(No Model.) 2 Sheets—Sheet 1.

W. BRUENING.

PHONOGRAPH.

No. 511,402. Patented Dec. 26, 1893.

Fig. 1

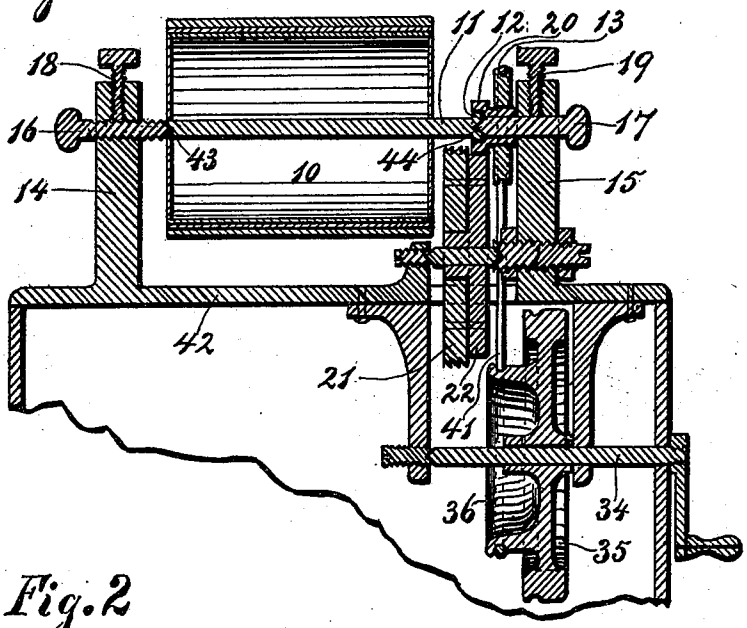

Fig. 4

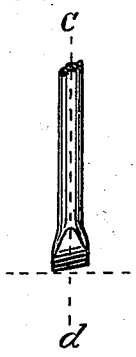

Fig. 2

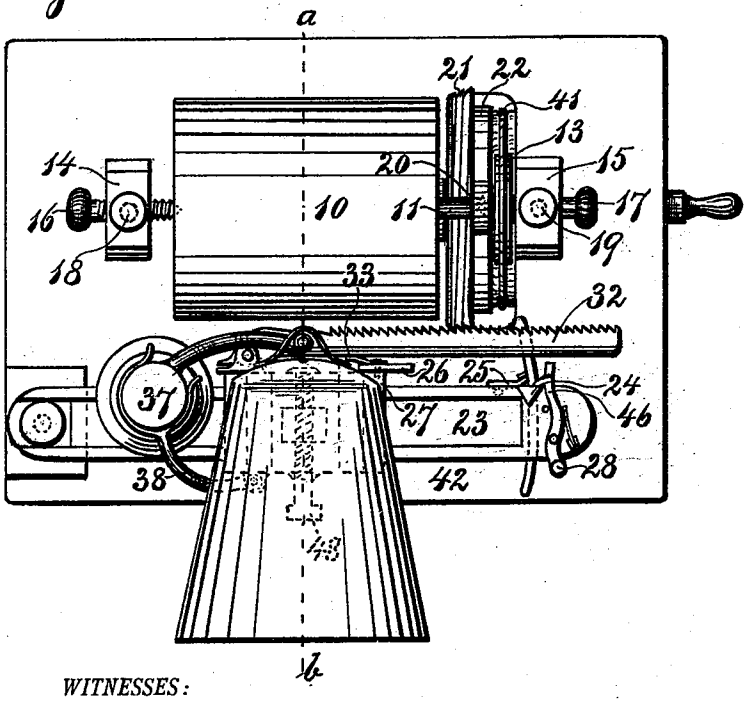

Fig. 5

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3

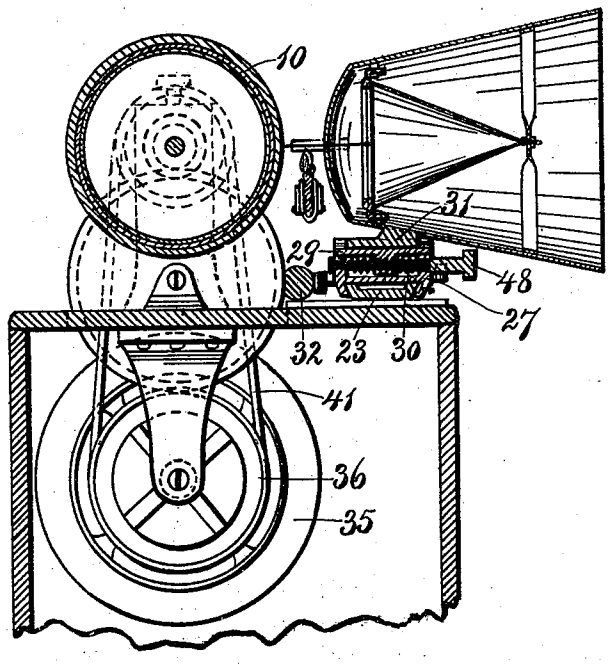


Fig. 6

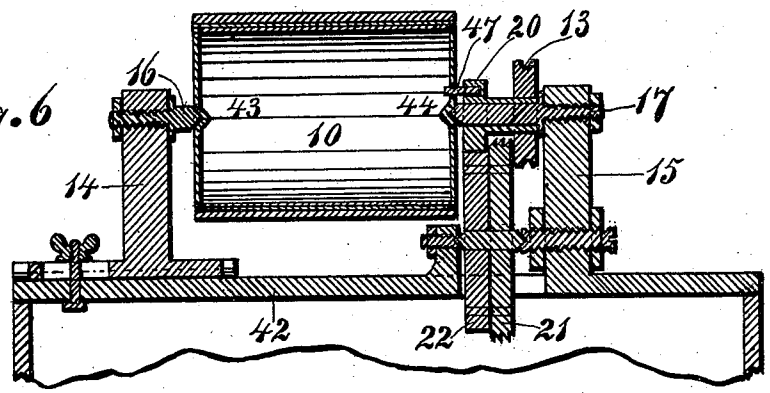
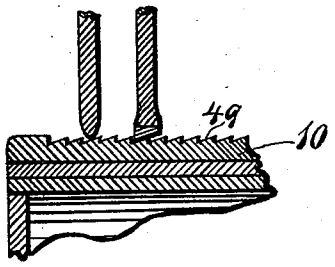


Fig. 7



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WILLIAM BRUENING, OF EAST ORANGE, NEW JERSEY.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 511,402, dated December 26, 1893.

Application filed June 20, 1893. Serial No. 478,236. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BRUENING, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Phonographs, of which the following is a specification.

My invention relates to improvements in phonographs and has for its object to obtain a cheap and efficient mechanism for recording and reproducing sounds and consists in attaching a rack which engages with a rotating worm wheel to a slide rest carrying the recorder or reproducer, to cause longitudinal motion thereof on a slide or bed held parallel to the cylindrical surface of a tablet; in an improved shape of the track or tracks forming the record which may be reproduced by a style the point of which is not necessarily of the same shape or which may be wider than the record track, and in an improved shape of the point or end of the style with which such record is made.

In the accompanying two sheets of drawings which form part of this specification, Figure 1 is a vertical central section of the mechanism. Fig. 2 is a top view of the mechanism. Fig. 3 is a vertical cross-section on line *a*—*b* Fig. 2. Fig. 4 is an enlarged elevation of part of the style. Fig. 5 is a longitudinal section of part of the enlarged style on line *c*—*d*, Fig. 4. Fig. 6 is a central vertical section showing a different arrangement of engaging the tablet with the rotative mechanism. Fig. 7 is a vertical enlarged section of part of the tablet showing an exaggerated view of the ratchet-shaped record tracks in cross-section and parts of different enlarged reproducing styles located thereon, one having a rounded point and the other a point wider than the track.

Similar numerals refer to similar parts throughout the figures.

The tablet 10, Figs. 1, 2, 3, and 6, may be a solid or hollow cylinder made of or coated with suitable recording material and is movably and detachably supported on its axis by pivots or centers and thereby held in proper relation to the rotative mechanism. I prefer to make the tablet of a hollow cylinder of tin plate, to the cylindrical surface of which a sheet of paper or other porous material is affixed; a layer of recording material is then applied by rotating the cylinder in contact with melted or dissolved recording material; when a desired thickness of the material has adhered it is allowed to harden and may be turned true and smooth in a lathe or in the machine herein described and the tool used for this purpose may be heated if desired. An eccentric opening 47 in or an eccentric projection on one of the heads of the cylinder may be provided to engage with the rotative mechanism, as in Fig. 6, but I prefer to attach a bar 11 to the center of one of the cylinder heads and if desired the bar 11 may extend through the entire length of the tablet and form the axis thereof; see Figs. 1 and 2. The projecting end of the bar 11 is made angular or provided with a key 12 whereby it engages with an angular recess or a slot in the gear 20 or other attachment of the pulley 13.

The frame 42 is provided with standards 14 and 15, which support the rods 16 and 17; one of the standards may be movable, see Fig. 6, but I prefer to make the rods adjustable, which may, if desired, be provided with screw-threads to engage with an internal thread on the sockets and are held in place by the set-screws 18 and 19 and the ends of said rods form the centers 43 and 44, on which the tablet is axially supported and rotated; the rod 17 also carries the pulley 13 and the attached gear 20. The wormwheel 21 is pivoted or journaled in the standard 15 and in a projection of the frame 42 and has a gear 22 attached which engages with the gear 20.

The movable bed or slide 23 may be of any usual construction and is shown in Fig. 2 as a bar provided with ways which is pivoted at one end to the frame 42 and is provided at its other end with a latch 46 by which it may be secured to the post 24 which is attached to the frame and thereby held parallel to a line between the centers 43 and 44; a spring 25 moves the slide a desired distance outwardly to disengage the rack and worm and the style and tablet when the latch is released by contact with the projection 26 on the slide rest 27 or by moving the thumbpiece 28.

The slide rest 27 moves longitudinally on the slide 23 and is provided with a plate 29 which may be moved transversely by turning

the screw 30 in the nut attached to its lower side and is provided on its upper side with a channel or recess to retain a lug 31 which is attached to the frame of the recorder or reproducer; the screw 30 is held at its ends in the frame 27 and has a handpiece 48.

The rack 32 is movably attached at one end to the slide rest 27 and an intermediate spring 33 holds it against the wormwheel 21 when the slide 23 is in position.

The hangers on the lower side of the frame support a shaft 34 provided with a flywheel 35 and a pulley 36 which is connected with the pulley 13 by the belt 41.

Hand or any other power may be used to give motion to the mechanism.

When it is desired to use a heated style for the purpose of melting or fusing a record into the tablet, the lamp 37 is supported by a holder mounted on the pivoted rod 38 with which it may be moved to bring the flame into position to heat the style and may be moved aside when the record is completed, or an electrically heated style, such as set forth in my Patent No. 486,394, issued November 15, 1892, may be used instead.

The recorder or reproducer may be of any usual construction but I make the end or operative part of the recording style as follows: The broad side of the flattened end of the style is rounded or beveled by grinding or in any other convenient manner to an edge which is mounted and held against the tablet so as to form an acute angle with the surface and in the direction of the axis thereof; I prefer to give the end of the style a shape similar to that of a skew-chisel, see Fig. 4, which permits the body of the style to be held at right angles to the surface of the tablet. This style may be used to cut a sound record in resisting material and in that case the edge is held with the flat side of the style toward the advancing material of the rotating tablet, but when fusing or melting a record in fusible material with a heated style the rounded or beveled side of the style is preferably presented to the moving recording material, thereby bringing a greater heated surface in contact with the fusible material, the edge of the style touching it last and determining the shape of the record track by moving the viscous material out of its path. The track 49 thus formed, see Fig. 7, is ratchet-shaped or in other words presents in cross-section a surface inclined to the axis of the tablet and is terminated by a vertical or approximately vertical wall, the surfaces of the successive tracks lying in parallel planes, and is applicable also to flat, curved or reciprocating tablets. The elevations and depressions corresponding to sound vibrations in a record thus made extend the entire width of the track and will therefore cause the motion of a reproducing style, whether the point thereof is rounded or of the same shape as and wider than that of the recording style and the successive tracks may be made closer to each other than by other means heretofore used without diminishing the efficiency of reproduction, as no inoperative ridges or partitions intervene.

I prefer to use a reproducing style provided with an end or point of the same shape and size as that of the recording style herein described, as the rounded or beveled surface glides smoothly over and readily accommodates itself to the record while if any part of said surface projects beyond the track, such part will not bear on the adjacent record because its contour is not in the same plane therewith.

To record sounds, the tablet 10 is placed in position by adjusting the centers 43 and 44 to support it at its axis and bring the end of the bar 11 in engagement with the slot in the gear 20 and securing the rods 16 and 17 in position by the setscrews 18 and 19. The diaphragm and style, which in the drawings is shown as the recorder in my Patent No. 468,608, issued November 22, 1892, and provided with a style point as herein described, but which may be substituted by a recorder of any other suitable construction, is attached to the slide rest by inserting and securing the lug 31 on the frame of the diaphragm in the recess in the plate 29. The slide rest 27 is moved into the desired position on the slide 23 and the latter is moved until it is in contact with the post 24 to which it is secured by the latch 46 which brings the rack 32 into engagement with the worm wheel 21.

Motion is given the mechanism by revolving the pulley 13 by means of the belt 41 connecting it with the pulley 36 or any other motor which causes the tablet to rotate on its axis on the centers 43 and 44. The gear 20 engaging with the gear 22 causes rotation of the worm wheel 21, which may have a right or left hand thread according to the direction desired in making the record, which causes the rack 32 to move the slide rest 27 with the attached recorder longitudinally on the bed 23 and parallel to the tablet surface; the style having been adjusted by turning the screw 30 until the style point penetrates the material of the tablet to a desired depth and sound being caused to operate on the diaphragm through the horn or mouthpiece, a spiral record will be formed in the material of the tablet by the vibration of the style.

To heat the style, the lamp 37 is swung on the rod 38 until the flame is under the style and the heat thereof may be regulated to any desired intensity.

To reproduce a record, a reproducer is substituted for the recorder and the lamp removed.

In employing removable phonograph tablets which dispense with a separate carrier and are provided with axial bearings which revolve on a fixed rod or bar, as set forth in my Patent No. 499,370, issued June 13, 1893, frequent use will cause the wear of the bar and bearings by abrasion and will result in

unequal motion of the surface of the tablet and consequently in faulty reproduction; in this invention the adjustable centers take up all wear and equal motion is maintained with but a minimum of friction. The rack and worm-wheel answer the purpose of a costlier fine-threaded screw heretofore used. The movable slide allows the style to be readily shifted to any part of the record or tablet and the slide rest may be adjusted to accommodate recorders or reproducers of various construction; by the use of a recording style which is provided with an end or point as herein set forth a record is produced the tracks of which may be closer together than where a ridge or partition separates them, thereby economizing space, and which may be reproduced by a reproducing style the point of which need not be of the same shape or narrower than that of the recording style, as in records heretofore made, while the mechanism is of simple construction and may be cheaply made and adapted to record sound by any of the known methods.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a phonograph, a frame provided with adjustable centers or pivots, a cylindrical tablet which is axially supported by said centers or pivots and means for rotating said tablet thereon in combination with a movable slide or bed, a slide rest carried by said slide or bed, a recorder or a reproducer adjustably secured to said slide rest, a rack attached to said slide-rest, a wormwheel and means for rotating said wormwheel, substantially as described.

2. In a phonograph, a style capable of vibration and provided with a skew-chisel shaped point or end in combination with a diaphragm or other means of transmitting sound vibrations to said style, substantially as described.

3. In a phonograph, a tablet provided with a record of sound vibrations which consists of a ratchet-shaped track or tracks having elevations and depressions corresponding in form to said vibrations, substantially as described.

4. In a phonograph, a cylindrical tablet provided with a record of sound vibrations which consists of undulations of the surface of a spiral track which in cross-section is inclined to the axis of said tablet and forms an angle with a vertical or approximately vertical wall, said undulations corresponding in form to said vibrations, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 19th day of June, 1893.

WILLIAM BRUENING.

Witnesses:
CHARLES S. WILLIAMS,
MONTGOMERY LINDSAY.