

[54] **EQUIPMENT ON THE HUMAN BODY FOR GIVING SIGNALS, ESPECIALLY IN CONNECTION WITH ALARM SYSTEMS**

3,644,919 2/1972 Mathauser 200/DIG. 2
 1,096,125 5/1914 Pidot..... 200/DIG. 2
 2,135,476 11/1938 Rugh..... 340/277

[76] Inventor: **Otto Riedo**, Talbachliweg 18, CH-8048 Zurich, Switzerland

Primary Examiner—Robert K. Schaefer
Assistant Examiner—William J. Smith
Attorney—William D. Hall et al.

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[51] Int. Cl. **H01h 3/14**

[58] Field of Search 200/52, DIG. 2; 340/276, 277, 279

[57] **ABSTRACT**

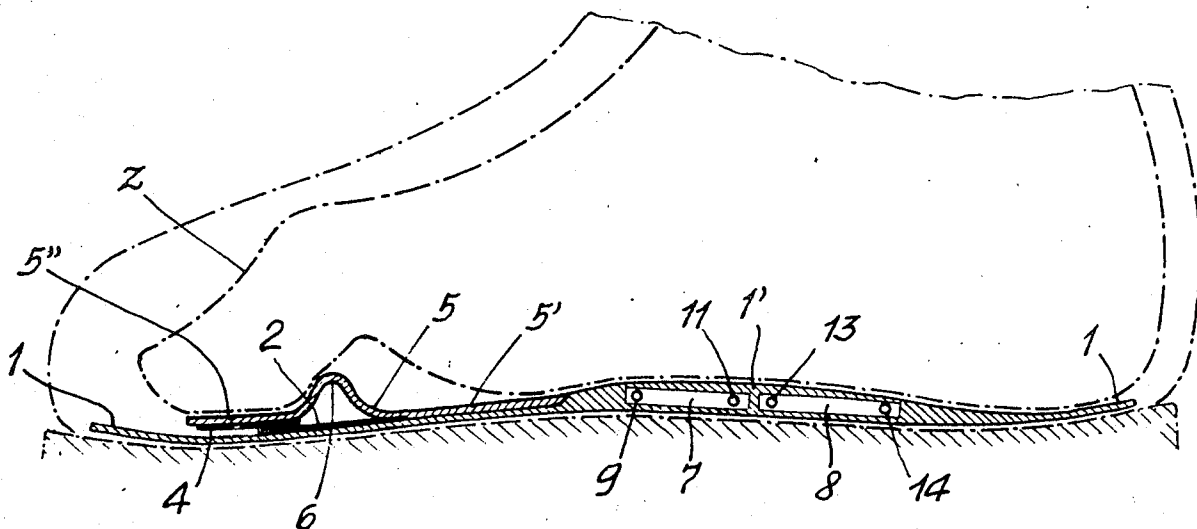
The invention provides equipment for use on the human body, for giving signal, especially in alarm systems, comprising a vehicle for attachment to a limb of the human body, and an actuating instrument incorporated in said vehicle and adapted to respond to movements of said vehicle such that a change of position of said limb and of said vehicle affects the actuating instrument to give an alarm.

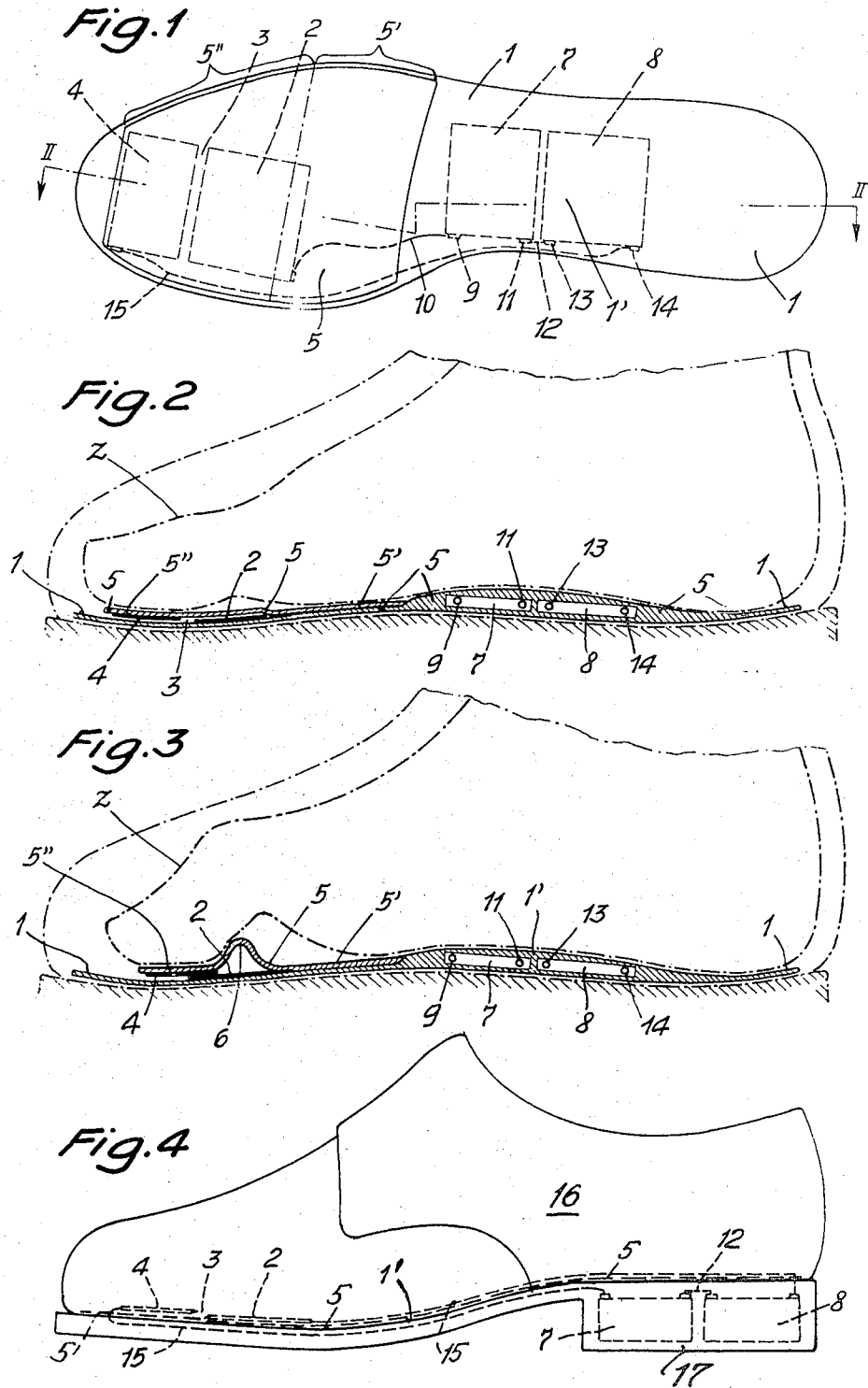
[56] **References Cited**

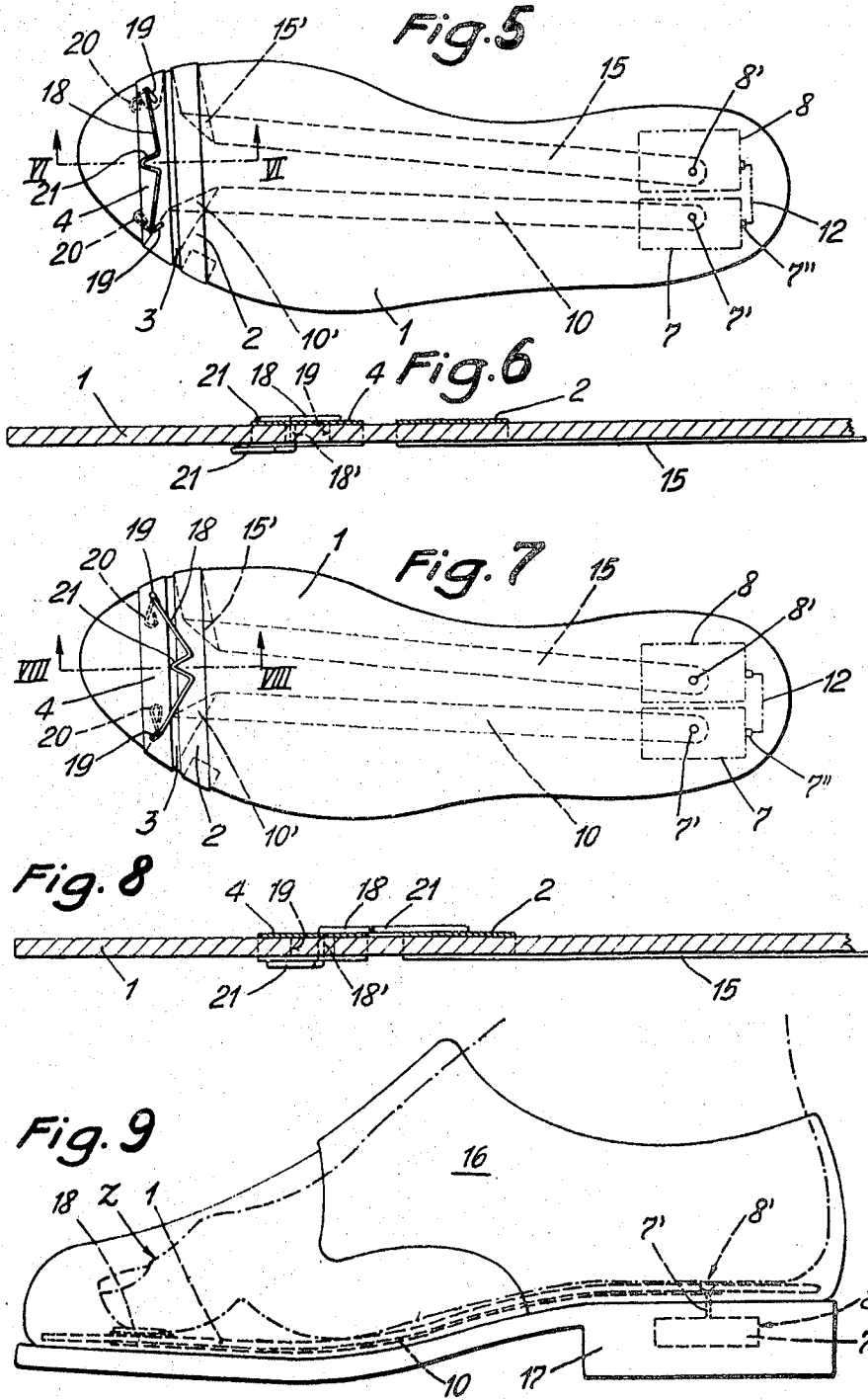
UNITED STATES PATENTS

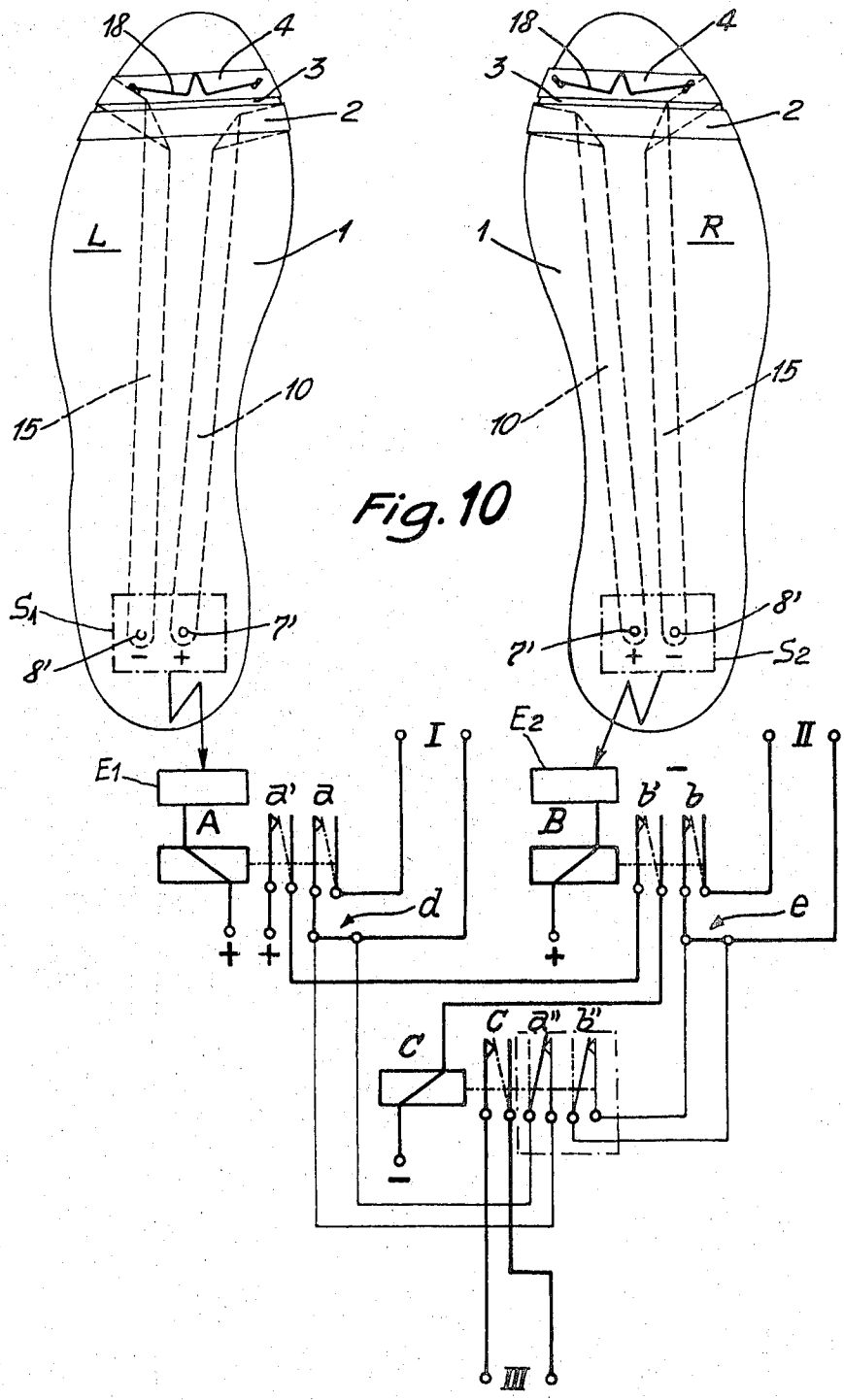
1,824,663 9/1931 De Munbrun 340/277 X
 1,771,258 7/1930 Kalikow 340/277 X

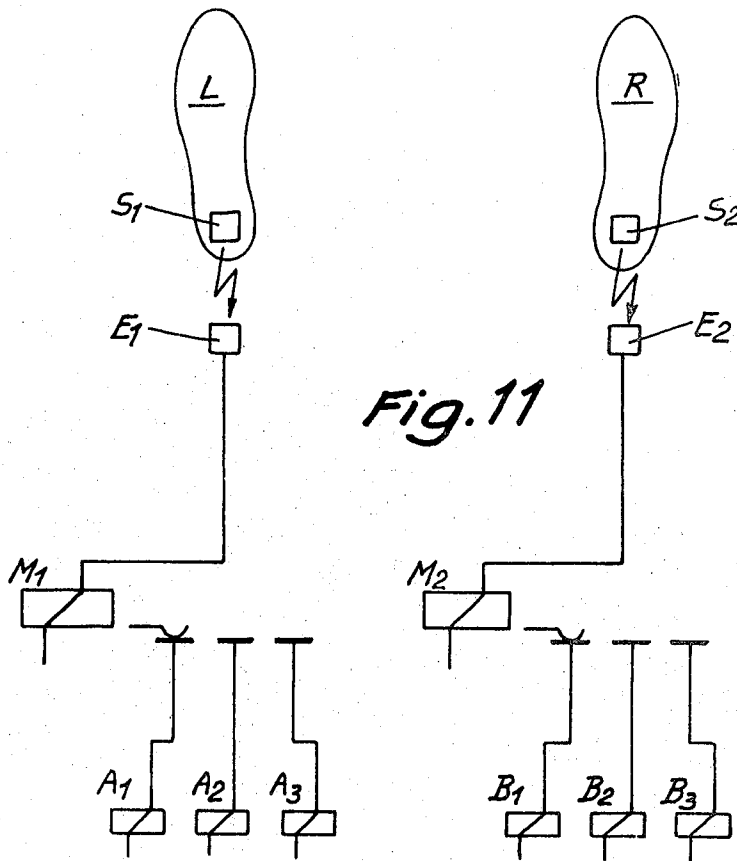
8 Claims, 11 Drawing Figures











EQUIPMENT ON THE HUMAN BODY FOR GIVING SIGNALS, ESPECIALLY IN CONNECTION WITH ALARM SYSTEMS

Counter clerks, especially in banks and post offices, and also staff in the cash and wages offices of business and industrial concerns, are barely able to operate an existing alarm device in the event of a sudden attack without risking their lives. Any suspicious movement can be fatal to them. In many cases, too, victims of accidents, invalids and crippled persons in nursing homes have difficulty in alerting the neighbourhood.

The present invention consists of a device fitted to the human body for giving signals, especially in alarm systems. In accordance with the invention, this is made possible by a device characterised by the fact that a device, designed for attachment to a limb of the human body, is envisaged, into which there is fitted an actuating instrument which responds to movements of the limb in such a way that a change in the position of the limb and of the device affects the actuating instrument and gives the alarm.

An appropriate form of the device is an item of footwear, the actuating instrument, with the contact belonging thereto, being fitted into a part of it.

The drawing shows examples of practical versions of the subject of the invention, as follows:

FIG. 1: a view from above of a first version,

FIG. 2: a section through the line II — II of FIG. 1, in the normal position with the contact open,

FIG. 3: the same, with the contact closed and

FIG. 4: a second version, with the device built into a shoe which is depicted in side view,

FIG. 5: a view from above of a third version, consisting of a liner element with the contact device in the open position,

FIG. 6: a detailed longitudinal section through the line VI — VI of FIG. 5, to a larger scale,

FIG. 7: a view of the liner element from above, with the contact device in the closed position,

FIG. 8: a detailed longitudinal section through the line VIII — VIII of FIG. 7, to a larger scale,

FIG. 9: a liner element with a contact device closed by the toes,

FIG. 10: the wiring diagram of a fourth and

FIG. 11: the wiring diagram of a fifth version.

In the versions shown in FIGS. 1 to 3, a small plate-shaped contact area 2 of conducting material such as copper is mounted in a liner element 1 in the region of the balls of the toes. A contact area 4 of conducting material, which is movable relative to the contact area 2, rests on the liner element 1 leaving a gap 3 of about 4 — 5 mm from the contact area 2. A flexible, membraniform vehicle channel 5, about 1 mm thick, is secured by its rear part 5', either by adhesive or rivets, to the liner element 1, while its front part 5'' rests loosely on the liner element 1. The movable contact surface 4 is rigidly fixed by an adhesive to the elastic vehicle channel 5. By flexing the toes Z (FIGS. 2 and 3), indicated by chain-dotted lines, which rest on the front end of the vehicle channel 5, the contact surface 4, together with the part of the vehicle channel 5 linked to the latter, can, while forming a fold 6, be displaced far enough to the rear from the position in FIG. 2 to bring the rear part of the contact surface 4 above the front part of the contact surface 2, as is shown in FIG. 3. If, for example, the battery 7 and the transmitter 8 are located in the

liner element 1, the centre section 1' of the latter is made thicker. The one pole 9 of the transmitter 8 is connected by a wire 10 with the contact surface 2, while the other pole 11 of the battery 7 is connected via a wire 12 to a terminal 13 of the transmitter 8. The other terminal 14 is connected via a wire 15 to the movable contact surface 4.

When, as is shown in FIG. 3, the circuit between the contact surfaces 2, 4 is closed, the gap 3 (FIGS. 1 and 2) disappears and the circuit 10, 15 is closed via the transmitter 8. When the circuit is closed, the transmitter 8 is activated in the normal way and emits control signals which are passed to a remotely situated receiver forming part of a conventional alarm system.

For identification purposes, a pungent and lasting odour or colouring can be used, which is projected from a spray can the moment the contact surfaces 2, 4 make contact and close the circuit. It is, for example, possible to arrange for a valve of the spray can to be actuated by electromagnetic control when the circuit is closed, enabling the pressurised odour or identification medium to be released. This variation is especially suitable for the subsequent identification of the culprits. This spray equipment can be operated by itself or in conjunction with the transmitter.

Operation of the device by moving and flexing the toes Z is completely inconspicuous and in every case voluntary. Involuntary movement while walking, running, hopping, etc., does not normally occur, as the toes Z are not pulled back during these movements.

The power source 7 and the transmitter 8 can also be located separately, away from the liner element 1, e.g., elsewhere on the human body or in the clothing. The wire connection 15 is relatively long, and has to be led through the shoe and the clothing to the remotely located battery 7 and to the transmitter 8. A spray can can also be used with or in place of the transmitter 8.

FIG. 4 shows a version in which the vehicle channel 5 is located on the sole 1' of the shoe 16. The contact surfaces 2, 4 are fitted on top of the vehicle channel 5, connected with the battery 7 by the wire 15 and have their mutually opposite ends either tapered or rounded, to allow them to slide over one another. 8 designates the transmitter which, together with the battery 7, is fitted into a hollow space in the heel 17 of the shoe. Operation of the contact surface 4, emission of a signal and the method of functioning are similar to those described in connection with the first version. The transmitter can be replaced by a siren, report, whistle or a spray device.

The vehicle channel 5 for the plate-shaped contact surfaces 2, 4 could also take the form of a flexible strip resting either fixed or loose on the sole of the footwear or shoe.

With the aid of the invention described, unobtrusive operation of the alarm system is possible.

As shown in FIGS. 5 to 9, a liner element 1, preferably of conventional material such as leather, has on its upper surface, in the region of the toes, a contact surface 2 consisting of a metal strip and, a short distance 3 away from it, a second contact surface 4 also made of metal. The contact surfaces 2 and 4 extend as far as the edge of the liner element 1 and are embedded in the underside thereof, and are led, one on each side, to the heel section of the sock via an elbow 10' and 15' acting as a conductor 10 and 15. Connecting wires 7', 8' pass through the upper layer of the heel 17 of the shoe 16

and link the lead 10 and 15 with the one electrode 7' of a current source and with the terminal 8' of a transmitter 8. The current source 7 and the transmitter 8 are built into the heel 17 of the shoe. 12 is the lead connecting the other electrode 7'' of the current source to the transmitter 8.

The battery circuit is closed via the transmitter 8 by means of a projecting contact-bridge piece 18 with a spring action, which is located on top of the liner element, across the longitudinal direction of the sole. The contact-bridge piece 18 rests on the contact surface 4, and its two ends sections 18' are angled vertically to the contact surface 4. The angled sections 18' pass through the liner element 1 in slots 19 running obliquely to the longitudinal direction of the sole and are curved underneath the sole at right angles to the oblique slots 19 to form loops 20 which lie flush with the underside of the liner element 1 and provide the contact-bridge piece 18 with the conduction and security necessary for its operation when it is in a position in which it lies flat against the contact surface 4. A projection 21 fitted to the contact-bridge piece 18, in the plane of the latter, serves to prevent sticking of the contact surfaces 2, 4. In addition, this projection 21 pushes to the centre any foreign bodies, such as threads from socks or stockings, which may appear during working movements, thus ensuring a good contact. Without this sweeping, the threads could work their way beneath the projection, lift it and prevent proper contact.

To operate the contact device, the toes Z, which exert pressure on the contact-bridge piece 18, are flexed back, thereby partially displacing the spring-loaded contact-bridge piece 18 on to the contact surface 2 by bending in the longitudinal direction of the sole. This action closes the contact device, and, with it, the battery circuit via the transmitter 8. As long as the circuit remains closed, the transmitter emits control signals which are passed to a remotely-located receiver of an alarm system.

In the version shown in FIG. 10, 1 again represents the liner element, made preferably of sweat-absorbent, strong material such as leather, which is inserted in the shoes of, for example, a bank cashier. Here, L indicates the left and R the right liner element. 2 and 4 are the contact surfaces, made of metal strip, fitted on to the liner element 1 in the region of the toes, at a distance 3 from one another, which are linked by leads 10, 15, located underneath the liner element, to connecting wires 7', 8'. In each liner element L and R, the terminal 7' is connected to the negative electrode of a battery which is not illustrated, and the terminal 8' is connected via a relay A or B or, respectively, with an ultrasonic or high frequency transmitter S₁ or S₂ to the positive electrode of the appropriate battery. 18 is a spring-loaded contact-bridge piece of stainless steel wire fitting against the contact surface 4 and with its ends fixed thereto, which can be partially displaced by deflection by means of the toes of the foot towards the contact surface 2, thereby closing the contact device. Closing of the contact device in sole L trips the relay A via receiver E₁ and closing of the contact device in sole R trips the relay B via receiver E₂. Relay A actuates the switches a, a' associated with it, and relay B the switches b, b' associated with it. Tripping of relay A as a result of closing the contact device in the left sole L closes the switches a, a', causing the call I to be triggered via switch a. Tripping of relay B as a result of

closing the contact device in the right sole R closes the switches b, b', causing the call II to be triggered by switch b. Simultaneous operation of the contact devices in both socks L and R trips both relays A and B, thereby simultaneously closing switches a, a' and b, b', the closing of switches a', b' tripping relay C, which closes switch c, while a'' and b'' are opened. In the process, closing of switch c causes the call III to be triggered. Unsoldering of the connecting bridges d and e will prevent calls I and II being switched on at the same time as call III.

Triggering of call I confirms that the device in the left liner element L is operating satisfactorily, and triggering of call II confirms that the device in the right liner element R is operating satisfactorily. Call I and call II at the same time trigger call III and thus the alarm, provided that call III is intended for this purpose. It is also possible, for example, for concealed cameras, tape recorders, etc., to be set in operation simultaneously with call I and call II.

In the version shown in FIG. 11, the signals given by the operating devices in the liner element L, R via the transmitters S₁, S₂ to the receivers E₁, E₂ operate stepping magnets M₁, M₂, which trigger off the required calls via the relays A₁, A₂, A₃ and B₁, B₂, B₃.

These step-by-step switches M₁ and M₂, operated by electromagnets and connected in front of the relays A₁, A₂, A₃ and B₁, B₂, B₃ increase enormously the possible modes of operation and call possibilities. For example, the 34. function can be triggered by giving three pulses (tens) from the right sock R and four pulses (units) from the left liner element L. In the same way, the 63. function is triggered by giving six pulses from the liner element R and three pulses from the liner element L. Existing and suitable semi-conductor switches can by all means be used instead of the step-by-step switch, and can also replace relays A and B. Technically, semi-conductor switches are used just as frequently as stepping magnets.

I claim:

1. Apparatus for surreptitiously sounding an alarm comprising in combination:

a. at least one item of footwear each of which includes;

1. switch means which is at least in part operatively connected to one said footwear item,
2. means responsive to movement of a portion of a foot supported within said footwear item relative to the rest of the foot for actuating said switch means to selectively open and close an electrical circuit, and

b. means controlled by said electrical circuit for providing a distinctive signal.

2. The apparatus of claim 1 wherein said controlled means is responsive to the flexing of a toe on the foot supported within said footwear item to move a first element of said switch means into electrical conductive engagement with a second element of said switch means.

3. The apparatus of claim 1 wherein said footwear item comprises a shoe and said switch means comprises first and second electrically conductive elements connected to a liner element supported on the inner sole surface of the shoe.

4. The apparatus according to claim 3 wherein said liner element is flexible and said first and second conductive elements are attached thereto at spaced posi-

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tions one from another when said liner element is flat, said first and second conductive elements being brought into electrical contact upon flexing of said liner element is response to flexing of a toe of the foot.

5 5. The apparatus according to claim 1 wherein said switch means comprises first and second conductive elements at least one of which comprises a spring-loaded flexible member adapted to be gripped by the toe and displaced toward the other said conductive element.

6. The apparatus of claim 1 where said switch means comprises first and second conductive elements, the first of said conductive elements including a spring-loaded element operatively connected to an associated contact member, said spring-loaded element being engagable by a toe of the foot and moveable longitudinally of the sole of the footwear item into engagement with another contact member included in said switch means.

7. The apparatus of claim 1 which includes two footwear items, one for each foot, and each including said switch means and said means responsive to foot movement for actuating said switch means, said controlled means being responsive only to the concurrent actuation of said switch means associated with both said respective two footwear items to provide said distinctive signal.

10 8. The apparatus of claim 1 which includes two items of footwear, one for each foot, and each including said switch means and said means responsive to movement of the foot for actuation of said switch means, said controlled means including counting means for each said footwear item for counting the number of actuations of said switch means for each said item of footwear and for producing distinctively different output signals in response to different numbers of pulses counted by said counting means.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,777,086 Dated December 4, 1973

Inventor(s) OTTO RIEDO

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Foreign Application Priority Data

October 12, 1971 Switzerland. 14 880/71
January 17, 1972 Switzerland. 609/72
June 7, 1972 Switzerland. 8 483/72
June 13, 1972 Switzerland. 8 897/72

Signed and sealed this 10th day of September 1974.

(SEAL)
Attest:

McCOY M. GIBSON, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

UNITED STATES PATENT OFFICE
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