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SWITCHING DEVICE FOR HIGH FREQUENCY ELECTRICAL ENERGY

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FIG. 1

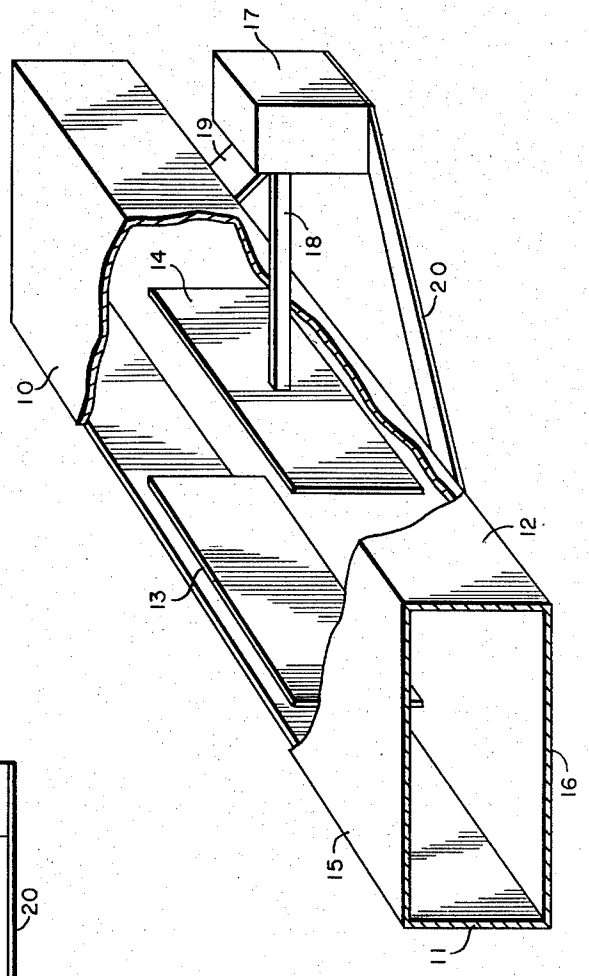
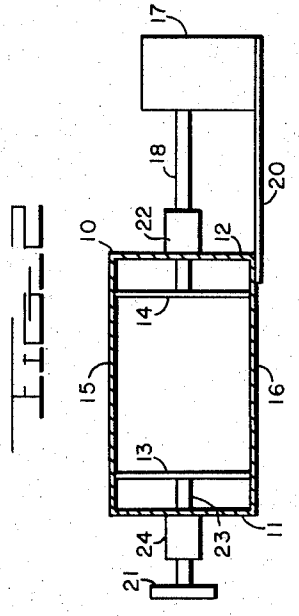


FIG. 2



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SWITCHING DEVICE FOR HIGH FREQUENCY ELECTRICAL ENERGY

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This invention relates to electrical energy switching devices and more particularly to switching devices of a type suitable for controlling the transmission of high-frequency electrical energy through waveguide systems.

In numerous applications of electrical energy transmission systems of the waveguide type it is desirable to effect switching so that the energy flow may be controlled. Certain applications further require high speed operation with a clean transition between the conductive and the non-conductive states. Switching devices for waveguide systems have been available in the past, however these prior systems suffer from numerous difficulties such as undue complexity or serious limitation of the speed of operation.

Accordingly it is an object of the present invention to provide a switching device of simple structure for controlling the flow of electrical energy through a waveguide type transmission system.

Another object of the present invention is to provide a switching device of simple construction for high speed operation to control the flow of electrical energy through a waveguide type transmission system.

Other and further objects and features of the present invention will become apparent upon a careful consideration of the accompanying description and drawings.

Fig. 1 is a partly cut-away view of a waveguide transmission line system embodying the principles of the present invention.

Fig. 2 is an end view of the typical waveguide system showing in more detail the switching mechanism employed therein.

In accordance with the fundamental concepts of the present invention an electrical energy switching device for a waveguide type system is provided in which a movable member may be inserted or varied in position in the waveguide to vary the propagational characteristics thereof. One specific characteristic which may thus be varied is the cut-off frequency to permit or prevent transmission of energy of a selected frequency or frequency band.

With particular reference to Fig. 1 a waveguide switching device is shown embodying the features of the present invention. A section of waveguide **10** which is cut-away at both ends is shown. The typical waveguide chosen for illustration is of the rectangular type for energy transfer in the simple modes in which the cut-off frequency is primarily dependent upon the spacing between the narrow bounding walls **11, 12**. A waveguide having close spacing between walls **11** and **12** will have a higher natural cut-off frequency for the simpler modes than one having wide spacing between the walls **11, 12**.

Placed within the guide and parallel to the walls **11, 12** is a pair of flat rectangular plates **13, 14** shown through the cut-away portion of the guide **10**. Plates **13** and **14** are parallel to one another and serve to constrict the width of the waveguide so that the cut-off frequency may be varied. In this connection it is desirable in most cases that the plates **13** and **14** establish good electrical contact with the walls **15** and **16**. A driver device **17** is linked with plate **14** by means of bar **18**. Device **17** is held in fixed position relative to the guide **10** by support members **19, 20**. Longitudinal motion of the bar **18** produced by the driver **17** results in the motion of plate **14** toward or away from the plate **13**. Since this space variation will produce a variation in the cut-off frequency of the waveguide, switching action can result provided the spacing adjustment is such that with minimum spacing between plates **13, 14** the waveguide is operating below the cut-off frequency and with maximum spacing of plates **13, 14** the waveguide is capable of operating above the cut-off frequency. The range of operating frequency may be controlled by varying the amplitude of the motion of plate **14** at the driver **17**. Another method of adjustment of this range is by a position variation of plate **13** by a positioning knob **21** shown in Fig. 2.

Where high speed switching action is required the driving mechanism **17** may be actuated by a suitable high speed operating device such as an electrical relay or magnetic driver.

An end view of the waveguide structure is shown in Fig. 2. In addition to the correspondingly numbered parts of Fig. 1, rod **18** is supported at the side of waveguide **10** by a sleeve **22**. Plate **13** is supported by rod **23** which is in turn held by the sleeve **24** placed in the side member **11**. As previously mentioned, the positioning knob **21** may be employed to adjust plate **13**.

From the foregoing discussion it is apparent that considerable modification of the features of the present invention is possible and while the device herein described and the form of apparatus for the operation thereof constitutes a preferred embodiment of the present invention it is to be understood that the invention is not limited to his precise device and form of apparatus and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

1. A high frequency switching device operable to instantaneously transmit or cut off the electrical energy flowing through a waveguide by varying the effective width of said waveguide, comprising a rectangular waveguide, a movable plate located within and substantially parallel to one of the walls of said waveguide, and rapid acting means connected to said plate for alternately varying the plate between two positions, in one position the effective width of said waveguide is reduced to a point where the cut off frequency of said waveguide is greater than the frequency of said electrical energy and in the other position the effective width of said waveguide is increased to a point where the cut off frequency is equal to or less than the frequency of said electrical energy.

2. A high frequency switching device as defined in claim 1, wherein a second movable plate is mounted within said waveguide opposite the first mentioned moveable plate and manually operated positioning means connected to said second plate whereby the limits of waveguide cut-off frequency can be altered.

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