

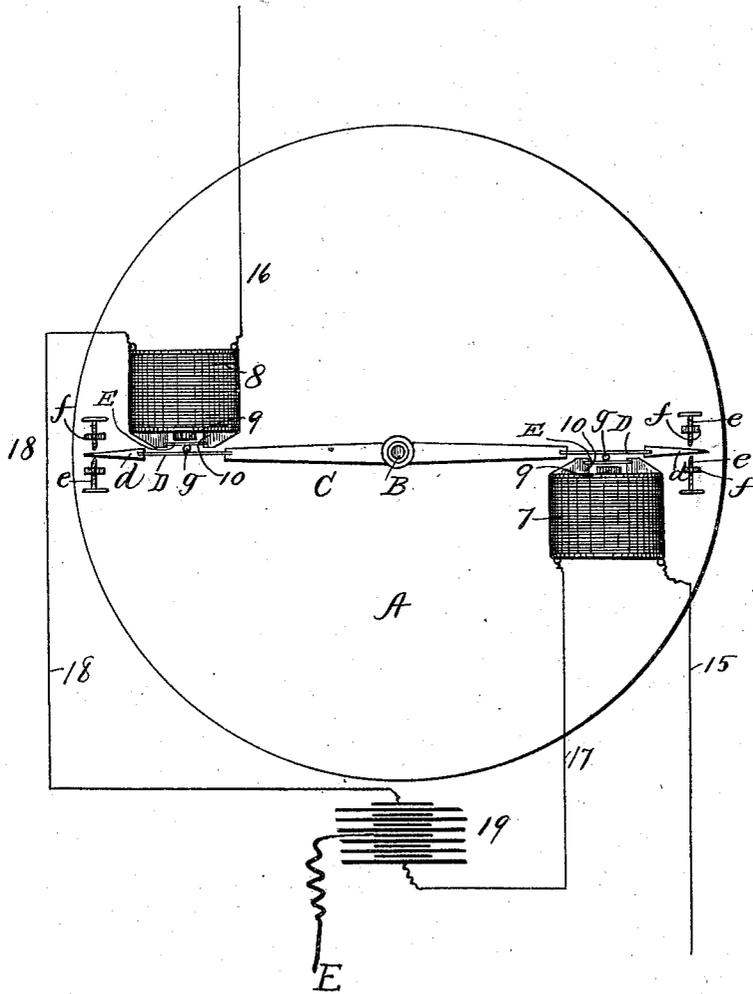
No. 643,225.

Patented Feb. 13, 1900.

J. HOULEHAN.
TELEPHONIC REPEATER.

(Application filed Sept. 14, 1899.)

(No Model.)



Witnesses.
Al. A. Edelen
H. B. [Signature]

Inventor
James Houlehan
by W. R. Edelen
his atty.

UNITED STATES PATENT OFFICE.

JAMES HOULEHAN, OF TOLEDO, OHIO.

TELEPHONIC REPEATER.

SPECIFICATION forming part of Letters Patent No. 643,225, dated February 13, 1900.

Application filed September 14, 1899. Serial No. 730,429. (No model.)

To all whom it may concern:

Be it known that I, JAMES HOULEHAN, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Telephonic Repeaters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has reference to improvements in telephonic repeaters which can be adapted for telephonic or sound instruments, but more especially for long-distance telephones and the like apparatus. I propose to provide means for overcoming the obstructions incident to long-distance telephony and to increase the sphere of usefulness of the telephone.

The invention consists of certain other novel features of construction, which will be hereinafter fully set forth in the specification, elucidated in the drawing, and clearly pointed out in the claims.

The object of the present invention is to produce a repeater that will be mechanically automatic in its operation, in contradistinction to the automatic electric repeaters in present use, and at the same time have all the parts constituting the same simple and of economical construction and not liable to become deranged from continued use.

The ordinary automatic electrically-operated repeating instruments in present use consist of an electric magnet, around which the line-current flows and whose delicately-poised mechanism when attracted operates a local circuit in which a local battery and connecting devices are included. The principle of the repeater is, then, that a current too weak to do the work itself may set a strong local current to do its work for it. Therefore the great objection to automatic electrical repeaters is the delicacy of a portion of their construction and also the great danger of becoming deranged, which makes this class of instruments objectionable and unreliable. An instrument that will transmit the pulsations or vibrations automatically and not be dependent upon an electrically-operated device,

such as a sensitive spring-armature, would evidently meet all the requirements desired in a device of this class. Such an instrument for transmitting the vibrations through a repeater is the subject of this application. 55

The repeater is constructed similar to the ordinary devices in present use, except the sensitive connections, for which I substitute a pivoted needle or armature, which operates non-electrically through the pulsations or vibrations of sensitive diaphragms located on opposite ends of the armature, immediately opposite diaphragms secured on two electromagnet-frames, and having small rubber contacts between the diaphragms for transmitting vibrations from a receiving-magnet to a repeating-magnet. The diaphragms on the coil-frames are adjacent to the poles of the coils, but do not contact said poles. The diaphragms are secured to the opposite ends of the armature and are preferably circular in contour. Diametrically opposite the point where the diaphragms are secured to the armature or needle are points or a continuation of the needle for the purpose of equalizing the pulsations of the diaphragms through the medium of adjustable set-screws adjacent to said points for regulating the movement of the armature. 60 65 70 75

To more fully elucidate my invention, I will proceed to describe the drawing, which consists of a table having two electromagnets thereon and in communication with a non-magnetic needle or armature which is pivoted centrally between the electromagnets. 80 85

In the drawing, A indicates a table and on which is pivotally mounted at B a needle or armature C, which has secured to its ends diaphragms D. Secured to said diaphragms are points *d*, which are in alinement with the needle or armature and may be considered as constituting portions of said armature. Located centrally opposite said diaphragms D are electromagnets 7 and 8 and which are provided with an extension 10 for supporting diaphragms E. Interposed between said diaphragms D and E are rubber contacts *g*, which are cemented to said diaphragms. The points *d* of the needle previously referred to are provided with contact-points *e*, which are screw- 90 100

threaded and are adjustable in lugs *f* for regulating the vibratory movements of said needle C or armatures.

The numeral 15 indicates the line-wire, and 5 16 is a transmitting line-wire, or vice versa. 17 and 18 are battery-wires which lead to the battery 19, respectively.

When necessary to use my improved re- 10 peater, it is switched into the line-wires by an operator at the central station in the ordinary manner. As the switching device is so well known I have not shown it in the drawing.

The diaphragms E, previously referred to, 15 are in close proximity to the magnetic poles 9, but do not contact said poles.

I do not limit myself in the purpose to which my invention can be applied, as it can be employed for submarine cables or under any 20 conditions requiring a telephonic repeater.

The operation of my improved repeating device comes under the following known principles: When sound-waves are projected 25 against the diaphragm before the pole of a receiving-electromagnet, the diaphragm is set in motion and caused to vibrate in front of the pole. By this action a series of variations in the strength of the electric currents are induced proportionate to and synchronous with 30 the variations in the movement of the diaphragm, and these vibratory variations are transmitted through a contact to the diaphragm on the armature, the latter reproducing and converting its sonorous vibrations to 35 the diaphragms at the opposite ends of such vi-

bratory armature into the transmitting-coil 8, thus energizing the line-wire through said coil through its mechanical action.

Having thus described my invention, that which I consider as new, and desire to secure 40 by Letters Patent of the United States, is—

1. In a telephonic repeater, consisting of a vibratory needle or armature, having diaphragms on opposite ends thereof, electromagnets opposite said diaphragms, said electro- 45 magnets also bearing diaphragms, mechanical connections between said diaphragms for the purpose as shown and described.

2. In a telephonic repeater consisting of a vibratory needle having diaphragms on oppo- 50 site ends thereof, rubber connections secured to said diaphragms, electromagnets opposite said diaphragms, diaphragms secured to the frames of said electromagnets, and said rubber connections also secured to said dia- 55 phragms for the purpose as specified.

3. In a telephonic repeater, of a vibratory armature or needle having diaphragms thereon, magnets bearing diaphragms opposite said vibratory armature-diaphragms, mechanical 60 connections between said diaphragms, points secured to the vibratory armature-diaphragm in alinement with said armature and provided with stop-screws for the purpose as specified.

In testimony whereof I affix my signature 65 in presence of two witnesses.

JAMES HOULEHAN.

Witnesses:

W. REES EDELEN,
WM. L. FORD.