(No Model.)

A. A. KNUDSON.

CONDUCTOR FOR TELEPHONES.

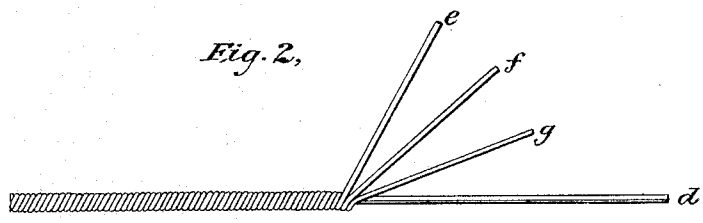
No. 351,704. Patented Oct. 26, 1886.

Fig. 1,



Wires of different degrees of hardness & tensile strength

Fig. 2,



Witnesses
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UNITED STATES PATENT OFFICE.

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CONDUCTOR FOR TELEPHONES.

SPECIFICATION forming part of Letters Patent No. 351,704, dated October 26, 1886.

Application filed October 12, 1885. Serial No. 179,711. (No model.)

To all whom it may concern:

Be it known that I, ADOLPHUS A. KNUDSON, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Conductors for Telephones, of which the following is a specification.

My invention has reference to the construction of compound conductors for telephones, and has for its special object the providing a conductor adapted to be used with "mechanical" or "acoustic" telephones, so called, in which the sound-waves are mechanically transmitted from one station to the other. One of the greatest difficulties met with in this class of telephone is the vibration caused by currents of air or other similar disturbing mechanical circumstances, which produce sounds in the instrument sufficient to overcome the vibrations caused by the voice, and which frequently prevent the use of the telephone upon lines of such lengths as are otherwise quite within the capacity of the instrument to transmit speech. I have found that this difficulty is entirely overcome by the use of a compound conductor consisting of two or more wires differing in size, and one of which shall be of harder metal than the others.

The explanation of the operation of the conductor appears to be that when made as described it cannot form itself into nodes, as is the case with a tightly-strung single wire, or where a number of wires which are just alike are used for a conductor. Wires of different sizes and degrees of hardness when subjected to the same amount of tension will have different rates of vibration, or, in other words, the nodes, and consequently the loops, will occur in different places. This being true, when a conductor is made up of such wires and subjected to tension, it will happen that the node or point of rest in one wire will come opposite the loop or vibrating portion of another wire. Each component wire of the cable or conductor will therefore tend to destroy the vibration of every other wire, and as a result the vibration of the whole conductor will tend to be destroyed.

In the accompanying drawings I have illustrated my invention by two forms of conductor, both of which I have found to answer admirably in practice.

Figure 1 shows a conductor composed of three wires, *a*, *b*, and *c*, *a* being the largest, and *b* and *c* successively smaller. These are loosely twisted together and protected by any of the ordinary coverings. Besides being the largest wire, *a* is also harder than either of the others. Thus I have found, if the conductors are made of copper, *a* should be what is known as "hard-drawn," and the others of the ordinary hardness.

In Fig. 2 a different form is shown, in which the conductors *d*, *e*, *f*, and *g* are combined by winding *e*, *f*, and *g* closely about *d*, which is straight. *e*, *f*, and *g* are successively smaller than *d*, and are made, preferably, of softer material. Other forms of combination may be used embodying the same principle.

While especially adapted for use with a mechanical or acoustic telephone, as described, the invention is useful in other ways—as an anti-vibrating or noiseless conductor. Wires that are attached to the sides of buildings, especially frame buildings, often sound in a very disagreeable and troublesome manner. When such are used for the conductors for electric telephones, the sound is more or less heard in the instrument and prevents distinct performance; and wires used for telegraphic purposes often seriously interfere, by the sound of their vibrations, with the reading of the signals from instruments placed near the support of the wires. My invention gives a noiseless conductor, and is very efficient and useful in such cases for the first stretch or two of the line from the building.

I claim as my invention—

1. A conductor for telephones, consisting of two or more wires of the same material differing in their sizes and degrees of hardness.

2. A conductor for telephones, consisting of two or more wires of the same material differing in their degrees of hardness.

3. A conductor for telephones, consisting of two or more wires of the same material differing in their degrees of hardness and covered with an insulating or water-proof material.

4. A telegraph or telephone cable composed of two or more wires of the same metal differing in their sizes and degrees of hardness.

In testimony whereof I have hereunto subscribed my name this 9th day of October, A. D. 1885.

ADOLPHUS A. KNUDSON.

Witnesses:

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