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SWITCHING DEVICE FOR TELEPHONE INSTRUMENTS

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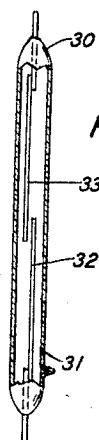


FIG. 5

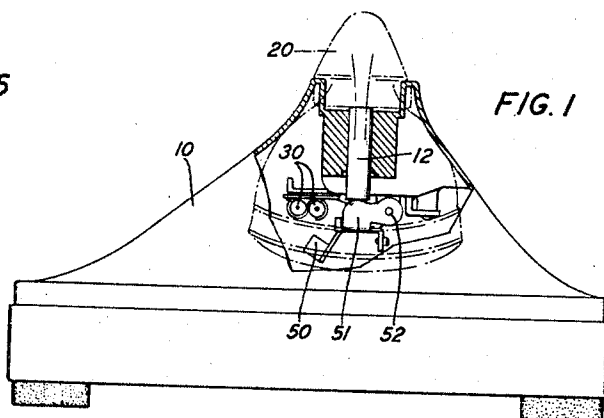


FIG. 1

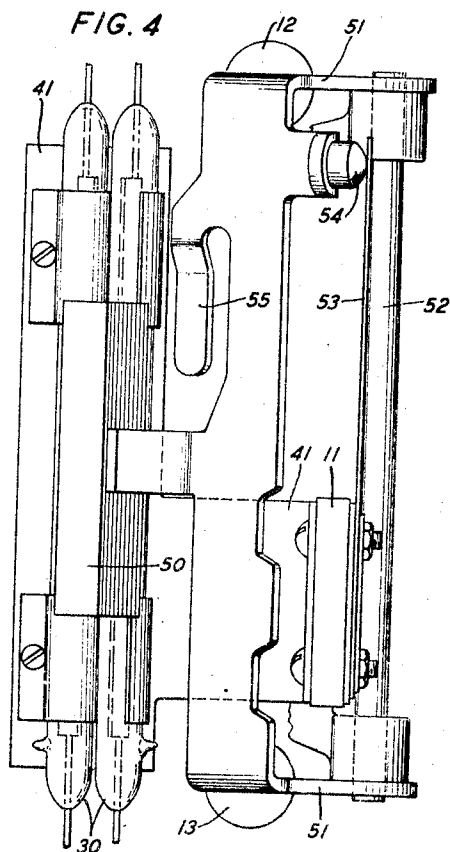


FIG. 4

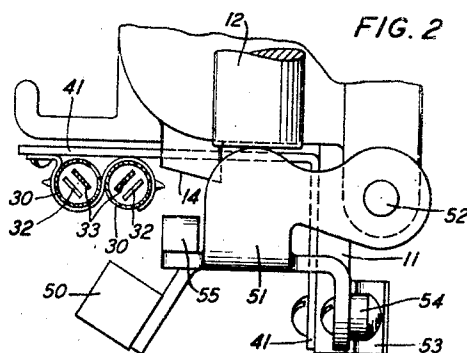


FIG. 2

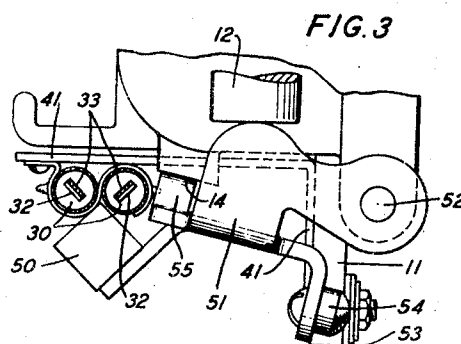


FIG. 3

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SWITCHING DEVICE FOR TELEPHONE INSTRUMENTS

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Application May 15, 1940, Serial No. 335,246

1 Claim. (Cl. 179-164)

This invention relates to switching devices and more particularly to switching devices adaptable for use in connection with a telephone instrument.

An object of the invention is to provide improved switching means in a telephone instrument.

A feature of the invention resides in a switching device in which contacts of the switch are enclosed in a hermetically sealed container.

Another feature resides in a movable permanent magnet means for operating the switch contacts.

The arrangement here shown comprises a subscriber's telephone substation set in which switch contacts are enclosed in a hermetically sealed container or containers and arranged to be operated when the telephone receiver or handset is removed from and returned to its cradle support. The usual mechanical connection with the switch contacts is avoided by using a magnetic coupling or linkage between the switch contacts and a movable magnetic member operated by the removing and the replacing of the receiver. The switches comprise overlapping spaced finger-like contacts of magnetic material enclosed within a sealed tubular housing or housings and an associated movable permanent magnet located outside of the tube or tubes. The contacts are held closed when the magnet is in a position to cause an appreciable magnetic flux to traverse the contact members and elastically opened when the magnet is moved to a position substantially reducing the flux traversing the contact members.

One form of switch which may be used consists of a small glass tube with a reed of magnetic material supported at and extending from each end into overlapping spaced relationship and attractable together magnetically. This is disclosed in the pending patent application of Walter B. Ellwood, Serial No. 198,629, filed March 29, 1938. This relay or relays are mounted in the base portion of a telephone instrument and a permanent magnet is mechanically connected to the plunger or plungers in the mounting of a handset telephone so that the magnet is moved away from or towards the relay elements when the handset is removed from or replaced in its cradle on the mounting or base portion of the telephone set.

One form of telephone mounting or support for a telephone handset to which this invention is applicable is shown in Patent 2,096,046 issued to J. J. Kuhn October 19, 1937.

A more detailed description of an embodiment chosen for illustrating this invention follows:

Fig. 1 is a side view of a telephone substation set partly in cross-section and having a portion of the housing cut away to show the sealed switch elements in association with the switch operating mechanism;

Figs. 2 and 3 are transverse views cross-sectional of the switch elements and end views of the operating mechanism when non-operated and operated, respectively;

Fig. 4 is a bottom view of the switch elements and the operating mechanism viewed from below; and

Fig. 5 is a longitudinal cross-section view of the tubular hermetically sealed switch element. Similar reference characters refer to the same parts in the different drawing figures.

A telephone substation set is shown in Fig. 1 equipped with magnetically operable sealed switches and magnetic coupling or linkage mechanism connected with the plungers which are operated by removing and replacing the handset 20 on the desk mounting 10. The sealed switches 30, shown in detail in Fig. 5 and as mounted in the mechanism in each of the other drawing figures may, as heretofore stated, be of the type described. This relay switch unit 30 consists of a glass tubular housing 31 with flexible iron reeds 32 and 33 extending inwardly from each end of the tube, respectively, into overlapping spaced relationship. The housing may be hermetically sealed and contain a suitable gas at proper pressure or be evacuated. Two switches 30 are held in place in the desk mounting 10 by a supporting angle plate 41 attached to a downwardly projecting portion 11 of the desk mounting. A permanent bar magnet 50 for operating the reed contact members of magnetic material of the switches 30 is carried by a rocker member 51 pivoted at each end on shaft 52 supported in the desk mounting 10. The axes of the switches and the bar magnet are parallel. The contacts of the switches elastically open when the bar magnet 50 is away from the switches and little of its magnetic field traverses the reed members, as shown in Figs. 1 and 2; the contacts are closed when the magnet is moved into close proximity to the switches, as shown in Figs. 3 and 4. In the latter position a powerful magnetic coupling exists as a relatively large portion of the stray magnetic flux of the bar magnet returns through the iron contact reeds 32 and 33 of the switches to cause their free ends to draw together and close the switches. The rocker member 51 car-

rying the bar magnet 50 is caused to rotate the magnet towards the switches and into the position shown in Figs. 3 and 4 by the action of the flat spring 53 attached to projection 11 and elastically engaging the rocker member 51 at 54 while it is rotated away from the switches by the weight of the handset when it is placed on its cradle support of the desk mounting 10. The handset engages plungers 12 and 13 which pass downwardly through the desk mounting 10 into engagement with the cam-shaped portions at each end of the rocker member 51. The weight of the handset overcomes the force of the spring 53 and holds the bar magnet 50 away from the switches 30, as shown in Figs. 1 and 2. A stop arm 55 on rocker member 51 is arranged to engage abutment 14 on the desk mounting 10 to limit the nearness to which the bar magnet 50 may approach the switches 30 and avoid hitting them. The switches are preferably so mounted that the plane passing between their reeds 32 and 33 passes through the axis of the bar magnet 50 so that the magnetic flux traversing them primarily causes mutual attraction and movement between the reeds rather than between the reeds and the magnet.

What is claimed is:

In a telephone substation set comprising a sup-

port adapted to serve as a rest for a telephone instrument, and a plunger in said support normally held down by the weight of said instrument, in combination, a plurality of sealed containers supported in said support, each of said containers having supported therein spring fingers which are magnetically operable to be moved to a circuit closing condition, the said spring fingers in each container being normally held against contact by their own spring tension, a rocker member pivotally supported in said support and bearing upwardly against said plunger, a permanent magnet supported on one end of said rocker member and for movement thereby relative to said containers to magnetically attract the said spring fingers in each of said containers to a circuit closing condition and spring means in engagement with said rocker member and constantly urging said rocker member against the action of said plunger so that when said instrument is removed from said support said magnet will be moved close enough to said containers to magnetically cause said spring fingers to move to a circuit closing condition.

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