

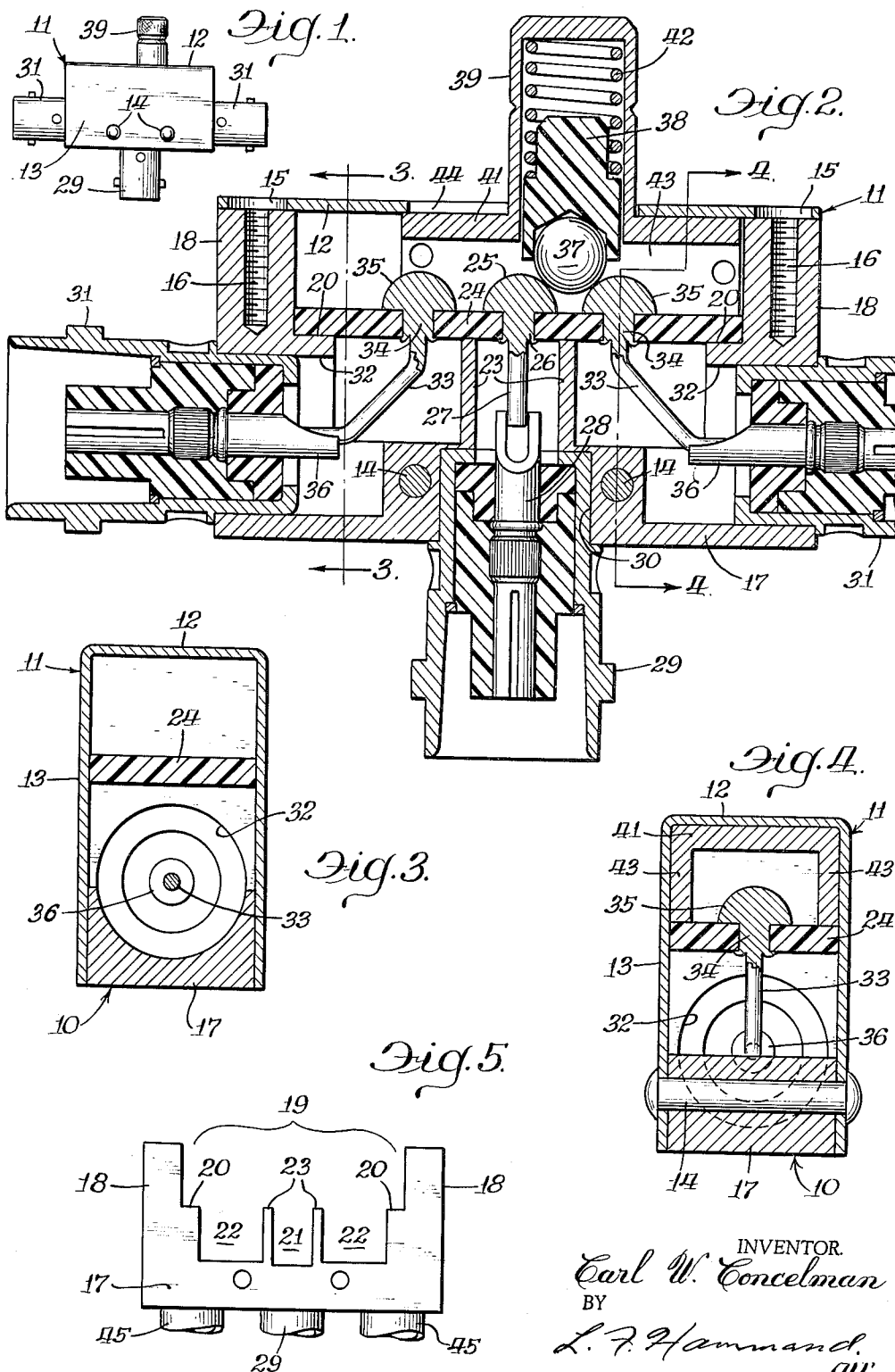
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COAXIAL SWITCH

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COAXIAL SWITCH

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1 Claim. (Cl. 200—153)

This invention relates to electrical switches for coaxial radio frequency transmission lines, and has as its general aim the provision of an improved yet simplified arrangement of parts whereby simplicity of structure and operation are obtainable without sacrifice of desirable electrical characteristics.

It is among the objects of the invention to provide a relatively simple, compact and trouble-free switching unit providing a satisfactory voltage standing wave ratio, and having highly satisfactory characteristics of elimination of cross talk, yet at the same time being of such mechanical design as to be relatively economical in manufacture and simple in assembly.

In the form of the invention illustrated, the teachings of the invention are applied to a manually operable single-pole, double-throw switch.

A present preferred embodiment of the invention is illustrated in the drawings attached hereto, wherein:

FIGURE 1 is a front elevation of a typical switch constructed in accordance with the principles of the present teaching;

FIGURE 2 is a greatly enlarged central cross sectional view through the switch of FIGURE 1;

FIGURE 3 is a greatly enlarged detail sectional view taken substantially on the plane of the line 3—3 of FIGURE 2;

FIGURE 4 is a greatly enlarged detail sectional view taken substantially on the plane of the line 4—4 of FIGURE 2; and

FIGURE 5 is an enlarged front elevational view of the main housing member of the same switch, but showing a modified positioning of the connector fittings assembled therewith.

As illustrated, the switch consists of a main housing member generally designated 10, enclosed within a wrap-around cover 11 of three-sided conformation, having a top portion 12 and a pair of depending side walls 13. The cover may be held in position on the housing by any convenient means, as by the rivets 14, but in the preferred form of the invention the top 12 of the cover also has punched apertures 15 in registry with threaded screw holes 16 in the housing so that, if desired, the switch may be mounted behind any conventional type of panel and conveniently secured thereto.

The shape of the main housing 10 is best shown in FIGURE 5, from which it will be apparent that the housing consists of an elongated base 17 extending between upright ends 18. The top central portion of the housing is cut away to provide a switching cavity generally indicated at 19, terminating in steps or offset shoulders 20. The housing is also formed to include a central terminal cavity 21 and a pair of outer terminal cavities 22, each separated from the cavity 21 by one of a pair of barrier walls 23. As shown, the upper edge of each of the barriers 23 lies in the same plane as the offset steps 20, so that the barrier walls coact with the steps to provide mounting means for an insulating panel 24 on which the contact members of the switch are mounted (FIGURE 2).

The contacts include a central contact button 25 of generally hemispherical form, having a shank 26 riveted into an appropriate aperture in the panel 24 with a conductor 27 extending from the contact shank to the central

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contact 28 of a coaxial connector generally designated 29. The fitting 29 is mounted within a cylindrical bore 30 in the housing 10, in communication with the central cavity 21. Similar coaxial connectors 31 are mounted in bores 32, which may be at the opposite ends of the housing or on the bottom thereof, and in either case are in communication with the terminal cavities 22 so that conductors 33 may be conveniently extended to the shank portions 34 of end contacts 35, each riveted into the insulating panel 24.

From the description thus far it will be apparent that the design of the housing structure is such that power input and output connections to the switch may be established through any of several different conventional types of connector fittings or coaxial transmission lines, and that these may be arranged either at the opposite ends and lower center of the switch body, as shown in FIGURES 1 and 2, or alternatively in parallel position along the bottom of the housing, as shown in FIGURE 5. In either event, the central contact 28 of connector 29 communicates directly with the central contact button 25. Similarly, the central contacts 36 of each of the connectors 31 are connected to the contacts 35 so that either of these may be alternatively joined to the central connector. For this purpose a spring-pressed metal ball 37 is mounted on an insulating plunger 38 carried within the tubular handle portion 39 of a slide member 41 and urged downwardly by a coil spring 42.

As best seen in FIGURE 4, the slide 41 is of channel-shaped construction, having paired side walls 43 confined between the side walls 13 of the cover 11, and the top panel 12 of the cover is pierced with an elongated slot 44 to permit the desired degree of back-and-forth movement of the tubular switching handle 39. With this arrangement the metallic ball 37 functions not only as the electrical contacting member, completing the circuit between contacts 25 and 35, but also serves as a mechanical detent to give the switch a smooth acting "click" and secure the slide quite positively in either of its two operating positions.

It will thus be seen that the present invention provides an unusually simple, compact and rugged switching unit for establishing electrical connection alternatively between any one transmission line and a plurality of other lines, while at the same time providing adequate shielding and electrical isolation between the conductive leads extending to the switch contacts. The contacts themselves, together with their leads to the connector fittings, serve to hold the insulating panel firmly in its operating position and this function is also mechanically assisted by the wrap-around cover and detent mechanism of the switch. As a result, switches according to the present invention are sturdy, compact, rugged and mechanically trouble-free, and may be manufactured more economically than more conventional types, yet they are nonetheless capable of handling relatively high voltages and high radio frequencies with a highly satisfactory voltage standing wave ratio, and with satisfactory elimination of cross talk.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is:

A switching device for interconnecting a selected pair of three coaxial radio frequency transmission lines comprising, in combination a switch housing consisting of integral conductive material throughout, and having an elongated base extending between a pair of upright ends, with a switching cavity located between the upright ends in a position generally parallel with the elongated base and with three terminal cavities each disposed between the switching cavity and the aforesaid elongated base, said terminal cavities being isolated from each other by con-

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ductive barrier walls formed therebetween and comprising integral parts of the aforesaid housing; said terminal cavities and the aforesaid switching cavity being separated from each other by an insulating panel extending therebetween; three coaxial connectors each with a central contact extending into one of said terminal cavities, with one of said connectors having an outer tubular conductor connected directly to said elongated base of the aforesaid housing and each of the two remaining connectors having an outer tubular conductor directly connected to a respective upright end of said switch housing; three conductive contacts, each carried by the aforesaid insulating panel and projecting into the switching cavity, with a conductor extending from each of said contacts through one of said terminal cavities to the central conductor of one of said coaxial connectors; together with a conductive cover enclosing and shielding said switching cavity and terminal cavities; and shiftable switching means adapted to selectively interconnect a pair of the aforesaid contacts within the switching cavity, said switching member com-

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prising a conductive ball mounted on a spring-urged insulating plunger shiftable within said switching cavity.

References Cited by the Examiner

UNITED STATES PATENTS

2,432,476	12/1947	Hesse	200—4
2,550,145	4/1951	Geci	200—166
2,759,152	8/1956	Charles	200—153
2,784,379	3/1957	Schunemann	200—153

OTHER REFERENCES

E. I. Green, F. A. Leibe and H. E. Curtis: "The Proportioning of Shielded Circuits for Minimum High-Frequency Attenuation." In *Carrier Cable Communication*, by International Standard Electric Corp., 1939, pp. 100-102.

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