

[72]	Inventor	Siegfried Biedermann Schellenberg, Liechtenstein
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[73]	Assignee	Uninorm Anstalt Vaduz, Liechtenstein

[54] APPARATUS FOR TRANSMISSION OF INFORMATION
9 Claims, 5 Drawing Figs.

[52]	U.S. Cl.	340/167 R, 340/164, 340/168 R, 340/312
[51]	Int. Cl.	H04q 9/00
[50]	Field of Search	340/164, 167

[56] **References Cited**
UNITED STATES PATENTS

3,175,191 3/1965 Cohn et al. 340/167 X
Primary Examiner—Donald J. Yusko
Attorney—Ernest G. Montague

ABSTRACT: An apparatus for the transmission of information between a plurality of stations by means of a common transmission path for light call installations, light call speaking installations, speaking installations, surveying installations,

remotely operative installations, person-investigating installations, remote indicators, remote control means, and the like, which comprise receivers, an impulse exciter and a counter chain including flip-flops. The receivers are operated only upon occurrence of a predetermined binary code in the receivers, the binary code being delivered by the impulse exciter by means of the counter chain which includes the flip-flops. A time period section, divided into two partial time periods, is coordinated to each of the receivers, and a corresponding receiver is selected by the binary code during the time period section within one of the part-time periods and information is transmitted to the receiver within the other of the partial time periods. Synchronously running counter chains and a conduit common to all stations are also provided and the counter chains are connectable with the impulse exciter by means of the conduit for setting the time period stations. The counter chains have at least as many flip-flops, as are required for the number of provided channels corresponding with the binary coding given by the flip-flops. Decoding circuits respond to the same counter position and are connected with the counter chains of the stations to be coordinated relative to each other. A gate is applied to the conduit. Time gaps, disposed between the impulses of the impulse exciter applied to the gate serve the transmission of the information. Upon expiration of at least one of the partial time periods for the synchronization of the entire installations a synchronous impulse is transmitted by filling out of the last of the impulse gaps, and at least one joint main station is provided for a plurality of extension stations connectable with the transmission path.

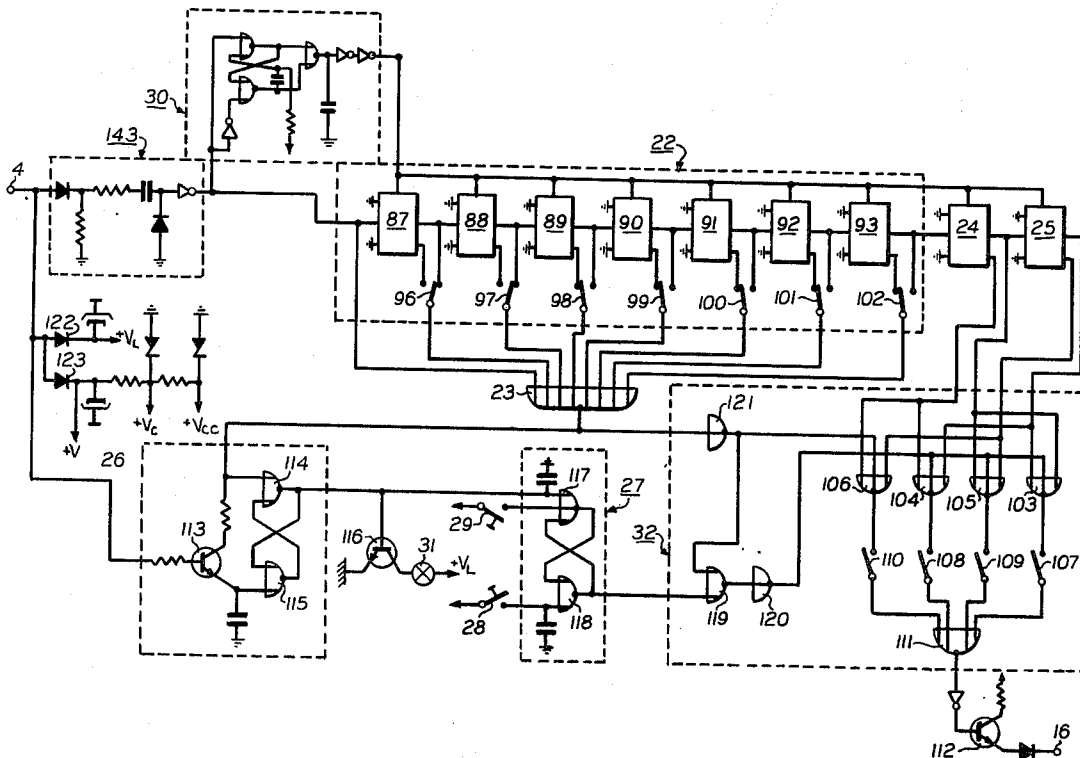
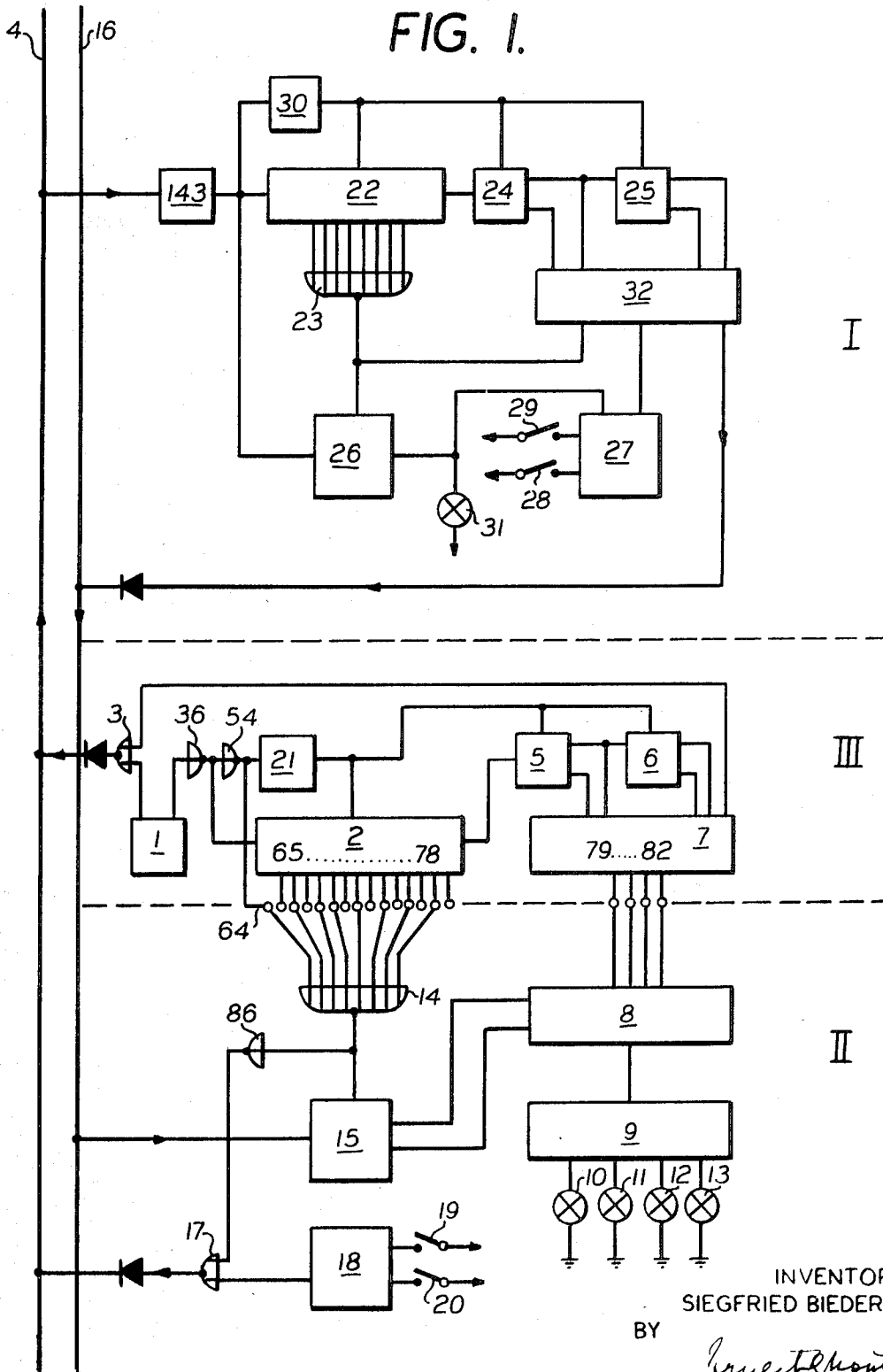


FIG. 1.

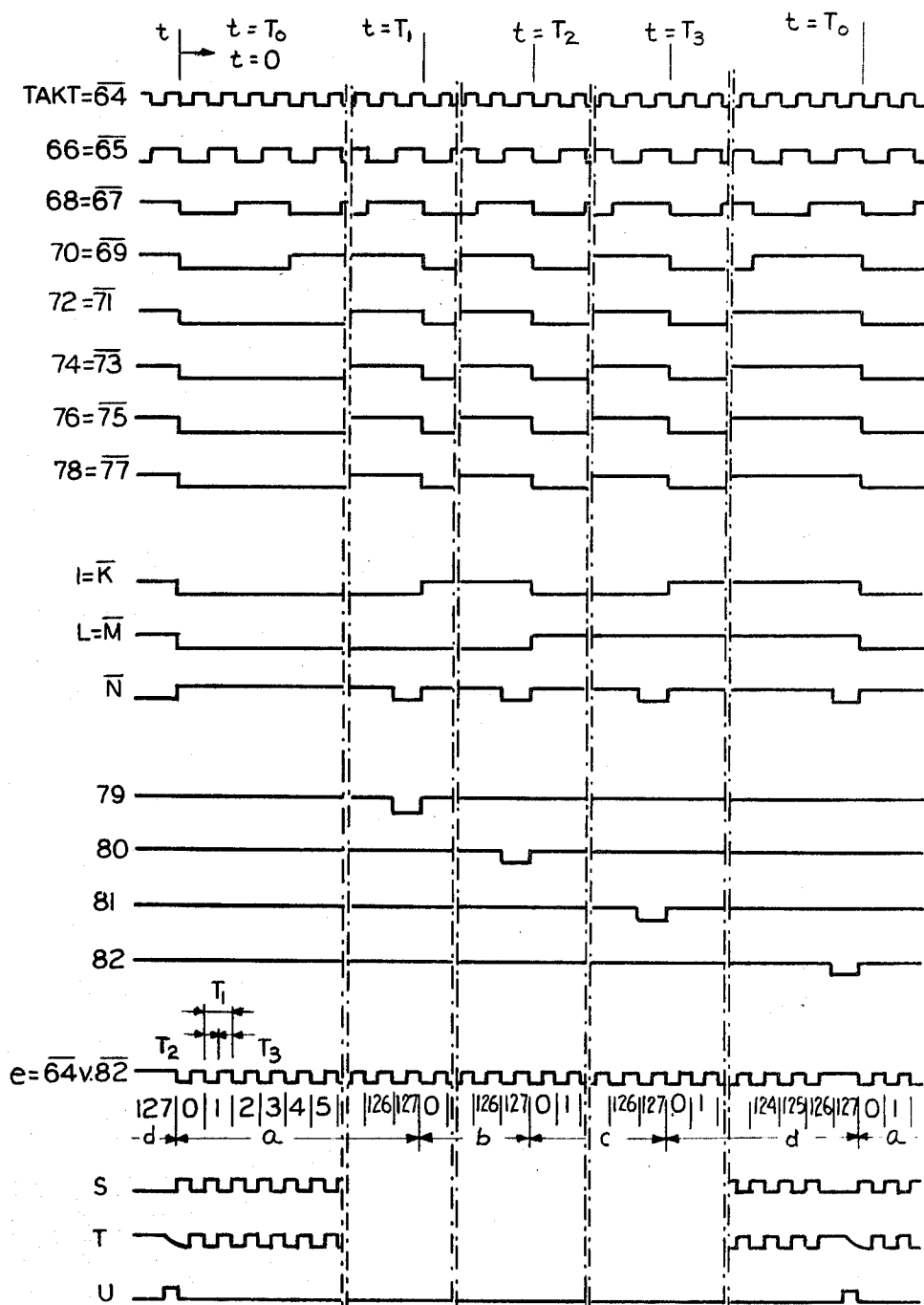


INVENTOR
SIEGFRIED BIEDERMANN
BY

Siegfried Biedermann

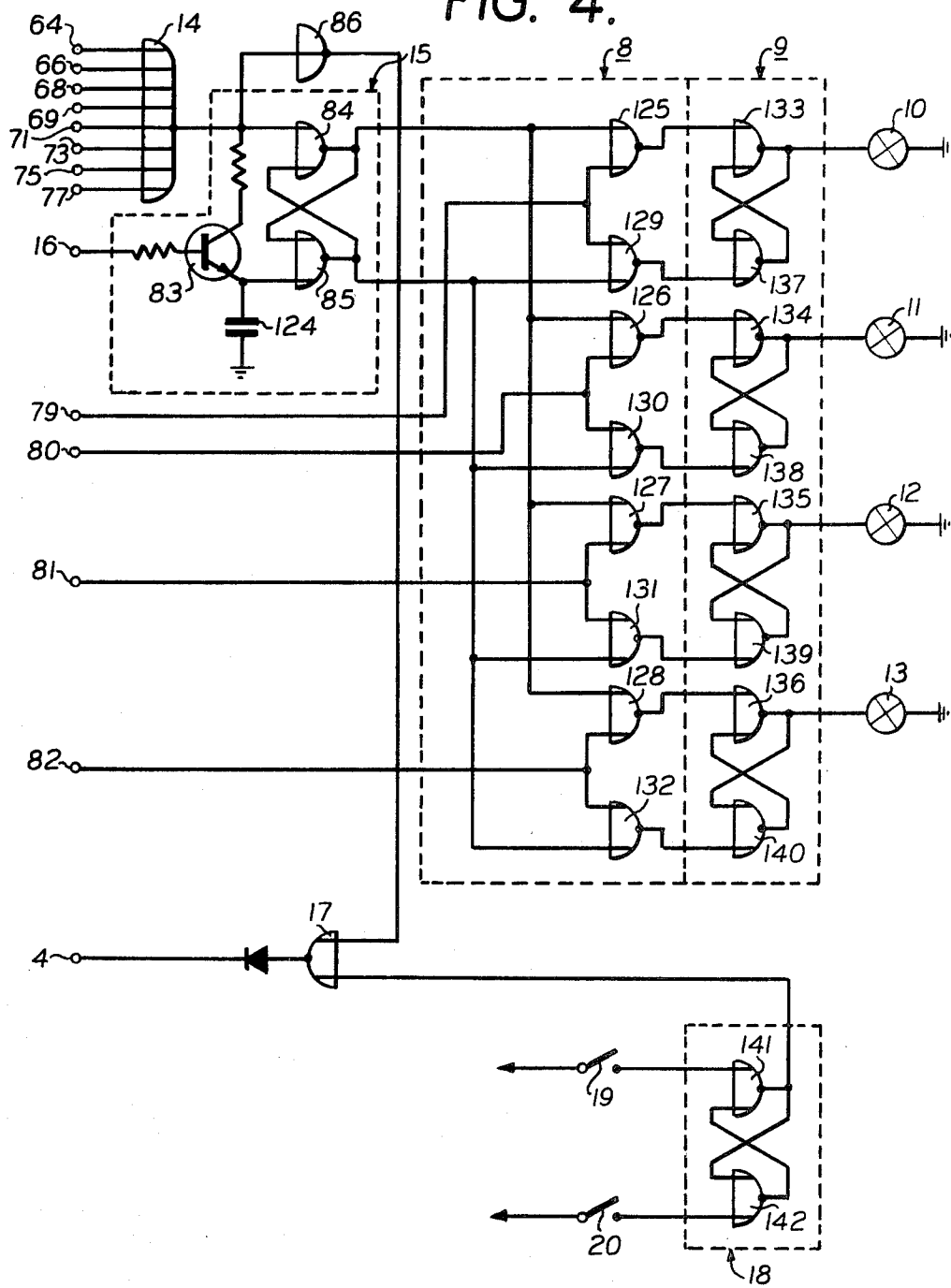
ATTORNEY.

FIG. 3.



INVENTOR
SIEGFRIED BIEDERMANN
BY
Guenther Koutag
ATTORNEY.

FIG. 4.

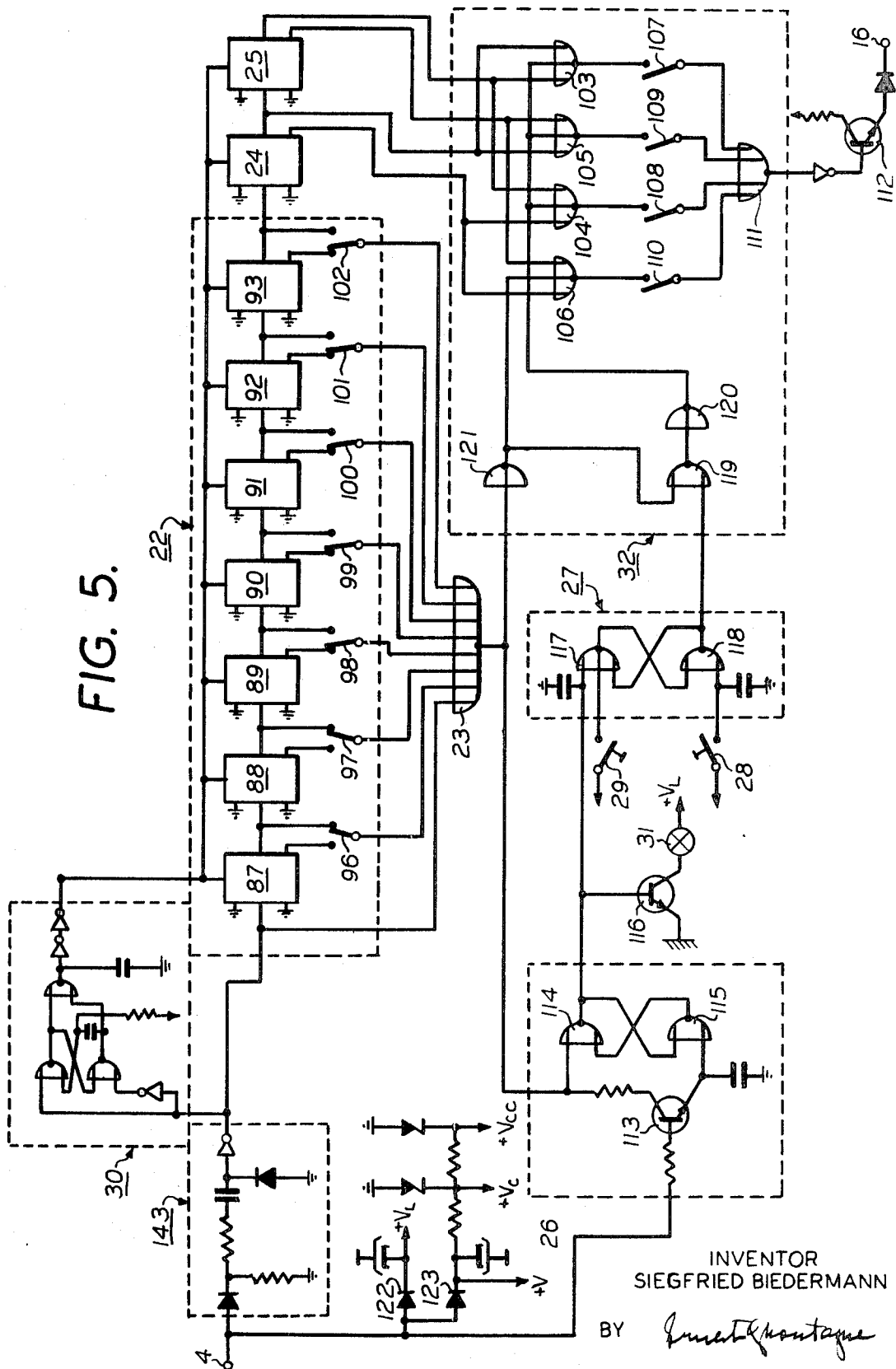


INVENTOR
SIEGFRIED BIEDERMANN

BY

Ernest J. Montague

ATTORNEY.



INVENTOR
SIEGFRIED BIEDERMANN

BY *[Signature]*

ATTORNEY

APPARATUS FOR TRANSMISSION OF INFORMATION

The present invention relates to an apparatus for the transmission of information between a plurality of stations by means of a joint transmission path for light call installations, light call speaker installations, speaker installations, surveilling installations, remotely operating installations, person-investigating installations, remote indications, remote control arrangements, and thereon, in which the receivers are operated only, when a predetermined binary code is delivered by means of an impulse generator over a counter chain consisting of flip-flops. The present invention relates first of all to light call-speaker installations, as they are applied for instance in hospitals for the transmittal of information between the nurses' rooms and the patients' rooms, as well as for apparatus for the surveillance of banks and industrial installations and the like.

The previously known wire-operated installations have the drawback, that for transmittal of a plurality of different information, for instance personal calls, counter confirmation, broadcast transmission, telephone operation on a duplex line, light signal transmission, circuit call transmission, alarm signal transmission, and the like, a great number of conduits was required. Furthermore, expensive relay stations were necessary, which must be arranged as group or central stations, in order to be able to perform all circuit functions and transmission paths.

The wireless installations save by the costs of the conduits and partly also save the relay stations, yet are rather very complicated in their structure and very sensitive against listening and disturbances. Only by means of an increased technical expenditure, selective call installations can be created, which are, however, no longer economically applicable for a greater number of extension stations.

It is, therefore, one object of the present invention, to provide an apparatus for the transmission of information between a plurality of stations, in which the drawbacks of the known installations are extensively avoided, wire material is saved, the possibilities of disturbances against disturbing frequencies are reduced and in which with a low conduit expenditure a relatively great number of extension stations can be connected. Relay stations should as much as possible be omitted. Also an exchangeable traffic between a plurality of stations is possible. Furthermore the possibility exists, to permit connecting of portable, additional stations at any selective points of the installation by plugs.

The wireless installations save the expenses for the conduits, and partly the relay stations which are, however, very complicated in structure and very sensitive against listening and disturbances. Only by increased technical expenditure can the selective calling installations be created, which, however, are usable for a greater number of extension stations no longer economical.

By U.S. Pat. No. 3,134,961 and by the analogous German Publication No. 1,094,638, respectively, already a code selector for the receiver of a person-calling installation has been known, in which a calling device is operated only in a predetermined receiver, when a predetermined binary code occurs on a conduit of the receiver, to which the selector is supposed to respond, whereby the first impulse of the arriving code comprising a plurality of successive impulses within a predetermined time period releases a phase generator circuit, the control impulses of which switch through within the cycle of the arriving impulse sequence the operating cycle of a ring counter, in which the outputs of the individual steps, switched together corresponding with the own code of the receiver, are connected with the inputs of a Tor-circuit, in which the individual impulses of the ring counter steps can be compared with the individual impulses of the arriving codes and upon termination of a complete working cycle the impulse of the last step of the ring counter does not release a call, when an impulse arriving upon nonconformation with its own code through the Tor-circuit has prevented the call by a locking circuit, while the impulse of the last step of the ring counter

releases the call, if upon confirmation of the own code and of the impulses the locking circuit is open.

The present invention is based on the concept to transmit information simultaneously from a plurality of extension stations to a main station and in reverse order, as well as to connect together main and extension stations by at least two-wire, particularly three-wire conduits.

In a three-wire trunk, one wire serves as a sending wire, the second as a receiving wire and the third as a joint return wire. The indications, sending and receiving wire are hereby defined from the extension station.

In accordance with the present invention, in the manner of a time multiplex system, a predetermined time section (participant time period) is assigned to each receiver, whereby during this subscriber time period within the one part-time period, the receiver is selected by the binary code and information is transmitted within the second part-time period, whereby for the setting of the subscriber time periods by means of a conduit jointly for all stations, synchronously running counter chains connectable with the impulse generator are provided, which have at least as many flip-flops, as are required for the number of provided channels corresponding to the binary code given by the flip-flops. On the counter chains of the stations, coordinated to each other, decoding circuits, particularly gates, are connected. The gaps disposed between the impulses applied from the impulse generator to the conduit serve the transmission of the information. Upon termination of one or a plurality of partial periods for the synchronization of the total installation, a synchronous impulse, particularly by filling out the last impulse gap, is transmitted, and at least one joint main station is provided for all or a plurality of stations (extension stations) connectable onto the transmission path.

Advantageously the transmission of the information by means of impulses takes place preferably with the half-amplitude of the frame pulse.

In accordance with a further development of the present invention for the transmission of a plurality of different information between two stations of the same code, several successive periods (partial periods) are provided.

If the impulse generator emits at any position of the conduit rectangular impulses onto the sending and receiving wire and if n extension stations are present, at least n impulses form a partial period. If m informations are transmitted between one extension station and the main station, at a maximum m partial periods are joined to one cycle period.

If s is the number of the steps of the counter, the number of the coding time points per partial period amounts to 2^s . If the x extension station exchanges an information with the main station, by logic connections of the step outputs of the counter chain present in this unit and of the phase, it can be brought about that, within the subscriber time period, for instance, a complementary impulse gap can be raised from the potential "0" to any selected value, preferably to the half-potential of an impulse. This information reaches the main station by means of the sending wire. There the unit coordinated to this extension station questions this impulse gap and gives an output signal due to the information contained therein. The main station communicates with the extension stations by means of the receiving wire in the same manner.

This synchronous impulse secures the synchronization of all connected sending and receiving units, so that at all units, the same counter position sets itself synchronously. Thus to each counter corresponds a code number of a unit.

The permanent transmission of the code impulses makes possible a particularly rational solution of the problem of the energy supply, since in accordance with another feature of the present invention, the phase impulses deliver simultaneously, for instance by means of a blocking valve, the output for the individual units connected with the transmission path.

For the delivery of the output of the individual units connected with the transmission path, also impulse amplifiers can be provided, which amplify the transmitted phase impulses. Thereby a circuit arrangement can be chosen of diodes and

condensers, which takes the energy only from the phase impulses, not, however, from the information contained in the impulse gaps, in which the diodes charge the condensers in the supply conduit of each unit of the installation only in case of an applied voltage, which is for instance larger than half of the impulse voltage.

Instead of the use of separate sending and receiving wires, for one of the two directions, further partial periods and subscriber time periods, respectively, can be used. Thus, for instance, all even-numbered impulse gaps for information can be used from the extension station to the main station and all uneven-numbered impulse gaps for information from the main station to the extension station.

Further details of the present invention result in the showing in the drawings in which an embodiment is disclosed for four part periods, which are applied for the transmission of four different signals. In the direction from the main station to the extension stations, these partial periods are, however, not exploited, rather in all partial periods in this direction only one and the same signal is sent.

FIG. 1 is a principally simplified circuit of an apparatus in accordance with the present invention with main station unit, a common cycle generator and an extension station:

FIG. 2 is a circuit diagram of a phase exciter;

FIG. 3 is an impulse program of the phase exciter disclosed in FIG. 2;

FIG. 4 is a circuit diagram of a main station unit according to FIG. 1; and

FIG. 5 is a circuit diagram of an extension station according to FIG. 1.

In all Figures all shown gates are shown as NOR gate.

Referring now to the drawings, and in particular to FIG. 1, by example the circuit of a main station with an extension station in accordance with the present invention is disclosed, whereby all details required for the following explanation have been omitted.

The main station comprises main station units II of a number resulting from the number of the extension stations I and a phase exciter III common to all main station units II. In the phase exciter III is disposed an impulse exciter 1, which is connected, on the one hand, to a counter chain 2 constructed of flip-flops, and, on the other hand, is connected by means of a gate 3 to the conduit 4. The outputs of the flip-flops of the counter chain 2 are fed to all main station units II of the main station. Two additional flip-flops 5 and 6 are connected to the counter chain 2, which flip-flops 5 and 6 are provided for the production of partial periods, for which purpose a gate circuit 7 is provided.

To the gate circuit 7 is connected a gate circuit 8 coordinated to each main station unit II for switching through of the partial periods. A memory arrangement 9 follows this gate circuit 8, which memory arrangement contains the memories coordinated to the partial periods. Selected receivers can be connected to the memory arrangement 9, which receivers receive the signals transmitted during the individual partial periods. In FIG. 1 by example one signal lamp each 10, 11, 12 and 13 is provided therefor.

To the counter chain 2 is connected by means of a gate 14, which selects the impulse gap of the impulse sequence (coding time point), characterizing the connected extension station (coding time point), on the one hand, a calling circuit 15, the input of which is connected with the conduit 16 connected with all extension stations I and the outputs of which are connected with the gate circuit 8, on the other hand, to a gate 17, the output of which is connected with the conduit 4 and the second output of which is connected with the output of the sender memory 18, which is operable by means of a call key 19 or a release key 20.

For the synchronization of the counter chain 2 a synchronic impulse filter 21 is switched in between the impulse exciter I and the counter chain 2.

The extension station I equals in principle the structure of the main station II, III with the exception of a few switching

elements, as for example, the impulse exciter I, which delivers the phase impulses not only to the counter chain 2 of the main station, but also by means of the gate 3 and the conduit 4 to the counter chain 22 of the extension station, at the output of which is analogously switched to the gate 14 of the main station unit II. Here likewise are provided flip-flops 24 and 25 for the production of the partial periods, the calling circuit 26, the sending memory 27, the call key 28, the release key 29 and the synchronous impulse filter 30.

Since, in this embodiment, shown by example from the main station II, III, always one and the same signal can be fed to the extension station in all partial periods, only one signal lamp 31 is provided here. Since four different signals should be transmittable from the extension station to the main station in the four partial periods, the extension station I has a gate circuit 32, which corresponds with the gate circuit 8 of the main station, but contains in addition a switching device (not shown in FIG. 1) for the selection of the partial period and thereby of the desired signal.

The impulse exciter 1 sends continuously phase impulses to the counter chain 2, as well as to the counter chain 22, whereby the corresponding stations (extension station and the coordinated unit of the main station) are coordinated to each other by means of the gates 14 and 23. The two flip-flops 5, 6, and 24, 25, respectively, connected with the counter chain 2 and 22, respectively, make possible in the shown embodiment the production of four partial periods, so that a total period of four such partial periods is combined, whereby to each of these partial periods one of the four signals can be coordinated.

Referring now again to FIG. 1, the function upon pushing the call key 28 of the extension station I is now explained. By means of the sending memory 27 in dependency upon the gate circuit 32 the feeding of the call signal takes place within the partial period coordinated thereto by impulses in the impulse gap of the impulse exciter 1 to the conduit 16, which impulse gap is selected by the counter chain 22 and the gate 23. This signal disposed in the impulse gap activates the calling circuit 15 within that time section, which is coordinated by the gate 14 to this main station unit. By the gate circuit 7 it is determined, within which of the four partial periods the activation has taken place, whereupon by means of the gate circuit 8, a memory device of the memory arrangement 9 which is coordinated to this partial period is activated, which memory arrangement 9 in turn brings about the lighting of the signal lamp (10-13) coordinated thereto. Upon pushing the release key 29 of the extension station I, the sending memory 27 is reset, whereby the signal in the impulse gap disappears on the conduit 16, the calling circuit 15 and the memory of the memory arrangement 9 is returned and the signal lamp is extinguished.

In reversed order upon pushing the call key 19 of the main station unit II the sending memory 18 is activated, which opens the gate 17, whereby the impulse selected by the gate 14 is brought to the conduit 4. Here also an activation of the calling circuit 26 takes place and a lighting up of the coordinated signal lamp 31. In the case the sending memory 27 has been set for this time period, it is returned by the signal, causing the lighting of the lamp 31.

If now a plurality of extension stations is connected with the conduits 4 and 16, to which extension stations is coordinated at the main station always a unit thereof, always only one extension station cooperates with the corresponding unit of the main station. Thus upon pushing the calling key 28 of an extension station, only one of the signal lights 10-13 of the coordinated unit II of the main station lights up, although all extension stations and the units of the main station coordinated to the latter are disposed at the same conduits 4 and 16.

It is apparent, that the main station for a plurality of extension stations contains a joint phase exciter, which comprises the impulse exciter 1 with the gate 3, counter chain 2, flip-flops 5 and 6, the gate circuit 7 and the synchronous impulse filter 21, as it is shown clearly in detail in FIG. 2.

The impulse exciter 1 has a rectangular generator (not shown), which delivers rectangular impulses with the sequence frequency of 1 kilocycle per second. The impulse sequence of kHz. extends over the gate 3, an amplifier 34 and the switch 35, on the one hand, to the conduit 4 (FIG. 1) and, on the other hand, over the switch to the switch 35, serving the switching of the remote synchronization and the gate 36 to the counter chain 2 (FIG. 1) consisting of the flip-flops 37, 38, 39, 40, 41, 42 and 43, to which are connected still the flip-flops 5 and 6 for the partial periods. The gate switch 7 comprises the gates 46, 47, 48 and 49, which are in connection with the outputs of the flip-flops 37-43 by means of the gates 50, 51, 52 and 53.

The synchronization impulse filter 21 serves the return of the counter chain and comprises the gates 55, 56 and 57, the condenser 58, the resistance 59, the condenser 60 and the transistor 61. The inverse phase frequency is fed to the synchronous impulse filter 21 by means of the gate 54.

At the end of the fourth partial period, the synchronous impulse, in form of a last impulse of the total period widened for the impulse width is brought from the output of the gate 49 by means of the gate 3 and the amplifier 34, to the conduit 4, so that a synchronous impulse of treble impulse width is created, as is still further explained in connection with FIG. 3.

The switch 35 makes it possible in the one (lower) position to feed the counter chain 2 directly from the impulse exciter 1 and to supply the conduit 4, as mentioned, with the synchronous phase, so that all counter chains connected with the conduit 4 are synchronized. If the synchronous phase of another position is attached to the conduit 4, the switch 35 is brought into the other (upper position), whereby the impulse exciter 1 is switched off and the synchronous phase from the conduit 4 is brought by means of the filter 62, to the gate 36 and thereby to the counter chain, which filter 62 serves the removal of disturbing impulses and of information present in the impulse gaps.

The outputs of the flip-flop 37 to 43, as well as of the gates 46 to 49 are supplied by means of the output transistors 63 to the terminals 65 to 82.

It is apparent, that by the seven flip-flops 37 to 43 belonging to one period, totally $2^7=128$ different counting steps result, whereby due to the synchronous impulses up to 127 independent extension stations can work together with one main station.

FIG. 3 discloses the impulse program of the phase exciter shown in FIG. 2.

The impulse program comprises 4×128 steps, which are divided into four partial periods starting at the points $t=T_0, T_1, T_2$ and T_3 to 128 phases each (0 to 127). The characterization of the partial periods takes place such, that after the synchronous impulse (127) the first part period *a* starts with the phase number 0 and terminates with the phase number 127, to which, at the output 79, an impulse is emitted, which indicates the end of the first part period. The second part period *b* is terminated by an impulse at the output 80, the third part period *c* by an impulse at the output 81 and the fourth part period *d* by an impulse at the output 82. The impulses at the outputs 79, 80, 81 and 82 are obtained at the outputs of the gates 46, 47, 48 and 49 (FIG. 2) by means of the impulse succession N achieved by the gates 50, 51, 52 and 53.

The impulse succession *e*, which originates from the overlaying of the phase frequency 64 and the inverse synchronous impulse 82, results by the addition $e=64 \vee 82$ in the gate 3.

The function of the synchronous impulse filter 21 is apparent from the frequency successions S, T, U, whereby the impulse successions S, T are disposed at the inputs of the gate 57, and the impulse succession U at the output of the gate 57.

FIG. 4 is a circuit of the main station unit, shown by example only.

The gates 14 of all main station units having eight inputs each are connected with the terminal 64-78 such, that each main position 1/127 is coordinated to a partial period. This time period 1/127 of a partial period is available to each par-

ticipant within each of the four part periods. An input of the gates 14 is always connected with the terminal 64, while the remaining seven inputs are connected with seven of the 14 terminals 65 to 78 such, that the counter-stand coordinated to the main station unit all these inputs have 0-potential.

As in FIG. 1 the output of the gate 14, is disposed jointly with the output of the transistor 83 of the calling circuit 15, the base of which is connected with the conduit 16 at the memory device formed by the gates 84 and 85, the output of which leads to the gate circuit 8, which is also connected with the outputs 79 and 82 of the phase exciter (FIG. 2), which deliver the impulse successions 79 to 82, in accordance with FIG. 3. The gate circuit 8 is followed by the memory arrangement 9, which has four memory circuits coordinated to the signal lamps 10 to 13.

The gate 17 is connected to the output of the gate 14 by means of a gate 86, the output of the gate 17 being disposed on the conduit 4. The second input of the gate 17 is disposed at the output of the memory circuit 18, to which the call key 19 and the release key 20 are connected.

FIG. 5 discloses finally the principal circuit of an extension station, which discloses in greater detail the extension station I shown in FIG. 1, for which reason the same parts are identified by the same numerals.

The counter chain 22 in accordance with FIG. 1 comprises in the main station flip-flops 87, 88, 89, 90, 91, 92 and 93, to which the flip-flops 24, 25 are still connected for the partial periods. The outputs of the flip-flops 87 to 93 are guided to the switches 96, 97, 98, 99, 100, 101 and 102, with which by corresponding switching of these switches a predetermined participation time period is selected. By this arrangement that main station unit is coordinated, which has the same participation time period. These switches 96 to 102 lead to the inputs of the gate 23, which leads by means of the gate 121, on the one hand, to the gate 119 and, on the other hand, to gate 106.

The gate switch 32 (FIG. 1) serving the partial period selections, comprises four gates 103, 104, 105 and 106, the outputs of which lead to manually operable switches 107, 108, 109 and 110, which are disposed by means of a further gate 111 and the sending impulse amplifier with the transistor 112 at the conduit 16.

To the conduit 4 not only is the counter chain 22 connected, but also the calling circuit 26, the input of which has a transistor 113, which is connected with a memory circuit comprising the gates 114 and 115. The output of this calling circuit 26 is connected, on the one hand, by means of a transistor 116 with the signal lamp 31, and on the other hand, with the input of the sending memory 27, which is formed of the gates 117, 118. The sending memory 27 is operable with the calling key 28 and the releasing key 29, respectively, and leads with its output by means of the gates 119, 120 to the inputs of the gates 103, 104 and 105.

FIG. 5 shows furthermore still a possibility to supply the extension station with current from the phase impulses emitted on the conduit 4, for which reason the rectifiers 122 and 123 are provided.

In the following, the participant time period τ_1 is divided into a time section τ_2 and a time section τ_3 , as it is shown in FIG. 3 for the phase 1 of the period *a* by example. τ_2 corresponds to the impulse gap for the transmission of the information between two impulses of the length τ_3 .

Upon pushing the call key 28 the sending memory 27 is set, whereby at the output of the latter an 0-signal is created. This 0-signal is connected in the gate 119 during the time τ_2 with the signal, which is secured with the switches 96-102 and is fed by means of the gates 23 and 121 to the second input of the gate 119 as an 0-impulse. Due to the AND-connection, an 0-signal is created at the output of the gate 120 during the time period τ_2 . This 0-signal is fed to the gates 103, 104 and 105, which have at their inputs likewise AND-connections. With the 0-signal arriving from the gate 120 and the 0-signals arriving from the outputs of the flip-flops 24 and 25 during the time period τ_2 , a 1-signal is created at the output of the gate

103 during the first part period *a* (FIG. 3), at the output of the gate 104 during the second part period *b* and at the output of the gate 105 during the third part period *c*. In the fourth *d* period during the time period τ_2 always a 1-signal is created at the output of the gate 106 independently from the sending memory device 27.

By means of the switches 107, 108, 109 and 110, the outputs of the gates 103, 104, 105 and 106 are set selectively to the inputs of the gates 111. Due to the OR-connection in this gate 111 just by closing of the switch 110 the transistor 112 becomes conducting during the time period τ_2 in the fourth part period *d*, whereby only this impulse with a time period τ_2 is applied during the total period $(a+b+c+d)$. By closing one of the switches 107, 108 and 109 a 1-impulse is formed during the first part period *a*, of the second part period *b*, on the third part period *c* for the time period τ_2 to the gate 111, as soon as the sending memory device 27 is set.

It can be recognized that in the shown embodiment, given by example, three different informations are transmitted from the extension station to the main station by operation of the calling key 28, depending which one of these three informations has been prepared by operation of one of the switches 107 to 109. Upon closing of the switch 110 a fourth information is transmitted independently from an operation of the calling key 128. The impulses emitted in the first, second or third part period (*a*, *b*, *c*) over the conduit 16 repeat each other within the successive total periods as long as the sending memory device 27 is returned by pushing the release key 29. As long as no impulses are transmitted over the conduit 16, at the output of the gate 14 (FIG. 4) 1-impulses are created in each part period during the time period τ_2 within the participant time period τ_1 . These set the memory device comprising the gates 84 and 85 such, that at the output of the gate 84 an 0-signal is created. This 0-signal is fed to the outputs of the gates 125, 126, 127 and 128 of the gate circuit 8. As can be ascertained from FIG. 3, an 0-signal is applied to the second input in these gates by means of the terminals 79, 80, 81 and 82 at the end of each partial period. Due to the AND-connection on these gates, 1-signals are created at their outputs, which are fed to the inputs of the gates 133, 134, 135 and 136 at the outputs of which as a consequence 0-signals occur, so that the signal lamps 10, 11, 12 and 13 remain without current. Since the gates 133, 134, 135 and 136 are connected with the gates 137, 138, 139 and 140 to memory devices, this state remains.

By means of the conduit 16 the sender impulses which are emitted from the extension station (FIG. 5) reach the transistor 83 of the calling circuit 15 of the main station unit and render conductive this transistor, if at the output of the gate 14 at the same time τ_2 an 1-impulse is provided. This 1-impulse is created at this time τ_2 such, that the inputs of the gate 14 are connected in the same manner to the outputs of the counter chain 2, as the inputs of the gate 25 in FIG. 5. By this arrangement the condenser 124 is charged. Upon termination of the time period τ_2 the 1-signal disappears at the output of the gate 14, the condenser 124 is discharged through the input of the gate 85 and sets the memory circuit comprising the gates 84 and 85 in such a manner that at the output of the gate 85 an 0-signal is created. This 0-signal is set to the inputs of the gates 129, 130, 131 and 132.

If for instance in FIG. 5 the switch 110 is selected, the calling circuit 15 (FIG. 4) is set in each fourth part period within the participant time period τ_1 such, that at the outset of the gate 85 an 0-signal occurs. At the end of the fourth part period an 0-signal occurs at the terminal 82 (see also FIG. 3). Due to the AND-connection in the gate 132 a 1-signal occurs at the output thereof and sets the memory circuit comprising the gates 136 and 140 such, that at the output of the gate 136 a 1-signal occurs, whereby the signal lamp 13 lights up.

If the switch 110 is opened, the sender impulse is missing on the terminal for the conduit 16, whereby the transistor 83 cannot become conducting any more. By the output impulses of the gate 14, the calling circuit 15 is turned back, so that at the

output of the gate 84, an 0-signal occurs. This 0-signal is set among others to the input of the gate 128, on which at the end of the fourth part period an AND-connection with the 0-signal at the terminal 82 is performed. The 1-signal occurring at the output of this gate 124 sets back the memory circuit pertaining to the lamp 13 and the lamp 13 is shut off.

By preselection of the switches 107, 108, 109 (FIG. 5), and pushing of the sending key 28 in the first, second or third part period an illumination and extinguishing, respectively, of the lamps 10, 11 and 12 is brought about. By pushing the call key 19 (FIG. 4) of the main station unit the center memory device is set such, that at the output of the gate 141 an 0-signal occurs. With this 0-signal and the output signal of the gate 14 an AND-connection is performed in the gate 17, so that again within the previously assumed time period τ_2 a 1-signal is applied to the conduit 4, on which are already provided the phase impulses with the synchronous impulses fed by the phase exciter (FIG. 2). The 1-signal arriving from the gate 17 falls within all part periods and within the coordinated participant time period into the particular gap τ_2 of the phase impulses. The amplitude of the impulses emitted from the gate 17 is chosen in this embodiment to such an extent, that it corresponds approximately to the half-amplitude of the phase impulses, because for the correct circuit of the counter chain 22 of the extension station (FIG. 5), the nonfalsified phase signals must be obtained even when information is transmitted in the impulse gaps. For this purpose an impulse filter 143 is provided in the extension station, which, as the impulse filter 62 in FIG. 2, serves the removal of disturbing impulses and of information disposed in the impulse gaps.

In addition to all other impulses disposed on the conduit 4 in the selected example during the time period τ_2 within the participant time period τ_1 , also the signal impulse emitted from the gate 17 (FIG. 4) is applied to the base of the transistor 113. For the same time period τ_2 the output of the gate 23 (FIG. 5) delivers a 1-signal to the collector of the transistor 113. As already explained in connection with the calling circuit 15 (FIG. 4), the memory circuit formed by the gates 114 and 115 is set such, that at the output of the gate 114 a 1-signal occurs. This brings, on the one hand, the transistor 116 into the conducting state, so that the signal lamp 31 lights up, and on the other hand, the sending memory device 27 as much as it has been set by the calling key 28, is reversed again, whereby a call coming from this participant is cancelled. If the release key 20 (FIG. 4) is pushed, the impulse disappears in the time period τ_2 , whereby the calling circuit 26 is reversed and the lamp 31 is extinguished.

While I have disclosed several embodiments of the present invention, it is to be understood that these embodiments are given by example only and not in a limiting sense.

I claim:

1. An apparatus for the transmission of information between a plurality of stations by means of a common transmission path comprising
 - a plurality of receiver means for receiving signals and being operated only upon occurrence of a predetermined binary code,
 - an impulse exciter means for providing impulses having time gaps therebetween,
 - a counter chain including flip-flops operatively connected to said impulse exciter means,
 - said impulse exciter means for delivering said binary code by means of said counter chain including said flip-flops to said receiver means,
 - means for providing a time period section, divided into two partial time periods which are coordinated to each of said receiver means,
 - means for selecting a corresponding receiver means by said binary code during said time period section within one of said partial time periods and
 - means for transmitting information to said receiver means within the other of said partial time periods,
 - another counter chain, said counter chains running synchronously,

a plurality of extension stations,
a conduit common to all said stations,
said counter chains being operatively connectable with said
impulse exciter means by means of said conduit, for
setting said time period sections,
said counter chains having at least as many flip-flops as are
required for the number of provided channels cor-
responding with the binary code given by said flip-flops,
decoding circuit means responding to a same counter posi-
tion and being connected with said counter chains of said
stations to be coordinated relative to each other,
a gate connected to said conduit and said impulse exciter
means,
said time gaps between said impulses of said impulse exciter
means being applied to said gate serving the transmission
of information,
means upon expiration of at least one of said partial time
periods for the synchronization of said apparatus by a
synchronous impulse being transmitted by filling out of
the last of said impulse gaps, and
at least one joint main station being operatively connected
to a plurality of said extension stations connectable with
said conduit.

2. The apparatus, as set forth in claim 1, further comprising
means for transmitting of information with a half-amplitude
of said impulses.

3. The apparatus, as set forth in claim 1, further comprising
means for providing a plurality of successive partial periods
for the transmission of a plurality of different information
between two stations of equal coding.

4. The apparatus, as set forth in claim 3, which includes
additional flip-flops connected with said counter chains for

obtaining said partial periods.

5. The apparatus, as set forth in claim 4, which includes
a synchronous impulse filter means for emitting a return im-
pulse for said counter chains upon occurrence of a
synchronous impulse.

6. The apparatus, as set forth in claim 5, wherein said main
station includes a main station unit operatively coordinated to
each of said extension stations.

7. The apparatus, as set forth in claim 6, which includes
a phase exciter,
all of said main station units of said main station are con-
nected with said phase exciter,
said phase exciter including said impulse exciter means,
the latter is connected with said counter chain jointly for all
of said main station units,
and said main station units are connected according to the
coding with outputs of said flip-flops of said counter
chain.

8. The apparatus, as set forth in claim 7, wherein
the input of said counter chain is selectively connectable
with said impulse exciter means and said conduit, respec-
tively, whereby, upon connection of said counter chain
with said impulse exciter, the output of said impulse
exciter means as well as the conduit connected with said
counter chain and emitting the synchronous impulse is
connected with said conduit.

9. The apparatus, as set forth in claim 8, further comprising
a locking valve means for delivering with said phase impul-
ses simultaneously an output for the individual units con-
nected with said conduit.

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