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H. A. BLAKE ET AL
SIGNAL AND CONTACT DEVICE

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Fig. 1

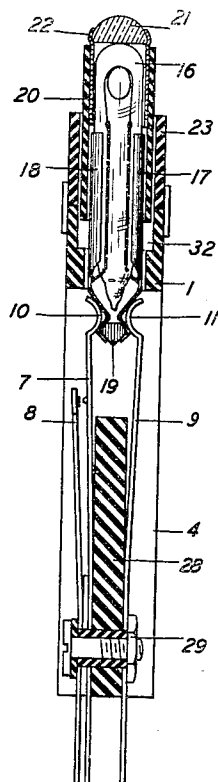


Fig. 2

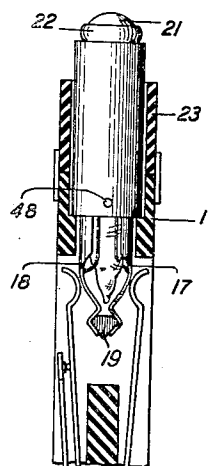


Fig. 3

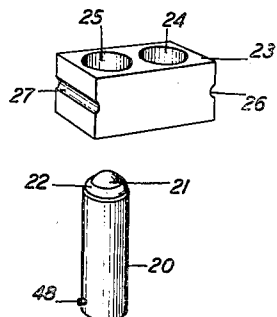


Fig. 4

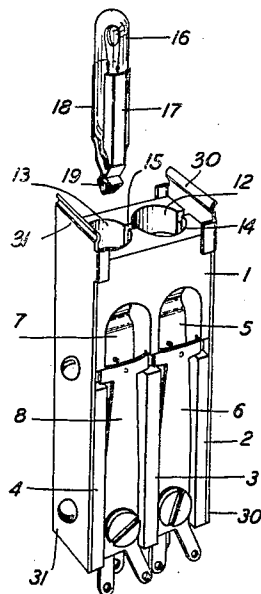
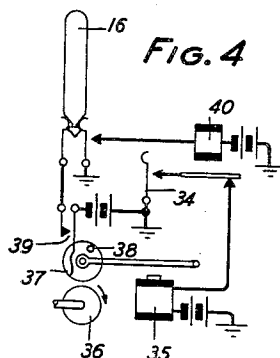
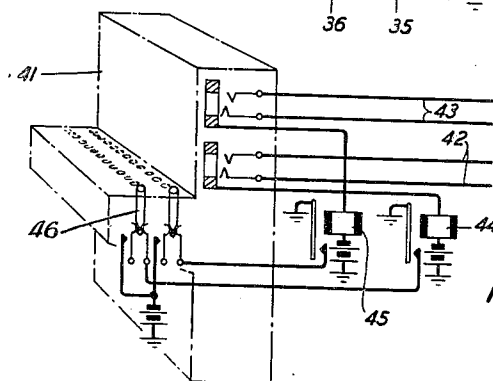


Fig. 5



INVENTORS: H. A. BLAKE
H. SCHMITT

BY

W. B. McFadden
ATTORNEY

UNITED STATES PATENT OFFICE

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SIGNAL AND CONTACT DEVICE

Homer A. Blake, Boonton, N. J., and Harold Schmitt, Richmond Hill, N. Y., assignors to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

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6 Claims. (Cl. 177—329)

This invention relates to signaling and contact-making devices and particularly to such devices when employed at operators' positions in telephone systems.

5 The objects are to combine in a single structure a signal lamp and a key for controlling contacts, to effect economy in the mounting space at the operator's position, to simplify the duties of the operator, and to otherwise improve apparatus of this character.

10 It has been proposed heretofore to associate contact-making keys and signal lamps with each other in such a way as to facilitate their identity to the operator.

15 According to the present invention, advantages are secured over these prior art devices by combining in a unitary structure a contact-making key and the associated signal lamp in such a way that the bulb of the lamp is movable, under the control of the operator, from a normal position to an operative position, and, when released by the operator, is restored to its normal position by means of the contact springs of the key combination, said springs serving to open and close electrical contacts in response to movement of the lamp bulb. By this construction, the lamp and the individual key are definitely associated with each other in the same space. The lamp bulb serves not only as a signal but also as a contact-actuating element, which the operator seizes when she wishes to perform the necessary switching operation, and the contact springs of the key combination serve to hold the lamp bulb in its normal position and to restore it to that position when it is released by the operator after having been advanced to its operative position.

20 Fig. 1 of the drawing is an enlarged view of one of the key and lamp units illustrated partly in cross section. In this figure, the parts are illustrated in their normal position.

40 Fig. 2 is a view similar to that of Fig. 1 with the lamp shown in its actuated position.

Fig. 3 is a perspective view of the device with certain of the parts disassembled.

45 Fig. 4 is a circuit illustrating one of the uses of the device.

Fig. 5 illustrates another use of the device and shows its application to an operator's switchboard.

50 The combined key and lamp mechanism comprises a mounting structure 1 made of any suitable insulating material. The mounting structure 1 is provided with a series of openings or recesses formed by integral partitions 2, 3, 4 and so forth. While Fig. 3 illustrates only two of these recesses, the structure may have as many of these

as is desirable. Each of the recesses contains a spring combination for controlling circuit contacts. The spring combination located in the recess between the partitions 3 and 4, shown also in Figs. 1 and 2, includes the spring members 7, 8 and 9. The springs 7, 8 and 9 are secured to the mounting structure 1 by a bolt 29 which passes through the integral portion 28 of said mounting structure. The spring members 5 and 6 located within the recess formed by the partitions 2 and 3 are visible in Fig. 3, the third spring member being located on the rear side of the structure. In a similar manner each of the successive recesses in the housing structure 1 is equipped with a spring combination.

15 The two longer springs of each combination, such as the springs 7 and 9 in Figs. 1 and 2, are provided at their free ends with the semi-circular shaped tips 10 and 11 respectively. The purpose of these semi-circular shaped tips is to hold the lamp bulb in position as will be explained presently. In the particular combination illustrated in the drawing, the electrical contacts are carried by the springs 7 and 8.

20 Communicating with each of the recesses in the housing structure 1 is a circular aperture such as the apertures 12 and 13 illustrated in Fig. 3. These circular apertures receive the movable lamp units, each of which serves as a visible signal and also as a key or contact actuating device. The lamp unit for the aperture 13, for example, comprises an elongated electric lamp bulb 16 having the usual filaments therein. The circuit terminals of the lamp consist of two metallic pieces 17 and 18 cemented or otherwise suitably secured to the exterior of the bulb 16. As seen in Figs. 2 and 3, the filament wires are brought out through the bulb and connected to the terminals 17 and 18. The lower ends of the terminals 17 and 18 are so shaped, as seen in Figs. 1 and 2, as to present cam surfaces which, when engaged by the semi-circular tips of the springs 7 and 9, maintain the bulb in its normal position and which serve to restore the bulb to said position after it has been depressed to its actuated position. In order to give the terminal pieces 17 and 18 the necessary rigidity opposite the cam surfaces, a small piece of insulating material 19 is inserted between their free ends.

50 After the bulb 16 has been passed into the aperture 13 and has been located in its fixed position between springs 7 and 9, a sleeve 20 is passed on over the bulb 16. The upper end of the sleeve 20 is covered by a translucent lamp cap 21 which is held in position by an inner sleeve 22. With

the sleeve 20 in position, the lamp cap 21 encounters the upper end of the bulb 16 to prevent further downward movement of the sleeve. With the parts in these positions a pin 48 extending from the surface of the sleeve 20 enters a slot 15.

The assembly is completed by a block of insulating material 23 having a series of circular apertures 24, 25, etc. therein, one for each of the lamp units. The block 23 fits on top of the housing structure 1 and is held securely in position by the end spring pieces 30 and 31, the upper ends of which enter the notches 26 and 27 respectively in the block 23. With the block 23 in position, the successive lamp caps and sleeves extend through the openings 24, 25, etc. to a position where they may be readily seized by the operator for depression. The sleeve 20 is held against removal through the opening 25 by means of the pin 48 which engages the under surface of the block 23.

In the normal condition of the device, the lamp 16 and the sleeve 20 are held in their uppermost position by the springs 7 and 9, and a circuit may be completed in any suitable manner for the lamp filament through the springs 7 and 9. When it is desired to perform a contact closing operation, the operator seizes the lamp cap 21 and depresses it down until the lower edge of the sleeve 20 encounters the shoulder 32 in the housing structure 1. This shoulder prevents any further downward movement of the lamp bulb. The bulb 16 as it moves downward, forces the springs 7 and 9 against their tension until the spring 7 encounters the electrical contact on spring 8, thus closing a circuit between the springs 7 and 8. The actuated condition of the device is clearly seen in Fig. 2. Upon release of the lamp cap 21, the tension of the springs 7 and 9 immediately forces the bulb and sleeve back to normal position, opening the contacts on the springs 7 and 8.

The invention is applicable to a timing device such as illustrated in Fig. 4. When it is desirable to measure an interval of time, key 34 is actuated to close a circuit from battery through the winding of the magnet 35, contact of relay 40, contact of key 34 to ground. The magnet 35 contracts its armature and presses the roller 37 against a time-control driving wheel 36. After the predetermined interval has expired, a pin 38 on the roller 37 closes the contacts 39. This lights lamp 16 by means of a circuit from battery through the contacts 39, thence through the filament of the lamp 16 to ground. The operator seeing the lamp lighted, seizes the lamp cap and depresses it, closing a circuit from battery through the relay 40 and contacts of the combined lamp and key to ground. Relay 40 operates and opens the circuit of magnet 35, thus restoring the device to its normal position and extinguishing the lamp.

Another application of the invention is illustrated in Fig. 5, which shows an operator's position, the keyshelf of which is provided with a series of combined lamps and keys and in the panel of which terminates a group of circuits or trunks 42, 43, etc. Should the operator desire to know if any one of the trunks is busy, such as the trunk 42, she depresses the combined lamp and key 46 individual to that particular trunk. If the trunk 42 is busy, the individual relay 44 will be in operated condition and a circuit is closed from ground to the contact of said relay, thence through contacts of the combined line and key and the filament of the lamp to battery. The operator, noting the lighting of the lamp, knows that the trunk is busy.

It will be understood that numerous modifications may be made without departing from this invention. For example, the spring combination may assume various forms including normally open contacts and normally closed contacts. It will also be understood that the invention has many applications although only a few have been illustrated.

What is claimed is:

1. In combination a set of supporting springs having cam surfaces, a bulb, a casing surrounding said bulb, a housing, said bulb and casing being movable within said housing between a normal position and an operated position, a stop block detachably mounted on said housing, a stop pin fixed to said casing, said stop block and pin serving to limit the movement of said casing in said housing to said normal position, said housing having slots through which said pin extends, said slots and pin serving to limit the movement of said casing in said housing to said operated position, filament terminals having cam surfaces and secured to said bulb, and means for mounting said supporting springs on said housing so that a camming action between said spring cam surfaces and said terminal cam surfaces will hold said bulb and casing in their normal position and restore them to their normal positions when displaced to any other position.

2. In combination, a movable bulb, a housing for said bulb, means for limiting the movement of said bulb in said housing between a normal position and an actuated position, terminals secured to said bulb and having cam surfaces, a set of springs having cam surfaces, means for mounting said springs on said housing so that a camming action between the spring cam surfaces and said terminal cam surfaces will hold said bulb in its normal position and restore it to said normal position when displaced to any other position.

3. In combination, a movable electric lamp bulb, a housing for said bulb, means for limiting the movement of said lamp bulb in said housing between a normal position and an actuated position, terminals having cam surfaces and secured to said lamp bulb, a set of springs having cam surfaces and engaging said terminals to conduct current to the filament of said lamp bulb from said springs, means for mounting said springs on said housing so that a camming action between said spring cam surfaces and said terminal cam surfaces will hold said bulb in its normal position and restore it to said normal position when displaced to any other position.

4. In combination, a movable bulb, a housing for said bulb, means for limiting the movement of said bulb in said housing between a normal position and an actuated position, terminals having cam surfaces and secured to said bulb, a set of springs having cam surfaces, means for mounting said springs on said housing so that a camming action between said spring cam surfaces and said terminal cam surfaces will hold said bulb in its normal position, and so that its camming action will spread said springs when the bulb is moved from its normal position to its actuated position, and so that a camming action will restore the bulb to its normal position when released, an electrical contact, means for mounting said electrical contact on said housing to engage one of said springs when said springs are spread.

5. In combination, a bulb, a housing for said bulb, a casing secured to and surrounding said

bulb and slidably mounted within said housing, means for limiting the movement of said casing within said housing between a normal and an actuated position, terminals having cam surfaces and secured to said bulb, a set of springs having cam surfaces, means for mounting said springs on said housing so that a camming action between said spring cam surfaces and said terminal cam surfaces will hold said casing in its normal position and so that a camming action between said cam surfaces will spread the springs when the casing is moved from the normal position to any other position and restore the casing to the normal position when released, an electrical contact and means for mounting said electrical contact on said housing to engage one of said springs when said springs are spread.

6. In combination, a housing having slots in its sides, a bulb, a casing secured to and surrounding said bulb and slidably mounted in said housing, a stop block, means for detachably mounting said stop block on said housing, a stop pin fixed to said casing and protruding through the slots in said housing, said pin coacting with said block and slots to limit the movement of the casing in the housing between a normal and an actuated position, two springs having cam surfaces, two terminal plates having cam surfaces and secured to the filament of said bulb to conduct current to said springs, means for mounting said springs in position to cause camming action between the cam surfaces on one spring and a terminal and between the cam surfaces of the other spring and the other terminal to clamp the terminals between the two springs to hold the casing in its normal position and to flex said springs apart when said casing is moved from the normal position and to automatically restore it to this position after movement ceases, a third electrical contact spring and means for mounting said third spring to make electrical contact with one of said other springs when said other springs are flexed.

HOMER A. BLAKE.
HAROLD SCHMITT.