

UNITED STATES PATENT OFFICE.

VALDEMAR POULSEN, OF COPENHAGEN, DENMARK.

APPARATUS FOR ELECTROMAGNETICALLY RECEIVING, RECORDING, REPRODUCING, AND DISTRIBUTING ARTICULATE SPEECH, &c.

SPECIFICATION forming part of Letters Patent No. 788,728, dated May 2, 1905.

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To all whom it may concern:

Be it known that I, VALDEMAR POULSEN, a subject of the King of Denmark, residing at Copenhagen, in the Kingdom of Denmark, have invented certain new and useful Improvements in and Relating to Apparatus for Electromagnetically Receiving, Recording, Reproducing, and Distributing Articulate Speech and other Messages or Signals, of which the following is a specification.

This invention relates to apparatus for electromagnetically receiving, recording, reproducing, and distributing articulate speech and other messages or signals, and utilizes the principle disclosed in Patent No. 661,619, of November 13, 1900, issued to me. In the said patent a method is described of recording electrical impulses which are created by sounds or other means in an electrical circuit, which consists in tracing a magnetic record thereof in a steel body by means of an electromagnet, through which the said impulses flow. The steel body retains the magnetic record or impression, and when it is desired to reproduce the speech or signals the magnet is subjected to the said magnetic impressions, and electrical impulses of the same character are again created in the circuit containing the magnet. If the original impulses were created by the voice acting upon a telephone-transmitter, the reproduced impulses may be caused to affect a telephone-receiver, which will then give out the same message that was spoken into the transmitter. The present invention utilizes this principle, but consists of a means whereby the recorded message is substantially simultaneously reproduced and distributed to an indefinite number of receiving instruments immediately after it has been recorded, thereby rendering it possible for a number of persons or instruments to receive the same message at a number of different points or locations. The apparatus therefore becomes useful as a means for distributing information or news of any character to an indefinite number of subscribers simultaneously.

The invention also consists of a special form of receptive surface or body and means for

operating the same, whereby a simple and cheap form of instrument is produced.

The invention will be described in detail with reference to the accompanying drawing, in which the figure represents, somewhat conventionally, the complete apparatus.

Referring to the drawing by letter, A and B are two pulleys placed a convenient distance apart and around which passes an endless band or wire *a* of steel or other suitable paramagnetic material. One of the pulleys—A, for instance—is rotated by a motor C of any character by means of a belt *c* passing over a pulley *c'* on the axis of pulley A. The band *a* is thereby caused to travel.

e is an electromagnet, which I call the "recording-magnet." It is preferably placed beneath the band or wire *a*, with its pole-pieces either resting in contact with said wire or band or so close to it as to magnetically influence the band when the magnet is vitalized. This magnet is in a telephone-circuit containing a transmitter T, and the latter instrument may be directly in circuit with the magnet, or it may be in the primary circuit *t* of induction-coil *r*, the secondary circuit of which includes the said magnet.

f f' f'' f''', &c., indicate reproducing electromagnets of similar character to the magnet *e* and are placed in similar relation to the wire or band from the recording-magnet in the direction in which the band travels. Each of these magnets *f* is in a circuit *g g' g''*, &c., leading to various points, localities, or subscribers' stations, where are placed suitable receiving instruments, such as telephone-receivers R. The circuits *g* obviously may be of any length within the capacity of the telephonic service and may cover a wide range of territory. Beyond the magnets *f* I locate another electromagnet *z*, similarly placed with respect to the wire or band and being in circuit with a source of constant current *z'*.

The operation of this apparatus is as follows: It being understood that information or news is to be sent out to the various subscribers at a certain hour, those subscribers who wish to obtain such information or news will listen at their receivers R at that time,

A sending operator will at the same time speak the information or news into the transmitter T, and the motor C will be started. The telephonic currents or impulses thus impressed upon the circuit containing the recording-magnet *e* vitalize said magnet successively in varying degrees, corresponding to the sound-waves of the voice of the speaker, and this magnet therefore magnetizes successive portions of the band or wire *a* in a manner corresponding to its own changing magnetic condition. The band being of steel or similar magnetic material retains these magnetic conditions or impressions, and as it moves along it carries them successively past the poles of the several magnets *f*, *f'*, &c. As the pole or poles of each magnet comes under this influence a current or impulse of electricity is generated in the coil of the magnet, which traverses the circuit *g*, *g'*, or *g''*, &c., and acts upon the receiver R therein. As each magnetic impression in the band acts correspondingly on the magnets *f*, each receiver R will give out the speech or message that is delivered into the transmitter T, and all subscribers will receive the message at substantially the same time. The magnet *i* is maintained at a constant degree and polarity of magnetism, so as to uniformly magnetize the band after it has passed beyond all of the magnets *f*, *f'*, &c., to thus obliterate the magnetic record made by the magnet *e* after it has been fully utilized and allow the band to be continuously presented to said recording-magnet in a "clean" condition. By this arrangement it is possible to use the band continuously for any length of time, whereas if the obliterating-magnet were not used the capacity of the band would be limited to one turn around the pulleys. Obviously, a permanent magnet can be substituted for the magnet *i* and its battery.

Instead of the telephonic instruments described telegraphic instruments can be used, thus a key in the place of the transmitter T and a recorder or relay and sounder in place of the receivers R.

Whenever a subscriber finds it inconvenient to listen to the message at the time it is delivered, he can cut in a telegraphone G of the character described in said Poulsen patent by throwing the switch *j* and record the message thereon, after which he can listen to it as his pleasure.

Having described my invention, I claim—
 1. The combination of a receptive body for magnetically recording speech or other signals represented by electrical impulses, consisting of an endless band or wire of steel or other paramagnetic material and an electromagnet through which such impulses flow, a second electromagnet in which said impulses are reproduced and a third magnet of constant strength adapted to uniformly magnetize the band or wire.

2. In an apparatus for magnetically record-

ing and reproducing electrical impulses, the combination of a body in which the record is made, a recording-electromagnet and a reproducing-electromagnet arranged in succession along said body and means for utilizing them simultaneously.

3. In an apparatus for magnetically recording and reproducing electrical impulses, the combination of a body in which the record is made, a recording-electromagnet, a reproducing-electromagnet and an obliterating-magnet arranged in succession along said body and means for utilizing them simultaneously.

4. In an apparatus for recording and reproducing speech or signals the combination with a body on which the record is made, a recording apparatus and a plurality of reproducing apparatuses adapted to be operated simultaneously.

5. In an apparatus for recording and reproducing speech or signals, the combination with a paramagnetic body, a recording-magnet having its pole or poles presented to said body, an electric circuit including said magnet, transmitting apparatus included in said circuit, a plurality of reproducing-electromagnets whose poles are presented to said body, electric circuits respectively including said reproducing-magnets and receiving apparatus located in said circuits.

6. In an apparatus for recording and reproducing speech or signals electromagnetically, the combination with a paramagnetic body in the form of an endless strip, a recording-electromagnet having its pole or poles presented to said strip, an electric circuit including said magnet, a transmitting apparatus included in said circuit, a plurality of reproducing-magnets whose pole or poles are presented at successive points to said strip, electric circuits respectively including said reproducing-magnets and receiving apparatus located in said circuits.

7. In an apparatus for recording and reproducing speech or signals electromagnetically, the combination with a paramagnetic body in the form of a strip, a recording-magnet having its pole or poles presented to said strip, an electric circuit including said magnet and also a transmitting apparatus, a plurality of reproducing-electromagnets whose pole or poles are presented at successive points to said strip, electric circuits respectively including said reproducing-magnets, receiving apparatus also included in said circuits, another magnet possessing a constant degree of magnetism and means whereby said strip may be moved with respect to the poles of all of said magnets.

8. In an apparatus for recording and reproducing speech or signals electromagnetically, the combination of pulleys, means for rotating the same, a paramagnetic strip passing around said pulleys and adapted to be moved thereby, a recording-magnet having its pole or poles presented to said strip, an electric cir-

cuit including said magnet and a transmitting apparatus, a plurality of reproducing-electromagnets arranged at successive points along said strip beyond the recording-magnet and
5 whose poles are likewise presented to said strip, electric circuits respectively including said reproducing-magnets and receiving apparatus located in each of said circuits.

9. In an apparatus for recording and reproducing speech or signals electromagnetically,
10 the combination of pulleys, means for rotating the same, a paramagnetic strip passing around said pulleys and adapted to be moved thereby, a recording-magnet having its pole
15 or poles presented to said strip, an electric circuit including said magnet and a transmitting apparatus, a plurality of reproducing-electromagnets arranged at successive points along said strip beyond the recording-magnet, and
20 whose poles are likewise presented to said strip, electric circuits respectively including

said reproducing-magnets, receiving apparatus located in each of said circuits and an obliterating-magnet presented to said strip at a point beyond the reproducing-magnet. 25

10. In an apparatus for recording and reproducing electrical impulses representing speech or signals, the combination with a steel or other magnetizable body, of a magnet of constant strength adapted to impart a uniform
30 magnetization to said body, an electromagnet-coil through which the impulses to be recorded are directed, and a second electromagnet in whose coils said impulses are reproduced, the magnets and the said magnetizable body hav- 35
ing a movement with respect to each other.

In testimony whereof I have hereunto set my hand in the presence of two witnesses.

VALDEMAR POULSEN.

Witnesses:

E. S. HAYEMANN,
P. V. PEDERSEN.