Sept. 3, 1929. H. HUBBELL 1,726,835

SIGNAL SYSTEM

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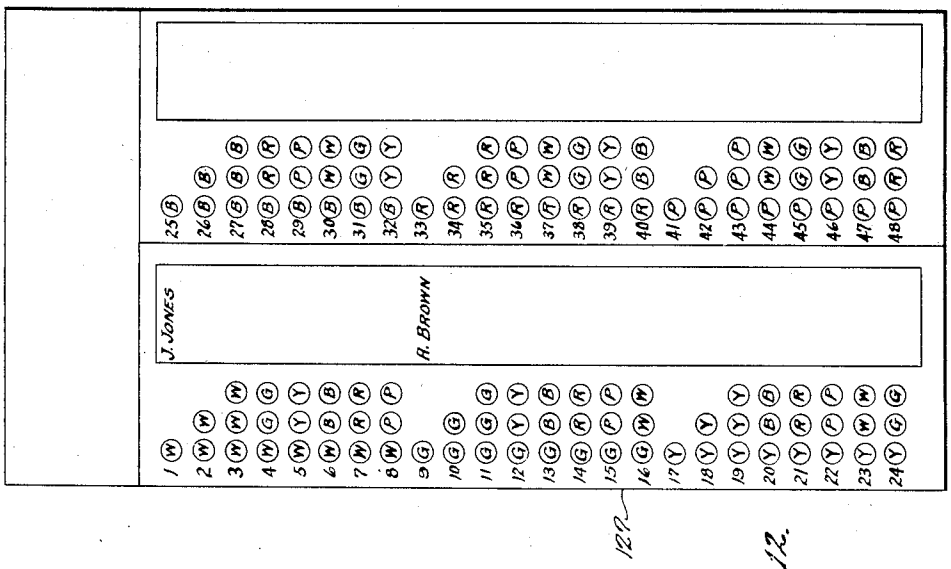


Fig. 12.

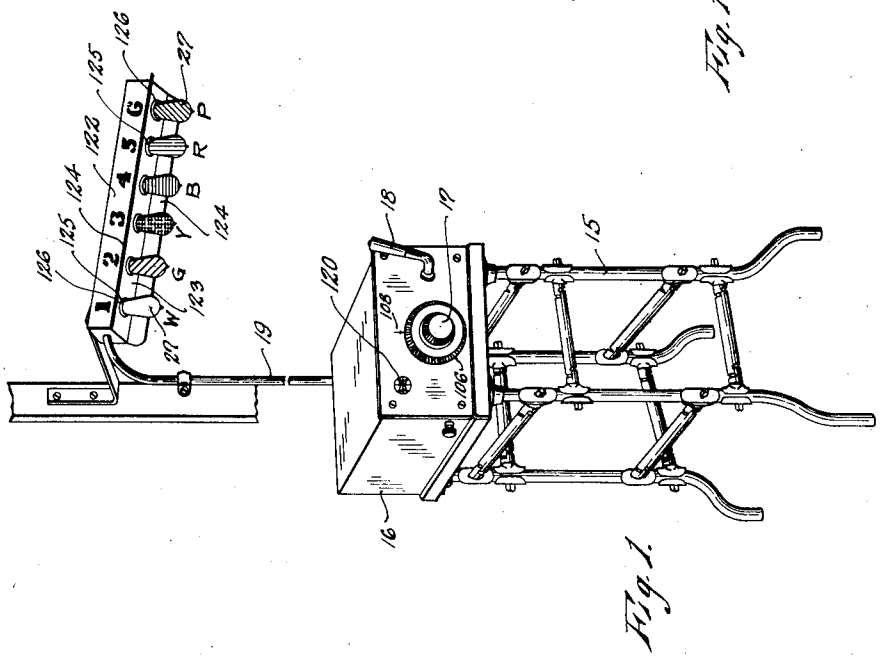


Fig. 1.

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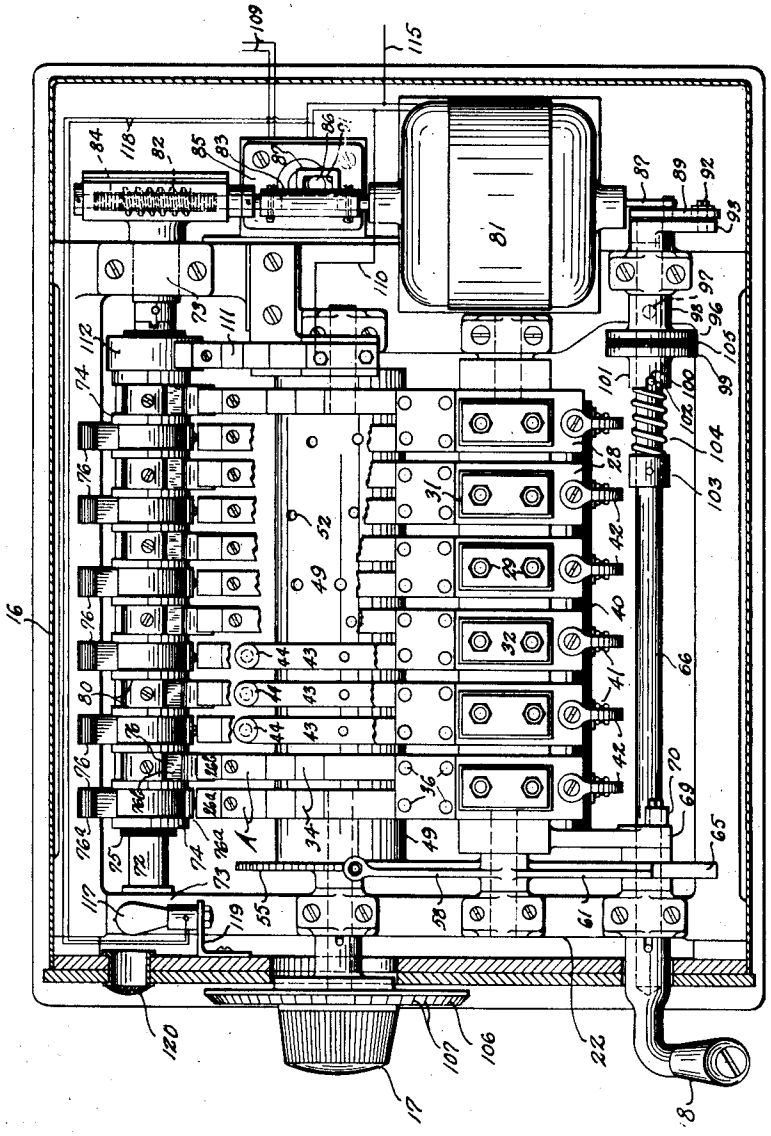


Fig. 2.

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SIGNAL SYSTEM

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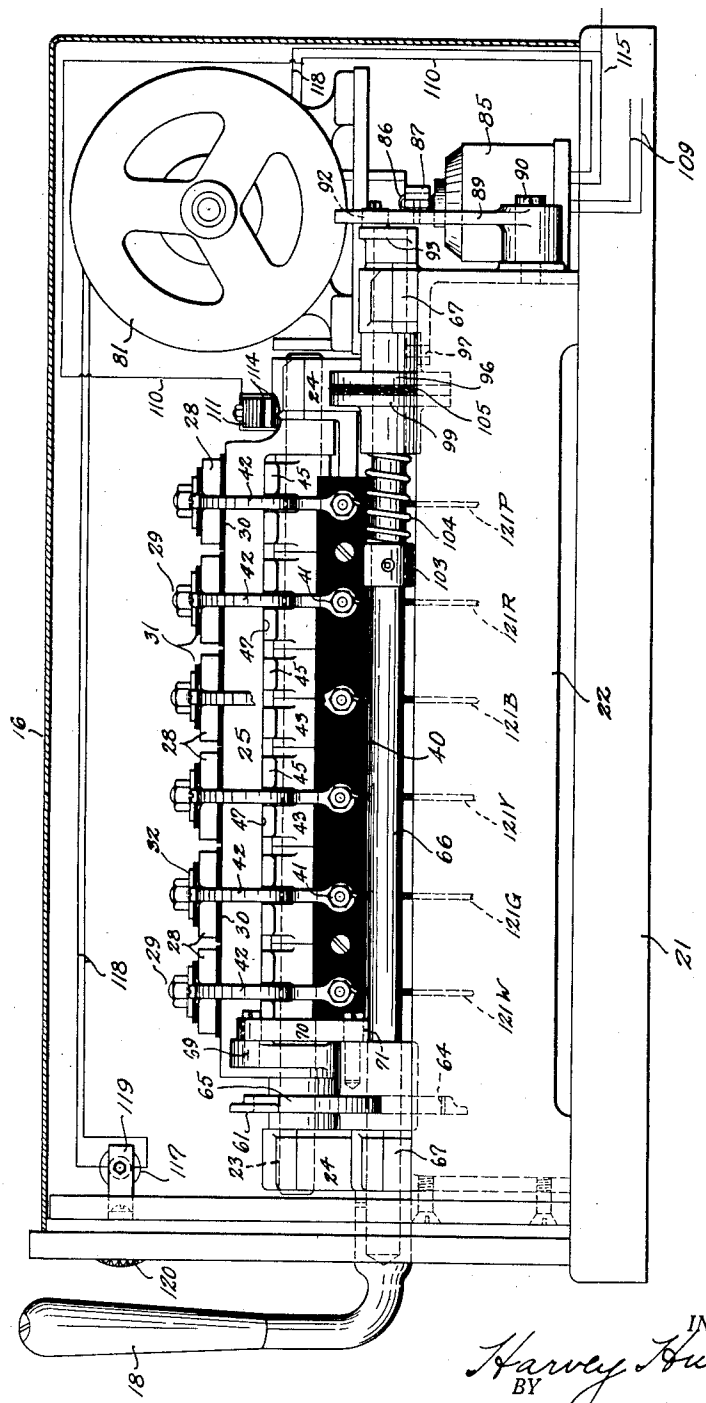


Fig. 3.

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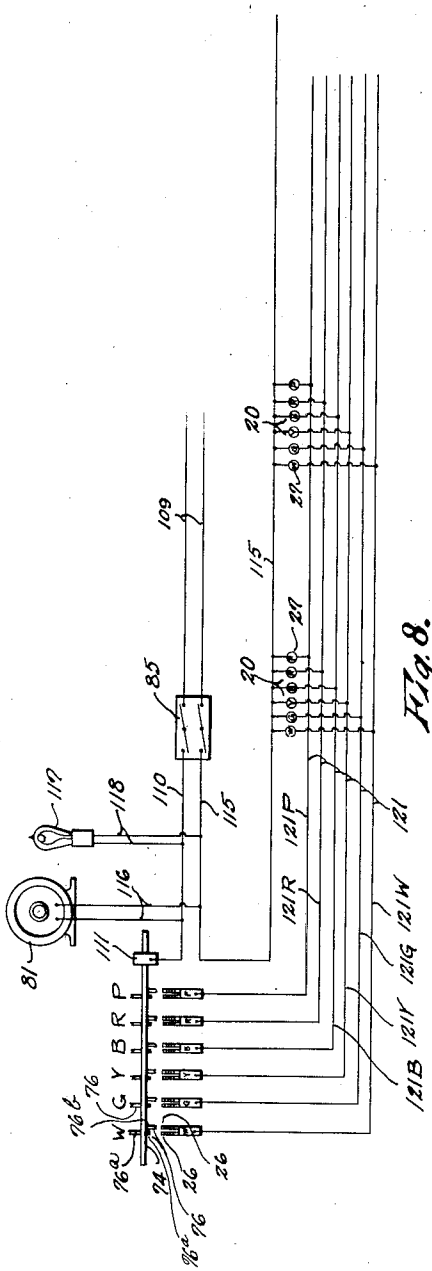


Fig. 8.

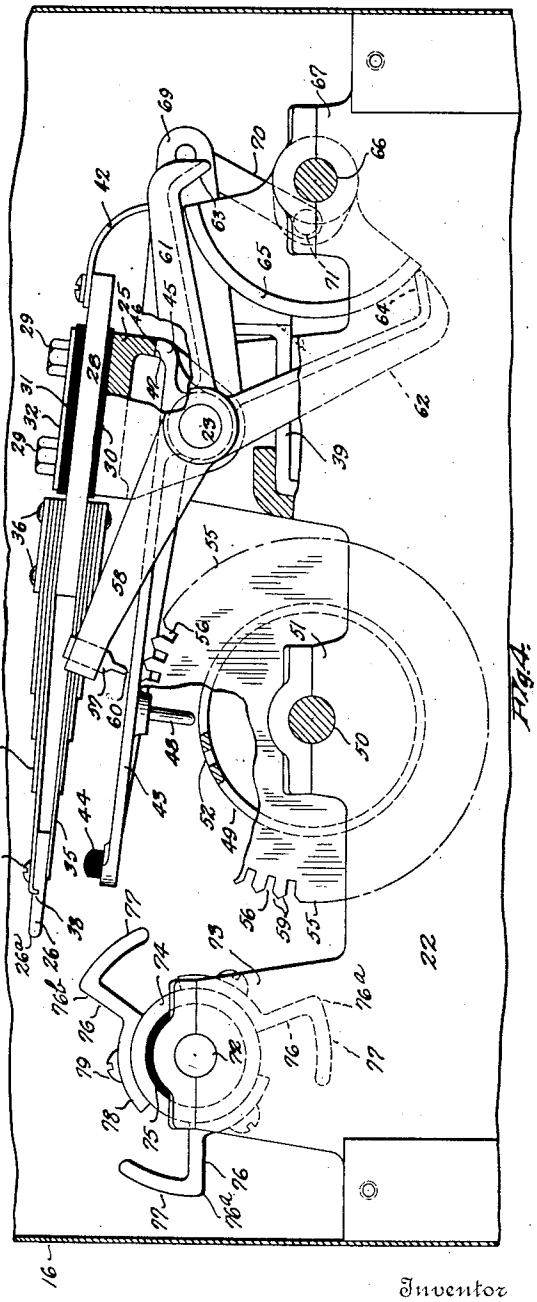


Fig. 4.

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SIGNAL SYSTEM

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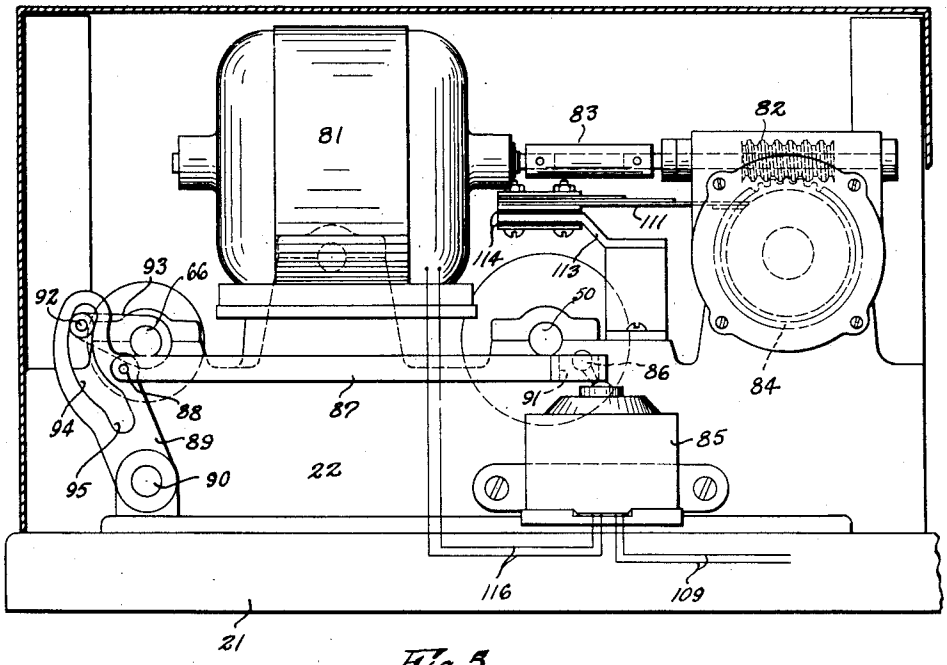


Fig. 5.

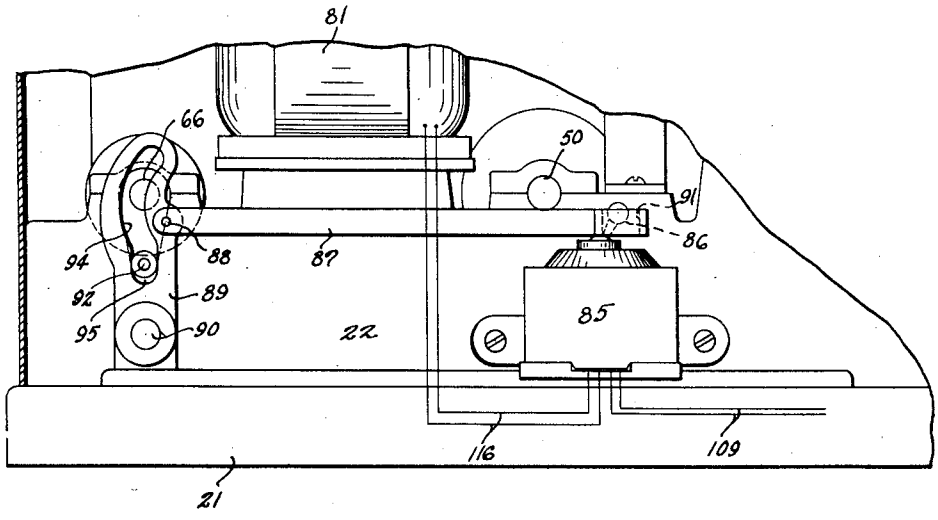


Fig. 7.

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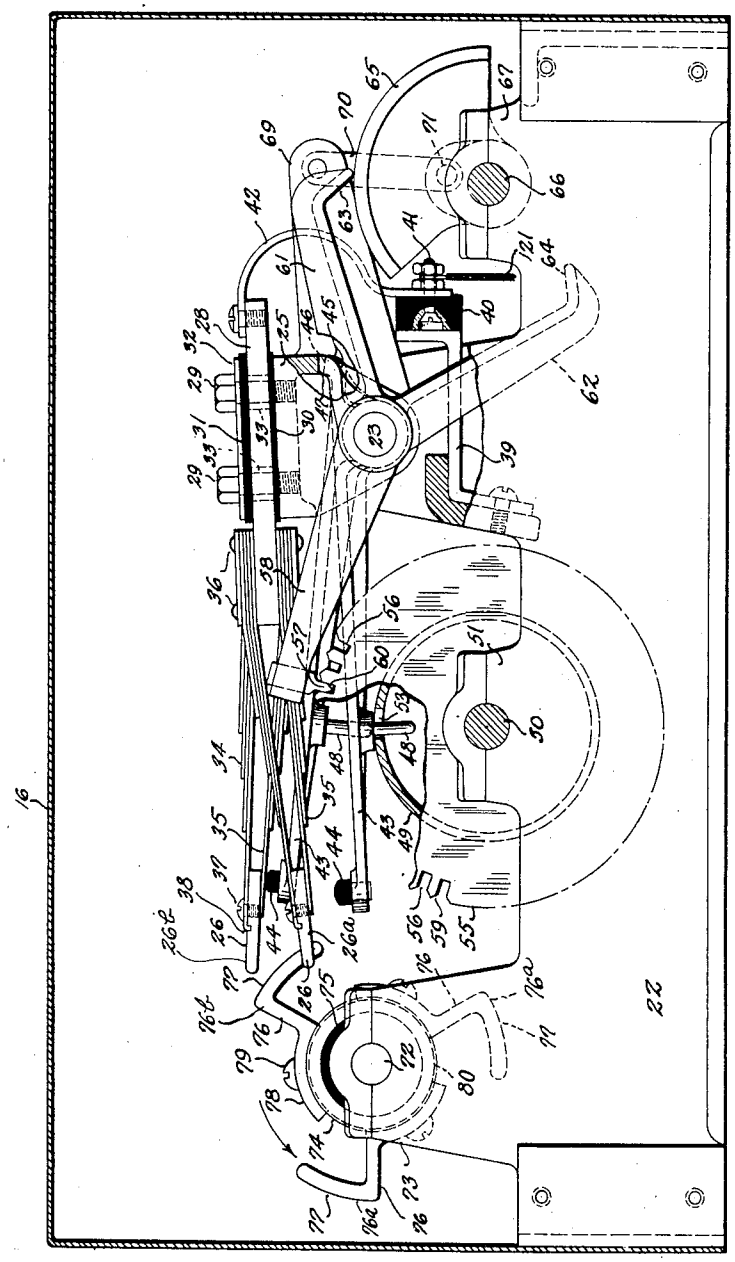


Fig. 6.

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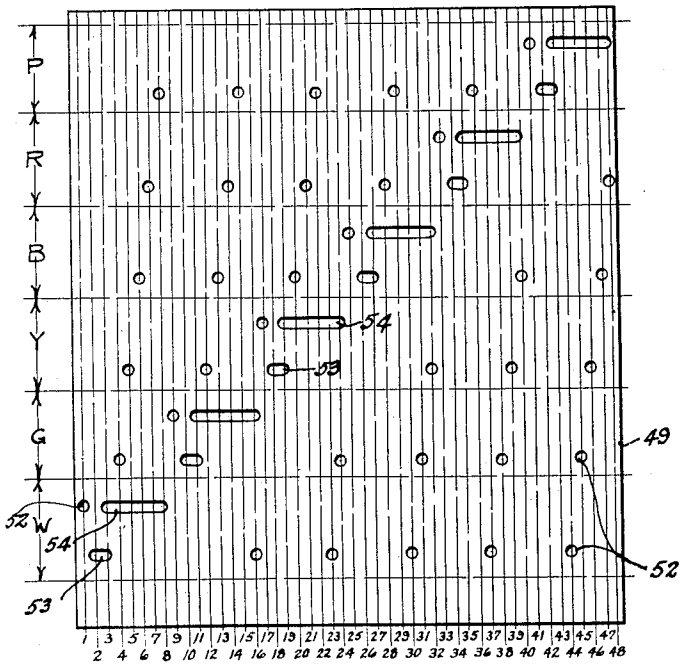


Fig. 9.

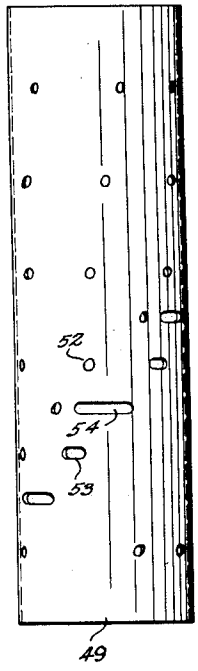


Fig. 10.

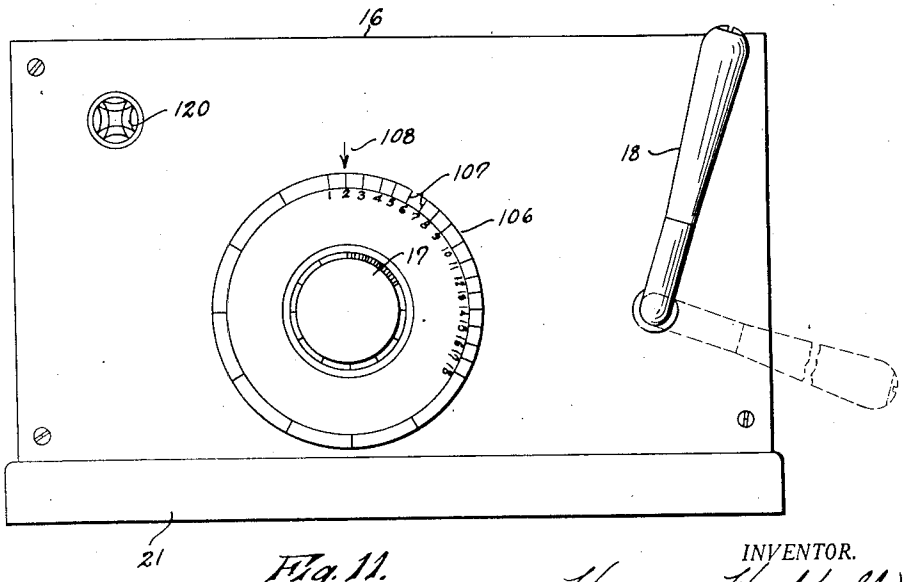


Fig. 11.

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Patented Sept. 3, 1929. 1,726,835

UNITED STATES PATENT OFFICE.

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SIGNAL SYSTEM.

Application filed January 5, 1924. Serial No. 684,539.

This invention relates generally to call systems and particularly to what are known as "flash light" signal systems, although it is not limited to use with visible signals, but may also be employed, if desired, with audible signals. This system is of the general type disclosed in my prior Patent #1,229,463, dated June 12, 1917, in which normally open electric circuits run from a convenient central station to a number of different local stations whereby an operative at the central station may close any of said circuits and transmit thereby a message in the form of a pre-arranged signal, either visible or audible, at each of said local stations, but whereas in the system disclosed in said prior patent a separate switch corresponding to each call to be made is required with the resultant complicated wiring and large space required for the large number of switches, especially if the system is to be capable of transmitting a large number of different signals, in the present case all the signals are transmitted from a single switch mechanism which I term a multiple switch, and thus the wiring required is very simple and the device occupies a very small space, at the same time being much more easily operated.

These systems are especially adapted to save time and trouble in large factories, mercantile houses, etc., which comprise a number of different and sometimes widely separated departments and it is frequently necessary to summon from a central station an official or an employee stationed in one of the departments or happening to be in such department when his presence is desired in some other department. In establishments having a private telephone exchange the call system may be conveniently operated by the switch board operator. With this arrangement anyone desiring another person may call the operator who in the event the party desired cannot be reached on his own telephone will send out the proper signal to all the departments through this signal system, and then the party required will call the switch board operator from the nearest telephone who will inform him where and by whom he is desired.

It is an object of this invention to provide a device of this character which will not only transmit a large number of different signals from a single compact device but which by a single operation will transmit the same signal simultaneously to a local station in each department or stations variously located throughout the building or the plant.

It is also an object of the invention to devise a device for performing these functions which will be efficient and reliable in operation, in which any signal desired may be transmitted quickly and surely with a minimum number of movements or operations on the part of the operator, and in which the signal will be automatically continued for any desired length of time.

It is a further object of the invention to provide a device of the character outlined in which any of a large number of signals may be transmitted by the manipulation of the same elements, and by a minimum number of these elements.

With the foregoing and other objects in view I have devised the construction illustrated in the accompanying drawings, forming a part of this specification, similar reference characters being employed throughout the various figures to indicate the corresponding elements. In these drawings,

Fig. 1 is a perspective view of the control device as it may be conveniently installed at the central call station, showing one grouped set of the electrically operated signals.

Fig. 2 is a top plan view of the signal operating device, the enclosing casing being shown in section.

Fig. 3 is a rear elevation of the signal operating device.

Fig. 4 is an end elevation of the signal operating device showing the elements in the off or inoperative position when no signal is being transmitted, certain of the elements being broken away to more clearly show the construction.

Fig. 5 is an elevation of the rear end of the signal operating device with the elements in the position they occupy when the device is not operating.

Fig. 6 is a view similar to Fig. 4 showing the elements in position to transmit a signal.

Fig. 7 is a view similar to Fig. 5 showing

the elements disclosed therein in the position they occupy when transmitting a signal.

Fig. 8 is a wiring diagram of the system.

Fig. 9 is a development of the control cylinder or drum.

Fig. 10 is a side elevation of this cylinder or drum.

Fig. 11 is an elevation of the front end of the machine showing the devices to be manipulated by the operator.

Fig. 12 shows a chart which may be provided at each station in the system to indicate to anyone interested, the signal for each individual party on the system.

While it will be apparent that my invention is applicable to the transmission of energy adapted to produce auditory as well as visual signals, I have illustrated as a preferred embodiment of my invention a flash light call system in which there are a plurality of different colored lights which are flashed in different ways and different combinations to give the various signals. Referring to Fig. 1, 15 represents any convenient stand for carrying the control mechanism enclosed in the casing 16, so that the device may be positioned where the control elements 17 and 18 are convenient to the hand of the operator. Leading from the casing is a conduit 19, leading to the various stations comprising the groups of the different colored lights 20. In the present instance I have employed six lights for each station. The colors may be any colors desired and they may be arranged in any way desired, but in the present instance I have used white, green, yellow, blue, red and pink lights arranged as indicated and numbered so that the observer if he cannot distinguish the colors can still get the signal by observing the numbers. This arrangement is carried out throughout the entire installation, it being understood that there is a group of these lights placed in each department or location in which it is desired that the signals be given.

Mounted on a suitable base 21 is a support or frame 22 upon which the control mechanism is carried. Extending longitudinally of this frame is a shaft 23 having bearings at its opposite ends in upstanding lugs 24 on the frame. Mounted on this shaft is a rocker 25, and carried by this rocker are a number of contacts 26. These contacts in the present instance are arranged in groups of two each, one group for each of the signal lamps 27. The groups are insulated from each other although the two contacts of each group are electrically connected. For securing these contacts to the rocker 25 I provide a plurality of metal blocks 28, one for each pair or group of contacts, which are secured to the rocker in spaced relation and are insulated therefrom. As a convenient means for mounting these blocks on the rocker I pass screws 29 through these blocks and thread them into the rocker, as shown in Fig. 6, with a strip of insulating material 30 between the block and the rocker and another strip 31 of insulating material between the rocker and a metal strip 32 forming a suitable bearing for the heads of the screws. Where the screws pass through the blocks 28 they are surrounded by insulating bushings 33. The contact elements 26 are connected to the block 28 by suitable yieldable or spring connections 34 and 35 to allow these contacts to yield in operation. There are preferably two of these springs, as shown, engaging the block 28 and the contact 26 on opposite sides thereof. Both of these springs are secured to the block 28, as by rivets 36, but only the upper spring 34 is secured to contact 26, as by screws 37. The end 38 of the spring is also preferably bent downwardly and set into a transverse groove in the contact to give a more rigid connection. These springs are preferably leaf springs, as indicated, as they are more reliable in operation.

Carried by the frame is a pair of brackets 39 upon which is mounted a bar 40 of insulating material, and carried by this bar are a plurality of binding posts 41, one for each of the signal lights to be controlled. They also correspond in number to the blocks 28 and each block is connected to one of these binding posts by a bowed strip of flexible metal 42 to form an electrical connection from the binding posts to the blocks and thus to the contact elements 26.

Also carried by the shaft 23 are a plurality of levers 43, these levers being loosely mounted on the shaft so that they may turn relative thereto. There is one of these levers located under each one of the contacts 26 and carries at its free end a block or button 44 of insulating material adapted to engage the under side of the lower spring 35 adjacent the free end thereof, as shown in Fig. 6. Each lever has a rearwardly extending arm 45, having a shoulder 46 adapted to engage a shoulder 47 extending longitudinally of the rocker 25 so that under certain conditions the rocker will hold the free ends of these levers elevated as will later be described. Carried by each lever and projecting downwardly therefrom is a pin 48 which coacts with the control cylinder or drum 49 of the selective device to hold certain of the contacts elevated as will also be described later.

This cylinder 49 is carried by a shaft 50 mounted to rotate in suitable bearings 51 in the frame 22 and this cylinder is provided with a series of openings 52, 53 and 54 some of which (52) may be round openings and others of which (53 and 54) may be slots of required lengths for controlling the signal as will later be described. In the present instance these openings and slots are arranged substantially as shown in Fig. 9. Also carried by the shaft 50 is a disc 55 having a

series of notches 56 throughout its periphery adapted to receive a pawl 57 carried by a pivoted lever 58 to coact with this pawl to lock the cylinder in any of a number of different positions to insure sending of the proper signal, and to prevent operation of this control cylinder while the signal sending mechanism is operating. The upper ends of the teeth between the notches 56 are tapered or substantially V-shaped, as shown at 59, and the lower end of the pawl is correspondingly tapered, as shown at 60, so that should the cylinder not be properly positioned when the pawl 57 is swung to engage the disc 55 there will be no danger of the pawl resting on top of one of these teeth and prevent operation of the device, but the inclined surfaces will coact to rotate the cylinder 49 sufficiently to allow the pawl to seat in one of the notches 56. The lever 58 is mounted to rock on any suitable pivot but is preferably loosely mounted on the shaft 23. This lever is provided with a pair of spaced arms 61 and 62 extending on the opposite side of the pivot from the arm 58, which arms are provided with cam surfaces 63 and 64 respectively, adapted to coact with a segment 65 carried by a shaft 66 and rigidly connected therewith. The shaft 66 is mounted to rotate in suitable bearings 67 in the frame 22. This shaft also extends to the front end of the casing 16, and mounted thereon is the operating handle 18.

Rigid with the rocker 25 is a lever 69 (Figs. 4 and 6) which is connected by a link 70 with a crank pin 71 carried by the shaft 66, so that when this shaft is oscillated the rocker will also be oscillated for a purpose later to be described.

Extending longitudinally of the frame 22 on the opposite side of the shaft 50 is a rotatable shaft 72 having suitable bearings 73 in the frame. Carried by this shaft is a metal electric conducting cylinder 74 which, however, is insulated from the shaft by a cylinder 75 of insulating material. The insulating cylinder is rigidly secured to the shaft and the conducting cylinder is rigidly secured to the insulating cylinder so that it will rotate with the shaft. Carried by the metal cylinder 74 are a plurality of contact elements 76. These may be of different shapes but are preferably shaped substantially as shown in Figs. 4 and 6, and comprise two curved portions 77 and 78, the portions 78 being adapted to engage the surface of the cylinder and are secured thereto by any suitable means, such as a screw 79. To more rigidly secure these contacts to the cylinder the surface of this cylinder is preferably provided with a plurality of grooves 80 in which the contacts are seated. The contacts 76 are arranged in a plurality of groups, one group for each set of contacts 26, and there is at least one contact 76 arranged in alignment with each contact 26. The contacts 76 of each group are uniformly spaced about the axis of the shaft 72, as shown in Figs. 4 and 6, and as in the present instance there are three contacts to a group, two of the contacts in each group are arranged in a single groove and in alignment with one of the contacts 26 of a set, and the other contact 76 of the same group is arranged in alignment with the other contact 26 of the corresponding set. Thus for the first set (A) of the contacts 26 there are two contacts 76^a in alignment with the first contact 26^a and one contact 76^b in alignment with the other or inner contact 26^b, and the same arrangement is carried throughout the six groups of contacts 76 and the six sets of contacts 26.

The shaft 72 and the contacts 76 are rotated to actuate the various signals. For rotating this shaft I provide an electric motor 81 adapted to drive a worm 82 through a suitable connection 83. This worm meshes with a worm gear 84 carried by the shaft 72. The operation of the motor is controlled by a suitable switch 85 (Figs. 5 and 7) which is preferably a snap switch having a rocking operating lever 86. This switch lever is oscillated to start and stop the motor by means of a bar 87 having pivotal connection at 88 with an arm 89 pivoted to the frame at a point 90. At its free end this bar is provided with opening 91 into which the pawl of the lever 86 extends, so that as this bar is reciprocated the opposite end walls of this opening will engage the switch lever and swing it to on and off positions. Also connected with the arm 89 is a crank pin 92 eccentrically mounted on the shaft 66 by means of an arm 93. This pin, however, extends into a slot 94 in the arm 89. The upper portion of this slot is concentric with the axis of the shaft 66 but at its lower end, as shown at 95, it is straight and extends on a line projecting radially from the center of oscillation of the arm 89. It will thus be seen that as the shaft 66 is rotated counter-clockwise, as viewed in Fig. 5, the pin 92 will move in the curved portion of the slot 94 without moving the arm 89 until this pin 92 reaches the straight portion 95 of this slot when further movement of this pin will oscillate the arm 89 about its pivot 90. On movement of the shaft 66 in the opposite direction the arm 89 will be immediately swung back until the pin 92 enters the curved portion of the slot when further movement of the pin will have no effect on the arm 89.

To provide a certain amount of resistance to rotation of the shaft 66 and to prevent accidental shifting of this shaft, I mount on this shaft a disc 96 (Fig. 2), this disc being held stationary by any suitable means, such as a pin 97, projecting upwardly from the frame 22 into an opening in the lower side of the neck 98 connected with this disc, the shaft being rotatable relative to this disc.

Carried by the shaft and secured thereto so as to rotate with the shaft is another disc 99, this disc being also slidable longitudinally of the shaft. A convenient means of connecting this disc to the shaft so that it must rotate with the shaft but still is slidable longitudinally thereon, is to provide a notch 100 in the neck 101 and provide a pin 102 carried by the shaft projecting into this notch. Embracing the shaft 66 and bearing at its opposite ends against the neck 101 and a collar 103 rigidly secured to the shaft, is a coil spring 104, and it will be apparent from Fig. 2 that this spring tends to force the disc 99 toward the stationary disc 96. I preferably mount between these two discs a leather or other suitable washer 105. As this leather is pressed on its opposite sides by the two discs it forms a suitable brake to yieldingly hold the shaft 66 in different positions and prevent accidental actuation thereof, but will allow operation of the shaft by means of the handle 18.

Mounted on the shaft 50 carrying the control cylinder 49 is the knurled knob 17 (Fig. 11) for rotating this shaft, and associated with this knob is a graduated dial 106 with the graduations 107 thereon numbered to correspond with the signals to be transmitted by the device. Carried by the casing is a mark 108 by which the dial may be set to give the desired signal.

The wiring diagram is shown in Fig. 8. Leading from any suitable source of power, not shown, are the power lines 109 connected to the switch 85, this switch being a double pole switch as indicated. One of the leads 110 from this switch extends to a spring contact or brush 111 (Figs. 2 and 3) resting on the cylindrical portion 112 of the metal cylinder 74 to carry electric current to the contacts 76. The contact or brush 111 is mounted on a suitable support 113 (Fig. 5) from which it is insulated by the insulating elements 114. The other lead 115 from the switch is connected to one contact of each lamp 27 in all of the groups in the different locations. The motor is connected across the leads 110 and 115 by the conductors 116. A pilot light 117 is also connected across these leads by conductors 118, this light being mounted where it is visible to the operator to indicate whether the device is functioning. It may be conveniently mounted on the inner wall of the front end of the casing 16 by a suitable bracket 119, and there is also preferably provided in the end of the casing a lens 120 through which this light is visible. The other contact of each lamp 27 is connected to one of the sets of contacts 26 by lead wires 121, all of the lamps of the same color from all of the grouped sets of signal lights being connected to the same set or pair of contacts 26, as shown in Fig. 8. For example, the white light indicated by the letter (W) of each group 20 will be connected by the lead 121W with the pair of contacts 26 indicated by letter (W). The green light indicated by letter (G) of all of the groups 20 will be connected by its lead 121G with the pair of contacts 26 indicated by letter (G) and so on throughout the entire system. The leads 121 are connected to the binding posts 41, as shown in Figs. 3 and 6.

Referring to Fig. 1, I have shown a convenient form of box for carrying the signal lights at each station. This box may comprise a sheet metal body 122 closed on three sides and its opposite ends but open at its other side which is closed by a reflector 123. The reflector is preferably provided with inclined wings 124 extending longitudinally thereof on the opposite sides of the lamps, and the end walls of the casing or body are provided with suitable openings for passage of the lead wires to the lamps and connection of the conduit 19 to the box. The lamp sockets 125 are carried in the openings 126 in the reflector.

The operation is as follows:

Normally when no signal is being transmitted the elements are in the positions indicated in Figs. 2, 3, 4 and 5 with the switch 85 in the off position. Should it now be desired to call a given party, the operator by means of knob 17 will turn the dial 106 to bring the desired graduation 107 in alignment with the mark 108, Fig. 11. The graduations 107 are numbered to correspond with the numbers of the different parties. Suppose for instance it is desired to call the party whose signal corresponds to No. 2. The dial is turned to the position shown in Fig. 11 and then the handle 18 is moved to the right or clockwise, as viewed in this figure, to the dotted line position. Movement of the handle to this position automatically transmits the signal corresponding to the setting of the dial to each station 20, and will continue to flash this signal until the handle is again moved back to the full line position. When the handle 18 is in the full line position the cylinder 74 is stationary and all of the contacts 26 are raised, as shown in Fig. 4, so that they cannot engage the contacts 76. All the levers 43 are also held elevated by engagement of the shoulders 46 with the shoulder 47 of the rocker so that the lower ends of the pins 48 carried by the levers 43 are spaced just above the surface of the control cylinder 49. The pawl 57 is held elevated and away from the notches in the disc 55 by engagement of the segment 65 with the cam 64.

If now the dial 106 be set and the handle 18 swung downwardly to the dotted line position, this action will turn the shaft 66 clockwise, as viewed in Figs. 4 and 6, and will move the elements from the position shown in Fig. 4 to the position shown in Fig. 6, the showing being that where the dial 106 is set for signal No. 2. As the handle 18 is swung downwardly

the upper end of the segment 65 engages the cam 63 and swings the lever 58 about its pivot to bring the pawl 57 into the corresponding notch 56 in the edge of the disc 55. This is one of the first results of the movement of the handle 18 and immediately locks the disc 55 and the control cylinder 49 against movement. Further movement of the shaft 66, through the crank pin 71, link 70 and arm 69, will swing the rocker 25 counter-clockwise, as viewed in Figs. 4 and 6, on the shaft 23. This will release all of the levers 43 so that the lower ends of the pins 48 will rest on the surface of the control cylinder 49 unless one of these pins happens to be in alignment with one of the openings 52, or slots 53 or 54, in which case the pin would drop through the opening or slot and allow the corresponding lever to drop to the position indicated by the lower lever 43 in Fig. 6. In the showing in Fig. 6 the lever which has dropped is the one under the outside contact 26^a for the white light, and the pin 48 carried by this lever has dropped into the small slot 53 at the lower left hand corner of Fig. 9, the pin being on the longitudinal line No. 2. As there is no other opening on this line all of the remaining levers 43 are held elevated by engagement of their pins 48 with the surface of the drum or cylinder. As a result the first contact 26^a is allowed to drop downwardly into the path of movement of the first two contacts 76 carried by the rotatable cylinder 74, and I have indicated these two contacts by character 76^a. However, as the remaining levers 43 are held elevated all of the remaining contacts 26 are also held elevated by engagement of the insulating buttons 44 carried by the levers 43 with the springs 35, and therefore, as the element 74 rotates the contacts 76 can engage only the contact 26 which has been allowed to assume its lower position. In the showing in Fig. 6 this is the first contact or contact 26^a, and as the element 74 rotates it will be engaged by the two contacts 76^a alternately.

The movement of the shaft 66 to bring the elements to the position shown in Fig. 6 also starts the shaft 72 and the element 74 rotating. This is accomplished through the crank pin 92, the lever 89 and bar 87. Referring to Figs. 5 and 7, as the shaft 66 is rotated the pin 92 is swung downwardly in the curved sections 94 of the slot in the lever 89, but as this curved portion of the slot is concentric with the axis of the shaft 66 the shaft may have considerable movement before the pin 92 will impart any movement to the arm 89. As the pin 92 enters the straight portion 95 of the slot it will swing the arm 89 on its pivot and through the bar 87 will shift the lever 86 of the switch 85 to the on position. This action closes the circuit through the motor 81, starts it to rotating and through the worm drive rotates the cylinder 74 with contacts 76. This action at the same time lights the pilot light 117 which indicates to the operator that the device is functioning. The closing of the switch 85 also places the contacts 76 in electrical communication with one of the supply leads 109 through conductor 110 and brush 111, and also places one side of each lamp in all of the stations 20 in electrical connection with the other lead 109 through the conductor 115. As described above the bar 87 is shifted to swing the switch lever 86 to the on position only during the last part of the movement of the shaft 66. In other words while the pin 92 is moving in the curved portion 94 of the slot the switch is in the off position and the contacts 26 are being dropped to the position shown in Fig. 6, and thus the contacts 76 are not energized or started rotating until the control cylinder 49 is locked and the contacts 26 are in the proper position to transmit the signal. On the other hand when the handle 18 is swung back to the full line or off position the first action is to swing the lever 89 counter-clockwise, as shown in Figs. 5 and 7, from the position shown in Fig. 7 to the position shown in Fig. 5 and move the switch lever 86 to the off position. Thus the first part of the reverse movement of the shaft 66 cuts off the current supply to the device and stops rotation of the contacts 76. Further movement of the shaft 66 swings the rocker 25 clockwise from the position shown in Fig. 6 to the position shown in Fig. 4 which will raise the contacts 26 to their uppermost positions, and by engagement of shoulder 47 with shoulders 46 on the arms 45 of the levers 43 will also raise these levers to remove the pins 48 from engagement with the cylinder 49 and withdraw any pin 48 which has entered any opening 52, 53 or 54 in the cylinder. After this has been accomplished further movement of the shaft 66 will cause the segment 65 to engage the cam 64 and raise the pawl 57 from the notch 56 in the disc 55. Thus the cylinder 49 is released and may be rotated to any other position desired for the purpose of sending another signal.

Going back to the device as operated with the elements in the positions shown in Fig. 6, signal No. 2 will be transmitted as the first lever carrying the contact 26^a is the only one which is dropped to its lowermost position. In this setting of the dial and the cylinder 49 the signal flashed on the lights will be two flashes of the white light for each revolution of element 74 with a wait or skip between the two flashes. That is, the element 74 rotates at a constant speed and as the first two contacts 76^a are the only ones in alignment with the contacts 26^a each of the white lights will be flashed or lighted when the contacts 76^a engage contact 26^a, but there will be a wait or no flash of the white light when the contact 76^b is passing the contact 26^b as this latter contact 26^b is held out of the path of

movement of the contact 76^b. Referring to Fig. 9 the openings in the zone marked (W) control the white lights, the openings in the zone marked (G) the green lights and so on throughout the system. It will be apparent that if the dial is turned to No. 1 and the handle 18 shifted, then the only lever which will be allowed to drop will be the second lever from the end or lever 26^b, and this lever will drop because there is only one opening 52 on the line 1, as shown in Fig. 9. As there is only one contact 76^b there will be only one flash of the white light for each revolution of the element 74. If the device is set for signal No. 2, as described above, only the first lever carrying the contact 26^a will be allowed to drop because, as shown in Fig. 9, there is only one opening 53 on the line 2 and that is in alignment with this first lever. However, as there are two contacts 76^a in alignment with the contact 26^a there will be two flashes of the white light for each revolution of the element 74, but these two flashes will not be equally spaced because the two contacts 76^a are not equally spaced about the element 74. If now the device is set for No. 3 it will be seen from an inspection of Fig. 9 that both the levers for the white light carrying contacts 26^a and 26^b will be allowed to drop as there is a small slot 53 and also a large slot 54 on the line 3 of Fig. 9. Thus as the element 74 rotates, for each revolution there will be two flashes of the white light by engagement of the contact 76^a with the contact 26^a and also one flash of the white light by engagement of contact 76^b with contact 26^b, and all three of these flashes will be equally spaced because contacts 76^a and 76^b are equally spaced about the element 74, as shown in Fig. 6. This same arrangement is carried through for all of the lights of this system. Thus for No. 17 there will be a single flash of the yellow light for one revolution of element 74. For No. 18 there will be two flashes of the yellow light for one revolution of the element 74, with a gap or rest between every alternate flash, and for No. 19 there will be three flashes of the yellow light equally spaced for each revolution of the element 74. The various colored lights are also combined to give different signals. For example, in No. 12 there will be one flash of the green light and two flashes of the yellow light for each revolution of the element 74, and in No. 37 there will be two flashes of the white light and one flash of the red light for each revolution of the element 74, and so on throughout the entire system. In the present instance with the six lights we are enabled to secure forty-eight different signals using no more than two lights for any one signal. Of course, the number of signals could be greatly increased by increasing the number of lamps or the number of contacts 76 or by using more than two lights for a signal, but it is preferred not to use more than two lights for any one signal.

I have shown in Fig. 12 a convenient chart 127 to indicate the various signals corresponding to the different numbers. For instance, No. 1 indicates that the white light is flashed once for each revolution of the element 74. No. 2 shows that the white light is flashed twice, with a wait after each alternate flash, for each revolution of the element 74. No. 3 that there are three white flashes for each revolution of the element 74 and these flashes are equally spaced. No. 4 indicates one flash of the white light and two flashes of the green light for one revolution of the element 74, and so on throughout the entire chart. It will be obvious that in transmitting any of the signals as the element 74 rotates continuously until stopped by the operator the signal is repeated as long as desired. In the chart (Fig. 12) instead of the letters being used in the circles to indicate the colors of the lights, the circles may if desired be colored the corresponding colors. The names of the parties having the various signals are placed opposite the proper signal, as indicated.

It will be apparent from the foregoing description that all the signals may be transmitted by the same mechanism and the same multiple switch, and that in transmitting any signal the same two elements, namely, the dial 106 and the handle 18, are actuated by the operator, and that these are the only elements required to be operated in transmitting any signal. Thus the transmission of the signals may be easily and quickly accomplished with a minimum loss of time and effort. It will also be apparent that the electrical wiring required is extremely simple.

Having thus set forth the nature of my invention, what I claim is:

1. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits comprising a differently colored lamp in each circuit, a selective device adapted to be set to select any one or more of said signals for operation comprising pivotally mounted spring supported contacts in the said circuits normally in an ineffective position, means for moving certain of said contacts to an effective position to select the corresponding signal, and means cooperating with said contacts for automatically and continuously repeating the signal or signals selected by said device.

2. A signaling system comprising a plurality of electric circuits, a grouped set of differently colored signal lamps in said circuits one in each circuit, a single selective device adapted to be set to select one or more of said lamps for operation, means for automatically and continuously repeating operation of the lamp or lamps selected by said

device, and interlocking means between the selective device and said operating means and arranged to prevent operation of the selective device while the lamp operating means is operating.

3. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a multiple switch for controlling said circuits having a plurality of contacts in each circuit and a rotating element having a contact adapted to coact with each of the first mentioned contacts, the movable contacts for each circuit arranged in different angular positions about the rotating element so as to actuate the corresponding signals at different times, a selective device adapted to render one or more of said contacts effective, and means for rotating the rotary element to actuate the signals selected.

4. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a multiple switch for controlling said circuits having contacts in each circuit and a rotary element having spaced contacts adapted to coact with the first mentioned contacts to actuate the corresponding signals, means to mount said first mentioned contacts for movement toward and from the path of movement of the rotary contacts, a selective device comprising a rotary drum having openings therein, means adapted to move the first mentioned contacts into the path of movement of the respective rotary contacts, and independently movable means between each contact and the drum and having a projection adapted to pass through an opening in the drum when in alignment therewith to allow said movement of the contact and otherwise to engage the surface of the drum to prevent said movement, and means for rotating the rotary contacts to actuate the signals selected.

5. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a multiple switch for controlling said circuits having contacts in each circuit and a rotary element having spaced contacts adapted to coact with the first mentioned contacts to actuate the corresponding signals, said first mentioned contacts being movable toward and from the path of movement of the rotary contacts, a selective device adapted to move one or more of the first mentioned contacts into the path of movement of the respective rotary contacts, means for rotating the rotary contacts to actuate the signals selected, and means to prevent actuation of the selective device while the rotary contacts are rotating.

6. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a multiple switch for controlling said circuits having a plurality of contacts in each circuit and a rotary element having a plurality of groups of contacts adapted to coact with the first mentioned contacts to actuate the signals, there being one group for each circuit and confined to use therewith, a selective device adapted to render one or more of said contacts effective and means for rotating the rotary element to actuate the signal or signals selected.

7. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a multiple switch for controlling said circuits having a plurality of contacts in each circuit and a rotary element having a plurality of groups of contacts adapted to coact with the first mentioned contacts to actuate the signals, there being one group for each circuit and confined to use therewith and at least one contact in each group adapted to coact with each contact of the corresponding circuit, the contacts of each group being equally spaced about the periphery of the rotary element, a selective device adapted to render one or more of said rotary contacts effective, and means for rotating the rotary element to actuate the signal or signals selected.

8. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a multiple switch for controlling said circuits having a pair of contacts in each circuit and a rotary element having a plurality of groups of contacts adapted to coact with the first mentioned contacts to actuate the signals, the contacts in each group being equally spaced about the periphery of the rotary element and there being at least one contact in each group for coaction with each contact of the corresponding pair in the circuits, a selective device adapted to bring one or more of said circuit contacts into operative relation with the corresponding rotary contacts, and means for rotating the rotary element to actuate the signal or signals selected.

9. A signaling system comprising a plurality of electric circuits, a grouped set of differently colored signal lamps in said circuits, one in each circuit, a plurality of pivoted contacts in each circuit, a rotary element provided with a plurality of contacts in alignment with the pivoted contacts, a selective device adapted to move any one or more of said pivoted contacts into the paths of movement of the aligned rotary contacts, and means for rotating the rotary element to operate the lamps selected.

10. In combination, a plurality of electric circuits, a pivoted rocker, a plurality of spaced contacts in said circuits and carried by said rocker, a rotary element provided with a plurality of contacts in alignment

with the first mentioned contacts, means adapted to swing the rocker to bring the contacts carried thereby into the paths of movement of the contacts carried by the rotary element, a selective device adapted to hold certain of said circuit contacts out of said paths of movement, and means for rotating the rotary element.

11. In combination, a plurality of electric circuits, a pivoted rocker, a plurality of spaced contacts in said circuits and carried by said rocker, a pivoted lever under each contact, a rotary drum under said levers, a rotary element provided with a plurality of contacts in alignment with the first mentioned contacts, means adapted to swing the rocker to bring the contacts carried thereby into the paths of movement of the contacts carried by the rotary element, and coacting means carried by the drum and levers adapted when the rocker is swung to hold certain levers and their corresponding contacts elevated and out of the paths of movement of the rotary contacts and to allow other levers to drop and their contacts to move into the paths of movement of the corresponding rotary contacts.

12. In combination, a plurality of electric circuits, a pivoted rocker, a plurality of spaced contacts in said circuits and carried by said rocker, a pivoted lever under each contact having a downwardly extending pin, a rotary drum under said levers provided with openings adapted to be brought into alignment with said pins, a rotary element provided with a plurality of contacts in alignment with the first mentioned contacts, said rocker being arranged to normally hold the contacts carried thereby away from the rotary contacts, coacting means carried by the rocker and levers for normally holding the levers elevated, and means for swinging the rocker to allow the levers to drop and to move the contacts into the paths of movement of the rotary contacts, said drum being adapted to engage the pins not in alignment with the openings in the drum and hold the corresponding levers elevated.

13. A signaling system comprising a plurality of electric circuits, a grouped set of differently colored signal lamps in said circuits one in each circuit, a selective device for controlling said circuits arranged to be set to operate any one of said signals and also the combination of any signal with any other of the signals, a single element for actuating the selective device, means for actuating the signals selected by said device, and a single operative element for controlling the signal actuating means.

14. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a selective device for controlling said circuits, a single operative element for setting the selective device, means for actuating the signals selected by said device, a single operative element for controlling the actuating means, and means controlled by the latter element for locking the selective device against movement while the signal actuating means is functioning.

15. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a selective device for controlling said circuits, means for setting the selective device, means for actuating the signals selected by said device including a motor, means for rendering the circuits selected effective, and means controlled by the latter means for controlling said motor.

16. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a selective device for controlling said circuits, a locking means for said selective device, means for actuating the signals selected by said device including a motor, means for controlling said motor, and means for actuating said locking means and motor control means so arranged that on actuation of said means the locking means is first rendered effective and then the motor control means is operated to start the motor.

17. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a selective device for controlling said circuits, a locking means for said selective device, means for actuating the signals selected by said device including a motor, means for controlling said motor, and a single means for successively actuating said locking means and said motor controlling means.

18. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a rocker, a plurality of contacts in said circuits and carried by said rocker, a plurality of rotary contacts in alignment with the first mentioned contacts, a selective device including a rotary drum, said rocker adapted when oscillated to move its contacts into the path of movement of the rotary contacts, means adapted to coact with the drum to hold certain of the circuit contacts elevated, means for holding the drum in different positions including a notched disc and a pivoted lever having a pawl adapted to coact with said notches, means for rotating the rotary contacts including a motor, a switch for controlling said motor, and a single operative means for swinging the pawl carrying lever, oscillating the rocker and operating the motor switch.

19. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a plurality of rotary contacts, a plurality of

contacts in said circuits and adapted for movement to and from the paths of movement of the rotary contacts, a selective device including a rotary drum, means adapted to coact with said drum for allowing certain of the circuit contacts to move into cooperative relation with the rotary contacts and to hold the remaining contacts elevated, a disc connected with the drum having teeth about its periphery, a locking lever having a pawl adapted to enter between said teeth, the outer ends of the teeth and the pawl being tapered, and means for swinging said pawl to and from engagement with said disc.

20. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a plurality of movable contacts, a plurality of contacts in said circuits and movable to and from the path of movement of the first mentioned contacts, a rotary drum having openings therein, and means beneath the circuit contacts adapted to coact with the surface of said drum to hold certain of the contacts elevated and to coact with said openings to allow others to move into the path of movement of the movable contacts.

21. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a plurality of rotary contacts, a plurality of contacts in said circuits and adapted for movement to and from the paths of movement of the rotary contacts, a rotary drum, a lever under each of the circuit contacts, and coacting means carried by the levers and drum arranged to hold certain of the circuit contacts out of the paths of movement of the rotary contacts and to allow certain others of the circuit contacts to move into operative relation with the rotary contacts.

22. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a plurality of rotary contacts, a plurality of contacts in said circuits in alignment with the rotary contacts and movable to and from the paths of movement of the rotary contacts, a rotary drum having openings in its surface, a lever under each circuit contact, a projecting element carried by each lever and extending toward said drum, said projecting elements adapted to engage the surface of the drum to hold the corresponding contact element away from the rotary contacts and to enter one of said openings to allow the corresponding contact to move into the path of movement of a rotary contact.

23. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a plurality of rotary contacts, a rocker, a plurality of contacts in said circuits and carried by said rocker, spring supports between said contacts and said rocker, a rotary drum having a plurality of openings, a lever under each circuit contact, a pin carried by each lever and adapted to engage the drum to hold the corresponding contact away from the rotary contacts and adapted to enter one of said openings to allow the corresponding contact to move into the path of movement of a rotary contact, and means for swinging the rocker.

24. A signaling system comprising a plurality of electric circuits, a grouped set of electrically actuated signals in said circuits, a plurality of contacts in said circuits, a plurality of rotary contacts in alignment with said first mentioned contacts, a motor for rotating said contacts, a switch for controlling said motor, means for moving certain of the circuit contacts into the paths of movement of the rotary contacts including a shaft, a pin eccentrically mounted on said shaft, a pivoted arm having a slot into which said pin projects, a portion of said slot being concentric with the path of movement of said pin and a portion extending radially from the center of oscillation of the arm, and an operative connection from said arm to said switch.

25. In a signaling system, a grouped set of electrically actuated signals, a rotary element, a plurality of contacts carried by said element, a plurality of contacts in alignment with the rotary contacts and movable to and from the paths of movement of the rotary contacts, connections from the signals to the respective second mentioned contacts, leads from a source of current supply, one of said leads being connected to the rotary element and the other lead to each of said signals, a control switch in said supply circuit, means for moving certain of the second mentioned contacts into and from the path of movement of the aligned rotary contacts and means controlled by said latter means for operating the control switch.

26. In a signaling system, a grouped set of electrically actuated signals, a rotary element, a plurality of contacts carried by said element, a plurality of contacts in alignment with the rotary contacts and movable to and from the paths of movement of the rotary contacts, connections from the signals to the respective second mentioned contacts, leads from a source of current supply, a selective device adapted to control the movement of the second mentioned contacts, means for moving the contacts selected into the paths of movement of the corresponding rotary contacts, a motor for rotating the rotary element and connected with the supply circuit, a switch in said circuit, and means controlled by the contact moving means for operating the switch.

In testimony whereof I affix my signature.

HARVEY HUBBELL.