

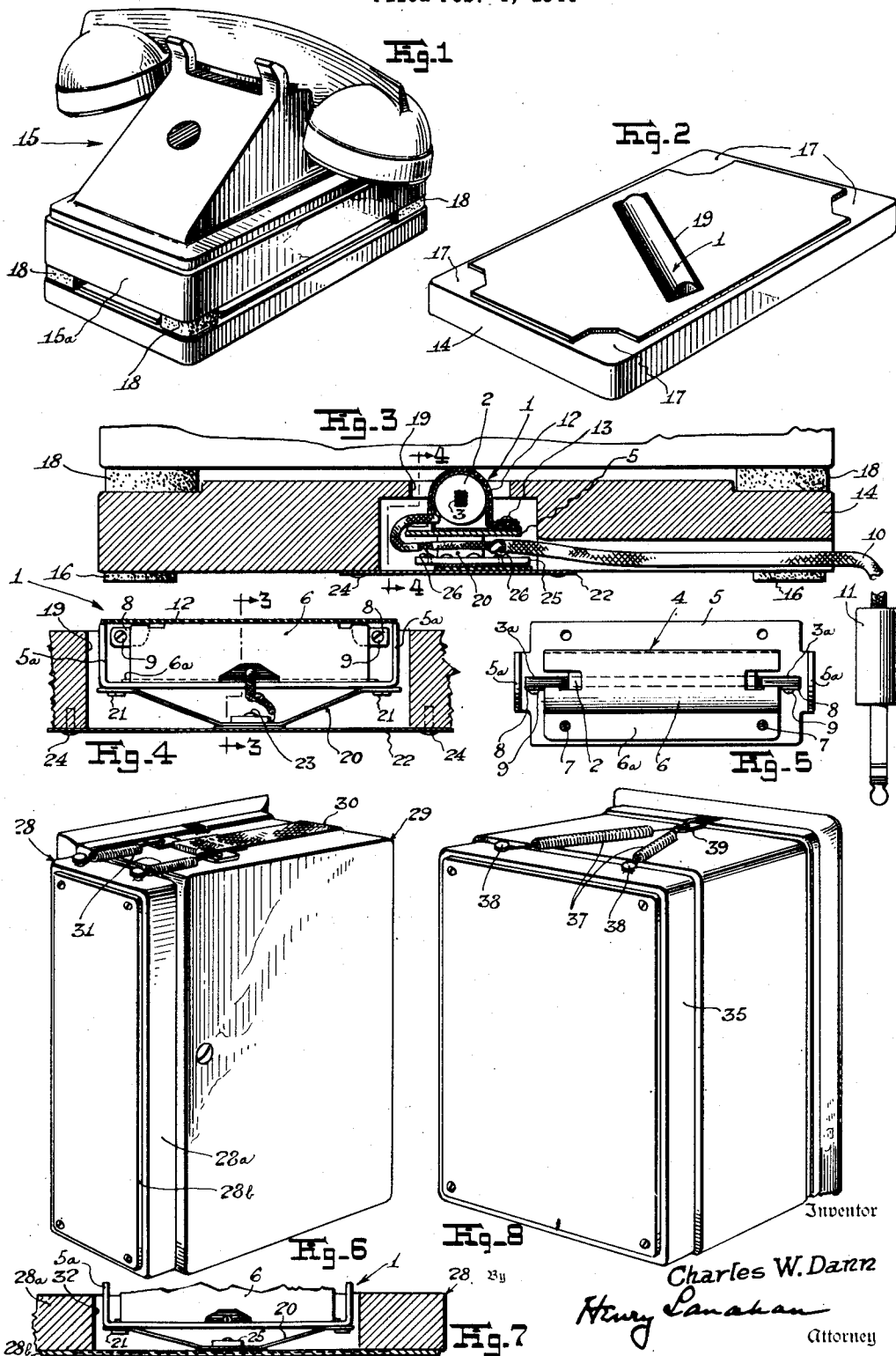
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C. W. DANN

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TELEPHONE COUPLING APPARATUS

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Inventor

Charles W. Dann

Henry Panahan

Attorney

UNITED STATES PATENT OFFICE

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TELEPHONE COUPLING APPARATUS

Charles W. Dann, Orange, N. J., assignor to
Thomas A. Edison, Incorporated, West Orange,
N. J., a corporation of New Jersey

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This invention relates to apparatus for making an electrical coupling to a telephone through the box of the telephone apparatus. While the invention contemplates coupling to a telephone system for the purpose of picking up signal energy from the system as well as for feeding signal energy into the system, the invention is more commonly used as a pick-up to couple, for example, the input of a phonographic recorder or of a loud-speaking system to a telephone, and it is in terms of such pick-up that the invention is herein illustrated and described.

This invention is especially concerned with improved mounting apparatus for holding and localizing a telephone coupling unit with respect to the box of a telephone system. The more common form of coupling unit is of the magnetic type, comprising a coil wound on a magnetic core, and this coil is positioned so that it will be magnetically coupled with the induction coil of the telephone apparatus. In picking up signal energy from telephone systems, however, only a small percentage of the flux of the induction coil is available outside the box for coupling purposes, and it is therefore highly important that the pick-up coil be critically positioned relative to the induction coil within the box so that the maximum possible coupling coefficient may be obtained between it and the induction coil.

It is an object of my invention to provide improved apparatus for mounting a telephone coupling unit in relation to the box of a telephone system.

It is another object to provide an improved mounting apparatus which will critically locate the coupling unit relative to the induction coil in the telephone box.

It is another object to provide an improved mounting apparatus wherein the coupling unit is resiliently supported and urged toward the telephone box.

It is another object to provide a simple frame or housing member for the mounting of a telephone coupling unit which is shaped to fit the telephone box in a predetermined position relative thereto and which, when in mounted position, has an exterior outline conforming substantially to the shape of the telephone box.

It is another object to provide an improved mounting apparatus for a telephone coupling unit which will maintain the coupling unit in direct contact with the telephone box irrespective of tolerance variations in the dimensions of the parts making up the apparatus.

It is to be understood that I herein use the

term "telephone box" to mean the conventional box of a telephone system wherein, among other components, there is housed the telephone induction coil, and that I mean the term to include both wall boxes and boxes mounted in the base portions of hand combination desk sets.

Particularly, for hand combination desk sets, it is an object of my invention to provide a mounting apparatus for the coupling unit which is adapted to provide a stable support for the desk set and maintain the coupling unit in contact with the bottom wall of the desk set irrespective of variations in the height of the foot pads of the set.

Other and allied objects and features of my invention will more fully appear from the following description and the appended claims.

In the description of my invention reference is had to the accompanying drawing, of which:

Figure 1 is a perspective view of a hand combination desk set in mounted relation with a telephone coupling apparatus according to one embodiment of my invention;

Figure 2 is a perspective view of the telephone coupling apparatus of Figure 1 with the hand combination set removed;

Figure 3 is a vertical sectional view of the telephone coupling apparatus of the foregoing figures, taken at right angles to the axis of the coupling unit along the line 3-3 of Figure 4, and showing a bottom portion of the hand combination set in mounted position relative thereto;

Figure 4 is a fractional sectional view taken principally on the line 4-4 of Figure 3;

Figure 5 is a top plan view of the coupling unit per se with an insulating shield thereof removed;

Figure 6 is a perspective view of another embodiment of my invention applied to one side of a telephone box of the wall type;

Figure 7 is a fractional sectional view of the coupling apparatus of Figure 6 taken on a line through the axis of the coupling unit; and

Figure 8 is a perspective view of still another embodiment of my invention applied to another side of a telephone box of the wall type.

By way of illustration, I show in the drawing a coupling unit 1 of the pick-up variety. Preferably, for this pick-up, I employ one of the magnetic type comprising a coil 2 constructed in accordance with the teachings of the pending application Serial No. 463,798 of Joseph C. Adams (now Patent No. 2,381,097), which application has a common assignee with the present application. This pick-up coil is of a long, slender, sole-

noidal type provided on a laminated magnetic core 3 which has a large ratio of length to square root of cross sectional area and which has pole portions 3a at the ends of the coil that extend unidirectionally, radially of the coil, to as far as the periphery of the coil. When this form of pick-up coil is mounted in close proximity with a telephone box and properly oriented with respect to the telephone induction coil within the box, with the radially extending poles 3a directed toward the induction coil, the pick-up coil serves as a highly efficient device for picking up signal energy from a telephone system. For further details of the construction of the pick-up coil per se, reference may be had to the pending application abovementioned.

The pick-up coil 2 is housed in a metal case 4 comprising a flat bottom plate 5 having upturned semicircular portions 5a at the ends, and a semicircular cover 6 having a flange 6a at one side by which it is held to the bottom plate by screws 7. The coil is held fixedly within this case by lugs 8 turned down from the ends of the cover and by screws 9 which secure the poles 3a to the lugs; as so held, the poles 3a are at right angles to the bottom plate 5 and extend away from that plate to the top of the cover 6. Lead connections to the coil are made by way of a shielded cable 10 which may, for example, have connection to a telephone plug 11 to facilitate connecting the coil to suitable electrical apparatus, as to the input of an amplifier, not shown. The shield of the cable 10, the case 4 and the magnetic core 3 are all interconnected to provide a common and continuous electrostatic shielding for the coil and its leads. In order however that the shielding may not have direct connection with the telephone box, a layer 12 of insulation, such as of fish paper, is applied over the cover 6 and held in place by screws 13 which fasten to the bottom plate 5, the insulation layer conforming to the portions 5a of the bottom plate 5 shown in Figure 4.

The coupling unit above described is mounted within a frame or housing member 14. Preferably, this frame member is provided in the form of a block and made of a suitable material such as of wood. In the embodiment of my invention shown in Figures 1 through 5, this frame member serves as a base or support onto which a hand combination desk set 15 is to be placed, the frame member itself having foot pads 16 at the corners so that it may rest evenly on any flat surface such as the top of a desk or table. The top surface of the frame member is adapted to receive the hand combination set in one definite position relative thereto, and to this end recesses 17 are provided in the frame member at the four corners thereof to receive the foot pads 16 of the hand combination set. The vertical sides of the frame member are substantially flush with the corresponding sides of the hand combination set and, with the recessing of the frame member as above explained, the frame member appears as a substantially even downward extension of the lower box portion 15a of the hand combination set.

At the central portion of the frame member there is a rectangular opening 18 extending through the member and having an upper portion of narrow width and a lower portion of substantially greater width as shown in Figure 3. The coupling unit is held in the top portion of this opening, with the axis of the pick-up coil 2 parallel to the top face of the frame member and with the poles 3a extending upwardly at right

angles to this face, and the opening is so located and diagonally positioned with respect to the sides of the frame member that when the hand combination set is mounted on the frame member the pick-up coil will be favorably oriented for effective coupling with the telephone induction coil.

Normally, the level of pick-up of signal energy from a telephone system, when the pick-up is made without direct connection to the telephone system and through the telephone box, as is here considered, is so low as to require substantially the maximum practical gain realizable from an electric amplifier to increase the pick-up to a sufficiently high level capable of satisfactorily operating an electrical apparatus such as a phonographic recorder or loud-speaker. The use of a pick-up coil designed according to the teachings of the Adams application above-mentioned materially relieves the gain requirements of the amplifier but, additionally, the gain requirements may be relieved materially further provided the pick-up unit is held at a very minimum possible distance from the induction coil—i. e., in direct contact with the wall portion of the telephone box which is adjacent the induction coil. In order that the pick-up coil may be so held in direct contact with the telephone box within the range of tolerances of the parts making up the telephone coupling apparatus, and for varying heights of the yieldable foot pads 16 of the hand combination set, without the hand combination set being ever rockably held by the pick-up unit above the frame member 14, I provide a downwardly yieldable mounting for resiliently holding the pick-up unit above the level of the top surface of the frame member 14, but have the yieldability of this mounting so adjusted that it will be overcome by the weight of the hand combination set on the pick-up unit. This resilient or yieldable mounting comprises simply an upwardly bowed spring 20 the ends of which are loosely secured by screws 21 to the bottom of the plate 5, and a base plate 22 onto which the central portion of the spring 20 is held by screws 23. This base plate extends across the opening 18 at the bottom and is held to the frame member by screws 24. The screws 23 serve also to hold in place an insulating strip 25 which carries terminals 26 to which the leads of the coil 2 and of the cable 10 connect.

In Figure 6 I show a frame member 28 which is shaped to fit an exterior side of a wall box 29 and provide a substantially even extension of the respective side walls of that box. This frame member is held to the box by a strap 30 and by tensioning springs 31 as illustrated in the drawing. This frame member comprises a thick portion 28a covered by a thin panel 28b. The portion 28a has an opening 32 extending there-through. In this opening there is mounted the coupling unit 1 and its resilient support comprising the spring 20 and base plate 22 as above described. The base plate 22 is inset in the portion 28a and extended across the opening 32, and the panel portion 28b lies flat against the portion 28a to cover the base plate. As in my embodiment above described, the coupling unit is held yieldably in a position beyond the face of the frame member 28 that is to lie adjacent the wall box. Accordingly, when the frame member is placed in mounted position against the box, as shown in Figure 6, the coupling unit will be held in direct contact with the box. Moreover, it will be understood that the positioning of the coupling unit

relative to the frame member 28 is such that the coupling unit will be oriented for maximum coupling with the induction coil contained within the telephone box.

In Figure 8 I show another form of frame member 35 which is adapted to be placed against a front side of a wall box and again form a substantially even extension of the box. This frame member is held in position against the box by a pair of tension springs 37 at the top and bottom of the box of which only the top springs are shown. These springs connect for example to pins 38 on the frame member and to a hook 39 which engages an opening in the base portion of the wall box. It will be understood that the coupling unit 1 may be yieldably mounted within this frame member in the same way in which it is mounted in the frame member 28 and that, when the frame member 35 is mounted on the wall box as shown, the coupling unit will be held in direct contact with the wall box for maximum coupling coefficient with the induction coil contained within the box.

I have herein shown and described my invention in terms of several preferred embodiments but it is to be understood that these embodiments are intended to be illustrative and not necessarily limitative of my invention, since the same are subject to changes and modifications without departure from the scope of my invention, which I endeavor to express according to the following claims. In the claims the term "wall" of the telephone box is intended to mean any bounding wall of the box and, in hand combination desk sets, to include the under side of the desk set.

I claim:

1. In apparatus for association with a telephone box, including a pick-up coil for effecting a magnetic coupling with the telephone induction coil contained in said box, said pick-up coil having a magnetic core with pole portions extending radially of the coil: the combination of a housing for said pick-up coil shaped to cooperate with a wall of said box and be thereby localized in relation thereto; and means in said housing for holding said pick-up coil adjacent to the said wall of said box and in position wherein the coil is axially parallel to said wall and said pole portions are directed theretoward.

2. In apparatus for association with a telephone desk set, including a magnetic pick-up coil for effecting a magnetic coupling with the telephone induction coil contained within the box of said set: the combination of a base member for supporting said desk set, said base member having an uneven top surface adapted for receiving and locating said desk set in a predetermined position in relation thereto, said base member being adapted to serve as a housing for said pick-up coil; and positioning means within said base member for said pick-up coil, said positioning means being adapted to locate said pick-up coil in close proximity with said box and in substantially axially parallel relation to said induction coil to secure an at least substantially maximum coupling of the pick-up coil with said induction coil.

3. In apparatus for association with a telephone desk set, including a magnetic pick-up unit for effecting a coupling with the telephone induction coil contained within the box of said

set, said set having resilient foot pads extending therebelow: the combination of a support member for said desk set, said support member having the top surface thereof recessed to receive said foot pads and to locate said desk set relative thereto; and positioning means within said support member for said pick-up unit, said positioning means being adapted to urge said unit upwardly against the bottom wall of said box and maintain said pick-up unit in contact with said box irrespective of variation in the effective height of said foot pads.

4. A device for picking up currents from the induction coil contained in the box of a telephone system, comprising a pick-up coil for electromagnetic coupling with said induction coil; a housing for said pick-up coil having a side thereof adapted to seat onto a wall of said box and to be held firmly thereagainst under pressure; and a resilient mounting means in said housing for said pick-up coil, said mounting means holding the coil in position wherein it projects beyond said side of the housing when the housing is disassociated from said box, and said mounting means being relatively flexible whereby it will yield to said seating pressure of the housing against the box.

5. A device for picking up currents from the induction coil contained in the box of a telephone system, comprising a pick-up coil for electromagnetic coupling with said induction coil; a housing for said pick-up coil having a side thereof adapted to seat onto a wall of said box; and a resilient parallel-motion support on said housing for said pick-up coil, said support holding said pick-up coil beyond said side of the housing when the housing is disassociated from said box, and said support yielding to seating pressure of the housing against said box.

6. A device for coupling to a telephone apparatus contained in the box of a telephone desk set, said desk set being provided with supporting feet, comprising a coupling means; a housing for said coupling means adapted to serve as a supporting base for said desk set and on which said desk set will seat; and resilient mounting means securing said coupling means to said housing and urging the coupling means upwardly above the top face of the housing, said resilient mounting means yielding to the weight of the desk set whereby upon placing the desk set onto the housing the desk set will seat thereon and said coupling means will contact the bottom wall of the desk set irrespective of variations in the height of said feet.

7. A device adapted to be mounted onto a telephone box and to effect a coupling with apparatus of the telephone system contained in said box including a coupling means; a housing for said coupling means having a side thereof adapted to seat onto a wall of said box; means for attaching said housing to said box including resilient means for holding the housing seated on the box under pressure; and a resilient mounting means on said housing for said coupling means, said mounting means holding the coupling means in position wherein it projects beyond said side of the housing when the housing is detached from said box, and said resilient mounting means being adapted to yield to the seating pressure provided by said attaching means.

CHARLES W. DANN.