

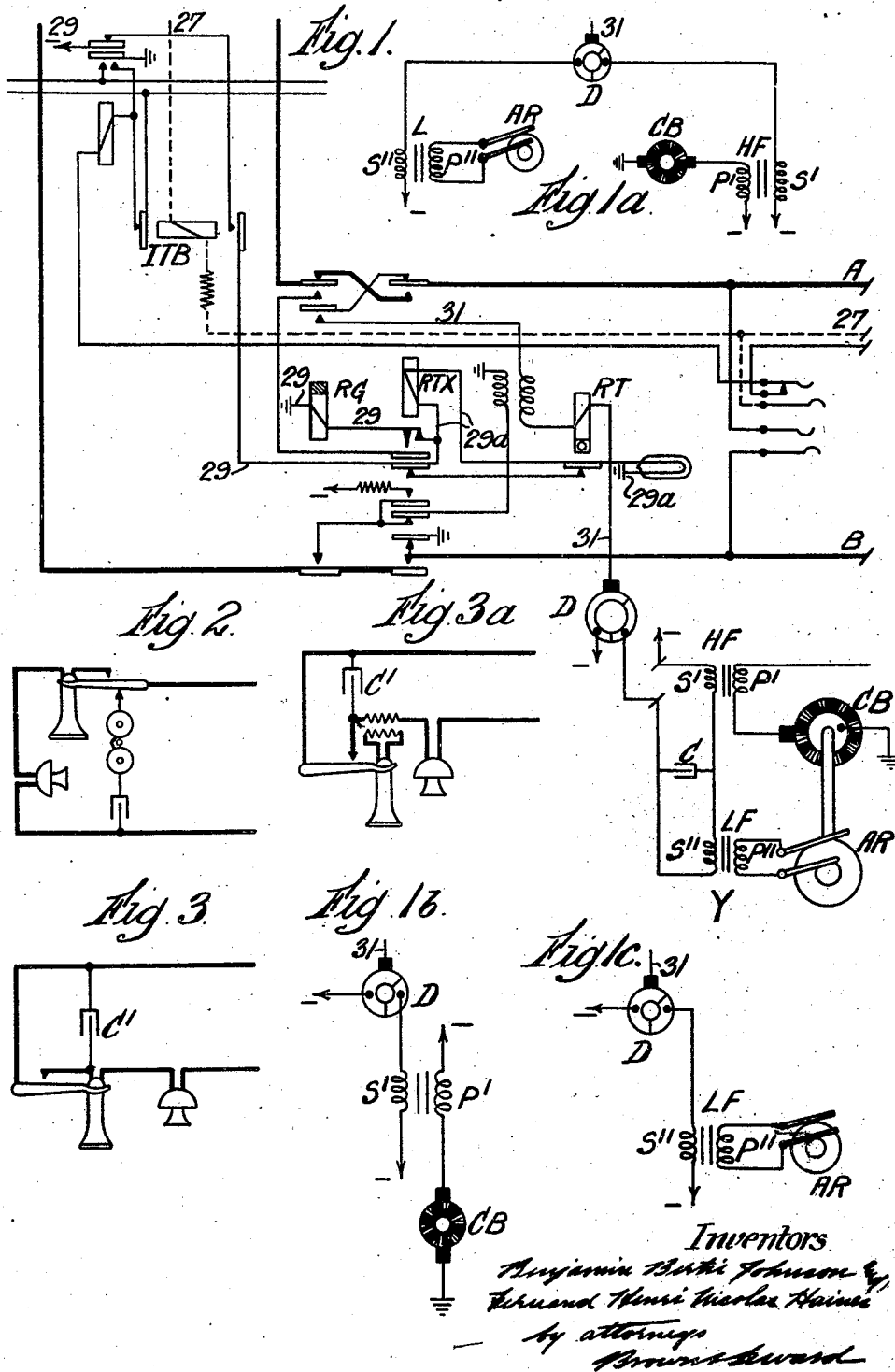
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B. B. JOHNSON ET AL

TELEPHONE SYSTEM

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BENJAMIN BERTIE JOHNSON, OF LONDON, ENGLAND, AND FERNAND HENRI NICOLAS HAMES, OF PARIS, FRANCE, ASSIGNORS TO THE RELAY AUTOMATIC TELEPHONE COMPANY, LIMITED, OF LONDON, ENGLAND.

TELEPHONE SYSTEM.

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Our invention relates to improvements in telephone systems and particularly to means for calling the attention of wanted parties.

The usual method of calling a wanted party is by applying a low frequency alternating or pulsating current to the line for the purpose of actuating a bell at the subscriber's station.

In local battery systems it is well known to apply to a subscriber's line a comparatively high frequency alternating or pulsating current for the purpose of giving an audible signal or "howl" in his receiver and this principle has been applied in both local and central battery systems to call the attention of a subscriber who has left the receiver off its hook.

It has been suggested to apply this principle of applying high or audible frequency currents to subscribers' lines in central battery systems as the normal method of calling and so to modify the circuits at a subscriber's station that the receiver shall be normally included in the line circuit, the line being kept open to direct current by the inclusion in series therewith of a condenser.

An exchange working exclusively on this system would have the disadvantage that whilst the "howl" produced in the receiver upon the application of the high frequency current would be sufficiently loud for those instruments which were placed in quiet offices, it might be insufficiently loud for instruments in noisier places.

According to our invention we provide a telephone system some of the lines of which are furnished with a call bell while in others the receiving telephone is normally connected directly or inductively to the line and at the exchange serving these lines there are means whereby any subscriber may be called no matter whether his line is of the first or the second class. Preferably one and the same operation at the exchange applies to a wanted line both a howler current and a low frequency ringing current. Alternatively lines having bells may be connected to a different numerical group from that to which are connected the lines whose receivers are adapted for calling purposes, a low frequency ringing current being applied to a wanted line connected to the first group,

while a high frequency current is applied to a wanted line connected to the second group.

The accompanying drawing illustrates our invention in connexion with a ringing group, which has elsewhere been described as applied to an automatic telephone system in which the entire switching is done by means of relays. This we have done for convenience only. As the system referred to is well known and as an understanding of the system is not necessary to an understanding of our present invention, it is not described here. It will be obvious to any one skilled in the science, however, that our invention can be equally well applied to any telephone system.

In the accompanying drawing, Figure 1 shows the ringing group referred to above as being used in a well known system of automatic telephony. Figures 1^a, 1^b and 1^c show modifications of the arrangement of Figure 1. Figure 2 shows a subscriber's instrument provided with a bell. Figure 3 shows an instrument having no bell, but so arranged that the receiver is in series with the line and a condenser when resting upon its support. Figure 3^a shows a modification of the arrangement shown in Figure 3 with an induction coil interposed between the line and the receiver.

It will be noticed that in the part marked Y in Figure 1 there are two transformers HF and LF with primaries P' and P'' and secondaries S' and S'' respectively.

HF and LF indicate that the transformers deal respectively with high and low frequency alternating or pulsating currents.

The high and low frequency currents can be obtained in any well known manner such as from a high speed current interrupter CB and an alternator AR.

The secondaries S' and S'' may be joined together as shown in Figure 1, one end of S'' being connected to a distributor D. In series with S' and in parallel with S'' is a condenser C. With this arrangement the howler current will be superimposed on the ringing current.

The condenser C is of too small capacity to short-circuit the low frequency ringing. On the other hand, it constitutes a by-pass

for the high frequency signalling currents which cannot pass through the comparatively high reactance of transformer LF.

Alternatively, the secondaries S' and S'' may as shown in Figure 1^a be connected to the distributor D independently of one another so that the howler and ringing currents will be applied to the wanted line alternately.

10 The operation of ringing is the same in each case and is as follows:—

When a connexion shall have been established relay ITB will be energized in circuit 27 whereby circuit 29 will be completed through relay RG. Relay RG operates and connects ringing lead 31 of the ringing group to the A wire. If the instrument of the wanted line be of the type Figure 3 or 3^a the high frequency current will by passing through condenser C' cause a howl in the receiver. If, on the other hand, the instrument be of the type of Figure 2 the low frequency current will ring the bell thereof.

25 The removal of the receiver in either case will by completing the loop permit relay RT to operate. This will remove a short-circuit from across relay RTX which will operate in the extension 29^a of circuit 29 to cut out relay RG. This relay will now release owing to the fact that at this time the line wire to which RG is connected is itself connected to earth through the winding of the well known current feeding relay. The operation of relay RTX and release of relay RG will complete the talking circuit through the ringing group.

30 If the lines having bells are connected to one numerical group and the lines whose receivers are normally connected conductively or inductively to the lines are connected to another numerical group different ringing arrangement will be used when connexion is desired with a line of one group from those which would be used if a connexion be desired with a line of the other group. These ringing arrangements may be of the type shown in Figure 1 and may be arranged so that those associated with the numerical group to which the bell

instruments are allocated have connected to distributor D an alternator and that those associated with the numerical group to which the receiver instruments are allocated have connected to distributor D a high frequency generator. These may be as shown in Figures 1^b and 1^c.

In the method outlined above it would be quite unnecessary for a subscriber to know what type of instrument he was calling as the selecting apparatus being controlled by the numerical impulses would direct the connexion into such paths as would include the appropriate calling apparatus.

What we claim is:—

1. In a telephone system the combination of a telephone line, a second telephone line, and an apparatus adapted for connection to either line, said apparatus being further adapted non-selectively to project to either line two signalling currents, the first said telephone line being provided with an apparatus for effectively responding to one of said signalling currents there being no apparatus for effectively responding to the other said current and the said second telephone line being provided with a different apparatus for effectively responding to the second said current there being no apparatus for responding to the first said current.

2. In a telephone system, the combination of a number of lines in each of which a subscriber's instrument includes a bell, a number of lines in each of which the subscriber's telephone is normally connected to the line, and means at the exchange for supplying to a wanted line high frequency current and low frequency current alternately.

3. In a telephone system, automatic means for supplying to a wanted line both a howler current and a low frequency ringing current and means operable upon the response of the called subscriber for disconnecting such currents from the line.

In testimony that we claim the foregoing as our invention we have signed our names this 13th day of October 1922.

BENJAMIN BERTIE JOHNSON.
FERNAND HENRI NICOLAS HAMES.