

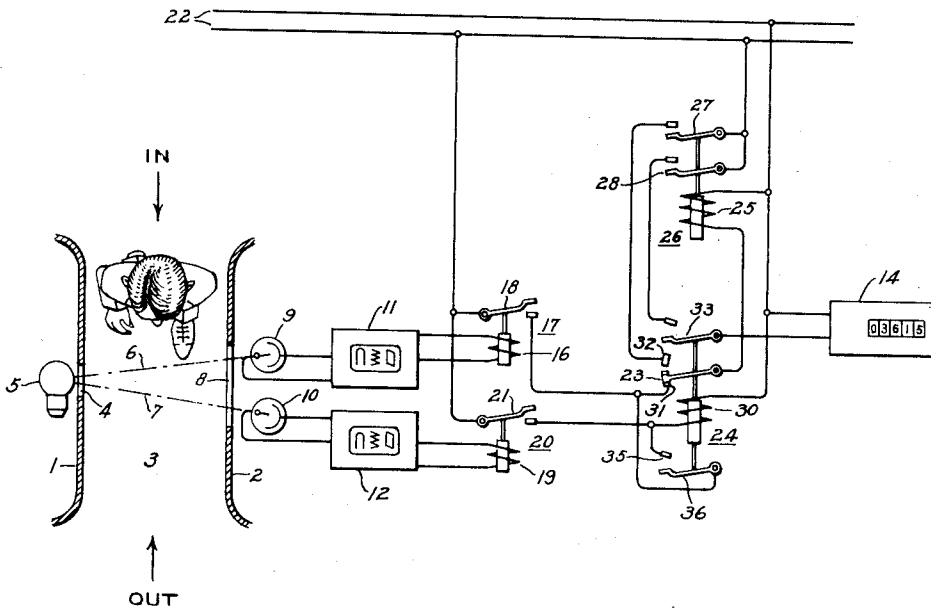
March 26, 1935.

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1,995,881

COUNTING APPARATUS

Filed Jan. 30, 1932



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UNITED STATES PATENT OFFICE

1,995,881

COUNTING APPARATUS

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Application January 30, 1932, Serial No. 589,864

4 Claims. (Cl. 250—41.5)

Our invention relates to electric apparatus for counting passing objects, being of the type which employs light sensitive devices for effecting a response to the passage of objects. Our invention

5 has for its object the provision of improved apparatus of this character which while affected by objects passing in both directions will count only those objects which pass in one direction. Our present application is a continuation in part

10 of our prior application, Serial No. 562,744, filed September 14, 1931.

Our invention will be better understood from the following description taken in connection with the accompanying drawing, and its scope

15 will be pointed out in the appended claims.

In the single figure of the drawing which illustrates one embodiment of our invention we have chosen by way of example to show our invention employed in a theatre having a passageway

20 through which patrons pass both in entering and in leaving the theatre. By means of our invention persons passing in one direction only through the passageway are counted; for example, a count is made of the total number of persons entering

25 the theatre without regard to the number who leave.

Referring now to the drawing, we have shown at 1 and 2 guides forming the passageway 3 through which patrons of the theatre enter and may also leave. Behind the opening 4 in the guide 1 is the light source 5, for example an electric lamp, from which the two diverging light beams 6 and 7 represented by dot and dash lines are projected across the passageway 3 through the opening 8 in the opposite guide 2. If desired, two separate lamps may be employed, one for directing each beam, or a lamp and one or more mirrors may be used. Behind the guide 2 and opposite opening 8 we have arranged the two photo-electric tubes 9 and 10 spaced apart by a distance such that a person passing through the passageway will successively shadow the tubes by intercepting the two light beams, the interception of the second beam taking place before the first is reestablished, thus providing a short interval during which both beams are intercepted. Connected with the respective tubes 9 and 10 are suitable amplifying devices 11 and 12, such for example as thermionic amplifiers. Through the instrumentality of the relay devices now to be described the amplified output of photo-electric tubes 9 and 10 is caused to operate the electrically operated counter 14, the relays being so

55 constructed and arranged that the counter is

actuated once in response to the passage of each person into the theatre but is not actuated in response to the passing of persons from the theatre.

The output circuit of amplifier 11 connects with the winding 16 of relay 17 the relay being so constructed that when its winding is energized in response to the free passage of light beam 6 its movable contact 18 is raised to open circuit position. The output circuit of amplifier 12 likewise connects with the winding 19 of relay 20 which like relay 17 has its movable contact 21 maintained in open position when the winding is energized as a result of the free passage of light beam 7.

A person entering the theatre by way of the passageway 3 first intercepts the light beam 6 which causes relay 17 to become deenergized and drop into closed circuit position. Movable contact 18 thereof thus completes a circuit from the source of supply 22 through the movable contact 23 of relay 24 and through the winding 25 of relay 26. Relay 26 thereupon is energized and its movable contacts 27 and 28 are raised to closed circuit position. As the person entering the theatre progresses farther through the passageway 3, he intercepts also the light beam 7 in addition to light beam 6. This interception of beam 7 causes the deenergization of relay 20 and the closing of its contacts whereby the circuit of winding 30 of relay 24 is closed. The resulting energization of relay 24 shifts contact 23 thereof from the fixed contact 31 to fixed contact 32 which, since contact 27 of relay 26 is in closed circuit position, completes a holding circuit for relay 26. The operation of relay 24 also moves its contact 33 to closed circuit position which with the closed contact 28 of relay 26 closes the operating circuit of the counter 14. As the person entering the theatre passes on, light beams 6 and 7 are consecutively reestablished causing both relays 17 and 20 to open and accordingly relays 24 and 26 to return to their opened or original positions, thus opening the operating circuit of counter 14.

A person leaving the theatre by way of passageway 3 will intercept the light beams 6 and 7 in the opposite order from that described above. The interception of beam 7 will as described above deenergize relay 20 and energize relay 24. In this case, however, since relay 17 is still open, energization of relay 24 cannot of itself cause the energization of relay 26. As the person leaving the theatre passes on and intercepts also

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the light beams 6, relay 17 closes but since contact 23 of relay 24 has already moved off of fixed contact 31, the closing of relay 17 cannot cause the energization of relay 26. By the further outward movement of the person leaving the theatre both beams 6 and 7 are reestablished and relays 17 and 20 resume their open circuit or original positions as also does relay 24. In the case of a person leaving the theatre as above described, it will be noted that at no time is the circuit of the counter 14 closed since this requires the simultaneous closing of both relays 24 and 26. During the outward passage of the person both relay 26 and relay 24 close but are not closed at the same time.

With the above described apparatus it has been found that the counter 14 sometimes makes a double count for a person entering the theatre who is carrying an object such as an umbrella, a bag, or a package in front of him. This is due to the fact that while the person himself is intercepting the first beam 6, the second beam 7 is intercepted twice, first by the object he is carrying and then by himself. Relays 20 and 24 and the counter thus are actuated twice when they should be actuated but once. To prevent such a double count we have provided relay 24 with the fixed and movable contacts 35 and 36 respectively which connect with the fixed contacts of relays 17 and 20 thus establishing a holding circuit for relay 24. Relay 24 after having been once operated cannot be released and reoperated until relay 17 moves to open circuit position by the reestablishment of beam 6.

In accordance with the above description it will be seen that we have provided an electric counting apparatus of simple construction which will count objects passing in one direction in a given path but which will make no response to objects moving in the same path in the opposite direction.

We have chosen the particular embodiment described above as illustrative of our invention and it will be apparent that various other modifications may be made without departing from the spirit and scope of our invention which modifications we aim to cover by the appended claims.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. Apparatus for counting objects passing in one direction in a predetermined path and disregarding objects passing in the opposite direction in said path comprising means for projecting light across said path, two photoelectric devices arranged to receive said light and spaced apart such that each object shadows the devices in succession a counter and relay apparatus connected with the counter and with the devices and responsive entirely to the operation of said devices in one order for causing one operation of said counter for each object that passes and responsive to the operation of the devices in the opposite order for preventing an operation of the counter, said relay apparatus including means for preventing a second operation of the coun-

ter in response to the passage of a single object.

2. Apparatus for counting objects passing in one direction in a predetermined path and disregarding objects passing in the opposite direction in said path comprising means for projecting light across said path, two photoelectric devices arranged to receive said light and spaced apart longitudinally of the path such that they are shadowed successively by the objects, the second device being shadowed while the first is still shadowed, an electrically operated counter and relay apparatus connected with said devices and arranged to close the operating circuit of said counter in response to the operation of said devices in one order and to prevent the closing of said circuit in response to the operation of the devices in the opposite order, said relay apparatus being constructed to reset entirely in response to a restoration of light to said two devices and including means for preventing a second closure of the counter circuit while the first device is still shadowed.

3. Apparatus for counting objects passing in one direction in a given path comprising means for projecting light across said path, two photoelectric devices on the opposite side of the path arranged to receive said light and spaced apart such that each object shadows the devices in succession, a counter and relay apparatus connected with the counter and with the devices, said apparatus including means for causing an operation of the counter in response to the successive shadowing of said devices by said objects in one order and including means whereby the apparatus is restored to its original condition in response to the restoration of light to both devices, said apparatus also including means for preventing a second operation of the counter in response to a restoration of light to one of said devices and to a second shadowing thereof while the other device is still shadowed.

4. Apparatus for counting objects passing in one direction in a given path and disregarding those passing in the opposite direction comprising means for projecting light across said path, a first and a second photoelectric device on the opposite side of said path arranged to receive said light and spaced apart such that each object shadows the devices in succession, a counter having an actuating circuit and relay apparatus connected with said circuit and with the devices, said apparatus including means for closing the counter circuit in response to the successive shadowing of said first and second devices by said devices and for holding said circuit open in response to the successive shadowing of the devices in the reverse order, said apparatus including means whereby it is restored to its original condition in response to the restoration of light to both devices and said apparatus, also including means for holding said counter circuit open in response to a restoration of light to said second device and a second shadowing thereof while the first device is still shadowed.

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