(No Model.)

W. T. BARNARD.

TELEGRAPH RECEIVER.

No. 388,333. Patented Aug. 21, 1888.

Fig. 1.

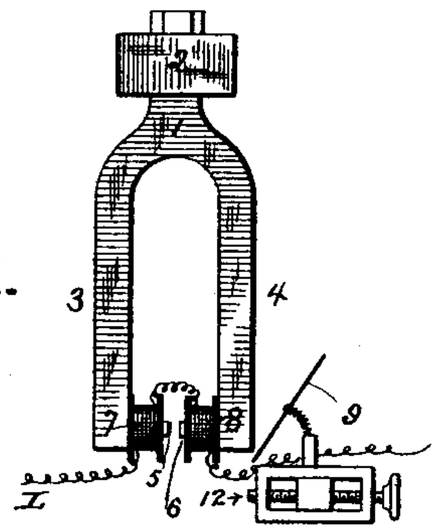


Fig. 2.

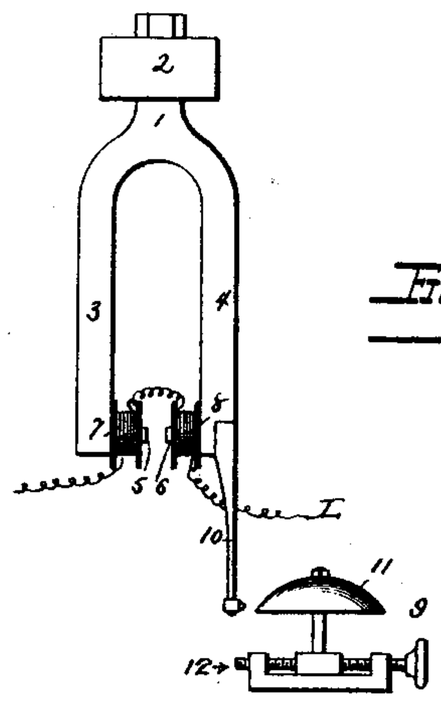


Fig. 3.

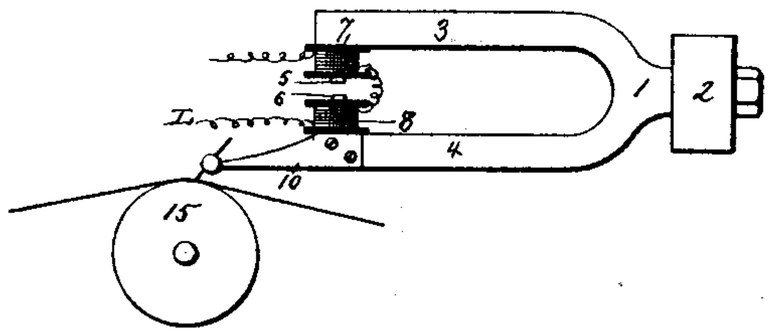
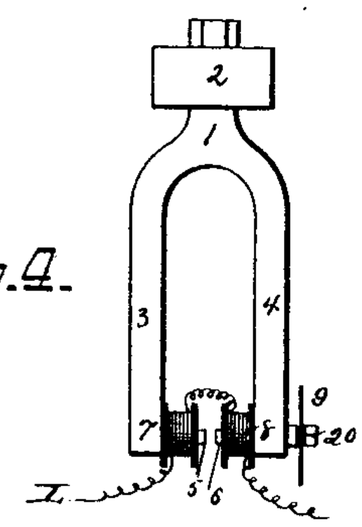


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM T. BARNARD, OF BALTIMORE, MARYLAND.

TELEGRAPH-RECEIVER.

SPECIFICATION forming part of Letters Patent No. 388,333, dated August 21, 1888.

Application filed April 30, 1887. Serial No. 236,693. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM T. BARNARD, a citizen of the United States, residing at Baltimore, Maryland, have invented certain new and useful Improvements in Telegraph-Receivers, of which the following is a specification.

My invention relates to tone or harmonic telegraphy, and more particularly to apparatus for receiving the tones or signals adapted for use in such systems; and it has for its object to so improve such systems and provide such instruments that a large number of separate messages may be transmitted and received upon a single wire without interference with each other, and more particularly without disturbances from induction or other cause; and my invention consists in the constructions and arrangements more particularly described hereinafter.

In the accompanying drawings I have illustrated diagrammatically various devices which I have used in carrying out my invention, and which serve as illustrations of my improved apparatus.

It is well understood that in this class of telegraphy the transmitters are suitably connected and arranged to throw or superpose upon the main line independent series of impulses varying in rate or number for each transmitter, and it is not necessary for me to show or describe any particular form of transmitters, as my invention relates to the receiving-instruments only.

In Figure 1 I have shown a tuning-fork of a construction that is well adapted for carrying out my present invention, and which consists in a fork having a handle or carrier, 1, preferably secured to a sound-insulating support, 2, the free arms or legs 3 4 of which are arranged in proximity to magnetic cores 5 6, surrounded by coils 7 8, connected to the line-circuit L, and adapted to cause the arms or legs to vibrate at a given rate of speed substantially corresponding to some transmitter also connected to the line. The arrangement of these devices is such that when the desired signal or message is being sent—as, for instance, a Mor e signal—and the key is closed for a dot or a dash the transmitter will throw upon the line a continued series of impulses, or will cause continued variations in the electric potential of the line at a certain given rate, and these will continue as long as the key is closed and stop as soon as the key is opened. The receiver-fork, being tuned to vibrate at substantially the rate of the variations on the line, will take them up, and the legs will vibrate or remain silent in accordance with the condition of the transmitter.

In order that these signals or periods of alternate vibration and rest may be distinctly understood by the receiving-operator, I arrange in proximity to the fork some mass or body 9, that will receive shocks or blows from the vibrating arm of the fork and render the signals distinctly audible, and I have shown in Fig. 1 a plate of some resonant material, as of metal, wood, glass, &c., placed so that the end of one of the legs of the fork will impinge directly and mechanically operate upon the body as the fork vibrates to and fro under the influence of the variations of currents in the line. This arrangement serves to illustrate my invention in its broad application, and in carrying it out in practice it is evident that it is susceptible of many and various modifications and applications without departing from the principle thereof. I have illustrated some few of the applications of this principle, as in Fig. 2, in which the leg 4 of the fork is provided with a light extension, 10, rigidly secured to the leg, and preferably having its end formed into a sort of hammer, which is arranged to impinge upon the edge of the body 9, shown in this instance as a gong, 11. Suitable means of adjusting the body are provided, as a screw, 12, mounted upon suitable support.

In Fig. 3, I show the body as consisting of a traveling wheel or cylinder, 15, and the end of the extension 10 is formed like a stylus, between which and the drum or wheel passes some suitable material, as a paper strip, which may be indented by the stylus and form a record of the message; or the stylus may be included in a local circuit and reproduce the message in characters on chemical paper in a manner well understood, and at the same time the signals may be heard and read by the shocks or blows of the stylus.

In Fig. 4 I have shown another form, in

which the body or mass 9 is loosely mounted upon a headed screw, 20, secured to the end of the vibrating leg of the fork, and as the fork vibrates to and fro the signals can be heard by the rattle of the body on the screw.

It will be observed that in all cases it is the vibrating fork itself that acts to mechanically produce the effect directly upon the mass or body by which the signal or message is rendered distinguishable, in contradistinction to acting directly upon a mass of air to increase the volume of air vibrating at a given ratio.

As before stated, induction has been found a serious obstacle in the use of tone or harmonic telegraphy, in that false signals are produced thereby, and I have found that the receiving mass or body may be so arranged in relation to the legs of the fork that the disturbances due to induction may be entirely obviated, and this is accomplished by simply adjusting the body in its relation to the fork so that the induced or other disturbance will not be able to move the fork sufficiently to cause the signal; or, in other words, the receiver may be "adjusted over" the disturbance without interfering with its utility to receive the signals sent. Thus the body may be adjusted so that it will be out of the range of the vibrations of the fork unless it is vibrating to its full extent under the influence of a rapid succession of impulses at the proper rate; or it may be, especially if elastic at all in its nature, adjusted so as to bear upon the fork or extension under pressure, so that contact will not be broken until the full vibrations are imparted to it.

If a large number of tuning-forks are used upon the same circuit, the intervals between their rates of vibration must necessarily be comparatively small, and it has been found that sometimes a fork will vibrate to a certain extent when the signals are sent by a transmitter, producing variations very near the rate of the transmitter to which the receiver is intended to respond. It is, however, well understood that a tuned fork will not be made to vibrate to its fullest extent unless the rate of impulses is substantially in accordance with the normal rate of the fork, and it is thus apparent that any given fork will not fully respond to other rates of vibration than its normal, though it may respond to some extent, and this has been found to be an obstacle in the use of such forks, especially when they are used to control local circuits. By my arrangement this difficulty is also avoided, as the mass or sounder may be adjusted in such relation to the leg of the fork, as above described, so that it will not respond to the false vibrations.

From the above it will be understood that my present invention is not limited to any specific construction or arrangement of the mass or body in connection with the tuning-fork, but that it comprehends combination with the fork of any adjustable device, body, or mass of solid material so arranged as to be acted upon mechanically by the vibrating portion of the fork to produce the signals, in contradistinction to utilizing such vibrations of the fork to control other instruments that in themselves or in connection with other devices increase the mass of air in vibration to produce the signals, so arranged as to be capable of being adjusted over the vibrations produced in the fork by induced currents or other disturbing causes. I would further remark that while it is well known that a vibrating reed is not the full equivalent of a vibrating tuning-fork, especially when used in a tone or harmonic telegraph, I deem my invention as broad enough to include the use of a vibrating reed acting directly and mechanically upon an adjustable mass or body to produce the desired signals in the manner above described.

Having now fully described the principles of my invention and illustrated some of the various means for carrying it into effect, what I claim is—

The combination, with a vibrating fork, of a resonant body upon which the fork acts mechanically to produce the signals, and adjusting devices whereby the resonant body may be adjusted so as to be struck by the vibrating fork when vibrating at its full normal speed, whereby the effects of induction may be avoided, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM T. BARNARD.

Witnesses:
DAVID D. KENNER,
MURRAY HANSON.