J. P. TARBOX.

DISPLAY REGISTERING SYSTEM.

APPLICATION FILED SEPT. 15, 1915.

1,218,016.

Patented Mar. 6, 1917.

5 SHEETS—SHEET 1.

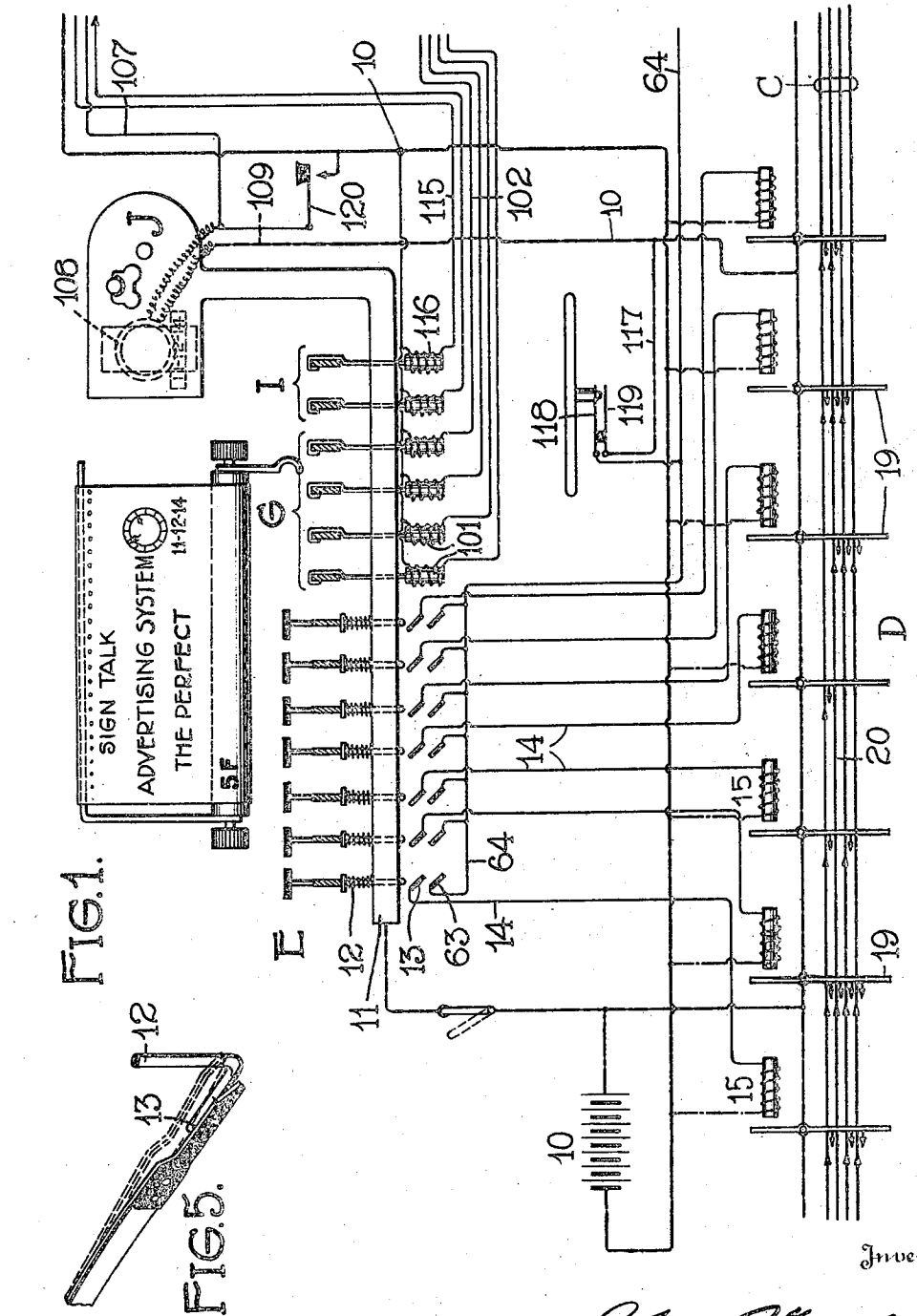


FIG. 1.

FIG. 5.

Witness

Samuel Payne.

Inventor

John P. Tarbox

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5 SHEETS—SHEET 2.

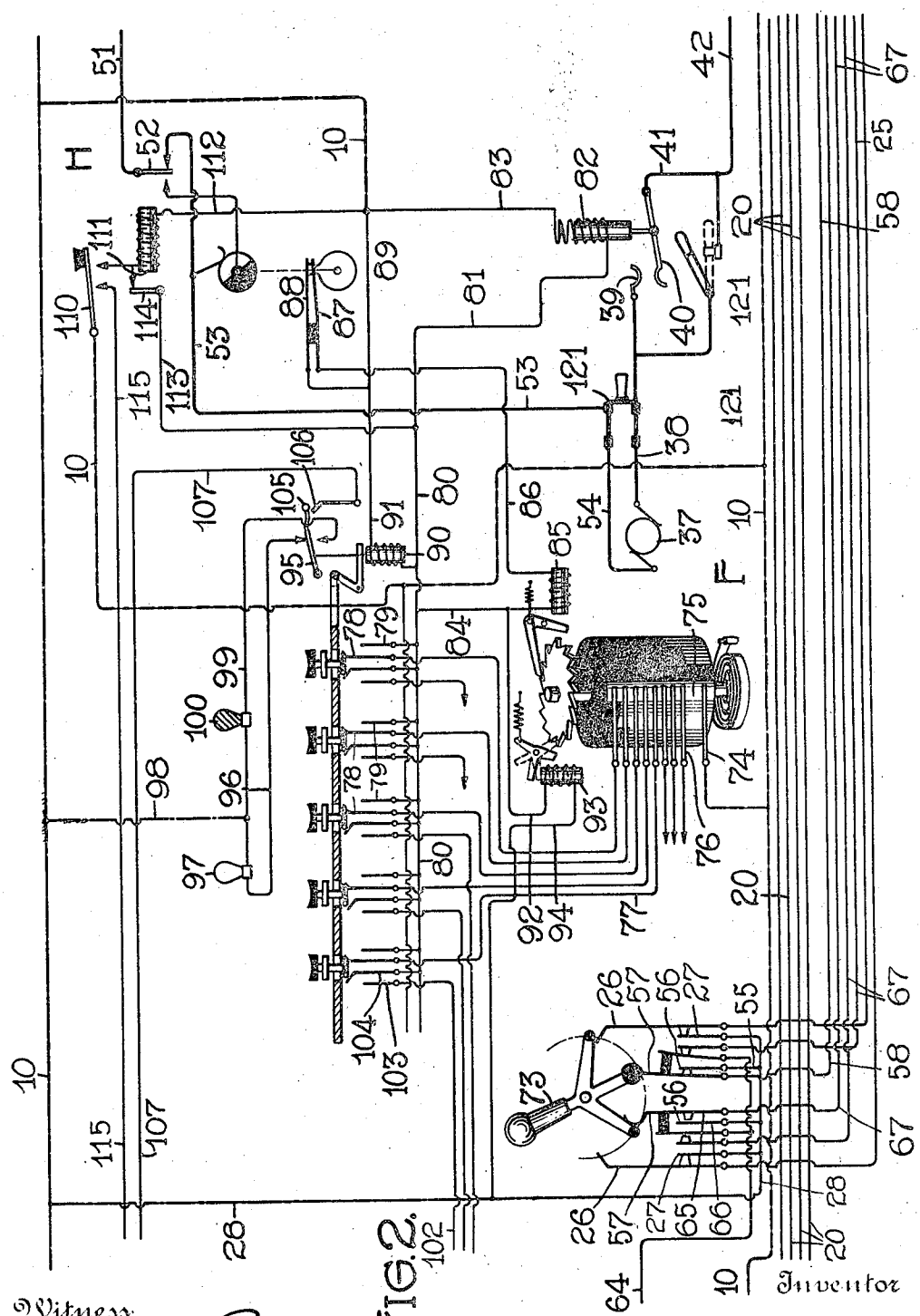


FIG. 2.

Witness

Samuel Payne.

Inventor

J. P. Tarbox

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5 SHEETS—SHEET 3.

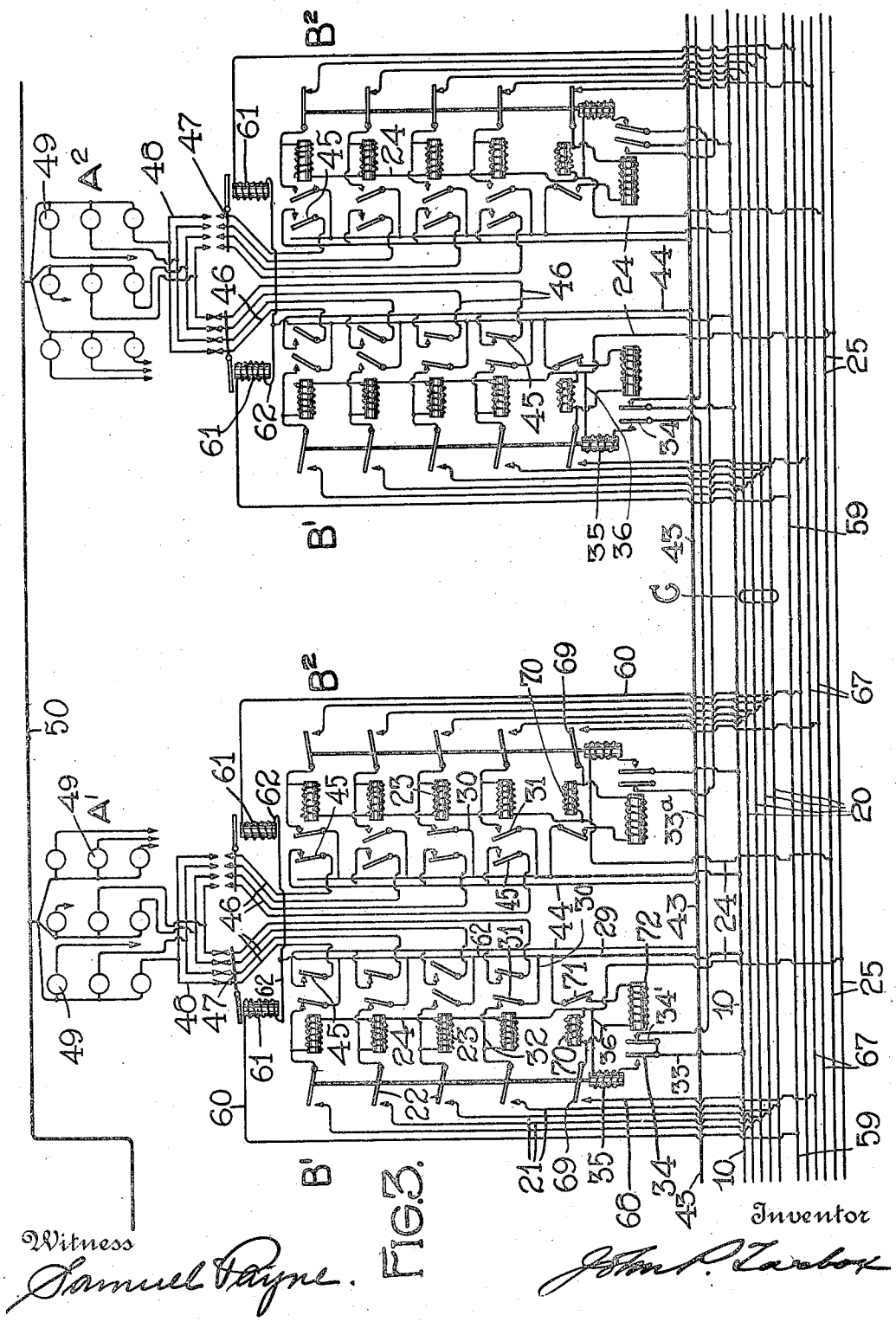


FIG. 3.

Witness

Samuel Payne.

Inventor

John P. Tarbox

J. P. TARBOX.

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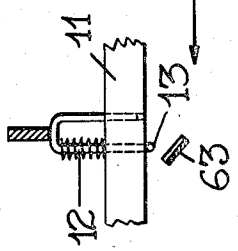
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5 SHEETS—SHEET 4.

FIG. 7.



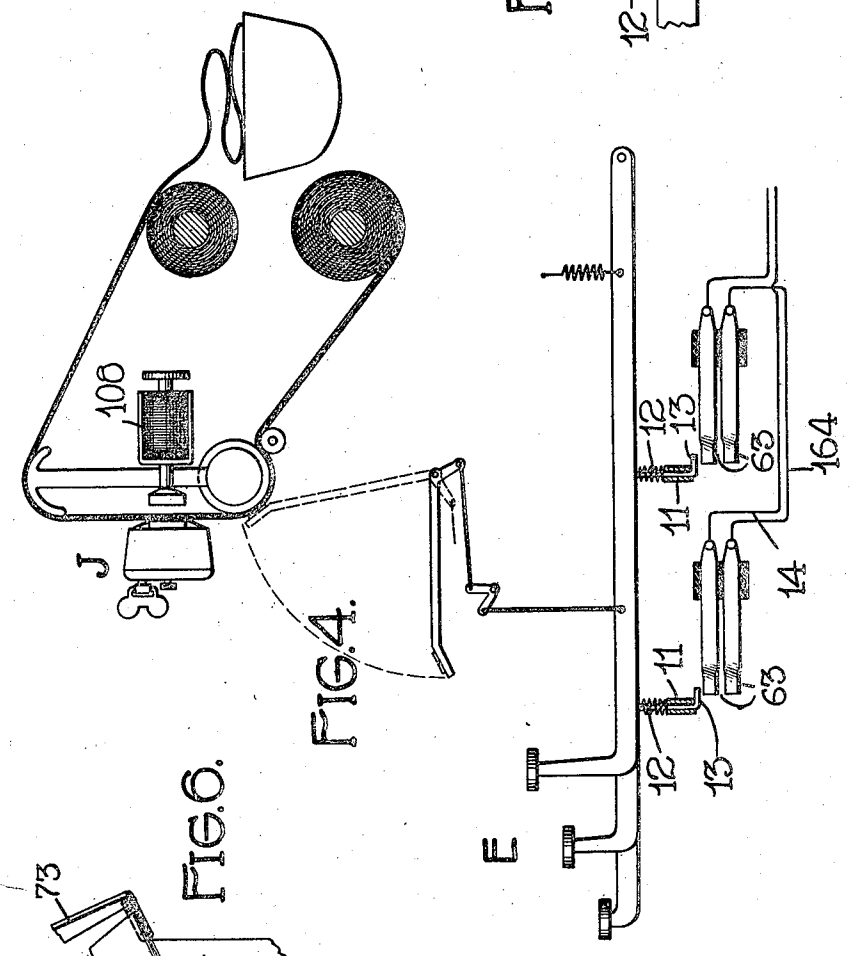


FIG. 4.

FIG. 6.

Witness
Samuel Payne.

Inventor
John P. Tarbox

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5 SHEETS—SHEET 5.

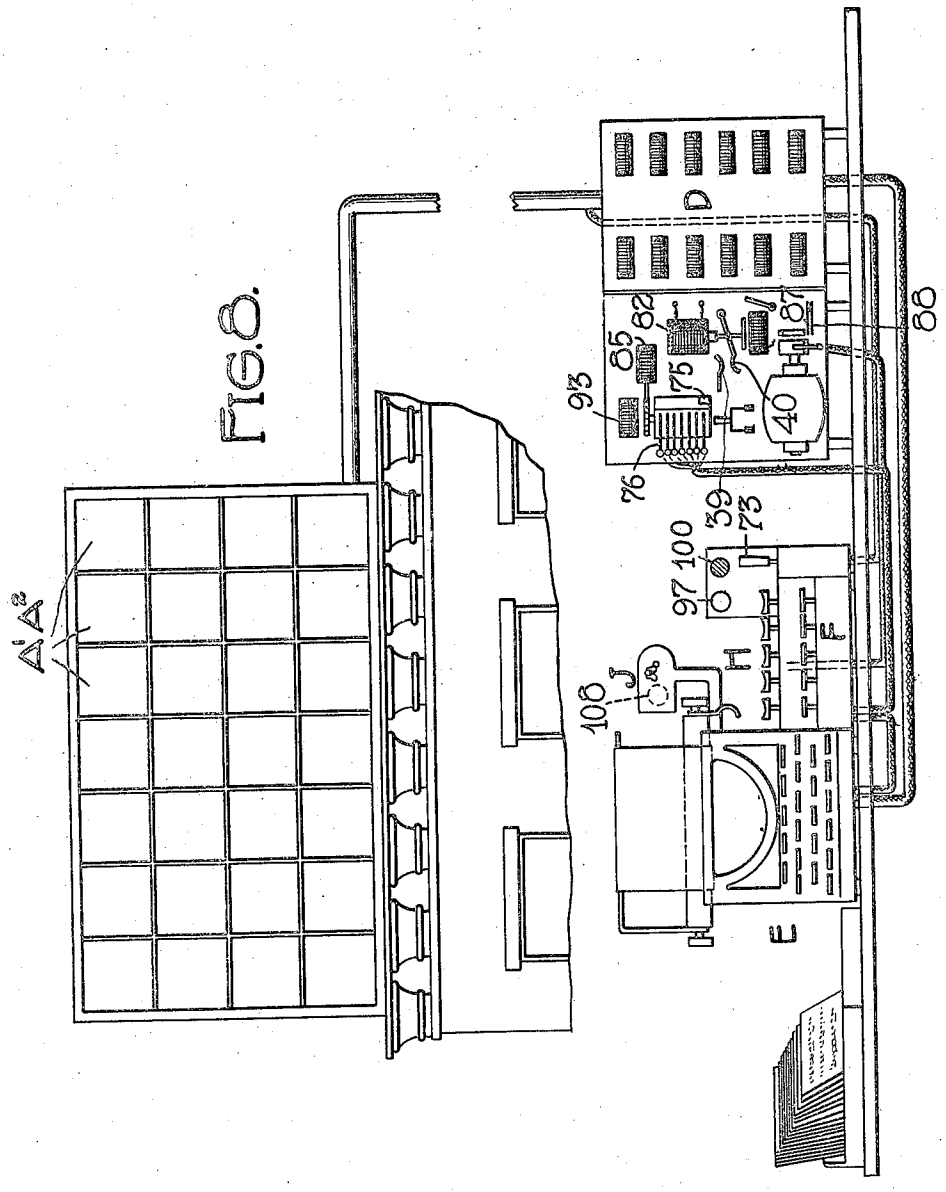


FIG. 8.

Witness
Samuel Payne.

Inventor
John P. Tarbox.

UNITED STATES PATENT OFFICE.

JOHN P. TARBOX, OF BUFFALO, NEW YORK.

DISPLAY-REGISTERING SYSTEM.

1,218,016. Specification of Letters Patent. Patented Mar. 6, 1917.

Application filed September 15, 1915. Serial No. 50,843.

To all whom it may concern:

Be it known that I, JOHN P. TARBOX, a citizen of the United States of America, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Display-Registering Systems, of which the following is a specification.

My invention relates to systems of display of the key-board operated type. It has for its prime objects the metering and duplex registration of display in such a manner as to commercialize the use of key-board operated display systems. Further objects are to simplify and improve the efficiency of such systems.

The system of my invention accordingly comprises a display board composed of a number of display panels, character selecting switching apparatus adapted to determine the characters displayed upon the individual panels, a key-board by means of which the character selecting apparatus is controlled, a display timing apparatus adapted automatically to determine the time of the display, power controlled switches determining the quality of the characters displayed (flashing or fixed, one color or another), together with registering apparatus operated from each the key-board or character selecting apparatus, the timing apparatus, and the power controlling switches whereby each the character of the display, the quality thereof, and the duration are all recorded, and constitute together such a record as may be presented as a bill to the customer. Certain auxiliary apparatus is used to record also the day and time of day, and further auxiliary apparatus makes it possible to set up one display while another is illuminated, whereby the display board may be used continuously and made to pay for every minute of time.

In the accompanying drawings I show that embodiment of my invention now best known to me, and others will readily occur to those skilled in the art.

Of the drawings

Figure 1 shows diagrammatically the operating key-board, the recording mechanism, and the character selecting apparatus.

Fig. 2 is a diagram in continuation of Fig. 1 showing the timing apparatus and the power control apparatus.

Fig. 3 is a diagram in continuation of Fig. 2 showing the details of two display panels of a display board.

Fig. 4 is a semi-diagrammatic showing of the control key-board and recording apparatus in end elevation.

Fig. 5 is an enlarged perspective view of one of the circuit-closing contacts of the key-board.

Fig. 6 is a detail of the contact of the circuit shifting switch.

Fig. 7 is an enlarged detail of a plunger operating the contacts of the type of Fig. 5.

Fig. 8 is a diagrammatic illustration of the arrangement of the various apparatuses of the system under conditions of use.

The various elements and apparatuses of the system are characterized and related as follows, reference to the various parts being made by their numerical designation upon the drawings. The designation will for the sake of convenience and brevity be first made at the opening of the paragraph describing any group of apparatus or circuits, and the parts designated by the characters described in detail in the body of the paragraph. To designate the grouping or complete circuits as a whole, the groups of character designations are placed in parenthesis.

(A^1, A^2—Fig. 3). These are the display devices proper. They consist each of a plurality of electric lamps and are usually arranged in partitioning boxes grouped in monogramic relation. By illuminating the lamps in various groups, any desired letter or numeral character may be displayed. Any other form of variable character display device may be substituted for this however.

(B^1, B^2). Duplicate groups of circuit controlling magnets for each display device A^1, A^2, etc. There is provided a magnet in each group for each illuminating device of the corresponding display panel A^1, A^2, etc. Each magnet is provided with a locking circuit, and the locking circuits of each group are collectively controlled, as will be seen, whereby the magnets may be locked up in chosen groups representing chosen characters. Thus they constitute in reality a character registering means by which appellation they will be hereinafter referred to. Each magnet controls the circuit of one illuminating device. In connection with each

group B^1, B^2 there are provided auxiliary relays the function of which is to isolate either group upon occasion.

(C). A group of trunk conductors multiple to the various relays of the character registering mechanisms B^1, B^2.

(D—Fig. 1). Character selective apparatus comprising a plurality of electro-magnets each operating circuit closing contacts which coöperate with a different group of the trunk conductors C and hence are adapted to energize a different group of the character registering relays B^1, B^2.

(E). A typewriting machine from the key bars of which are operated contacts which control the circuits of the magnets of the character selecting apparatus D. This may be a standard machine of any approved type having a sufficient number of key bars, or may be specially built similarly thereto. As such it is provided with the usual set of type bars which operate upon the platen, as clearly shown in Fig. 4. The circuit controlling contacts of the electro-magnets of the character selective apparatus D are mounted edgewise in a transversely supported bar of insulated material beneath the key bars. L-shaped plungers are mounted in a bar superposed above the free ends of the contacts with the base of the L extending parallel with the free ends and approximately centrally of them. The free ends are twisted out of the plane of the body 45 degrees and, as shown in Fig. 5, provided on their under sides with a strip of insulating material. Thus, when any key is depressed to record a character, the associated plunger is depressed and its base end contacts successively with the angled blades below it, successively deflecting them and passing them to the under or insulated side thereof (see Fig. 5). When the key bar is released the plunger is returned by a suitable spring, ratcheting past the insulated under sides of the contacts without completing an electrical circuit. It will be apparent that the typewriting machine constitutes a recording mechanism controlled in the operation of its key-board to actuate the character selective apparatus D to record the characters so determined.

(F—Fig. 2). Time operated circuit controlling means arranged to determine the duration of the display as set up through the operation of the character selective apparatus D and the registering relays B^1, B^2. This timing mechanism F comprises a plurality of keys in an auxiliary key-board, each of which when depressed effects the closure of the power circuit for a different interval of time. After the character of the display has been determined and recorded by operation of the apparatuses E, D, B^1, or B^2, one of the keys of the timing apparatus F is depressed and remains depressed for a predetermined time at the end of which it is automatically released.

(G—Fig. 1). A group of key bar actuating magnets which together with the associated type bars of the typewriting machine constitute an auxiliary recording mechanism arranged through connection of the circuits of the magnets G with the timing apparatus F to be controlled by the latter to record the duration of the display. This is simply accomplished by attaching to the type bar associated with any magnet G a numeral character indicative of the duration of time determined by the corresponding key of the apparatus F.

(H). Switching mechanism controlling the connection of the display devices A^1, A^2 with a source of power and determining the quality of the display. It comprises a circuit shifting magnet arranged to connect the display devices either directly to the source of power or indirectly thereto through a commutating device, the display being of a fixed quality in the former case and of a flashing quality in the latter case. This apparatus, like each of the others, may take any one of a variety of forms, and may effect the color as well as the frequency of the display, all as clearly set forth in my accompanying application, Serial No. 816,080 filed February 2, 1914.

(I). A group of magnets controlled from the quality determining apparatus H, and together with the key bars and associated type bars operated thereby, constituting a recording mechanism controlled in the operation of the quality determining apparatus H to record the quality of the display. As in case of the mechanism actuated by magnets G, the record is very simply coördinated with the operation of the apparatus H by placing on the type bars characters indicative of quality, thus X may be chosen to indicate "fixed" and F, to indicate "flashing".

(J). A chronometrically operated recording mechanism in the form of an electro-magnetically operated time stamp supported from the frame of the typewriting machine in any suitable manner. The circuit of the actuating electro-magnet of this time stamp is controlled from the timing apparatus F to effect an energization thereof at the moment the display begins. The record sheet of the typewriting machine is passed over a guide vertically above the platen, whereby the sheet takes a vertical course for several inches in the plane passing between the hammer and the anvil of the time stamp, whereby when the carriage is at one extreme of its movement or the other, one margin of the record sheet is interposed between the hammer and the anvil in proper position to receive record of the time of day. Auxiliary hand set characters may be pro-

vided in connection with the time stamp to record also the date in a well understood manner.

Throughout the specification numeral 10 will be used to designate the battery and the bus conductors leading directly therefrom and thereto without passing through any switch or translating apparatus. Moreover, the bus conductors are designated by broken lines whereby the tracing of circuits now to be described will be greatly simplified.

(10, 11, 12, 13, 14, 15, 10). The circuits of the electro-magnets 15 of the character selective apparatus D which are closed individually by operation of the key bars of the typewriting machine E, the key bars depressing plungers 12 and contacting their lower ends (charged with potentials from supporting bar 11 connected with battery 10) with contacts 13. There is one of these circuits for each character to be displayed, and, as will be readily understood, the key board of the typewriter is provided with a properly designated key for each key bar which actuates a plunger 12.

(10, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 10). The initial energizing circuits of the relays 23 of the registering apparatuses B^1, B^2, the closures of which circuits are controlled over trunk conductors 20 by contacts 19 of electro-magnets 15 of character selecting apparatus D.

(10, 29, 30, 31, 32, 23, 24, 25, 26, 27, 28, 10). The locking circuit of each relay 23 of registering apparatuses B^1, B^2.

(10—Fig. 3—33, 34, 35, 36, 24, 25, 26, 27, 28). The initial energizing circuit of the advance isolating magnet 35 controlling through normally open contacts 22 the connection of the registering relays 23 with the trunk conductors C. Normally the first magnet 35 of the series of groups B^1 or B^2 is energized, while the remainder are deënergized, whereby the relays 23 of the first registering group B^1, and only that group, are normally connected with trunk conductors C. On them, therefore, is registered the first character selected through operation of the character selective apparatus D over the circuits aforesaid. As many of the relays 23 are pulled up and locked up over their locking circuits just traced, as there are conductors 20 of group C energized. This number depends upon which one of the electro-magnets 15 of the selecting apparatus has been energized.

(37,—Figs. 2 and 3—38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54). The circuits of the individual illuminating devices 49 of display panels A^1, A^2, etc. which are closed through contacts 45 of registering relays 23 when they are energized, as aforesaid. Through these circuits each illuminating device 49 is connected with the generator 37 or other principal source of power.

(10—Figs. 2 and 3—28, 55, 56, 57, 58, 59, 60, 61, 62, 29, 10). The circuits of rear isolating magnets 61 controlling through their contacts 47 the connection of contacts 45 of relays 23 with illuminating devices 49. Normally, as indicated, the rear isolating magnets 61 of one or the other of the groups B^1, B^2 of each of the display panels A^1, A^2, etc. are closed, as indicated in Fig. 3, and they remain closed during the use of the particular series of groups B^1, B^2 which happens to register the characters then being displayed. They are not energized, however, until complete registration of the entire display has been effected, control of this being had through contacts 56, 57, under control of the operator as will be pointed out.

(10—Fig. 1—11, 12, 63, 64, 65, 66, 67, 68, 69, 70, 24, 25, 26, 27, 28). The circuits of spacing relays 70 auxiliary to the groups B^1, B^2, one of which circuits is closed immediately following the closure of any character selecting circuit, plungers 12 placing battery on contact 63 immediately following their placing battery on contacts 13. As in the case of contact 13, the contact with 63 is a passing contact made in one direction only.

(10—Fig. 3—29, 71, 72, 70, 24, 25, 26, 27, 28). The circuits of transfer magnets 72 which through their contacts 34 govern the closing and opening of the circuits of the advance isolating magnets 35 previously traced. These relays 72 by their front contacts normally close, or partially close, the circuits of isolating magnets 35, but each by its rear contact extends battery to the isolating magnet 35 of the next succeeding panel.

(10, 33, 34′, 33^a, 34 of the succeeding panel, 35, 36, 24, 25, 26, 27, 28). The transfer circuits aforesaid which are successively closed from one panel to another, thereby successively cutting in groups of registering relays B^1 or B^2. It is thus apparent that inasmuch as immediately after registration is made by selecting apparatus D upon any group B^1 or B^2, the circuits of the transfer relay 70 and magnet 72 are closed momentarily, the group upon which registration has been effected is isolated through deënergization of the associated magnet 35, and a group B^1, B^2 of the next succeeding panel is connected with the trunks C by initial energization of its advance isolating magnet 35. Thus operation of the key-board of the typewriting machine to register a desired character on any panel results in isolating that panel immediately after registration and rendering ready for use the next succeeding panel.

73—Fig. 2). A double throw switch under control of the operator and having control of the two groups of contacts 26, 27, 56, 57, and 65, 66 in the circuits aforesaid. By operating this switch to one side or the other, one series of groups B^1 or B^2 of the registering apparatuses is associated with the character-selecting apparatus D to the exclusion of the other, the other being the while connected with the source of power. To this end, contacts 26, 27 of the circuits of the registering relays 23 of both groups B^1, B^2 are normally closed. When operated in either direction, however, these contacts are engaged by the lateral branches of the operating lever of switch 73 and momentarily opened by engagement of the inclined and offset portion of the outer contacts 26 by a pin or projection on the branch, as clearly indicated in Fig. 6. The projection from the lateral arm ratchets past the offset portion of contact 26 on movement in the opposite direction, pressing the contacts more firmly together. Thereby the circuits of registering relays 23 are momentarily opened to unlock them, and immediately thereafter they are available for a succeeding registration. The contacts 56, 57 which control the circuits of the rear isolating relays 61 are normally open and one or the other of them is closed when the switch lever 73 is thrown, energizing one or the other of the relays 61 and connecting the group B^1 or B^2 to the display panel A^1 according to the position of switch 73. The contacts 65, 66 are also normally open and according to the position of switch 73 one set or the other of them is closed to connect the key-board end of the transfer or spacing circuit to the transfer relays and magnets 70, 72, of one set or the other of the registering relays B^1, B^2. In the position shown, the set B^1 of the first panel A^1 is in use, its auxiliary isolating magnet 61 being energized and connecting the lamps 49 of panel A^1 in circuit. The circuit of this magnet 61 may be traced through the right hand contacts 56, 57. The right hand group B^2 of panel A^1 has received a registration, several of the relays being locked up and connecting leads 46 to the source of power but the associated isolating magnet 61 has its circuit open at contacts 56, 57 on the left of switch 73. The group B^1 of panel A^2 is in a condition similar to the registering group B^1 of panel A^1, while the group B^2 of panel A^2 is just about to receive a registration, this group having been connected in circuit with conductors C or "enabled" by transfer of energization of magnet 35 from group B^2 of panel A^1, as previously described. Step by step this transfer of circuits is carried out until the entire series of registering groups B^2 are energized (or such portion of them as it may be desired to utilize), whereupon by simply reversing the position of switch 73, the display devices are disconnected by magnet 61 from the groups B^1 and connected immediately after to all of the groups B^2. At the same time this connection is effected to the groups B^2, maintaining circuits 24, 25, 26, 27, 28 of the relays 23 of the group B^1, are opened momentarily at left hand contacts 27, 28. The relays of these groups are thereby unlocked and immediately rendered ready to receive a second registration. Thus it will appear that through the provision of the duplicate sets of registering apparatus B^1, B^2, a display may be registered on one set while another display is being made from the other set, and the registered display commenced upon the panels immediately the preceding display is finished. It is therefore possible to use the display board every moment irrespective of the time required for setting up any given display.

(10—Fig. 2—74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 10). The circuit of the circuit breaker 82 which through its contacts 39—40 of the power circuit from generator 37 controls the application of power to the display devices. This circuit includes a pair of contacts 78, 79 closed by a chosen one of the control buttons of the timing apparatus F, and a pair of contacts 75, 76 of a ratchet driven switching device. The contact 75 is in the form of a stepped cylinder, and the various contacts 76 are so positioned along an element of that cylinder that when contact 75 is stepped around, the contacts 76 leave contact 75 one after the other.

(10, 74, 75, 76, 77, 78, 79, 80, 84, 85, 86, 87, 88, 89, 10). The circuit of stepping magnet 85 of contact 75. This circuit is intermittently closed at contacts 87, 88 by a chronometrically driven cam which is preferably on the same shaft as is the commutator which controls the quality of the display as aforesaid. This commutator and cam are preferably driven by a constant speed electric motor, though some suitable clock train may be employed as desired.

(10, 75, 76, 77, 78, 79, 80, 90, 91, 89, 10). The circuit of locking magnet 90 upon the energization of which any depressed key is held depressed as long as the magnet is energized.

(10, 75, 76, 77, 78, 79, 80, 84, 92, 93, 94, 10). The circuit of retaining magnet 93 of contact 75, the retaining pawl of which is normally in inoperative position, but when the magnet is energized, is moved into operative position against the tension of the withdrawing spring. A suitable spiral spring, shown at the bottom of the contact 75, biases this contact about its axis against the pawls of magnets 85 and 93 to normal position.

Since each of the foregoing circuits is dependent for completion upon the closure of contacts 75, 76, when any key of the time

apparatus F is depressed, each of the three magnets 85, 90, and 93 are energized, the first-named intermittently, and the two last-named continuously, as long as the contact 76 associated with the key which has been depressed, bears upon contact 75. Step by step magnet 85 rotates the contact 75 and it is held in such position by the pawl of magnet 93 until the circuits of the several magnets 85, 90, 93 are simultaneously opened at contacts 75, 76, whereupon the locking bar controlled by magnet 90 is released, thereby opening contacts 78, 79 which also are in each of the three circuits, and releasing the holding pawl of contact 75, whereupon contact 75 is carried upon its biasing spring immediately back to normal position. Circuit breaker 82 belongs to the group 85, 90, 93, and it will therefore be observed that power has been automatically, by pressing one of the buttons of the apparatus F, placed upon the display devices, retained there for a time determined by the particular button of the apparatus F which was pressed, and automatically removed at the end of that time. The apparatus F therefore controls the duration of the display. Through the various circuits 75, 76, 77 etc. it may be variously energized for any one of a number of selected intervals of time.

(10, 95, 99, 100, 98, 10). The circuit of a red lamp illuminated as long as the timing apparatus is in use, the circuit being closed through a front contact of magnet 90. Inasmuch as the circuit breaker 82 has entire control of the energization of the display devices A^1, A^2, and inasmuch as its circuit is controlled in multiple with the circuit of relay 90, the busy or idle condition of the timing apparatus F indicated by lamps 97, 100, is also the condition of the display devices. Promptly the red lamp goes out and the white (97) light comes on, the operator knows that the display board is ready for the succeeding display, and having previously registered this display on the then idle one of the registering apparatuses B^1, B^2, he may throw switch 73 to its opposite extreme and press that one of the buttons of the timing mechanism F according with the duration of the display he desires, and the display will take place immediately and continue for the period desired. While the display continues, a further display may be registered upon the previously used registering apparatus B^1 or B^2. The use of the display board is thus continuous as aforesaid, and the groups of registering apparatus B^1, B^2 are alternately used in accordance with the indication of the signal lamps 97—100.

(10—Fig. 1—101, 102, 103, 104, 10). The circuits of actuating magnets 101 of the recording mechanism group G. These circuits are individually controlled each by a pair of contacts 103, 104, closed when one of the buttons of the timing mechanism F is depressed. The contacts 103, 104 are like the contacts 12, 13, and 63 of the key-board mechanism, one-way passing contacts (see Fig. 5), whereby on the downward movement of the timing button the circuit of the corresponding magnet 101 is momentarily closed and a type-bar is actuated to make a record of the duration of the display; thus, if this is to be ten seconds, the character 10 is impressed upon the record sheet, if five, the character 5, etc.

(10—Fig. 2—105, 106, 107, 108, 109, 10). The circuit of the actuating magnet 108 of the time stamp J. This circuit is closed momentarily by one direction passing contacts 105, 106 of the type shown in Fig. 5, the contact 105 being an extension of armature 95 of locking relay 90. At the same moment therefore that a record is made by the recording mechanism of group G of the duration of the display, record is also made of the time of day and the date.

(10, 110, 111, 112, 10—Fig. 2). The circuit of the actuating magnet of the quality determining device H. This circuit is closed by depression of button 110, whereupon the solenoid 111 locks itself up.

(10, 74, 75, 76, 77, 78, 79, 80, 113, 114, 111, 112, 10). The locking circuit of the solenoid 111 which controls the shifting of contact 52 and the consequent connection of the lamps 49 of the display devices by way of conductor 51 either directly to the source of power 37 or thereto through a flashing commutator. This commutator may be driven in any manner.

(10, 110, 115, 116, 10). The circuit of actuating magnet 116 of still a third auxiliary recording mechanism I closed when quality determining key 110 is depressed. Over it magnet 116 is momentarily energized to record the quality of the display.

(10, 17, 18, 117, 118, 119, 64, 65, 66, 67, 68, 69, 70, 24, 25, 26, 27, 28, 10). The circuit of transfer relays 70 as closed by the special spacing key operating contacts 118, 119. By operating these contacts 118, 119, the registering apparatus B^1 or B^2 of any desired number of panels may be passed over during the operation, and display thereon omitted.

(10, 120, 107, 108, 109, 10). An auxiliary controlled key for the chronometrically driven time stamp J by means of which it may be operated to record both the beginning and the end of a display independently of the timing apparatus F.

(121). A power controlling switch in shunt to the contacts 39—40 of circuit breaker 82 by means of which the system may be used without the timing apparatus F.

Such is the system of my invention. Its manipulation is simple and skill therein easily acquired. The operation is efficient

and the results produced highly advantageous. The record sheet is preferably used from rolls in which it is wound in duplicate, as indicated in Fig. 4, in which the carbon is shown as being rerolled while the original is loosely caught in a box or basket. The back of the original is carbonized to produce the carbon impression, thus eliminating the necessity for special carbon paper. The sheet is transversely perforated as indicated in Fig. 1 at intervals determined by the number of lines of display devices A^1, A^2 that there are upon the display board. Sufficient space is allowed between perforations to accommodate a corresponding number of lines of typewriting and one extra. The typewriting machine is set to leave a margin of approximately two inches on the right hand side of the record sheet. This is to receive the impression of the time of day as indicated. The record sheet is then adjusted to commence a record just below any given line of perforation, the carriage moved to the extreme right, switch 73 moved to the right, and the operation begun. The keys of the typewriter are operated to write the display desired on the record sheet, the spacing key being so used as to properly justify the various words with respect to the margin and with respect to each other. The appearance would be much as indicated in Fig. 1. During this operation through character selective device D registration has been made upon the registering apparatuses B^1. The carriage of the typewriter is now moved to the extreme right, and as a result the record sheet is in a position to receive writing on the last line. The transfer switch 73 is thrown to its opposite extreme, one of the buttons of timing mechanism F is depressed, and immediately following the button 110 of the quality determining mechanism F if some quality other than that of a fixed display is desired. These operations follow each other in a 1—2—3 order much as the punching of the buttons on the key-board of an adding machine. The display commences. In the operation of the buttons to commence the display, the timing button depressed energizes a magnet 101 to record the selective duration of the display indicated by the numeral 5 on the record in Fig. 1. Simultaneously, the time stamp J is energized to impress the time and date on the margin at the right, for the margin of the record sheet when the carriage is at the extreme right, lies between the hammer and the anvil of the time stamp. Immediately following this a magnet 116 of the quality recording mechanism I is energized to record the quality of the display as designated by the character F (flashing) immediately after the numeral 5 which indicates the duration.

This display is now being made on the display board in accordance with the setting given it. The operator now simply moves the carriage of his machine again to the extreme right, thereby spacing the record sheet across the lower perforation for writing on the next section and proceeds with the setting up of the next display, typing it upon the record sheet in identically the same manner as he typed the preceding one. Having completed this, if he observes the red light 100 is still lit, he may busy himself with other matters for the time being. If the white light is lighted, he knows that the display has been completed in accordance with its setting, and the board is ready for the succeeding display. He thereupon operates switch lever 73, the proper button of timing mechanism F and the proper button of the quality determining mechanism in 1—2—3 order as in case of the preceding display, and proceeds to set up still a third display, and so on, *ad infinitum*. It will be observed that a complete record has been made not only of the character and arrangement of the display on the display board, but in addition the record sheet bears an absolutely correct record of the duration of the display, its quality, the time of day it was made to the minute, and the date. The originals are separated and are presented to the customer accompanying a bill for services computed on the basis of the duration of the displays, or else the various records are thus constituted bills by simply appending charges on the lower right hand corner in accordance with the indication of the quality and the duration. The operating concern has a duplicate record on its roll to which reference be made for substantiation of any facts concerning the original record.

If some special progressive display is desired covering a longer period than that over which the timing apparatus F will operate, the power switch 121 may be closed in shunt to the contacts of circuit breaker 82, and time stamp J energized at the beginning and at the end of such display by the operation of the control key 120. This will be of particular advantage when the recording mechanisms of the system herein outlined are used in connection with the system of my copending application, Serial No. 816,080, filed February 2, 1914, for in this application I describe a system especially adapted for progressive display. By this term, "progressive display", I mean displays of a length exceeding the capacity of the display board and carried out either letter by letter as typed, transferring the display from one line to the next above, and so on, or else filling the board. then extinguishing, and filling again.

In Fig. 8 I show a proposed general arrangement of the apparatus. The apparatus E F H J is located on a suitable table.

Cable connections from the various contacts of this apparatus extend to a switch board carrying the apparatus D and the apparatus of Fig. 2. The switch board may be mounted on the same table as the apparatus E F H J within convenient reach of the operator. The display panels A^1 A^2 and the like are located on top of the building or on suitable structural steel frame work as is common, in plain view of thousands of people passing traffic centers. The operator keeps the advertising schedule of the evening on cards in a suitable rack indicated on the left of the apparatus E. One by one he sets upon the apparatus E and F the display called for on the card, and in the same order the display is made on the panels A^1 A^2. As he uses one card he may transfer it to the back of the box whereby regular rotation of the display is made. If periodic repetition of certain advertisement is desired, a simple system of indexing can be applied to the cards whereby the advertisement will come up regularly for repetition.

Claims:

1. A character display system comprising in combination a display device, character selecting apparatus associated therewith and arranged to determine the characters displayed thereon, and a variable time controlled means controlling the duration of the display separately from the selecting apparatus.

2. A character display system comprising a display device, character selecting apparatus associated therewith and arranged to determine the characters displayed on said device, and automatic timing mechanism controlling the duration of the display independently of said selecting apparatus.

3. A character display system comprising in combination a display device, a character selecting apparatus associated therewith and arranged to determine the characters displayed thereon, a key-board for controlling the said character selecting apparatus, and timing mechanism controlling the duration of the selected display as a whole.

4. A character display system comprising a display device, power connections for the display device, a circuit breaker controlling said power connections, a timing element having various coördinate control connections with said circuit breaker, and variable switching means governing said control connections.

5. A character display system comprising display devices arranged in a plurality of lines spaced vertically apart, a character selecting apparatus connected therewith and arranged to determine the character of the display thereon line by line, together with a line writing typewriter mechanism and connected keyboard through which latter the character selecting apparatus is controlled, whereby the characters may be recorded in the precise line for line and space for space relation which they occupy in the display.

6. A character display system comprising display devices arranged in a plurality of lines spaced vertically apart, a character selecting apparatus associated therewith and arranged to determine the character of the display thereon line by line, a line writing and spacing typewriter mechanism having a keyboard, switching means actuated from said keyboard and controlling the character selecting apparatus, quality designating means associated with said typewriter recording mechanism, quality determining means associated with said display devices, and key controlled means controlling jointly said quality designating and quality determining means.

7. A character display system comprising display devices arranged in a plurality of lines spaced vertically apart, a character selecting apparatus associated therewith and arranged to determine the character of the display thereon line by line, a line writing and spacing typewriter mechanism having a keyboard, switching means actuated from said keyboard and controlling the character selecting apparatus, quality designating means associated with said typewriter recording mechanism, quality determining means associated with said display devices, together with circuit control means for said quality means.

8. A character display system comprising a display device, and two groups of display registering elements associated with said display device, variable actuating means therefor, and switching means intermediate the display registering elements and the display device on the one hand and said registering elements and their said actuating means on the other.

9. A character selective system comprising a display device and two groups of associated display registering elements arranged to be alternately connected therewith, together with letter forming switches controlling the actuation of said registering means.

10. A character display system comprising a display device, a display register arranged to be connected therewith to effect a registered display, register control means, and a second display register arranged to be connected with said control means to receive a registration, and switching means to transfer the registration from the second register to the display device.

11. A character display system comprising a display device, duplex display registering means associated therewith, and control means for said registering means, together with letter forming switches controlling the actuation of said registering means.

12. An electrical character display system

comprising a variable display device, character selecting apparatus arranged to determine the character of the display thereon, a recording mechanism connected to record the character selection, and a key-controlled time stamp mechanism connected with said recording mechanism to record also the time of day.

13. In a character display system, a display device, character selecting apparatus arranged to determine the character of the display thereon, a recording mechanism connected to record the character selections, a source of power, a switch controlling the connection of the display devices thereto, and a time stamp mechanism connected with said recording mechanism and controlling in the operation of said switch.

14. A character display system comprising a display device, character selecting means, variable circuit controlling means in addition thereto for determining the quality of the display thereon, and quality recording mechanism controlled in the operation of said quality determining means to make a record of the quality of the display.

15. A variable character display system comprising a display apparatus, character selecting apparatus arranged to be variably operated to determine the different displays, a source of power, a time switch mechanism arranged to be set to control the duration of the connection of said display apparatus with said source of power, and a recording mechanism controlled in the operation of said time switch mechanism to record the duration of the said connection.

16. A character display system comprising a display device, variable circuit controlling means therefor determining the quality of the display, a record element, recording mechanism actuated through the operation of said quality determining means to record the quality of the display on said record element, time operated circuit controlling means controlling the duration of said display, and additional recording means operating upon the same record element in response to operation of said time operated controlling means to record the duration of the display.

17. A character display system comprising a display device, time operated circuit controlling means therefor arranged to control the duration of the display, a record element, recording mechanism actuated through operation of said time controlled device to record on said recording element the duration of the display, and a time stamp recording mechanism arranged to record on the same record element the time of day.

18. A character display system comprising a display device, character selective apparatus arranged to determine the character of the display thereon, a keyboard from which said selective apparatus is controlled, a time operated circuit controlling device arranged to determine the duration of the display, together with signaling means indicating the condition of activity of said display device.

19. A character display system comprising in combination a plurality of display devices, a variable timing mechanism arranged to control the duration of the display, and variable character selecting apparatus arranged to determine the different displays independently of said timing mechanism.

20. A variable character display system comprising a plurality of display devices, variable character selecting apparatus arranged to determine the different displays, a source of power, and a timing mechanism arranged to be set to determine the connection of said display devices to the source of power independently of said character selecting apparatus.

21. A character display system comprising a display apparatus, a source of power, a time switch mechanism arranged to be set preliminarily to control the duration of the connection of said display apparatus with said source of power, and a recording mechanism controlled in the setting of said time switch mechanism to record the duration of said connection.

22. A character display system comprising in combination a display device, variably operable character selecting apparatus arranged to determine the different displays thereon, and a chronometrically controlled variably timing mechanism arranged to be set preliminarily to control the duration of the display.

23. A variable display system for electric signs comprising a plurality of display devices, a display register arranged to receive one at a time the registrations of display to be made, and a time switch mechanism set to determine preliminarily the duration of the display.

24. A variable character display system for electric signs comprising a plurality of display devices, a plurality of registering relays associated with each device, and arranged to be locked in their registering position, together with a variable timing mechanism controlling the duration of the display.

25. A character display system comprising a display device, multiple registration means associated with said device, switching apparatus to variably connect the registration means with the display device, a keyboard from which the multiple registering means is controlled, a time operated circuit controlling device determining the duration of the display, and signaling

means indicating the condition of activity of said display device.

26. A character display system comprising a display device, variably actuable character selecting means to determine the different displays, recording means operated in the actuation of said selecting means to record the character selected, switching mechanism to determine the quality of the display independently of character, and quality recording mechanism controlled in the actuation of said quality switching means.

27. A changeable character electric sign board system comprising a plurality of display devices, character selective switches arranged to be set to determine the character of the display on said devices, time switch mechanism controlling the duration of the display, actuating means for the character selecting switches, and separate actuating means for the time switch mechanism.

28. A changeable character electric sign board system comprising a plurality of display devices, character selective switches arranged to be set to determine the character of the display on said devices, time switch mechanism controlling the duration of the display, selective actuating means for the character selecting apparatus, and separate selective control means for the time switch mechanism.

29. A changeable character electric sign board system comprising a plurality of display devices, character selective switches arranged to be set to determine the character of the display on said devices, time switch mechanism controlling the duration of the display, a keyboard connected with said character selective switches to control the same, and a separate set of keys to control the setting of said timing apparatus.

30. A changeable character electric sign board system comprising a plurality of display devices, character selective switches arranged to be set to determine the character of the display on said devices, time switch mechanism controlling the duration of the display, a keyboard connected with said character selective switches to control the same, a separate set of keys to control the setting of said timing apparatus, typewriter recording mechanism operated through actuation of said keyboard, and additional operating means for said recording mechanism operated through the said control keys of the timing mechanism.

31. A changeable character electric sign board system comprising a plurality of display devices, the elements of which on one side are provided with common terminals and on the other side with individual terminals, character selective switches controlling the display through the individual terminals, and time switch mechanism operating through the common terminal for control of the duration of the display.

32. A character display system comprising a display device, multiple registration means associated with said device, switching apparatus to variably connect the registration means with the display device, a keyboard from which the multiple registering means is controlled, and a time operated circuit controlling device determining the duration of the display.

33. A changeable character electric sign board system comprising a plurality of display devices, means to register a desired display connected with the display devices, character selective means connected to operate upon the registering means to register a display, and timing mechanism controlling the duration of a registered display.

34. A changeable character electric sign board system comprising a plurality of display devices, a plural section register arranged to receive and simultaneously retain on its sections a plural number of registrations of display, character selective means selected to operate upon said register to determine the display, timing mechanism controlling the duration of the registered display, and a shifting switch arranged to shift the display devices from one section of said register to the other.

35. A changeable character electric sign board system comprising a plurality of display devices having energizing circuits, two sets of locking register relays each arranged to control independently the energizing circuits of the display devices, and character selective means common to both said sets and connectible to each independently.

36. A changeable character electric sign board system comprising a plurality of display devices having energizing circuits, character selective means therefor, two sets of locking register relays each arranged to control independently the energizing circuits of the display devices, together with a circuit shifting switch controlling jointly the locking of said relays, the connection of the sets with the display devices, and the connection of the character selective means with the sets of relays.

37. A changeable character electric sign board system comprising a plurality of display devices, character selective switches arranged to be set to determine the character of the display on said devices, character recording means actuated through operation of said character selective means, timing mechanism connected to limit the duration of the display, switching means adjustable to determine the quality of the display, and recording means for the quality.

38. A changeable character electric sign board system comprising a plurality of display devices, character selective switches ar-

ranged to be set to determine the character of the display on said devices, a line and space typewriting mechanism operated in the actuation of said character selective means to record the characters displayed in the proper line and space relation, a keyboard controlling said typewriter and said character selective means, timing mechanism connected to determine the duration of the display, and operating means for said typewriter in addition to said keyboard arranged to record the duration of the display.

39. A changeable character electric sign board system comprising a plurality of display devices, character selective switches arranged to be set to determine the character of the display on said devices, character recording mechanism operated through actuation of said character selective switches, timing mechanism to limit the time of the display, and a time stamp controlled through the setting of said time switch mechanism to stamp the record with the time.

40. A changeable character electric sign board system comprising a plurality of display devices, character selective switches arranged to be set to determine the character of the display on said devices, character recording mechanism operated through actuation of said character selective switches, and a time stamp controlled through operation of said display devices to make a record of the time of operation.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN P. TARBOX.

Witnesses:
HELEN M. DELANEY,
C. V. P. NEWBOLD.