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CLOSURE DEVICE FOR CRYSTAL CONVERTERS

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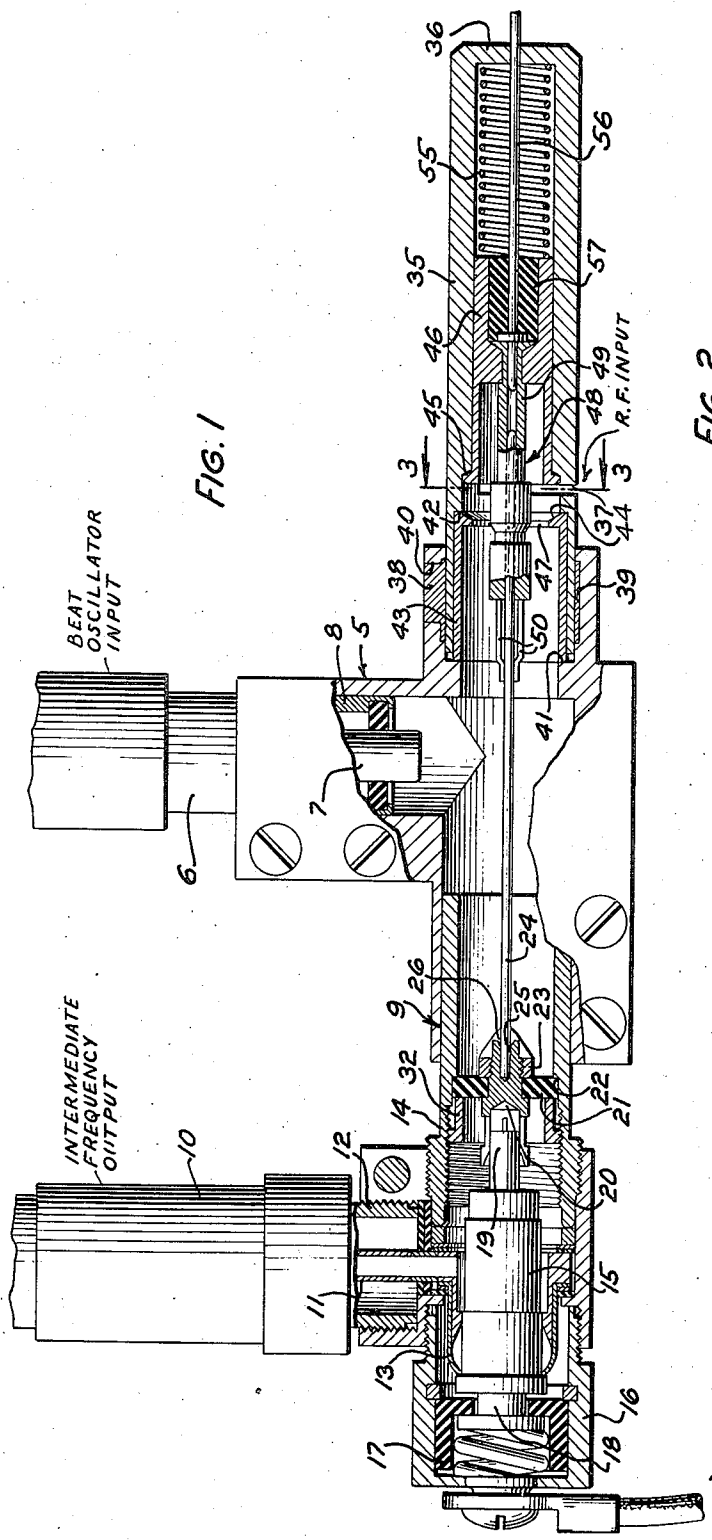


FIG. 1

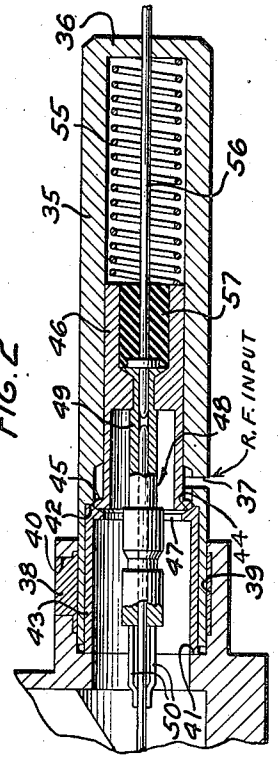


FIG. 2

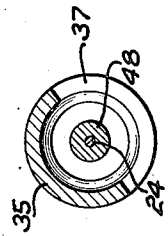


FIG. 3

INVENTION
W. L. NELSON
BY Harry L. Duft
ATTORNEY

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CLOSURE DEVICE FOR CRYSTAL CONVERTERS

Wilbur L. Nelson, Chicago, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

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7 Claims. (Cl. 250—31)

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This invention relates to radar equipment and more particularly to a device for blocking the high frequency input passage to a crystal converter when the converter is not operating.

In crystal converters of ultra high frequency equipment, it is necessary to disconnect the crystal from the input circuit when the converter is not being used in order to protect the crystal from damage by accidental non-rectified currents. In the past, the core member of a co-axial pair leading to the crystal assembly was physically disconnected from the crystal assembly automatically upon shutdown of the rectifying frequency supply. However, since the core conductor of the co-axial pair is relatively small and extends coaxially within the outer conductor of the pair, radial displacement of the conductor frequently occurred, which interfered with its reconnection to the crystal unit.

It is an object of the present invention to provide a simple, rugged and effective device for preventing high frequency inputs to a crystal converter during non-operating periods thereof.

In accordance with one embodiment of the invention, the core member of the coaxial pair has one end fixed to the crystal unit and the other end is slidably engaged in a spring chuck held coaxially in a cap member normally urged to close the ultra high frequency input gap to the coaxial assembly at a point in the coaxial assembly ahead of the beat oscillator frequency input. The cap member is slidably mounted to seat on a shouldered tubular element inserted in the coaxial line adjacent the slot through which the ultra high frequency enters the system and is spring biased to its closed position, an actuator rod therefor being provided for pulling the cap to open position at all times when the converter is operating.

A complete understanding of the invention may be had by reference to the following detailed description when considered in conjunction with the accompanying drawings, wherein like reference characters designate the same parts throughout the several views, and wherein

Fig. 1 is a side elevational view, partially in section, of a crystal converter showing the position of the cap member when the converter is operating;

Fig. 2 is a fragmentary sectional view of the right end of the apparatus shown in Fig. 1, showing the cap member in the position which it occupies when the converter is not operating, and

Fig. 3 is a transverse sectional view taken substantially along the line 3—3 of Fig. 1 showing the

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gap or passage through which the ultra high frequency passes to the coaxial system of the converter.

In the drawing, there is shown a crystal converter assembly comprising a T-shaped block 5, having mounted in one leg thereof a coaxial assembly 6 comprising inner and outer conductors 7 and 8 leading to a source of coaxially transmitted beat oscillator frequency. The T-shaped block 5 has connected to another of its arms a crystal unit assembly 9, from which there extends a line 10 to an intermediate frequency amplifier. The terminus of the line 10 includes inner and outer coaxial conductors 11 and 12 connected to a crystal engaging contact 13 and a tubular conductor 14, respectively. A crystal unit 15 is held in the assembly 9 by means of a mounting cap 16 carrying insulators 17 and 18, which serve to hold the crystal unit 15 in the assembly 9. The crystal unit 15 may be removed from the assembly 9 by removing the mounting cap 16. When the crystal unit is mounted in the assembly 9, its central contacting tip 19 will enter a spring chuck 20, which is seated in an insulating washer 21 nested against a shoulder 22 in the tubular conductor 14. The washer 21 is held against shoulder 22 by a retainer ring 32 threaded in tubular conductor 14 and the chuck 20 extends through the washer 21 and is threaded to receive a lock nut 23, which holds the chuck in place on the washer 21.

Suitably attached to the chuck 20 is a central conductor rod 24, which enters a suitably formed socket 25 in the chuck 20 and is fixed in place therein by means of solder 26. The rod 24 extends through the T-shaped block 5 and constitutes the central conductor thereof. Thus the tubular conductor 14 is electrically connected through the mounting cap 16 and an enlargement of conductor 14 to the conductor 12, whereas the conductor rod 24 is electrically connected through the chuck 20, contacting tip of crystal unit 15, the crystal (not shown) in unit 15, and crystal engaging contact 13 to the conductor 11.

The leg of the T-shaped block 5, which extends to the right (Figs. 1 and 2), has mounted therein a tubular member 35, having a shoulder 36 formed at its right end. The tubular member 35 has a slot 37 formed in it, through which ultra high frequencies being received may enter the coaxial system of the converter. The position of the slot 37 with respect to the T-shaped block 5 may be regulated by rotating the tubular member 35 with respect to the block 5 and, after the slot 37 has been properly located, the tube 35 may be

locked in position, with respect to the block 5, by means of solder poured through an aperture 40 into an annular cavity 39, formed internally of the block 5.

Interposed between a shoulder 41 formed in the block 5 and a shoulder 42 formed in the tubular member 35 is a tubular seat member 43, which has a shoulder 44 adapted to be engaged by a shoulder 45 on a cap member 46. The inner surface of the tubular seat member 43 is flush with the innter surface of the portion of the T-shaped block in which the seat member is positioned and the shoulder 44 formed on the seat member extends a short distance inwardly to define an annular passage 47 coaxial with a chuck member 48 suitable attached to the cap member 46. The chuck member 48 comprises a shouldered tubular body portion 49 having extending therefrom a plurality of spring fingers 50—50, which are adapted to slidably engage the conductor rod 24.

The cap member 46 is freely slidable in the tubular member 35, being normally urged to carry its shoulder 45 into seating engagement with the shoulder 44 on the seat member 43 by a compression spring 55. An actuator rod 56 is fixed to the cap member 46 by means of an insulating collar 57, wedged or molded in the end of the cap member and surrounding a portion of the rod 56. The actuator rod 56 may be moved to the right from the position shown in Fig. 2 to the position shown in Fig. 1 to retract the cap member 46 to inoperative position, thus opening the slot 37 to the coaxial system, comprising the conductor rod 24 and the walls of the crystal converter assembly which surround the rod 24. Thus the tubular member 35, seat member 43 and cap member 46 comprise a valve mechanism which may be opened or closed to permit or block the passage of ultra high frequency input to the coaxial line which includes the core conductor comprising the rod 24 and associated parts. The actuator rod 56 may be connected to any suitable mechanism responsive to the generator for the beat oscillator frequency, whereby, when the beat oscillator frequency generator is inoperative, the spring 55 will push the cap 46 from the position shown in Fig. 1 to the position shown in Fig. 2, thereby blocking the ultra high frequency gap or passage 37 and preventing stray frequencies from reaching the crystal converter when the converter is not in operating condition.

What is claimed is:

1. In a crystal converter having a series connected crystal in a coaxial line, a valve controlling an ultra high frequency input passage to the coaxial line, and means for closing said passage comprising a cylindrical member having a seat formed thereon and positioned in the coaxial line, a cap member biased to engage said seat and close said passage, and means to hold the cap member out of engagement with the seat when the converter is in use.

2. In a crystal converter having a series connected crystal in a coaxial line, a core member in said coaxial line, a valve controlling an ultra high frequency input passage to the coaxial line, and means for closing said passage comprising a cylindrical member having a seat formed thereon and positioned in the coaxial line, a cap member biased to engage said seat and close said passage, means to hold the cap member out of engagement with the seat when the converter is operated, and means on said cap member for slidably engaging and supporting the core member in said coaxial line.

3. In a crystal converter having a series connected crystal in a coaxial line, a core member in said coaxial line, a valve controlling an ultra high frequency input passage to the coaxial line, and means for closing said passage comprising a cylindrical member having a seat formed thereon and positioned in the coaxial line, a cap member biased to engage said seat and close said passage, means to hold the cap member out of engagement with the seat when the converter is operated, and a sliding chuck on said cap member having contact fingers for slidably engaging the core member of said coaxial line and having surfaces for supporting said core member.

4. In a crystal converter, a tubular member having an ultra high frequency passage therein, a core conductor coaxially mounted with respect to said tubular member and contacting the crystal of the converter, a closure member slidably positioned in said tubular member to slide along the core conductor, means on said closure member for contacting and supporting the core member, a seat ring fixed in said tubular member, and resilient means for urging the closure member to engage said ring to close the passage.

5. In a crystal converter, a tubular chamber, a core in said chamber and spaced from the walls thereof, an input passage communicating with said chamber, and means for closing said passage comprising a seat member fixed in said chamber and having an inwardly extending annular shoulder, a movable core supporting cap having an outwardly extending annular shoulder, and means for urging said cap to engage its annular shoulder with the annular shoulder of the seat member to seal said chamber from communication with said input passage.

6. In a crystal converter, a tubular chamber, a core coaxially mounted in said chamber, an input passage in communication with said chamber, and means for closing said passage comprising a seat member fixed in the chamber, a movable core supporting cap slidable in said chamber, means for urging said cap to engage the seat member to seal the chamber from communication with the input passage, and contactor fingers on a cap for resiliently engaging said core member in the various positions of the movable cap.

7. In a crystal converter, a tubular chamber, a core having one end fixedly positioned coaxial with respect to said chamber, an input passage communicating with said chamber, and means for closing said passage comprising a cap member having a central core supporting section and slidably positioned in said chamber, an annular closure seat mounted in said chamber for engagement by said cap member, means on said central core supporting section for resiliently contacting the core member, and means for urging said cap to engage said seat.

WILBUR L. NELSON.

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