each of the parallel bars 27, 28 and 29, and insulated therefrom, are three groups of yielding resilient brushes 80, each group containing three brushes, and the three groups being arranged to cooperate respectively with the three oblong contact plates 75. These groups of brushes 80 are arranged so that the groups of one of the bars 27, 28 and 29 are in longitudinal alinement with the groups of the other two bars respectively, so that these groups of the three bars form three series 81, 82 and 83 of brushes respectively, containing nine brushes in each series and arranged so that these three series cooperate respectively with the three oblong contact plates 75, and so that as the flexible strip 55 is moved between the brushes 80 and the contact plates 75, each rectangular opening 56 in the three series 61, 62 and 63 of perforations will permit three corresponding longitudinally alined brushes 80 to make engagement successively with the corresponding contact plate 75. The transverse bar 29 is also provided with three yielding resilient brushes 85, 86 and 87 secured thereto but insulated therefrom and arranged to cooperate with the fourth fixed contact plate 78, and the series 60 of rectangular perforations 56 in the flexible strip 55 are so arranged that each perforation will permit a corresponding one of the brushes 85, 86 and 87 to engage against the fixed contact plate 78 as the strip 55 is drawn between the brushes 85, 86, 87 and the contact plate 78.

The three brushes 85, 86, 87 are electrically connected respectively to the three contact plates 75, by means of three conductors 88, 89 and 90. The contact plate 78 is connected by a conductor 95 to one pole of a direct current electric generator 96 or other source of electric energy, the other pole of which is connected by a conductor 97 and branch conductors 98, 99 and 100 with one terminal of each of the electric lamps 20. The other terminals of the lamps 20 are connected respectively to a corresponding brush 80 in each of the series 81, 82 and 83 of brushes 80, which cooperate with the three oblong contact plates 75.

In the operation of the form of this invention shown in Figs. 1 and 2, the strip 55 is caused to move longitudinally at a uniform rate between the rollers 40 and 41 by the action of the corresponding electric motor 46, and the strip is taken up on the reel 35 by the action of the corresponding motor 45. As the strip thus moves between the brushes 80, 85, 86, 87 and the contact plates 75 and 78, the brushes 85, 86 and 87 engage successively in the rectangular perforations 56 on the strip 55, and thus cause the three series of brushes 81, 82 and 83 to be operatively connected successively

with the electric light display board 10. For instance, when the outer brush 85 projects through one of the openings 56 and engages the contact plate 78, the corresponding series 81 of brushes 80 are operatively connected to the electric light board 10 in such a manner that if any of the brushes 80 of this series are permitted to contact with the corresponding contact plate 75, the circuits through the corresponding lights will be closed and thus one or more predetermined lights will be illuminated depending upon the arrangement of the rectangular perforations 56 in the series 61 of perforations. When any one of the three series 81, 82 and 83 of brushes 80 is thus in operation, the other two series of brushes are prevented from controlling the electric light board 10. In this manner, the three series 81, 82 and 83 of brushes are rendered successively operative when the groups of perforations are in their proper positions with respect to the brushes 80, and cause a corresponding plurality of groups of lamps 20 on the display board 10 to be lighted in quick succession, thus producing upon the board 10 a plurality of predetermined successive illuminated figures or delineations which produce upon the observer the effect of moving pictures.

In the modified form of this invention shown in Figs. 4, 5, 6 and 7, the system includes an electric light board 10 provided with a plurality of lights 20 arranged in three series or groups 21, 22 and 23, as hereinbefore described. This modified form of the invention also includes a duplex controlling device or machine 150 by which the lights 20 are controlled.

The duplex machine 150 comprises two rigid upright stationary frames comprising a main frame 152 and a secondary frame 153, each of which includes two substantially vertical and substantially parallel side plates 155. Between each pair of side plates are arranged two transversely extending reels 156 and 157 which are rigidly secured respectively to two horizontal parallel shafts 158 and 159, the ends of which extend rotatably through a corresponding pair of side plates 155. The two pairs of reels 156 and 157 support respectively two strips or sheets 160 and 161 of tough paper or fabric, or other suitable material, which are provided respectively with rectangular perforations 162 and 163, the perforations in each strip being arranged in three aligned series extending longitudinally of the strip. Each of the two frames 152, 153 is also provided with two parallel horizontal rollers 164 which are arranged above the corresponding reels 156 and 157 respectively in a predetermined horizontal plane to guide the strips 160 and 161 respectively. For moving the two strips 160 and 161

longitudinally with respect to the stationary frames 152 and 153, and at a uniform rate, a horizontal shaft 165 extends through the two frames 152 and 153 and is mounted in bearings 166 carried by the frames to rotate about a fixed axis coincident with its longitudinal axis. Rigidly secured to this shaft 165 are two pairs of sprocket wheels 168 which are arranged to engage, respectively in four series of marginal perforations 169 provided therefor in the two strips 160 and 161. A gear 170 is rigidly secured to one end of the shaft 165, and is engaged by a pinion 171 which is rotated by an electric motor 172 or by any other suitable means for rotating the shaft 165 and the sprockets 168 carried thereby.

The forward reel 157 of each pair of reels 156 and 157 is arranged to be rotated by a corresponding electric motor 175, or other suitable means, the motor 175 being secured to a corresponding one of the fixed side plates 155 and being provided with a pinion 176 which engages and rotates a gear 177 rigidly secured to the corresponding shaft 159 which carries the corresponding forward reel 157, the motor 175 being arranged to rotate the reel 157 in such a manner as to take up any slack in the corresponding flexible strip 160 or 161 as it is moved forwardly by the corresponding sprocket wheels 168.

A main flat horizontal movable frame 180 and a secondary flat horizontal movable frame 181 are mounted upon the two stationary frames 152 and 153 respectively, and are arranged to reciprocate with respect thereto in a predetermined horizontal plane upon two pairs of brackets 182 and 183 respectively, the two pairs of brackets 182 and 183 being rigid respectively with the two stationary frames 152 and 153. The two movable frames 180 and 181 are spaced slightly above the plane of the portions of the flexible strips 160 and 161 which extend between the two pairs of rollers 164.

Arranged above the main and secondary horizontal movable frames 180 and 181 respectively are two flat horizontal rigid brush plates comprising a main brush plate 190, and a secondary brush plate 191. Each of these brush plates 190 and 191 carries a plurality of depending yielding, resilient brushes 192 rigidly secured thereto but insulated therefrom, nine brushes 192 being secured to each plate in the form of the invention illustrated. These two groups of brushes 192, carried by the two plates 190 and 191, are arranged to cooperate respectively with two fixed oblong rectangular contact plates 193 and 194 which are rigidly secured to the two fixed frames 152 and 153 respectively. The central major portions of these two contact plates 193 and 194 are flat

and arranged in the same horizontal plane to engage against the under surfaces of the horizontal portions of the two flexible strips 160 and 161 respectively, and the opposite ends of these two contact plates are curved downwardly to avoid tearing the flexible strips 160 and 161. Each of these brush plates 190 and 191 is slidably mounted upon a plurality of vertical pins 195 which extend snugly through the brush plate and are rigidly secured at their lower ends to the corresponding movable frame 180 or 181. Each of these brush plates 190 and 191 is, therefore, free to reciprocate vertically in a predetermined path, but is held against movement horizontally with respect to the corresponding frame 180 or 181.

For reciprocating the main movable frame 180 in a horizontal plane, this frame 180 is extended laterally and carries two rollers 200 and 201 which are arranged to rotate with respect to the main frame 180 about two vertical axes respectively fixed with respect to the main frame 180.

Arranged between these two rollers 200, 201, and in a plane therewith, is a flat cam 205 which is rigidly secured upon the upper end of vertical shaft 206 which is rotatably supported at its lower end in a rigid bracket 166 which is rigidly secured to the corresponding side plate 155 of the outer stationary frame 152. The longitudinal axis of this vertical shaft 206 is arranged to intersect the longitudinal axis of the horizontal shaft 165, and a bevel gear 208 is fixedly secured to the vertical shaft 206 and is arranged to be engaged by a bevel gear 209 which is fixedly secured to the outer end of the horizontal shaft 165. The rigid bracket 207 carries upon its outer end a rigid horizontal bar 210 upon which the outer portion of the main horizontal frame 180 is arranged to be slidably supported.

The cam 205 is so formed that its marginal surface 211 is always in engagement with the two rollers 200, 201, and as the cam 205 is rotated by the vertical shaft 206, the cam causes the frame 180 to reciprocate horizontally through a predetermined path. The cam 205 is preferably symmetrically formed about a given axis and the contour of each half of the cam is approximately in the form of an Archimedean spiral, or spirals being slightly modified at their points of meeting to avoid a too sudden reversal of the movement of the frame 180. The cam 205 is thus formed to cause the two brush plates 190 and 191 to travel alternately forwardly at the same rate as the sheets 160 and 161 are moving as long as the brushes carried by the plates 190 and 191 are in contact with their corresponding contact plates, and to cause the brush plates 190 and 191 to be reversed smoothly at the proper times, as will appear hereinafter.

For causing the horizontal movement of the main movable frame 180 in either direction to move the secondary movable frame 181 simultaneously in an opposite direction, the inner edges of these two frames are provided respectively with racks 225 and 226 integral therewith or rigidly secured thereto respectively, and arranged to extend in parallel directions longitudinally of the machine. Arranged between and engaging both of these racks is a pinion 227 which is arranged to rotate about a fixed vertical axis and is held against vertical movement on the lower end of a vertical stud 228 which projects downwardly from and is rigidly secured to a bracket 229 which is rigidly secured to the adjacent fixed vertical side plates 155. This pinion 227 is so arranged with respect to the racks 225 and 226 that when the main movable frame 180 is at the limit of its movement in either direction, the secondary frame 181 is at the limit of its movement in an opposite direction, and so that when the main frame 180 is moved horizontally in either direction, the secondary frame 181 will be simultaneously moved horizontally in an opposite direction.

For reciprocating the main and secondary brush plates or supports 190 and 191 vertically in a predetermined manner, the four vertical side plates 155 of the machine are provided respectively with four oblong openings 235 which extend longitudinally of the side plates 155 along the upper edges thereof. One pair of these openings 235 are oppositely arranged in the two side plates 155 respectively of the main stationary frame 152 and in such a manner as to be substantially intermediate of the limits of the horizontal path of the main brush plate 190. The other two apertures 235 are similarly arranged in the side plates 155 of the secondary stationary frame 153 to be substantially intermediate of the limits of the horizontal path of the secondary brush plate 191. Each of these apertures 235 is provided with a guide plate 236 arranged therein and extending longitudinally thereof, the central major portion of each guide plate being substantially rigid and held in a fixed position by a vertical cleat 237 rigidly secured thereto and rigidly secured to the outer surface of the corresponding side plate 155. The ends of each guide plate 236 are flexible and resilient, and the forward end of each guide plate is turned downwardly and the rear end turned upwardly, as shown in Figs. 5 and 5^a. The two brush plates 190 and 191 are each provided with a pair of oppositely projecting horizontally aligned pins 238 rigid therewith, which engage in the corresponding apertures 235, and are positioned similarly either above the corresponding guide plates 236 or similarly below the corresponding guide plates 236 according to the direc-

tion of motion of the corresponding brush plate 190 or 191. Each pin 238 may be surrounded by a loose roller to engage the walls of the corresponding aperture 235, and the guide plate 236 to reduce the friction, these openings 235 and guide plates 236 are so arranged that when, for example as shown in Fig. 5^a the brush plate 190 moves forwardly, the corresponding pin 238 or roller will pass beneath the corresponding guide plate 236, and as the brush plate reaches a position approximately the limit of its forward movement, the pin 238 and the brush plate 190 carried thereby is lifted gradually upwardly by the upwardly inclined portions of the corresponding walls of the aperture 235 and into such positions that when the movement of the brush plate is reversed and the brush plate is moved rearwardly the corresponding pin 238 will ride up over the upper surfaces of the corresponding guide plate 236 until the brush plate reaches a position approximating the limit of its rearward movement, whereupon the upwardly projecting end of the guide plate 236 will be pressed downwardly and the pin 238 and brush plate carried thereby will be forced downwardly by the downwardly inclined extremities of the upper walls of the aperture 235 and the pin 238 will be carried beyond the extremities of the guide plate 236, and will be guided downwardly into their initial positions beneath the corresponding guide plates 236 ready for the next forward movement of the brush plate 190. This movement of the pin 238 causes the brush plate 190 to be lowered into an operative position at the beginning of the forward movement of the brush plate and permits the brush plate to remain in an operative position until the brush plate reaches a position approximating the limit of its forward movement, whereupon the brush plate will be raised to move the brushes carried thereby out of operative position and to hold the brushes out of operative position until the brush plate has been returned to its initial position.

In the modified system shown in Figs. 4, 5, 6 and 7, an electric light display board 10 is provided, and has mounted thereon a plurality of electric lamps 20 arranged as hereinbefore described. One terminal of each of these lamps 20 is connected by a conductor 250 and branch conductors 251 to two corresponding brushes 192 carried by the brush plate 190 and 191 respectively, and the other terminals of the lamps 20 are connected by a plurality of branch conductors 252 to one end of a main conductor 253, the other end of which is connected to one terminal of a direct current generator 254 or other suitable source of electric energy, the other terminal of which is connected by a conductor 255 and branch conductors 256 with the two sta-

tionary contact plates 193 and 194 respectively, so that the lights 20 may be controlled either by the brushes carried by the brush plate 190 or by the brush plate 191.

In the operation of the modified system shown in Figs. 4 to 7, the motor 172 is driven at a uniform rate to move the flexible strips 160 and 161 simultaneously forwardly at a uniform rate, and as the flexible strips 160 and 161 are thus unrolled from the reels 156, the forward ends of the strips are taken up on the reels 157 so as to maintain the portions of the strips between the rollers 164 in a horizontal plane. As the strips 160 and 161 are moved forwardly, the brush plates 190 and 191 are reciprocated by the action of the cam 205, as hereinbefore described, in a horizontal plane in an alternate manner, one of the brush plates being moved forwardly while the other brush plate is being moved rearwardly, and the brush plates 190 and 191 are also reciprocated simultaneously vertically in opposite directions at the ends of their horizontal movements by the guide plates 236 respectively, each brush plate being moved upwardly at the forward end of its horizontal path and being moved downwardly at the rear end of its horizontal path so that during the rearward or return movement of each brush plate the corresponding brushes will be held out of operative position.

The cam 205 is so formed that when either of the brush plates 190 or 191 is in its lowest position with its brushes 192 resting upon the corresponding flexible strip 160 or 161 or upon the corresponding stationary contact plate 193 as the case may be, the brushes carried thereby will be moved forwardly at the same rate as the corresponding flexible strip 160 or 161 is being moved forwardly. The rectangular apertures 162 and 163 in the two flexible strips 160 and 161 are so arranged as to permit predetermined brushes to come into contact with the corresponding contact plate 193 or 194 during substantially the entire time that these brushes are moving forwardly in a predetermined one of its cycles of operation. Each time that a brush 192 is permitted to contact with the corresponding contact plate 193 or 194, a corresponding lamp 20 will be illuminated upon the display board 10.

It is evident from the foregoing that the successive periods of illumination of the electric light board 10 will be of much greater duration than the intervening periods during which the electric light board 10 is not illuminated, and that by suitably arranging the perforations 162 and 163 any predetermined series of figures or delineations may be successively illuminated upon the electric light board 10 as a result of the alternate action of the two reciprocating brush plates 190 and 191, to produce upon

the electric light board 10 the effect of moving pictures.

While in the form of this invention shown in Figs. 1, 2 and 3, and also in the form shown in Figs. 4 to 7, an electric light board 10 is used, which has arranged thereon but nine electric lights 20, and the controlling mechanisms in both cases are shown as arranged to control but nine lights, it is to be understood that in actual practice a very much greater number of lights, for instance, two thousand or more, might be necessary on the board 10 in order to produce any desired elaborate effects in the form of moving pictures, and the controlling mechanisms would have to be modified accordingly.

Although only two forms have been illustrated herein in which this invention may be embodied, it is to be understood that the invention is not limited to any specific construction, but might be embodied in various forms without departing from the spirit of the invention or the scope of the appended claims.

Having thus fully described this invention, I claim:

1. Means for controlling a plurality of electric lamps, comprising an element arranged to reciprocate in a predetermined plane, a brush plate carried by said element and arranged to reciprocate with respect thereto in a direction intersecting said plane, and a perforated strip arranged to be moved in such a path as to cooperate with said brushes.

2. Means for controlling a plurality of electric lamps, comprising two elements arranged to reciprocate simultaneously in opposite directions through predetermined paths, of a brush plate carried by each of said elements and arranged to reciprocate with respect thereto in a direction intersecting the corresponding path of movement of said element, a set of brushes carried by each of said plates, a fixed contact plate arranged to be engaged by each of said sets of brushes, and means for moving a perforated strip between each of said sets of brushes and the corresponding one of said contact plates.

3. In an electric display system, a plurality of electric lamps, an electric circuit for each lamp, a plurality of contacts forming respectively terminals of said circuits, said contacts being arranged in sets, a contact plate for each set arranged to co-operate with said contacts, a strip of material provided with fields of perforations each field being adapted to pass between one set of contacts and the contact plate therefor, means for feeding said strip between said contact plates and contacts and means for simultaneously reciprocating said contact plates in opposite directions.

4. In an electric display system, a plurality of electric lamps, an electric circuit for

each lamp, a plurality of contacts forming respectively terminals of said circuits, said contacts being arranged in sets, a contact plate for each set arranged to co-operate with said contacts, a strip of material provided with fields of perforations, each field being adapted to pass between one set of contacts and the contact plate therefor, means for feeding said strip between said contact plates and contacts and means to move one of said contact sets with said strip for a portion of the travel of said strip.

5. In an electric display system, a plurality of electric lamps, an electric circuit for each lamp, a plurality of contacts forming respectively terminals of said circuits, said contacts being arranged in sets, a contact plate for each set arranged to co-operate with said contacts, a strip of material provided with fields of perforations, each field being adapted to pass between one set of contacts and the contact plate therefor, means for feeding said strip between said contact plates and contacts, means to move one of said contact sets with said strip for a portion of the travel of said strip and means to lift said contact set out of engagement with said strip at a predetermined point and return said set to its initial position.

6. In an electric display system, a plurality of electric lamps, an electric circuit for each lamp, a plurality of contacts forming respectively terminals of said circuits, said contacts being arranged in sets, a contact plate for each set arranged to co-operate with said contacts, a strip of material provided with fields of perforations, each field being adapted to pass between one set of contacts and the contact plate therefor, means for feeding said strip between said contact plates and contacts, means to move said contact sets with said strip for a portion of the travel of said strip and means to lift said sets out of engagement with said strip at a predetermined point and return said sets to the initial position.

7. In an electric display system, a plurality of electric lamps, an electric circuit for each lamp, a plurality of contacts forming respectively terminals of said circuits, said contacts being arranged in sets, a contact plate for each set arranged to co-operate with said contacts, a strip of material provided with fields of perforations, each field being adapted to pass between one set of contacts and the contact plate therefor, means for feeding said strip between said contact plates and contacts, means to reciprocate said contacts sets alternately at the same speed as said strip and means to bring said sets into contact with said strip when moving with said strip and to lift said sets when moving opposite to the movement of said strip.

8. In an electrical system, a plurality of

electrical devices, a plurality of groups of contacts, the number of contacts in each of said groups being the same as the number of said devices and the contacts of each group being electrically connected to said devices respectively, and contact selecting means arranged to be moved continuously to select from said groups of contacts successively a plurality of different combinations of contacts whereby said combinations of contacts are rendered successively effective to control the corresponding ones of said devices.

9. In an electrical system, a plurality of electrical devices, a plurality of groups of contacts, the number of contacts in each of said groups being the same as the number of said devices and the contacts of each group being electrically connected to said devices respectively, and contact selecting means arranged to be moved continuously to select from said groups of contacts successively a plurality of different combinations of contacts whereby said combinations of contacts are rendered successively effective to control the corresponding ones of said devices, all of the contacts in each of said selected combinations of contacts being rendered simultaneously effective to control the corresponding devices.

10. In an electrical system, a plurality of electrical devices, a plurality of groups of contacts, the number of contacts in each of said groups being the same as the number of said devices and the contacts of each group being electrically connected to said devices respectively, and contact selecting means arranged to be moved continuously to select from said groups of contacts successively a plurality of different combinations of contacts whereby said combinations of contacts are rendered successively effective to control the corresponding ones of said devices, said contact selecting means including means provided with a plurality of series of groups of perforations.

11. In an electrical system, a plurality of electrical devices, a plurality of groups of contacts, the number of contacts of each of said groups being the same as the number of said devices and the contacts of each group being electrically connected to said devices respectively, and contact selecting means arranged to be moved continuously to select from said groups of contacts successively a plurality of different combinations of contacts whereby said combinations of contacts are rendered successively effective to control the corresponding ones of said devices, all of the contacts in each of said selected combinations of contacts being rendered simultaneously effective to control the corresponding devices, and said contact select-

ing means including means provided with a plurality of series of groups of perforations.

12. In an electrical display system, the combination with a stationary electrical conducting means, of a plurality of electrical contacts, a plurality of electrical devices controlled by said contacts respectively, contact selecting means movable to select a predetermined combination of said contacts, said contacts being arranged to be moved automatically during certain periods in the same direction as and substantially in unison with said contact selecting means.

13. In an electric display system, the combination with a plurality of electric lamps, of a plurality of groups of contacts arranged to control said lamps, the number of contacts in each of said groups being the same as the number of said lamps, and means including means provided with a plurality of series of groups of perforations arranged to select predetermined combinations of contacts from said groups of contacts successively, and render the same successively effective to control said lamps.

14. In an electric display system, the combination with a plurality of electric devices, of a plurality of groups of electrical contacts each of said groups being arranged to be reciprocated and the contacts in each group being of the same number as the number of said devices, and the contacts of each group being arranged to control said devices respectively, and means provided with a plurality of series of groups of perforations arranged to cooperate with said plurality of groups of contacts to render combinations of contacts selected from said groups respectively successively effective to control said devices.

15. In an electric display system, the combination with a stationary conductor, of an electrical contact, means for moving said contact from an initial position through a predetermined path in engagement with said conductor and for then moving said contact away from said conductor and returning said contact to its initial position, and a perforated strip arranged between said conductor and said contact and operative either to permit said contact to engage said conductor or to hold said contact out of engagement with said conductor, and an electrical device controlled through the co-operative action of said conductor, said strip and said contact.

Signed at Gloucester in the county of Essex and State of Massachusetts this 22nd. day of December A. D. 1916.

JOHN HAYS HAMMOND, JR.

Witnesses:

LESLIE BUSWELL,
ABBIE F. RUST.