

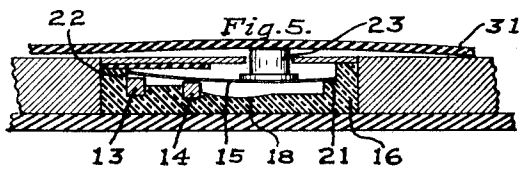
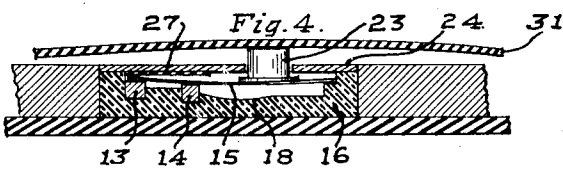
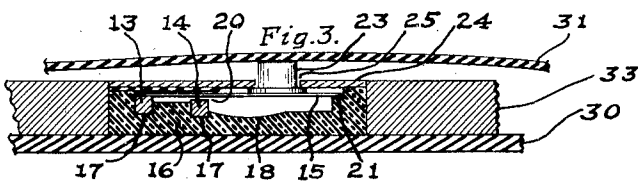
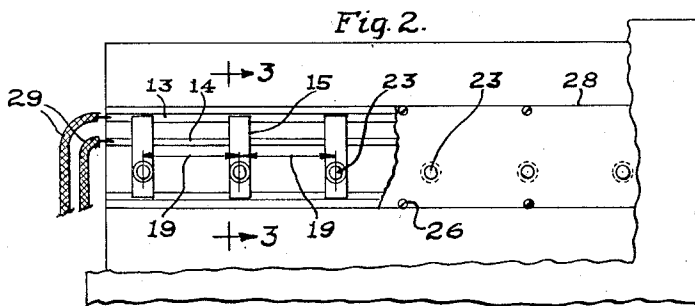
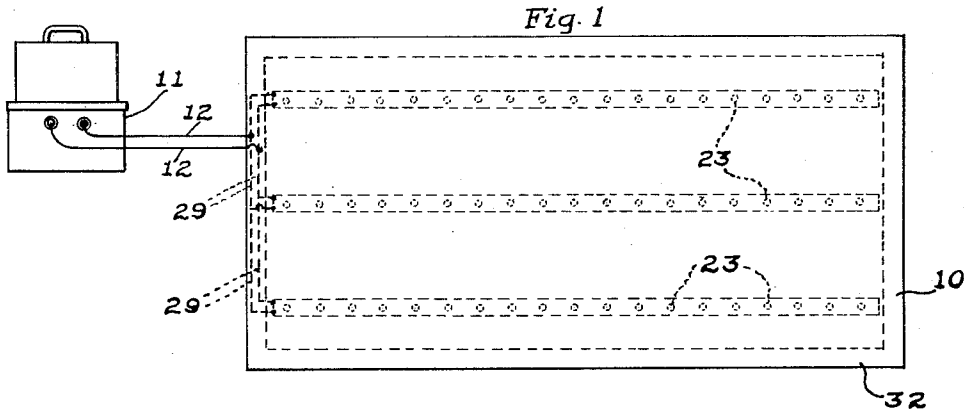
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APPARATUS FOR COUNTING PEDESTRIAN TRAFFIC

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APPARATUS FOR COUNTING PEDESTRIAN TRAFFIC

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5 Claims. (Cl. 235—92)

This invention relates to apparatus for counting pedestrian traffic and to other apparatus responsive to the passage of pedestrians and, among other objects, aims to provide apparatus capable of counting pedestrian traffic or otherwise responsive thereto without special regulation of the traffic.

The nature of the invention may be readily understood by reference to one illustrative apparatus embodying the invention and shown in the accompanying drawing.

In said drawing:

Fig. 1 is a plan view of a contact mat connected with counting apparatus;

Fig. 2 is a fragmentary plan view of a portion of the mat having certain parts broken away to expose the interior;

Fig. 3 is a section of a detail taken on the plane 3—3 of Fig. 2; and

Figs. 4 and 5 are views similar to Fig. 3 illustrating the contact devices in successive positions.

The automatic counting of pedestrian traffic has heretofore required expensive special equipment of limited application for regimenting the traffic. For example, counting turnstiles require that the traffic arrange itself into one or more columns in passing through the turnstiles. This also applies to counting pedestrian traffic by means of photoelectric cells and to other traffic responsive apparatus incapable of differentiating between one or more persons walking abreast. Equipment of this character, besides being expensive, is essentially immobile and limited in its application.

The present apparatus is designed to require no regimentation of traffic and to have universal application. In external form, it comprises a mat or plate of such dimensions as to insure that persons to be counted, or by whom apparatus is to be actuated, will tread on it with one foot. For counting persons travelling along a sidewalk, for example, the mat should preferably be as wide as the sidewalk and deep enough (in the direction of the traffic) to insure that the average person will not ordinarily step across it but will tread on it at some point with one foot. The mat is not rendered inoperative if one or more persons remain standing upon it but is capable of counting a plurality of persons traversing the mat at the same time. This is achieved in the present instance by embodying in the mat a plurality of electrical contact devices designed to effect only a momentary change in the electrical counting circuit when one treads on the mat.

In other words, in treading on the mat (employing a normally open circuit) a person's foot closes an electrical circuit, then instantly breaks it, leaving the circuit in condition to be closed (and then again instantly broken) by another person, whether or not the first person still remains on the mat. In other words, continuous pressure on the mat (as where one remains standing on it) does not hold the circuit closed.

The illustrative mat 10 is here shown equipped with a normally open counting circuit, and, in the present instance, the electrical contact devices operate also to effect a momentary closing of the circuit when the pressure of one's foot is removed from the mat. Thus two electrical impulses, each of very short duration, result for each impact with the mat. The impulses advantageously actuate a counter or recorder designed to register one count for each two impulses. One form of counter suitable for this purpose is illustrated in Paver Patent No. 2,067,336. The counting devices therein illustrated are employed for recording vehicular traffic which delivers two electric impulses for each vehicle. Such counters, however, function equally effectively with the present pedestrian counter. The counter may advantageously print or otherwise make a periodic record of the count. The counter may be housed in a tamper-proof container 11 which may, if desired, be located remote from the counting mat 10, being connected thereto by wires 12. The container 11 may advantageously carry a storage battery (six volts being adequate) to energize the electrical circuits in the mat as well as to operate the counter and recording apparatus.

The contact making device embodies a resilient element adapted on initial deflection to make contact with a conductor (to complete a circuit) and then on further deflection in the same direction immediately to break that circuit. Such contact making and breaking means is here represented by a pair of conductors 13 and 14 connected to the opposite sides of the circuit and a contact element 15 designed to close a circuit across said conductors for actuating the counter. The contact element is resilient and arranged to be deflected by the pressure of one's foot to close and then instantly open the counting circuit. The manner of effecting closing and then instantly opening the circuit employed in this instance is illustrated in Figs. 3, 4 and 5. As there shown, the conductors 13 and 14 are elongated and arranged in parallel relationship extending across the width of the mat 10. They are ad-

vantageously supported in insulating material 16 longitudinally slotted as at 17 to hold the conductors in place, the latter being in this instance square in cross section. At intervals the insulating material is recessed as at 18 to receive and to allow for the deflection of the contact elements 15. The latter are preferably made from strips of resilient material, such as spring steel, and are preferably spaced apart a distance 19 somewhat less than the width of a person's foot. The recesses 18 in the insulating material are only slightly wider than the strips and serve to prevent their longitudinal displacement. The strips are here shown resting normally in contact with one of the conductors 13 but out of contact with the conductor 14, the latter being at a slightly lower elevation to provide a small space 20 between it and each of the contact elements (Fig. 3). On the initial downward deflection of the contact element under the pressure of a person's foot, contact is also made with conductor 14, thereby completing a circuit through the counter (Fig. 4). Slight further deflection of the element 15 between conductor 14 and the seat 21 supporting the other end of the element quickly and substantially raises the opposite free end 22 thereof out of contact with the conductor 13, thus opening the circuit. The closing of the circuit is thus only instantaneous. By this arrangement, closing and breaking the circuit require a very small movement of the contact strip. This makes it possible to make a thin mat with very little offset in the surface over which the pedestrians travel. If desired, the contact element may be connected with one conductor and on deflection first engage and then pass beyond the other conductor to make and break a circuit. This arrangement, however, requires a greater range of movement of the deflectable contact member.

In the present instance, the pressure of a pedestrian's foot is transmitted to each contact element through buttons 23 resting on an intermediate portion of the contact elements, and, in this instance, held in place by a cover plate 24 having opening 25 therein through which the buttons pass. The cover plate is preferably appropriately fastened by screws 26 or the like to the body of insulating material 16. If the cover plate be metal, as in this instance, a strip of insulating material 27 is preferably interposed between the cover plate and the contact elements 15 in the region of the conductors 13 and 14.

The body of insulating material 16, together with the cover plate 24 carrying the contact members, advantageously comprises a unitary structure 28 which may be incorporated in the pedestrian mat. Each of the units 28 is provided with lead-in wires 29 connecting the conductors 13 and 14, respectively, in parallel with the wires 12 leading to the counter. A plurality of units 28 are advantageously incorporated in the mat 10 to give the latter such width or depth in the direction of travel that the average pedestrian would not ordinarily step clear across it. A mat may advantageously comprise three units spaced about 12 inches apart. Preferably the units are completely enclosed to exclude water and dirt. One form of mat comprises a bottom sheet 30, preferably waterproof, such as rubber, and a flexible top sheet 31 which may also be rubber, having a water-tight connection between the bottom sheet along its margins 32. The units 28, between the top and bottom sheets, may advantageously be spaced in the mat by

strips of material 33 approximately the thickness of the units. Such strips are, in this instance, of rubber but may be made of less expensive material since their function is simply that of a spacing filler. The units 28 whose thickness determines the thickness of the mat should be relatively thin so that the mat will not present a substantial offset to the surface along which pedestrians are walking. In the present instance, the units are about $\frac{3}{8}$ of an inch in thickness and may lie upon a sidewalk, floor or the like without interfering with the pedestrians normal stride.

The number and spacing of the units, as well as the number and spacing of the buttons 23, may be varied within considerable limits. It is not essential that the registered count coincide with the true count provided it has a reasonably definite relation to the true count. The causes of variation from the true count are: (1) double counts, by individuals with long feet engaging two units or by individuals, such as children, taking two steps on the mat; (2) failure to count when the individuals with narrow heeled shoes engage strip between two contact buttons or when persons deliberately step clear across the mat; and (3) failure to make a true count where two or more persons close the circuit exactly at the same instant. These variations, however, have proved to be reasonably constant for a given arrangement of units and a given spacing of buttons 23 in each unit. To determine the correction factor for given spacings, it is necessary simply to make a short manual test count to determine the relation between registered count and actual count. This provides a correction factor by which in subsequent automatic counts the true count may be determined. The correction factor is substantially constant despite variation in concentration of traffic. Tests have shown that the apparatus is very effective not only in light traffic but in traffic of such concentration that one or more individuals traverse the mat at the same time. Generally, interest in counting traffic arises when the traffic becomes relatively heavy. The present apparatus is of particular utility in such cases, since it is portable, may be installed anywhere, and is capable of counting pedestrians even though two or more may cross the mat at about the same time.

Obviously the invention is not limited to the details of the illustrative construction since these may be variously modified. Moreover it is not indispensable that all features be used conjointly since various features may be used advantageously in different combinations and sub-combinations.

Having described my invention, I claim:

1. Apparatus for counting pedestrian traffic comprising in combination a counter, a pedestrian mat adapted to be located across a path traversed by pedestrians to be counted and having a plurality of electric switches therein, said switches being connected in parallel circuits with each other and in series with the counter for actuating the counter, each switch operating when trod upon by a pedestrian first to close a circuit and then immediately to open the circuit and to hold said circuit open so long as a pedestrian remains standing on a switch, whereby counting of other pedestrians traversing said mat is not interrupted if a pedestrian remain standing on a switch.

2. Apparatus for counting pedestrian traffic comprising in combination a counter, a pedes-

trian mat adapted to be located across a path traversed by pedestrians to be counted and having a plurality of electric switches therein, said switches being connected in parallel circuits with each other and in series with the counter for actuating the counter, each switch operating when trod upon by a pedestrian first to close a circuit and then immediately to open the circuit and to hold said circuit open so long as a pedestrian remains standing on a switch, whereby counting of other pedestrians traversing said mat is not interrupted if a pedestrian remain standing on a switch, the dimension of said mat in the direction of pedestrian traffic being such that on the average in traversing said mat pedestrians will always place a foot thereon, said switches being spaced apart so that one switch will be closed by the average pedestrian's foot wherever it is placed on said mat.

3. A pressure actuated switch for pedestrian counters and the like comprising in combination, a pair of conductors adapted to extend across a path traversed by pedestrians to be counted, a plurality of resilient contact devices at a plurality of separated points across said path in parallel with one another in the circuit and adapted to be actuated by pedestrians for making electric contact across said conductors, said devices being normally out of contact with one of said conductors and deflectable so as to complete a circuit across said conductors, and means for mounting each contact device so that on further deflection said circuit is broken, whereby said switch remains operative even though a pedestrian remains standing on one of said contact devices.

4. A pressure actuated switch for pedestrian counters and the like comprising in combination a pair of conductors adapted to extend across a pathway traversed by pedestrians, a plurality of resilient contact elements lying across said conductors and each being supported adjacent one end on one of said conductors and adjacent the other end on an insulated support, said elements being normally out of contact with the other conductor but being deflectable into contact therewith to complete a circuit, said elements being further deflectable in the same direction to raise their first named end out of contact with its supporting conductor to break said circuit whereby a pedestrian may hold one or more of said elements in depressed position without rendering the apparatus inoperative.

5. A pedestrian mat for devices actuated by pedestrian traffic and the like, comprising in combination, a base having therein a plurality of spaced pairs of conductors extending across the width of the mat, a plurality of contact making means associated with each of said pairs of contacts and distributed across the width of the mat, each of said means being deflectable under foot pressure first to close a circuit through a pair of conductors and then immediately to open said circuit, said pairs of conductors and said contact making means being so spaced that the average pedestrian in crossing the mat will operate one of said contact making means, a cover over said mat to exclude dirt and moisture from the interior of the mat, and lead-in wires connecting said pairs of conductors in parallel.

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