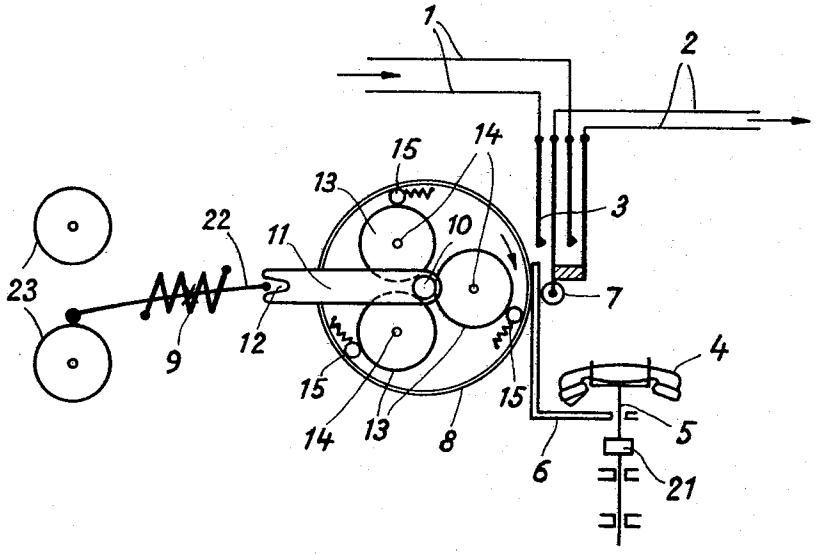
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DEVICE FOR FORWARDING CALLING SIGNALS
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DEVICE FOR FORWARDING CALLING SIGNALS IN TELEPHONE INSTRUMENTS

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In telephone installations, particularly office telephone installations it is often desirable to forward the calling signals from one substation set to another if the call is not answered at the first instrument. To this end, several devices have been designed, chiefly consisting of a stepping mechanism, which progresses one step for each calling signal, and a releasing relay, which releases the stepping mechanism when the call is answered. The stepping mechanism is provided with a contact device closing after a certain number of steps, for example three. By means of said contact device the calling signal is forwarded to another instrument, where the call may instead be answered. Such a device, which is rather complicated and expensive, is so bulky, that it must be placed in a special wall box for telephone instruments.

A considerably simpler and cheaper device is obtained when using the invention, which is to be described below and is chiefly characterized by the bell-armature of the instrument being used as driving mechanism for a stepping or switching device, which can be made so small, that it can be placed within the instrument. Thereby the advantage is also achieved, that a releasing device is not necessary. Instead, the switch-hook itself mechanically restores the contact device to the initial position each time it is actuated to answer a call. An especially suitable embodiment of the invention is obtained if the switching device is designed as a friction connection.

The invention will be more closely described with reference to the single figure of the accompanying drawing, in which only the details characteristic of the invention are shown.

The incoming line **1** can be connected with the outgoing line **2** by means of a contact spring device **3**. Each time the receiver **4** is lifted, a slide **6** in the switch hook **5** is moved to the position shown on the drawing. The slide is then pressed between a roll **7** on the spring set **3** and a cylinder **8** which is part of a switching means actuated by the armature **22** of the bell **23** of the instrument. The coil **9** of the bell is normally connected to the incoming line **1**. On the drawing, the switching means is shown as comprising a shaft **10**, on which a lever **11** is fixed. The armature **22** of the bell engages a fork **12** in said lever. The shaft **10** is pressed between three rolls **13** rotatable about pins **14** on cylinder **8**. The rolls are connected to the cylinder **8** by means of the balls **15**, which are kept in frictional engagement with the two rolls and the cylinder by means of a light spring pressure. When the coil **9** of the bell is energized, the lever **11** is rocked. The friction coupling formed by balls **15** causes the cylinder **8** to turn in the direction of the arrow, when the lever moves upwards. When the lever moves downwards, on the other hand, the cylinder is released and remains stationary during that movement of the lever. Thus, a stepwise rotation of the cylinder in the direction of the arrow is obtained as long as the bell works. By this rotation the slide **6** is moved downwardly step by step and after a sufficiently large rotation of cylinder **8** the slide has been moved so far downwards, that the

roll **7** is released and moves to the left, whereby the contact set **3** connects the lines **1** and **2**. The incoming calling signal is then forwarded to the outgoing line **2** leading to the next telephone substation set. If receiver **4** is lifted, the slide is restored to its initial position by a lifter **21** on the switch-hook **5** and the connection between the lines **1** and **2** is broken again, whereby the calling signal is forwarded in a known manner to the line **9** only.

The design according to the invention has several advantages in comparison with known designs. As appears from the description no additional relays are required. No additional elements load the line circuits, and the whole device can be made extremely small and cheap. It is naturally not necessary to use the friction connection described above with relation to the invention, but this embodiment permits a very favourable construction of the device mostly due to the described connection effecting a reduction of the movement of the armature of the bell so that the cylinder **8** will turn through very small steps for each call of the bell.

I claim:

1. In a telephone installation including several telephone substation sets having signal means operated by a vibrating armature, a device for forwarding calling signals from one set to another, the said device comprising a switching means movable by the armature movements of the signal means of a set of the installation receiving calling signals, an incoming calling line for the said set, an outgoing calling line leading from the said set to another set, and contact means controlling the interconnection of said lines, the said contact means being controlled by the movement of said switching means so as to connect said lines in response to the said set receiving a predetermined number of calling signals each operating the signal means thereof.

2. In a telephone installation including several telephone substation sets having signal means operated by a vibrating armature, a device for forwarding calling signals from one set to another, the said device comprising a switching means movable by the armature movements of the signal means of a set of the installation receiving calling signals, an incoming calling line for the said set, an outgoing calling line leading from the said set to another set, contact means controlling the interconnection of said lines, the said contact means being controlled by the movement of said switching means so as to connect said lines in response to the said set receiving a predetermined number of calling signals each operating the signal means thereof, and return means for returning the switching means into a position causing disconnection of said lines by the contact means, the said return means being operable by a component of the said substation set movable by lifting the receiver of the respective set from its cradle.

3. In a telephone installation including several telephone substation sets having signal means operated by a vibrating armature, a device for forwarding calling signals from one set to another, the said device comprising an incoming line leading to a first substation set of the installation, an outgoing line leading from the first set to a second substation set, contact means on the first set controlling the interconnection of said lines, and switching means controlling said contact means, the said switching means including a first movable member movable by the armature movements of the signal means on the first set due to the reception of calling signals by said set, and a second movable member coacting with the first movable member for movement thereby, movement of the second member from an initial position into a position corresponding to a predetermined number of calling signals received by said first set effecting closing of said contact means for interconnecting said lines.

4. A device according to claim 3 and further comprising return means for moving said second movable member into a position causing opening of said contact means, the said return means including a lifting member engageable with said second movable member for the purpose aforesaid and operable by lifting the receiver of said first substation set from its cradle.

5. A device according to claim 3, wherein the said contact means comprise a contact member biased into a position closing said contact means, and wherein the said second movable member in its initial position retains said contact member in a position opening said contact means and upon movement into its position corresponding to the predetermined number of received calling signals, releases the contact member for closing said contact means.

6. The device according to claim 5, wherein the said first movable member is a rotary member rotatable by movements of said armature and wherein the said second movable member is an axially displaceable member engaged by the first movable member for effecting displacement of the second member by the rotation of the first member, the said contact member being retained by the second movable member in the initial position of the latter and released upon displacement of the second movable member into the position corresponding to the predetermined number of received calling signals.

7. The device according to claim 3 and further comprising one-way coupling means coupling the first movable member with said armature of the signal means for transmitting movements of the armature to the first movable member in one direction of the armature movement only thereby effecting a step-by-step movement of the first movable member.

8. The device according to claim 7, wherein the said first movable member comprises a rotary hollow cylinder, the said second movable member being in movement transmitting engagement with the outer periphery of said cylinder, and wherein the said one-way coupling means comprises a rotary shaft, an arm fixedly seated upon said shaft and coupled with said armature for rotating the shaft by the movements of the armature and roller means coupling the shaft with the inner peripheral wall of said cylinder, the said roller means including rollers disposed to transmit rotation in one direction and to idle in the opposite direction thereby causing said cylinder to rotate step-by-step in one direction.

9. The device according to claim 3, wherein the said first movable member and the said second movable member are in motion transmitting frictional engagement.

No references cited.