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N. J. THOMPSON

2,697,207

COMBINED RELAY AND DIRECTIONAL COUPLER

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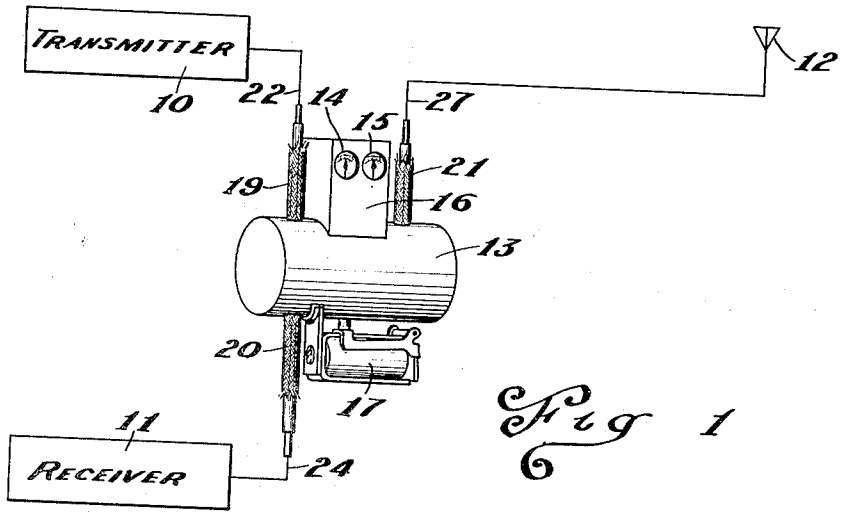


Fig 1

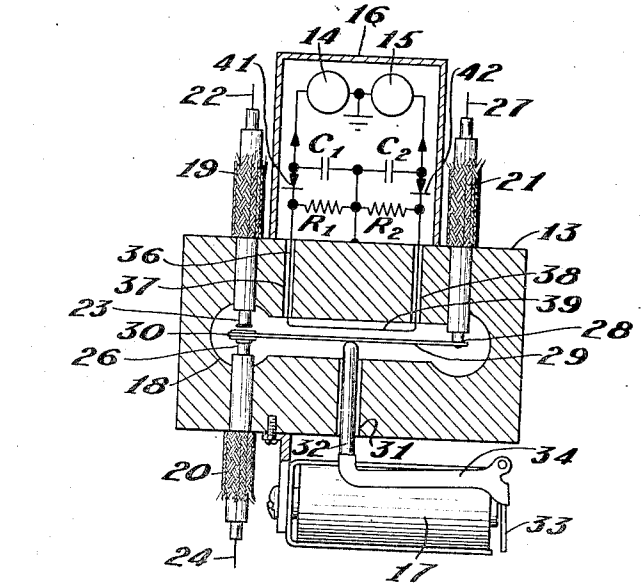


Fig 2

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COMBINED RELAY AND DIRECTIONAL COUPLER

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1 Claim. (Cl. 333—7)

This invention relates in general to a combination switching and power measuring device.

It is oftentimes desirable in radio communications to use a single antenna for transmission and reception of energy.

It is an object of this invention to provide a combination power measuring and switching means.

Yet another object of this invention is to provide an automatic switching means wherein the contact switched is coupled to the power measuring device.

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

Figure 1 illustrates the apparatus of this invention, and

Figure 2 is a sectional view of the apparatus of Figure 1.

Figure 1 discloses a transmitter **10**, a receiver **11**, and an antenna **12** which are connected, respectively, to a switching and power measuring device **13**. A pair of indicating dials **14** and **15** are mounted to a projection **16** attached to the member **13**. A relay **17** is also attached to the member **13**.

As shown in the sectional view, Figure 2, the body portion **13** is formed with an internal generally cylindrical opening **18**. The input lines **19**, **20** and **21** from the transmitter, receiver and antenna, respectively, have their outer conductors connected to the body portion **13**. The body portion **13** might be made of copper, for example.

The inner conductor **22** of line **19** is connected to an internal contact **23** which is mounted within one end of the generally cylindrical opening **18**. The center contact **24** of line **20** is connected to an internal contact **26** within the opening **18** and adjacent the contact **23**.

The center contact **27** of the line **21** is connected to a contact **28** at the opposite end of opening **18**.

A flexible conducting member or spring **29** is permanently fastened to the contact **28** and has an engaging portion **30** which may be moved between the contacts **23** and **26**.

An opening **31** is formed through the body portion **13** and an insulated plunger **32** is received therethrough. The plunger **32** engages the member **29**. The spring **29** is made of conducting material and is normally biased so as to engage the contact **26**. The plunger **32**, however, can move it so that it engages contact **23**. The relay **17** has a movable armature **33** that has a lever **34** attached thereto. The lever **34** is engageable with the plunger **32** to move it when the relay is energized.

A coupling loop **36** extends through a pair of openings **37** and **38** formed in the body member **13** and is insulated therefrom. A portion **39** of the conductor **36** is parallel to the spring **29**. Opposite ends of the conductor **36** are attached to resistors R_1 and R_2 and diode rectifiers **41** and **42**. Condensers C_1 and C_2 are connected across the other side of the diodes **41** and **42**, and meters **14** and **15** are connected between the diodes and ground.

The conductor **36**, in combination with the resistors R_1 and R_2, condensers C_1 and C_2, the diodes **41** and **42**, and

the meters **14** and **15**, form a double reflectometer capable of measuring reflected and incident power. Such directional couplers are known to those skilled in the art and for a more detailed description, reference may be made to Patent No. 2,423,390.

In operation, when it is desired to transmit, the relay **17** is energized, thus moving the spring **29** to engagement with the contact **23** and the directional coupler measures the incident and reflected power to and from the antenna **12**. One of the meters **14** measures the reflected power and the other measures the incident power.

When it is desired to receive, the relay is de-energized and the spring **29** engages contact **26** and thus connects the antenna directly to the receiver **11**.

Since directive couplers normally are used in the power range where more than a few watts are being transmitted or received, the coupler will be inoperative during the receiving portion of the cycle. This is true because generally energy received is at a very low level.

However, when transmission occurs the meter **14** and **15** will measure the reflected and incident power. It is to be noted that the spring **29** forms the center conductor between the line **21** and the lines **19** and **20**. It is required that the capacitive and inductive coupling between the loop **36** and the spring **29** be equal for the position in which contact **30** engages transmitter contact **23**. This principle of directive couplers is more fully set forth in the above mentioned patent.

It is seen that this invention provides means for reading power and simultaneously switching from transmit to receive.

Although this invention has been described with respect to a particular 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 claim.

I claim:

Unitary apparatus for alternately switching a first conductor from a second conductor to a third conductor and measuring incident and reflected power when connected to the second conductor comprising, a body portion formed with a generally cylindrical opening, first, second and third coaxial cables fastened to said body portion with the outer conductors grounded to said body portion, the inner conductors of said coaxial cables extending within the confines of said body portion and terminating within said cylindrical opening, a flexible conductor connected to the first of said inner conductors within the cylindrical opening, the free end of said flexible conductor movable between first and second positions to contact the second and third inner conductors respectively, actuating means mounted on one side of said body portion for moving said flexible conductor, a coupling loop mounted on the opposite side of said body portion adjacent said flexible conductor, the inductive and capacitive coupling between said loop and said flexible conductor being of equal value when said conductor is in said first position, a directive coupler connected to said conductive loop the coupling between said loop and said flexible conductor being effective when said flexible conductor is in said first position to render said coupler operative to indicate the reflected and incident power.

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