Oct. 12, 1965 F. W. JOHNSON 3,211,847

R-F MATRIX SWITCH LINE WITH INTEGRAL STUB DISCONNECT

Filed Sept. 18, 1963 2 Sheets-Sheet 1

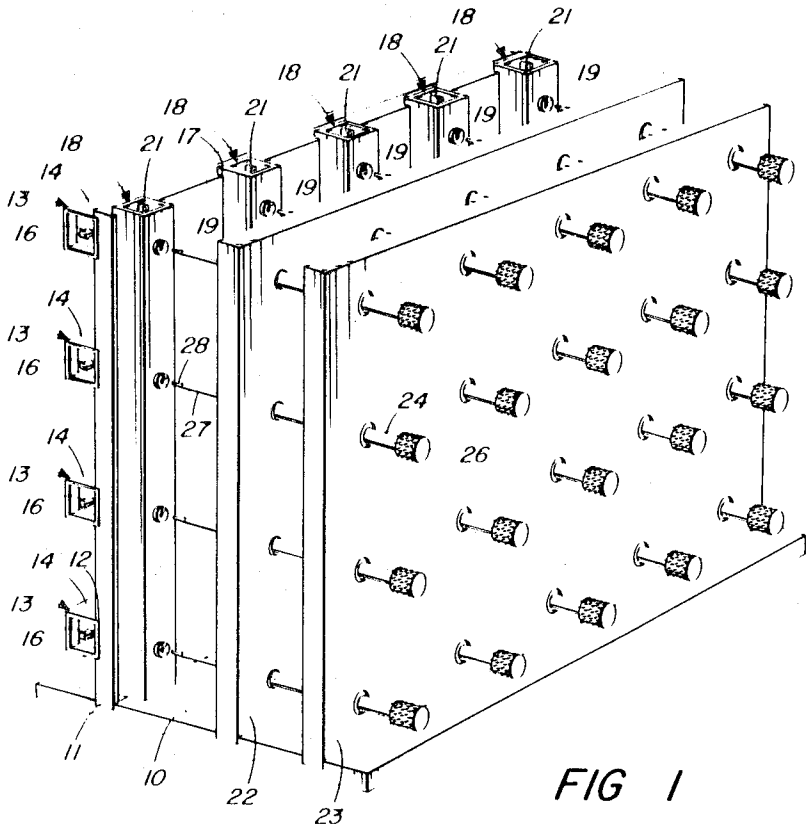


FIG 1

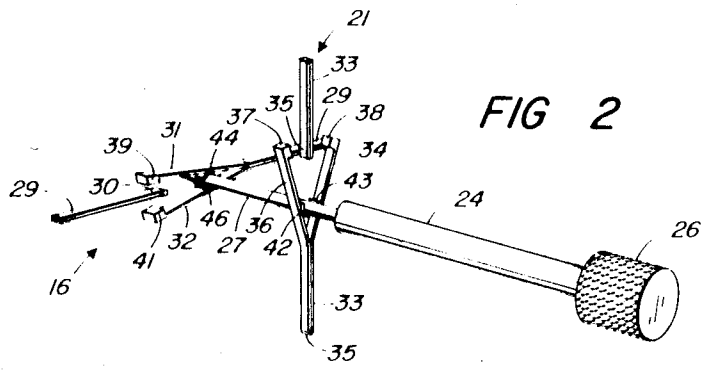


FIG 2

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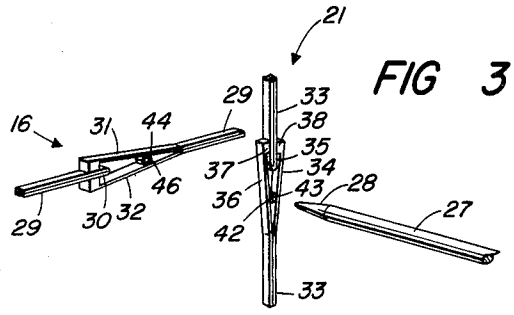


FIG 3

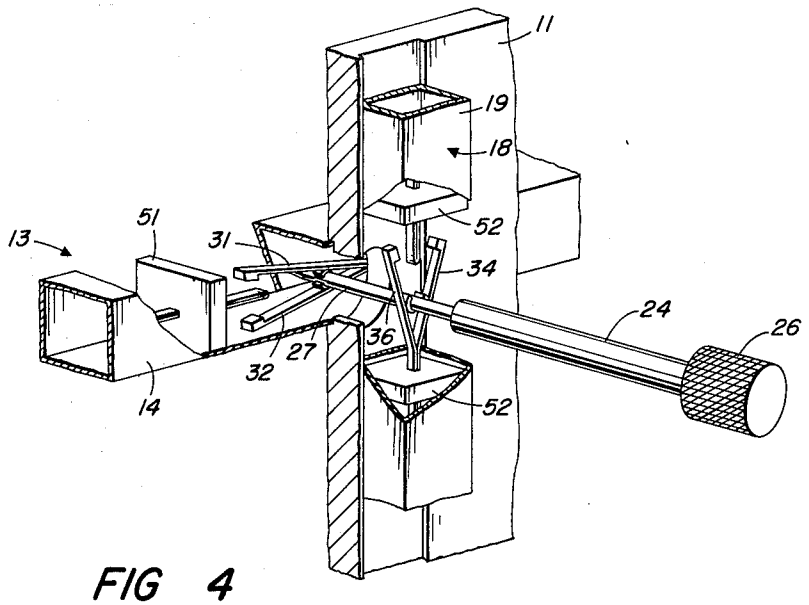


FIG 4

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R-F MATRIX SWITCH LINE WITH INTEGRAL STUB DISCONNECT

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7 Claims. (Cl. 200—5)

This invention relates in general to coaxial wave guide switches, and in particular to a bayonet-type switch which is capable of connecting crossing wave guides while simultaneously disconnecting unused stubs of the wave guides.

It is oftentimes desirable to connect a first wave guide to a second wave guide. At times matrices comprising a first plurality of wave guides lying in a first plane are to be selectively connected to one of a second plurality of wave guides lying in a second plane. It is desirable to prevent radiation and spurious responses to disconnect the unused stub portions of the wave guides after the connections are made.

It is an object of this invention, therefore, to provide a bayonet-type switch in which the unused portions of the wave guides are disconnected when the switch is closed.

Further objects, features, and advantages of this invention will become apparent from the following description and claims when read in view of the drawings in which:

FIGURE 1 is a perspective view of two matrices of wave guides lying in different planes which cross adjacent each other and which are to be selectively connected by bayonet switches according to this invention;

FIGURE 2 illustrates one of the bayonet switches of this invention with the switch in the closed position;

FIGURE 3 illustrates one of the bayonet switches according to this invention with the switch in the open position, and;

FIGURE 4 illustrates a partial cutaway view of a bayonet switch according to this invention in the closed position.

FIGURE 1 illustrates a base plate **10** which supports a holding plate **11** formed with horizontal grooves **12** in which are mounted a plurality of square wave guides **13**. The wave guides **13** are formed with outer conductors **14** and inner conductors **16**. The wave guides fit in grooves **12**. A number of vertical grooves **17** are formed in holding plate **11**, and a second plurality of square wave guides **18** are received in them. The wave guides **18** comprise outer conductors **19** and center conductors **21**. The holding plate **11** may be made of conducting material so as to electrically connect the outer conductors **14** to the outer conductors **19**.

A pair of guide plates **22** and **23** are also supported by plate **10** and slidably support plungers **24** which are provided with suitable knobs **26**. A conducting bayonet member **27** is connected to the plunger **24** as best shown in FIGURE 2. The end of the bayonet **27** is sharpened to form a point **28**.

The center conductors **16** are formed of a plurality of sections **29** which are receivable between jaws **31** and **32**. Likewise, the vertical wave guides consist of a plurality of sections **33** connected to jaws **34** and **36**. The ends **35** are received between contact points **37** and **38**, respectively, which are attached to the jaws **34** and **36**. Likewise, the ends **30** of members **29** are clamped by contact points **39** and **41** which are attached to the jaws **31** and **32**, respectively. The bayonet **27** forces jaws **34** and **36**, and **31** and **32** apart by passing through crescent-shaped members **42** and **43** attached to jaws **36** and **34**, respectively, and crescent-shaped members **44** and **46** attached to jaws **31** and **32**, respectively. Thus, in the closed

position with the bayonet **27** in engagement with crescent members **42**, **43**, **44** and **46**, electrical contact is made between the center conductors **16** and **21**. The stub portions of the center conductors are disengaged from the center conductors due to the opening of jaws **31** and **32**, and **34** and **36**.

FIGURE 3 illustrates the switch in the open position with the bayonet **27** removed from engagement with the center conductors **16** and **21**. It is to be noted that the jaws **34** and **36** make electrical contact with the end **35** of the next portion **33**, and the jaws **31** and **32** make electrical contact with the end **30** of the next adjacent section **29** of the center conductor **16**.

FIGURE 4 is a partial cutway view illustrating a plunger **24** which is connected to the bayonet **27** which has been moved to the closed position by depressing the knob **26**. The bayonet **27** forces jaws **34** and **36** apart and makes electrical contact between jaws **31** and **32** and jaws **34** and **36**. Jaws **31** and **32** have been simultaneously forced apart. It is to be noted that the center conductors are held in predetermined space relationship with the external conductors **14** and **19** by insulating spacer blocks **51** and **52**.

Thus, when the plungers **27** are out of wave guides **13** and **18** no cross connection is made. Electrical continuity exists in all of the horizontal wave guides, and there is no connection between a horizontal and a vertical wave guide. However, when one of the plungers **34** is moved to the left relative to the figures, the bayonet **27** makes an electrical connection between the center conductors **16** and **21** at the point corresponding to the particular plunger moved. Simultaneously, the center conductors **16** and **21** are broken at the contact point so that the unused stubs are electrically disconnected from the circuit. Thus, electrical continuity exists between one of the wave guides **13** and one of the wave guides **18** at the point of the depressed plunger.

It is seen that this invention provides a simple and effective switch for coaxial wave guides and although it has been described with respect to a preferred embodiment thereof, it is not to be so limited, as changes and modifications may be made therein which are within the full intended scope of the invention as defined by the appended claims.

I claim:

1. A switch comprising a first electrical conductor having a pair of jaws between which are received a second electrical conductor, a third electrical conductor lying in a different plane from the first two conductors and formed with a pair of jaws, a fourth conductor receivable between the jaws of the third conductor, means supporting said conductors, and a conducting plunger supported by the supporting means and movable into engagement with the jaws of the first and third conductors to electricity connect them together while simultaneously spreading the jaws so as to electrically disconnect the first conductor from the second conductor and the third conductor from the fourth conductor.

2. A switch comprising supporting means insulatingly supporting a first pair of conductors in axial alignment with each other and with one of said conductors formed with a first pair of jaws which grasp the end of the other conductor, a second pair of conductors insulatingly supported by said supporting member and lying in the same plane and with one of the second pair of conductors formed with a second pair of jaws between which the other of said pair of conductors is receivable, a conducting plunger supported by said supporting member and movable from a first position out of engagement with the jaws of the conductors to a second position into engagement with the jaws of said conductors so that said plunger makes elec-

trical contact between said first and second pairs of jaws while simultaneously spreading said pairs of jaws.

3. A plurality of bayonet switches comprising a first plurality of conductors lying in a first plane, a supporting member supporting said plurality of conductors, a second plurality of conductors lying in a second plane and supported by said supporting member closely adjacent the first plurality of conductors, a plurality of bayonet switches insertable through openings in the supporting member, a plurality of jaws formed in the first plurality of conductors which grasp portions of the conductors, a second plurality of jaws forming a part of the second plurality of conductors for grasping portions of the second conductors and said bayonet switches movable between the first and second jaws to electrically connect said first and second plurality of conductors while simultaneously forcing the jaws apart.

4. In apparatus according to claim 3 wherein said first and second plurality of conductors comprise the center conductors of coaxial wave guides in which the outer conductors of said coavial wave guides are electrically connected together and the inner conductors of said coaxial wave guides are insulatingly supported by the outer conductors.

5. In apparatus according to claim 3 wherein said first and second plurality of jaws have inner portions and crescent-shaped members are attached to said inner portions to form camming surfaces for the bayonet switches.

6. In apparatus according to claim 5 wherein the bayonet switches are formed with sharp points so as to engage camming surfaces of the crescent-shaped member to open the jaws.

7. In apparatus according to claim 4 wherein said first and second plurality of jaws have inner portions and crescent-shaped members are attached to said inner portions to form camming surfaces for the bayonet switches and wherein the bayonet switches are formed with sharp points so as to engage camming surfaces of said crescent-shaped members to open said jaws.

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