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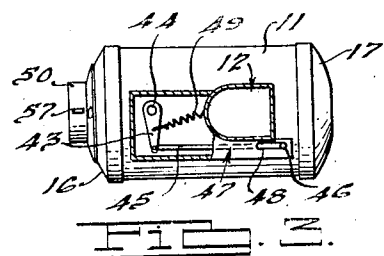
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RADIO APPARATUS

Filed Oct. 1, 1941

2 Sheets-Sheet 1



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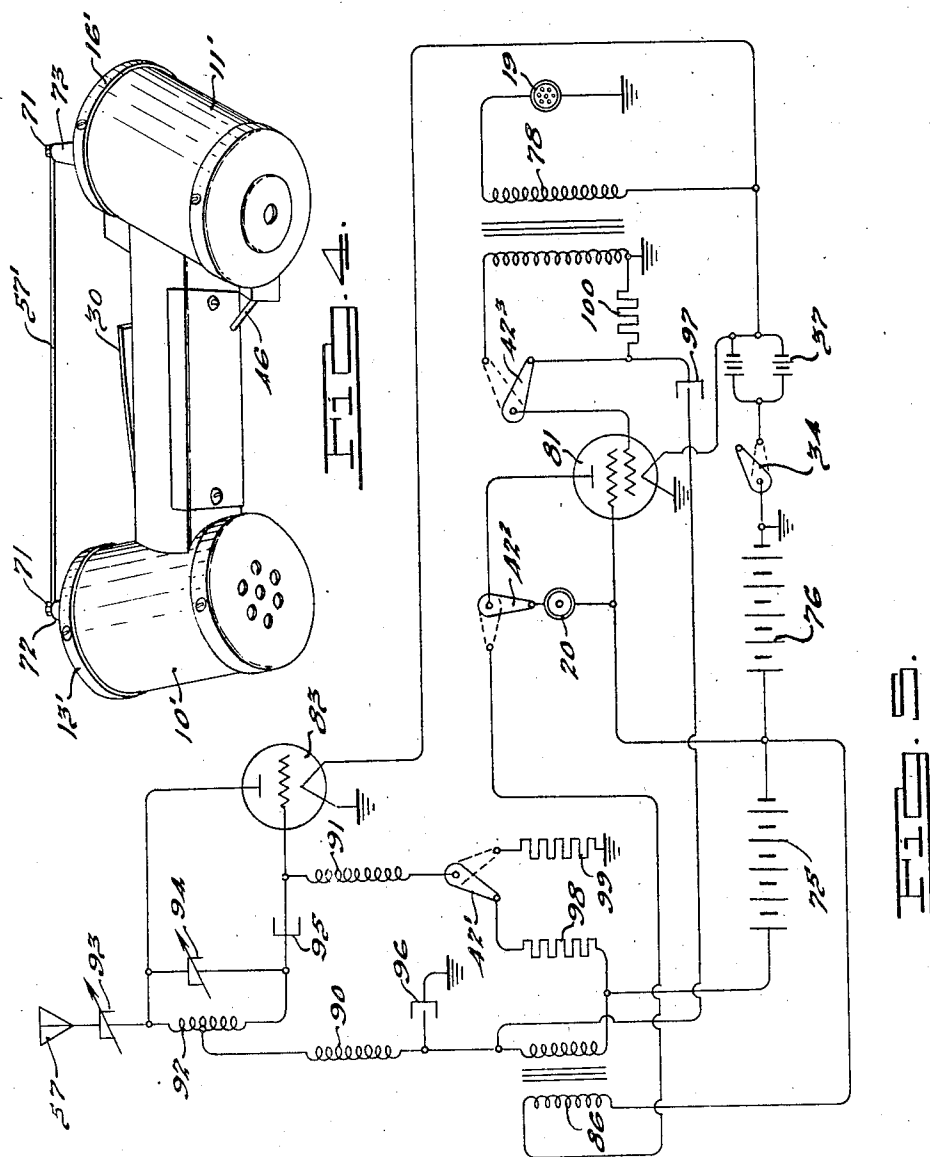
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2 Sheets-Sheet 2



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RADIO APPARATUS

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10 Claims. (Cl. 250—13)

The present invention relates to radio apparatus, and particularly to a portable, self-contained radio transmitting and receiving unit.

It is the general object of the present invention to provide a small, compact, entirely self-contained unit containing apparatus for transmitting and/or receiving radio telephone signals, and particularly adapted for relatively short range field use.

More particularly, it is the object of the present invention to provide a single unitary casing of convenient form for carrying and use which supports a radio antenna and contains radio apparatus adapted to both transmit and receive radio telephone signals.

Another object of the present invention is to provide in a device of the type mentioned a convenient form of extensible antenna.

Still another object of the present invention is to provide improved control means for selectively energizing the radio apparatus as a transmitting or receiving unit at the will of the operator.

Other objects and advantages of the invention will become apparent from the following specification, the accompanying drawings, and the appended claims.

In the drawings, in which like numerals are used to designate like parts in the several views throughout:

Figure 1 shows a perspective view of a complete unit, with the aerial extended;

Fig. 2 is a longitudinal section view taken on the line 2—2 of Figure 1, showing in a diagrammatic view certain of the elements of the radio apparatus within the casing;

Fig. 3 is a section taken on the line 3—3 of Fig. 1 with parts broken away;

Fig. 4 shows a unit similar to that illustrated in Figure 1, but equipped with a modified form of antenna; and,

Fig. 5 is a wiring diagram for the alternatively operable radio telephone transmitting and receiving apparatus contained within the casing of the unit.

As best illustrated in Figures 1 and 2, the radio unit of the present invention is embodied in a unitary casing in the general form of a so-called "French" phone, which consists of a pair of substantially cylindrical casings 10 and 11 rigidly connected by a tubular handle portion 12. Casing 10 is closed at its ends by a pair of similar closure caps 13 and 14, the latter having a plurality of perforations 15, and the casing 11 is similarly closed at its ends by a pair of similar closure caps

16 and 17, the latter being provided with an opening 18 at its center.

Closure cap 14 of casing 10 carries a microphone, indicated diagrammatically at 19, while closure cap 17 of casing 11 carries an ear phone, indicated diagrammatically at 20.

The microphone and ear phones may be secured to the closure caps 14 and 17 in any desired manner. In the particular embodiment illustrated, a pair of curved brackets 22 are welded to the inner side of the closure cap 14, and carry adjusting screws 23 adapted to clamp against the back of microphone 19 to secure it in position. Similar curved brackets 24 are secured to the underside of the closure cap 17, and a bridging element 25 is fastened by suitable screws 26 to the brackets 24, and bears against the back side of the ear phone 20 for holding it in position against the inner side of the closure cap.

The size, shape and relative location of the cylindrical casings 10 and 11 are such that when the handle 12 is grasped by the hand of the operator, the ear phone 20 may be placed in juxtaposition to the ear of the operator while the microphone 19 is simultaneously in proximity to the operator's mouth, so that he may either transmit messages by talking into the microphone or listen to received messages without changing the position of the casing.

It will be noted that when the unit is so held in the left hand of the operator with the ear phone 20 adjacent the operator's left ear, that the palm of the operator's hand will rest against the relatively flat surface 12' of the tubular handle 12 with the fingers extending around the back side of the handle 12, as viewed in Figure 1, and the thumb extending over a removable cover plate 27, which closes a correspondingly shaped opening in the front side of the handle 12, as viewed in Figure 1. It will be noted further that the thumb of the operator will be at the upper end of the handle 12, as viewed in Figure 1.

The radio apparatus contained within the unit is preferably of the type which may be alternatively energized as either a transmitting or a receiving apparatus, and the control means for energizing the unit as a whole, as well as the means for controlling whether or not it acts as a transmitting or receiving set, are so constructed and arranged that they may be operated by the hand or fingers of the operator which grasps handle 12 without any shift from its position as described above.

In the preferred arrangement illustrated in the drawings, the primary control element comprises

a flexible leaf spring 30 secured in any suitable manner, as by a rivet 31, to that portion of the handle 12 embraced by the fingers of the operator's hand. Leaf spring 30 in its normal position is spaced from the tubular handle 12, but is adapted to be compressed against the handle by the fingers of the operator's hand. Spring 30 engages a plunger 32 which, in turn, carries a V-shaped contact 34 adapted on depression to pass between and contact the central terminals 35 and 36 of a pair of B batteries 37 and 38. The circuit of the radio apparatus, as hereinafter described in greater detail, is so arranged that the making of an electrical connection between the terminals 35 and 36 and the casing energizes the filament circuits of the vacuum tubes. Since the plunger 32 carrying contact 24 is in electrical contact with the handle portion 12 of the casing it will conduct current from the terminals 35 and 36 to the casing when the contact engages the terminals. A helical spring 40 is preferably provided surrounding plunger 32 between the left spring 30 and casing 12 to assist the leaf spring in retracting the plunger.

In addition to the primary control element, there is provided a control switch, indicated generally at 42, within the casing 11 which is adapted to selectively energize the radio circuit, either as a transmitting or receiving apparatus, in the manner indicated in greater detail hereinafter. The switch 40 is provided with a control arm 43 secured to a rotatable switch operating shaft 44. A link 45 is pivoted to the end of lever 43 at one end and is provided at its opposite end with a portion 46 bent at right angles to the main body of the link. The lever 43 and link 45 are preferably enclosed in an auxiliary housing, indicated generally at 47, as best shown in Figure 3, and the terminal 46 of the link 45 projects through a suitable slot 48 formed in the housing wall in a position to be engaged by the thumb on the hand of the operator which grips the handle portion 12 of the unit without requiring the operator to shift the position of his hand.

Any suitable means, such as the spring 49, is provided for holding the arm 43 and link 45 in their right-hand positions as viewed in Figure 3, in which position the switch 42 renders the radio circuit operative as a receiving set.

When the operator desires to transmit messages, he merely depresses the terminal portion 46 of link 45 with the thumb of the hand which grips the handle portion 12 thereby shifting the control arm 43 and switch 42 to a position energizing the radio circuit as a transmitting set. Such operation of the terminal 46 may be performed without any shift of the operator's hand on the handle portion 12 and should be performed without releasing the pressure on leaf spring 30 which energizes the circuit as a whole.

There is provided, in accordance with the preferred form of the present invention, an extensible antenna similar in construction to the conventional coiled steel rule of the type in which the steel tape has a transverse arch in order to make it self-sustaining and relatively rigid when extended. This antenna assembly is mounted within a cylindrical casing 50, secured in any desired manner to be insulated from the closure cap 16 of housing 11.

In the particular embodiment shown, the housing 50 is provided with a peripheral flange 51 which is riveted to the closure cap 16 by suitable rivets 52 with an intermediate layer of insulation 53 between the flange and the closure

cap. A suitable sleeve 54 of insulating material also surrounds the shank of each rivet.

Journalled within the casing 50 on a central hollow shaft 55 is a rotatable drum 56 upon which is wound a spring steel tape 57 having an initial transverse arch so that it will remain relatively straight and rigid when extended even though supported at only one end. The drum 56 preferably contains a spiral spring 58 adapted to wind up and retract the tape 57. In order to hold the drum 56 against rotation when the tape 57 is extended, there is provided a clutch bar 59 which extends through slots in hollow shaft 55 and is normally forced against an end wall of the drum 56 by means of a helical spring 60, and is adapted to engage one or more lugs 61 on the housing wall to prevent rotation of the drum. A button 62, secured to the bar 59 at the center thereof, projects from the casing 50 at its center and is adapted on depression to release the clutch bar against the force of spring 60 and enable the spring 58 to wind up the tape 57.

The hollow shaft 55 is insulated from the closure cap 16 but projects through a suitable opening therein and is held against withdrawal by means of a nut 63. A suitable terminal 64 is provided at the inner end of the tubular shaft 55 in order that an electrical connection can be made between the antenna and the circuit of the radio set. The circuit to the antenna tape 57 runs from the shaft 55 through the spring 58 which is fixed at its inner end to shaft 55 and at its outer end to drum 56. The tape in turn is fixed at its inner end to the drum to complete the circuit.

In the alternative form of invention shown in Figure 4, the antenna comprises a straight wire 57' secured at its ends by any suitable means such as nuts 71 to a pair of insulators 72 and 73 secured, respectively, to the closure caps 13' and 16' on housing 10' and 11'. The insulator support 73 is provided with a terminal at the inner side of the closure cap 16' in the usual manner in order that the antenna may be electrically connected to the circuit of the radio set. The unit illustrated in Figure 4 is otherwise similar to that illustrated in the remaining figures of the drawings.

It will be noted that both types of antenna illustrated and described herein extend in substantial parallelism to the casing of the unit which comprises the ground for the electrical circuit of the radio set.

The electrical circuit of the radio transmitter and receiver may be of any known type, preferably one adapted to be operated both as a transmitting and receiving apparatus, provided, of course, that the circuit must be of simplified form in order that all the elements thereof may be enclosed in the relatively small casing contemplated by the present invention.

The major elements of the circuit are preferably mounted in the casing in the manner best illustrated in Figure 2 wherein, as previously mentioned, the B batteries 37 and 38, which are preferably small, cylindrical dry cells, are located within the handle portion 12 of the casing. The A batteries 75 and 76, which are preferably 45 volt dry cells, along with the microphone transformer 78, may conveniently be placed within the housing 10. The size of housing 10 is preferably such that these last mentioned three elements snugly fit the same so that no particular fastening means is necessary to hold them in

position. If necessary, suitable packing means (not shown) may be utilized to prevent any relative movement of the batteries and transformer located in the housing 10.

It has been found convenient to locate all of the remaining elements of the radio transmitting and receiving apparatus within the casing 11 and for this purpose there is preferably provided a central transverse partition 80 upon which is supported an amplifier tube 81 by means of a bracket 82. The oscillator tube 83 which is mounted upon a supporting plate 84 is secured to the opposite side of the partition 80 by means of a plurality of studs 85. A modulation transformer 86 is likewise secured to the partition 80 at the same side thereof as the amplifier 81. The remaining elements of the circuit, including condensers, reactances, and resistors, are preferably not secured in place within the casing 11 but are merely held in position by the connecting wiring of the circuit illustrated diagrammatically in Figure 5. This wiring for the sake of clarity is omitted in Figure 2, but the position of the various other elements of the circuit is indicated diagrammatically in Figure 2 by the use of reference numerals hereafter noted in the description of the electrical circuit for the apparatus.

Referring particularly to Fig. 5 the illustrated system will be recognized as a conventional one which may be selectively adjusted to either receive or transmit signals. The previously mentioned microphone 19 is coupled through the microphone transformer 78, to the control grid of the amplifier 81, the output circuit whereof is coupled, through the modulation transformer 1, to the grid circuit of the oscillator 83, the output circuit whereof is conventionally coupled to the antenna 57. In addition to the above mentioned elements, which have previously been referred to, the circuit also includes the usual radio frequency choke coils 90 and 91, a usual so-called tank coil 92, tuning condensers 93, 94, 95, 96 and 97, and resistors 98, 99 and 100. The previously mentioned receiver 20 is normally coupled to the amplifier 81 by means of the blade 42² of the control switch 42, the other blades 41' and 42³ whereof normally occupy the illustrated full line positions. As previously described all of these blades may be simultaneously turned to the dotted line positions to adjust the apparatus for transmitting purposes. The filament switch 34 normally occupies the illustrated open position in which position the apparatus is non-operative.

It will be understood that by closing the switch 34 in the previously described manner, the filament circuits of the oscillator 83 and the amplifier 81 are completed and provided switch 42 is in the illustrated full line position the apparatus will function as a receiver during which operation signals received by the antenna 57 are detected by the element 83, amplified by the amplifier 81 and applied to the receiver 20.

With switch 34 closed and switch 34 in the dotted line position, the receiver 20 is disconnected, and signals applied to the microphone 19 are amplified by the amplifier 81, and these amplified signals are applied to the grid circuit of the oscillator through the modulation transformer 1.

Although only several specific embodiments of the invention have been described in detail, it will be appreciated that various other modifications in the form and arrangement of the parts may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A portable radio telephone receiving and sending unit comprising a casing, a microphone and a receiver supported by said casing and spaced and angularly positioned to be placed in simultaneous juxtaposition to the mouth and ear respectively of the operator, said casing having a handle portion by which the casing may be supported by one hand of the operator with the microphone and receiver in juxtaposed position, and a complete radio transmitting and receiving apparatus located within the casing and operatively connected to said microphone and receiver.

2. A portable radio telephone receiving and sending unit comprising a casing, a microphone and a receiver supported by said casing and spaced and arranged to be placed in simultaneous juxtaposition to the mouth and ear respectively of the operator, said casing having a handle portion by which the casing may be supported by one hand of the operator, radio apparatus within said casing adapted to operate alternatively to transmit and receive radio telephone signals and operatively connected to said microphone and receiver, a switch for energizing said apparatus, and a device for selectively causing said apparatus to operate to transmit or receive signals, said switch having an operating element mounted on said handle and adapted to be operated to energize said apparatus by an increase in the pressure of said one hand of the operator on said handle and said device including an operating element movable between two positions and located on said casing in position to be operated by the thumb on said one hand while said hand is in normal engagement with the handle.

3. A portable radio telephone receiving and sending unit comprising a casing, a microphone and a receiver supported by said casing and spaced and angularly positioned to be placed in simultaneous juxtaposition to the mouth and ear respectively of the operator, said casing having a handle portion by which the casing may be supported by one hand of the operator with said microphone and receiver in said juxtaposed position, a complete radio transmitting and receiving apparatus located within the casing and operatively connected to said microphone and receiver, and an antenna for said apparatus extending from and supported by said casing.

4. A portable radio telephone receiving and sending unit comprising a casing, a microphone and a receiver supported by said casing and spaced and angularly positioned to be placed in simultaneous juxtaposition to the mouth and ear respectively of the operator, said casing having a handle portion by which the casing may be supported by one hand of the operator with said microphone and receiver in said juxtaposed position, a complete radio apparatus within said casing adapted to operate alternatively to transmit and receive radio telephone signals and operatively connected to said microphone and receiver, a device for selectively causing said apparatus to operate to transmit or receive signals, and an antenna for said apparatus supported by said casing.

5. A portable radio telephone receiving and sending unit comprising a casing, a microphone and a receiver supported by said casing and spaced and arranged to be placed in simultaneous juxtaposition to the mouth and ear respectively of the operator, said casing having a handle portion by which the casing may be supported by one hand of the operator, radio apparatus within

said casing adapted to operate alternatively to transmit and receive radio telephone signals and operatively connected to said microphone and receiver, a switch for energizing said apparatus, a device for selectively causing said apparatus to operate to transmit or receive signals, said switch having an operating element mounted on said handle and adapted to be operated to energize said apparatus by an increase in the pressure of said one hand of the operator on said handle and said device including an operating element movable between two positions and located on said casing in position to be operated by the thumb on said one hand while said hand is in normal engagement with the handle, and an antenna for said apparatus insulated from and supported by said casing.

6. A self-contained portable radio telephone sending and receiving unit including a casing consisting of a pair of housings connected by a handle adapted to be grasped by a hand of the operator to support the entire casing thereby, a microphone in one of said housings and a receiver in the other, said microphone and receiver being so spaced and positioned that they may be located simultaneously in juxtaposition to the mouth and ear respectively of the operator when the operator supports the casing by said handle, and a complete radio transmitting and receiving apparatus located within said casing and operatively connected with said microphone and receiver.

7. A portable radio telephone sending and receiving unit including a casing consisting of a pair of housings connected by a handle adapted to be grasped by a hand of the operator to support the entire casing thereby, a microphone in one of said housings and a receiver in the other, said microphone and receiver being so spaced that they may be located simultaneously in juxtaposition to the mouth and ear respectively of the operator when the operator supports the casing by said handle, radio apparatus within said casing adapted to operate alternatively to transmit and receive radio telephone signals and operatively connected to said microphone and receiver, a switch for energizing said apparatus, and a device for selectively causing said apparatus to operate to transmit or receive signals.

8. A portable radio telephone sending and receiving unit including a casing consisting of a pair of housings connected by a handle adapted to be grasped by a hand of the operator to sup-

port the entire casing thereby, a microphone in one of said housings and a receiver in the other, said microphone and receiver being so spaced that they may be located simultaneously in juxtaposition to the mouth and ear respectively of the operator when the operator supports the casing by said handle, radio apparatus within said casing adapted to operate alternatively to transmit and receive radio telephone signals and operatively connected to said microphone and receiver, a switch for energizing said apparatus, and a device for selectively causing said apparatus to operate to transmit or receive signals, said switch having an operating element mounted on said handle and adapted to be operated to energize said apparatus by an increase in the pressure of said one hand of the operator on said handle and said device including an operating element movable between two positions and located on said casing in position to be operated by the thumb on said one hand while said hand is in normal engagement with the handle.

9. A portable radio telephone sending and receiving unit including a casing consisting of a pair of housings connected by a tubular handle adapted to be grasped by a hand of the operator to support the entire casing thereby, and a microphone in one of said housings and a receiver in the other, said microphone and receiver being so spaced that they may be located simultaneously in juxtaposition to the mouth and ear respectively of the operator when the operator supports the casing by said tubular handle, and radio sending and receiving apparatus located in said casing, said radio apparatus including A batteries located in said tubular handle.

10. A portable radio telephone sending and receiving unit including a casing consisting of a pair of housings connected by a tubular handle adapted to be grasped by a hand of the operator to support the entire casing thereby, a microphone in one of said housings and a receiver in the other, said microphone and receiver being so spaced that they may be located simultaneously in juxtaposition to the mouth and ear respectively of the operator when the operator supports the casing by said tubular handle, and radio sending and receiving apparatus located in said casing, said radio apparatus including A batteries located in said tubular handle, and B batteries located in the housing containing the microphone.

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DISCLAIMER

2,276,933.—*Cletus J. Collom*, Detroit, Mich. RADIO APPARATUS. Patent dated March 17, 1942. Disclaimer filed December 11, 1944, by the inventor.

Hereby enters this disclaimer to claims 1, 3, 4, 6, 7, and 9 of said patent.

[*Official Gazette January 16, 1945.*]