

No. 873,084.

PATENTED DEC. 10, 1907.

V. POULSEN.
TELEGRAPHONE.

APPLICATION FILED SEPT. 29, 1902. RENEWED MAY 2, 1907.

2 SHEETS—SHEET 1.

Fig 1a.

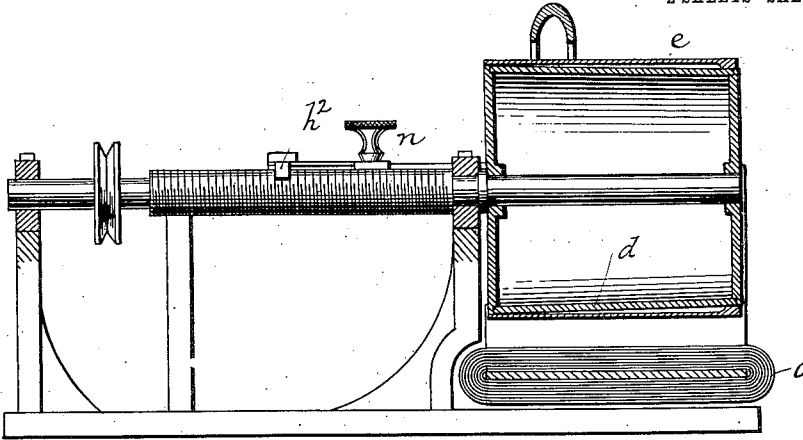


Fig 1.

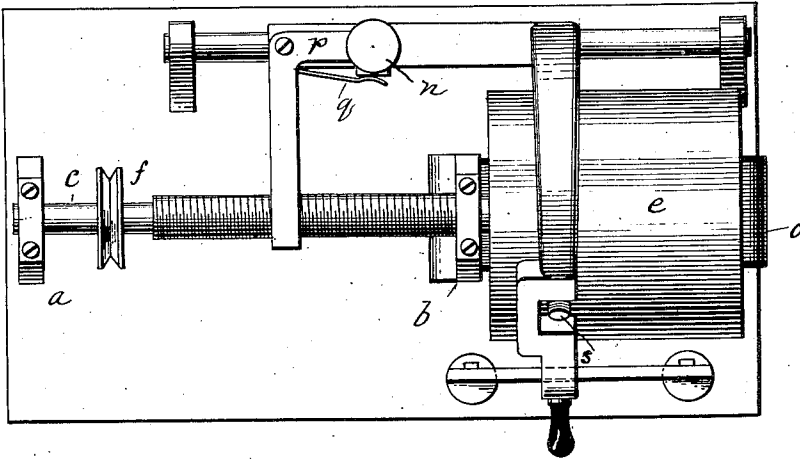
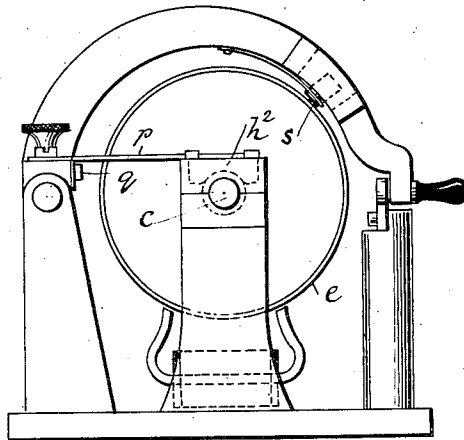


Fig 1b.



Witnesses
Paul S. Ober
Waldo M. Schaffner

Inventor
Valdemar Poulsen
By his Attorney
W. A. Roubann

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2 SHEETS—SHEET 2.

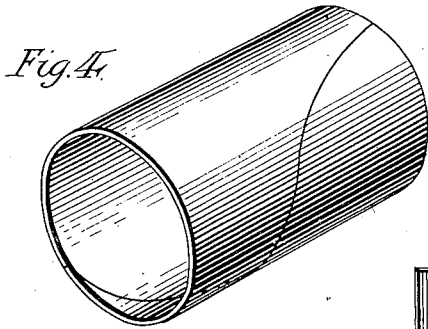


Fig. 4.

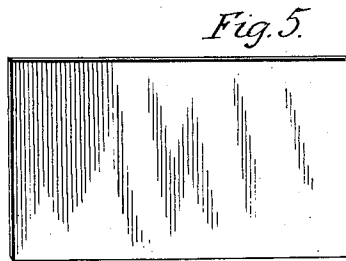


Fig. 5.

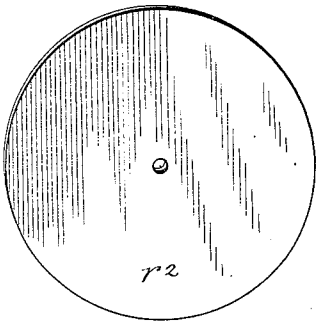


Fig. 6.

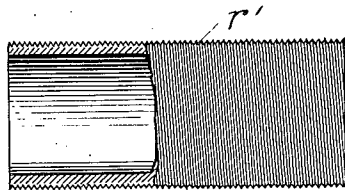


Fig. 7.

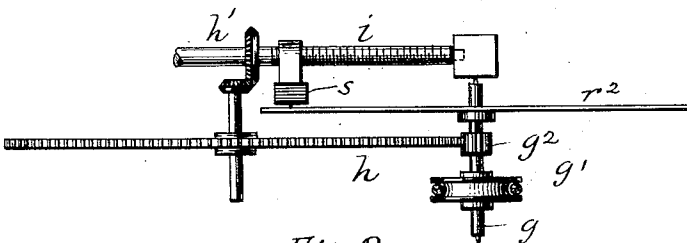


Fig. 2.

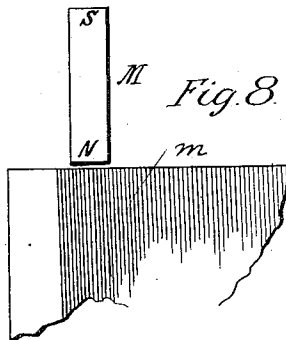


Fig. 8.

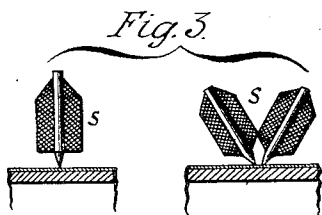


Fig. 3.

Witnesses
 Paul S. Ober
 Aldo M. Chapin

Inventor
 Valdemar Poulsen
 By his Attorney M. Rosenbaum

UNITED STATES PATENT OFFICE.

VALDEMAR POULSEN, OF COPENHAGEN, DENMARK, ASSIGNOR TO AMERICAN TELEGRAPHONE COMPANY, A CORPORATION OF THE DISTRICT OF COLUMBIA.

TELEGRAPHONE.

No. 873,084.

Specification of Letters Patent.

Patented Dec. 10, 1907.

Application filed September 29, 1902, Serial No. 125,148. Renewed May 2, 1907. Serial No. 371,455.

To all whom it may concern:

Be it known that I, VALDEMAR POULSEN, a subject of the King of Denmark, residing at Copenhagen, Denmark, have invented certain new and useful Improvements in Telegraphones, of which the following is a full, clear, and exact description.

This invention relates to telegraphones, the object being to provide a form of instrument which is capable of recording a comparatively long message or speech in or on a comparatively small, compact and easily handled recording body.

It is also an object of the invention to produce a recording device which will render it possible to run the machine at a slower speed than has been heretofore possible without diminishing the intensity of the record or the distinctness with which it is reproduced.

Another object of the invention is to provide a recording body of such form that it can be easily transferred, sent by mail or other carrier, easily adjusted to, and removed from, the telegraphone, and generally handled, without injury.

A still further object is to provide means for more rapidly effacing a record from the recording body than is possible by methods heretofore practiced.

All forms of the telegraphone heretofore produced have embodied a recording body in the form of a narrow elongated strip, such as a wire or ribbon of steel, or other para-magnetic material. The material in this form requires either spools upon which it is wound and unwound to pass before the recording magnet, or a rotating cylinder upon which the wire is permanently fixed. A machine in either of these forms is necessarily large for a given capacity. Experiments have now demonstrated the fact that it is possible to record the electrical undulations created in the telephone circuit in a body of magnetic material in the form of a sheet, and to make such record in closely adjacent, parallel lines. The surface of the sheet may be perfectly smooth, in which case the magnet would be guided thereover by suitable mechanical devices, or it may be provided with grooves or corrugations with which the poles of the magnet mechanically engage to properly guide the magnet over the surface. The sheet may obviously be used in various forms, each of which will require its own par-

ticular construction of instrument to properly direct the magnet over its surface. For instance, the sheet may be in the form of a cylinder or cone, either with or without a joint; it may be a flat sheet like a postal card, or it may be a disk. In the case of the cylinder or cone the magnetic record would be traced upon its surface in a screw-line, and in the case of a flat sheet the record would be traced in straight lines, while in the case of a disk the tracing would be in the form of a spiral, leading from the edge towards the center. The recording body must be made of steel, nickel or some other magnetizable material. As a material for said forms of recording body can be used the different kinds of steel, described in the magnetic literature as well as any material which possesses high remanence, permanence, permeability or other property suitable for telegraphonic purposes. (For instance molybden-steel etc.)

The accompanying drawing is illustrative of the invention and consists of the following figures:

Figure 1 is a view of a somewhat conventional form of telegraphone; Fig. 2 is a similar view of a different form of machine; Fig. 3 shows two sectional views of the improved magnets, single and double pole; Figs. 4, 5, 6 and 7 are views of different forms of the recording body, and Fig. 8 illustrates the improved effacing device.

In Fig. 1, *a* and *b* are standards supporting a shaft *c*, upon which is mounted a carrier *d* for the recording body *e* of the telegraphone. The carrier is a cone, and the recording body, which is a cylinder, is put on it, as shown in the drawing. The shaft with the carrier is adapted to be rotated from a suitable source of power through the medium of a pulley *f*. The recording and reproducing magnet is indicated at *s* and is adapted to be moved lengthwise of the cylinder, as a piece of a nut *h*, with which it is in a solid collection, is moved on by a screw-thread on the shaft *c*. The carrier *d* may also be adapted to wear the recording body shown in Fig. 4. This is a very thin sheet of steel, nickel, or other para-magnetic material, rolled into cylindrical form in such a way, that the joint is a screwline. The carrier must then be a cylinder and provided with something to keep fast the recording body. The cylinder, however, may be made without an open

joint, in which case it may also be of very thin material or of heavier material, as shown in Fig. 7. This last figure, however, more particularly illustrates a record carrier in cylindrical form having upon its surface, 5 grooves r' which are traversed by the poles of the recording magnet in order to properly guide and feed it.

Special mechanism for recording upon a flat sheet, such as shown in Fig. 5 is not 10 illustrated, as it is not considered necessary since it can be understood that the recording magnet can even be moved back and forth by hand across the face of such a sheet, but 15 an arrangement of guide rails and racks can easily be applied for this purpose.

Mechanism for using the form of recording body shown in Fig. 6 is illustrated in Fig. 2. This, however, is conventional. The disk is 20 indicated by r^2 and is mounted upon a vertical axis g , rotated from a source of power through the pulley g' . On the axis g is a pinion g^2 , engaging a large spur-gear h . Wheel h drives the screw-shaft i through the 25 reducing bevel-gear h' . Shaft i carries the magnet s and is arranged in a radial position. As the disk r^2 is rotated on its axis g , the magnet is very slowly moved towards the center and therefore traverses a spiral path.

When the recording body has a perfectly 30 smooth surface, it may be necessary to adjustably mount the magnet, so that it may be slightly moved to accurately locate its poles for reproducing a record which has 25 been previously made, because parallel magnetic lines of the record are very close together and a slight displacement of the poles of the magnet in reproducing would result in indistinct reproduction or "double speech". 40 By means of a fine screw the poles of the magnet can be adjusted laterally to bring them accurately into the magnetized line. This is in Fig. 1 done by means of a screw n . This screw has a cone, which will press the 45 arm p against the feather q . In this way the distance between the nut h and the recording and reproducing magnet may be varied.

Fig. 3 illustrates the improved form of recording and reproducing electro-magnet, the 50 essential feature of which is that the end of the pole which is presented to the recording surface is pointed, or terminates in a surface of very small area compared with the diameter of the magnet core. The result of this is 55 that the lines of force are converged and more of them occupy a given cross section of the recording body than is the case when the poles are blunter. The intensity of the record seems to be increased by this means and 60 the magnetic record lines can be placed closer together in the recording surface and the speed of the latter materially reduced without sacrificing the distinctness of the reproduction.

65 For obliterating or effacing the record

either a permanent magnet or an electro-magnet is used, but the present improvement consists in the use of a magnet having a pole piece sufficiently broad to cover a number of the magnetic record lines, so that the 70 obliteration can be quickly accomplished. The pole of the magnet may, in fact, be broad enough to cover the entire length of the cylinder or sheet, in which case a single rotation of the cylinder or a single movement of the 75 sheet past the pole would be sufficient to remove the entire record. In Fig. 1 is obliterated with a long horse-shoe magnet indicated by o . Often is also used one or more single magnets placed one after another in the 80 revolving direction. Fig. 8 shows the pole of permanent magnet M applied to the surface of a cylinder and spanning a plurality of the magnetic lines graphically represented at m .

Having described my invention, I claim: 85

1. A record receiving body for telegraph- 90 phones consisting of magnetic material in sheet form, in combination with means for tracing magnetic lines throughout its surface.

2. A record receiving body for telegraph- 95 phones consisting of a sheet of magnetic material having a smooth surface, in combination with means for tracing lines of magnetism throughout its surface.

3. A record receiving body for telegraph- 100 phones consisting of a sheet of magnetic material in the form of a cylinder, in combination with means for tracing lines of magnetism throughout its surface.

4. A record receiving body for telegraph- 105 phones consisting of a sheet of magnetic material in the form of a cylinder and having a smooth surface, in combination with means for tracing a screw-thread line of magnetism thereon.

5. A record receiving body for telegraph- 110 phones consisting of a sheet of magnetic material rolled into cylindrical form and having abutting end edges.

6. A phonogram consisting of a sheet of paramagnetic material containing a magnetic record of speech or sounds arranged 115 thereon in lines covering its surface.

7. A phonogram consisting of a cylindrical 120 surface of paramagnetic material having traced thereon by electro-magnetism, a magnetic record of speech or sounds extending throughout its surface.

8. A record receiving body for telegraph- 125 phones, having a smooth magnetic homogeneous surface and means for tracing contiguous magnetic lines upon said surface.

In witness whereof, I subscribe my signature, in presence of two witnesses.

VALDEMAR POULSEN.

Witnesses:

CARL SCHAU,
J. HERM. CHRISTENSEN.