April 18, 1933. C. B. BARTLEY 1,903,972

TELEPHONE SYSTEM

Filed Dec. 20, 1930 2 Sheets-Sheet 1

FIG. 1

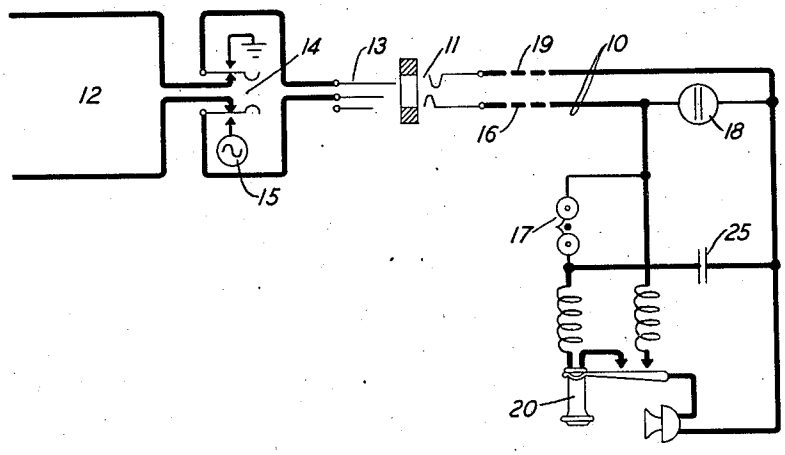


FIG. 2

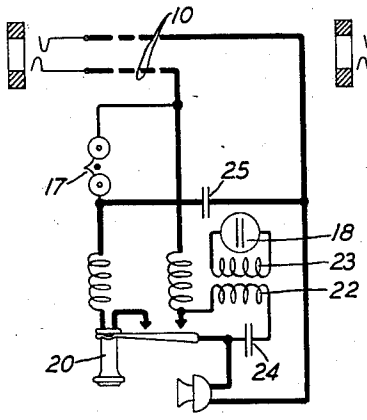


FIG .3

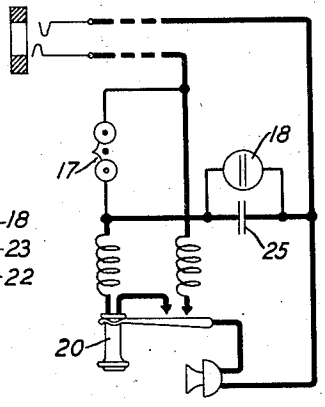
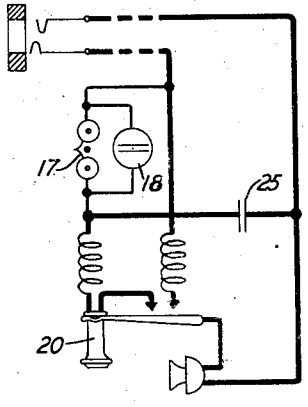


FIG.4



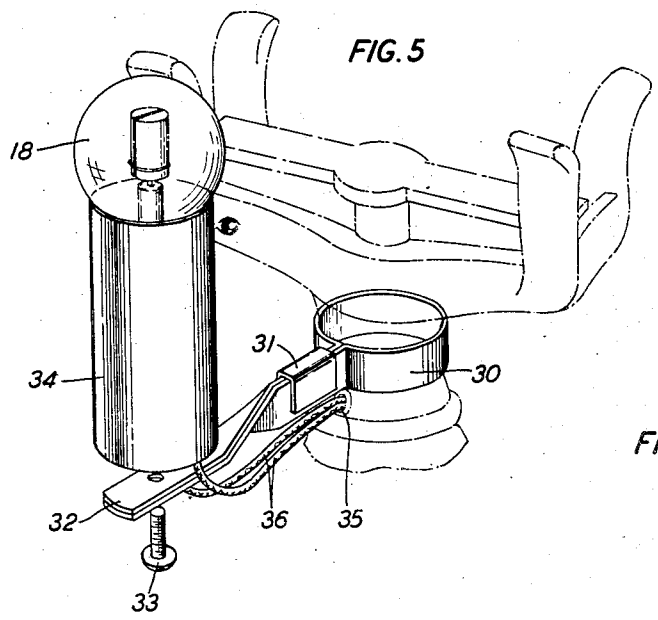
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FIG. 5



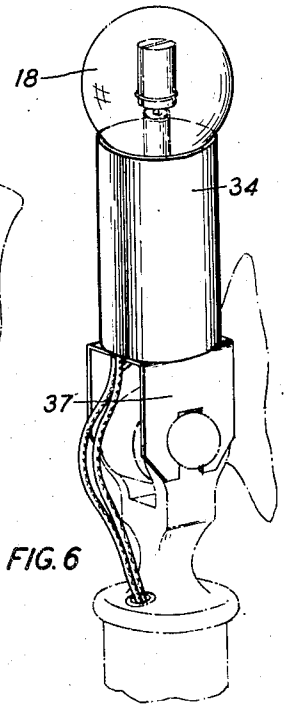
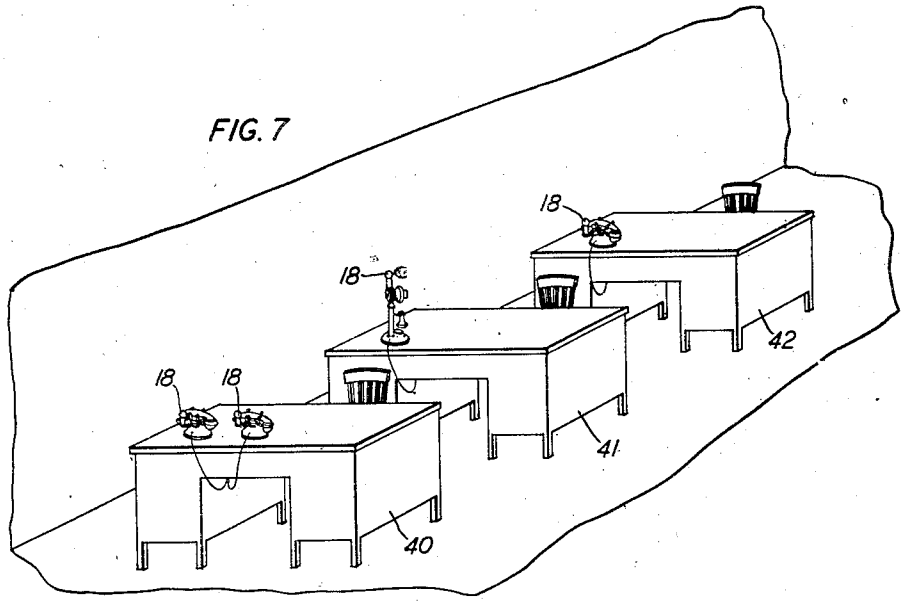


FIG. 6

FIG. 7



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Patented Apr. 18, 1933

1,903,972

UNITED STATES PATENT OFFICE

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TELEPHONE SYSTEM

Application filed December 20, 1930. Serial No. 503,703.

This invention relates to telephone signaling systems and particularly to such systems wherein alternating current is employed to effect the actuation of a signaling device at a called subscriber's station.

Heretofore, in signaling a called subscriber it has been common practice to employ an audible signal at the subscriber's station. This practice in most cases has proven satisfactory, particularly where a subscriber has but one telephone to attend to, and also where a plurality of telephones are located in the same locality but sufficiently removed from one another to preclude the possibility of confusion as to which telephone was signaled. However, there are numerous occasions, such as in brokerage houses, department stores and the like, where an operator or an attendant is called upon to handle incoming calls on a plurality of closely associated telephones. Invariably, these telephones are so closely grouped together that, unless the attendant's sense of hearing is so unusually keen as to permit him to readily discriminate between various tone signals, he would be unable to determine which telephone was being signaled.

It is accordingly the object of this invention to enable an attendant to quickly and conveniently detect which one of a plurality of closely grouped telephones is being signaled.

This object is attained in accordance with a feature of the invention by the provision of a visual signaling device individually associated with each of the telephones in a group and responsive to the regular signaling current usually employed in actuating the well-known audible ringer.

The invention will be readily understood from the following detailed description made with reference to the accompanying drawings in which,

Fig. 1 is a circuit diagram of a simple substation line circuit and a portion of an operator's cord circuit which may be employed in establishing telephonic connection with the substation, and shows one method of connecting the visual signal to the line;

Fig. 2 is a modification of the substation circuit arrangement shown in Fig. 1 and shows the visual signal inductively associated with the line circuit and connected thereto at the receiver switchook contacts;

Figs. 3 and 4 are substation circuit disclosures showing other methods of connecting the visual signal to the substation circuit;

Fig. 5 is a perspective view showing how the visual signal may be mounted on a cradle type desk set;

Fig. 6 shows the method of mounting the visual signal on the ordinary upright type of desk set; and

Fig. 7 is a perspective view showing a portion of a room or office in which a plurality of telephones are closely grouped, a condition which renders this invention particularly desirable.

In each of the figures disclosed in the drawings, a glow discharge tube, in the form of a neon lamp, is utilized as the visual signal at the subscriber's station. The electrical characteristics of the glow type lamp are such as to render its use in the capacity contemplated by the applicant particularly desirable. Such lamps are known to have a considerably longer life than an ordinary filament lamp; they operate satisfactorily at relatively low voltages and are readily adaptable for operation by alternating current at energy levels regularly employed in operating the usual audible type ringer.

Referring to Fig. 1 the subscriber's line 10 is shown terminating at a central office in a jack 11. An operator's cord circuit 12 terminates in a plug 13 at an operator's position at which the jack 11 is located. In signaling the substation, the operator inserts plug 13 into jack 11 and actuates the ringing key 14. A circuit is thereupon established from the AC signaling source 15, lower contacts of ringing key 14, ring contacts of plug 13 and jack 11, ring conductor 16 of the subscriber's line 10 through the ringer circuit including ringer 17, and condenser 25, and glow lamp 18 in parallel, conductor 19 of the line 10, tip contacts of jack 11 and plug 13 to ground by way of the upper contacts of ringing key 14. The ringer 17 and glow lamp 18 are energized in this circuit, the

former giving the usual audible signal and the latter a distinctive visual signal. It is evident that, irrespective of how many telephones are grouped together within a small area, there will be no uncertainty as to which of the telephones is being signaled when the regular audible signal is accompanied by a visual identification.

When the attendant at the signaled telephone removes the receiver 20 in answer to the incoming call the signaling equipment at the substation is short-circuited at the receiver switchhook contacts.

It is obvious from the foregoing description that the glow lamp 18 will be lighted only while the signaling current is on the line, prior to the removal of the receiver at the called station.

In some cases, particularly where the subscriber's station is located at a relatively great distance from the central office, it is found desirable to employ a step-up transformer in order to bring the voltage of the signaling source up to a value equal to, or greater than, the breakdown voltage of the glow lamp. Fig. 2 shows a circuit arrangement suitable for such a contingency. The primary winding 22 of the step-up transformer is bridged across the conductors of the line 10 at the contacts of the receiver switchhook, while the glow lamp 18 is connected in series with the secondary coil 23. The condenser 24 is connected in circuit with the primary coil 22 in order to prevent the passage of direct current when the talking circuit is established. It is believed unnecessary to enter into a detailed description of the operation of the circuit shown in Fig. 2, as that already given in connection with Fig. 1 is sufficiently applicable.

Fig. 3 shows the glow lamp bridged across the condenser 25 in the ringing circuit, whereas Fig. 4 shows it connected in shunt with the ringer 17 itself. These alternative arrangements for connecting the glow lamp in circuit depend upon the electrical characteristics of the ringer circuit and particularly to the capacity of the ringing condenser 25.

From the foregoing description, it is apparent that applicant has devised a simple, economical and very practical signaling arrangement wherein the usual audible signal is accompanied by a visual indication and wherein the visual signal is actuated directly by current from the signaling source and not through the instrumentality of an auxiliary ringing relay.

In the practical application of applicant's invention to standard telephones any desirable method of securing the lamp to the telephone, whether it be a desk set, hand set or wall set may be employed. Figs. 5 and 6 illustrate simple clamping arrangements suitable for desk sets of the cradle and upright types of telephones.

Referring to Fig. 5 a bracket 30 is shown secured to a cradle type telephone by means of a clamp 31. The signaling device is mounted on the outwardly extending end 32 of bracket 30 by means of a screw 33 which passes through the bracket end 32 and engages the lower end of the signaling device casing 34. Within the casing the transformer, comprising windings 22 and 23 hereinbefore referred to, and condenser 24 may be mounted in any suitable manner. The lamp 18 is screwed into the upper end of the casing 34. An aperture 35 is located near the neck of the cradle to permit the wires 36, which connect the signaling device with the telephone line, to be passed through.

In Fig. 6 a U-shaped clamp 37 having bifurcated ends is employed to mount the signaling device to the usual upright type of telephone.

In Fig. 7 there are shown three closely grouped desks 40, 41 and 42 each of which is provided with a telephone, the desk 40 having two. It is evident that, without applicant's visual signal 18, there would be confusion as to which of the several telephones was being signaled by the usual audible ringer. Such confusion would be greater in the case of the attendant located at desk 40. The association of a visual signal with each telephone, actuated simultaneously with the audible ringer, precludes the possibility of any such confusion and enables an attendant to immediately select the signaled telephone regardless of his position in the room.

What I claim is:

1. A telephone substation including a signal lamp associated with the instruments comprising said substation and arranged in the circuit network of said substation to respond directly and only to incoming signaling current.

2. A telephone substation including a glow discharge lamp associated with the instruments comprising said substation and arranged in the circuit network of said substation to respond directly and only to incoming signaling current.

3. In a telephone system, a plurality of lines each terminating in one of a plurality of closely grouped telephone substation sets, an audible signal for each said set and a lamp signal for visually indicating the set being signaled associated with each said set and responsive directly and only to incoming signaling current for actuating said audible signal.

4. In a telephone system, a plurality of lines each terminating in one of a plurality of closely grouped telephone substation sets, an audible signal for each said set and a neon lamp signal for visually indicating the set being signaled associated with each said set responsive directly and only to incoming sig-

naling current for actuating said audible signal.

5. In a telephone system, a plurality of telephone lines each terminating in one of a plurality of closely grouped telephone substation sets, and an attachment for each of said telephones including a lamp signal for visually indicating the signaled telephone responsive directly and only to signaling current incoming over said lines, said visual signal being bridged across a pair of switch-hook contacts at its respective telephone set and adapted to be short-circuited by the removal of the receiver thereat.

6. In a telephone signalling system, the combination of an alternating current ringing circuit, visual and audible signalling devices included in multiple in said circuit, and condenser means also included in said circuit in series with said signalling devices.

7. In a telephone signalling system, the combination of a ringing circuit including in series an audible signalling device and a condenser, a circuit shunting the audible signalling device and a visual signalling device included in the shunt circuit.

8. A telephone signalling circuit comprising a ringing circuit including a suitable source of alternating current supply, and means for closing said circuit, a visual signalling circuit shunted across the ringing circuit, and a visual signal included in said shunt circuit, whereby the visual signal is adapted to be energized by current from the ringing circuit.

9. A telephone signalling circuit comprising a ringing circuit including a suitable source of alternating current supply, and means for closing said circuit, a visual signalling circuit shunted across the ringing circuit, and a non-filament tube included in said shunt circuit, whereby the non-filament tube is adapted to be energized by current from the ringing circuit.

10. In a telephone signalling system, the combination of an alternating current signalling circuit including in multiple an audible signalling device and a non-filament tube, and condenser means in series with both the audible signalling device and the non-filament tube.

11. The herein described method of signalling by ringing current which consists in passing such ringing current through a non-filament tube and precluding the passage of direct current through the tube by causing the ringing current to pass through the tube by way of a condenser.

12. The herein described method of signalling by ringing current which consists in passing a portion of the ringing current through an audible signalling device to produce an audible signal, diverting a portion of such current from the audible signalling device, passing such diverted portion of the current through a visual signalling device and precluding the flow of direct current through the visual signalling device by causing the diverted portion of the ringing current to pass through a condenser.

13. In a telephone signalling system, the combination of a ringing circuit including in series an audible signalling device and a condenser, a circuit shunting the condenser and a visual signalling device included in the shunt circuit.

In testimony whereof, I sign my name.

CHARLES B. BARTLEY.