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WAVEMETER HAVING STRIP-LINE RESONATOR CAPACITIVELY COUPLED TO FEED, WITH MOVABLE DIELECTRIC EFFECTIVELY VARYING RESONATOR LENGTH

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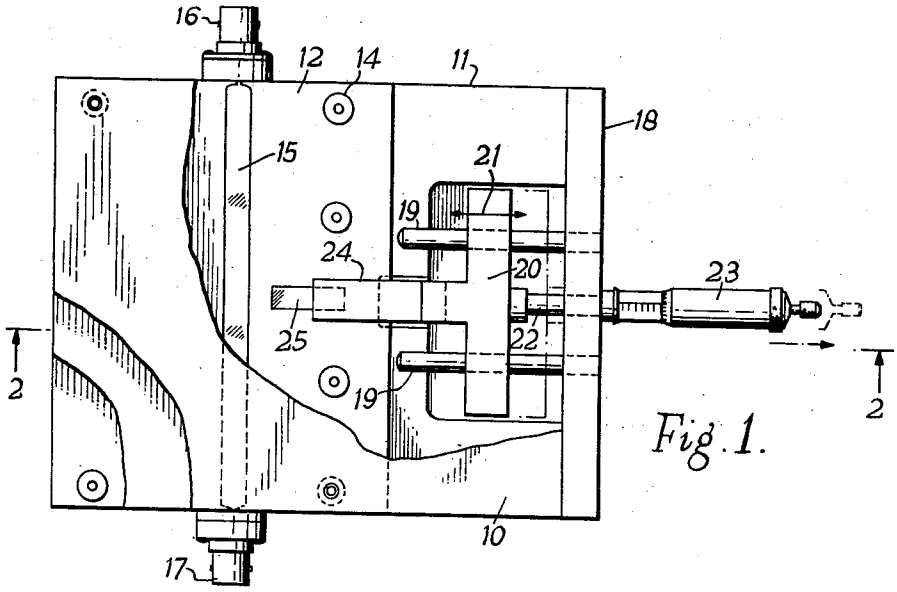
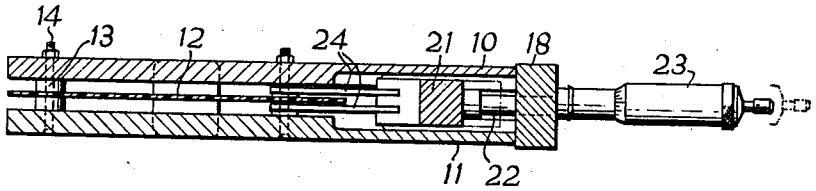


Fig. 1.

Fig. 2.



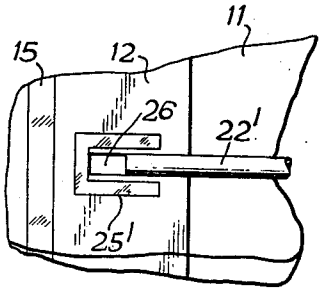


Fig. 3.

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WAVEMETER HAVING STRIP-LINE RESONATOR CAPACITIVELY COUPLED TO FEED, WITH MOVABLE DIELECTRIC EFFECTIVELY VARYING RESONATOR LENGTH

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The present invention relates to wavemeters for use in strip-line transmission systems.

A strip-line transmission system comprises an elongated conductor arranged between and spaced and electrically insulated from two substantially flat conducting plates, known as earth planes, which are electrically connected together and usually connected to earth. Conviently the elongated conductor is supported upon an insulating sheet which may extend on either side of the conductor and be clamped between the earth planes through suitable spacers. There may be two conductors in register with one another on the two sides of the insulating sheet. The conductors may be in the form of metal foil or may be applied for example by a printed circuit technique.

According to the present invention there is provided a strip-line wavemeter comprising an elongated conductor mounted between and spaced and electrically insulated from two flat conducting earth planes which are electrically connected together, a further conductor spaced from, and extending laterally away from the elongated conductor, and means for varying the capacitance between the further conductor and the earth planes.

The invention will be described, by way of example, with reference to the accompanying drawing in which

FIG. 1 is a plan view, partly broken away, of one embodiment of the invention,

FIG. 2 is a view in section on the line 2—2 of FIG. 1, and

FIG. 3 is a plan view of a part of a modified embodiment of the invention.

Referring to FIGS. 1 and 2, a strip-line transmission system comprises two earth planes **10** and **11** having clamped between them as insulating sheet **12** of low loss material. Spacers **13** are provided to maintain the sheet **12** spaced suitably from the earth planes and the assembly is clamped together by bolts **14**.

On each side of the sheet **12** is a conducting strip **15**. Only one of the strips is shown but they are in register with one another. End connectors **16** and **17** are provided for coupling the strip-line device between coaxial cables (not shown). In this example the sheet **12** is a laminate formed of layers of silicon glass cloth bonded with silicone resin. The conductors **15** are strips of copper foil bonded to the sheet **12** by means of an epoxy resin. The two conductors **15** are connected together at their two ends where they join the connectors **16** and **17** and may also be connected together at one or more points intermediate the ends, for instance by means of rivets.

A member **18** is fixed to one edge of the earth planes **10** and **11** and serves as a support for two guide pins **19**. A T-shaped member **20** is slidably mounted on the guide pins **19** which pass through holes in the cross-piece of

the T. Movements of the member **20** in the directions of the arrows **21** is effected by a micrometer screw **22** threaded into the member **18** and operated by an extension **23**. The screw **22** is coupled to the member **20** in any convenient manner permitting relative rotation but preventing relative movements in the directions **21**. To the stem of the T are fixed two plates **24** of material of high dielectric constant so spaced apart as to allow the edge of the sheet **12** to slide freely between them. An example of a suitable material for the plates **24** is polystyrene loaded with titanate. Two further conducting strips **25** are fixed in register with one another on opposite sides of the sheet **12**, and extend at right angles from the conductors **15**, the strips **25** being spaced from the conductors **15** but being sufficiently close to the conductors **15** to be electrically coupled thereto. The arrangement in such that the plates **24** can be made to overlap the stripes **25** to a greater or less extent as the plates **24** are moved by means of the micrometer **22, 23**. In this way the capacitive coupling between the strips **25** and the earth planes can be varied.

In order to measure the frequency of radio waves propagating through the strip-line system **10, 11, 15**, a measuring instrument indicating the amount of radio frequency energy passing through the strip-line system is connected thereto. The instrument may, under suitable conditions, be a crystal detector followed by an ammeter. The micrometer **22, 23** is adjusted until the indication on the instrument is a minimum, thereby indicating maximum absorption of energy by the capacitively coupled conductors **25**. The micrometer **22, 23** may be calibrated in frequency or wavelength.

If desired the conductors **25** or plates **24** may be of other than rectangular shape and such that the relation between change in capacitance and movement of the plates **24** departs from a linear relation in a desired manner. A like effect can be produced by making the plates **24** of non-uniform thickness.

In the modification shown in FIG. 3, the insulating sheet **12** is provided with a slot **26** into which slides an extension **22'** of the micrometer screw **22** of FIGS. 1 and 2. The conductors **25** of FIGS. 1 and 2 are replaced by a U-shaped conducting coating **25'**, the inside edges of the limbs of the U being set back so as to be out of electrical contact with the electrically conducting extension **22'**. This modification operates in the same way as the embodiment of FIGS. 1 and 2.

The device described is of particular use in radar systems, although it may find application in any radio system.

We claim:

1. A strip-line wavemeter comprising two electrically connected flat conducting earth planes disposed parallel to one another and spaced apart, a sheet of insulating material, an elongated conductor carried upon each side of said sheet of insulating material, means insulatingly supporting said sheet between said earth planes with said conductors air-spaced from said earth planes, a further pair of conductors spaced from, electrically coupled to and extending laterally away from said elongated conductors, and means for varying the capacitance between said further pair of conductors and said earth planes, comprising a moveable member in overlapping relation to said further pair of conductors and being slidable between a position of substantially no overlap with said

further conductors and a position of substantially complete overlap with said further conductors.

2. A strip-line wavemeter according to claim 1 wherein said sheet of insulating material is slotted and wherein said movable member is movable into and out of said slot.

3. A strip-line wavemeter according to claim 2, wherein the further conductors are of approximately U shape and extend around the slot.

4. A strip-line wavemeter according to claim 1 wherein said capacitance-varying moveable member comprises two plates of dielectric material each slidable between one of said further conductors and one of said earth planes.

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