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# United States Patent [19]

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Norimatsu

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[54] TELEPHONE HAVING TOUCH SENSOR FOR RESPONDING TO A CALL

4,870,676 9/1989 Leno ..... 379/58  
4,870,696 9/1989 Yorita ..... 379/57 X

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### FOREIGN PATENT DOCUMENTS

[73] Assignee: NEC Corporation, Tokyo, Japan

0213929 11/1987 European Pat. Off. .  
0283853 9/1988 European Pat. Off. .  
0100381 8/1981 Japan ..... 340/562  
0153342 9/1984 Japan ..... 379/61  
0229432 11/1985 Japan ..... 379/61  
61-171230 8/1986 Japan .  
62-3546 1/1987 Japan .  
8503820 2/1985 PCT Int'l Appl. .  
2040524 8/1980 United Kingdom ..... 340/562

[21] Appl. No.: 998,652

[22] Filed: Dec. 29, 1992

### Related U.S. Application Data

[63] Continuation of Ser. No. 474,910, Feb. 5, 1990, abandoned.

### Foreign Application Priority Data

Feb. 3, 1989 [JP] Japan ..... 1-23713

[51] Int. Cl.<sup>5</sup> ..... H04M 11/00

[52] U.S. Cl. .... 379/58; 379/61;  
200/DIG. 2; 341/22

[58] Field of Search ..... 379/57, 58, 96, 61;  
200/DIG. 2; 341/22, 33, 34; 340/562

### References Cited

#### U.S. PATENT DOCUMENTS

3,668,659 6/1972 Hutchings .  
3,705,424 12/1972 Harvey, Jr. .... 200/DIG. 2 X  
3,728,501 4/1973 Larson et al. .... 200/DIG. 2 X  
3,737,670 6/1973 Larson ..... 200/DIG. 2 X  
3,811,054 5/1974 Wern et al. .... 340/562 X  
3,944,843 3/1976 Vaz Martins ..... 200/DIG. 2 X  
4,237,421 12/1980 Waldron ..... 340/562 X  
4,281,323 7/1981 Burnett et al. .... 341/33 X  
4,550,310 10/1985 Yamaguchi et al. .... 341/33 X  
4,567,470 1/1986 Yoshikawa et al. .... 341/33 X  
4,651,133 3/1987 Ganesan et al. .... 341/33 X  
4,725,817 2/1988 Wihlborg ..... 341/34  
4,827,085 5/1989 Yaniv et al. .... 379/96 X  
4,831,279 5/1989 Ingraham ..... 340/562 X  
4,848,887 7/1989 Suzuki et al. .... 379/58

### OTHER PUBLICATIONS

Patent Abstracts of Japan, vol. 11, No. 171 (E-512)(2618) Jun. 2, 1987.  
Patent Abstracts of Japan, vol. 10, No. 379 (E-465)(2436) Dec. 18, 1986.

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### [57] ABSTRACT

The telephone includes a touch sensor which may be attached on a handset. When the telephone receives a call meant therefor, the telephone alerts the user to the call by outputting a ringing tone through a speaker. In response to the call, the telephone also transmits a signaling tone to a base station which may be connected to the telephone over a radio channel and to a public switching telephone network. If the user touches the touch sensor in response to the ringing tone, the telephone stops the signaling tone and thus informs the base station that the user has responded to the call.

28 Claims, 3 Drawing Sheets

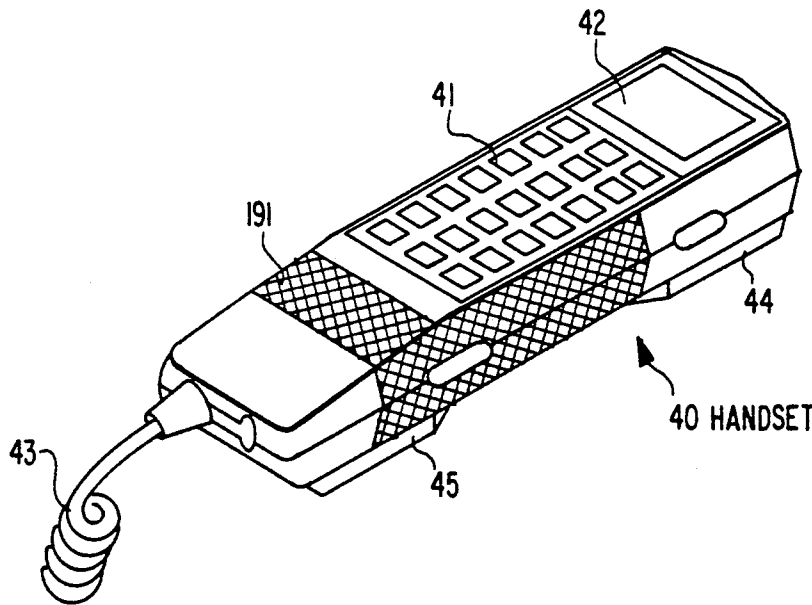


FIG. 1

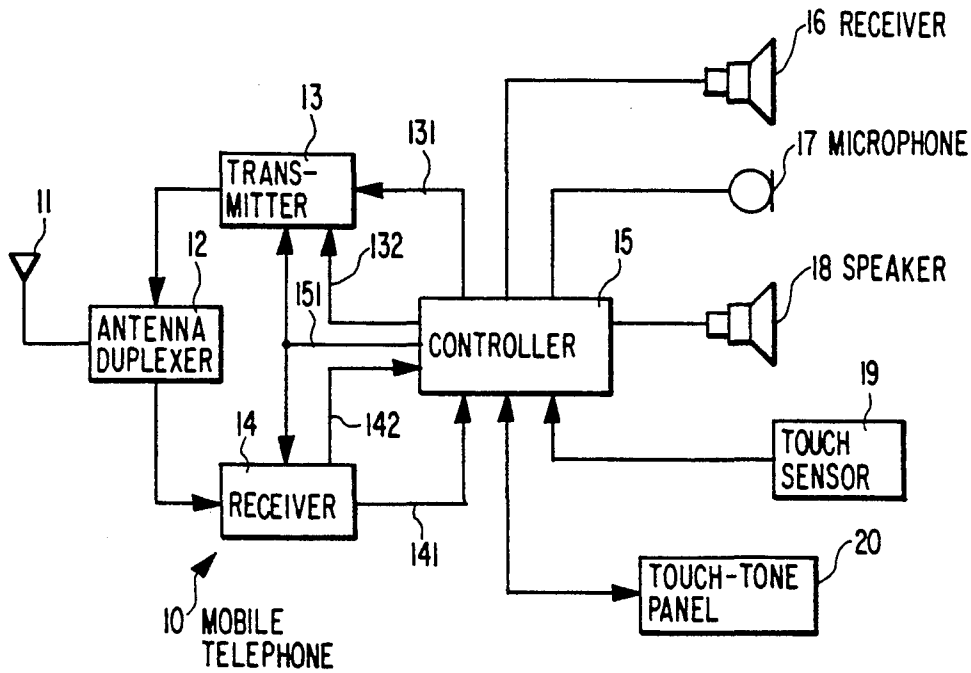
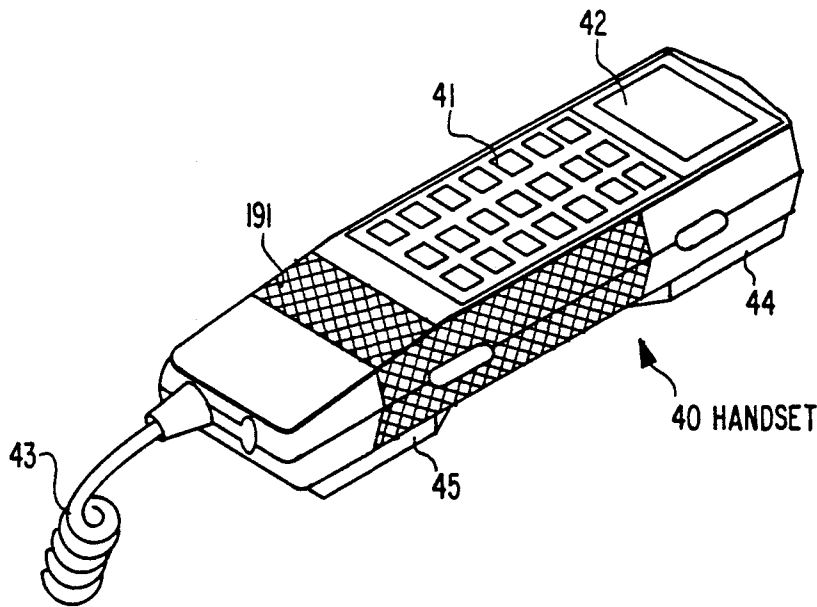


FIG. 4



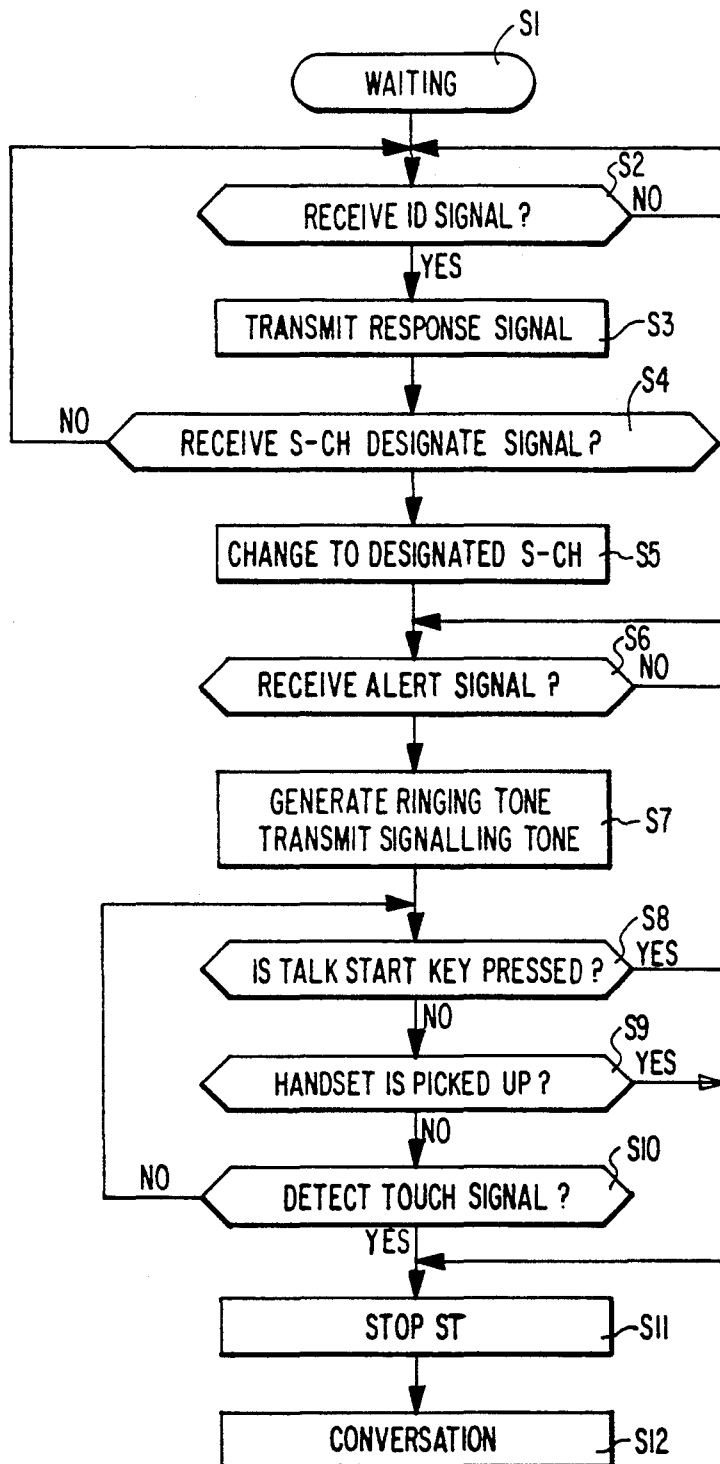


FIG. 2

FIG. 3

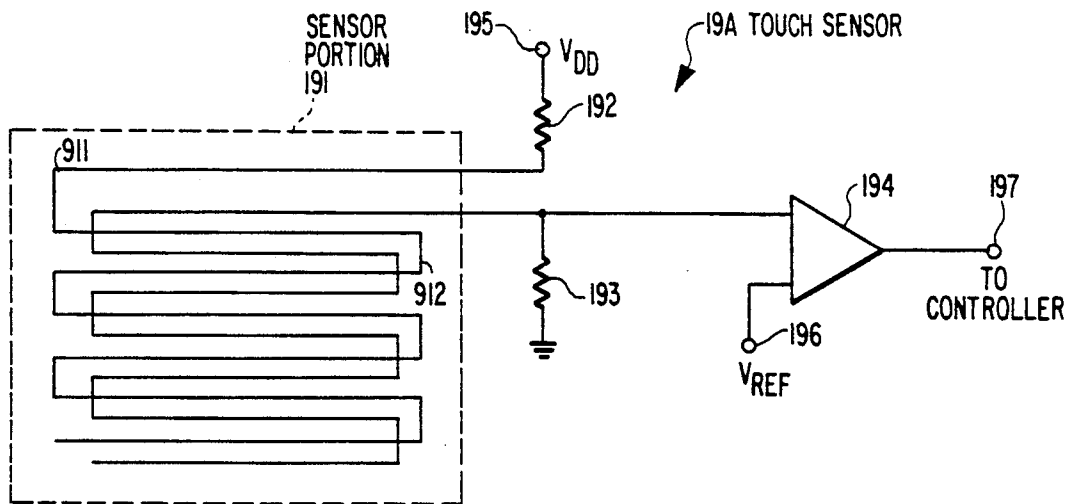


FIG. 5

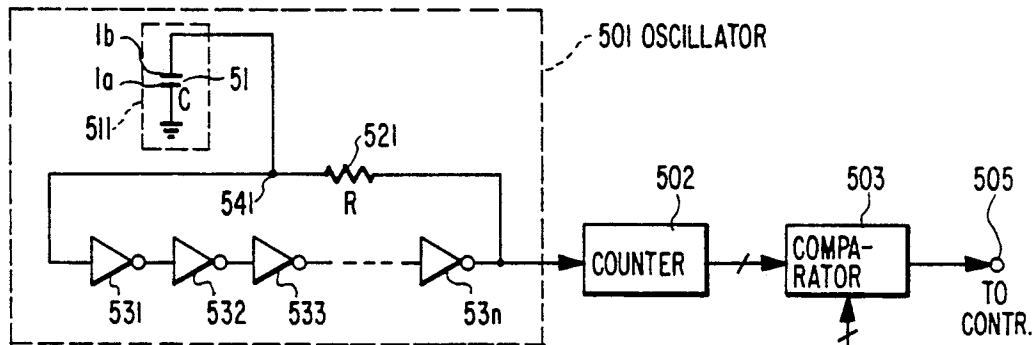


FIG. 6A

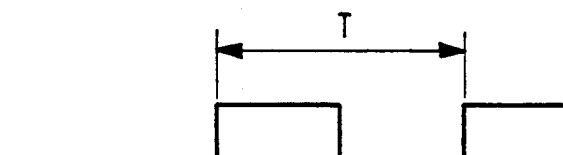


FIG. 6B



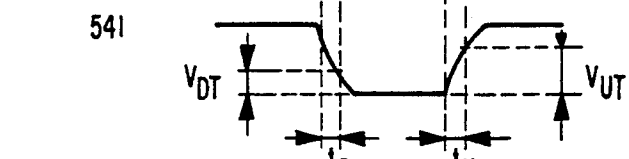
FIG. 6C



FIG. 6D



FIG. 6E



## TELEPHONE HAVING TOUCH SENSOR FOR RESPONDING TO A CALL

This is a continuation of application Ser. No. 5 07/474,910 filed Feb. 5, 1990 now abandoned.

### BACKGROUND OF THE INVENTION

The present invention relates to a telephone and, more particularly, to a telephone suitable for a mobile telephone system.

In a conventional telephone the user responds to a telephone call by picking up a handset or pressing a talk start button.

In the case of picking up the handset, a hook switch of the telephone is closed to inform a telephone exchange, which in a mobile telephone system may be connected to the telephone through a mobile base station, that the user of the telephone has responded to the call. If the user wants to use the telephone as a hands-free telephone, however, he does not need the handset; nevertheless, he must pick it up to connect the call.

Similarly, upon pressing the talk start button, the telephone informs the telephone exchange that the user has responded to a call. In this case, however, the user must search for the talk start button among many buttons provided on the telephone. This may hinder driving when the telephone is used in a vehicle.

### SUMMARY OF THE INVENTION

An object of the present invention is, therefore, to provide an improved telephone which has a touch sensor to respond to a call.

Another object of the present invention is to provide a telephone in which the user can easily respond to a call by simply touching the telephone.

Yet another object of the present invention is to provide a telephone having a touch sensor to respond to a call in addition to a talk start button and to a hook switch.

Still yet another object of the present invention is to provide a telephone suitable for a mobile telephone system, which eliminates any trouble in responding to a call, while the user drives a vehicle in which the telephone is installed.

According to the present invention, there is provided a telephone comprising a speaker for annunciating a call meant for the telephone. The telephone also comprises a touch sensor which includes a sensor portion and detects whether the sensor portion is touched or not. Upon detecting a touch on the touch sensor, the telephone informs a telephone exchange that the user has responded to the call. The exchange then connects the telephone to a calling party telephone from which the call originated.

### BRIEF DESCRIPTION OF THE DRAWINGS

Above and other objects, features and advantages of the present invention will become more apparent from the following description referring to the accompanying drawings in which:

FIG. 1 is a block diagram showing a mobile telephone embodying the present invention;

FIG. 2 is a flow-chart showing the operation of the FIG. 1 telephone;

FIG. 3 shows a schematic circuit diagram of a touch sensor to be used in the FIG. 1 telephone;

FIG. 4 is a perspective view of a handset on which the touch sensor shown in FIG. 3 is provided;

FIG. 5 is a schematic circuit diagram of another touch sensor to be used in the FIG. 1 telephone; and

FIGS. 6A to 6E are used to show the operation of touch sensor 19B shown in FIG. 5.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIG. 1, a mobile telephone 10 is shown which may be used for a mobile telephone system. The mobile telephone 10 may be connected over a radio channel to a mobile base station which in turn may be connected to a telephone exchange included in a public switching telephone network (PSTN).

The mobile telephone 10 includes an antenna 11 for picking up a radio signal transmitted from the mobile base station (not shown). The antenna 11 is also used for transmitting a radio signal to the mobile base station. The antenna 11 is connected to both a transmitter 13 and a receiver 14 through an antenna duplexer 12. The transmitter 13 receives a speech, or voice, signal and a control signal from a controller 15 through conductor lines 131 and 132, respectively. The transmitter 13 modulates a radio frequency signal with the received speech signal and control signal and transmits the modulated signal to the base station through the antenna duplexer 12 and antenna 11.

The receiver 14 receives a radio frequency signal from the base station through the antenna 11 and antenna duplexer 12. The receiver 14 demodulates the received signal to provide the demodulated speech and control signals to the controller 15 through conductor lines 141 and 142, respectively. The controller 15 changes the channel frequencies of transmitter 13 and receiver 14 through a conductor line 151. The controller 15 may be composed of a commercially available microprocessor. The antenna 11, antenna duplexer 12, transmitter 13 and receiver 14 are well-known in the art and thus no further description of them will be given.

The mobile telephone 10 further comprises a receiver 16, microphone 17 and speaker 18 which are coupled to the controller 15. The receiver 16 and microphone 17 are used for a telephone conversation. The speaker 18 is used for annunciating a call to the user by outputting a ringing tone which is generated in the controller 15 in response to an alert signal, as will be described later. The receiver 16 and speaker 18 may be accommodated in an earpiece of a handset. The microphone 17 may be accommodated in a mouthpiece of the handset.

The telephone 10 includes a touch-tone panel 20 for dialing. The panel 20 may include a key pad and a display. The telephone also includes a touch sensor 19 which detects whether or not the user touches the telephone 10 in response to the ringing tone, i.e., in response to a call meant for him. By using the touch sensor 19, the user can respond to the call without resorting to picking up the handset or to pressing any key. It is to be noted that the user may also respond to a call by picking up the handset or by pressing a talk start key as in the prior art.

Referring to FIG. 2, the operation of the controller 15 as shown in FIG. 1 will now be described in more detail. In a waiting state (step S1), the controller 15 causes the transmitter 13 and receiver 14 to tune to a paging channel over which a calling signal is transmitted from the mobile base station. The calling signal may include an identification (ID) number of the mobile

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