May 9, 1933. A. PFEIFFER 1,907,660

TELEPHONE SUBSTATION CIRCUIT

Filed Dec. 29, 1930

Fig. 1.

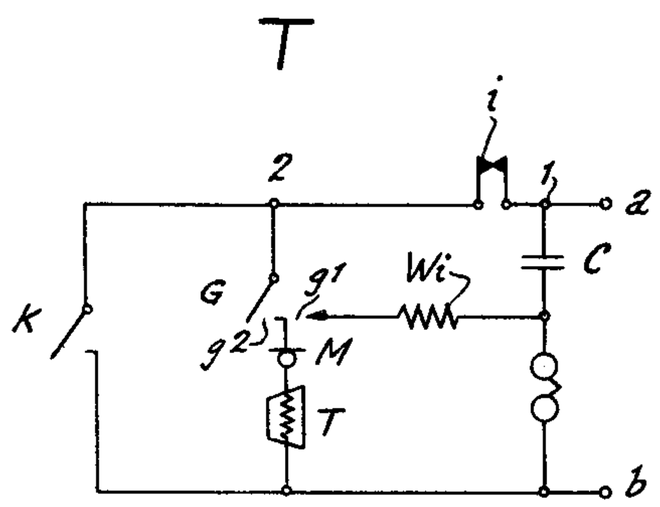
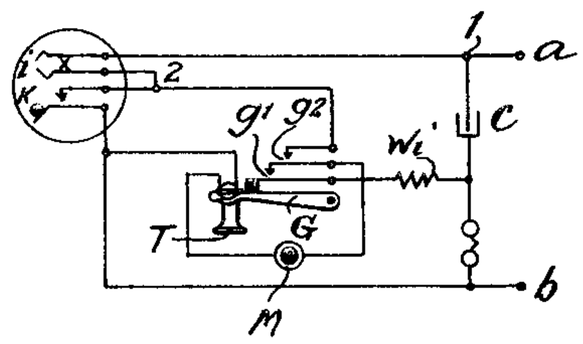


Fig. 2.



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UNITED STATES PATENT OFFICE

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TELEPHONE SUBSTATION CIRCUIT

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The present invention relates to a circuit arrangement for subscribers' stations in telephone systems with automatic operation and particularly to an arrangement for the prevention of sparks at the impulse and switch hook contacts.

The means known up to the present, which serve the purpose of quenching sparks at the contacts at a subscriber's station consist in this, that the spark-quenching circuit is connected in parallel to the impulse contact. On the other hand, such an arrangement for the protection of the switchhook contacts is not known. An attempt has merely been made to keep the surplus voltage, generated by the spark formation at this contact, from the endangered components of the subscriber's station, such as the receiver and microphone by short circuiting them.

The present invention, due to its simple construction and reliability, shows a considerable advance in this respect, that a spark preventing device, arranged at the station, bridges the contacts of the impulse transmitter and also of the hook. Thereby is also the condition fulfilled that the receiver and the microphone are not influenced by the incoming ringing current.

The accompanying drawing shows an embodiment of the invention in which Fig. 1 is a schematic diagram and Fig. 2 is a wiring diagram of a substation circuit. When the subscriber T wishes to establish a connection with another subscriber, he lifts up his hand set and by means of the switchhook G, closes contacts $g1$ and $g2$. Thereby the spark-quenching circuit, consisting of the condenser C in series with the resistance Wi, is connected up in parallel to the impulse contact over: terminal 1, condenser C, resistance Wi, contacts $g1$ and $g2$, and terminal 2. This circuit absorbs, in known manner, the energy generated at the opening and closing of the impulsing contact during the transmission of impulses to the automatic switches. At shunt springs k, the microphone and receiver of the calling subscriber T are in addition short circuited during the operation of the dial.

After the conversation, the subscriber T replaces his receiver and opens the contacts controlled by the switchhook. These contacts are set in such a manner that contact $g2$ opens before contact $g1$. The spark-quenching circuit, which quenches the spark in the impulsing circuit is also effective during the time contact $g2$ is open and $g1$ closed to quench the spark at the switchhook contacts over: terminal 2, impulse contact i, terminal 1, condenser C, resistance Wi, and contact $g1$. The magnetic energy generated in the electromagnetic receiver and the subscriber's line can, therefore, discharge itself, in known manner, over the spark-quenching circuit and thus prevent sparks. The opening of contact $g1$ has no effect, as the feed current is already broken by contact $g2$ and the contact surfaces of contact $g1$ are placed on the same potential.

What is claimed is:

1. A telephone system including a subscriber's line comprising two line conductors, a substation circuit including a receiver and a transmitter, a first and a second switchhook spring adapted to engage each other when the switchhook is being raised for bridging said receiver and transmitter across the conductors of said line, a spark quenching circuit including a condenser and resistance for absorbing sparks, and a third switchhook spring engaging said second switchhook spring prior to the engagement of the first spring with the second spring when the switchhook is being raised for bridging said spark quenching circuit across the conductors of said line, said third spring maintaining said spark quenching circuit bridged across the line conductors for an interval after said first and second switchhook springs disengage from each other when the switchhook is being lowered to prevent sparking at said first and second switchhook springs.

2. A telephone system including a subscriber's line comprising two line conductors, a substation circuit including a receiver and a transmitter, a first and a second switchhook spring for bridging said receiver and transmitter across the conductors of said line when the switchhook is being raised, an impulsing circuit including said two conductors but ex-

cluding said receiver and transmitter, a pair of impulse springs for interrupting and closing said impulsing circuit, a spark quenching circuit including a condenser and a resistance for absorbing sparks, and a third switchhook spring for connecting said spark quenching circuit across the conductors of said line when the switchhook is raised for quenching sparks at said impulse springs, and said third spring maintained engaged with said second spring for an interval after said first and second switchhook springs disengage when the switchhook is being lowered to prevent sparking at said first and second switchhook springs.

3. A telephone system including a subscriber's line comprising two line conductors, a substation circuit including a receiver and a transmitter, a first switchhook spring terminating one of said line conductors, a second switchhook spring terminating said receiver, transmitter, and the other line conductor, a spark quenching circuit including a condenser and a resistance for absorbing sparks having one end connected to said one line conductor, a third switchhook spring terminating the other end of said spark quenching circuit, a switchhook for closing said first, second, and third switchhook springs together in direct electrical connection with each other to bridge both said spark quenching circuit and said receiver and transmitter across the said line conductors when the switchhook is raised, and said third spring being adjusted to maintain said spark quenching circuit bridged across the line conductors for an interval after said first and second switchhook springs disengage from each other when the switchhook is being lowered to prevent sparking at said first and second switchhook springs.

In witness whereof, I hereunto subscribe my name this 3rd day of December, A. D. 1930.

ALFRED PFEIFFER.