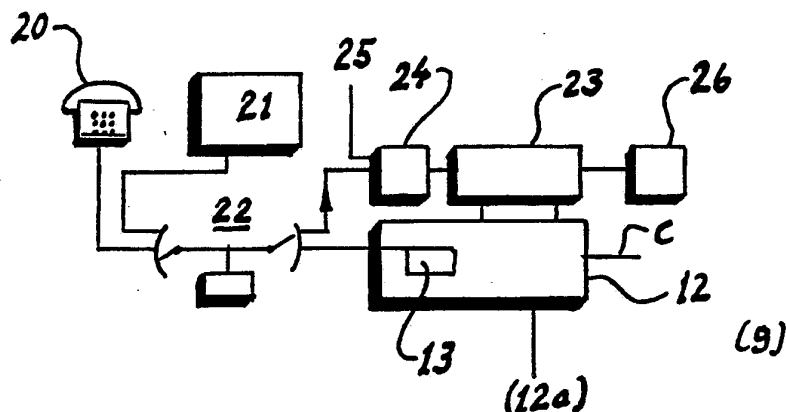




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(21) International Application Number: PCT/SE93/00210 (22) International Filing Date: 10 March 1993 (10.03.93) (30) Priority data: 9200740-0 10 March 1992 (10.03.92) SE (71)(72) Applicant and Inventor: NORDSTRAND, Lennart [SE/SE]; Björkgatan 73, S-753 23 Uppsala (SE). (74) Agent: LINDBLOM, Erik, J.; Flotthamn, S-150 23 Enhörna (SE). (81) Designated States: AT, AU, BB, BG, BR, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, SN, TD, TG).		Published <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>

(54) Title: ARRANGEMENT IN A TRANSFER CALL EQUIPMENT



(57) Abstract

The invention relates to an arrangement pertaining to call transfer equipment (12) in a telecommunication system, where a call directed to a first unit (9) is transferred by this equipment to a second unit (20, 21) included in the system. The equipment (12) coacts with a so-called call routing means (23) which has been provided by said second unit (21), subsequent to identification, with special criteria for transferring calls to the second unit (21), and wherein the call transfer equipment (12) can be activated in accordance with the criteria inserted into the call routing means (23).

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TITLE OF INVENTION: Arrangement in a Transfer Call
Equipment

TECHNICAL FIELD

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The present invention relates to an arrangement which is intended to coact with or to form part of call transfer equipment incorporated in a telecommunication system.

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The call transfer equipment functions to transfer a call to a first unit in the telecommunication system to a second unit when the first unit is unable to receive and process the call for some reason or other.

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The invention finds particular use when the call transfer equipment is intended to coact with or to form a part of a telephone exchange, a telephone switchboard, and a private manual branch exchange, but can also be used beneficially in conjunction with extension telephone sets, a subscriber telephone set or station or the like.

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In order to simplify the following description of the invention, the invention will be described primarily with reference to private manual branch exchanges (ANODAL), although the person skilled in this art will be aware of those procedures and measures that shall be adopted to achieve a corresponding service within other related applications.

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Thus, the inventive arrangement is described below with reference to its use in a private branch exchange, and then particularly in such an exchange which includes a plurality of incoming lines, central control equipment, a plurality of outgoing lines, and requisite switching means for connecting a call occurring on an incoming

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line to a selected outgoing line in accordance with information obtained.

BACKGROUND ART

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In the case of private branch manual exchanges of this kind, calls arrive on incoming lines and are primarily connected to an unengaged initials operator serving the exchange by switching devices, while when all telephone operators are engaged calls are transferred by call transfer equipment to another unit, telephone set or station in the telephone system, such as another telephone exchange, private branch exchange or the like, or alternatively to an extension set, subscriber's station or the like.

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With regard to call transfer equipment connected to private branch exchanges or switchboards, it is known to initiate a call transfer to another number from an own telephone set and to inhibit an earlier initiated call transfer function from an own telephone set.

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Thus, when an incoming call shall be transferred for some particular reason, the call transfer equipment of the kind intended here will transfer the call immediately to a unit or to a telephone set whose telephone number is stored in the call transfer equipment.

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Although such call transfer equipment is normally incorporated in central switching exchanges and in private branch exchanges or like exchanges, the equipment may also be incorporated in a subscriber's station or a telephone extension set.

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Those incoming calls which cannot be handled by the telephone operators can be transferred to a subscriber's

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station belonging to the telephone system, or to another telephone switchboard, a private branch exchange or the like, therewith assisting the telephone operators in those situations when the number of connected calls and the duration of said calls exceeds the capacity of the telephone operators employed in the exchange.

One limitation with this application is that it can only be permitted when all incoming calls can be expected to have a particular nature and which need not necessarily require or cause connection to an extension set belonging to the private branch exchange.

An example of calls of such particular nature is one in which all or the majority of incoming calls have the nature of queries which require from the telephone operator answers of a more standardized type, for instance inquiries relating to train times, prices, departure times, etc., and thus do not need to be connected to another extension set, station or the like.

DISCLOSURE OF THE PRESENT INVENTION

TECHNICAL PROBLEMS

When considering the standpoint of techniques as described above, it will be seen that a technical problem resides in realizing the significance of limiting the call transfer intensity and call duration from a first unit to a selected second unit, such as a telephone set or switchboard, solely during those times in which the second unit has declared itself prepared to receive calls transferred from said first unit, through the agency of an identifying, coded signal.

A technical problem related hereto is one of realizing

those measures that are required in order to enable the second unit to influence and program utilized call transfer equipment itself, through the agency of an identifying code signal, and therewith itself define those times during which a call or calls may be transferred, and also to define the maximum number of calls that may be transferred per unit of time, for instance each hour.

10 When considering the standpoint of techniques as described above with regard to a private branch switchboard or subscriber's station which includes call transfer equipment or call transfer function, it will be seen that a technical problem is one of creating in another
15 subscriber's station to which calls could be transferred conditions which will enable this other station, through the agency of identifying code signals generated by a telephone operator or the like, to decide to which extent and within which time periods the call transfer
20 equipment can be allowed to transfer calls to precisely this telephone switchboard or subscriber's station, by programming said call transfer equipment to this effect with the aid of a coded signalling process.

25 It will also be seen that a technical problem resides in realizing the significance of permitting call transfer equipment belonging to the first unit to coact with means which will transfer, solely in accordance with information stored in said means, a call to a sub-
30 scriber's set or switchboard pointed-out by said means, via special criteria.

Finally, it will also be seen that a technical problem reside in realizing that a telephone set and/or telephone switchboard (exchange) which can be pointed-out by
35 the call transfer equipment shall be constructed to

insert and remove information concerning its current or instantaneous availability via a line connected to said means and also through the agency of an identifying code signal or the like, this information containing, for instance, data relating to the maximum number of calls per hour that can be accepted.

SOLUTION

With the intention of solving one or more of the afore-said technical problems, according to a first aspect the present invention is based on an arrangement pertaining to call transfer equipment included in a telecommunication system, wherein a call that is directed to a first unit by said transfer equipment is transferred to a second unit in the system.

The invention is mainly characterized in that the call transfer equipment cooperates with information receiving and call procedure control means (hereinafter referred to as so-called call routing means) which, subsequent to identification, is provided with special criteria by said second unit relating to the transfer of calls to this second unit, and in that the call transfer equipment can be activated to transfer calls in accordance with the criteria inserted in said call routing means.

According to a further development of the invention, the unit is comprised of a subscriber's set or private manual branch exchange, and that the insertion of special criteria into said means is effected by connecting a call to said means and transmitting a coded message which corresponds to said special criteria.

According to a second aspect, the invention is based on the use of private branch exchange and/or a subscriber's

set (or subscriber's station). or telephone switchboard which includes a number of incoming lines, central control equipment, a number of outgoing lines, switching devices necessary for connecting a call occurring on one incoming line to a selected outgoing line in accordance with information obtained, wherein calls are connected by said switching means to a "free" switchboard operator serving the private branch exchange, whereas calls which occur over time periods in which all telephone operators are busy are transferred through the agency of a call transfer equipment to an extension set or subscriber's station or to some other private manual branch exchange belonging to the telephone system.

It is proposed in accordance with the present invention that in an arrangement of this kind, the call transfer equipment shall coact with means to transfer said calls to a telephone set and/or telephone switchboard pointed-out by said call routing means, in accordance with information activated by and stored in the subscriber's set (station) and/or said other private branch exchange.

It is also proposed, within the concept of the invention, that each subscriber's set and/or private branch exchange shall be capable of inserting and removing information concerning the current or instantaneous availability of said set or exchange, via a line connected to said means and via a code signalling process or some like process.

The aforesaid information will preferably include a reference to the number of calls that can be accepted hourly.

ADVANTAGES

Those advantages primarily afforded by an arrangement according to the different anodal of the present invention reside in the creation of conditions which enable the call transfer function of the call transfer equipment of a first unit to be influenced in a manner such that each call transferred to a second unit, such as a subscriber's set or station and/or another private branch exchange, will only occur in accordance with given conditions, such as time conditions and intensity, that have been set by the second unit itself, subsequent to identification.

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The inventive arrangement is primarily characterized by the features set forth in the characterizing clause of Claim 1.

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BRIEF DESCRIPTION OF THE DRAWING

An exemplifying embodiment of the invention at present preferred and having characteristic features significant of the present invention will now be described in more detail with reference to the accompanying drawing, in which

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Figure 1 is a highly simplified illustration of the principles by which mutual cooperation is achieved between a telephone switchboard and a private branch exchange, and where the telephone switchboard coacts with call transfer equipment;

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Figure 2 is a block schematic illustrating a private branch exchange coacting with call transfer equipment belonging to the telephone switchboard; and

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Figure 3 is a block schematic which illustrates an inventive arrangement functioning to control the call transfer equipment

10 DESCRIPTION OF EMBODIMENTS AT PRESENT PREFERRED

It is evident that one skilled in this particular technical field will realize those procedures that are required to connect the arrangement described below to a telephone system with the guidance of the following description, which explains in more detail the application of an inventive arrangement in a telephone switchboard/station and private branch exchange PBX.

20 Figure 1 illustrates in a greatly simplified fashion a telephone switchboard or exchange "A" included in a telephone system and having a number of incoming lines. One of these lines, 5, connects a subscriber's set 6 to the telephone switchboard "A" and a call initiated by the subscriber's set 6 can thus be transferred to the switchboard "A" and the switchboard is able to connect the subscriber's set 6 with a telephone set or telephone unit that corresponds to a code generated in the subscriber's set or station 6, such as to the telephone set 30 9 of a telephone operator 10 in a private branch exchange 2, with the aid of switching means in said exchange.

The telephone switchboard "A" also includes call transfer equipment 12, which is intended to transfer calls when all telephone operators 10 are engaged.

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As shown in Figure 1, a call transfer can be made to one of three available telephone sets, of which the telephone set 20 represents a subscriber's set and the telephone set or apparatus 21 illustrates a private branch exchange, preferably manned by several telephone operators 10'.

The invention is intended to enable calls which are initially directed to telephone operators 10 in a first private branch exchange 2 to be relieved automatically during a "rush period", so that hopefully all calls to the exchange 2 will be answered, even when all of the telephone operators 10 in the first exchange 2 are busy.

This is achieved by transferring all calls that cannot be answered by these telephone operators 10 to another subscriber's set (or station) or another private branch exchange in which telephone operators 10' are able to accept the calls.

The invention is based on the ability of the other or second branch exchange 21 (or subscriber's set/station 20) to control the call transfer equipment in the first private branch exchange 2 or the telephone switchboard "A", so that calls will only be transferred in accordance with criteria which, subsequent to accepted identification code signalling, can be inserted by the receiving, second private branch exchange into an information receiving and call procedure controlling means, referred to hereinafter as the call routing means, as described more clearly below.

Figure 2 is a block schematic of an inventive arrangement 1, and shows the arrangement connected to call transfer equipment 12 in a telephone switchboard or exchange "A" that coacts with a private manual branch

exchange 2, or telephone station.

The private branch exchange 2 includes a number of extension sets 3, 4, a number of incoming lines 5a for incoming calls from a subscriber's set 6 belonging to the telephone system, and requisite switching means 7 which can be activated in a known manner to connect the calling subscriber's set 6 with an extension set or a telephone operator corresponding to the code in response to a code delivered by a calling subscriber's set 6, through the agency of available connection routes or paths.

The invention assumes that the private branch exchange 2 includes a control unit 8 which controls the exchange functions.

Also connected to the private branch exchange 2 is one or more attendant sets 9, each belonging to a respective telephone operator 10.

The control unit 8 will normally include computer equipment which is intended to detect traffic in the private branch exchange 2 and to control the functions of said exchange. These complex control units are known to the art and will not therefore be described in detail here.

The present invention relates to an arrangement 1 which coacts with call transfer equipment 12 in a telephone switchboard or exchange "A". Only one, 5, of a number of incoming lines has been shown in the Figure. Located between the switchboard "A" and the private branch exchange 2 are a number of lines 5a.

The private branch exchange 2 uses complex central control equipment 8 and a number of outgoing lines, of

which a number of lines "D" each coact with a respective attendant set or station. Each of a number of other outgoing lines "B" is connected to a respective extension set 3, 4, and a number of lines "C" are connected to the aforesaid call transfer equipment 12.

The invention is based on the assumption that each call of a particular kind and which, in accordance with the number dialled, occurs on the incoming line 5a shall be capable of being connected to a telephone operator 10 in the private branch exchange by said switching means 7. When all telephone operators 10 are engaged with ongoing calls, the switching means 7 and the call transfer equipment 12 will function to transfer calls of this kind to a unit, such as a subscriber's set or station 20 or some other private branch exchange 21 of a kind which can be associated with the embodiment illustrated in Figure 2 and which belongs to the telephone system.

When equipment included in the central control equipment 8 establishes that all telephone operators 10 are engaged with calls and that further calls which also require the services of a telephone operator come into the switchboard, the central control equipment 8 will activate a unit 12a in the switchboard "A" which there-with activates the call transfer equipment 12, and causes the switching means 7 to switch these incoming calls to the call transfer equipment 12 in the telephone switchboard A over the line "C".

The call transfer equipment 12 may be of the kind which, via a means 13, activates a call to an indicated subscriber's set 20 or some other private branch exchange 21, and when the subscriber's set 20 or the exchange 21 has answered effects connection of the call via the line "C" to the subscriber's set 20 or the exchange 21, via

12

one or more telephone switches, when necessary, of which one switch has been referenced 22 in Figure 3.

5 However, in accordance with the present invention, the call transfer equipment 12 coacts with a means 23 which, in accordance with information activated by and stored in the subscriber's set 20 and/or said other private branch exchange 21 transfers the call to a subscriber's set and/or private branch exchange indicated by the
10 means 23.

Thus, when signals occur from the means 12a and the call has been connected to the line C, the call transfer equipment 12 shall transfer the call solely in accor-
15 dance with information stored in the means 23.

The information contained in the means 23 shall only be capable of being inserted and stored from each sub-
scriber's 20 and/or each private branch exchange 21.
20

This is achieved by dialling on the subscriber's set 20 a specific subscriber number and connecting the sub-
scriber's set through the telephone switchboard 22 to a
receiving unit 24 which coacts with the means 23 in a
25 manner such that in conjunction with subsequent code signalling or the like and subsequent to accepted identification inserts and removes information into and from the means 23 concerning current or instantaneous availability.
30

This information may thus contain data concerning the number of calls that can be accepted hourly.

The necessary signal exchange and code transmission can
35 be illustrated as follows:

A telephone operator 10' employed in the private branch exchange 21 wishes to insert into the means 23 information to the effect that the exchange 21 is prepared to receive five calls per hour.

5

The telephone operator initiates a call to the means 23, by dialling a particular subscriber number. When the connection is established, a message is delivered concerning the call transfer service together with a command to disclose an identification code, such as a four digit code, via tone-code signalling, via a voice generating unit 25.

Subsequent to having received the correct code (the relevant code is compared with the subscriber number), a message is sent, via units 25, to the effect that the correct code has been received and that the number of calls per hour specified in the information received can take place.

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This information can be based on the system that "00" denotes the number of calls per hour that can be received, "01" denotes that one (1) call per hour can be received, and so on.

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The unit 25 informs that inserted information is received and stored and the call is terminated.

When a call now arrives at the private branch exchange 2 from the subscriber's set 6 and all telephone operators are engaged, the voice generating unit 25 is activated and informs the subscriber's set 6 that "We are trying to connect you with free operator. Please wait".

35

The call transfer equipment 12 then establishes a call connection with the private branch exchange 21. If a

telephone operator is free in this exchange, the operator is informed through the unit 25 that "a call is transferred from exchange 2 (the Stockholm office)", whereafter the actual call transfer function is finalized.

If all telephone operators in the private branch exchange 21 are engaged, the subscriber's set 6 is informed through the unit 25 that "We are attempting to find a free operator, please wait" and the call transfer equipment 12 looks for a further call transfer possibility, for instance the subscriber's set 20, which is now free.

If the call transfer equipment is unable to find a free telephone set or telephone operator, a telephone queue can be brought into effect. This facility is described and illustrated in more detail in Swedish Patent Application No. 90 00920-0.

Although the private branch exchange 2 of the illustrated and described embodiment has internal means which decide when all available telephone operators 10 are engaged, and that these means control means in the telephone switchboard "A" for transferring calls to another telephone operator or the like, it will be understood that these means can be placed in the telephone switchboard "A".

Referring again to Figure 3, it can be mentioned that the receiving unit 24 is connected to the voice generating unit 25.

Furthermore, the means 23 includes equipment 26 having a memory in which available and inserted telephone numbers are stored, together with their capacity, and means for

disclosing the capacity time-wise on respective telephone numbers.

5 It will be understood that the invention is not restricted to the aforescribed exemplifying embodiments thereof, and that modifications and changes can be made within the scope of the inventive concept illustrated in the following Claims.

CLAIMS

1. An arrangement pertaining to call transfer equipment included in a telecommunication system, where a call
5 directed to a first unit is transferred by said equipment to a second unit included in the system, characterized in that the equipment (12) coacts with call routing means (23) which, subsequent to identification, is provided by said second unit (21)
10 with special criteria for transferring a call to said second unit (21); and in that the call transfer equipment (12) is activated in accordance with the criteria inserted in said means (23).

15 2. An arrangement according to Claim 1, characterized in that said second unit is comprised of a subscriber's set or station (20) or a telephone switchboard (21); and that the insertion of special criteria is effected by connecting (22) a call to the
20 call routing means (23), transmitting an accepted coded identification signal, and transmitting a coded message corresponding to said special criteria.

3. An arrangement pertaining to a telephone switchboard
25 or exchange (2) comprising a plurality of incoming lines (5a), central control equipment (8), a plurality of outgoing lines (D), requisite switching means (7) for connecting a call occurring on an incoming line (5a) to a selected outgoing line (D) in accordance with information obtained, wherein calls are connected by said
30 switching means (7) with a telephone operator (10) belonging to the private branch exchange, while incoming calls to engaged telephone operators are transferred through the agency of call transfer equipment (12) to a
35 telephone set or station (20) or some other exchange (21) belonging to the telephone system,

c h a r a c t e r i z e d by call routing means (23) which coacts with the call transfer equipment (12) and which in accordance with information stored in and activated by the telephone set or station (20) and/or the exchange (21) transfers said call to a telephone set or station (20) and/or exchange (21) indicated by said call routing means.

4. An arrangement according to Claim 3, c h a r a c -
t e r i z e d in that each telephone station or tele-
phone set (20) and/or each exchange (21) is intended to insert and remove information concerning current or instantaneous availability into and from said call routing means (23) via a connected line (22) and subsequent to accepted identifying code signalling or the like.

5. An arrangement according to Claim 4, c h a r a c -
t e r i z e d in that said information contains data relating to the number of calls that can be accepted each hour.

1 / 1

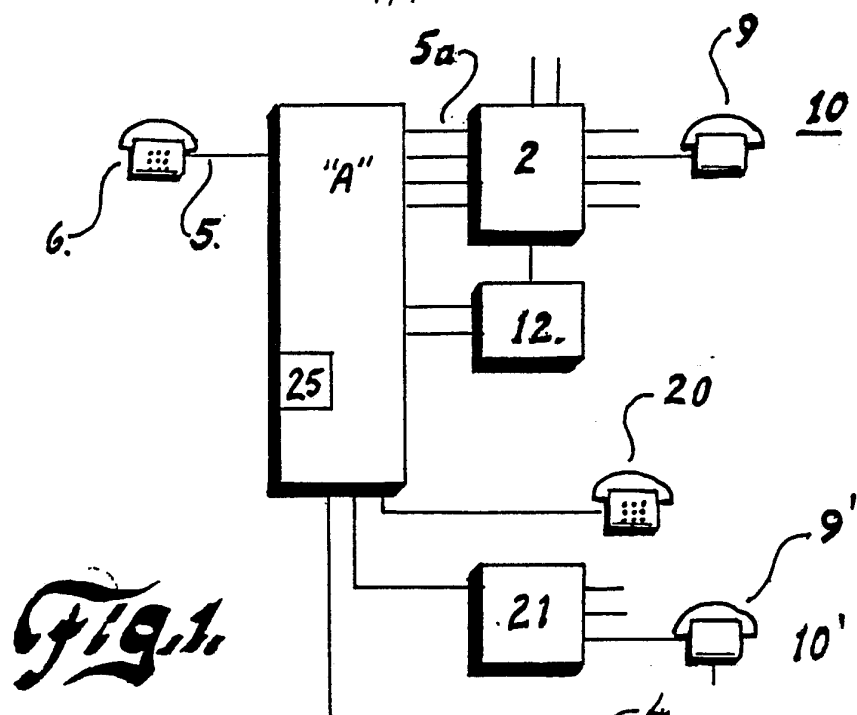


Fig. 1.

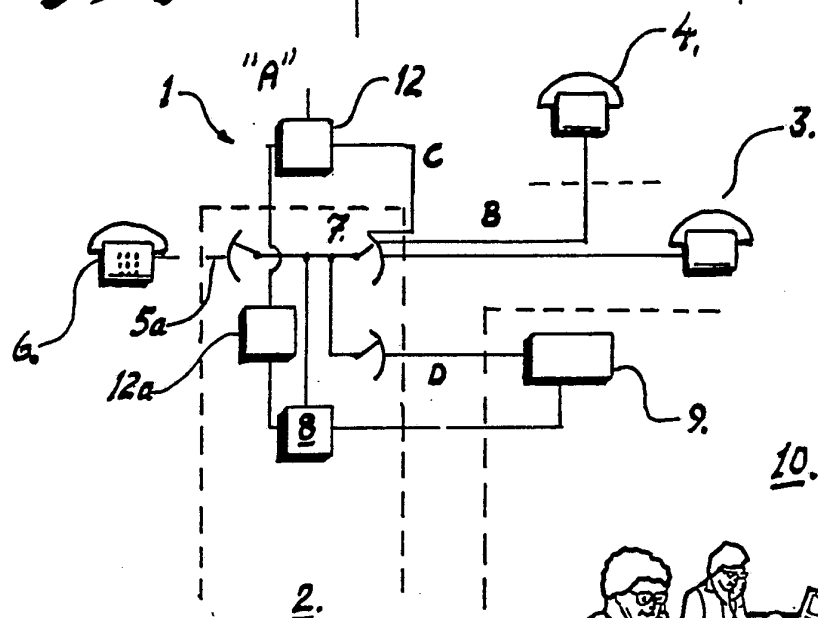


Fig. 2.

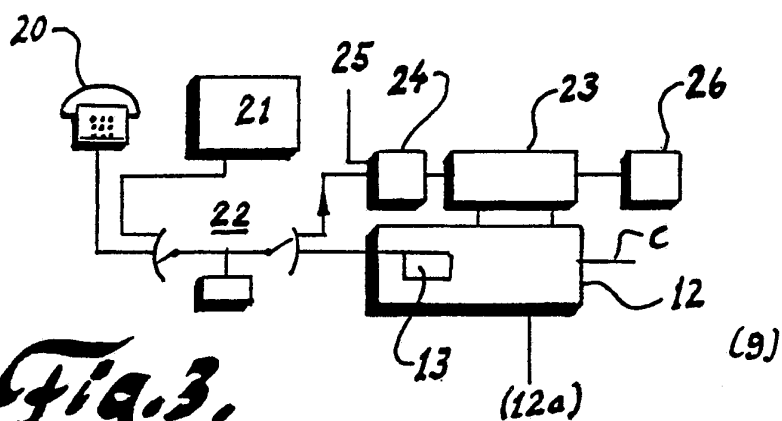


Fig. 3.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 93/00210

A. CLASSIFICATION OF SUBJECT MATTER

IPC5: H04M 3/54

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP, A2, 0216381 (AMERICAN TELEPHONE AND TELEGRAPH COMPANY), 1 April 1987 (01.04.87)	1-5

A	EP, A2, 0456128 (TELENORMA GMBH), 13 November 1991 (13.11.91)	1-5

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

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14 -06- 1993

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INTERNATIONAL SEARCH REPORT
Information on patent family members

30/04/93

International application No.
PCT/SE 93/00210

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A2- 0216381	01/04/87	AU-B- 586890 AU-A- 6309686 CA-A- 1252864 JP-A- 62091054 US-A- 4723273	27/07/89 26/03/87 18/04/89 25/04/87 02/02/88
EP-A2- 0456128	13/11/91	DE-A- 4015088	14/11/91