

Feb. 19, 1946.

H. HANSEN ET AL

2,395,269

IMPULSE TRANSMITTING DEVICE

Filed Dec. 4, 1941

2 Sheets-Sheet 1

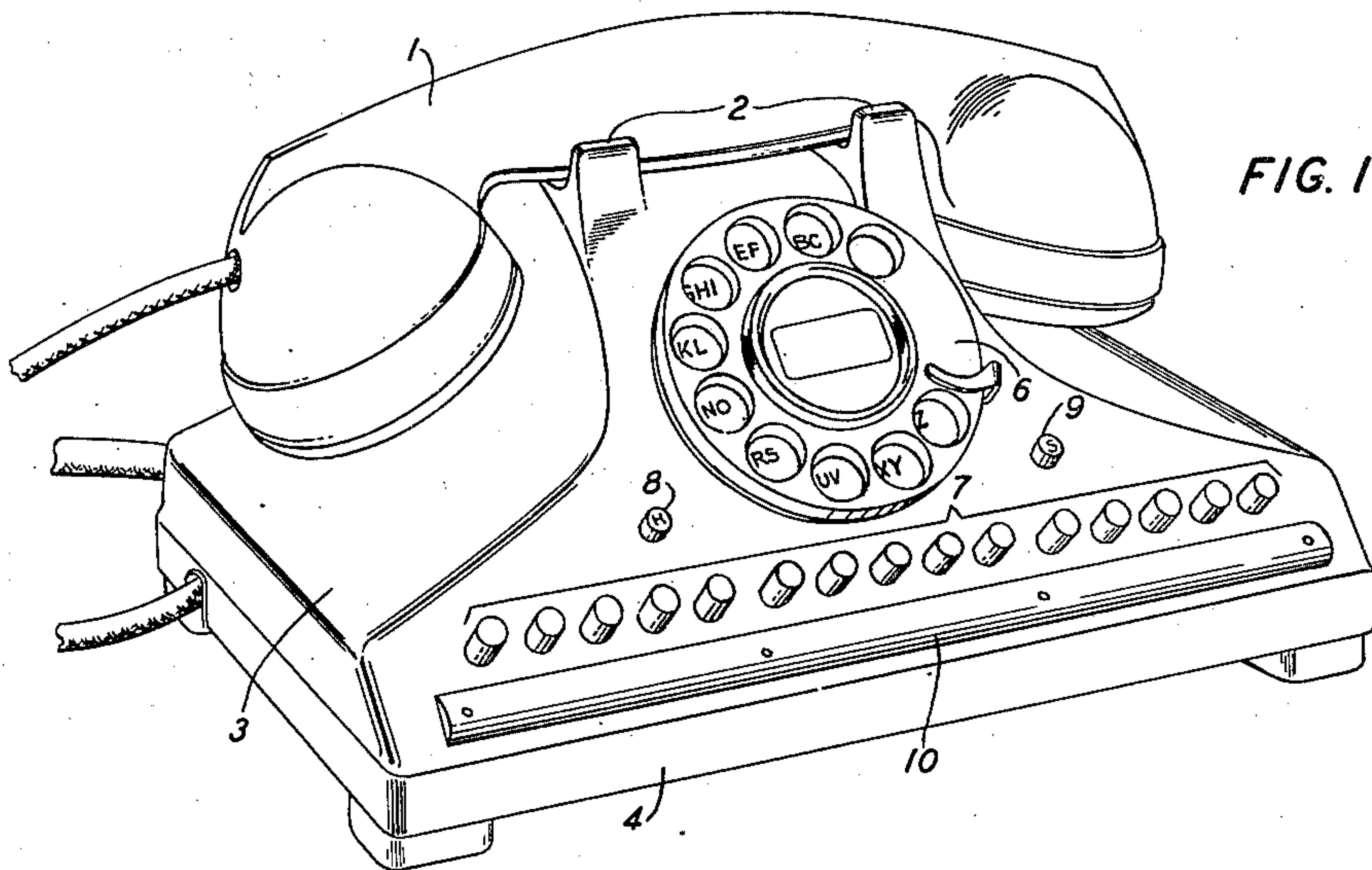


FIG. 1

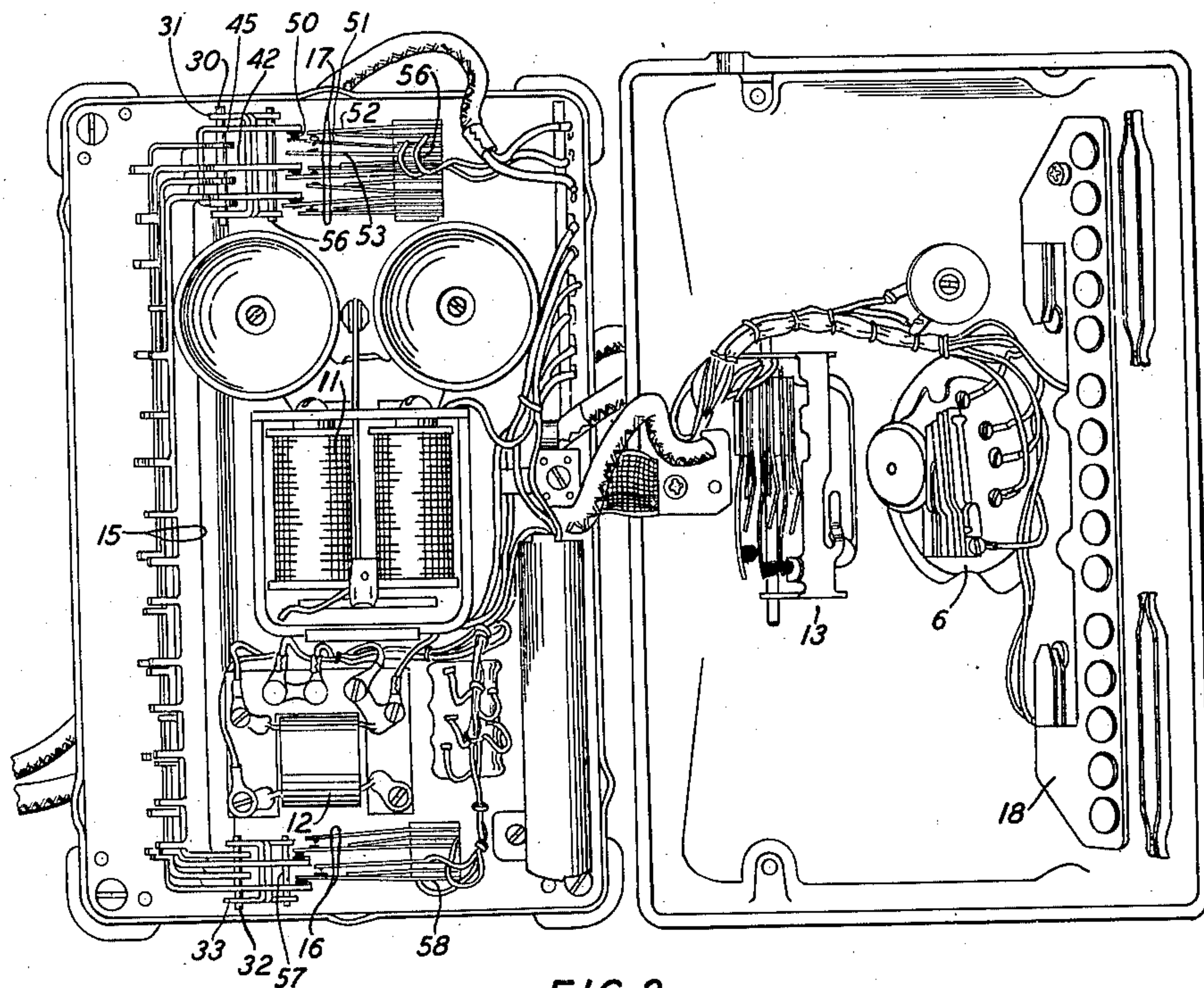


FIG. 2

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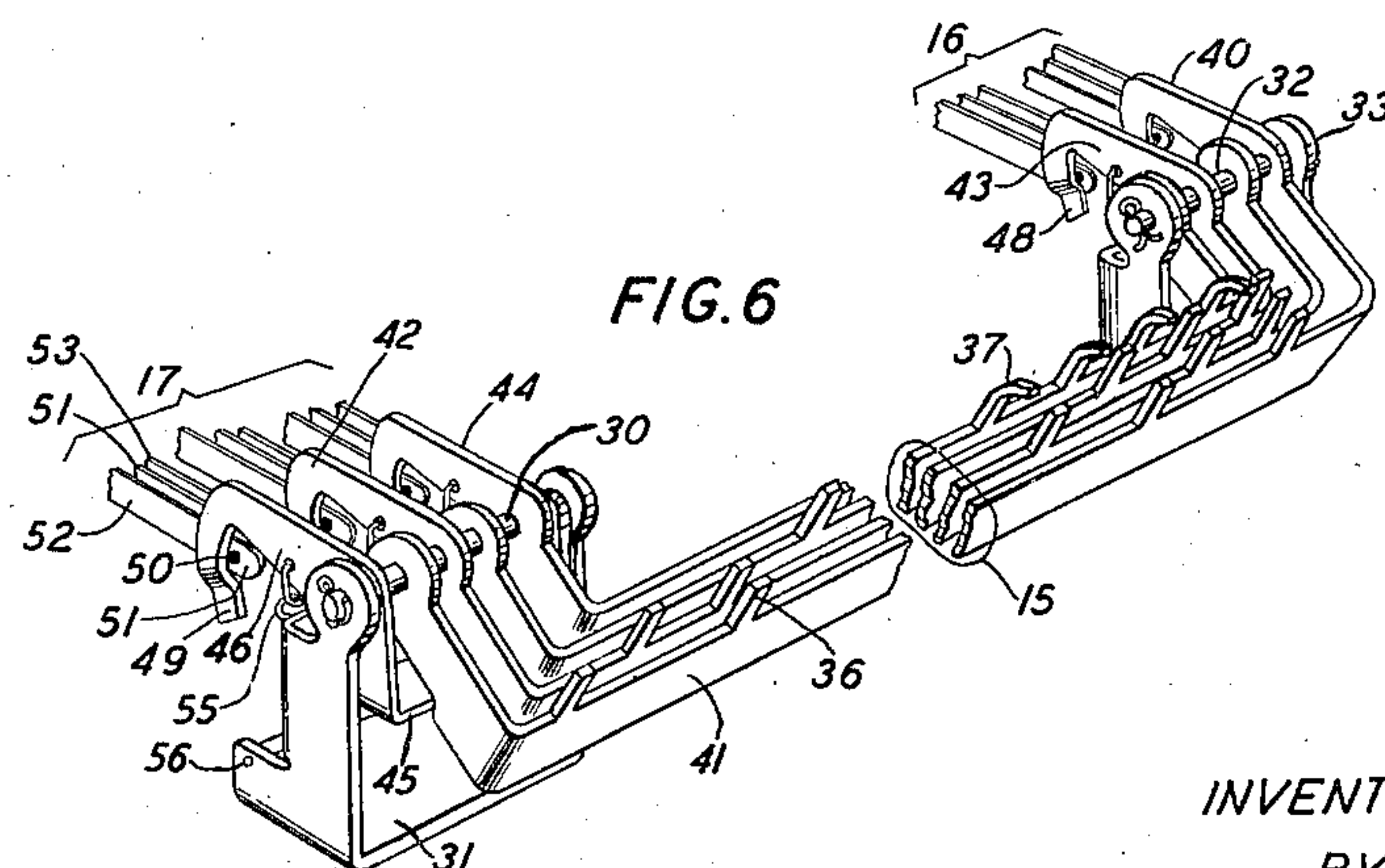
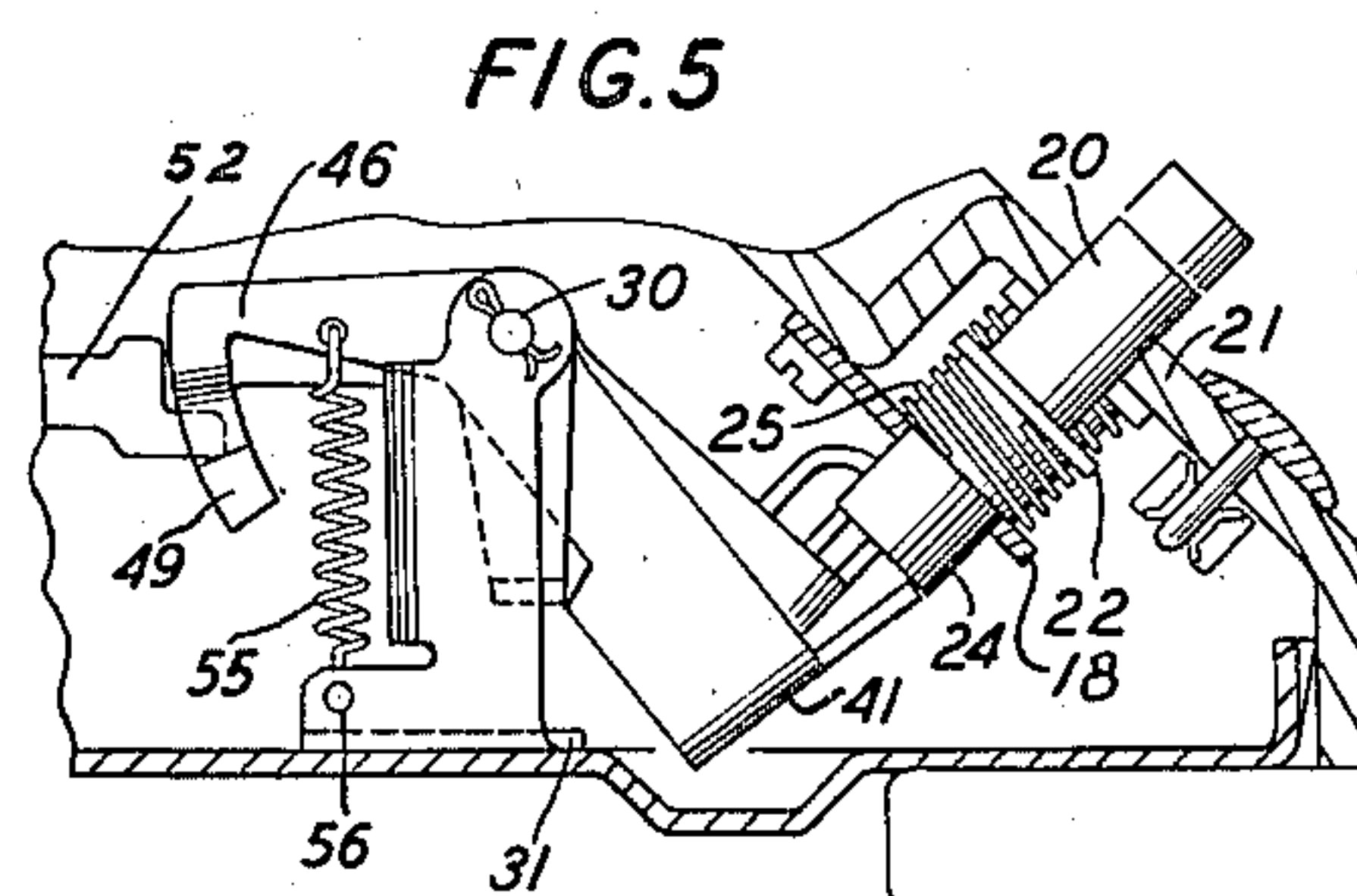
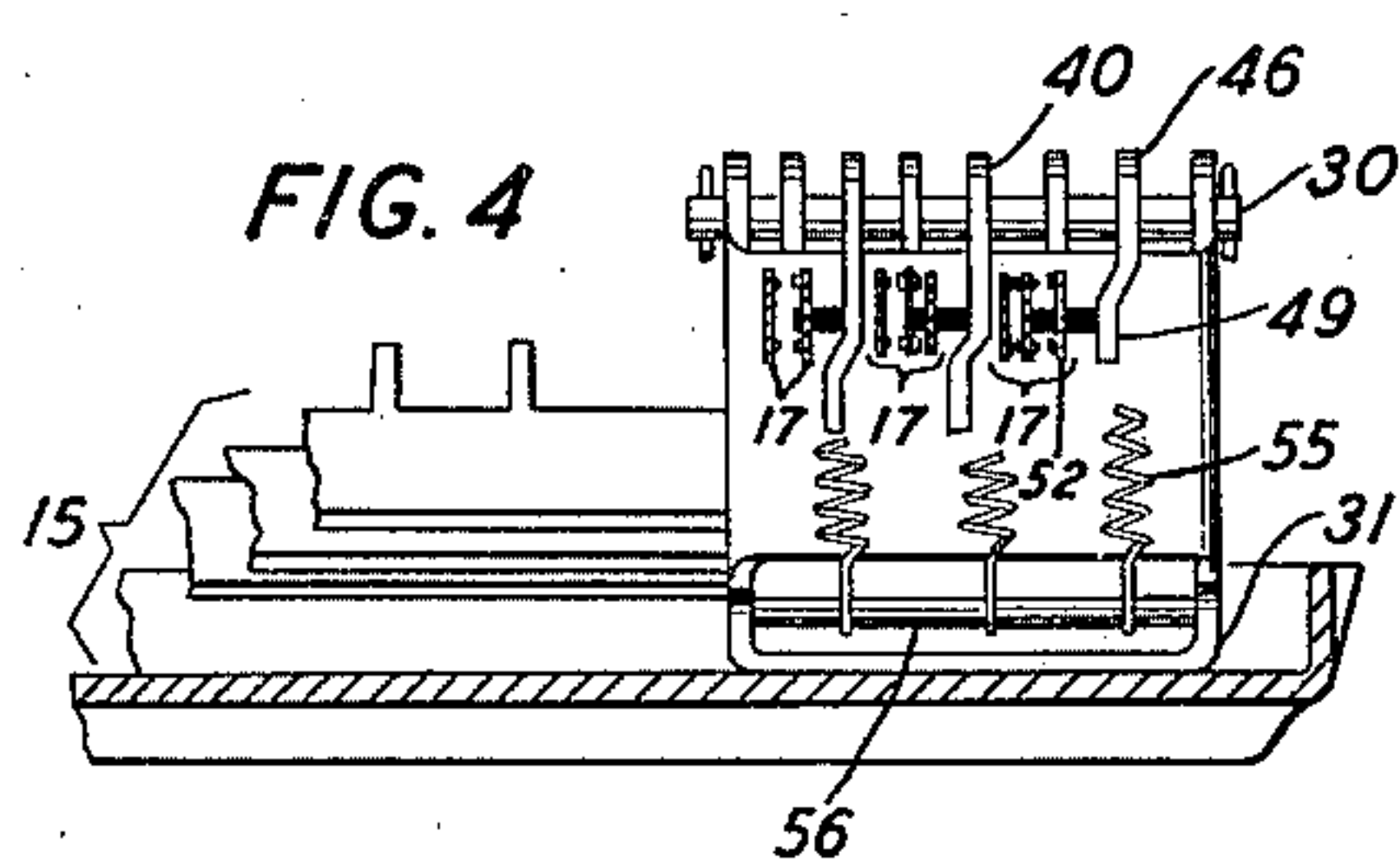
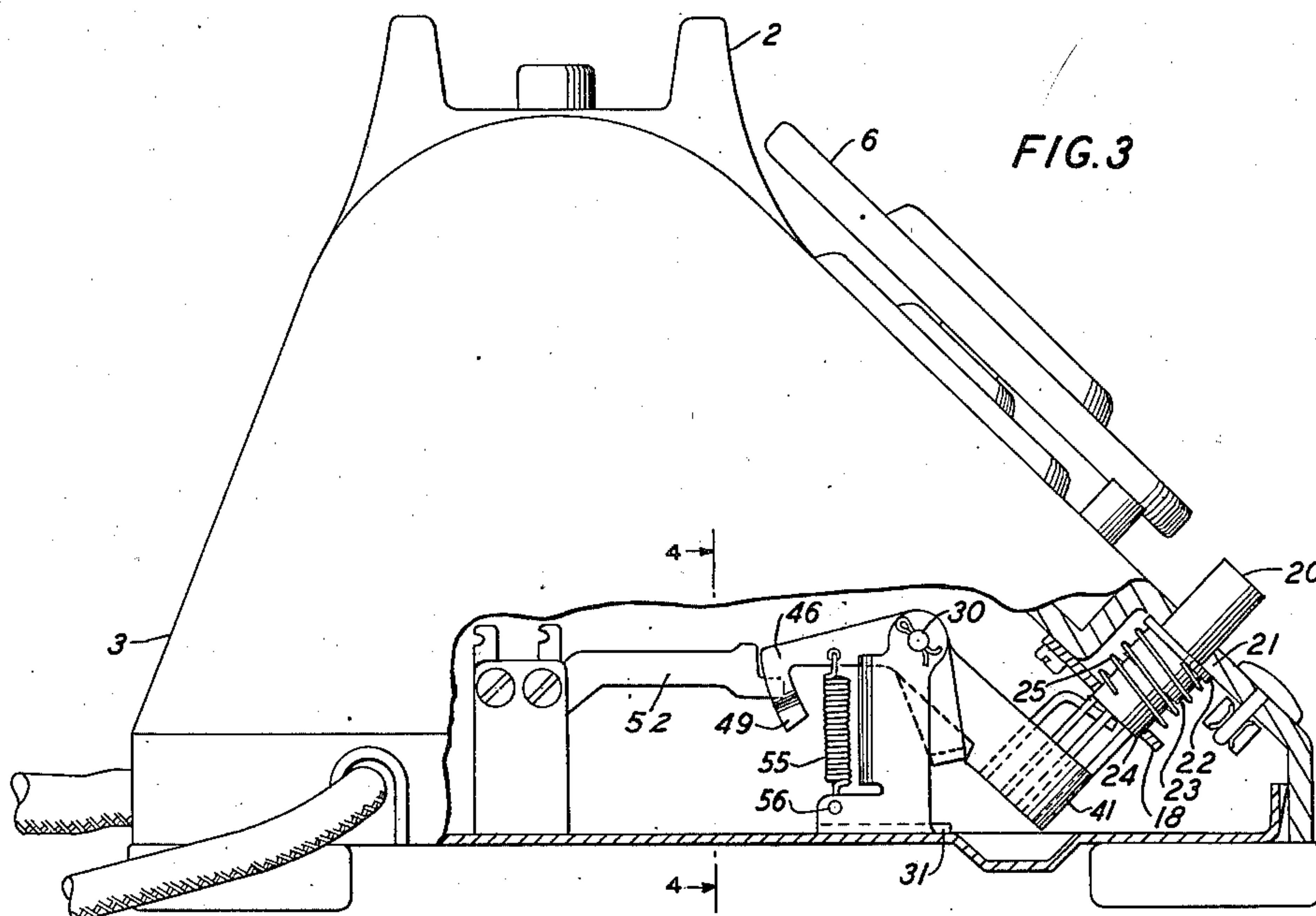
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IMPULSE TRANSMITTING DEVICE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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IMPULSE TRANSMITTING DEVICE

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Application December 4, 1941, Serial No. 421,572

2 Claims. (Cl. 179—90)

This invention relates to impulse transmitting devices and particularly to improvements in such devices for use in controlling the operation of switches in automatic telephone systems.

An object is to simplify the construction and improve the operating characteristics of such devices.

Heretofore impulse transmitting devices have been provided in which keys or push-buttons terminating in extensions operate on bars or levers to control them in combinations. Such bars may operate on contacts to close corresponding combinations of connections to establish code signals, while in other instances such levers may operate on reeds in combinations to transmit different combinations of frequencies over a line to control switches at a central office.

It is in connection with impulse transmitting devices of this general character that the present invention is concerned, and a feature thereof is an arrangement of a set of push-buttons in a single row in a telephone stand and in which a plurality of U-shaped levers are provided with different combinations of extension fingers on which the push-buttons act directly when depressed to rotate the levers in different combinations depending on the number and arrangement of such fingers acted upon by each push-button.

Another feature is a special arrangement of mounting means for these U-shaped levers comprising a U-shaped bracket provided with a bearing pin mounted between its side members and on which one side member of each U-shaped lever is rotatably mounted and an identical bracket provided with a bearing pin on which the other side member of each of said U-shaped levers is similarly rotatably mounted. Said brackets are secured to the base of the telephone stand. A special U-shaped lever is also provided having its side members mounted on one of said pins in the same manner as the regular U-shaped levers and in position to be rotated each time any one of said regular U-shaped levers is rotated.

Another feature is an extension on each of said regular and special U-shaped levers having a cam surface which acts on a corresponding set of contact springs when said levers are rotated for the establishment of combinations of connections to produce code impulses and for other purposes as required for the control of switches at a central office.

The invention has been illustrated in the accompanying drawings in which Fig. 1 shows a perspective view of a telephone stand with oper-

ating buttons arranged in accordance with applicants' invention.

Fig. 2 shows a general arrangement of the various apparatus inside of the telephone stand shown in Fig. 1 and embodying the mechanisms controlled by the buttons in accordance with the applicants' invention.

Fig. 3 is a side view of the telephone stand shown in Fig. 1 with a part of the housing broken away to show details of the applicants' invention.

Fig. 4 is a fragmentary section taken approximately on the line 4—4 of Fig. 3 to show contact springs and parts of the levers and their supports in accordance with the applicants' invention with one of the levers in actuated position.

Fig. 5 is a fragmentary portion of the desk-stand showing the mechanism revealed in Fig. 3 but with a button in operated position.

Fig. 6 is a fragmentary perspective of the applicants' invention showing the levers and their supports and the springs controlled by the extensions on said levers.

Referring now to the drawings, in general the desk-stand consists of a handset 1 mounted in a cradle 2 forming a part of a housing 3 of the desk-stand, the housing being mounted on a base plate 4 and on the front surface of the housing 3 is shown the usual dial mechanism 6 and buttons 7 arranged in a single row and other buttons 8 and 9 provided for the control of the establishing of a connection. In front of the row of buttons 7 is a transparent plate 10 under which the designations may be placed for the various buttons in the group 7. In Fig. 2 is shown the general arrangement of the apparatus inside the desk-stand such as the ringer 11, induction coil 12, a switching contact arrangement 13 controlled in the usual manner by the handset when placed in the cradle or removed therefrom and in general the inside view of the dial 6 as well as a mechanism such as the levers 15, the groups of contact springs 16 and 17 and a mounting plate 18 for the buttons as arranged in accordance with the applicants' invention.

Referring now to the applicants' invention as applied to this telephone stand, each button in the row 7 consists of a cylindrical portion 20 protruding through an opening in the slanting front portion 21 of the housing 3. This button is provided with a flange 22 that abuts against the inner surface of the slanting portion 21 and with an inner cylindrical portion 23 of a larger diameter than the cylindrical portion 20 and a cylindrical portion 24 somewhat smaller than the portion 23. Around

the portions 23 and 24 is wrapped a helical spring 25 that abuts at one end against the flange 22 and at the opposite end against the mounting plate 18 secured to the front portion 21 of the telephone stand. Portion 24 protrudes through an opening in this mounting plate 18 so that the button may be depressed to ride in this opening in mounting plate 18 and the opening in the front portion 21 and be returned to normal position by the tension in spring 25. The normal position of the button is determined by the flange 22 and the depressed position is determined by the shoulder formed between portions 22 and 23 when this shoulder touches the plate 18.

The regular levers 15 controlled by the buttons are four in number, are U-shaped and located side by side with their bottom portions parallel to each other and with the left-hand side members mounted on a pin 30 secured between the side members of a U-shaped bracket 31 which in turn is secured to the base plate 4 of the desk-stand. Similarly the right-hand side members of these levers 15 are mounted for rotation on the pin 32 secured between the side members of a similar U-shaped bracket 33 which is also secured to the base plate 4 of the telephone stand. It will be noted that the bottom members of these U-shaped levers 15 are provided with projections or fingers such as 36, 37 and others in various positions. Some of these are bent inwardly and others are projecting straight from the levers. These extensions are so arranged that the bottom surface of each button portion 24 will engage one or more of these projections so that when any one of these buttons is depressed it will rotate a certain combination of these levers depending on the number of projections on the levers that are engaged by the bottom surface thereof.

Each of the U-shaped levers 15 is provided with an extension member such as 40, for example, on the outside U-shaped member 41 or extensions 42, 43 and 44 on the other levers 15. It will also be noted that on the pin 30 of the bracket 31 is mounted an additional U-shaped lever 45. The bottom portion of this lever 45 extends under the side members of the other four levers 15 so that when any one of these four levers or any combination thereof are rotated, the lever 45 will also be rotated on the pin 30. The lever 45 is also provided with an extension 46 similar to the extensions 40, 42, 43 and 44 on the other levers 15. Each of the levers 15 and the lever 45 at their extensions 40, 42, 43, 44 and 46 are provided with angular projections bent to form cam surfaces such as projection 48 for the extension 43 and projection 49 for the extension 46. These projections operate through their cam surfaces on studs connected to contact springs. For example, the cam surface on projection 49 operates on the stud 50 connected to contact spring 51 so that when the associated lever 45 rotates, this cam surface will move the contact spring 51 to disconnect from contact spring 52 and connect with contact spring 53. Similarly when any of the other levers are rotated the corresponding cam surfaces on the associated extensions 40, 42, 43 and 44 will operate on similar contact springs in the groups 16 or 17 as shown particularly in Figs. 2 and 6. All of the levers are maintained in normal position by springs such as for example 55 connected to the extension 46 at one end and at the other end connected to pin 56 between the side members of the bracket 31. It will be noted that springs similar to spring 55 for the extensions 42 and 44 are also connected to pin 56 on bracket 31 and that springs

similar to spring 55 for extensions 40 and 43 are connected to pin 57 on bracket 33.

This arrangement of buttons, levers and contact springs may be employed in the establishing of telephone connections at a central office, to which the telephone set in the stand shown may be connected by a line, and each button may, when depressed, transmit a different digit as represented by a particular code of impulses produced in the line by the particular combination of contact springs operated. As an example of the type of code or impulses that may be produced by the depression of the different keys to operate different combinations of contact springs, an alternating current source may be connected to the usual two-wire telephone line conductors at a central office to which the telephone set is connected and rectifiers, four for example, may be interposed between the line conductors and ground through the contact springs controlled by the buttons. Thus by operating different contact springs in combination positive or negative impulses or both may be transmitter over one or both of the lines in different combinations. For example, if the fifteenth key is operated all five contacts in the sets 16 and 17 may be operated to connect the four rectifiers to the line conductors through the contacts to transmit positive and negative impulses on each line. On the other hand if, for example, the first key is operated positive impulses only are sent over one of the line conductors. Code impulse transmitting key arrangements demonstrating this general principle of code impulse transmission are disclosed in such patents as 2,278,410 of April 7, 1942, to H. M. Bascom et al. and 2,349,129 of May 16, 1944, to W. T. Albert. The designation of each subscriber may be imprinted on a card located under the transparent plate 10 in the form of a numeral as by the name of the subscriber. In the arrangement of the buttons as disclosed in Fig. 1, it may be observed that there are fifteen buttons in all in a single row and that these buttons are divided in three groups of five each with a greater space between the groups than between the individual buttons in the groups. This is a decidedly advantageous arrangement as it enables the operator of the buttons to more easily locate the desired party or number and the fact that the buttons are located on the slanting front face of the telephone stand also aids in the manipulation of the buttons.

What is claimed is:

1. In a telephone stand, a set of yokes, each consisting of a thin strip of flat material having a relatively long intermediate section and end sections formed by right angle bends, a common pivot support on which one end section of each of said yokes is mounted for rotation, a second common pivot support on which the other end of each of said yokes is mounted for rotation, the length of the end sections of said yokes diminishing progressively from one yoke to the next to provide a parallel disposition of the intermediate sections with freedom for each yoke to move about said pivot supports independently of the other yokes, the intermediate sections of each yoke being formed with integral projections which are disposed in groups representing desired combinations of said yokes, a series of cylindrical push buttons arranged close together in a straight line parallel to the intermediate sections of said yokes, there being a push button for each of said yokes of projections, the

bottom end of each button serving to operate a combination of yokes through the medium of said integral projections and having an area sufficient to embrace only a portion of the integral projections of groups representing certain desired combinations, the projection on at least one yoke for each of said certain combinations being bent inwardly toward the other projections of such combination to effect a concentration of said projections and to bring all of them within the working area of the corresponding button, sets of contact springs mounted in said stand, and cam-shaped extensions on the end sections of said yokes which serve to operate said contact springs in desired combinations when the corresponding yokes are rotated by the depression of the associated push button.

2. In a telephone stand, a set of yokes, each consisting of a thin strip of flat material having a relatively long intermediate section and end sections formed by right-angle bends, a common pivot support on which one end section of each of said yokes is mounted for rotation, a second common pivot support on which the other end section of each of said yokes is mounted for rotation, the length of the end sections of said yokes diminishing progressively from one yoke to the next to provide a parallel disposition of the intermediate sections with freedom for each yoke to move about said pivot supports independently of the other of yokes, the intermediate stations of each yoke being formed with integral projections, the projections on all

but one of said intermediate sections extending straight upward from said sections and the projections on the remaining intermediate section being bent over the other intermediate sections, all of said projections being disposed in groups, representing desired combinations of said yokes, a series of cylindrical push buttons arranged close together in a straight line parallel to the intermediate sections of said yokes, there being a push button for each of said groups of projections, the bottom end of each button serving to operate a combination of yokes through the medium of said integral projections and having an area which has a diameter equal to the distance between the maximum number of straight projections possible for all but said one intermediate section when said straight projections are arranged one in front of the other perpendicularly across said sections, said area being nevertheless sufficient to control a bent projection on the remaining intermediate section when located on one side of the associated straight projections, sets of contact springs mounted in said stand, extensions extending in a straight line from the end sections of said yokes, and cam members extending perpendicularly from the ends of said extensions of the end sections which serve to operate individual sets of contact springs in desired combinations when the corresponding yokes are rotated by the depression of the associated push button.

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