

(No Model.)

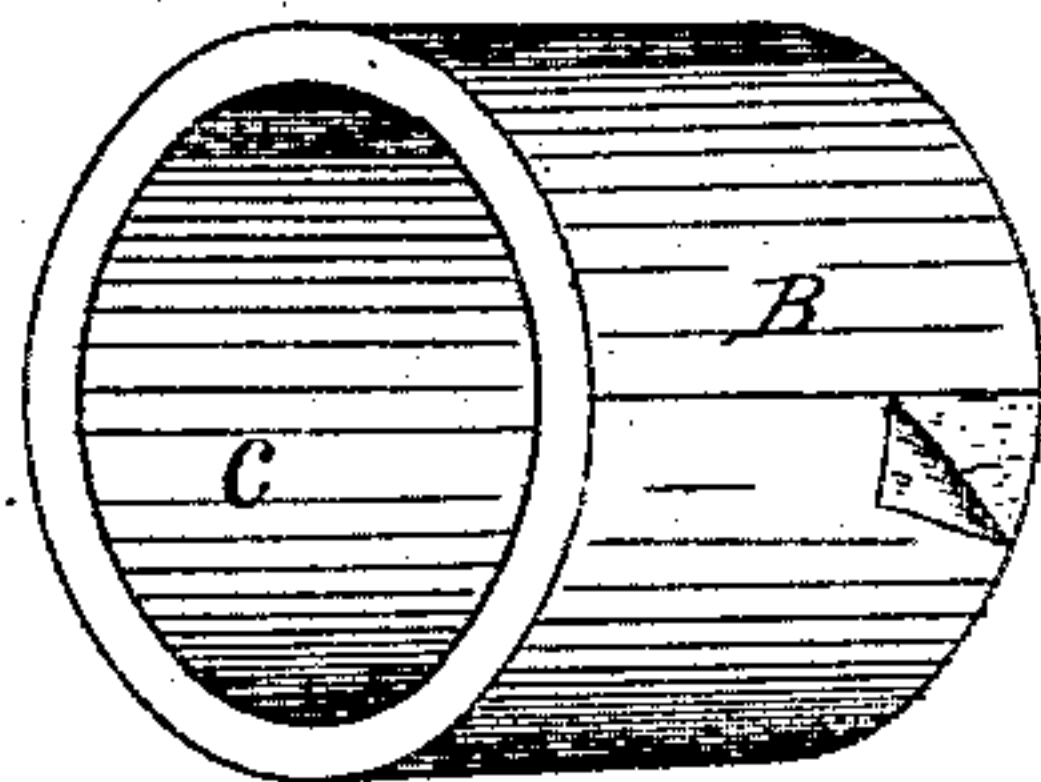
G. H. HERRINGTON.

PROCESS OF DUPLICATING PHONOGRAMS.

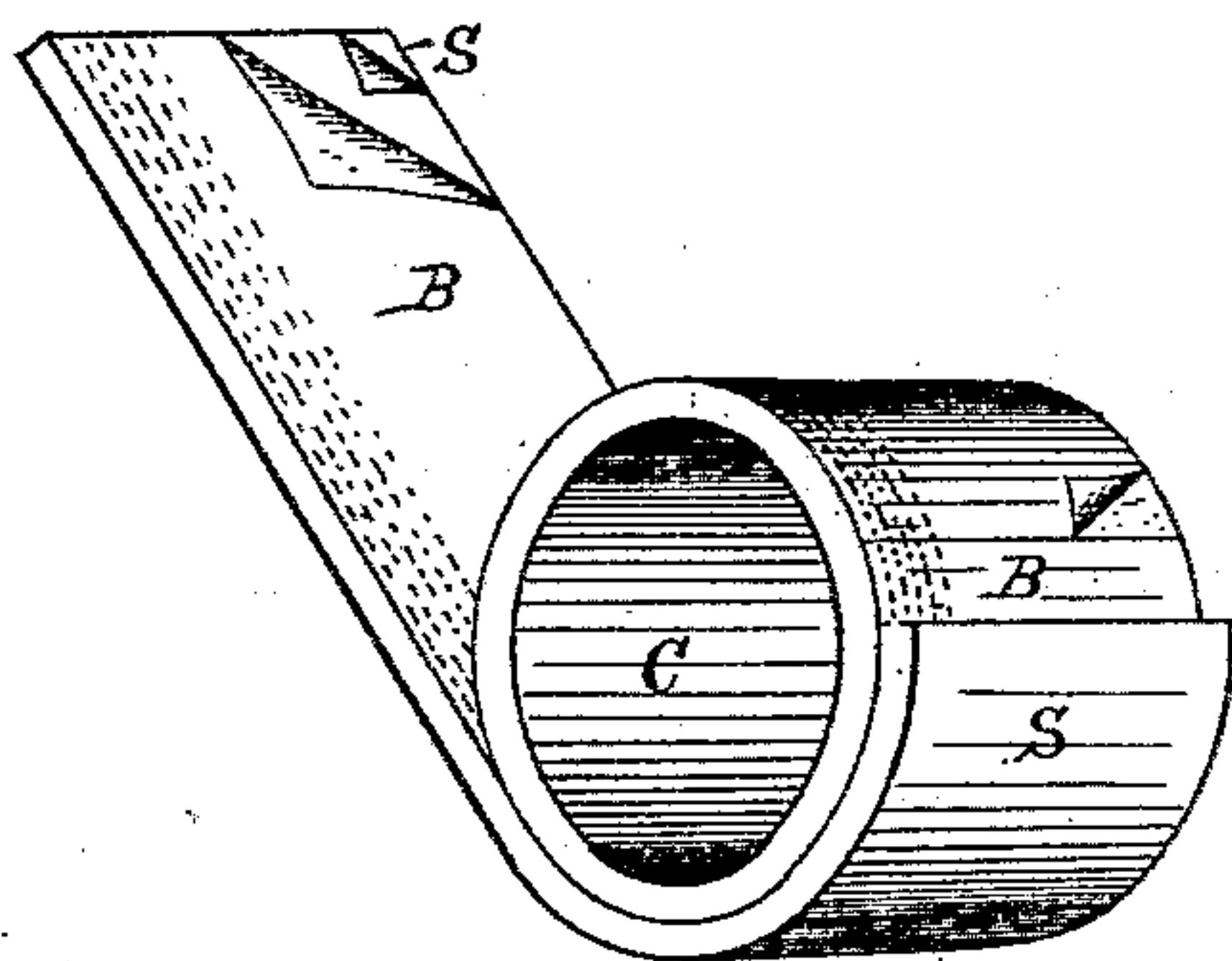
No. 399,264.

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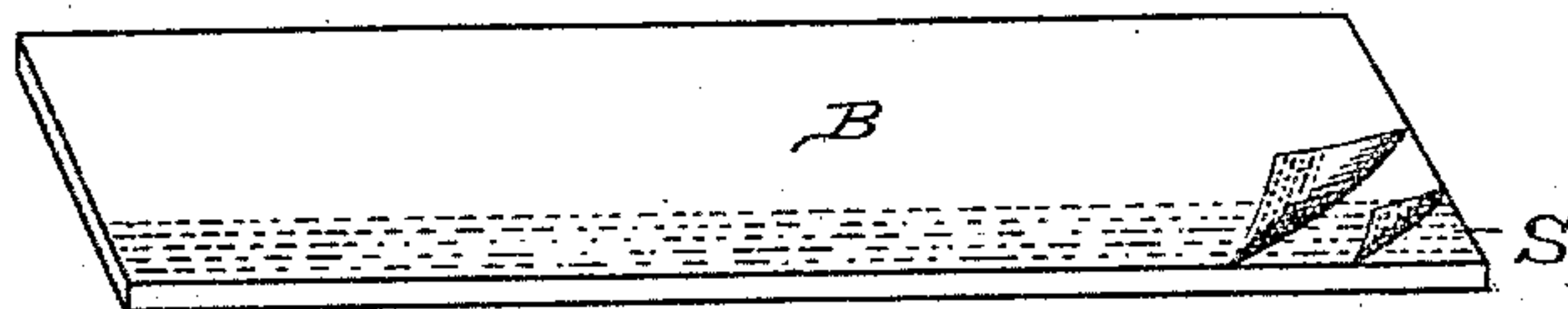
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

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## PROCESS OF DUPLICATING PHONOGRAMS.

SPECIFICATION forming part of Letters Patent No. 399,264, dated March 12, 1889.

Application filed September 21, 1888. Serial No. 285,977. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE H. HERRINGTON, a citizen of the United States of America, residing at Wichita, in the county of Sedgwick and State of Kansas, have invented certain new and useful Improvements in the Process of Making Duplicate Copies of Phonograms, of which the following is a specification, reference being had therein to the accompanying drawings and the letters and figures of reference thereon, forming a part of this specification.

This invention relates to certain improvements in the process of making duplicate copies of phonograms; and it consists, first, in preparing a phonograph-cylinder with a coating of wax or composition which is adapted to be softened by heat and become set and hard when cool; second, in covering said prepared cylinder with layers of tin-foil, upon which the phonogram-registrations are made while the wax or composition is soft; third, in covering said registered tin-foil with a coating of wax or composition which is adapted to be likewise softened by heat, and in removing said last covering, which serves as a matrix or shield for the tin-foil, together with one or more layers of tin-foil, when the said wax or composition is in a partially-cooled state, and in placing said matrix or shield with its layers of tin-foil upon a plane surface with the negative surface of its registrations presented, and, lastly, by making duplicate copies of the phonogram-record by rolling cylinders prepared with a coating of wax or composition across the surface of said registered foil, impressing positive characters of the phonogram-record in the surface of said cylinders while they are in a soft state, after which they are permitted to harden to retain the impressed characters, or the tin-foil may be removed from the matrix or shield and placed about a cylinder, and thus present the positive phonogram-duplicate upon the surface of said second cylinder, or in making casts of wax or composition when in a soft state in the form of sheets upon the negative surface of said registered tin-foil as it rests upon its matrix or shield, and applying said casts about cylinders while in a flexible state and permitting them to harden upon

their cylinders, and thus produce duplicate copies of the original phonogram. The duplicate copies of the original phonogram thus produced are adapted to be used in other phonographs or apparatus at distant places or at various places and times for reproducing the sound-vibrations of the original phonogram.

Figure I represents the cylinder of a phonograph, having a covering of either tin-foil, silver-leaf, or an equivalent material. Fig. II represents the process of making a reverse duplicate copy of a phonogram, and Fig. III represents the copying material after the impression is made and it has been removed from the cylinder.

Referring to the illustrations, C represents the cylinder of a phonograph.

B represents a thin sheet of either tin-foil, silver-leaf, or an equivalent material, and is shown in Fig. I as placed smoothly and closely about said cylinder, forming a surface upon which the phonogram is registered.

Referring particularly to Fig. II, the cylinder is shown with a covering of two or more thicknesses or layers of tin-foil, which have registered thereon the original phonogram. A covering or sheet of copying material, S, consisting of either wax, resin, pitch, celluloid, glue, rubber, or their compound or equivalent, which is adapted to be softened by means of heat or otherwise, is also shown as being impressed or formed with a duplicate negative copy of the original register and partially removed, removing with it one or more of the sheets of tin-foil, which have an impressed duplicate copy of the original register. Said copying material S, when applied in copying, is softened or used in a soft state and hardened or permitted to harden while in contact with the phonogram which it is copying, to insure perfect well-developed characters in the copy, thus forming a matrix or shield about said registered tin-foil before it is removed from the cylinder. After said material is removed from the cylinder with its impressed or formed characters, it is presented, as shown in Fig. 3, with a fine duplicate negative copy of the original phonogram upon its surface. By removing one or more layers of tin-foil from the original phonogram-cylinder with the matrix or shield it



is evident that the negative surface of the registrations of said foil will be presented, and their positive surface will be in contact with each other, with one in contact with the matrix or shield; and when said shield is in a hard state cylinders prepared with said wax or composition surface, when softened by heat, may be rolled across said registered foil with pressure sufficient to impress the registrations in the surface of said cylinders and closely press the tin-foil against them, and when said foil is permitted it will adhere to said cylinders and separate from its fellow layers and become the presented surface of the duplicate. If but a single layer of said registered foil is removed with the shield, the said foil may be treated with dilute glycerine or vaseline and duplicate copies produced, in the manner last described, excepting that the tin-foil will be permitted to remain in contact with its shield and the registrations made direct upon the surface of the duplicate cylinder.

The cylinder upon which the tin-foil is placed is first treated to either a coat of soft wax or with one or more of the said copying materials or their compound or equivalent; and when it is desired to register the phonogram thereon, if said coating is other than a soft material, it is softened by means of heat or otherwise, so it will properly receive and retain the register. If desired, soft wax may be employed for making duplicate copies of the original phonogram in a similar manner and in place of other material, as above stated. At times when it becomes necessary to remove the tin-foil from the cylinder having the original phonogram or from the copies thereof it may be done by treating the tin-foil with mercury without injury to the register.

One or more layers of thin tin-foil or an equivalent may be placed about the cylinder, and when the phonogram is registered thereon each layer of the tin-foil will receive and retain a duplicate copy thereof; also, the said register is impressed into the wax or composition on the cylinder beneath said layers of tin-foil.

When desired to prevent the tin-foil from sticking to the cylinder, so it may be easily removed, the cylinder is first subjected to dilute glycerine or vaseline on the face of the wax or composition. Said layers of tin-foil may be removed from the cylinder having the original phonogram thereon in duplicate pairs or singly; but before removing them they are covered with a coat or covering of either wax, resin, pitch, celluloid, glue, rubber, or their compound or equivalent, which is applied in a soft state and hardened or permitted to harden and form a shield to protect their register and form, after which they may be opened at their union, removed from the cyl-

inder having the original record, and placed or impressed about a second cylinder, and after they become properly impressed or seated upon said second cylinder said shield is removed, taking with it one or more of said sheets of tin-foil, and either leaving a covering of tin-foil having a duplicate record of the original phonogram thereon or impressing a duplicate copy of the original phonogram upon the surface of said second cylinder.

The object of this invention is principally to produce duplicate copies of original phonograms for the purpose of distribution or otherwise to reproduce the sound-vibration in a phonograph as registered on the original phonogram or any machine calculated to register the sound waves or vibrations, as in telegraphic, electric, and other minute operations of similar character; and the essential features of this invention consist in the use of tin-foil, silver-leaf, or some equivalent material for covering the phonograph-cylinders, and in the use of copying material, as above described, for receiving and retaining the copies in the manner stated.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. The herein-described process of making duplicate copies of original phonograms, consisting in preparing a phonograph-cylinder with a coat of wax or compound equivalent, in placing about said cylinder one or more layers of tin-foil, or an equivalent, thus forming a surface upon which to register the original phonogram, in covering said tin-foil having the original register thereon with a coat or covering of either wax, resin, pitch, celluloid, glue, rubber, or their compound or equivalent to form a shield to protect their impressed characters and form, and in removing said shield and tin-foil, and in placing or impressing said shield and tin-foil about a duplicate cylinder, in the manner substantially as and for the purpose specified.

2. The herein-described process of duplicating copies of phonograms, consisting in preparing a phonograph-cylinder with a coating of wax or composition which is adapted to be softened by the influence of heat, in placing layers of tin-foil or an equivalent about said prepared cylinder, thus forming a surface upon which to register the original phonogram, and in removing said layers of foil after the record has been made from the original cylinder and placing them about duplicate cylinders, thus forming duplicate copies of the original phonogram, substantially as and for the purpose specified.

GEORGE H. HERRINGTON.

Witnesses:

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