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SIGNALING SWITCH DEVICE

Original Filed March 13, 1945

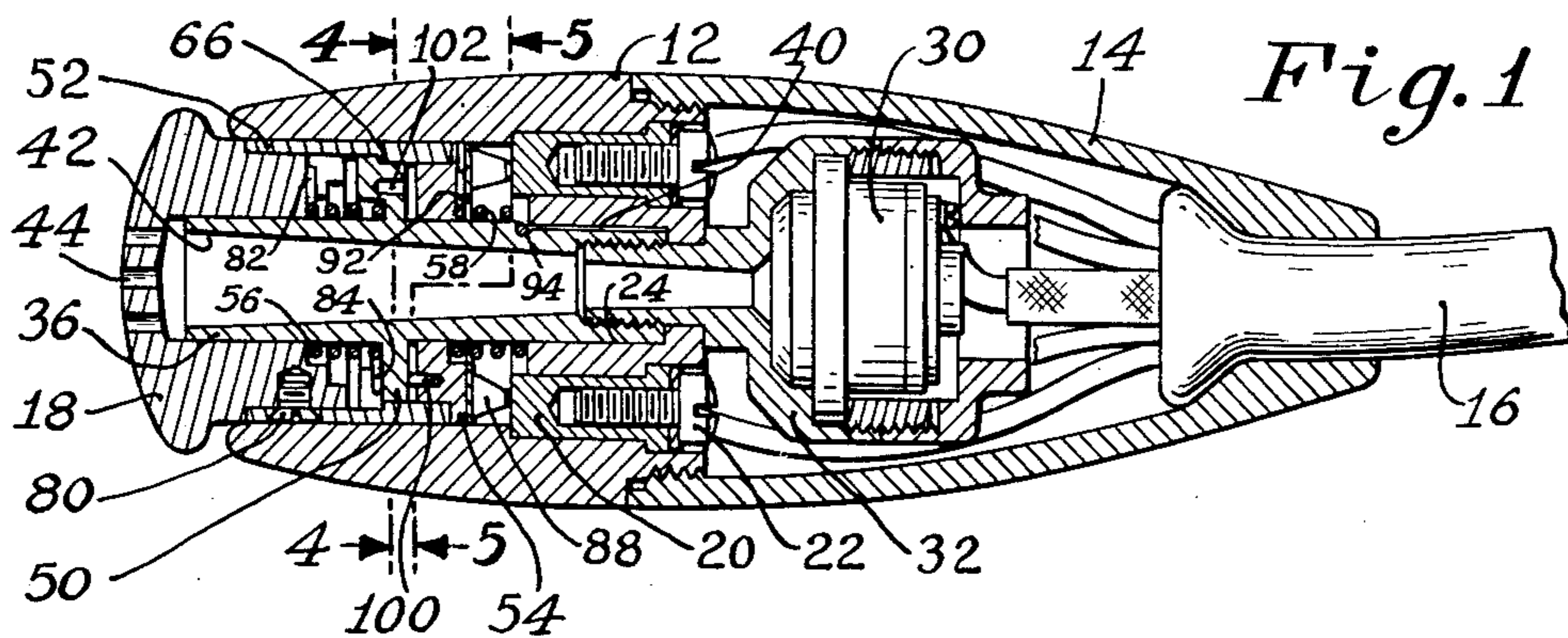


Fig. 1

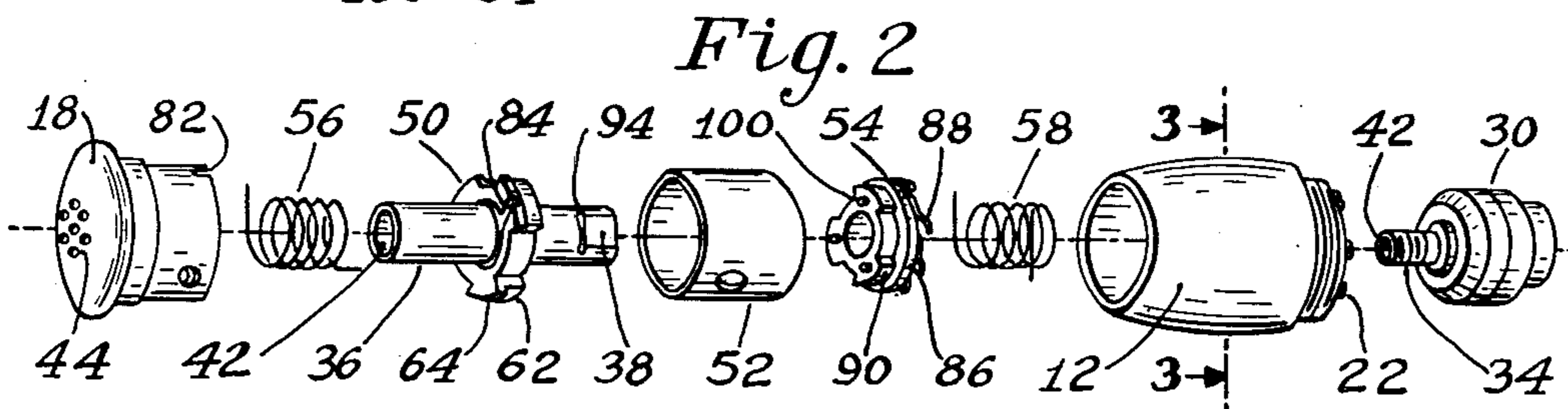


Fig. 2

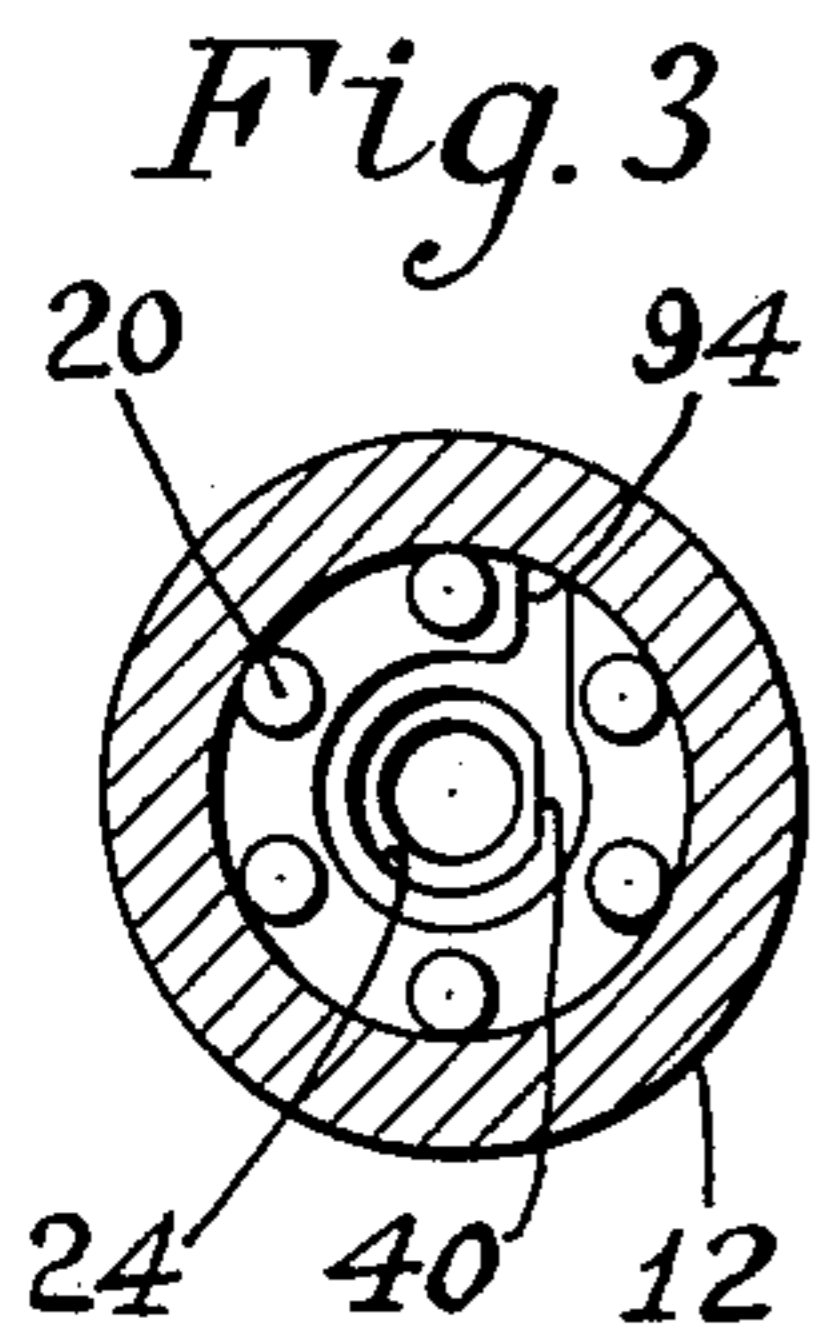


Fig. 3

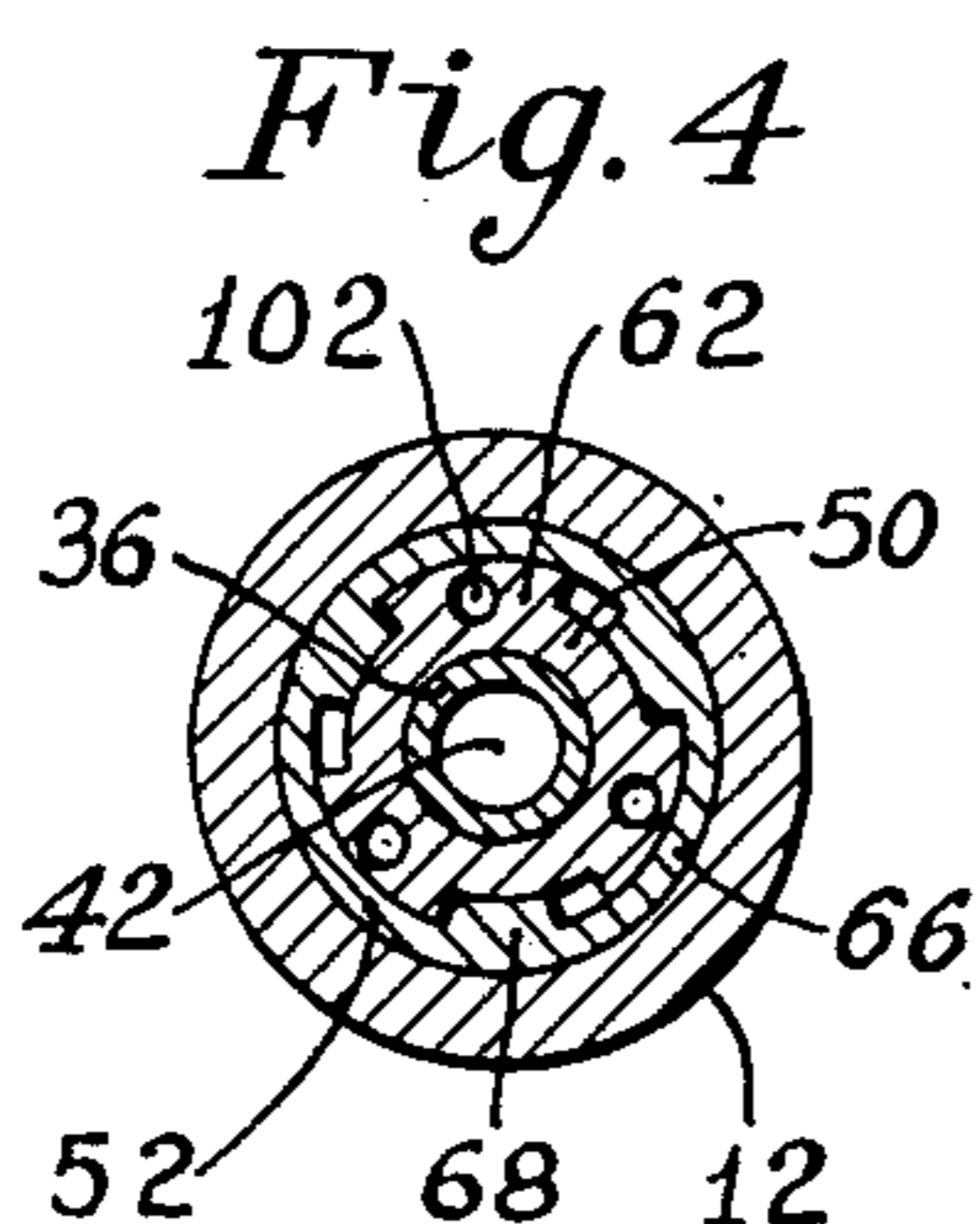


Fig. 4

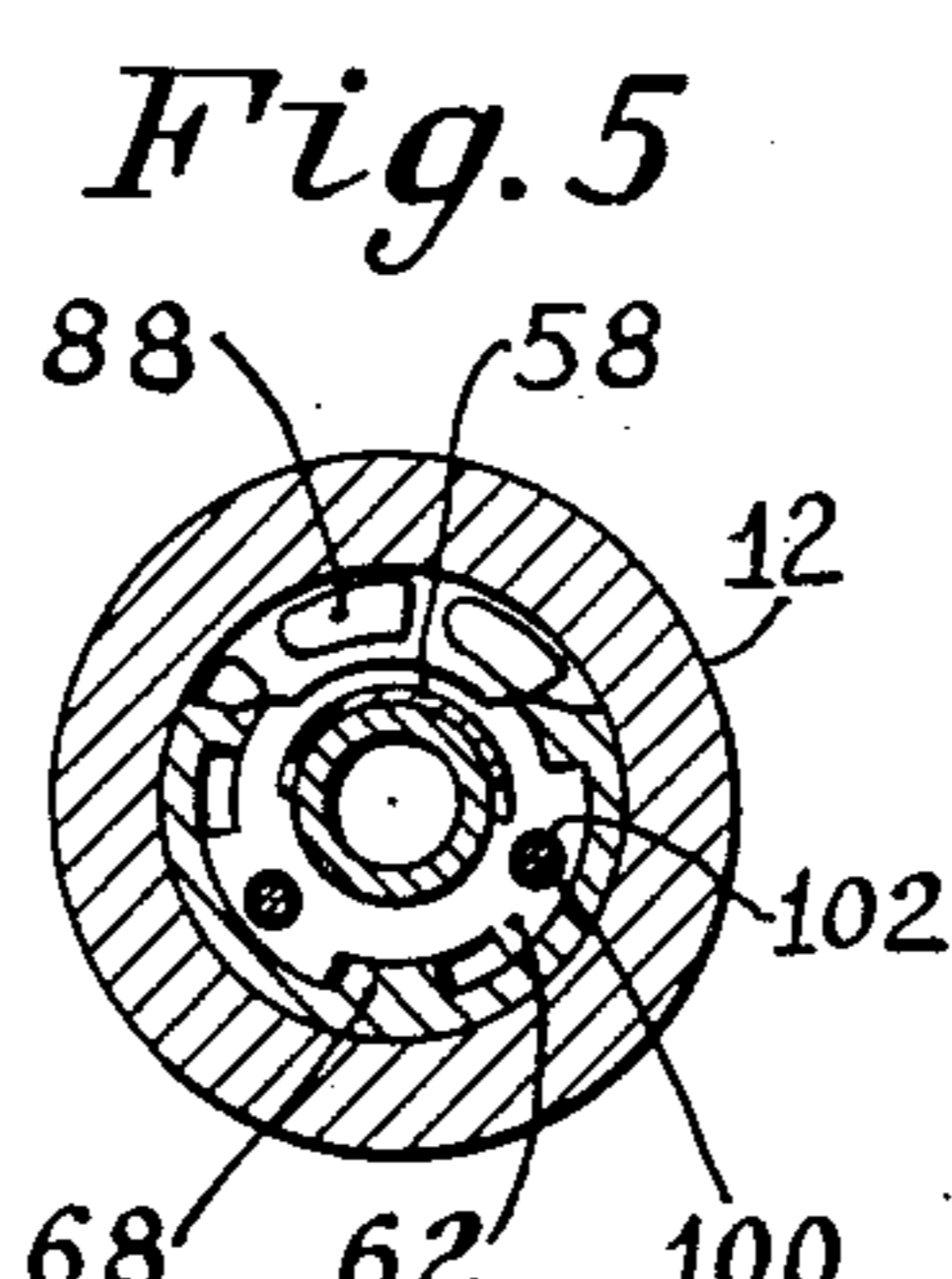


Fig. 5

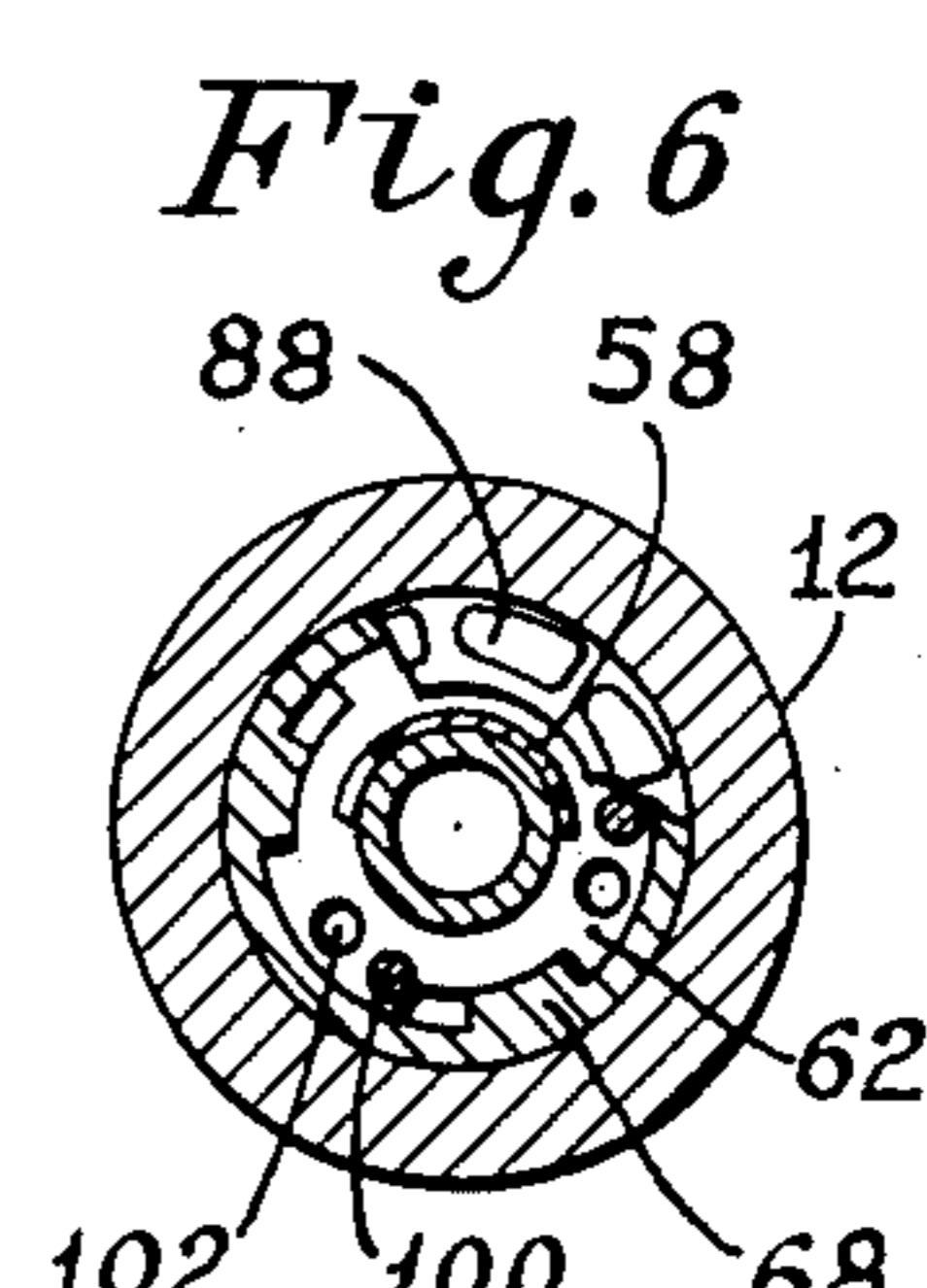


Fig. 6

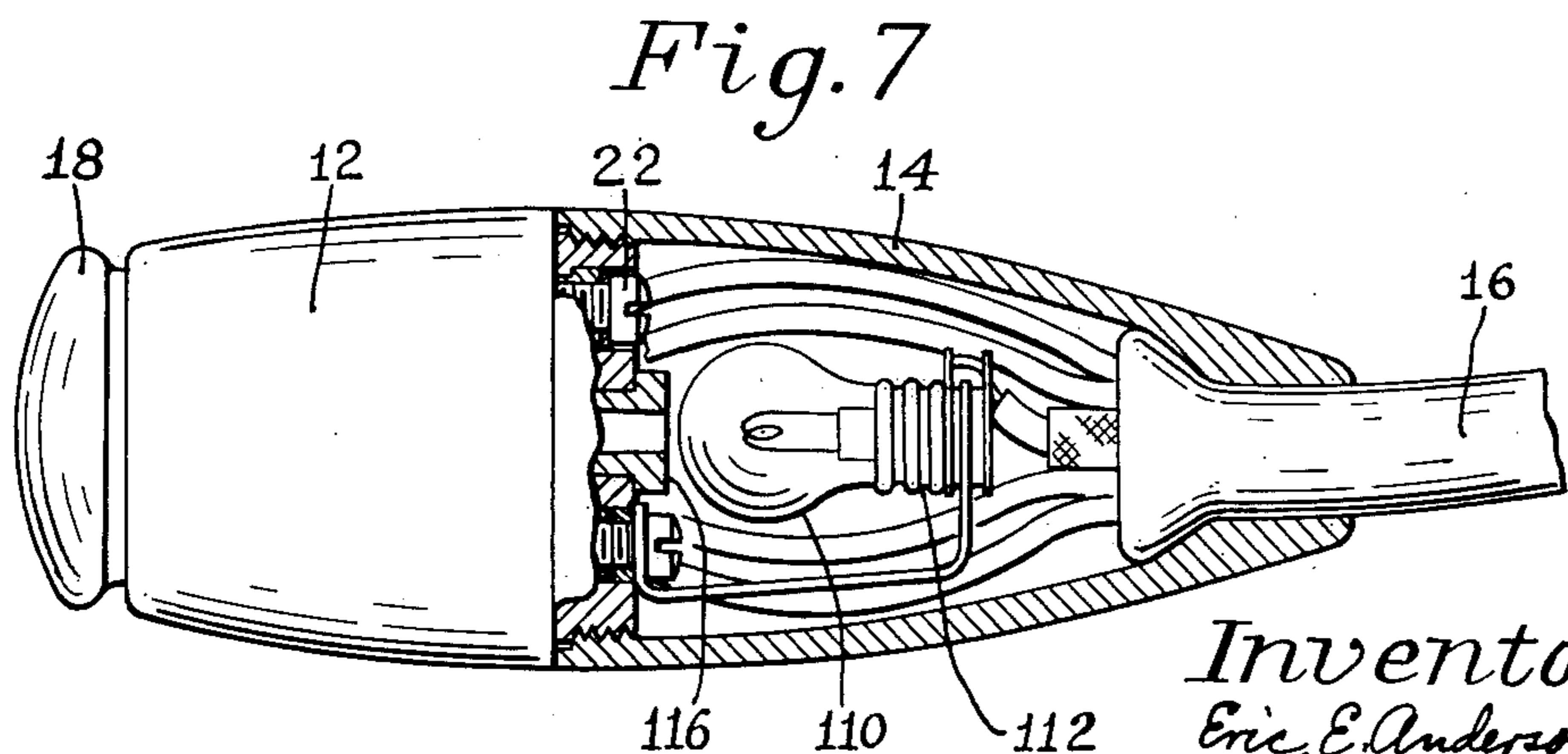


Fig. 7

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UNITED STATES PATENT OFFICE

2,624,808

SIGNALING SWITCH DEVICE

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Continuation of application Serial No. 582,466, March 13, 1945. This application March 30, 1949, Serial No. 84,362

1 Claim. (Cl. 200-4)

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The present invention relates to signaling devices, particularly adapted for use in hospital signal and communication systems.

These systems generally employ a push button switch for each patient, the switches being connected by a flexible cord to the room outlet to permit placing the push button conveniently close to the patient's hand. A system of audible and visual signals is usually provided to direct the attention of the supervising attendant to the existence of a call and to identify the room from which it came.

Such a system requires that the nurse or other attendant go to the room to ascertain the reason for the call. In numerous instances it will be found that the trip could have been avoided had direct communication been possible between the patient and the attendant at the desk.

It is, therefore, one of the objects of the present invention to provide a suitable signal and voice communication system for hospital use, wherein electro-acoustical transducing means may be directly incorporated in the patient's push button switch unit to permit two-way voice communication with substantially complete privacy and without disturbing other patients.

There is also the objection, in hospital signaling systems wherein the switch is at the end of a cord to permit placing it on the bed or under the pillow within easy reach of the patient, that the device often falls to the floor, which may leave the patient unable either to call the nurse or to reveal the existence of such inability.

The invention, therefore, has as a further object the provision of a push button switch unit so constructed and arranged that even a slight pressure on the button is sufficient to operate the switch, with the result, in the event the switch falls, that the impact due to the fall will, almost without exception, cause actuation of the switch and transmission of a signal, summoning the attendant.

According to one feature of the invention, there is provided in a compact housing, corresponding in size to conventional push button units, not only button-operated switching means for giving the usual visual and audible signals, but in addition, an electro-acoustical transducer adapted to function both as a telephone transmitter or microphone and as a telephone receiver to permit two-way voice communication with the attendant at the desk, and where desirable, to permit the latter to have auditory supervision of the patients directly from the desk.

Another feature of the invention concerns the push button switching arrangement which pro-

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vides, in a construction adapted to permit the use of a coaxially arranged transducer or other signaling device, a pre-set type switch having a single actuating button, the switch being pre-set by the nurse by rotary movement of the button, and actuated by the patient by a slight pressure on the button, the release being so arranged that a blow or impact, such as caused by the switch's falling to the floor, normally results in actuation of the switch and the giving of a signal to summon the attendant.

In the drawings illustrating the several features of the invention, Fig. 1 is a view in sectional elevation of the switch and transducer assembly on a somewhat enlarged scale; Fig. 2 is an exploded view of the operating parts removed from the housing; Figs. 3, 4, 5, and 6 are detail sectional views taken along correspondingly numbered section lines in Figs. 1 and 2, Figs. 5 and 6 being taken along the same section line and partly broken away, showing the parts in switch-off and switch-on positions, respectively; and Fig. 7 is a view partly broken away, of a modified form of the invention.

The signaling device comprises a housing or casing formed in two sections 12 and 14 having threaded connections for assembly into a smoothly rounded shape which may be conveniently held in one hand. A flexible multi-conductor connecting cord 16 enters the housing at one end, while at the other end the housing is provided with a push button 18 having a large domed head substantially the diameter of the adjacent end portion of the housing 12. At the base of the bore within which the push button is slidably mounted, a plurality of switch contacts 20 having screw terminals 22 is arranged about a central passage 24 in the housing in spaced, mutually insulated relation.

Arranged within the section 14 of the housing is a transducer in the form of a combination microphone-receiver unit 30 of compact but conventional construction. The unit is mounted within a casing 32 having a projecting neck or stem 34 adapted to be received within the passage at the base of housing 12. The transducer is clamped in position within the housing by means of threaded connections between stem 34 and the inner end of a tube 36. The tube is held against rotation within the housing through the provision of flats 38 and 40 on tube and housing passage 24, respectively.

To transmit sound effectively between the transducer diaphragm and the outside of the housing, the stem 34 and tube 36 are provided with an axial passage 42 which gradually expands

in cross-section from the inner end of the stem 34 adjacent the transducer unit to the outer end of the tube 36 adjacent the head of the push button 18. The push button which is bored to provide a free-sliding fit over the tube end, has the portion of its end wall which is in alignment with the tube end perforated at 44 to complete the acoustic passageway to the outside.

The switch mechanism, operating in conjunction with the fixed contacts 20 to transmit visual and audible signals to the attendant, is arranged about the longitudinal tube 36 as an axis, leaving the axial portion of the housing free to provide the acoustic passage. The switch components, in addition to the button 18 and fixed contacts 20 already mentioned, comprise a stator 50 integral with or fixedly secured to the tube 36, a sleeve 52, a rotor 54, and coil springs 56 and 58 associated with the button and rotor, respectively.

The stator 50 is provided with segments 62 having shoulders 64 projecting outwardly beyond the main body of the segments, while the sleeve 52 is formed with an inwardly extending shoulder 66 at one end, with segments 68 extending inwardly therefrom so as to cooperate with the segments 62 of the stator in permitting limited rotation of the sleeve and also inward axial movement thereof. The button and sleeve are adapted to be assembled into a single operating unit locked together by screw 80, with spring 56 disposed between the button and stator 50 in such manner as to urge the button and sleeve assembly outwardly and in a counter clockwise direction relative to the stator. Grooves 82 and 84 in button and stator, respectively, serve to anchor the spring ends.

The switch rotor 54 comprises a flange portion 86 to which resilient contact fingers 88 are secured. Since the several contact fingers need not be electrically isolated, the contact finger assembly may conveniently be formed from a single piece of sheet Phosphor bronze or other suitable material. Associated with the flange is a hub portion having segments 90 adapted to cooperate with the segments 68 of the sleeve. Spring 58 is arranged between the rotor and the housing 12 to urge the rotor against the sleeve and stator and at the same time to urge the rotor in counter-clockwise rotation relative to the stator. Slots or grooves 92 and 94 are provided in rotor 54, tube 36, and at the base of the bore in housing 12 for locking the spring ends.

By reason of the interlocking relationship between the segments on rotor and sleeve, and between the sleeve and the stator, the rotor is permitted limited rotary movement. The parts are so arranged that the contact fingers, when the rotor is at the limit of its clockwise movement, are out of contact with the fixed contacts 20. When the rotor is at the limit of its counter-clockwise rotation, on the other hand, the contact fingers are in alignment with the fixed contacts and, except for the contact fingers which are in control of the buzzer circuit, in electrical contact to complete the circuits, to the nurse's signal lights. A substantial portion of the switching operation is thus effected by rotation of the rotor to move the contact fingers into and out of registry with the fixed contacts 20.

Actuation of the switch rotor 54 is controlled by the push button through sleeve 52. Independent axial and rotary movements of the button are utilized to provide on-actuation and off-actuation, respectively, of the rotor. To latch the ro-

tor in pre-set, switch-off position, against the urging of spring 58, the rotor is provided with short pins 100 which project from the face of segments 90 of the rotor hub. These pins are arranged to register with and to enter holes or sockets 102 in the stator when the rotor is in clockwise, or switch-off position, so as to retain the rotor in that position until such time as a signal is to be given.

To actuate the switch, only slight pressure is required on the push button, since it is only necessary to move the rotor inwardly far enough to release the short pins 100 from their sockets 102, against the relatively slight axial force of spring 58. Once the pins are freed of the sockets, the rotor snaps to on-position, causing the nurse's signal lights to be energized. Because of the slight pressure and small movement required to cause the rotor to be lifted out of latching engagement with the stator, the switch will in most instances be actuated by the blow or impact occasioned by falling from the patient's bed to the floor, so as to summon the attendant.

In order that a brief audible signal may likewise be given, as a supplement to the light signals, the switch is so arranged that the contact finger of the rotor which is in control of the buzzer circuit has a shallower bend than the others, and does not normally make contact with the adjacent fixed contact, even with the rotor at the limit of its counter-clockwise rotation, in switch-on position. To actuate the buzzer, the button is pushed to the limit of its inward position, against the force of spring 58 and also of the spring contact fingers already in engagement with the fixed contacts, thereby bringing the buzzer-circuit finger into contact. Thus, the buzzer or other audible signal is given only so long as the button is pushed, while the light signals remain on after pressure on the button is released.

To reset the switch, once the call has been answered, it is only necessary to turn the push button clockwise until the pins of the rotor register with and enter the sockets in the stator, thus latching the rotor in off position. Since the resetting and actuating operations are entirely different in character, no chance for confusion exists between the rotary resetting operation and the conventional push-button calling operation.

As an alternative to the use of the microphone-receiver unit in association with the switch mechanism, other signaling means may be provided such as a signal light 110 mounted in socket 112 in the section 14 of the housing, as illustrated in Fig. 7. Such light might be controlled, for example, from the attendant's desk, and lighted in response to a call from the patient to indicate to the patient that the call has been noted, the light being visible from the push button end through the axial passage within the housing. In such embodiment a flanged sleeve 116 takes the place of the transducer casing 30 and stem 34 to retain the tube 36, upon which the switch mechanism is supported in place in the housing 12.

This application is a continuation of my co-pending application No. 582,466 filed March 13, 1945, now abandoned.

What I claim is:

An electric switch comprising in combination, a spring actuated rotary contact member, a co-operating stationary contact member, rotatably and axially movable plunger means having operating means engageable with the rotary contact member, releasable locking means for maintaining said rotary contact member in circuit open-

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ing position, said operating means actuated by the axial movement of said plunger means for releasing said locking means, and means actuated by the rotary movement of said plunger means for engaging and resetting the rotary contact member in circuit opening position.

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