(No Model.)

G. H. HERRINGTON.

PHONOGRAPH.

No. 464,476. Patented Dec. 1, 1891.

Fig 1.

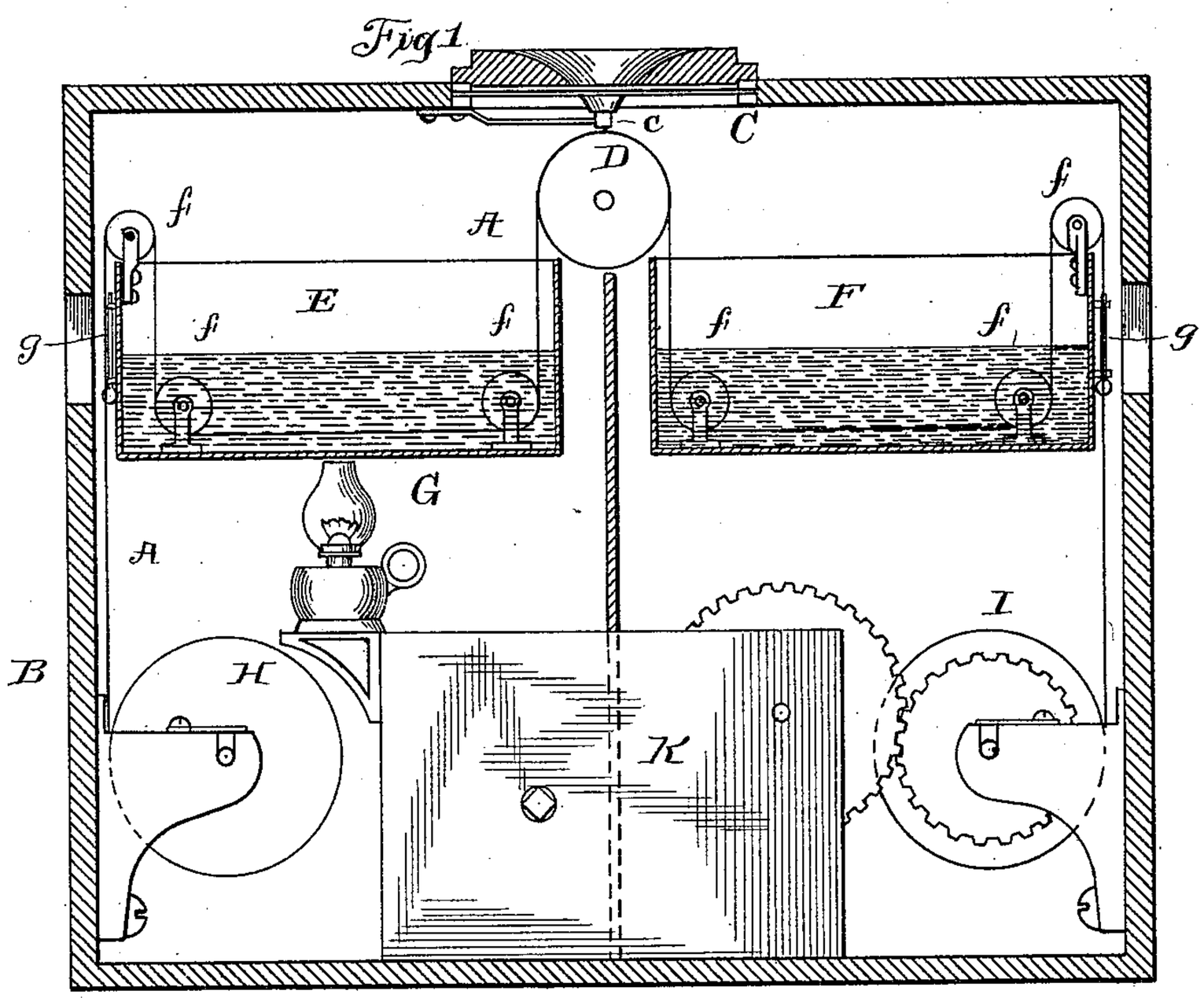


Fig 2.

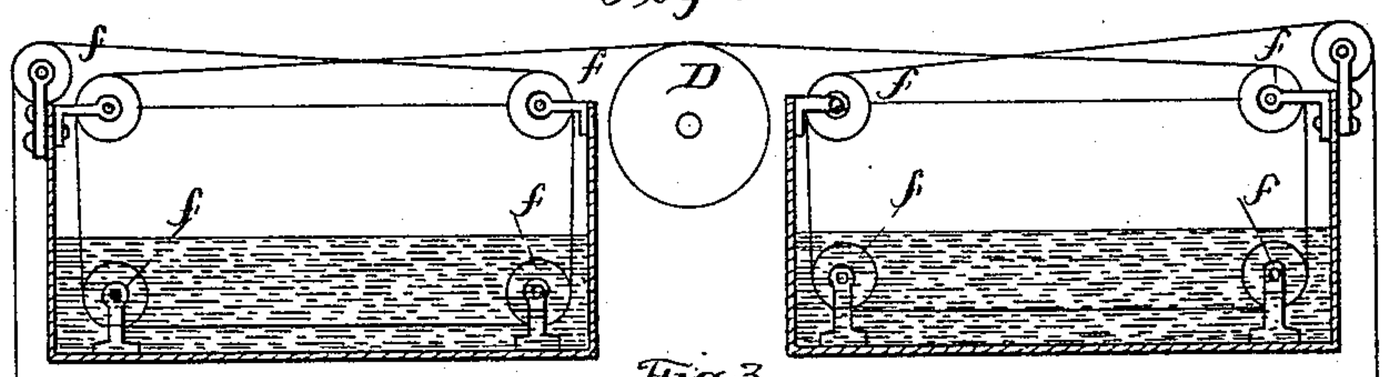


Fig. 3.

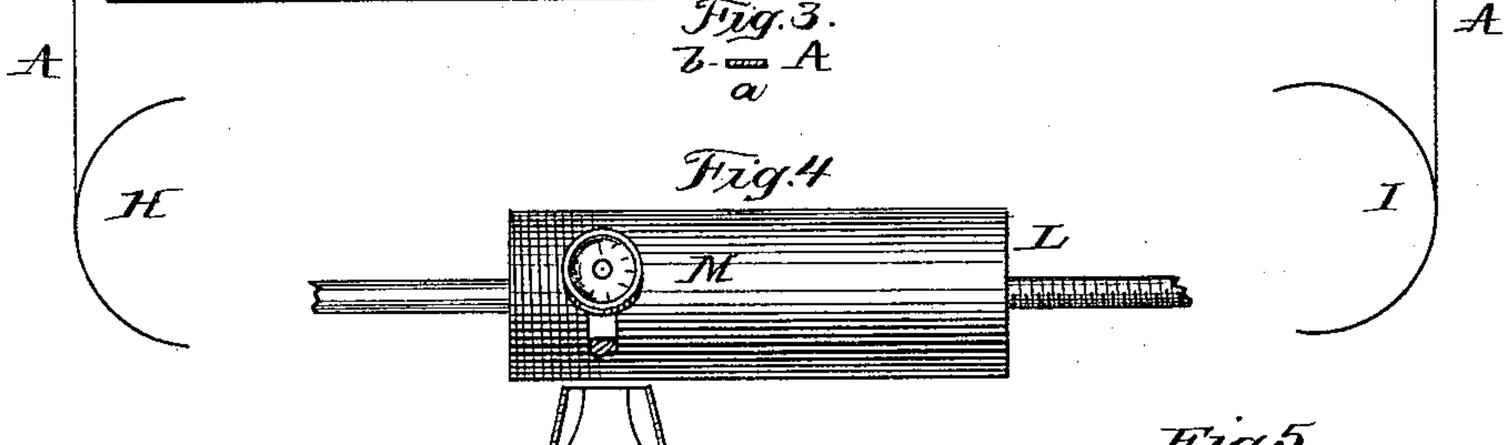


Fig 4.

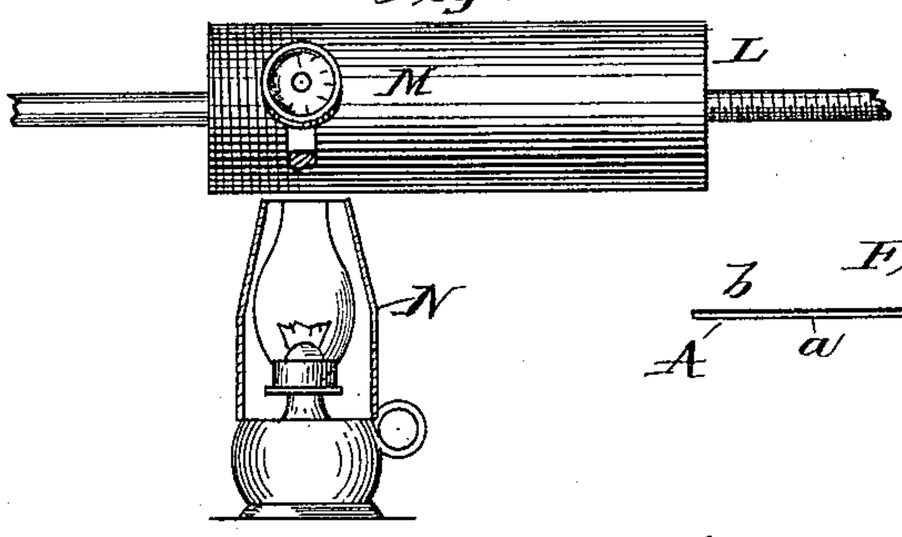
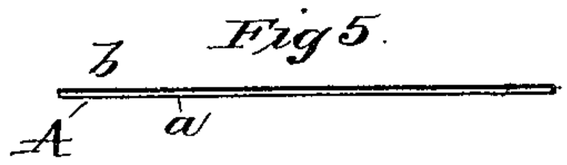


Fig 5.



Witnesses
E. Rowland.
William Pelzer.

Inventor
George H. Herrington
By his Attorneys
Dyer & Lay

UNITED STATES PATENT OFFICE.

GEORGE H. HERRINGTON, OF WICHITA, KANSAS.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 464,476, dated December 1, 1891.

Original application filed September 11, 1886, Serial No. 213,278. Divided and this application filed August 22, 1888. Serial No. 283,459. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. HERRINGTON, of Wichita, in the county of Sedgwick, in the State of Kansas, have invented a certain new and useful Improvement in Phonographs, of which the following is a specification.

In my application filed September 11, 1886, Serial No. 213,278, of which this application is a division, is set forth and claimed a method of recording sound-vibrations, in which the recording medium is first rendered plastic, then passed under the vibrating point or needle of the recording-instrument while in such plastic condition, and finally allowed to harden to set the impression and produce a permanent record. My present invention relates to the apparatus for carrying this method into effect, which apparatus is shown and described, but not claimed, in the application referred to, I having been required by the Commissioner of Patents to embody the apparatus in a separate application.

In carrying my invention into effect I employ as a recording medium to receive the needle-indentations a material capable of being softened or made plastic and of afterward becoming hardened. I cause such surface to receive the indentations while in its softened or plastic condition, and it retains them when it becomes hard again. I prefer to employ a substance, such as boiled tar, pitch, resin, asphalt, dental wax, or similar hard substances or compounds which become plastic when heated, and by the employment of heat I soften to the desired degree this surface as it passes under the point of the diaphragm-needle, and then by cooling harden the surface to give the record permanency. The heat-affected medium is preferably applied as a coating to a suitable supporting-thread, strip, or sheet of metal, fabric, paper, or rubber, and this supporting-body is also preferably flexible, so as to be readily wound upon spools and passed around wheels or drums. The recording-surface may also be covered with an extremely thin metallic foil or be powdered to prevent sticking to the needle or to the wheels or rollers while in a plastic condition. The heat may be applied in any suitable way, and air, water, or steam may be used, the recording medium passing through a heating-chamber or over or around heating drums or rolls just before reaching the diaphragm-needle. The cooling may be effected by an air or water chamber, or by drums, or by other suitable means.

The phonograph may have a motor to move the recording medium under the point of the diaphragm-needle, and the same machine may, by the removal of the heating and cooling devices, be used to reproduce sound from such a record as has been described.

The same method and essentially the same apparatus can be employed for recording the movements of telephonic or telegraphic apparatus, so as to register messages sent by such instruments without departing from the spirit of my invention.

In the accompanying drawings, forming a part hereof, Figure 1 is a vertical section of a simple form of apparatus, illustrating the invention. Fig. 2 is a similar view of some of the principal parts of a modified form of apparatus. Fig. 3 is a cross-section of the recording-strip used with the apparatus of Figs. 1 and 2. Fig. 4 is a side elevation and partial section illustrating the application of the invention to the ordinary form of phonograph, and Fig. 5 is an edge view of a recording-sheet such as would be used with the apparatus of Fig. 4.

The recording strip A or sheet A′ has a flexible body *a*, of thin metal, fabric, paper, rubber, or other suitable material, provided with a surface *b* of the recording medium, such as boiled tar, pitch, resin, asphalt, hard dental wax, or other similar substance or compound, and this surface may or may not be powdered or covered with extremely thin metallic foil, as before set forth.

In the apparatus shown in Figs. 1 and 2 a suitable box or frame B is provided for supporting and inclosing the parts. The ordinary phonograph-diaphragm C is supported in an opening in the top of this box, and beneath the diaphragm is the needle *c*, mounted in the ordinary way. Directly below the needle *c* is the roller D, over which the recording-strip A passes in a suitable guiding-groove, this roller serving to bring the recording-strip into contact with the point

of the diaphragm-needle. Heating and cooling chambers E and F are supported in the box B on opposite sides of the roller D, and are provided with wheels or rollers *f* for guiding and directing the recording-strip. A lamp G is shown for heating the chamber E and the recording-strip passing through it. Thermometers *g* are shown, by which the temperature of the chambers E F can be seen and regulated. Rollers H I carry the recording-strip, and a motor K gives the necessary movement to the strip.

In Fig. 2 the wheels or rollers *f* of the heating and cooling chambers are arranged so that in passing around them the recording-surface of the strip will not touch these wheels or rollers.

In Fig. 4 an ordinary phonograph-cylinder L is shown upon which the sheet A′ is placed. The phonograph mouth-piece is shown at M. A lamp N is shown for heating the recording-surface of the sheet to a plastic condition as it passes under the diaphragm-needle. The recording-surface is cooled by the air as it passes from the influence of the lamp.

The recording medium is made as plastic as possible without injury as it passes under the diaphragm-needle, thus giving the greatest possible freedom of movement to the diaphragm, while the subsequent cooling by the atmosphere or artificially gives the recording medium a permanent hardness. When a message or communication has once been registered on the strip or sheet by a phonograph, telephone, or telegraph instrument, it can be repeated any number of times and can be handled without injury to the impressions and sent to any distant point to be repeated without the aid of a skillful operator at that point.

By removing the lamp or other heating medium the same apparatus may be employed to reproduce the sounds by running the strip or sheet under the diaphragm-needle, so that its point will follow the sound-wave impressions or indentations.

It will be understood that I do not limit myself to the use of any particular material or compound as a recording medium, as any material or compound may be employed which when heated is sufficiently yielding or plastic to readily receive impressions and which will set and retain the impressions when cold.

What I claim is—

1. The combination, with a phonograph diaphragm and needle, of a traveling recording medium composed of a material or compound capable of being made plastic by heat, and means for heating and cooling such medium, substantially as set forth.

2. The combination, in a phonograph, of a strip or sheet phonogram-blank having a flexible body and a covering or surface of a material or compound capable of being made plastic by heat, and means for heating said material or compound, substantially as described.

3. The combination, with a phonograph diaphragm and needle, of a traveling recording strip or sheet having a flexible body and a surface of a material or compound capable of being made plastic by heat, and means for heating and cooling the surface of such strip or sheet, substantially as set forth.

4. The combination, with a phonograph diaphragm and needle, of a traveling recording medium capable of being made plastic by heat, a motor for moving such medium, and means for heating and cooling such medium, substantially as set forth.

This specification signed and witnessed this 2d day of August, 1888.

GEORGE H. HERRINGTON.

Witnesses:
JOHN P. ROGERS,
A. T. OWEN.

Correction in Letters Patent No. 464,476.

It is hereby certified that Letters Patent No. 464,476, granted December 1, 1891, upon the application of George H. Herrington, of Wichita, Kansas, for an improvement in "Phonographs," were erroneously issued to said Herrington as sole owner of the invention; that said Letters Patent should have been issued to said *George H. Herrington and Edward H. Johnson, jointly,* each being owner of one-half interest, as shown by the record of assignments in this Office; and that said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 8th day of December, A. D. 1891.

[SEAL.]

CYRUS BUSSEY,
Assistant Secretary of the Interior.

Countersigned:

W. E. SIMONDS,
Commissioner of Patents.