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J. O. PRESCOTT
SOUND RECORDING APPARATUS
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Fig. 1.

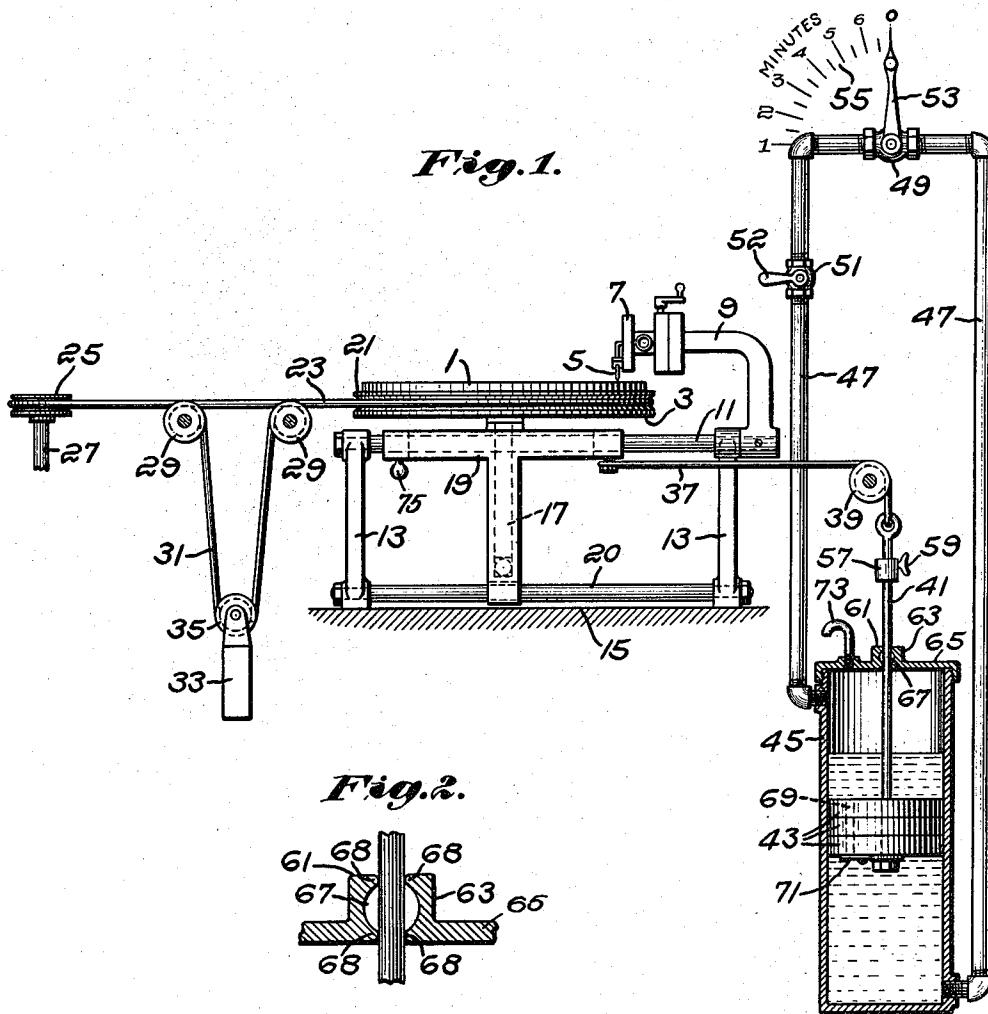


Fig. 2.

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UNITED STATES PATENT OFFICE.

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SOUND-RECORDING APPARATUS.

Application filed September 13, 1922. Serial No. 588,049.

My invention relates to sound recording apparatus and is particularly concerned with the mechanism for causing the relative motion between the record tablet and the stylus.

My invention has among its objects the provision of effective means for causing the relative motion without vibration but will be best understood from the following description when read in the light of the accompanying drawings of one specific embodiment of my invention selected for illustrative purposes, while the scope of my invention will be more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 shows more or less diagrammatically one form of sound recording apparatus constructed according to my invention; and

Fig. 2 shows a detail.

In the drawings, which show the embodiment of my invention which I have selected for illustration, the record tablet 1 is of the disk type while the record tablet support is exemplified by the turntable 3 on which the record tablet is mounted. The stylus 5 for cutting the record groove is carried by the diaphragm mechanism 7, the latter being mounted on an arm 9, which is carried at the end of a rod 11, the latter being rigidly secured adjacent opposite ends in a stationary support 13 resting on a table or the like 15. The turntable is supported on a spindle 17, which is rotatably mounted in a frame 19 slidably supported on the rods 11 and 20. In this manner it will be noted that the stylus is stationary while the turntable is bodily movable so as to cause the stylus to travel toward the center of the record tablet and cut a groove in the form of a flat spiral, the pitch of the groove, that is to say the radial distance between adjacent convolutions of the groove, being determined by the rate of lateral movement of the turntable relative to its speed of rotation.

For rotating the turntable the periphery thereof is shown as provided with a V-shaped groove 21, around which passes a belt 23 driven by the belt pulley 25 carried on the shaft 27 driven by any suitable motor. For causing the belt to be always under tension and to permit bodily movement of the turntable, one side of the belt 23 is shown as passing over a pair of idlers to form a loop 31 at the bottom of which is suspended the weight 33 by means of a pulley 35.

For giving the turntable its bodily movement the frame 19 as illustrated has attached thereto at one end the cord or other ligature 37 which is arranged horizontally and passes over a pulley 39, being at its opposite end attached to the upper end of a plunger rod 41. At its lower end the plunger rod carries a plunger composed of cylindrical weights 43, the peripheries of which fit the interior of the vertically arranged cylinder 45. When the plunger descends in the cylinder it causes the turntable to move bodily toward the right as viewed in the drawing and as the turntable at this time is rotating the stylus cuts a spiral groove in the record tablet.

For regulating the descent of the plunger the cylinder is partially filled with a liquid such as water, oil or mercury, or if desired may contain nothing but air. Further, the opposite end portions of the cylinder are connected by means of the by-pass pipe 47, said pipe having the regulating valve 49 and a second valve 51, the latter preferably being between the valve 49 and the discharge end of the pipe and having an operating handle 52. Associated with the valve 49 is a handle 53 and a suitable graduated scale shown diagrammatically at 55, the scale preferably being calibrated in minutes. In practice the handles 52 and 53 will be so disposed as to be in convenient reach of the operator who stands close to the recording stylus.

The descent of the plunger 43 and consequently the travel of the record tablet is mainly dependent upon the weight of the plunger, the character of the fluid filling the cylinder and the opening of the valve 49. Consequently, in the operation of the device described the weights are adjusted and the handle 53 is set on the scale at such point as will cause the record to come within and completely fill the usual record space. To provide a stop for the plunger, the rod 41 herein carries a slidable collar 57, which may be adjusted in any convenient position along the rod by means of a thumb screw 59. Preferably, in using the apparatus the collar 57 is set in such position that the stylus will travel a slight distance after the sound recording portion of the record is cut. In practice, when the sound to be recorded ceases, the valve 49 is immediately moved by the operator to a wider open position sufficient to cause the plunger to descend rapidly until the collar contacts the upper surface 61 of the boss 63 formed centrally of the

cover 65 of the cylinder. The opening of the valve 49 causes the stylus to cut a groove of steep pitch while the cessation of movement of the plunger which takes place when the collar contacts the boss 63 will cause the groove cut by the stylus to terminate in a circle.

It is of importance in some classes of work to increase the pitch of the record groove as the groove progresses toward the center of a disk record. This result may be secured in my apparatus when liquid is employed in connection with the cylinder and plunger. Referring to the drawings, which show the apparatus arranged for securing this result, it will be noted that the level of the liquid in the cylinder when the plunger is in the initial position is such as to provide an air space above said liquid vented to the atmosphere. Assuming there were no liquid above the piston the resistance to be overcome by the piston in its descent would be the frictional resistance of the liquid against the walls of the cylinder and pipe 47, the resistance to flow offered by the valve 49, and the head of the liquid measured from the bottom face of the piston to the top of the pipe 47. Under these conditions as the piston would descend this head would increase, that is to say if the piston descended say one foot, the head would correspondingly increase one foot. However in the actual arrangement of the apparatus, by returning to the cylinder space above the piston all the liquid displaced by the descent of the piston the increase of head just mentioned is compensated for, or in other words the effective static head to be overcome by the piston is constant. Because all the liquid displaced below the piston is returned to the cylinder space above the piston the level of the liquid above the piston is constant, and therefore the effective static head is that measured from this level to the top of the pipe 47 minus the head corresponding to the vertical length of the piston, which is a constant. The effective force acting to move the piston is its weight minus the sum of the just mentioned effective static head and the resistance offered by surface friction and the valve 49. In other words, the effective force is substantially constant for a given setting of the valve 49 and under the influence of this force the piston will act as a falling body with constant acceleration and therefore with a progressively increasing velocity. By varying the opening of the valve 49 this effective force can be varied and consequently the acceleration of the piston and its resultant velocities can be varied.

The cylinder may be of any suitable construction and as shown is permanently closed at its lower end and at its upper end is provided with the movable cover 65 hereinbefore referred to. The boss 63 on the

cover is perforated to receive the plunger rod 41 and the walls of said perforation are enlarged as shown at 67 to cause the plunger to contact the rod only at the upper portion of the boss and at the lower side of the cover, the edges 68 of the material contacting the plunger rod being rounded to reduce friction and vibration.

The plunger, which as heretofore described is composed of weights 43, may be varied in weight by increasing or diminishing the number of weights making up the plunger, and by employing weights of different thickness, access to the cylinder for this purpose being readily attained by removing the cover 43. In practice, each weight is provided with a perforation 69, which when the weights are assembled to form the plunger, are placed in alignment so as to provide a passage extending from the upper to the lower surface of the plunger. The lower weight carries at its lowermost surface a flap valve 71 which in conjunction with the passage 69 permits the plunger to be readily raised from its lowermost to its uppermost portion. Preferably the flap valve is so constructed that it will immediately close on the initiation of descent of the plunger, and if desired any suitable means may be provided for insuring that the weights will be held in such relative position that the perforations 69 will be in alignment.

For permitting the descent of the plunger to be uninfluenced by the formation of a partial vacuum above the liquid, the upper portion of the cylinder may be in permanent communication with the atmosphere and for this purpose I have shown the breather pipe 73 carried by the cover 65 of the cylinder.

The operation of my device will be apparent from the foregoing description. Briefly, however, with the parts in the position shown by the drawing if it is desired to cut a record the operator will first set the handle 53 to that position on the scale 55 which indicates a time slightly in excess of the duration of the sound to be recorded and then to start the apparatus the valve 51 is moved to its full open position which permits the plunger to begin its descent and thereby feed the center of the record tablet toward the stylus. For forming the "stop line," after the sound to be recorded ceases, the valve 49 is moved to a wider open position which will materially increase the pitch of the record groove and when the stop 57 causes cessation of movement of the plunger,—which will cause the stylus to cut a circular terminal groove, the stylus is raised from the record. The parts are then moved back to their initial position by any convenient means, for example by a handle 75 attached to the frame supporting the turntable, and after this is done the parts are

held in their initial position by closing the valve 52.

It will be understood that the cylinder and plunger with the by-pass pipe 47 exemplify a weight motor with a liquid escapement, and that although for the purpose of illustrating my invention I have shown the same embodied in an apparatus for forming a record on a disk tablet, the invention may be applied to apparatus for cutting a record on a cylindrical tablet. It will also be understood by those skilled in the art that instead of moving the record tablet laterally against the stylus I may move the stylus laterally against the revolving tablet, and that although I have described one specific embodiment of my invention for illustrative purposes I am not limited thereto and that within the scope of my invention wide deviations may be made therefrom without departing from the spirit of my invention.

Claims—

1. In a sound recording apparatus, the combination with a rotating record tablet and a stylus for cutting the record groove, a support for said tablet and stylus permitting relative motions therebetween radially of said tablet for giving pitch to the record groove, means for causing such relative motion, said means automatically causing such motion to increase at a constant rate for constantly increasing the pitch of said groove as said stylus cuts toward the axis of rotation of said tablet without interrupting the contact of said stylus with the record tablet.

2. In a sound recording apparatus, the combination with a rotating record tablet and a stylus for cutting the record groove, a support for said tablet and stylus permitting relative motions therebetween radially of said tablet for giving pitch to the record groove, a vertically arranged cylinder containing a body of liquid, a weight constituting a piston for said cylinder connected for causing the relative motion between said tablet and stylus, a discharge conduit from the portion of said cylinder below said weight, a regulatable valve in said discharge conduit for determining the speed of descent of said weight whereby the length of the record groove may be regulated, and a conduit for returning the fluid passing said valve to the cylinder portion above the weight for causing said weight to act against a constant force whereby said weight will descend with substantially constant acceleration and progressively increase the pitch of the record groove as the stylus cuts toward the axis of rotation of said tablet.

3. In sound recording apparatus, the combination with a rotating record tablet support and a stylus for cutting the record groove, of supporting means for said record

tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, and motor mechanism having a fluid escapement for causing said relative motion.

4. In sound recording apparatus, the combination with a rotating record tablet support and a stylus for cutting the record groove, of supporting means for said record tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, means for exerting a force tending to cause said relative motion, and a fluid escapement for controlling the application of said force.

5. In sound recording apparatus, the combination with a rotating record tablet support and a stylus for cutting the record groove, of supporting means for said record tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, means for exerting a force tending to cause said relative motion, a fluid escapement for controlling the application of said force, and means for regulating said escapement.

6. In sound recording apparatus, the combination with a rotating record tablet support and a stylus for cutting the record groove, of supporting means for said record tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, a weight motor for causing said relative motion, and a fluid escapement for said motor.

7. In sound recording apparatus, the combination with a rotating record tablet support and a stylus for cutting the record groove, of supporting means for said record tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, a weight motor for causing said relative motion, a fluid escapement for said motor, and means for regulating said escapement.

8. In sound recording apparatus, the combination with a rotating record tablet support and a stylus for cutting the record groove, of supporting means for said record tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, a weight for causing said relative motion, means for applying fluid pressure directly to said weight, and means for permitting the gradual escape of said fluid.

9. In sound recording apparatus, the combination with a rotating record tablet support and a stylus for cutting the record groove, of supporting means for said record tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, motor means including a relatively movable cylinder and plunger for causing said relative motion, and means for

permitting the gradual escape of fluid from said cylinder.

10. In sound recording apparatus, the combination with a rotating record tablet support and a stylus for cutting the record groove, of supporting means for said record tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, a vertically arranged cylinder member, a plunger member in said cylinder member, said members being movable relatively to each other, means for utilizing the relative movement of said cylinder member and plunger member for causing the relative motion between said record support and stylus, and a restricted discharge means for the contents of said cylinder member.

11. In sound recording apparatus, the combination with a rotating record tablet support and a stylus for cutting the record groove, of supporting means for said record tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, a relatively movable cylinder member and plunger member, said cylinder member being vertically arranged and said plunger member being within said cylinder member, means for utilizing the relative movement of said members for causing the relative motion between said record tablet support and stylus, and a regulatable restricted discharge means for the contents of said cylinder member.

12. In sound recording apparatus, the combination with a rotating record tablet support and a stylus for cutting the record groove, of supporting means for said record tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, a vertically arranged cylinder, a plunger in said cylinder, means for utilizing the motion of said plunger for causing the relative motion between said record tablet support and stylus, and a restricted discharge from said cylinder beneath said plunger.

13. In sound recording apparatus, the combination with a rotating record tablet support for a disk record and a stylus for cutting the record, of supporting means for said record tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, and motor means having a liquid escapement for causing said relative movement and progressively increasing said relative movement as the stylus cuts toward the center of said record tablet.

14. In sound recording apparatus, the combination with a rotating record tablet support for a disk record and a stylus for cutting the record, of supporting means for said record tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, motor

means for exerting a force tending to cause said relative movement, and fluid escapement means for controlling the application of said force and increasing said relative movement as the stylus cuts toward the center of said record tablet.

15. In sound recording apparatus, the combination with a rotating record tablet support for a disk record and a stylus for cutting the record, of supporting means for said record tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, motor means for causing said relative movement, escapement means for controlling said relative movement, and means dependent on the motion of said motor for increasing the relative movement as the stylus cuts toward the center of said record tablet.

16. In sound recording apparatus, the combination with a rotating record tablet support for a disk record and a stylus for cutting the record, of supporting means for said record tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, motor mechanism for causing said relative movement, escapement means for said motor mechanism, and means for increasing said relative motion as the stylus cuts toward the center of said record tablet.

17. In sound recording apparatus, the combination with a rotating record tablet support for a disk record and a stylus for cutting the record, of supporting means for said record tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, motor means for causing said relative movement, said motor means comprising a relatively movable cylinder and plunger, a liquid in said cylinder, a discharge orifice for permitting displacement of said liquid and escape thereof from said cylinder, and conduit means communicating with said orifice for so disposing the liquid displaced as to augment the relative motion of said cylinder and plunger.

18. In sound recording apparatus, the combination with a rotating record tablet support for a disk record and a stylus for cutting the record, of supporting means for said record tablet support and stylus permitting relative motion therebetween for giving pitch to the record groove, a vertically arranged cylinder, a plunger in said cylinder, a liquid in said cylinder beneath said plunger, conduit means for conveying liquid from beneath said plunger to the cylinder portion above said plunger, and means for causing the motion of said plunger to impart relative motion to said record tablet support and stylus.

19. In sound recording apparatus, the combination with a rotating record tablet

support for a disk record and a stylus for cutting the record, of supporting means for said record support and stylus permitting relative motion therebetween for giving
 5 pitch to the record groove, a vertically arranged cylinder, a plunger in said cylinder, a liquid in said cylinder beneath said plunger, conduit means for conveying liquid from beneath said plunger to the cylinder portion
 10 above said plunger, means for restricting said conduit, and means for causing the motion of said plunger to impart relative motion to said record tablet support and stylus.

20. In sound recording apparatus, the
 15 combination with a rotating record tablet support for a disk record and a stylus for cutting the record, of supporting means for said record tablet support and stylus permitting relative motion therebetween for
 20 giving pitch to the record groove, a vertically arranged cylinder, a plunger in said cylinder, a liquid in said cylinder beneath said plunger, conduit means for conveying liquid from beneath said plunger to the cyl-
 25 nder portion above said plunger, means for adjustably restricting said conduit, and means for causing the motion of said plunger to impart relative motion to said record tablet support and stylus.

30 21. The combination with a relative movable support for a sound recording record tablet and stylus for cutting the record groove, of a vertically arranged cylinder, a plunger in said cylinder, a liquid beneath
 35 said plunger, a by-pass conduit connecting opposite end portions of said cylinder, a valve in said conduit for regulating its effective cross sectional area, and means for causing the relative movement between said
 40 stylus and record tablet support comprising a ligature for operatively connecting one of them to said plunger.

45 22. The combination with a relative movable support for a sound recording record tablet and stylus for cutting the record groove, of a vertically arranged cylinder, a plunger in said cylinder, a liquid beneath
 50 said plunger, a by-pass conduit connecting opposite end portions of said cylinder, a valve in said conduit for regulating its effective cross sectional area, a second valve in said conduit for blanking and substan-
 55 tially unrestrictedly opening said conduit, and means for causing the relative movement between said stylus and record tablet support comprising a ligature for operatively connecting one of them to said plunger.

60 23. The combination with a relative movable support for a sound recording record tablet and stylus for cutting the record groove, of a vertically arranged cylinder, a plunger in said cylinder, a liquid beneath
 65 said plunger, a by-pass conduit connecting opposite end portions of said cylinder, a

valve in said conduit for regulating its effective cross sectional area, a second valve in said conduit for blanking and substantially unrestrictedly opening said conduit, said second valve being between said first
 70 mentioned valve and the discharge end of said conduit, and means for causing the relative movement between said stylus and record tablet support comprising a ligature for operatively connecting one of them to said
 75 plunger.

24. The combination with a bodily movable record tablet support and a stationary stylus for cutting the record groove, of driving means for rotating said record tablet
 80 support, said driving means permitting said bodily movement of said record tablet support, means tending to cause said bodily movement of said record tablet support, and a fluid escapement for controlling said bod-
 85 ily movement.

25. The combination with a bodily movable record tablet support and a stationary stylus for cutting the record groove, of driving means for rotating said record tablet
 90 support, said driving means permitting said bodily movement of said record tablet support, means tending to cause said bodily movement of said record tablet support, means opposing said bodily movement, and
 95 a ligature for operatively connecting one of ily movement.

26. The combination with a bodily movable record tablet support and a stationary stylus for cutting the record groove, of driving
 100 means for rotating said record tablet support, said driving means including a driving belt having a tension device which permits bodily movement of said record tablet support, and motor means including a
 105 weight and a liquid escapement for causing bodily movement of said record tablet support.

27. The combination with a rotatable turntable for a record tablet and a station-
 110 ary stylus for cutting the record groove, of a horizontally sliding support for said turntable, driving means for said turntable including a horizontally disposed belt, said driving means being arranged to permit
 115 sliding of said support for said turntable, a vertically arranged liquid containing cylinder having a plunger therein, said plunger being connected by a ligature to said sliding turntable support, and said ligature being so
 120 disposed to exert a force in the direction in which said turntable support slides.

28. The combination with a relatively movable record tablet support of a sound recording apparatus and a stylus for cutting
 125 the record groove, of a cylinder, a plunger in said cylinder for causing said relative movement, a by-pass conduit connecting the opposite end portions of said cylinder, said plunger having a passage opening on oppo-
 130

site sides thereof, and a check valve for controlling said passage.

29. The combination with a relatively movable record tablet support of a sound recording apparatus and a stylus for cutting the record groove, of a vertically arranged cylinder, a plunger in said cylinder for causing said relative movement, a by-pass conduit connecting the opposite end portions of said cylinder, said plunger having a passage opening on opposite sides thereof, and a downwardly opening check valve for controlling said passage.

30. The combination with a relatively movable record tablet support of a sound recording apparatus and a stylus for cutting the record groove, of a cylinder, a plunger in said cylinder and means cooperating therewith for causing the relative movement between said record tablet support and stylus, and means for varying the weight of said plunger.

31. The combination with a relatively movable record tablet support of a sound recording apparatus and a stylus for cutting the record groove, of a cylinder, a plunger in said cylinder and means cooperating therewith for causing the relative movement between said record support and stylus, and said plunger comprising a plurality of removable weights.

32. The combination with a relatively movable record tablet support of a sound recording apparatus and a stylus for cutting the record groove, of a cylinder, a plunger in said cylinder and means cooperating therewith for causing the relative movement between said record tablet support and stylus, and said plunger comprising a plurality of removable weights each fitting the wall of said cylinder.

33. The combination with a relatively movable record tablet support of a sound recording apparatus and a stylus for cutting the record groove, a ligature for causing the relative movement between said record tablet support and stylus, removable weights suspended by said ligature, and a fluid escapement for controlling the descent of said weights.

34. The combination with a relatively movable record tablet support of a sound recording apparatus and stylus for cutting the record groove, an expansible chamber having a movable wall and means cooperating therewith for causing the relative movement between said record tablet support and stylus, means tending to move said wall, and a restricted discharge for the contents of said expansible chamber.

35. The combination with a relatively movable record tablet support of a sound recording apparatus and stylus for cutting the record groove, an expansible chamber having a movable wall and means cooperating

therewith for causing the relative movement between said record tablet support and stylus, means tending to move said wall, and a regulatable restricted discharge for the contents of said expansible chamber.

36. In a sound recording apparatus having a record tablet support and stylus for cutting the record groove, a mounting for said record tablet support and stylus permitting relative motion therebetween for giving pitch to said record groove, and means for causing said relative motion and permitting the rate of said motion to be instantly changed at any point during the cutting of said groove without interrupting the contact of said stylus with the record tablet.

37. In a sound recording apparatus having a record tablet support and stylus for cutting the record groove, a mounting for said record tablet support and stylus permitting relative motion therebetween for giving pitch to said record groove, and means for causing said relative motion, a fluid escapement associated with said means, and valvular mechanism permitting the rate of said relative motion to be changed at any point during the cutting of the record groove without interrupting the contact of said stylus with the record tablet.

38. In a sound recording apparatus having a record tablet support and a stylus for cutting the record groove, feeding means for causing the stylus to give pitch to the record groove, and manually operated means for changing the rate of feeding at any point during the cutting of said record groove without interrupting the contact of said stylus with the record tablet.

39. In a sound recording apparatus having a record tablet support and a stylus for cutting the record groove, feeding means for causing the stylus to give pitch to the record groove, said means automatically progressively accelerating the rate of feeding and having manual means for changing the rate of acceleration.

40. In a sound recording apparatus having a record tablet support and a stylus for cutting the record groove, feeding means for causing the stylus to give pitch to the record groove, said means automatically progressively accelerating the rate of feeding in consonance with the length of groove cut and having manually operated means for changing the rate of acceleration.

41. In a sound recording apparatus having a record tablet support and a stylus for cutting the record groove, feeding means for causing the stylus to give pitch to the record groove, and means for changing the rate of feeding at the will of the operator without changing the contact of said stylus with the record tablet.

42. In a sound recording apparatus having a record tablet support and a stylus for

cutting the record groove, feeding means for causing the stylus to give pitch to the record groove, and means for changing the rate of feeding at the will of the operator at any point during the cutting of the record groove without interrupting the contact of said stylus with the record tablet.

43. In a sound recording apparatus, a relatively movable record tablet support and stylus for cutting the record groove, a ligature for actuating the relative movement between said record tablet support and stylus, and means for putting said ligature under tension.

44. In a sound recording apparatus, a relatively movable record tablet support and stylus for cutting the record groove, a ligature for causing the relative movement between said record tablet support and stylus, means for putting said ligature under tension, and means for varying said tension at any point during the cutting of the record groove without interrupting the contact of said stylus with the record tablet.

45. In a sound recording apparatus, a relatively movable record tablet support and stylus for cutting the record groove, a ligature for causing the relative movement between said record tablet support and stylus, means for putting said ligature under tension, and means for varying said tension at the will of the operator.

46. In a sound recording apparatus, a relatively movable record tablet support and stylus for cutting the record groove, a ligature for causing the relative movement between said record tablet support and stylus, means for putting said ligature under tension, and means for varying said tension at the will of the operator at any point during the cutting of the record groove without interrupting the contact of said stylus with the record tablet.

47. The combination with a rotatably mounted record tablet support, of a stylus for cutting the record groove, power means for rotating the record tablet support; and

other power means independent of the power means first named for feeding said record tablet support to move said record tablet laterally against said stylus.

48. The combination with a record tablet support and stylus, power means for rotating said record tablet support, and means independent of said power means for creating a force for causing relative movement laterally between said record tablet support and stylus.

49. In a sound recording apparatus having a record tablet support and a stylus for cutting the record groove, feeding means for causing the stylus to give pitch to the record groove, and means for increasing or diminishing at the will of the operator the pitch of the record groove while the stylus is in contact with the record tablet and cutting the record groove.

50. In a sound recording apparatus having a record tablet support and a stylus for cutting the record groove, feeding means for causing the stylus to give pitch to the record groove, and means for changing at the will of the operator the pitch of the record groove while the stylus is in contact with the record tablet and cutting the record groove.

51. In a sound recording apparatus, the combination with a rotating record tablet and stylus for cutting the record groove, a support for said tablet and stylus permitting relative motion therebetween radially of said tablet for giving pitch to the record groove, means for causing the radial motion, said means acting automatically to increase the radial motion at a constant rate as the groove cuts toward the axis of rotation of said record tablet, and said means comprising manually controlled means for materially increasing and then interrupting the radial motion while the stylus is in contact with the record tablet.

In testimony whereof, I have signed my name to this specification.

JOHN O. PRESCOTT