

Jan. 13, 1931.

G. B. KNÖS

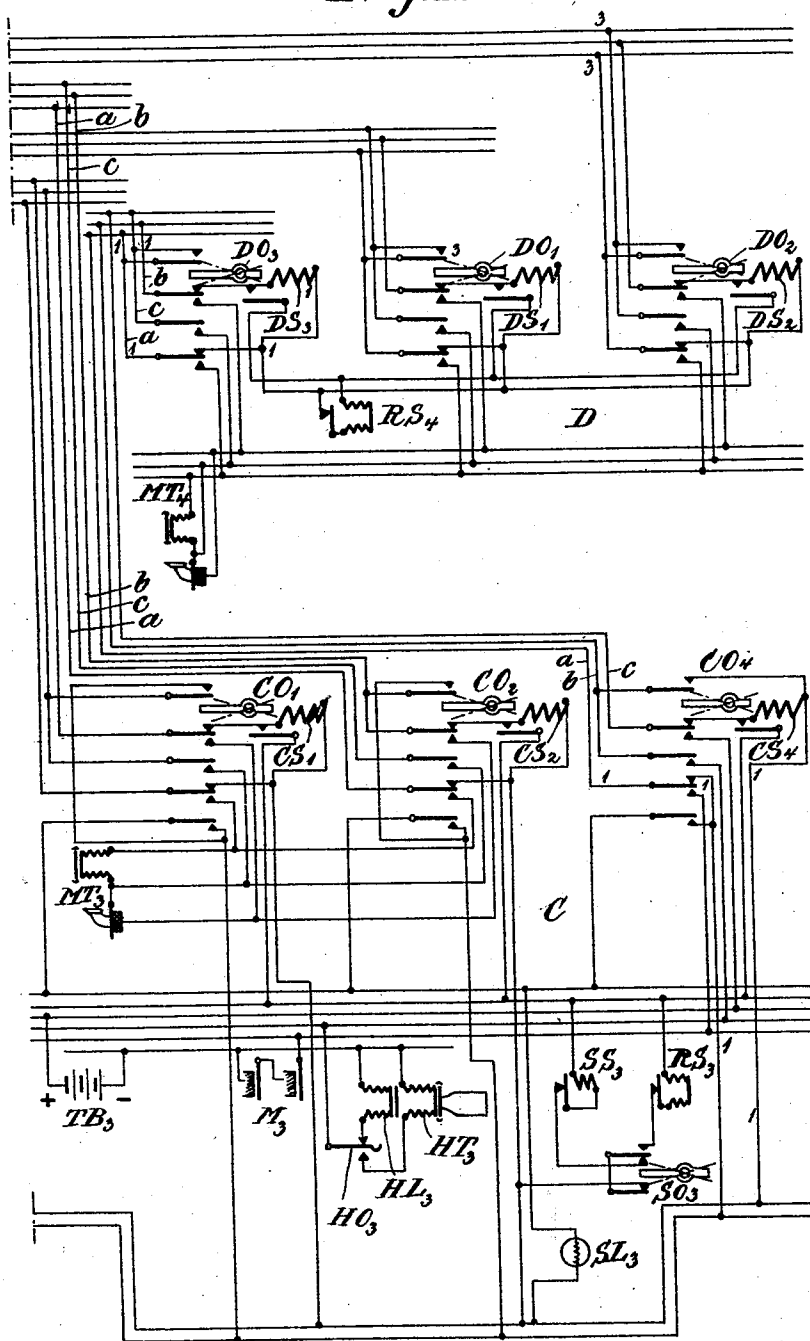
1,789,142

INTERCOMMUNICATION TELEPHONE SYSTEM

Filed March 29, 1929

2 Sheets-Sheet 1

Fig. 1.



G. B. Knös
INVENTOR

By: *Marks & Co.*
Att'ys.

Jan. 13, 1931.

G. B. KNÖS

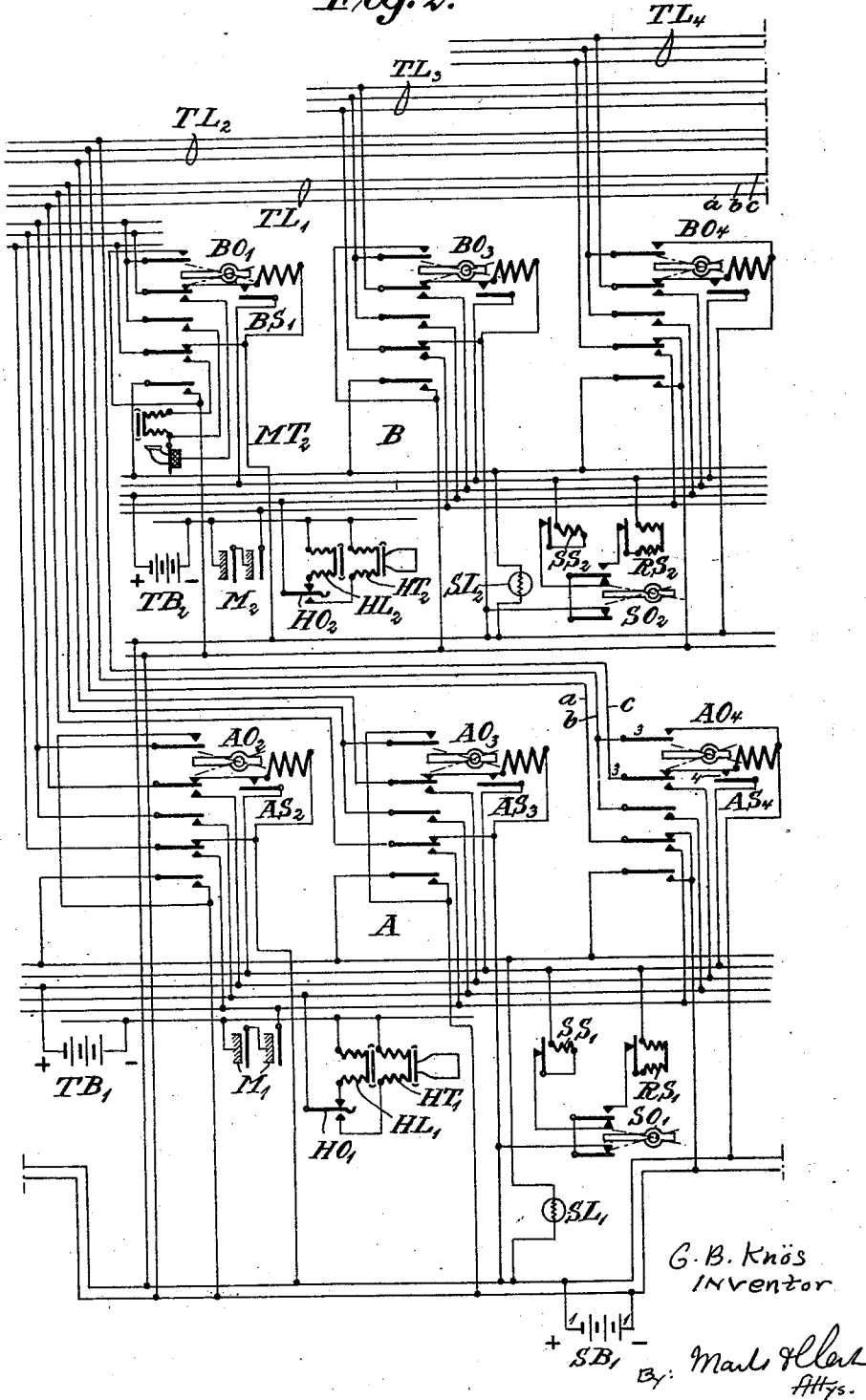
1,789,142

INTERCOMMUNICATION TELEPHONE SYSTEM

Filed March 29, 1929

2 Sheets-Sheet 2

Fig. 2.



UNITED STATES PATENT OFFICE

GUNNAR BÖRJE KNÖS, OF STOCKHOLM, SWEDEN, ASSIGNOR TO TELEFONAKTIEBOLAGET
L. M. ERICSSON, OF STOCKHOLM, SWEDEN, A COMPANY OF SWEDEN

INTERCOMMUNICATION TELEPHONE SYSTEM

Application filed March 29, 1929, Serial No. 351,017, and in Sweden March 31, 1928.

The present invention relates to intercommunication telephone systems. More especially, it refers to such systems which are called chief telephone systems and which in general are characterized by that the telephone apparatus are divided into chief apparatus and subordinate apparatus the former of which—the chief apparatus—are provided with loudspeakers and highly sensitive microphones in order to facilitate conversations at a comparatively great distance from the apparatus whereas the subordinate apparatus have no loudspeakers and usually are arranged as extension apparatus in relation to the chief apparatus, said extension apparatus being not able to communicate mutually among themselves. The present invention is substantially characterized by that the system comprises three kinds of apparatus which may be called chief apparatus, sub-chief apparatus and ordinary apparatus and among which the chief and sub-chief apparatus are in known manner provided with loudspeakers and sensitive microphones while the sub-chief apparatus also are provided with a speaking apparatus of ordinary type independent of the loudspeaker, by way of example a hand microphone, which latter is adapted to be connected into circuit during conversation with a chief apparatus while the loudspeaker and the sensitive microphone in the sub-chief apparatus are intended to be used during conversation with a subordinate apparatus. Such a system has certain advantages in comparison with previously known systems among which advantages the following may be mentioned. In the chief telephone apparatus the loudspeaker and the sensitive microphone may be used when talking with all the apparatus. In previously known systems both the talking persons, if they are in possession of apparatus provided with loudspeakers, must use hand receivers because the talking currents produced by the sensitive microphones are not sufficiently strong to actuate a loudspeaker. On the other hand, in a system according to the invention in which the sub-chief apparatus are provided with a special speaking set for conversation with the chief

apparatus, the microphone of said speaking set may be of such a type that the loudspeaker of the chief apparatus may be actuated by sufficiently strong currents. The system has further the advantage that a sub-chief when talking to the chief may communicate with a subordinate apparatus without interrupting the communication with the chief apparatus in order to gather informations the conversation with the subordinate apparatus being then held without using the loudspeaker and the sensitive microphone. The two speaking sets of the sub-chief apparatus are for this purpose adapted to be connected independently of each other into the corresponding talking line circuits with the aid of switches or keys individual to the lines, the system being arranged in such a way, that the hand microtelephone is connected into circuit over the switches appertaining to the line of the chief apparatus whereas the loudspeaker and the sensitive microphone are connected into circuit over the switches appertaining to the lines of all the subordinate apparatus.

The invention will be more closely described with reference to the accompanying drawings which together show the circuit of a local telephone system according to the invention. The drawings are intended to be placed beside each other, Figure 1 being on the right hand side of Figure 2.

The drawings show the connections between the three chief telephone apparatus A, B, C, and a subordinate telephone apparatus D. All the apparatus are provided with switches or keys. The talking connections are established by means of switches AO, BO, CO, DO which are individual to the different 3-wire talking lines TL. The switches may be shifted from the normal position shown on the drawing into a signalling position by throwing the switch downwards and also into a talking position by throwing the switch upwards. These positions are indicated on the drawings by dashed and dotted lines. The chief apparatus A, B, C are all provided with a loudspeaker MT and two series connected sensitive microphones M which ordinarily are mounted together with the switches in an apparatus box. Said loudspeakers and

microphones are intended to be used when talking with a subordinate apparatus which is then using a microtelephone of ordinary kind.

In the shown embodiment the chief apparatus are subdivided into chief and sub-chief apparatus as the apparatus B and C are subordinate to the apparatus A which latter is the real chief apparatus the apparatus B and C being then called sub-chief apparatus. When talking between the apparatus A and any of the apparatus B and C these latter are using a microtelephone MT₂ or MT₃ respectively of ordinary type. The chief apparatus A normally uses the loudspeaker but, if desired, instead a telephone receiver HL may be connected into circuit. The switching over is effected by means of a switch disposed in connection with the hook HO on which the telephone receiver HL is placed in such a way that the loudspeaker HT is disconnected and the telephone receiver HL is connected into circuit when removing the latter from the hook HO. The apparatus D is only provided with a hand microtelephone MT₄.

Each apparatus is provided with an optic signalling device AS, BS, CS or DS respectively individual to each line in the form of an electromagnetically actuated signalling shutter or the like. Further an acoustic signalling device RS in the form of a call bell is disposed in common to all the lines. The apparatus A, B and C are also provided with a buzzer signalling device SS. The signalling devices RS and SS may be connected into circuit and disconnected by means of a switch SO shiftable into three positions. In the normal middle position of the switch as shown on the drawing the buzzer signal SS is connected into circuit. By throwing the switch down the call bell RS is instead connected into circuit. In the upper position of the switch SO the signalling devices RS and SS are both disconnected only the signalling shutter being then operative to announce calls. The apparatus A, B and C are further provided with a warning lamp SL which automatically is connected into circuit and lights as soon as any of the switches AO, BO or CO respectively are shifted to the talking position. Further the apparatus A, B, C are each provided with a special talking battery TB which normally is disconnected from the talking wires but at a conversation with subordinate apparatus is connected into the corresponding talking circuit together with the microtelephones M and the loudspeaker HT by shifting the corresponding switch into talking position. For signalling a battery SB common to all the apparatus is used. The subordinate apparatus D has no special talking battery.

Figure 1 shows only a subordinate apparatus D although usually several apparatus of this kind are used. According to the shown circuit diagram they are arranged as exten-

sion apparatus in relation to the chief apparatus as they are able to talk only with the chief apparatus A, B, C but not mutually with one another.

The system functions as follows. Initially it is assumed that the apparatus C calls on the apparatus D. For this purpose the switch CO₄ is thrown down, a circuit 1 being then closed through the signalling battery SB over the talking line branches *a* and *b* and through the signalling shutter DS₃ of the apparatus D. The shutter is released and drops down. At the same time the shutter magnet closes a contact 1 the call bell RS₄ being then connected into circuit in parallel with the shutter magnet. After sending a call the caller shifts his switch CO₄ into talking position the talking battery TB₃ the microphones M₃ and the loudspeaker HT₃ being then connected into the talking circuit. When interrupting the signalling circuit 1 the bell RS₄ ceases to call whereas the signalling shutter remains in calling position. In order to answer the calls the switch DO₃ is shifted to talking position the shutter magnet and the call bell being then disconnected and the microphone MT₄ instead connected into circuit. At the same time, the shutter is restored to normal position by being mechanically actuated by the switch DO₃. The talking connection is then completed. The talking circuit is arranged in such a manner that the loudspeaker of the apparatus C and the microphone of the apparatus D are connected in series into the line branch circuit *b* whereas the microphones of the apparatus C and the telephone receiver of the apparatus D are included in series in the line branch *a*. The line branches *a* and *b* are during conversation connected in parallel with the talking battery TB the branch *c* being then used as a return wire.

A talking connection between the apparatus D and any of the other subordinate apparatus on account of a call sent from these latter is established in a completely analogous manner. Also a connection between the chief apparatus A and any of the apparatus B or C is established in same manner as just described. The apparatus B and C as above described then using, however, the microtelephones MT₂ or MT₃ respectively which are connected into circuit over contacts in the corresponding switches BO₁ or CO₁ respectively when said switch is shifted to the talking position. The loudspeaker and the sensitive microphone HT₂, M₂ or HT₃, M₃ are, on the other hand, intended to be used when talking with subordinate apparatus and are connected into circuit by way of example when talking with the apparatus D over the switch BO₄ or CO₄. When establishing connection between the apparatus B or C the apparatus B may use the loudspeaker whereas the apparatus C must use the microtele-

phone MT₃. The apparatus C can thus be considered as subordinate to the apparatus B.

The establishment of a talking connection upon a call from a subordinate apparatus to an apparatus which is "a chief one" in relation to the former one is effected in a similar manner as at a call from a chief to a subordinate. When calling by way of example from the apparatus D to A, initially, the switch DO₁ is shifted to the signalling position a signalling circuit 3 being then closed over the line branches *a* and *c* and through the signalling shutter AS₄. The latter connects over its contact 4 the buzzer signal SS or the call bell RS₁ into circuit. The call is answered in the apparatus A by shifting the switch AO₄ into talking position the signalling device being disconnected and the battery TB₁, the microphones M₁ and the loudspeaker HT₁ being then connected into the circuit of the line TL₁.

I claim:—

1. Intercommunication telephone system comprising a number of chief-telephone apparatus provided with loudspeakers and sensitive microphones, a number of sub-chief apparatus provided with a speaking set consisting of a loudspeaker and a sensitive microphone and in addition thereto a speaking set of the ordinary type independent of said first mentioned speaking set, a number of subordinate apparatus, means to connect said sub-chiefs ordinary speaking set into circuit upon establishing connection with a chief-apparatus and means to connect the loudspeaker and the sensitive microphone into circuit upon establishing connection with a subordinate apparatus.

2. Intercommunication telephone system comprising a number of chief-telephone apparatus provided with loudspeakers and sensitive microphones, a number of sub-chief apparatus provided with a speaking set consisting of a loudspeaker and a sensitive microphone and in addition thereto a speaking set of the ordinary type independent of said first mentioned speaking set, a number of subordinate apparatus, telephone lines interconnecting said apparatus, switches at the sub-chief apparatus individual to the chief-apparatus lines and adapted to connect up the ordinary speaking set of the sub-chief apparatus upon establishing connection with a corresponding chief-apparatus and other switches at the sub-chief apparatus individual to the subordinate apparatus lines and adapted to connect up the loudspeaker and sensitive microphone of the sub-chief apparatus upon establishing connection with a corresponding subordinate apparatus.

In testimony whereof I affix my signature.

GUNNAR BÖRJE KNÖS.