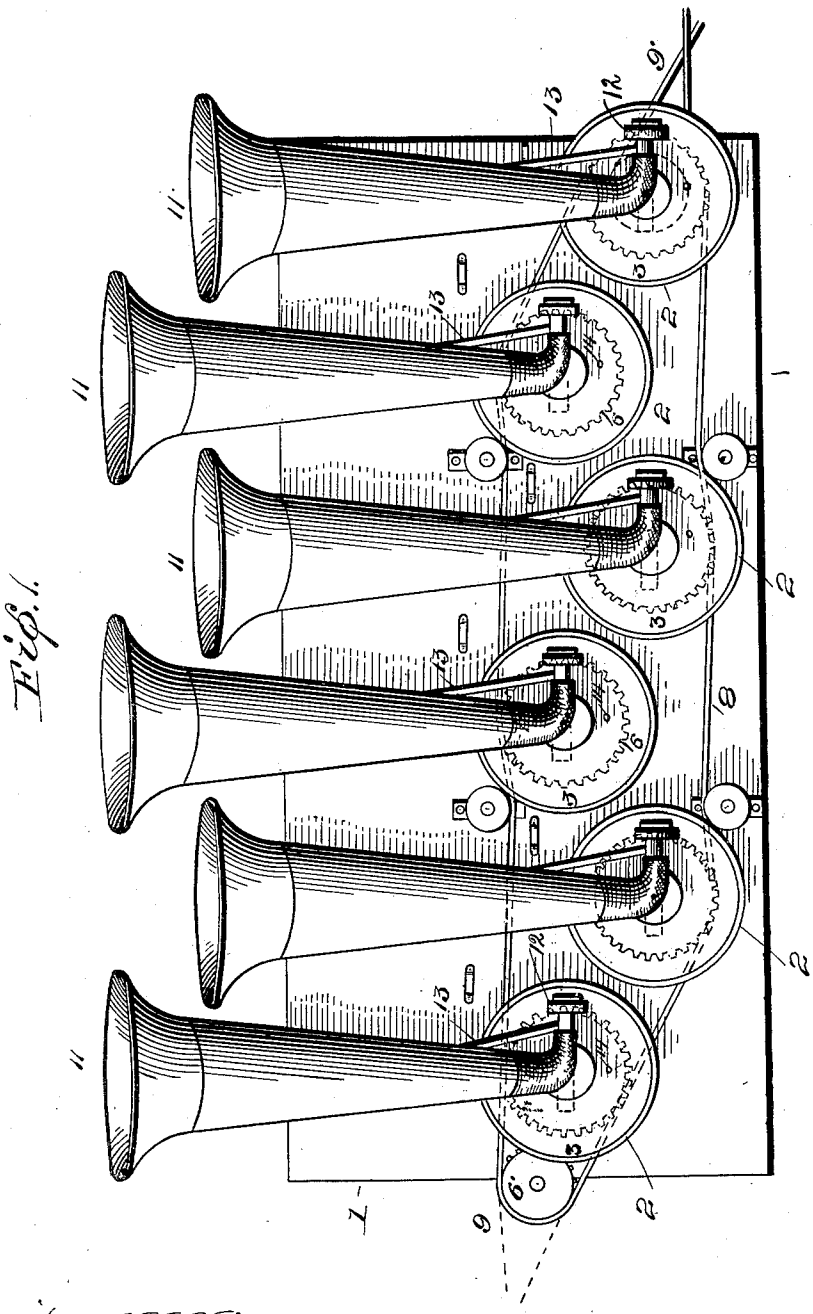
No. 692,502. Patented Feb. 4, 1902.

E. BERLINER.

GRAMOPHONE.

(Application filed June 13, 1900.)

(No Model.) 2 Sheets—Sheet 1.



Witnesses:
J. M. Fowler Jr.
F. J. Chapman

Inventor:
Emile Berliner,
By Lyons & Bissing.
Attys.

No. 692,502. Patented Feb. 4, 1902.

E. BERLINER.

GRAMOPHONE.

(Application filed June 13, 1900.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 2.

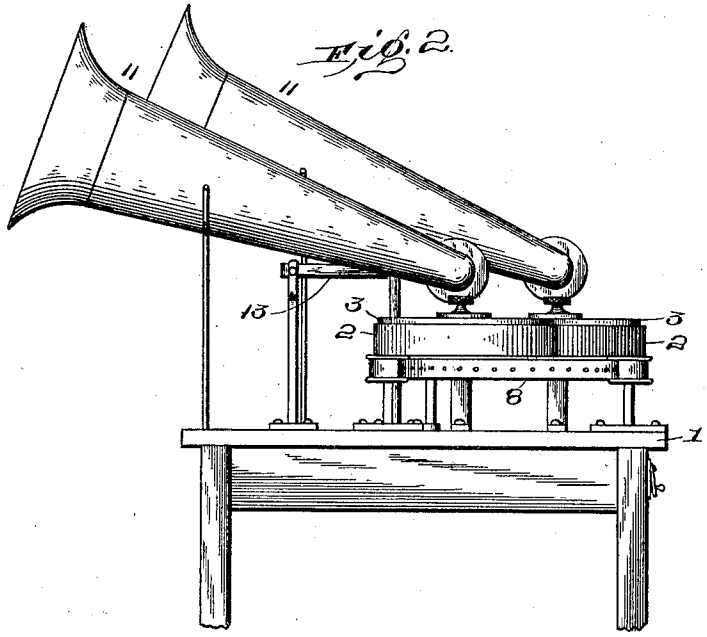


Fig. 3

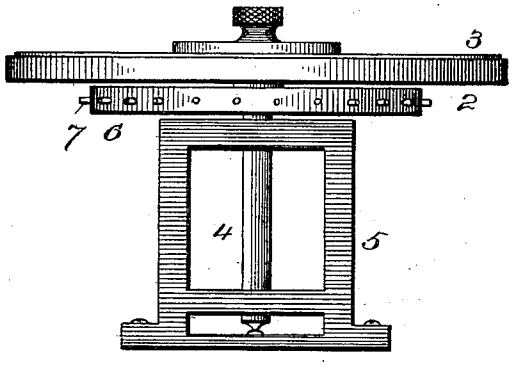
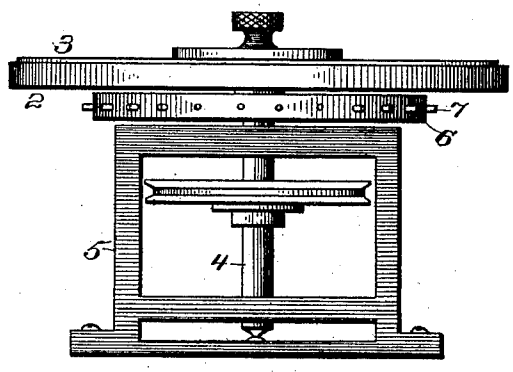


Fig. 4.



Witnesses:
J. M. Fowler Jr.
F. T. Chapman

Inventor
Emile Berliner
By Lyon & Lyon
Attys

UNITED STATES PATENT OFFICE.

EMILE BERLINER, OF WASHINGTON, DISTRICT OF COLUMBIA.

GRAMOPHONE.

SPECIFICATION forming part of Letters Patent No. 692,502, dated February 4, 1902.

Application filed June 13, 1900. Serial No. 20,170. (No model.)

To all whom it may concern:

Be it known that I, EMILE BERLINER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Gramophones, of which the following is a specification.

My invention has reference to improvements in gramophones, whereby any desired volume of sound may be produced from the existing commercial form of gramophone sound-records and sound-reproducing instrumentalities.

My invention is based on the fact that gramophone-records are exact duplicates of each other, even to the minutest detail, and as such are made in large numbers. Now I have discovered that if a number of such duplicate records be rotated in such synchronism as may be obtained by ordinary gearing or the like and to each be applied the stylus of a reproducer-head preferably provided with the usual amplifying-horn, so that all the styles shall touch the records at substantially the same point and so that there will be emitted from each horn identically the same sounds, these sounds will combine into a resultant sound of greatly-increased volume, proportional to the number of records and reproducing instrumentalities used.

My invention consists, therefore, of a gramophone-reproducer composed of a number of rotating tables coupled for synchronous movement to a common motor, a corresponding number of identical gramophone-records, and a corresponding number of gramophone reproducer-heads, preferably provided with amplifying-horns so mounted that the reproducer-styles may be placed at corresponding points on the records. In order to enable the operator to place the styles upon identically-corresponding points of the records without the exercise of any special care, I may employ a means for insuring the exact register of each record upon its supporting-table, so that the placing of the records upon the tables will bring them all into exactly the same relative position.

A multiple gramophone reproducer embodying my invention is shown in the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view. Fig. 2 is a side elevation, and Figs. 3 and 4 are side elevations of details of the structure.

Referring to the drawings, there is shown a bench or support 1, upon which are mounted a number of rotary tables 2 of the usual gramophone type and adapted to receive the usual gramophone record-tablets 3 of commerce. The rotary tables may for convenience be arranged in a staggered row, as shown in Fig. 1. Each table is supported upon an upright spindle or shaft 4 journaled near its upper and lower ends in a standard 5, fast on the bench 1. The shaft 4 is pointed at its lower end and stepped in a suitable bearing in the standard, as shown.

Upon each shaft 4, just below the table 2, there is secured a disk 6, having equally-spaced radially-projecting pins 7 on its periphery. The disks 6 are all of the same size, with the same number of pins, and they are driven, together with the tables 2, all at the same speed by means of a belt 8, having perforations spaced to fit the pins 7. This belt is preferably made of leather because of its flexibility and easy-running qualities. The belt is continuous and need engage only a few pins or teeth on each of the intermediate disks 6, as shown in Fig. 1. At the ends of the row of tables the belt may pass around the disks in the manner shown at the right hand of Fig. 1 or around a small supplemental disk 6′. (Shown at the left-hand end of Fig. 1.) This latter disk 6′ may be adjustable, so as to serve as a belt-tightener. It may also be provided with a pulley (not shown) for the application of power to drive the system of rotary tables through a belt 9, (indicated by dotted lines.) However, I may apply the driving-power from a belt 9′ at the other end of the machine.

The horns 11 are of ordinary construction, as are the reproducer-heads 12, mounted upon the swinging arms 13.

In order to insure that each record is placed in the same relative position on the table 2, I may provide each record with an orifice 14, the orifices in each identical record of a set being in the same relative position on the record. Such orifices could be made when the record is pressed. The tables 2 are provided with pins registering with the orifices. Other forms of registering devices might natu-

rally be employed. It is also plain that I may use spur, worm, bevel, or other gearing instead of the belt-gearing shown in the drawings, so long as it is common to the several records, and thus drives them synchronously.

In operation the records are placed on their tables or supports, as described, and the reproducing-styles are brought down on the first lines of the records. The registering devices 14 make it possible to insure the contact of each stylus with the corresponding point of each record by the mere act of placing the stylus on the proper line of the record. The proper point of that line is determined automatically by the length of the swinging arm 13. Power being applied to rotate the records, identical sounds are found to issue from each of the horns, and it will be found that the combined body of sound may be made as great as desired by using an appropriate number of records, but will always be what may be termed an "enlargement" or "amplification" of the sound which would be produced by a single record. Thus suppose a speaker should have made a record of his own voice and that gramophonic duplicates of this record were produced. By my invention, as above described, it would be possible for the speaker to hear an exact reproduction of his own voice louder than he could himself speak. The same remark applies to a vocalist, and a corresponding remark would apply to a violinist or pianist.

It will thus be seen that I am enabled to produce a sound-reproducing apparatus which can give sounds the same in quality as those now existing, but very much louder in intensity and without the slightest distortion. Furthermore, I have a convenient means of making the intensity of the sound precisely what I desire by simply selecting the proper number of records. It will also be seen that my invention enables me to produce for commercial purposes at least a better quality of record. Heretofore it has been customary to produce records by having the operator whose voice is to be recorded speak quite loudly into the recording apparatus in order that the record might be made to reproduce as loudly as is possible. This has tended to distort the natural voice which was to be recorded. Under my present invention the person whose voice is to be recorded may speak or sing quite naturally during the recording operation, and I may yet secure a greater degree of loudness than before by properly choosing the number of records to be simultaneously reproduced. Similar remarks apply to other kinds of records.

What I claim is—

1. A sound-reproducing machine comprising the combination of a number of identical records, reproducing-styles arranged for contact at corresponding points thereof, and mechanism common to all of the identical records for producing a relative but synchronous movement between the records and styles, substantially as described.

2. A sound-reproducing machine comprising the combination of a number of identical records, gearing common to the records for driving them synchronously and reproducing-styles arranged for contact with corresponding points of the records, substantially as described.

3. A sound-reproducing machine comprising the combination of a number of identical records, registering mechanism for insuring the exact register of each record upon its support, reproducing-styles arranged for contact with corresponding points of the records and mechanism common to all of the identical records for producing a relative but synchronous movement between the records and styles, substantially as described.

4. A sound-reproducing machine comprising a number of rotatable tables or record-supports each provided with a pin so placed that all the pins correspond in position, a number of identical records, one for each table, and each having an orifice registering with the pin on its table or support, reproducing-styles arranged for contact with corresponding points of the records, and mechanism common to all the supports for rotating the record-supports synchronously, substantially as described.

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

EMILE BERLINER.

Witnesses:
EDWIN S. CLARKSON,
C. E. MARSHALL.