April 14, 1936. F. E. BACKER 2,037,190

ADMISSION COUNTER

Filed April 30, 1931 2 Sheets-Sheet 1

Fig. 1.

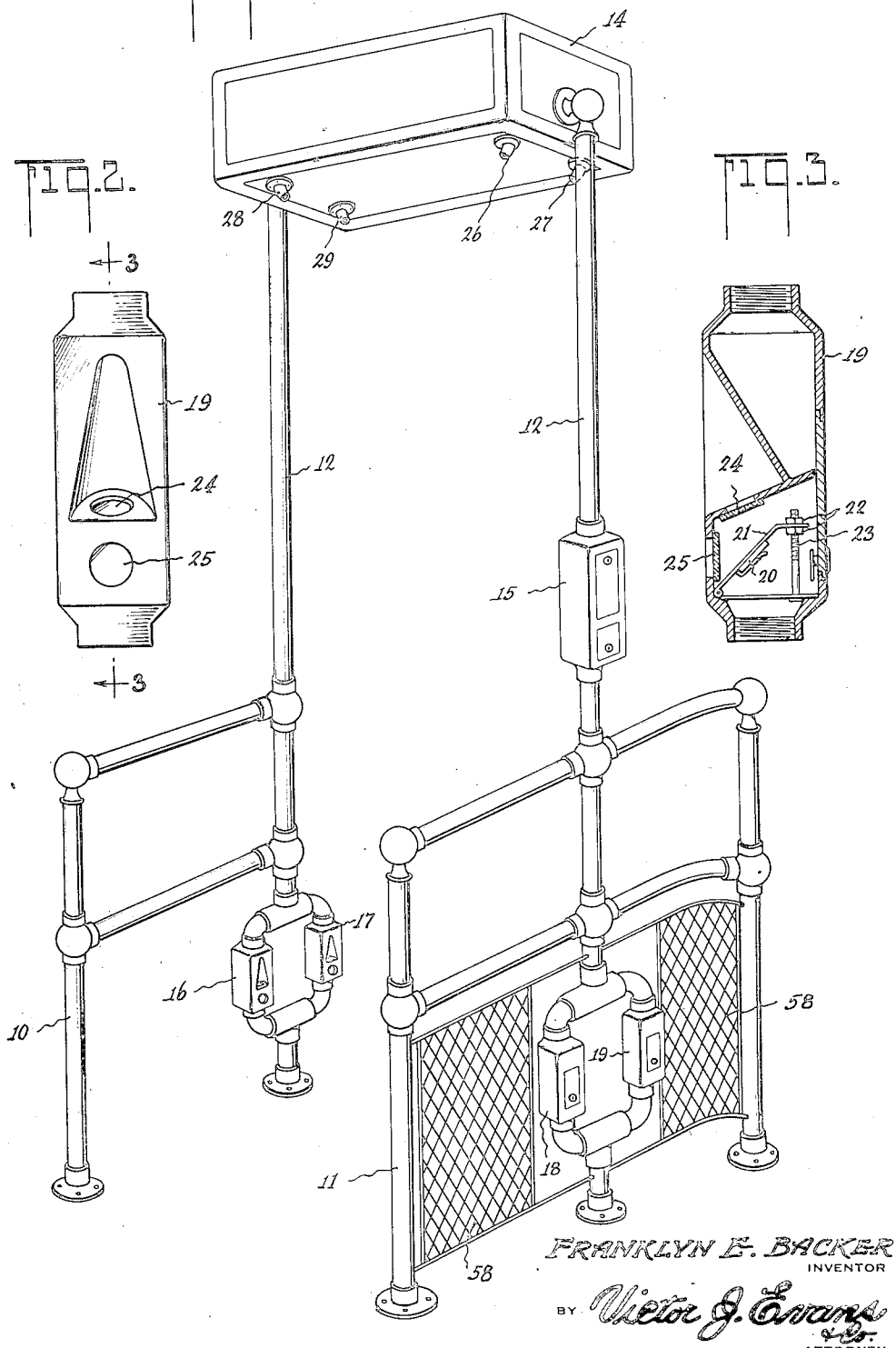


Fig. 2.

Fig. 3.

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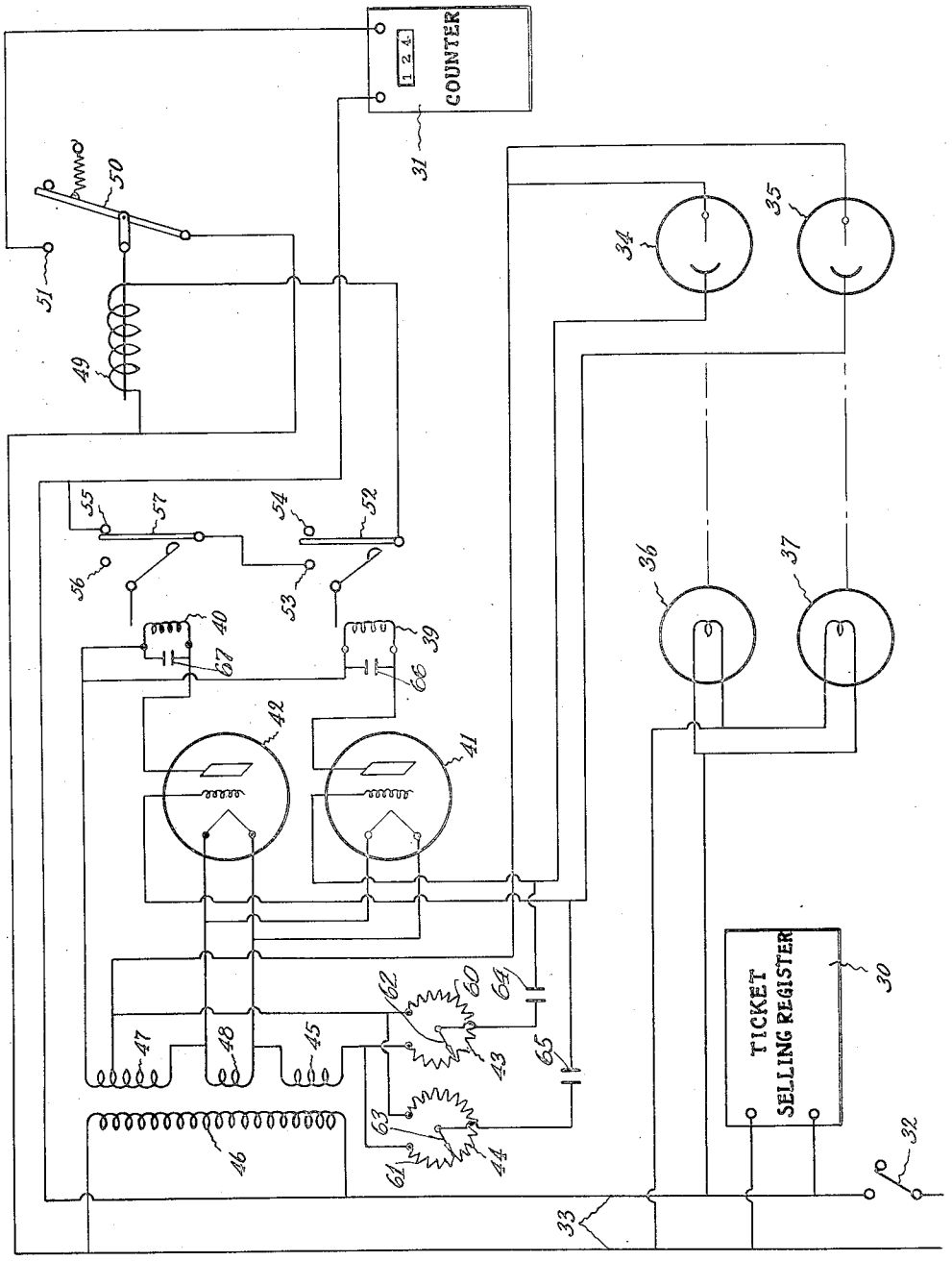


FIG. 4.

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2,037,190

ADMISSION COUNTER

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Application April 30, 1931, Serial No. 534,095

15 Claims. (Cl. 250—41.5)

Designed generally as a means for counting individuals passing a given point and particularly as a means for registering admissions to halls or theatres, the object of the invention is to provide a device of which part of the equipment constitutes guards defining a passageway through which the person seeking entrance must pass; to provide an optical system and a register or counter operatively connected therewith, as well as a light screen projected across the passage, the interception or obstruction of which will render the optical system responsive; to provide a device of the kind indicated in which the counter is actuated when the individual passes through the passageway in one direction but rendered inoperative when he or she passes through in the other direction; to provide an admission counter mechanism adapted for coordination with an automatic ticket selling register, so that the actual admissions may be effectively checked against the number of tickets sold; and to provide a device of the kind indicated which is generally of simple form and susceptible of cheap manufacture and low installation cost.

With this object in view, the invention consists in a construction and combination of parts of which a preferred embodiment is illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of the invention.

Fig. 2 is a front elevational view of one of the minor housings by which the light screen is provided.

Fig. 3 is a vertical sectional view on the plane indicated by the line 3—3 of Fig. 2.

Fig. 4 is a diagrammatic view of one form of an electrical system adapted to be used in conjunction with the invention.

In order that individuals may be counted when entering the auditorium of a theatre or hall, it is necessary that a passageway be defined to insure their entrance in single file and to this end the invention contemplates the provision of the guard rails 10 and 11 arranged in parallel relation, the latter being longer than the former so that one end may be close to the entrance, at which point the ticket taker will stand. The reduction in length of the other leaves a space to be occupied by the door of the entrance opening which then serves as a guard for the passage corresponding to the extending part of the guard rail 11.

Each guard rail is provided with an upstanding post 12 which at their upper ends are spanned by a housing 14, in which are housed the light sensitive devices comprised in the invention, as well as the light sources and the means for operatively connecting the light sensitive devices with the register which, in the illustrated embodiment, is housed in the casing 15 interposed in that post 12 upstanding from the guard rail 11.

Parallel reflector housings 16 and 17 are interposed in the post 12 of the guard rail 10 near the lower end of the post and correspondingly mounted in the opposite post 12 are the reflector housings 18 and 19. These several reflector housings are identical and each encloses a reflecting mirror 20 carried on a pivoted plate 21, so that it may be adjustable by changing the position of the lock nuts 22 carried by the screw stud 23. The mirror lies in a normally diagonal plane so that it may receive the light beam projected directly across the passage and reflect the same upwardly, or vice versa, the mirror being protected, where it receives or reflects the diagonal beam, by guard glass 24 and similarly protected, where it receives or reflects the horizontal beam, by means of the shield glass 25.

The light source originates in the housing 14, as for example from an electric bulb whose rays are projected through the thimble or sleeve 26, for the one screen, and a similar bulb whose rays are projected through the sleeve 27 for the other screen, the invention comprising a duality of light screens. For the one screen, the light rays projected through the tube or thimble 26, reach the mirror in the housing 16, being projected downwardly in a diagonal plane, and thence are reflected to the mirror in the housing 18 in a horizontal plane, and thence are reflected diagonally upward to the light sensitive device enclosed in the casing 14 directly behind the open end of the tube or sleeve 28. There is thus provided two crossing beams of light in a common vertical plane but in crossing diagonal planes, the one being an extension of the other by reason of the transverse horizontal beam which is projected from the mirror in the housing 16 to that in the housing 18. Thus the several beams constitute one continuous beam so worked back and forth across the passage that a light screen is provided substantially throughout the area of the space defined by the surface of the passageway, the two posts 12 and the housing 14. This light screen being formed of one continuous beam by means of bending it through the medium of reflectors, the obstruction of the screen at any point will affect the light sensitive device and therefore, result in the operation of the register to which the light sensitive device is operatively connected by appropriate mechanism.

The light beam provided by the lamp behind the tube 27 is bent by the reflectors in the housings 17 and 19 and finally directed on the light sensitive device in the housing 14 behind the open end of the tube 29, so that a light screen similar to and parallel to the first is provided. But the interruption or interception of this screen at any point is designed to prevent actuation of the register to prevent false counts, as where a person having once entered the enclosure in connection with which a count is to be made should persistently or inadvertently pass out through the same passageway.

In Fig. 4 there is shown diagrammatically one means by which the interruption of the light screen may be made to effect operation of the register when passing through the passageway in one direction but prevent register actuation in movement through the passageway in the other direction.

In theatres and amusement places, it is essential to check admissions against the number of tickets sold and therefore it is proposed to have both the ticket selling register 30 and the counter 31, which is designed to be enclosed in the housing 15, controlled from a common point, as by means of a switch 32, both the register and the counter being electrically operated and connected in on the electrical supply lines 33. Likewise the switch 32 may be made to control the light sensitive devices 34 and 35 and the light sources consisting of the light bulbs 36 and 37.

In the diagram, the light sensitive device referred to as being in the housing behind the tube 28, is that indicated at 34, the light 36 being that behind the tube 26. Correspondingly, the light sensitive device 35 and light 37 are positioned behind the tubes 29 and 27, respectively. Sensitive relays 39 and 40 are provided in the plate circuits of the triodes 41 and 42, respectively. A transformer whose primary 46 is connected across the service line 33 has three secondaries 47, 48, and 45 in series. The secondary 47 is connected in series with each plate circuit and the secondary 48 furnishes heating current for the filaments of the triodes 41 and 42. A tap is taken off the plate secondary 47 and connected to each of the anodes of the light sensitive devices 34 and 35 whose cathodes are connected respectively to the grids of the triodes 41 and 42.

Across the secondaries 45, 48 and 47 to the tap in series, are potentiometers 43 and 44 comprising resistances 60 and 61, respectively, one end of each of which is connected to the tap on the secondary 47 and the other end of each is connected to the free end of the secondary 45. The potentiometers 43 and 44 are provided with movable contacts 62 and 63, respectively. The contact 62 is connected through a condenser 64 to the grid of the triode 41 and the cathode of the light sensitive cell 34. The movable contact 63 is connected through a condenser 65 to the grid of the triode 42 and the cathode of the light sensitive cell 35. The condensers 64 and 65 serve the purpose of reducing the grid bias required to reduce the plate current to a given value when the light sensitive cells are dark. The potentiometers 43 and 44 as connected in the circuit control both the potential between the filament and grid of the triodes and the polarizing potential of the light sensitive cells. The potentiometers may be adjusted to obtain a most sensitive operating condition for different types of triodes and photoelectric cells and also for different light intensities. Since the triodes 41 and 42 are rectifiers, the action of the relays 39 and 40 may be improved by bridging them with suitable condensers 66 and 67, respectively.

The line 33 is connected on one side to the coil 49 of a service relay to the movable contact or arm 50 of which it is also connected, the relay being of the solenoid or long range type. The fixed contact 51 of the service relay is connected with the register to the opposite terminal of which the other side of a line 33 is also connected.

The remaining terminal of the coil 49 of the service relay is connected to the movable arm 52 of the sensitive relay 39 which has the live and dead contacts 53 and 54, the sensitive relay 40 also having live and dead contacts indicated at 55 and 56. The live contact of the sensitive relay 39 is connected to the movable arm of the sensitive relay 40 and the live contact 55 of said sensitive relay is connected in the opposite side of the line 33 from that which contacts with the coil of the service relay 49.

When the switch 32 is closed, the whole apparatus is placed in operative position, including the ticket selling register. Light beams are then projected by the light bulbs 36 and 37 across the passageway to form the light screens above referred to, the beams constituting these screens terminating at the light sensitive devices 34 and 35. With the light sensitive devices subjected to light, the grid potentials of the triodes 41 and 42 are at such potentials that the maximum plate currents flow in these triodes and the sensitive relays 39 and 40 are therefore energized, so that the movable arm 52 of the former is held against the dead contact 54 and the movable arm 57 of the latter against the live contact 55. In this condition, the circuit on the coil 49 of the service relay will be broken between the live contact 53 and arm 52 of the sensitive relay 39. When an individual enters the passageway and reaches the position to obstruct at any point the screen projected by the light 36, which screen will be in the vertical plane of the tubes 26 and 28 and the vertical axes of the housings 16 and 18, light will be cut off from the light sensitive device or cell 34, so that the potential of the grid of the triode 41 will be changed, therefore cutting down the plate current of that tube and deenergizing the sensitive relay 39 which will permit the movable arm 52 to engage by gravity the live contact 53, so that the coil 49 of the service relay will be placed across the line 33, current passing from one side of the line through the coil 49, thence over the arm 52, the contact 53, the arm 57 and contact 55 back to the other side of the line. Energization of the coil 49 is attended with actuation of the arm 50 which is then engaged with the contact 51, so that the register 31 is placed across the line and thereby actuated. Shortly after interruption of the light screen deriving its source from the lamp 36, that deriving its source from the lamp 37 is interrupted, when the light sensitive device 35, deprived of light, effects a change in grid potential of the triode 42, thus deenergizing the sensitive relay 40, which permits the arm 57 of the latter to fall by gravity against the dead contact 56, so that the circuit is then opened on the coil 49 of the service relay. Thus each individual who passes through the passageway in the proper direction is counted, but should one inadvertently or persistently use the passageway as a means of egress, the register should not be affected thereby and in this case he will first interrupt the screen projected by the light 37, so that the sensitive relay 40 will be actuated to engage its movable arm with the dead con-

tact 56, so that when the light screen projected by the lamp 36 is later broken or obstructed, which will permit engagement of the arm 52 with the contact 53, the register will not be operated because the circuit on the coil 49 of the service relay will be open between the contact 55 and arm 57 of the sensitive relay 40. From the foregoing description it will be noted that the spacing between the light screens should be such that at some instant a person in passing substantially obstructs both light beams.

To provide against unscrupulous attendants surreptitiously or maliciously obstructing the light screen by interposing the foot before the mirrors in either the housings 18 or 19 (which, however, would make the act conspicuous and therefore attract attention) a metal screen 58 is provided on the guard rail 11 in shielding relation to the housings 18 and 19.

What I claim as new is:

1. Means for counting individuals passing a selected point which comprises means defining a passage, a register, means for projecting a single light beam back and forth a plurality of times across the passage in a common vertical plane so as to form a light screen, and a light sensitive device operatively connected with the register and responsive to obstruction of the light screen at any point.

2. Means for counting individuals passing a selected point which comprises means defining a passage, a register, means for projecting a single light beam a plurality of times at different angles across the passage in a common vertical plane so as to form a light screen, and a light sensitive device operatively connected with the register and responsive to obstruction of the light screen at any point.

3. Means for counting individuals passing a selected point which comprises means defining a passage, a register, means for projecting a single light beam a plurality of times diagonally across the passage in a common vertical plane so as to form a light screen, and a light sensitive device operatively connected with the register and responsive to obstruction of the light screen at any point.

4. Means for counting individuals passing a selected point which comprises means defining a passage, a register, means for projecting a single light beam diagonally and horizontally at a relatively low level across the passage in a common vertical plane so as to form a light screen substantially across the full vertical cross sectional area of the passageway, and a light sensitive device operatively connected with the register and responsive to obstruction of the light screen at any point.

5. Means for counting individuals passing a selected point which comprises means defining a passage, a register, a light source above the passageway at one side, a light sensitive device correspondingly positioned at the other side of the passageway, a common housing for said light and said light sensitive device at the top of the passageway, and means for projecting a light beam from the light source diagonally downward across the passageway, then directly across the latter and diagonally upward across the same to the light sensitive device, and a circuit including means operatively connecting the light sensitive device with the register.

6. Means for counting individuals passing a selected point which comprises guards defining a passage, a register, a post upstanding from each guard, a housing spanning the passage and supported on the posts at their upper ends, a light sensitive device enclosed by the housing and exposed through the bottom of the latter at one side, a light source enclosed by the housing and exposed through the bottom of the latter at the other side, reflecting mirrors carried by the posts adjacent their bottoms, the mirrors, light source and light sensitive device lying in the same vertical plane and being so positioned that a beam from the source is directed diagonally downward to one mirror, thence across to the other and thence up to the light sensitive device, and means operatively connecting the light sensitive device with the register.

7. Means for counting individuals passing a selected point in one direction only which comprises means defining a passage, a register means for projecting two light beams across the passage a plurality of times in separate parallel vertical planes to provide spaced parallel light screens across the passage, a light sensitive device operatively connecting the register with one of the light screens to effect actuation of the register on obstruction of its related screen first by an individual passing in one direction, and a second light sensitive device operatively connecting the other screen with the first light sensitive device to render the latter inoperative on obstruction of the second light screen first by an individual passing in the opposite direction.

8. Means for counting individuals passing a selected point in one direction only which comprises means defining a passage, a register, means for projecting two light beams across the passage a plurality of times in separate parallel vertical planes to provide spaced parallel light screens across the passage, and interlocking light sensitive devices operatively connecting the light screens with the register to effect operation of the register on successively obstructing the two screens in one direction but to prevent operation of the register on successively obstructing the screens in the other direction.

9. A counting device for counting individuals passing a selected point in a passageway, a register, a light sensitive device positioned on one side of the passageway, a circuit for operatively connecting said device with said register, a source of light and means for directing a beam therefrom a plurality of times across the passage in the same vertical plane and finally on said light sensitive device, and means in said circuit for operating said register upon the obstruction of the light beam at any point.

10. A counting device for counting individuals passing a selected point in a passageway in one direction only, comprising a register, means for projecting two light beams across the passageway a plurality of times in separate vertical parallel planes, light sensitive devices for finally intercepting each of said beams, a circuit including means associated therewith for operating said register to count when the light beams are interrupted in one sequence and for preventing counting when the light beams are interrupted in the opposite sequence, and means supporting said light sensitive devices so that both are dark at some instant during the passage of an individual.

11. A counting device for counting persons passing through a passageway in one direction only comprising a register, two light sensitive devices, means for normally projecting light beams on each of said light sensitive devices, means supporting said light sensitive devices in

such close space relation that a person in passing interrupts the light beams on both light sensitive devices at some instant, means associated with one of said light sensitive devices for operating said register when the light beams are interrupted in one sequence, and means associated with the other light sensitive device to prevent the operation when the order of interruption is reversed.

12. A counting device for counting persons passing a selected point in a passageway in one direction only comprising a register, a control circuit for said register, two light sensitive devices, a relay associated with each of said light sensitive devices, means for normally projecting beams of light across the passageway on said light sensitive devices, normally closed contacts in said control circuit associated with one of said relays, and normally opened contacts in series with said normally closed contacts associated with the other relay, said normally opened and closed contacts being adapted to operate said register when the light beams are interrupted in one sequence, said normally closed contacts being adapted to open first and prevent the operation of said register when the light beams are interrupted in the reverse order.

13. A counting device for counting individuals passing a selected point in a passageway, a light source, a light sensitive device, mirrors for directing the light beam from said source back and forth across said passageway and on said light sensitive device, means for supporting said light source, said mirrors and said light sensitive device in a common vertical plane extending transverse said passage, a register, a circuit for operatively connecting said light sensitive device with said register, and means associated with said circuit for operating said register upon the interruption of the light beam at any point.

14. A counting device for counting individuals passing a selected point in a passageway, a light source, a light sensitive device, mirrors for directing the light beam from said source back and forth across said passageway and on said light sensitive device, means for supporting said light source, said mirrors and said light sensitive device in a common vertical plane extending transverse said passage, a second light source, a second light sensitive device and a second set of mirrors for directing the light beam from said second source on said second light sensitive device, means for supporting said second elements in a common vertical plane parallel to said first mentioned plane, a register, a control circuit therefor, a relay having normally open contacts and operatively connected with one of said light sensitive devices, and a relay having normally closed contacts and operatively connected with the other light sensitive device, said normally open and closed contacts being connected in series in said control circuit, said contacts being operative to close said control circuit to operate said register when the light beams are interrupted in one sequence and to maintain the circuit open when the light beams are interrupted in the opposite sequence to prevent the operation of said register.

15. A counting device for counting persons passing a selected point in a passageway in one direction only comprising a register, means for normally projecting across said passageway a light screen comprising a plurality of light beams spaced apart in a common substantially vertical plane, means for normally projecting across said passageway a second light screen comprising a plurality of light beams spaced apart in a common substantially vertical plane laterally spaced from said first plane, a light sensitive device normally subjected to light from said first screen, a second light sensitive device normally subjected to light from said second screen, means associated with one of said light sensitive devices for operating said register when the light screens are interrupted in one sequence and means associated with the other light sensitive device for preventing the operation of said register when the order of interruption is reversed.

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