J. E. LONG.

ELECTRIC SIGN.

APPLICATION FILED AUG. 24, 1917.

1,394,565.

Patented Oct. 25, 1921.

3 SHEETS—SHEET 1.

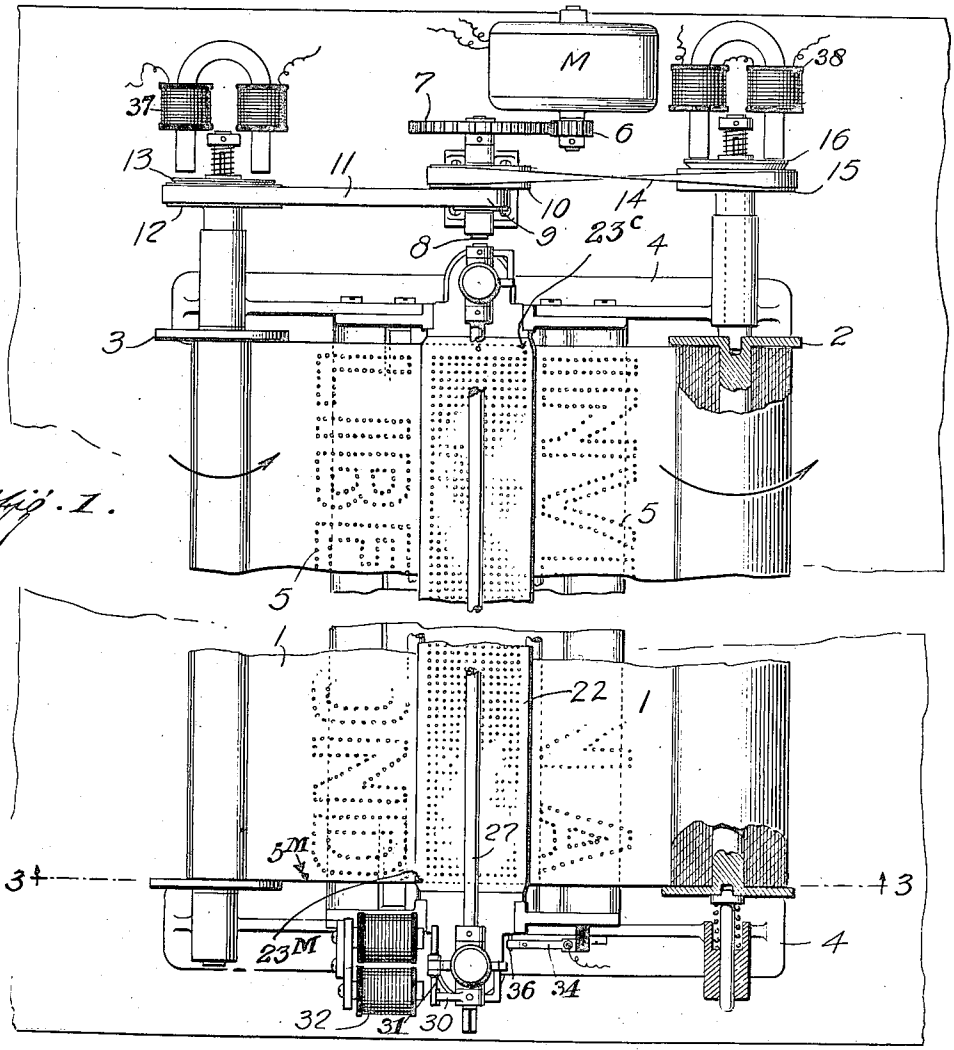

Fig. 1.

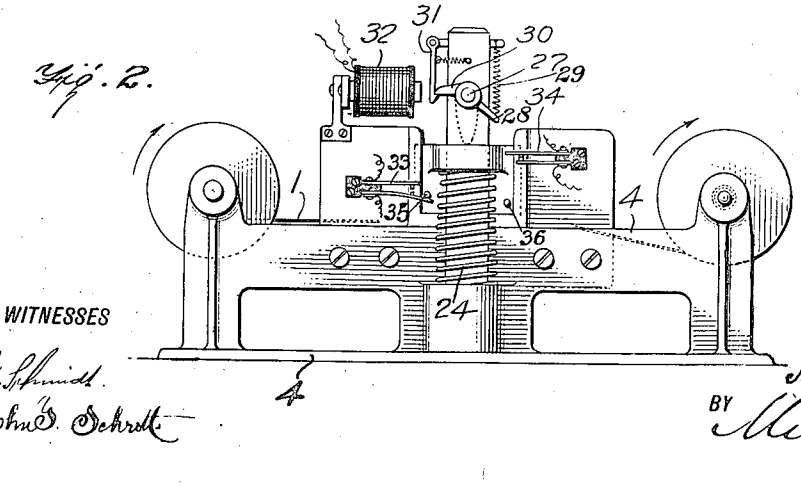

Fig. 2.

WITNESSES

L. H. Schmidt.

John D. Schrott.

INVENTOR

JOHN E. LONG,

BY Munn & Co.

ATTORNEYS

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3 SHEETS—SHEET 2.

Fig. 3.

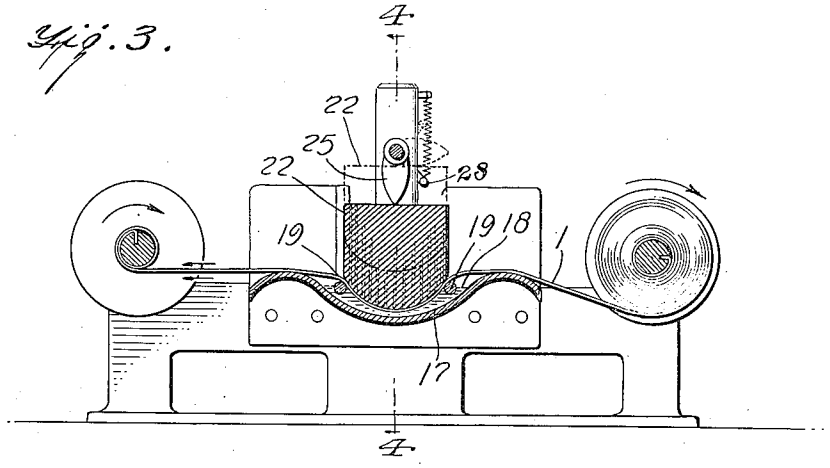


Fig. 4.

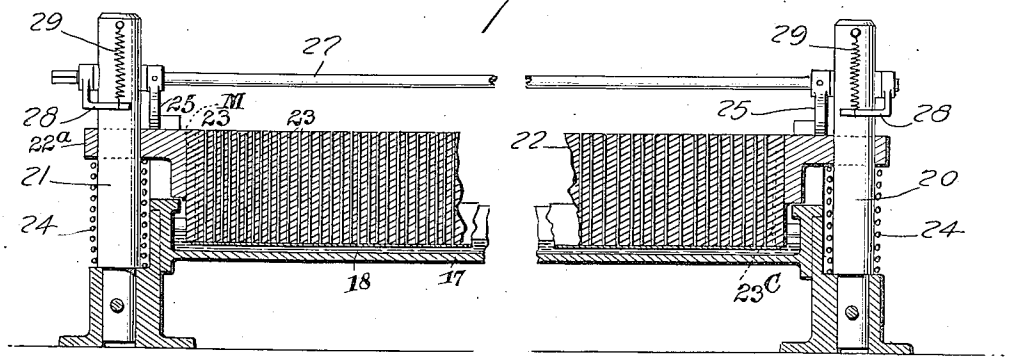


Fig. 7.

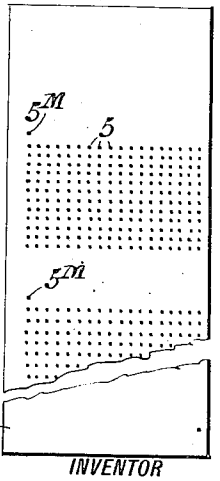
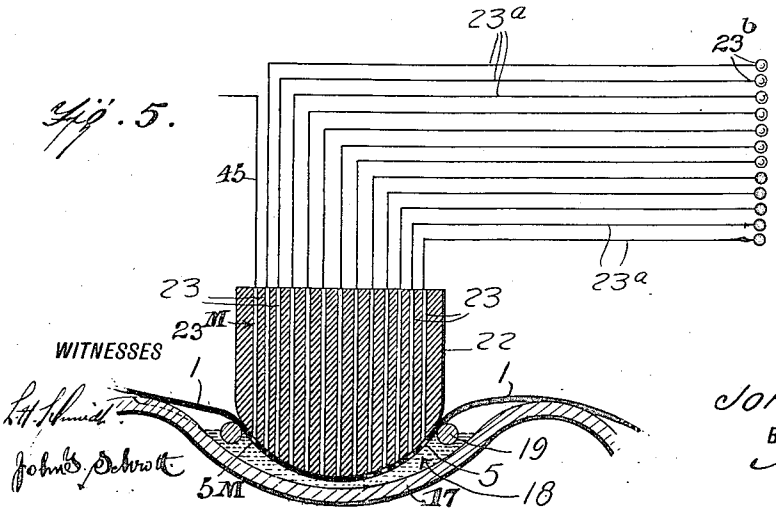


Fig. 5.



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3 SHEETS—SHEET 3.

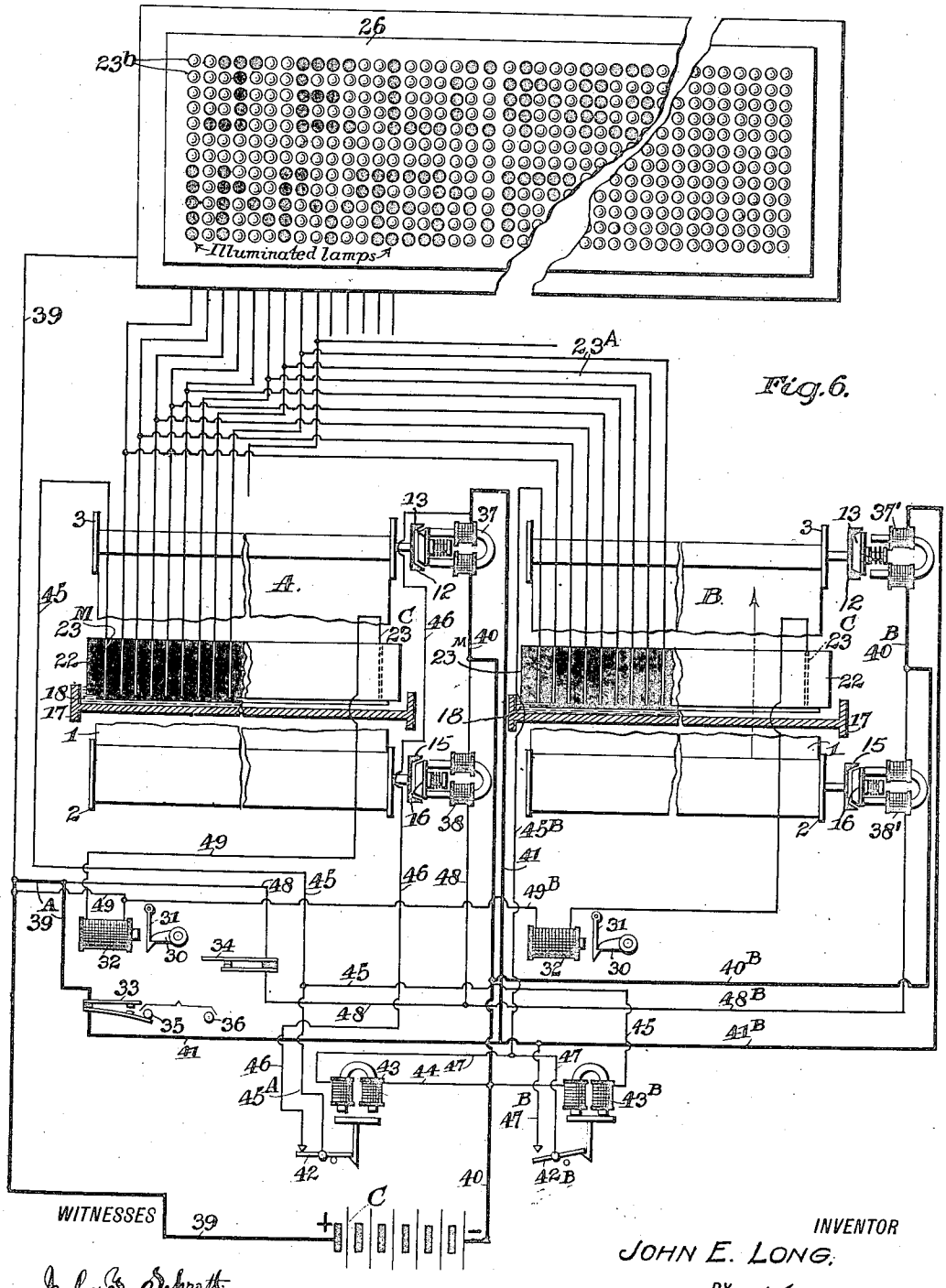

Fig. 6.

UNITED STATES PATENT OFFICE.

JOHN E. LONG, OF HOT SPRINGS, MONTANA.

ELECTRIC SIGN.

1,394,565. Specification of Letters Patent. Patented Oct. 25, 1921.

Application filed August 24, 1917. Serial No. 187,989.

To all whom it may concerns

Be it known that I, JOHN E. LONG, a citizen of the United States, and a resident of Hot Springs, in the county of Sanders and State of Montana, have invented a new and useful Improvement in Electric Signs, of which the following is a specification.

My invention relates to improvements in electric signs of the so-called flashing type, and it consists in the constructions, combinations, and arrangements herein described and claimed.

An object of my invention is to provide an electric sign which will permit the change from one design to another on the light-board without darkening the light-board.

Another object of the invention is to provide a novel form of apparatus for carrying out the changing of the designs without darkening the light-board.

Another object of the invention is to provide a pair of pattern or design sheets which have designs perforated therein, the perforated designs being adapted to close electric circuits to illuminate certain lamps on a light-board, said pattern or design sheets being movable alternately so that the letters or words of a message may be illuminated or built up on the light-board, successively.

Another object of the invention is to provide a pattern sheet having perforations adapted to effect the completion of electric circuits through the lamps on the light-board, said sheet being provided with master perforations which are adapted to complete the path for the light circuits, operate a clutch and throw a switch.

Other objects and advantages will appear in the following specification, reference being had to the appended drawings, in which:

Figure 1 is a plan view of a portion of the device, showing one of the perforated pattern sheets and the driving mechanism therefor.

Fig. 2 is an end view of the device shown in Fig. 1.

Fig. 3 is a cross section on the line 3—3 of Fig. 1 looking in the direction of the arrows.

Fig. 4 is a longitudinal section of the device on the line 4—4 of Fig. 3 looking in the direction of the arrows.

Fig. 5 is a sectional view showing the arrangement of the circuit connections of one vertical row of lamps from the movable tracker bar,

Fig. 6 is a diagrammatic view showing the complete arrangement of the electric circuits for the companion pattern sheet mechanisms.

Fig. 7 is detail view of a portion of one of the perforated pattern sheets.

Reference is directed to Figs. 1 and 2, wherein it will be seen a sheet 1 of flexible non-conducting material is provided. The sheet 1 is adapted to be wound on rollers 2 and 3, respectively, the rollers 2 and 3 being carried by a frame 4. The sheet 1 is perforated as shown at 5, the perforations forming designs or legends which are to be reproduced electrically. There are two such units as are shown in Fig. 1, these units being indicated A and B respectively, in Fig. 6. Since the construction of each unit is alike, a description of one will suffice for both.

Referring again to Fig. 1, it will be seen that a motor M is provided. The motor shaft carries a gear 6 which meshes with a gear 7 on a shaft 8 which carries pulleys 9 and 10. The pulley 9 is connected by a belt 11 with a pulley 12 which is arranged to be connected with the shaft of the roller 3 by means of an electro-magnetic clutch 13. The pulley 10 is connected by means of a crossed belt 14 with a pulley 15 adapted to be connected with the shaft of the roller 2 by means of an electro-magnetic clutch 16. It will be seen that by this arrangement the roller 3 revolves in the same direction as the shaft 8, while the roller 2 will be revolved in the reverse direction. It is, of course, understood that both of the rollers are not driven at the same time.

When the roller 3 is connected to the shaft through the means of the electro-magnetic clutch 13, the perforated sheet 1 is wound on the roller. The electrical connections are such that when the sheet is being wound on the roller 3, the roller 2 will be free and the sheet 1 may then be unwound from the roller 2. Conversely, the roller 3 may be freed while the roller 2 is operatively connected with its shaft through the medium of the electro-magnetic clutch 16, when the sheet 1 will be rewound on the roller 2.

By referring to Fig. 3 it will be seen that a receptacle 17 is provided in which a quantity of mercury 18 is poured. Side members or rollers 19 are provided over which the perforated sheet 1 runs.

Slidably disposed on posts 20 and 21 is

a tracker bar 22 which consists of a body portion of dielectric material having a plurality of conductors 23, these conductors being connected to lamps 23^b on a signboard 26 by wires 23^A. It will be observed that there is one conductor 23 for each lamp 23^b on the signboard 26. In the present embodiment of the invention there are a plurality of transversely extending rows of conductors 23, each of the transverse rows having 12 conductors. It will be seen in Fig. 6 that there are a plurality of vertical rows of lamps 23^b, there being 12 lamps in each of the vertical rows. It will thus be easily understood particularly from Fig. 5, that each of the conductors 23 shown therein and which are illustrative of one vertical row of the plurality of rows in the tracker bar 22, is connected with the corresponding one of the lamps 23^b in one of the vertical rows on the signboard 26.

When the device is out of operation, the tracker bar 22 is held in a normally elevated position as indicated in dot and dash lines in Fig. 3. In Fig. 4 it will be seen that springs 24 which encircle the posts 20 and 21, bear against ears 22^a formed on the ends of the tracker bar 22 and which slide on the posts 20 and 21. The tracker bar 22 is forced into the lower or operative position, by means of cams 25 on a rock shaft 27 which is provided with arms 28 to which springs 29 are attached. The shaft 27 may be rocked against the tension of the springs 29, by any suitable means such as a handle, or in any other suitable manner.

When the tracker bar 22 is in the lower position shown in Fig. 3, the adjacent portion of the perforated sheet 1 is submerged in the mercury 18 beneath the tracker bar 22. An electrical connection is thus effected between the mercury and that particular conductor 23 which is in registration with a perforation 5 in the sheet 1. The bottom of the tracker bar 22 is curved as shown in Figs. 3 and 5, and in order to properly effect the registration of the openings 5 in the sheet 1 which are spaced equi-distantly apart, the conductors 23 of the transverse rows in the tracker bar 22 are located closer together at the ends in order to compensate for the curvature on the tracker bar and properly effect the registration of the openings with the conductors, as above stated.

A master conductor 23^M is embedded in the tracker bar 22 at one side as indicated in Fig. 5. The perforated sheet 1 is adapted to move beneath the tracker bar 22 and stop when a certain set of perforations 5 come into proper registration with the conductors 23. When this occurs, electrical communication between those of the conductors 23 which are exposed to the mercury 18 through said registering perforations, is established with the master conductor 23^M, and certain ones of the lamps 23^b on the light-board 26 are illuminated. The master conductor 23^M is, however, adapted to effect the electrical communication above referred to, only when the perforations 5 of a certain set are in proper registration with the conductors 23. This function is effected by a master perforation 5^M. There is one master perforation 5^M arranged ahead of each set of perforations 5 in the sheet 1 as illustrated in Fig. 7.

The shaft 27 of each of the units A and B, is provided with a locking mechanism for locking the shaft 27 in a certain position. This locking mechanism consists of a lug 30 on one end of the shaft 27 which is arranged to be engaged by a pawl 31, the pawl forming an armature for a releasing magnet 32. The tracker bar 22 is lowered by turning the rock shaft 27, when the cams 25 will bear the tracker bar 22 down. The lug 30 will at the same time move upwardly and become engaged by the hook end of the pawl-armature 31. The position thus assumed in Fig. 2, is held and becomes the operative position of the tracker bar.

A pair of normally closed contacts 33 carried by an insulating block on one side of the frame 4 are adapted to be separated by a stud 35 carried by the tracker bar, when the tracker bar is lowered. Another pair of normally open contacts 34 carried on an insulating block on the frame 4, are adapted to close when a stud 36 carried by the tracker bar disengages the longer one of the contacts 34 when the tracker bar is lowered.

In Fig. 6 it will be seen that the clutch 13 of the roller 3 in the unit A, is arranged to be acted on by the electro-magnet 37, while the clutch 13 of the roller 3 in the unit B, is arranged to be acted on by an electro-magnet 37′. Similarly, the clutches 15 of the roller 2 in the units A and B respectively, are arranged to be acted on by the electro-magnets 38 and 38′. The lamps 23^b on the light-board 26 have one of their terminals connected with the positive pole of a battery C through a wire 39. A wire 40 is connected between the negative pole of the battery C and one side of the electro-magnet 37 of the unit A, while a wire 40^B is similarly connected to one side of the electro-magnet 37′ and to the wire 40.

A wire 41 is connected between one of the contacts 33 and the other side of the electro-magnet 37, while a branch wire 41^B connects with the other side of the electro-magnet 37′. A wire 39^A is connected between the common wire 39 and the other of the contacts 33. The wires 39, 39^A, 41, 40, 41^B and 40^B, which are indicated in heavy lines in Fig. 6, form a primary circuit which is closed at the contacts 33 when the tracker bar 22 is in the normally elevated position. The completion of this primary circuit

causes the energization of the electro-magnets 37 and 37′ in the units A and B respectively, and consequently draw the electro-magnetic clutches 13 into an inoperative position. The clutch members 16 are in operative engagement with the respective shafts of the rollers 2 because the coöperating electro-magnets 38 and 38′ are inactive. The rollers 2 of the units A and B may thus be rotated, and rewind the sheet 1 on the rollers.

Trip switches 42 and 42^B units A and B respectively, are operated by electro-magnets 43 and 43^B. A wire 44 is connected between the electro-magnets 43 and 43^B, and to the negative wire 40. A wire 45 is connected between the master conductor 23^M of the tracker bar 22 in the unit A, and with the other side of the electro-magnet 43^B. A branch 45^A of the wire 45, is connected to the pivotal point of the trip switch 42, while a wire 46 is connected between the fixed contact of the switch 42 and one side of the electro-magnet 37. The other side of the electro-magnet 43 is connected to the pivotal point of the trip switch 42^B bya wire 47, while the fixed contact of the switch 42^B is connected to the wire 41^B by the branch wire 47^B.

A wire 45^B is connected between the master conductor 23^M of the unit B and the wire 47. A wire 48 is connected to the common wire 39 at the branch 39^A at one end, and to one of the contacts 34 at the other. The continuation of the wire 48 beyond the contacts 34, connects to one side of the electro-magnet 38 and then to the negative wire 40. The extension 48^B of the wire 48 connects to the electro-magnet 38′ of the unit B and then to the negative wire 40^B. A wire 49 is connected at one end to the common wire 39 and at the other end to a closer conductor 23^C in the tracker bar 22 of the unit A, the release magnet 32 being embraced by the wire 49. An extension 49^B of the wire 49, embraces the release electro-magnet 32 of the unit B, and connects to the closer conductor 23^B of the unit B.

The operation of the device is as follows: The tracker bars 22 of both of the units A and B are normally in an elevated position as illustrated by the dot and dash lines in Fig. 3. The perforated sheet 1 then simply extends across the individual receptacles 17 out of contact with the mercury 18 in the receptacle. The tracker bars 22 are lowered by turning the rocker bar 27, when the cams 25 will exert a pressure on the end members 22^a of the tracker bars, and press the tracker bars down into the mercury. The perforated sheet 1 will in each instance then be submerged and will be in close contact with the round bottom of each tracker bar. Before continuing the description of the operation, it should be understood that while the tracker bars 22 were in the elevated positions, the stud 35 of the tracker bar 22 in the unit A was out of engagement with the contacts 33 which therefore were in engagement. The primary circuit previously referred to, was thus closed through the wires previously described. The electro-magnets 37 and 37′ were accordingly energized, thus pulling the companion clutch members 13 out of engagement with the pulleys of the rollers 3, thus leaving these rollers loose on their shafts. In the meantime, the electro-magnets 38 and 38′ of the rollers 2 were de-energized, thus causing the engagement of the companion clutch members and pulleys and the consequent rotation of the shafts of the rollers 2 whereby the rollers 2 were rotated to re-wind the perforated sheet 1 on the rollers. It will therefore be understood that when the tracker bars 22 are in the normally elevated position, the primary circuit indicated in heavy lines in Fig. 6, is the only active one and as above explained, throws the electro-magnetic clutches 13 out of engagement, so that the rollers 2 may be rotated to re-wind the perforated sheet of the units A and B.

When the end of a sheet reaches the tracker bar 22, a suitable perforation therein permits the establishment of an electric circuit through the release magnet 32, attracting the armature 31 and releasing the tracker bar so that it may return to the uppermost position through the effort of the springs 24.

Resuming, now, the operation of the device, the lowering of the tracker bar 22 in the unit A, causes the separation of the contacts 33 by means of the stud 35, which breaks the primary circuit above described, and the electro-magnets 37 and 37′ are consequently deënergized. The clutches 13 and pulleys 12 of the rollers 2 and 3 in the units A and B then engage, and both rollers will rotate. This rotation of the rollers continues however, but for a short time. As indicated in Fig. 7, each of the sheets 1 has an imperforate end. This imperforate end will be longer in one sheet than in the other, the purpose being to arrange the perforated zones in the sheets staggeredly. In other words, the perforated zones of the sheet 1 of the unit B will come just between the perforated zones in the sheet 1 of the unit A, so that when both rollers 3 have rotated in unison for a short time, a zone of perforations in the sheet 1 of the unit A will move beneath the tracker bar 22 of the unit A. At the same time, a blank place in the sheet 1 of the unit B will come beneath the tracker bar 22 of said unit, this being so because of the staggered arrangement of the zones of perforations in the sheets, as just explained.

As soon as the zone of perforations in the

sheet 1 of the unit A moves into position beneath the tracker bar 22, the master perforation 5^M in the sheet will register with the master conductor 23^M of the tracker bar 22 and the electro-magnet 37 will be energized to withdraw the electro-magnetic clutch from operative engagement and thus stop the rotation of the roller 3, it being remembered that the electro-magnet 37′ being deenergized, still leaves that electro-magnetic clutch in engagement and consequently permits the continued rotation of the roller 3 in the unit B. The sheet 1 in unit A has, therefore, stopped, while the sheet 1 in the unit B is still traveling.

The electro-magnet 37 was energized as follows: current from the positive pole of the battery C flowed over wire 39 to the light-board, and through certain ones of the lamps and wires 23^A which were in electrical connection with the mercury 18 in the receptacle 17 through the registering perforations 5 of the now stationary sheet 1. The current left the mercury 18 through the master conductor 23^M, flowed over wire 45, through electro-magnet 43^B, over negative wire 40, and back to battery. The return current in the wire 45 was divided at the branch 45^A, flowed through the switch 42, over wire 46, through electro-magnet 37, over negative wire 40, and back to the battery. The contacts 34 being closed, current from the battery C flows over the common wire 39, over the wire 48 now closed at the contacts 34, through the electro-magnet 38, over the negative wire 40, and back to battery. The current also passes over the wire 48^B through the electro-magnet 38′, over the negative wire 40^B, and back to battery. Both electro-magnets 38 and 38′ are, therefore energized, drawing the electro-magnetic clutches out of engagement and permitting the free rotation of the rollers 2. The current through these electro-magnets 38 and 38′ flows continuously while the tracker bars 22 are down and the contacts 34 are in engagement.

The set of lamps 23^b on the light-board 26 which corresponds to the perforations 5 of the sheet 1 effecting the electrical connection between the conductors and the mercury of the unit A, remains illuminated until the first perforated zone in the sheet 1 of the unit B moves into registration with the conductors of the tracker bar 22 of said unit B. As soon as the master perforation 5^M of the sheet 1 in the unit B comes into registration with the master conductor 23^M of the tracker bar, the circuit connection of the trip switch 42 is broken by the energization of the magnet 43 as will presently appear, thus extinguishing the lamps represented by the perforations in the sheet 1 in the unit A, and deënergizing the electro-magnet 37 so that the electro-magnetic clutch member 13 reëngages the pulley 12, and the rotation of the roller 3 is resumed. The path of the current when the master perforation 5^M of the sheet 1 of the unit B registers with the coöperating master conductor 23^M, is as follows: current from the positive pole of the battery C flows over the wire 39, through the light-board, over the wires 23^A to the conductors 23 in the tracker bar 22 in the unit B. From thence, through certain of the registering perforations into the mercury, out of the master conductor 23^M, over the wire 45^B, wire 47, electro-magnet 43, wire 44, and back to battery. The electro-magnet 43 being energized, operates the trip switch 42 as explained above and breaks the circuit just described as being completed through the magnet 37 at the wires 45^A and 46 thus releasing the clutch 13 and starting the sheet of unit A. As soon as the sheet 1 of the unit A commences to move, as it will do when the electro-magnetic clutch member 13 engages the pulley 12, the previously registering master perforation 5^M of said sheet will move from beneath the master contact 23^M and thus break the circuit completed through the electro-magnet 43^B which was previously energized and held the trip switch 42^B out of engagement with the fixed contact of the wire 47^B. As soon as the electro-magnet 43^B is deënergized in the manner just explained, the armature of the magnet falls and causes the trip switch to complete a circuit from the positive pole of the battery C, wire 39, board 26, wires 23^A, mercury 18, conductor 23^M, wire 45^B, wire 47 to the wire 47^B, over wire 41^B, through electro-magnet 37′, over wires 40^B and 40, back to battery. The electro-magnet 37′ being energized, separates the clutch members 12 and 13 and thus stops the rotation of the roller 3. The sheet 1 of the unit B is then stationary and certain ones of the lamps 23^B on the light-board 26 are illuminated accordingly as the perforations 5 in the sheet 1 register with the conductors 23 in the tracker bar 22.

It will be understood from the foregoing that each of the lamps 23^b on the light-board 26, is represented by a conductor 23 in both of the tracker bars 22 of the units A and B. The legends represented by the perforations 5 are pricked into the sheets 1 and 2 but are so arranged relative to each other, that when one of the zones of perforations of one of the sheets is active in illuminating certain ones of the lamps on the light-board, a blank space on the other sheet is moving beneath the conductors of the other tracker bar. The result is that a certain set of lamps is illuminated by one unit, and then another set of lamps is illuminated by the other unit. There is no time when the sign board is dark because the lamps are lighted in such a way that each succeeding message is blended into the other. For example,

a certain message is lighted up on the board by means of the now dormant unit A. At the same time, the sheet of the unit B is moving, and when all of the perforations in that sheet come into proper registration with the conductors of the companion tracker bar, a second set of lamps on the board is lighted up by the perforations in the sheet of unit B. Thus it will be observed that there is an instant when two messages are lighted up at the same time, but the arrangement is such that the set represented by the unit B is almost immediately extinguished after the unit B comes into operation. It will readily be understood that any message can thus be readily built up. For instance, the letters of a word or sentence can be spelled out one by one, or entire words can be made to appear one by one, to complete a sentence. Or, entire phrases can be made to appear one after the other, to complete a sentence. It will also be understood that the sheet 1 of each of the units moves forwardly intermittently and both sheets advance alternately.

While the construction and arrangement of the device as illustrated in the drawings, is that of a generally preferred form, obviously modifications and changes may be made without departing from the spirit of the invention or the scope of the claims.

I claim:

1. A light-board having lamps arranged thereon, and duplicate means for controlling the illumination of the lamps, said means including alternatively operative lamp circuit controlling sheets, with coöperating means for automatically stopping and starting the sheets.

2. A bank of electric lamps, a pair of movable sheets, each controlling circuits through the lamps; conveying means for each sheet, clutch mechanism for each conveying means, and instrumentalities severally controlled by the individual sheets, to unclutch the conveying means of the other sheet, and enable the movement of this sheet, while the other conveying means remains stationarily clutched in a lamp circuit, completing position until the moving sheet reaches a position corresponding to that of the stationary sheet.

3. In a sign including a light-board having lamps arranged thereon, plural means for effecting the illumination of different sets of the lamps in succession, and electro-magnetic unclutching means embodied in each one of the plural means enabling the actuation of each of said plural means when unclutched, the energization of each of said electro-magnetic unclutching means being governed by the other of the plural means.

4. In a sign including a light-board having lamps arranged thereon, a traveling sheet having patterns perforated therein, a tracker bar with conducting elements over the sheet, said elements being in connection with the lamps, a mercury cup containing mercury below the sheet, and means for simultaneously stopping the sheet and completing a circuit through the mercury when all of the perforations of one pattern are in complete registration with the conducting elements.

5. In a sign including a light-board having lamps arranged thereon, a tracker bar having conducting elements individually connected with each of the lamps, a mercury cup containing mercury adapted to contact the conducting elements, a traveling non-conducting sheet having openings therein, and means for stopping the sheet and completing a circuit through the mercury to illuminate the lamps when a prescribed set of the openings moves into complete registration with the conducting elements.

6. In a sign including a light-board having lamps arranged thereon, circuit controlling means for the lamps comprising conducting elements and a mercury electrode, the conducting elements including a master conductor, and a sheet movable between the mercury electrode and the conducting elements, the sheet having a pattern perforated therein adapted to register with the conducting elements, and a master perforation registrable with the master conductor when the perforated pattern is in complete registration with the conducting elements, whereby to complete an electric circuit and illuminate prescribed ones of the lamps on the light-board.

7. In a sign including a light-board and an electric circuit embracing lamps arranged on the light board, conducting elements representative of each lamp on the light-board, a mercury electrode adapted to contact the conducting elements, a master conductor associated with the conducting elements, a non-conducting sheet movable between the conducting elements and the mercury electrode to insulate one from the other, said sheet having a pattern perforated therein and a master perforation isolated from the perforated pattern, said master perforation and master conductors being adapted to register when the perforations of the pattern are in complete registration with the conducting elements to complete the electric circuit and simultaneously stop the movement of the sheet.

8. A sign having a light-board with lamps arranged thereon, plural sets of conductors in connection with the lamps, a mercury electrode for each set of conductors, movable sheets disposed between each of the sets of conductors and the respective mercury electrodes, each of the sheets having patterns perforated therein, the pattern of one sheet being in registration with

the companion set of conductors to complete an electric circuit through the lamps, moving means associated with each of the sheets, the moving means of the registering sheet being dormant while the moving means of the other sheet is active, and means arranged on the active sheet becoming operative when the perforations of said sheet are in complete registration with the companion conductors, to simultaneously stop the active sheet and complete an electric circuit through another set of lamps, and start the dormant sheet whereby the electric circuit previously completed through said sheet is severed.

9. In a sign including a light-board having lamps arranged thereon, plural sets of conductors connected to the lamps, each set having a co-acting mercury electrode, a movable sheet separating each set from the co-acting mercury electrode, each sheet having perforations registrable with the conductors to complete an electric circuit, electrically controlled winding means for each sheet, and means associated with each sheet for rendering the electrically controlled winding means of the opposite sheet active, whereby the sheets are advanced alternately.

10. In a sign including a light-board having lamps arranged thereon, a switch mechanism including a movable member having circuit making perforations therein for lighting a set of lamps, and a co-acting switch member including a moving mechanism having circuit making perforations therein adapted to become active after a pre-determined period to illuminate and blend another set of lamps into the set previously illuminated by the current passed by the circuit making perforations of the movable switch member.

11. In a sign, a plurality of tracker bars having conductors exposed on the lower surface a master conductor associated with but separated from the conductors of the tracker bars, mercury electrodes adapted to contact with the exposed ends of the conductors, non-conducting sheets separating the contacts and the mercury electrode of each tracker bar, each of said sheets having perforations registrable with the contacts of one tracker bar, said sheet remaining dormant during such registration, another sheet being adapted to move, each of said sheets including master perforations, and means rendered active to move the dormant sheet, when the master perforation and master contact of the moving sheet register.

12. In a sign, a tracker bar, an area of conductors composed of a plurality of longitudinal rows, a master conductor separated from, and located in advance at one side of the area of conductors, a second master conductor separated from and located posteriorly at the other side of the area of conductors, a non-conducting sheet movable beneath the tracker bar and having perforations registrable with the conductor, a master preparation registrable with the master conductor and a closing perforation registrable with the second master conductor, means co-active with the sheet for stopping the movement of the sheet when the master perforation and the master conductor register, a mercury electrode beneath the sheet and adapted to permit the passage of current through the perforations and conductors when the master perforation and master conductor are in registration, and means operative to raise the tracker bar out of the mercury electrode when the closing perforation and second master conductor register.

13. Plural units of groups of conducting elements in common and individual electrical connection with a corresponding group of lamps, a pattern sheet coacting with each unit, having registrable perforations therein arranged in individual groups, and means coöperating with each sheet, under control of the other sheet, for advancing the pattern sheets intermittently to move successive groups of perforations into registration with the conductors, one pattern sheet being arranged to stop when its group of perforations moves into complete registration with the conducting elements, while the other sheet continues to advance.

JOHN E. LONG.

Witnesses:
R. McCHESNEY,
WILL NICHOLS.