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APPARATUS FOR THE REGISTRATION OF SIGNALS
IN AUTOMATIC TELEPHONE INSTALLATIONS
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FIG. 1.

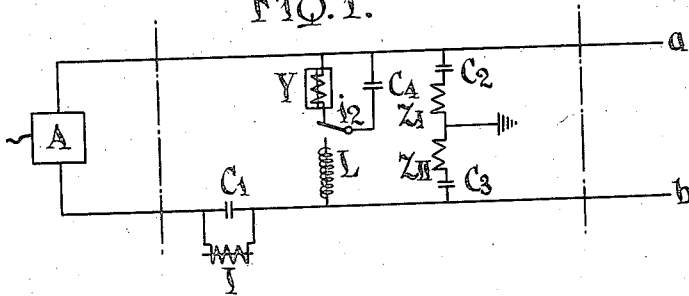


FIG. 2.

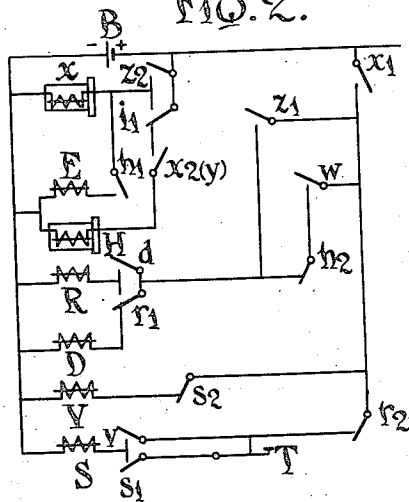
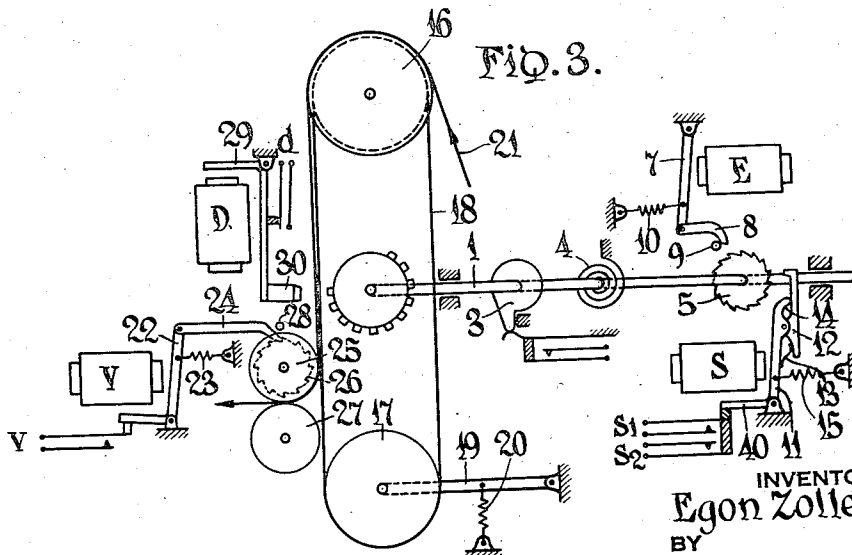


FIG. 3.



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APPARATUS FOR THE REGISTRATION OF SIGNALS IN AUTOMATIC TELEPHONE INSTALLATIONS

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18 Claims. (Cl. 179—7.1)

This invention relates to an apparatus for the registration of signals in automatic telephone installations which signals are given by means of the number dial or similar signal transmitting apparatus, and which are to be registered at the calling subscriber's station or at the exchange.

It is a primary object of this invention to register the numerals selected by the calling subscriber at his station or at the exchange and eventually to register the metering of the conversations at the registration apparatus.

A further object of this invention is an advantageously constructed registering apparatus, viz. the device for setting and locking the type wheel, the types of which are to be printed on a writing strip, furthermore the arrangement of apparatus for the metering of the conversations which may be effected by the exchange at the calling subscriber's station.

According to this invention, there is arranged within the subscriber's lines an impulse relay which preferably is bridged by a condenser and controls a slow release relay holding closed the feeding circuit of the registration apparatus as long as the receiver is taken off its hook and at least during the time in which impulses are given, which feeding circuit in its part is fed independently of the subscriber's exchange circuit.

A preferred embodiment of my invention allows to discriminate between those impulses which are given by the impulse transmitting device when selecting a number, and those impulses which reach the lines from the exchange, for instance, in installations in which the connections are built up by registers or senders. With this building up of the connection by means of registers, after the receiver will have been taken off its hook and with the starting of the selector, a short disconnection of the lines will arise and another disconnection will arise again, as soon as the selector will have found a free register or sender. The apparatus, according to this invention, will not allow to arrange the registration device so as to exclude from registration these impulses or other interruptions which arrive from the exchange.

According to this invention, a relay controlling the setting of the registering device in dependence of the impulses, is rendered dependent from a surveying relay which releases the setting magnet on impulses issuing from the impulse transmitting device of the calling subscriber's, but locks the feed magnet on impulses issuing from the exchange and flowing over the lines.

In a further development of the inventive idea, to the surveying relay there is allotted a con-

denser which will be charged on impulses issuing from the impulse transmitting device and which then, by means of its charge, will feed the surveying relay. A contact, dependent from the impulse relay, alternately connects the condenser to the subscriber's exchange circuit,—preferably over a choking coil for blocking the talking currents,—and in its zero, or normal, or rest position, to the surveying relay.

Thus, there is made use of the phenomenon that, at impulses issuing from the impulse transmitting device of the calling subscriber's station, the potential of the lines is a maximum, whereas at those interruptions, which arise on connection of selectors, or senders, or registers, the potential of the line is zero.

If now, according to this invention, there is allotted to the subscriber exchange circuit a condenser which is charged on impulses issuing from the impulse transmitting device, but remains uncharged on interruption issuing from the exchange, this condenser may be made use of in one case to release the registration apparatus for the registering, and in the other case to block it. For this purpose, the condenser will be controlled by a contact dependent from the impulse relay, and in such a manner, that in the working position of the contact, the condenser will lay in series to a choking coil across the subscriber's line wires, in the rest position of the contact, however, on a surveying relay, to which relay then the condenser will give up its load which it had received from the impulses to be registered.

It is a further object of this invention to allot to the setting magnet of the type wheel a slow release relay, which locks the actuation of the printing magnet during the setting of the type wheel, but will release it after setting is over.

The invention will thus allow by connecting up a simple device and without any considerable adeptment of the installation, normally existing in automatic telephone plants, to register any call issuing from a subscriber, any communication established and to be counted, and even to register the metering in those cases in which, such as with trunk communications, the established communication and then the duration of the call, for instance every three minutes, are to be counted and registered.

It is a further object of this invention to disconnect the apparatus automatically as soon as the call is over.

The invention will be understood best on referring to the drawing affixed to my specification and forming part thereof, which illustrates an

apparatus, according to my invention, by way of example.

Fig. 1 shows diagrammatically the system of connections of the line at the calling subscriber's side.

Fig. 2 shows diagrammatically the system of connections of the registration device.

Fig. 3 shows in part diagrammatically the registration apparatus, and in part a perspective view of same.

A represents the subscriber's station with the subscriber's line wires *a* and *b*. Into the line *b*, there is inserted the impulse relay I which controls the operating circuits, represented in Fig. 2 of the registration apparatus by means of the exchange supply direct current, flowing as soon as the receiver or ear piece is taken off its hook.

The impulse relay I is bridged by the condenser C₁ for giving free passage to the speech currents. A slow release or delay relay X is provided for cutting in the operation circuits of the registration apparatus which then will be fed from the battery B. This relay X will be switched on, as soon as, on taking the receiver off its hook at the calling station, current flows over the lines and the impulse relay will be energized and will throw over its contact *i*₁. As the relay X is constructed as a slow release relay, it will remain attracted, as long as the ear piece is taken off its hook, thus, during the period of impulse transmitting and registration, and thus, the contacts *x*₁ and *x*₂ will be held closed.

The registration apparatus, as shown in Fig. 3 comprises a shaft 1 which may be rotated against the action of the spring 4. The shaft also carries a type wheel 2, a ratchet wheel 5 and a contact disc 3. The type wheel is provided on its circumference with types 6, e. g. the numerals 1 to 9 and 0 and at 31 with a special sign for counting. The normal or rest position of the shaft is determined by the initially pressed spring 4 and the contact or limit stop 3, which at the same time operates the secondary off normal contact *w*.

For setting the type wheel, a setting magnet E is provided which, by means of its armature 7 and the pawl 8, actuates the setting wheel 5 constructed as a ratchet wheel.

On the magnet E having been de-energized, the pawl 8 will be withdrawn from the ratchet wheel 5 by means of the spring 10 and the stop 9. For holding the type wheel in position as ever set by the setting magnet, a locking magnet S is provided. On its armature 11 the locking pawl 12 is rotatably mounted which, by means of the spring 13 is raised from the armature and held against its stop 14. When the locking magnet is de-energized the spring 15 draws the armature 11, and by means of its stop 14, the pawl 12 out of its locking position. The armature 11 is constructed as a bell crank lever and controls by its limb 49 the contacts *s*₁, *s*₂.

The ink ribbon is denoted by 18. In the example shown, it is constructed as an endless band and lies around the rollers 16, 17. In order to put tension on the ink ribbon, the rollers 17 is mounted on the rock lever 19 which is acted on by the tension spring 20. The writing strip is passed over the roller 16. With advantage, the ink ribbon may be narrower than the strip of paper and is sunk or buried in the roller as shown in the drawing, so that except during the printing operation, the paper strip does not come into contact with the ink ribbon, but rotation of the roller 16, upon feeding forwards the paper strip,

advances the ink ribbon. The paper strip 21 is fed forwards by the feed wheel 26 which is provided with a ratchet wheel 25, and against which the strip 21 is held by the pressure wheel 27. The ratchet wheel is advanced by the pawl 24 which, by means of the armature 22 and the spring 23 is drawn into the teeth, while the feed magnet, by means of its armature and the stop 28 draws the pawl out of the teeth. To the armature 23 of the feed magnet is associated the contact *v*. The printing magnet D presses by means of its armature 29, which is shaped like a hammer 30, the paper strip 21 against ink ribbon and type, so that the type set in position will be printed. The contact *d* is associated to the armature 29 of the printing magnet.

The way in which this apparatus works is as follows:

On the receiver being taken off its hook at the subscriber's station A, the relay I will respond and throws over its contact *i*₁. This causes the circuit for the slow release relay X to close; (circuit: battery-positive, thrown over contact *i*₁, relay X, battery-negative). The relay X closes its contact *x*₁ and thus establishes the circuit for controlling the feeding magnet V; (circuit: battery-positive, contact *x*₁, normally closed contact *s*₂ of the locking magnet S, magnet V, battery-negative). The circuit for operating the locking magnet S is provided with a working contact *v* of the feed magnet V, so that both magnets V and S which mutually have contact within their operation circuits control each other.

The energized magnet V will thus close its contact *v*, so that now the locking magnet is energized through the working contact *v* and the normally closed contact *r*₂ of an intermediate relay R.

The locking magnet will draw its armature 11 so that the pawl 12 will engage the ratchet wheel 5 and prevent it from turning backwards. At the same time contact *s*₁ will be closed, contact *s*₂ will be opened, so that the locking magnet S will remain energized by its closed working contact *s*₁, while the circuit of the feed magnet V will be opened. The armature 22 of the feeding magnet falls off, the ratchet wheel advances one step.

On a number being selected by means of the number dial, with each interruption of the subscriber's loop, the relay I will fall off and will throw over its contact *i*₁ into the position shown in the drawing, at each opening period of the impulse contact of the subscriber's dial and corresponding to the number of impulses. As described above, the relay X will remain energized during the series of impulses and holds its contact *x*₁ closed. On the alternating play of the contact *i*₁ during each series of impulses, the impulse locking relay H will also be fed by current impulses, and due to its construction as a slow release relay, it will remain energized during the transmission of an impulse series and holds contact *h*₁ closed and contact *h*₂ opened.

After each impulse which is transmitted by the number dial and on the impulse relay I being energized, the setting magnet E will receive a current impulse; (circuit: battery-positive, contact *i*₁, contact *h*₁, setting magnet E, battery-negative). By means of these impulses, the type wheel 2 will be advanced stepwise according to the number of impulses.

When the giving of one impulse series is ended, contact *i*₁ remains in its working position, relay H will be de-energized and will open its contact

h_1 , so that the setting magnet will be de-energized.

When the type wheel advances its first step, the stop 3 releases the secondary off normal contact w which then will be closed. This will prepare the operating circuit for the printing magnet D, but this circuit will remain open, due to the open normally closed contact h_2 , until after the series of impulses is ended, the impulse locking relay will fall off and close its normally closed contact h_1 ; (circuit: battery-positive, contacts x_1 , w , h_2 , r_1 , printing magnet D, battery-negative).

On being energized, the printing magnet attracts its armature 29, the hammer 30 achieves the printing operation. At the same time contact d will be closed, the intermediate relay R in the operating circuit of which the contact d is provided, will be energized; (circuit: battery-positive, contacts x_1 , w , h_2 , d , relay R, battery-negative).

The intermediate relay R operates its working contact r_1 and is held in circuit together with this contact. At the same time by the switching over of contact r_1 the printing magnet D becomes de-energized.

When the intermediate relay R is energized, its normally closed contact r_2 will be opened and thus will break the operating circuit of the locking magnet S, so that its holding contact s_1 will fall off. The armature 11 of the locking magnet S will be released too, so that the shaft 1 will rotate backwards under the action of the spring 4 until the stop 3 reaches its original position of rest.

At the same time the contact w is opened, and this will cause the circuit for operation of the intermediate relay R to be broken. The locking magnet S having been de-energized its normally closed contact s_2 will be closed and therefore, the feeding magnet V will be energized. This will close the contact v and thus the locking magnet S will be energized again and opening its contact s_2 , it will de-energize the feed magnet V. The paper strip will advance one step, so that it will be prepared for the reception of a new number.

Now, in order to register the metering an alternating current relay Z is connected across the line wires a and b , as it is known per se for indicating the metering at the subscriber's station from the exchange. The alternating current relay Z is provided with two coils Z_I and Z_{II} which are connected to each other and grounded at their connection point. Condensers C_2 and C_3 are inserted between them and the talking lines a and b . As the two condensers C_2 and C_3 show the greatest inductive resistance against current flowing from line a to line b , or vice versa, talking currents are prevented from flowing across the relay Z. If however an alternating counting current impulse passes from the lines a and b and across the windings Z_I and Z_{II} to earth, they will act one against the other. Due to the capacities of both condensers C_2 and C_3 which differ from each other, a phase shifting will be produced within both windings of the relay Z, so that this relay will respond to the counting current.

When a counting is effected in the exchange, an alternating current impulse, say of the frequency of 50, will be sent by means of a transmitter, provided in the exchange, over the line wires a and b —flowing in both in the same direction—to the subscriber's station A. This alternating cur-

rent impulse will flow across both condensers C_2 and C_3 , both winding Z_I and Z_{II} of the alternating current relay and will then flow to earth and back to the exchange. The alternating current relay Z responds and closes its working contacts z_1 and z_2 . When the working contact z_1 is closed, the printing magnet D will be energized; (circuit: battery-positive, working contact x_1 , working contact z_1 , change-over contact r_1 , printing magnet D, battery-negative). The printing magnet responds and prints by means of its hammer 30 the counting sign on the paper strip, and the paper strip will then advance one step, as soon as the feeding magnet V has been transitively energized and then has been de-energized, as described above.

When, as soon as the called subscriber takes his receiver off its hook or, as soon as the connection between two subscribers is cut, a counting is accomplished and is registered on the registering strip, the apparatus will work as described. If the connection between both subscribers is a mains connection in groups, so that a repeated metering will take place, then, with each counting an alternating current impulse will be sent from the exchange to the subscriber's station, the metering relay Z responds and by operating its working contact z_1 , in the manner described above, will mark the counting so that corresponding to the number of calls counted at the exchange, an equal number of counting signs will be printed on the paper strip.

In plants in which counting is accomplished at the end of the conversation, a working contact z_2 of the metering relay Z is provided in the circuit of the slow release relay X allotted to the impulse relay I.

As soon as a counting current impulse arrives at the subscriber's station, and the relay Z responds, its working contact z_2 will be closed and thus the relay X will be energized. This relay then will maintain closed the working circuits of the registering apparatus by means of its contact x_1 . When the counting is terminated, the relay X falls off and the operating circuits of the apparatus will be without current.

In order to exclude disturbances from the counting operation and from its registration by any premature operation of the number dial, there may be provided any blocking device dependent from the counting circuit—not shown in the drawing—and by means of which the setting circuit will be blocked during counting operation and the type wheel will be released, eventually, which had been rotated on operation of the number dial.

For making immediately visible the registering of the numbers selected and of the metering signs, there is provided within the circuit of the blocking magnet S a key T which is connected in series to the working contact s_1 and together with this contact in parallel to the working contact v of the feeding magnet V. When contact x_1 is closed and the key T is opened by hand, locking magnet and feeding magnet will operate each other mutually and for any time, as long as ever the key will open the circuit, so that by this mutual control of feeding magnet and blocking magnet, the paper strip will be advanced and its printed part will be stepped out of the registering apparatus which, as a rule, will be placed within a closed casing and the strip may be read then.

When the connection between the subscribers is cut, relay I which is in series with the sub-

subscriber's loop, will fall off, relay X will be de-energized and will open its working contact x_1 and thus will cut out the registering apparatus.

The registering may be also connected to the exchange for automatically surveying a subscriber. In this case the metering relay will be connected to the counting wire.

A surveying device may be provided in plants in which besides those impulses which issue from the impulse transmitting device, disconnections of the lines arise which issue from the exchange and which, as described above, are due to the switching of lines from the starting circuit over to registers, senders, or the like. Such a surveying device, as represented by Fig. 1, comprises a surveying relay Y from which a relay operating the setting of the registering apparatus, preferably the impulse locking relay H is made dependent by inserting in its operating circuit a working contact y of the surveying relay Y in place of or besides contact x_2 . The condenser C_4 is allotted to the surveying relay Y. On the subscriber's taking off his receiver, a change-over contact i_2 of the impulse relay I will switch over the condenser C_4 in series to the choking coil L and across the line wires a and b , so that the condenser may charge, and this, on impulses issuing from the impulse transmitting device, when, on interruption of the subscriber's loop, the potential across the line wires is a maximum.

When, on giving impulses, the subscriber cuts his loop, contact i_2 steps into its rest position, as shown in the drawing, and connects to the impulse surveying relay the condenser C_4 which had been charged on the disconnections at the impulse transmission.

If now the condenser C_4 had been charged by an impulse to be registered, the relay Y will release registering by means of its contact y . If, however, the impulses had issued from starting senders, when the potential across the line wires is zero, the condenser will not charge, the surveying relay will remain de-energized, the contact y opened and the registering apparatus blocked.

I claim as my invention:

1. In an automatic telephone installation having conductor lines, a calling station, an exchange feeding circuit for interconnecting said calling station to the lines, a signal registering apparatus at the calling station, said registering apparatus comprising a supply circuit independent from said exchange feeding circuit, an impulse relay interconnected to said lines, a slow release relay allotted to said impulse relay and for being controlled by it, said slow release relay being adapted to maintain said supply circuit closed as long as the receiver is taken off its hook, at least during the time in which impulses are transmitted.

2. In an automatic telephone installation having conductor lines, a calling station, an exchange feeding circuit for interconnecting said calling station to the lines, a signal registering apparatus at the calling station, said registering apparatus comprising registering means for registering impulses issuing from said calling station, a supply circuit independent from said exchange feeding circuit, an impulse relay interconnected to said lines, a condenser bridging said impulse relay, a slow release relay allotted to said impulse relay and for being controlled by it, said slow release relay being adapted to maintain said supply circuit closed as long as the receiver is taken off its hook, at least during the time in which impulses are transmitted.

3. In an automatic telephone installation having an exchange, conductor lines, a calling station, an exchange feeding circuit for interconnecting said calling station to the lines, a signal registering apparatus at the calling station, said registering apparatus comprising a supply circuit independent from said exchange feeding circuit, a registering means for registering impulses issuing from the calling station, a surveying relay, a setting magnet for setting said registering means, switching means for controlling said registering means and dependent upon said surveying relay, said surveying relay being adapted to release said setting magnet on impulses issuing from the calling station, but to lock it on impulses issuing from said exchange.

4. In an automatic telephone installation as specified in claim 3, a condenser allotted to said surveying relay, said condenser adapted to charge on impulses issuing from the calling station, and switching means for feeding said surveying relay from said condenser on said impulses.

5. In an automatic telephone installation having an exchange, conductor lines, a calling station, an exchange feeding circuit for interconnecting said calling station to the lines, a signal registering apparatus at the calling station, said registering apparatus comprising a supply circuit independent from said exchange feeding circuit, a registering means for registering impulses issuing from the calling station, an impulse relay interconnected to said lines, a condenser bridging said impulse relay, a slow release relay allotted to said impulse relay and for being controlled by it, said slow release relay being adapted to maintain said supply circuit closed as long as the receiver is taken off its hook, at least during the time in which impulses are transmitted, said registering apparatus further comprising a setting magnet for setting said registering means, a surveying relay, a condenser allotted to said surveying relay, a change-over contact dependent from said impulse relay, a choking coil for blocking talking currents from passage across said condenser, said change-over contact for alternately connecting said condenser over said choking coil across the lines for charging said condenser on impulses issuing from the calling station, and, on the impulse relay being de-energized, for connecting said condenser up to said surveying relay to discharge said condenser and to feed said surveying relay on said impulses, switching means associated to said surveying relay, said switching means for releasing said setting magnet on impulses issuing from the calling station, but locking it on impulses issuing from said exchange.

6. In an automatic telephone installation having an exchange, conductor lines, a calling station, an exchange feeding circuit for interconnecting said calling station to the lines, a signal registering apparatus at the calling station, said registering apparatus comprising a supply circuit independent from said exchange feeding circuit, a registering means for registering impulses issuing from the calling station, an impulse relay interconnected to said lines, a condenser bridging said impulse relay, a slow release relay allotted to said impulse relay and for being controlled by it, said slow release relay being adapted to maintain said supply circuit closed as long as the receiver is taken off its hook, at least during the time in which impulses are transmitted, said registering apparatus further comprising a shaft, a type wheel mounted on said shaft, a

ratchet wheel on said shaft, a setting magnet for controlling said ratchet wheel and for setting said type wheel on impulses issuing from said calling station, a locking pawl for locking said ratchet wheel, a locking magnet for operating said pawl, a writing strip, a feed magnet for advancing said writing strip, a printing magnet, operating circuits for operating said feed magnet and said locking magnet, switching contacts in said circuits for adapting said blocking magnet and said feeding magnet to operate each other mutually.

7. In an automatic telephone installation as specified in claim 6, said switching contacts comprising a normally closed contact of the blocking magnet arranged in the operating circuit of the feed magnet and a working contact of the feed magnet arranged in the operating circuit of the blocking magnet.

8. In an automatic telephone installation having an exchange, conductor lines, a calling station, an exchange feeding circuit for interconnecting said calling station to the lines, a signal registering apparatus at the calling station, said registering apparatus comprising a supply circuit independent from said exchange feeding circuit, a registering means for registering impulses issuing from the calling station, an impulse relay interconnected to said lines, a condenser bridging said impulse relay, a slow release relay allotted to said impulse relay and for being controlled by it, said slow release relay being adapted to maintain said supply circuit closed as long as the receiver is taken off its hook, at least during the time in which impulses are transmitted, said registering apparatus further comprising a shaft, a type wheel mounted on said shaft, a ratchet wheel on said shaft, a setting magnet for controlling said ratchet wheel and for setting said type wheel on impulses issuing from said calling station, a locking pawl for locking said ratchet wheel, a locking magnet for operating said pawl, a writing strip, a feed magnet for advancing said writing strip, a printing magnet, operating circuits for operating said feed magnet and said locking magnet, an intermediate relay for operating said printing magnet, a normally closed contact of the blocking magnet arranged in the operating circuit of the feed magnet and a working contact of the feed magnet arranged in the operating circuit of the blocking magnet, a working contact of the blocking magnet being connected in parallel to said working contact of said feed magnet and arranged in said operation circuit of the blocking magnet, said operation circuit of the blocking magnet further comprising a normally closed contact of said intermediate relay, said working contact of said blocking magnet being adapted to maintain said blocking magnet energized until said normally closed contact of said intermediate relay will cut out said blocking magnet.

9. In an automatic telephone installation as specified in claim 8, switching means adapted to cause one step of the feeding magnet on the beginning of the registering process, said normally closed contact of said intermediate relay being closed, said feed magnet for then cutting in said blocking magnet, which then will maintain itself in circuit by means of its closed working contact during the series of impulses is transmitted, but for cutting out the feed magnet and for advancing it one step on impulse giving and registering being terminated.

10. In an automatic telephone installation as

specified in claim 8, a key being provided in series to said working contact of said locking magnet and in parallel to said working contact of said feed magnet, said key being adapted, when opened, to effect a mutual operation of said locking magnet and of said feed magnet during any time and thus to effect a stepping forth of the registering strip at ease.

11. In an automatic telephone installation having an exchange, conductor lines, a calling station, an exchange feeding circuit for interconnecting said calling station to said conductor lines, call counting means at the exchange and alternating current means for transmitting counting currents from the exchange to the calling station, a signal registering apparatus at the calling station, said apparatus comprising a registering strip, a type wheel shaft, a type wheel mounted on said type wheel shaft, printing means for printing said strip, a supply circuit independent from said exchange feeding circuit, an impulse relay interconnected to said lines, a slow release relay allotted to said impulse relay and for being controlled by it, said slow release relay being adapted to maintain said supply circuit closed as long as the receiver is taken off its hook, at least during the time in which impulses are transmitted, said apparatus further comprising a printing magnet for operating said printing means, an operation circuit for said printing magnet, an alternating current relay adapted to be controlled by said alternating current means, a contact of said alternating current relay being provided in said printing magnet operation circuit, said alternating current relay adapted, on said counting means of said exchange responding to control said printing magnet and to register the accomplished counting on the registering strip.

12. In an automatic telephone installation as specified in claim 11, the modification that in case the registering apparatus be connected to the exchange, means are provided for operating the metering relay immediately from the counting wire.

13. In an automatic telephone installation as specified in claim 11, said apparatus further comprising an intermediate relay for operating said printing magnet, an operating circuit of said intermediate relay, a contact of said metering relay provided in said intermediate relay operation circuit, a change-over contact of said intermediate relay, both said contacts for operating said printing magnet on said exchange metering responding.

14. In an automatic telephone installation as specified in claim 11, said apparatus further comprising an intermediate relay for operating said printing magnet, an operating circuit of said intermediate relay, a contact of said metering relay provided in said intermediate relay operation circuit, a change-over contact of said intermediate relay, both said contacts for operating said printing magnet on said exchange metering responding, a slow release holding relay allotted to said impulse relay, a normally closed contact of said impulse holding relay, a type wheel contact, both said contacts being connected in series to each other and in parallel to said contact of said metering relay.

15. In an automatic telephone installation as specified in claim 11, said apparatus further comprising an intermediate relay for operating said printing magnet, an operating circuit of said intermediate relay, a contact of said metering re-

lay provided in said intermediate relay operation circuit, a change-over contact of said intermediate relay, both said contacts for operating said printing magnet on said exchange metering responding, said metering relay comprising a working contact in the circuit of said slow release relay allotted to said impulse relay, said contact being adapted on the metering of the exchange responding and on talk being terminated, to cut in said impulse slow release relay which in its part maintains closed the registering apparatus supply circuit.

16. In an automatic telephone installation having an exchange, conductor lines, a calling station, an exchange feeding circuit for interconnecting said calling station to said conductor lines, call counting means at the exchange and alternating current means for transmitting counting currents from the exchange to the calling station, a signal registering apparatus at the calling station, said apparatus comprising a registering strip, a type wheel shaft, a type wheel mounted on said type wheel shaft, printing means for printing said strip, a supply circuit independent from said exchange feeding circuit, an impulse relay interconnected to said lines, a slow release relay allotted to said impulse relay and for being controlled by it, said slow release relay being adapted to maintain said supply circuit closed as long as the receiver is taken off its hook, at least during the time in which im-

pulses are transmitted, said apparatus further comprising a printing magnet for operating said printing means, an operation circuit for said printing magnet, said apparatus further comprising a setting magnet for setting said type wheel, a slow release impulse holding relay controlling said magnet, said impulse holding relay for blocking actuation of said printing magnet during setting of the type wheel, but for releasing said printing magnet as soon as setting is terminated.

17. In an automatic telephone installation as specified in claim 16, an impulse relay having a normally closed contact in the operation circuit of said printing magnet, said impulse relay and said impulse relay contact adapted to block operation of said printing magnet during setting of said type wheel.

18. In an automatic telephone installation having conductor lines, a calling station, an exchange feeding circuit for interconnecting said calling station to said lines, a signal registering apparatus for registering the calls issuing from said calling station, said registering apparatus comprising a paper strip, an ink ribbon, a guide roller for said paper strip and said ink ribbon, driving means for said paper strip, said ink ribbon being in the form of an endless band, said driving means adapted to drive said endless ink ribbon band by means of said paper strip.

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