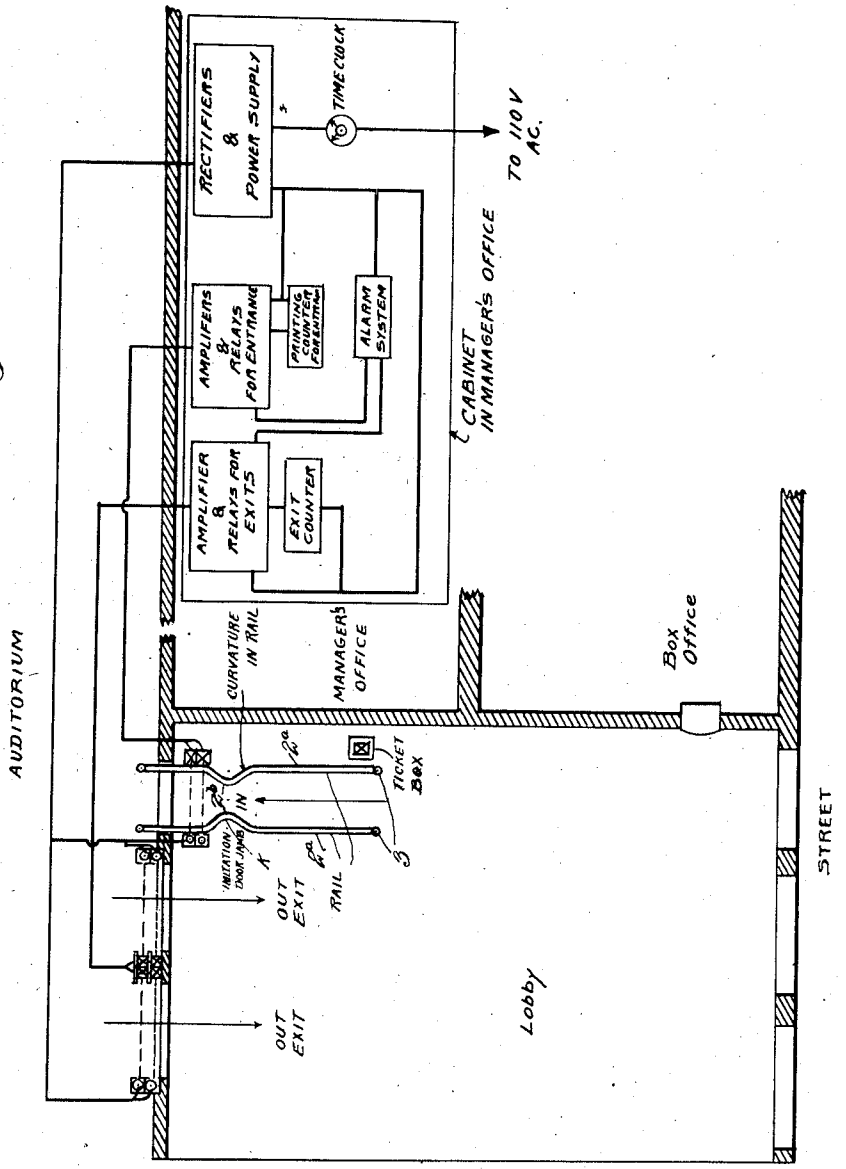
Dec. 22, 1936. J. H. BURNSIDE, 2D 2,065,048

COUNTING DEVICE

Filed April 25, 1932 3 Sheets-Sheet 1

Fig. 1.




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COUNTING DEVICE

Filed April 25, 1932 3 Sheets-Sheet 2

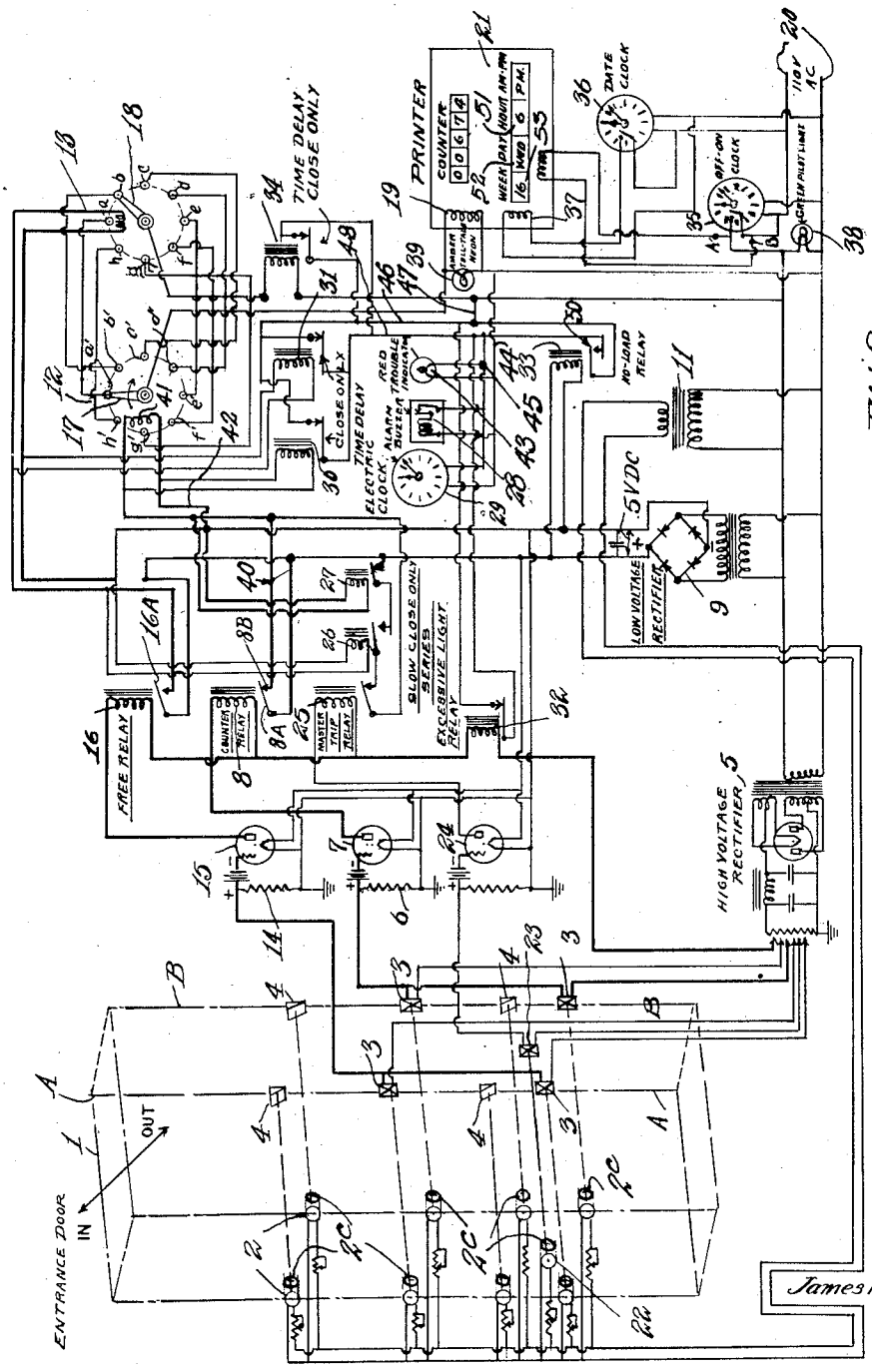



Fig. 2.

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COUNTING DEVICE

Filed April 25, 1932 3 Sheets-Sheet 3

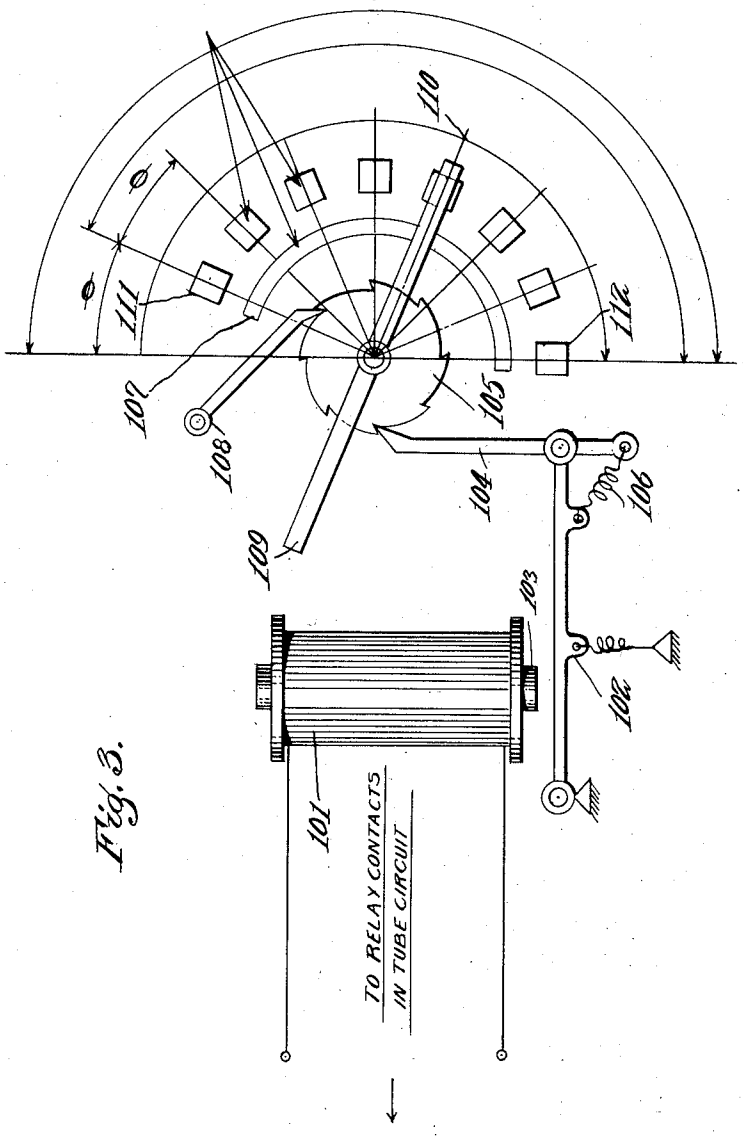



Fig. 3.

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Patented Dec. 22, 1936 2,065,048

# UNITED STATES PATENT OFFICE

2,065,048

## COUNTING DEVICE

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Application April 25, 1932, Serial No. 607,607

5 Claims. (Cl. 250—41.5)

My invention relates to a device for accurately counting the number of persons entering or passing in one direction in or out of any building or enclosure such as places of amusement, theaters, ball parks, railroads, busses, street cars or any other place where there is a need for accurate checking of the number of persons so passing.

In particular I provide a system employing a plurality of light sensitive cells controlling relays which actuate a recording mechanism, and interrupt the beams of light actuating such light sensitive cells by the passage of persons in the paths of such beams. I provide means whereby a plurality of beams of light must be so interrupted in order to actuate the recording mechanism, so that the passage of two persons walking abreast, or of one person carrying a bulky package will be correctly recorded. I also provide means for giving alarm whenever the system is not in operating condition because of unusual circumstances.

My invention will be understood from the following specification and accompanying drawings wherein:

Figure 1 shows a schematic view of the application of the counter system of my invention in a theater entrance;

Figure 2 shows in detail the arrangement and connection of the several elements of the counter system of my invention;

Figure 3 shows a detailed view of the step-by-step relays employed in the system of my invention.

Among the novel and useful features of this device are the following.

It accurately counts the number of persons entering a building, enclosure, car, room or similar space.

It permits persons to pass out of a building or enclosure without being counted or disturbing the counting mechanism of persons moving in the opposite direction.

No single person can, when passing in, register more than one count.

No two persons can when passing through the doorway close together register only a single count.

It automatically gives an hourly record, having the hour date and number of admissions at that hour, printed on a paper tape. Such a printing may also be had at any time by means of a manually operated switch.

The design is such that it may operate over a long period of time without any attention, and the entire system is placed in operation and taken out of operation daily or hourly at a predetermined time automatically.

The system contains both a visual and audible alarm system indicating trouble in the various circuits and recording the duration of such trouble, or gives warning should any unauthorized person attempt to interfere or tamper with the counting system at the doorways.

Due to the uni-directional characteristics explained above, the exits of a given place may also be equipped with this device, thereby counting anyone entering through an exit but still keeping the exits, doorways, etc., unobstructed in case of such emergencies as fire, etc., and permitting any number of persons to pass out of the building, enclosure, etc., through these exits without operating the counter.

The entire system may be placed in a sealed container having connections through sealed conduit lines, thereby preventing any unauthorized persons from tampering with its operation or accuracy.

The attempt to accurately count human beings passing through doorways, etc., involves problems that are not met with in the counting of objects. It is obvious that objects to be counted by means of a system involving a photoelectric principle or light sensitive cells is a relatively simple matter providing that such objects can be made to pass a given point in a definitely prescribed manner. For example, in counting bottles on a conveyor belt, the bottles can be so placed that each one presents a single, unbroken shadow, having a fairly uniform outline and a definite distance between adjacent bottles.

However, to accurately count human beings passing a given point by means of a system involving a photoelectric principle, a complex problem is presented. For instance, persons not only present shadows having very irregular outlines but also these shadows may be broken up by light passing between the legs, or between an arm and hand extended forward or backward and carrying objects, such as hats, umbrellas, etc. Such instances as the foregoing, result in conditions which must be taken into consideration to prevent more than one count for a single person due to the double shadow therefrom interrupting the light beams more than once.

On the other hand, a reverse condition of the foregoing occurs if two persons pass through the doorway abreast or so close together that they present a single shadow, in which case only one count will be registered. Also the allowable

tolerance in locating the photoelectric cells is limited since the counting of small children as well as adults must be taken into consideration.

From the foregoing, it is obvious that some means must be provided to prevent a single person from registering more than one count by reason of the possibility of such unusual shadows. Also a means must be provided to prevent two persons from registering a single count due to another condition mentioned above. It should be noted that the two foregoing conditions produce opposite effects. It will be found therefore, that attempts to eliminate one condition aggravate the other condition.

There must also be provided a means to prevent any attempt to render the device inoperative such as interrupting the light beams for a period of time by covering the photoelectric cells, or by placing a light directly before the photoelectric cells.

Overcounting has been eliminated in this device by utilizing a number of light beams across the doorway, all of which are focused on photoelectric cells being connected through a vacuum tube amplifier to a single relay, and the relay, (or amplifier) being so adjusted that a large change in light is necessary to operate the relay, which in turn, operates a counter.

Referring to the drawings in detail, Figure 1 shows schematically the entrance to a theater or auditorium and the application of the counter system of my invention for counting the number of persons entering. The persons entering pass between railings 2*a* in the direction shown as "In". At K, the railing is bent and narrows, causing the persons entering to pass this constricted portion in single file, to walk more slowly, and to become somewhat separated. Just beyond this constricted passage and on the side towards the auditorium, the light sensitive cells and auxiliary apparatus are located.

Figure 2 shows in detail the arrangement of the elements of the counter system of my invention, as it may be applied for instance to a theater or auditorium, together with the circuit connections.

An entrance, doorway or gateway 1 is shown in the drawings through which persons to be counted are caused to pass in single file through two railings 2*a* arranged as a guide, said railings being constricted at points immediately adjacent the doorway as shown at 2*b*. These constricted portions of the rails not only tend to cause the persons passing therethrough to enter in single file but also have a tendency to separate the persons, which is an essential factor in the counting of such persons through the operation of my improved system.

In one perpendicular door jamb, two rows of incandescent lamps or other light sources are arranged parallel to each other with each lamp of a corresponding pair the same heighth from the floor. Although I do not wish to be limited to any particular dimensions, it has been found most desirable to locate the lowest lamp about eighteen inches from the floor and the highest lamp about fifty-eight inches from the floor. Of course, the positioning of the lamps is something to which there is no restriction in this application and it will be understood that the same may be located in any position desired in a doorway or passageway or other entrance to a structure and arranged to meet the convenience of the user of the system and the convenience and necessity of the elements or apparatus thus being utilized.

These lamps or sources are equipped with condensing lenses 2*c* causing narrow beams of light to be focused on reflectors or photoelectric cells set in the opposite perpendicular door jamb and at the same corresponding heighth from the floor. The lamps are energized by the transformer 11 which is supplied from source 20.

In Figure 2, a number of photoelectric cells 3, 3, are shown arranged in the door jamb opposite the lamps, and 4 shows a number of reflectors in the same door jamb also opposite the lamps, so arranged with oblique reflecting surfaces as to cause the beam of light focused on them to be reflected on the light sensitive surface of the photoelectric cell located below the reflector. Thus, each photoelectric cell has the beams of at least two lights focused on its light sensitive surface and therefore it is necessary to interrupt at least two light beams to render any one photocell completely dark. While I have shown and herein described the use of reflectors which is a matter of economy, it will be understood that photoelectric cells may be substituted for the reflectors and I do not wish to be limited either to the complete use of photoelectric cells or the use of reflectors.

All the bank of photoelectric cells along the line B—B have their electric terminals connected in parallel to each other and the whole bank is connected as shown to a source of direct current potential 5 and to a high resistance 6 or other input device which is connected across the grid and filament of a vacuum tube 7. In series with the plate circuit of the vacuum tube 7 is connected the actuating winding of a relay 8. The contacts of the relay 8 are connected to a source of voltage 9 through the actuating winding of a step relay 12.

All the photoelectric cells along the line A—A (Fig. 2) are connected in parallel to each other and the whole bank is connected to a source of direct current potential and to a high resistance 14 which is connected between the grid and filament of another vacuum tube 15.

In series with the plate circuit of vacuum tube 15 is connected the actuating winding of another relay 16. The contacts of relay 16 are connected to a source of voltage 9 through the actuating winding of a step-by-step relay 13. All the vacuum tubes derive their filament voltage from the rectifier 9 and their plate voltage from the rectifier 5.

Each contact of another step-by-step relay 12 is electrically connected to the corresponding contact on step-by-step relay 13. For example, first contact *a'* on relay 12 is connected to first contact *a* on relay 13, and, second contact *b'* on 12 to second contact *b* on relay 13, as shown.

The contact arm 18 on relay 13 is connected to one side of source of voltage 20, and the contact arm 17 on relay 12 is connected through the actuating winding 19, on the counter device 21 to the other side of the voltage source 20. The whole step relay assembly is so connected that when contact arm 17 and contact arm 18 are on corresponding contacts, a current from the voltage source 20 is caused to flow through solenoid 19 operating the counter 21. The contact arms 17 and 18 are originally set so that when all the light beams are shining on the photoelectric cells, contact arm 17 is one step behind contact arm 18. For example, contact arm 17 is on first contact *a'* of relay 12, and contact arm 18 is on second

contact b of relay 13. The detail arrangement of step relays 12 and 13 is shown in Figure 3.

For instance, assume that four or more light beams are focused on two or more photoelectric cells connected in parallel such as those along line B—B in Figure 2. These photoelectric cells are connected to the grid and filament of a vacuum tube 7 through a high resistance 6. A relay 8 connected in series with the plate circuit of the vacuum tube 7 is so adjusted that three of the light beams must be interrupted simultaneously to close the relay 8. Now if the light beams are placed at the proper distances from the floor, a single person passing through the doorway could not interrupt more than two of the beams twice, which of course, would not give two counts since the interruption of at least three beams is necessary to count. For instance, a person passes through the doorway carrying a hat extended forward and down. The arm and hat would interrupt the two middle beams before the body interrupted these same beams. But two beams are not sufficient to operate the relay 8. However, that person's body as it advances would interrupt three beams simultaneously, thereby operating the counting relay 8. Also, if the beams are properly placed a small child can be made to interrupt at least three beams simultaneously.

By the same method of lamp placement the possibility of two persons being counted as one when passing through the doorway very close together, is remote, as it is extremely difficult for two persons to prevent the top beam from reaching the photoelectric cells by passing between them in the region of the neck and at the same time prevent the lowest beam from reaching the photoelectric cell by passing between the legs. Hence, since only two beams are simultaneously interrupted at such an instant, the relay 8 opens, closing again and thereby operating the counter, when the second body simultaneously interrupts three beams.

The operation of the system is as follows: When a body passes through the doorway 1 in the direction marked with the arrow "In", that body is caused to interrupt at least 75% of the total light beams focused on the reflectors and photoelectric cells along the line B—B. Such interruption reduces the total light flux incident on the sensitive surfaces of the photoelectric cells along the line B—B by 75%, causing the internal resistance of these photoelectric cells to increase and thereby decreasing the total current flowing through the high resistance 6 resulting in a lower voltage drop across this resistance. The voltage drop across the resistance 6, resulting from the current flowing through the resistor is impressed between the grid and filament of the vacuum tube 7 in a polarity opposite to the normal negative grid bias potential. Therefore, when the voltage existing across resistor 6 is reduced, the total grid potential between the grid and the negative end of the filament increases, causing the grid to become more negative. This results in a decrease of the plate current through the tube 7 and consequently there is a decrease in current through the actuating winding of relay 8. Such a reduction of current reduces the magnetic force acting on armature 8A permitting it to drop to contact 8B thereby closing the circuit and permitting current to flow from the positive side of the voltage source 9 through the actuating winding of step relay 12. The circuit is then from the positive side of the voltage source 9 to the armature 8A, then through the contact 8B and by means of the wire 40 to the actuating winding 41 of the step relay 12, then by means of the wire 42 back to the negative side of the voltage source 9. When the actuating winding of step relay 12 is energized, the contact arm 17 is moved one step in a clockwise direction as for example from first cantact $a'$ to second contact $b'$.

As explained, when contact arm 17 moves one step ahead it will rest on a corresponding contact with contact arm 18 and the circuit is closed permitting a current to flow from the voltage source 20 through contact arm 18 to contact b of relay 13 and then through a wire to contact $b'$ of relay 12 through contact arm 17 to the solenoid 19 of the counter 21 and back to the voltage source 20. As stated before when a current flows through actuating winding 19, one count is registered by the counter 21.

As the body advances through the doorway 1 in the direction marked on the arrow "In", that body is caused to also interrupt 75% of the total light beams focused on the reflectors and photoelectric cells along the line A—A, thereby reducing the total light flux incident on the photoelectric cells along the line A—A by at least 75%. Such a reduction of light reduces the current through all the cells along line A—A and through the high resistance 14 causing the grid of vacuum tube 15 to become more negative, thereby reducing the plate current through tube 15 and the actuating winding of relay 16. Such a reduction in current closes the contacts 16A and 16B, thereby causing a current to flow from the voltage source 9 through the solenoid of step relay 13 and when current flows through this solenoid, contact arm 18 advances one step in a clockwise direction, for example, from second contact b on step relay 13 to third contact c on step relay 13. Contact arm 18 is no longer on the corresponding contact with contact arm 17 but is advanced one step ahead thereby opening the circuit from the voltage source 20 and interrupting the current through actuating winding 19 on the counter 21. Hence, the body has passed in through the doorway 1 in the direction marked on the arrow "In" and has registered a count of one person.

Now when a body passes through the doorway 1 in the direction marked on the arrow "Out", that is the opposite direction to that just described, that body interrupts the light beams focused on the reflectors and photoelectric cells along the line A—A causing a reduction in current through these photoelectric cells and operating the relay 16, which, in turn, advances contact arm 18 on step relay 13 one step, for example, from third contact c to fourth contact d. The contact arm 18 is now two steps ahead of contact arm 17.

Now as the body advances further through doorway 1, that body interrupts the light beams focused on the reflectors and photoelectric cells along the line B—B. Such an interruption of the light flux incident on the photoelectric cells along line B—B causes the relay 8 to operate, which in turn advances the contact arm 17 on step relay 12 one step, for example, from second contact $b'$ to third contact $c'$. It will be noted that contact arm 17 is one step behind contact arm 18, and therefore the circuit through solenoid 19 on the counter 21 has not been closed. Therefore, no count has been registered. Hence, the body has passed through the doorway 1 in

the direction marked "Out" on the arrow, but has not registered a count.

Therefore, every person passing in through the doorway registers one count, but may pass out through the same doorway without registering a count, and in so doing will not actuate the counting mechanism.

The lamp 22 (Fig. 2) focused on the photoelectric cell 23 which is connected through the amplifying vacuum tube 24 to the relay 25 serves as a trip beam, counting persons who are either too short to interrupt 75% of the total light beams or those persons who have stooped down to avoid the other beams. When the light beam falling on the trip cell 23 is interrupted, the grid potential between the grid of tube 24 and the negative end of the filament of said tube increases, causing the grid to become more negative, in the same manner as described above with reference to tube 7. The plate current through tube 24 is thereby decreased, so that the coil of trip relay 25, being deenergized or at least weakened in its action, will allow its armature to drop. This will close a circuit energizing the actuating coil of the step relay 12, operating the contact arm 17 in the same manner as described above in connection with the action of the relay 8 and tube 7. This circuit includes the armatures and contacts of the relays 26 and 27, and is broken by the action of said relays, so that photoelectric cell 23 is rendered inoperative by the time delay relays 26 and 27 which are slow to close, should 75% of the light be interrupted on the photoelectric cells along the line A—A or the line B—B.

An alarm consisting of an electrically operated clock 29, an audible buzzer 28 and a signal lamp 43 is provided, which gives visible and audible alarm in the event of failures in any part of the system which would affect the accuracy of the device. The duration of such failures is recorded by the clock 29.

The alarm system is energized from the voltage source 20 by means of any one of the relays 30, 31, 32, 33 or 34. One side of the alarm system is connected to one side of the voltage source 20 by means of the wire 44; the other side of the alarm system is connected by means of the wire 45 to one side of the bus line 46; the other side of the bus line 46 is connected to the voltage source 20 by means of the wire 47. It should be noted that the contacts of the relays 30, 31, 32, 33, and 34 are all connected in shunt to the bus line 46; therefore, if any one of these relays is operated, closing its contacts, the bus line 46 will be short-circuited. When the bus line 46 is so short-circuited, current can flow from one side of the voltage source 20 through the wire 47 across the bus line 46 to the alarm system, and then by means of the wire 44 back to the other side of the voltage source 20. The alarm system may be energized or caused to operate by any of the following conditions:

Insufficient normal light flux on any of the photoelectric cells for their proper operation such as the failure of the lamp power supply, the burning out of lamps, obstructed light beams;

Failure of or defective photoelectric cells or connections or supply voltage;

Failure or defects anywhere in the vacuum tube circuit or their supply voltages;

Failure or defects in the plate circuit relays, or connections.

Any of the conditions just mentioned would reduce the current through at least one of the relays 8, 16 or 25, Fig. 2, causing their contacts to close and thereby energizing time delay relays 30 or 31 through voltage source 9. When relays 30 or 31 are energized for a predetermined period of time their contacts close operating the alarm system.

For example, assume the exciting lamps focused on the photoelectric cells along the line A—A, Figure 2, to be burned out. These photoelectric cells will then be rendered dark, causing a decrease in the plate current through the vacuum tube 15, and thereby closing the contacts of relay 16 as previously explained. Now, when the contacts of relay 16 are closed, the actuating winding of step relay 13 is energized, and as the winding of relay 31 is connected in shunt to the winding of relay 13, the relay 31 is also energized. When the actuating winding of relay 31 is energized, its armature 48 will move upward slowly, until it makes contact with 49. When this contact is made, the bus line 46 will be short-circuited, thereby placing the alarm system in operation as described above.

Should the photoelectric cells connected to the vacuum tube 15 become defective, the current through these photoelectric cells will decrease, causing a corresponding decrease in the plate current through the vacuum tube 15, and closing the relay 16, which in turn will operate the relay 31 as described above. When the contacts of the relay 31 finally close, the alarm system will be placed in operation.

Should the filament of the vacuum tube 15 burn out, the plate current through this tube will be interrupted, thereby closing relay 16, which operates relay 31 which in turn will operate the alarm system.

Should the voltage source 5 fail, the current through the actuating winding of relay 16 will cease, permitting the contacts of this relay to close, and thereby operating the alarm system by means of the relay 31 as described.

Should the photoelectric cells connected to the vacuum tube 7, or the lights focused on these cells fail, the effect would be to decrease the plate current through the vacuum tube 7, thereby closing the contacts of relay 8 as previously described. When the contacts of relay 8 are closed, the actuating winding 41 of step relay 12 is energized as previously described and since the actuating winding of the time delay relay 30 is connected in shunt to the winding of relay 12, the relay 30 will also be energized, causing its contacts to close slowly. When the contacts of relay 30 are finally closed, the bus line 46 is short-circuited placing the alarm system in operation.

The actuating winding of the time delay relay 34 is connected in series with the contact arm 18 of step relay 13, and is energized when the contact arms 17 and 18 are on corresponding contacts. The normal position of the contact arms 17 and 18 is one step apart as previously described, and should they remain on corresponding contacts for a predetermined length of time, the contacts of the relay 34 will close, short-circuiting the bus line 46 and thereby energizing the alarm system.

The actuating winding of relay 33 is connected directly across the voltage source 9, which supplies sufficient current normally to hold its contacts open; however, should the voltage source 9 fail, the actuating winding of relay 33 would no longer be energized, thus permitting its armature 50 to drop, closing its contacts and short-

circuiting the bus line 46, thereby energizing the alarm system.

Further conditions which would operate the alarm are: Should an attempt be made to hold a lamp directly in front of the photoelectric cells to prevent their operation such lights must be of exactly the same intensity on all the photocells as the regular exciter lamps 2. Should the foreign light be of greater intensity, the current through that photoelectric cell would increase, increasing the plate current in the vacuum tube to which it is connected. This increased plate current would close relay 32 and operate the alarm. Should the foreign light be of lesser intensity the current through that photoelectric cell would decrease operating the relay to which it is connected 8, 16 or 25 which in turn would operate relay 30 or 31 thus starting the alarm.

The clock 35, Fig. 2, automatically turns the power off and on at a predetermined time. Clock 36 is not disconnected from the power supply by clock 35 but operates continuously.

The clock 36, Fig. 2, sends an impulse of current through solenoid 37 once every hour. Each time the solenoid 37 is energized, the hour register wheels 51 are advanced one figure (in the same manner as the counter register is advanced when the solenoid 19 is energized). When the hour wheels have made one revolution (24 hours), the day wheel 52 is advanced one place (as, for example, from Wed. to Thu.) and when the day wheel has made one revolution (7 days), the week wheel 53 is advanced one place. Thus the date and hour register is caused to operate by the impulses from the clock 36 through the solenoid 37. Thus, a permanent record may be obtained, not only giving the total number of counts registered at any given time, but also the hour and date of the same.

The lamp 39 flashes every time a count is registered. The lamp 38 is lighted whenever power is on the system, causing it to be in operation.

Figure 3 shows a detailed view of step relays 12 and 13. When a current is caused to flow through the solenoid winding 101, Figure 3, a force is exerted on the armature 102, causing it to move upward to the pole face 103. The armature carries with it the pawl 104 which rotates the contact arms 109, 110 by means of the ratchet 105. The stroke of the pawl is only sufficient to move the contact arms 109, 110 one step.

When the current through solenoid 101 is interrupted, the armature 102 drops down causing the pawl to engage in the next lower ratchet tooth. The spring 106 serves to keep the pawl against the ratchet. Therefore, every separate current impulse sent through the solenoid 101 moves the contact arm 109, 110 one step in a clockwise direction. When contact arm 110 clears contact 112, contact arm 109 moves to contact 111. The local circuit is connected to the contact studs and the metal strip 107. The catch 108 prevents counter-clockwise rotation.

While I have referred to photoelectric cells, it will be understood that any light sensitive instrument which is electrically responsive to variations in the incident light flux may be used in the system of my invention, and the use of such elements as substitutes is comprised within the scope of my invention.

While I have described the plurality of light sources arranged in separate rows as a preferred embodiment of my invention, I do not wish to be limited to this embodiment since my system may employ various modifications thereof. Such a modification of my system may employ a single fixed light source so adapted as to project a sheet of light across the path of the bodies and impinge on the cells. Also my system may employ two fixed light sources arranged on the line of the respective rows of light sources opposite lines A—A and B—B in Figure 2. All of these and other modifications are within the spirit of my invention.

While I have described specific embodiments of my invention, it will be understood that various modifications may be made which are apparent to those skilled in the art, and I do not intend that any limitation shall be placed upon the scope of my invention except as indicated in the appended claims.

Having thus described the invention, what I claim is:

1. In a system for counting moving bodies moving in one sense of direction along a determined path, in combination, a plurality of sets each comprising a plurality of light responsive cells of variable electrical resistance, said sets being arranged in substantially parallel planes which are substantially perpendicular to the path of motion of said bodies, and the cells of the same set being arranged at different levels, a plurality of sources of light located substantially in said planes, said sources and said cells being respectively located on opposite sides of the path of said bodies, the cells constituting each of said sets being electrically connected in parallel, a plurality of relays operatively connected with said sets of cells, a plurality of similar step-by-step electromagnetically actuated distributors provided with contacts, with actuating windings, and with distributing arms, the corresponding contacts of each of said distributors being electrically connected together, the actuating windings of said distributors being operatively connected to the respective relays, and an electrically actuatable recorder provided with an actuating winding connected in series with the distributing arms of said distributors, whereby said relays must be actuated in predetermined order in order that a recording impulse may be delivered to said recorder.

2. In a system for counting moving bodies moving in one sense of direction along a determined path, in combination, a pair of sets each comprising a plurality of light responsive cells of variable electric resistance, said sets being arranged in substantially parallel planes which are substantially perpendicular to the path of motion of said bodies, and the cells of the same set being arranged at different levels, a plurality of sources of light located substantially in said planes, said sources and said cells being respectively located on opposite sides of the path of said bodies, the cells constituting each of said sets being electrically connected in parallel, a pair of relays operatively connected with each of said sets of cells, a pair of similar step-by-step electromagnetically actuated distributors provided with contacts, with actuating windings, and with distributing arms, the corresponding contacts of each of said distributors being electrically connected together, the actuating windings of said distributors being operatively connected to the respective relays, and an electrically actuatable recorder provided with an actuating winding connected in series with the distributing arms of said distributors, whereby said relays must be actuated in predetermined order in order

that a recording impulse may be delivered to said recorder.

3. In a system for counting moving bodies moving in one sense of direction along a determined path, in combination, a plurality of sets each comprising a plurality of light responsive cells of variable electrical resistance, said sets being arranged in substantially parallel planes which are substantially perpendicular to the path of motion of said bodies, and the cells of the same set being arranged at different levels, a plurality of sources of light located substantially in said planes, said sources and said cells being respectively located on opposite sides of the path of said bodies, the cells constituting each of said sets being electrically connected in parallel, a plurality of relays operatively connected with said sets of cells, a pair of similar step-by-step electromagnetically actuated distributors provided with contacts, with actuating windings, and with distributing arms, the corresponding contacts of each of said distributors being electrically connected together, the actuating windings of said distributors being operatively connected respectively to two of said relays, an electrically actuated recorder provided with an actuating winding connected in series with the distributing arms of said distributors, electromagnetically actuated means operatively connected with said relays and constructed to be operated by a third of said relays, a circuit controlled by said means and operatively connected with said recorder to actuate the latter, said means comprising circuit control elements actuated by the outputs of said first mentioned two relays for opening the controlled circuit of said third relay and rendering said third relay ineffective for operating said recorder when either of said first two relays is actuated.

4. In a system for counting bodies moving along a predetermined path, in combination, a plurality of light responsive cells of variable electrical resistance located at different vertical levels adjacent to such path, means for directing light across said path upon said cells, a counting mechanism, electrical means controlled by said cells for causing the operation of said counting mechanism only when at least 75% of the light directed upon said cells respectively located at different levels is intercepted, an additional light responsive variable electrical resistance operatively connected with said counting mechanism, means for placing said additional variable resistance into action when light is intercepted from less than 75% of said first-mentioned cells, and means for throwing said additional variable resistance out of action when light is intercepted from at least 75% of said cells.

5. A counting device for registering a number of persons or objects passing a given point comprising two adjacent light sensitive cells, a source of light normally illuminating said cells and a circuit including said cells, a counting device adapted to register when one of said cells is darkened first by a person or an object traveling in one direction, and means for preventing further registration until the other cell is darkened, said means also preventing the operation of said counting device when the other cell is darkened first by a person or an object traveling in the opposite direction.

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