

G. JUNGREN.
SOUND RECORDING AND REPRODUCING MACHINE.
APPLICATION FILED FEB. 27, 1905.

995,680.

Patented June 20, 1911.

3 SHEETS—SHEET 1.

Fig. 1

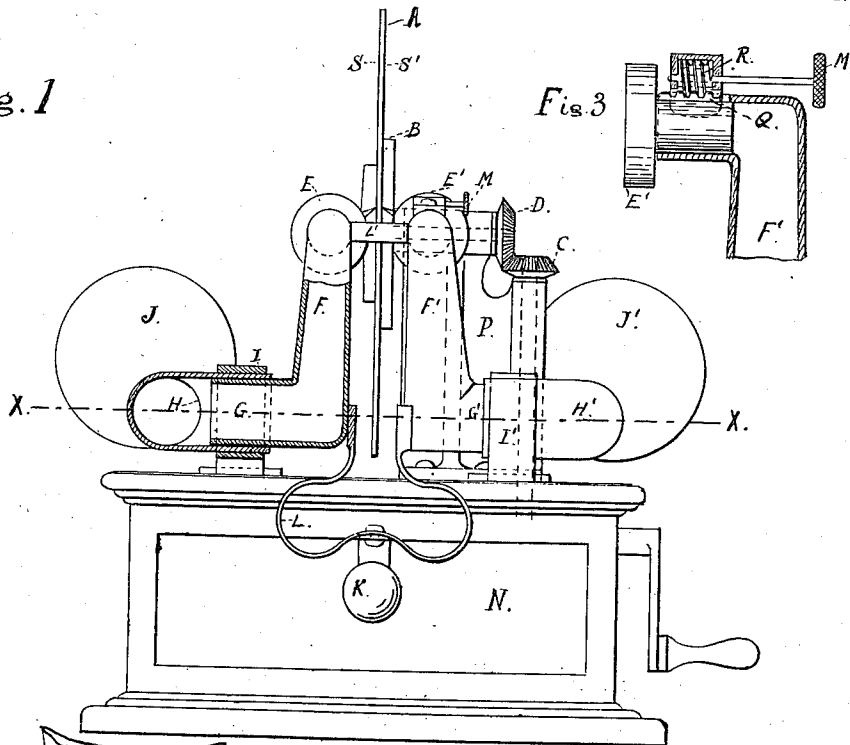


Fig. 3

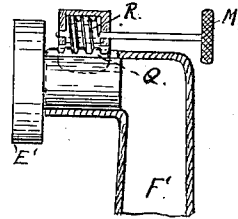
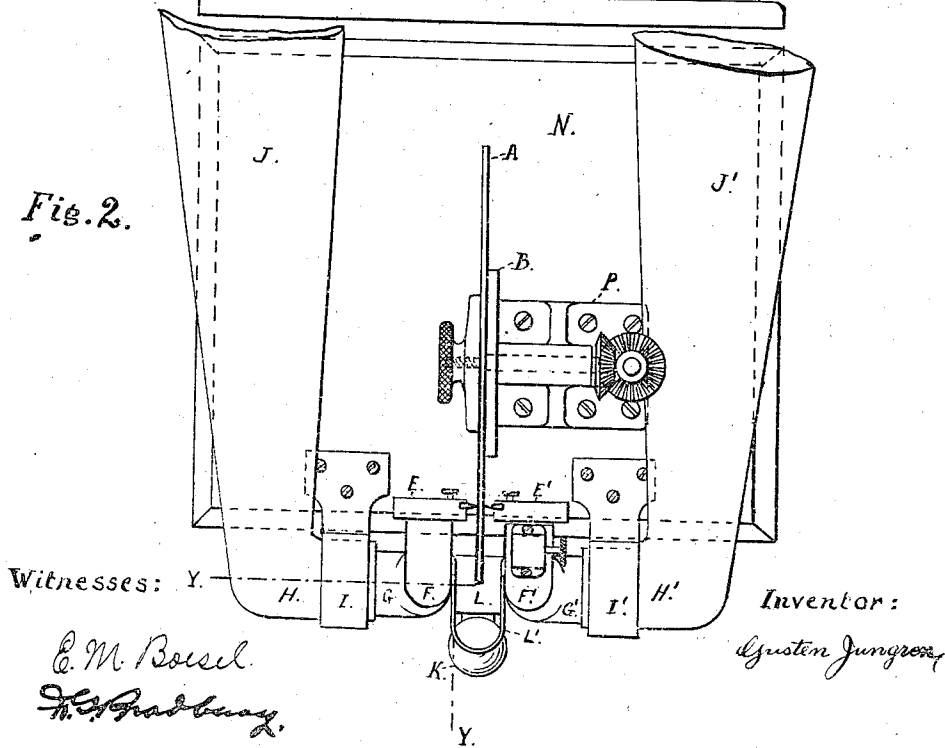


Fig. 2.



Witnesses: Y.

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3 SHEETS—SHEET 2.

Fig. 4.

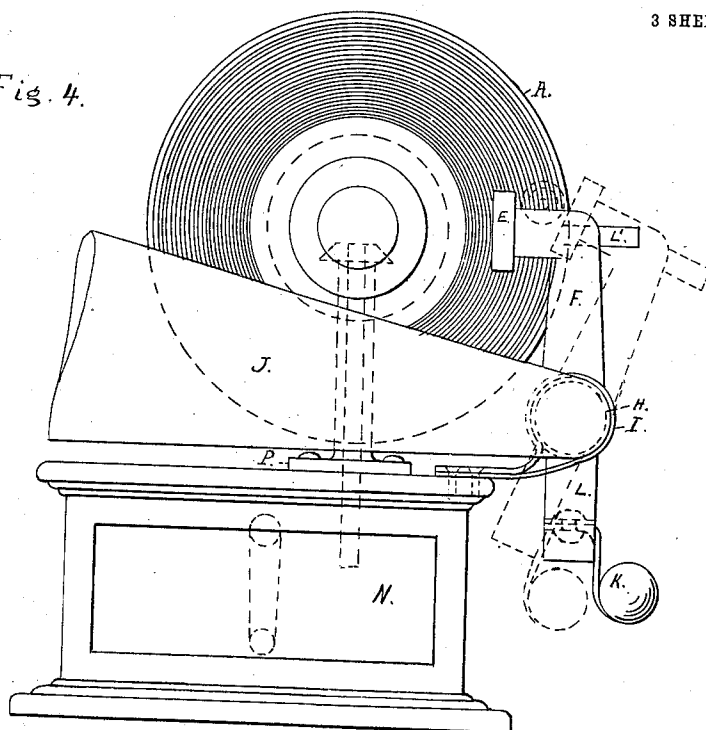
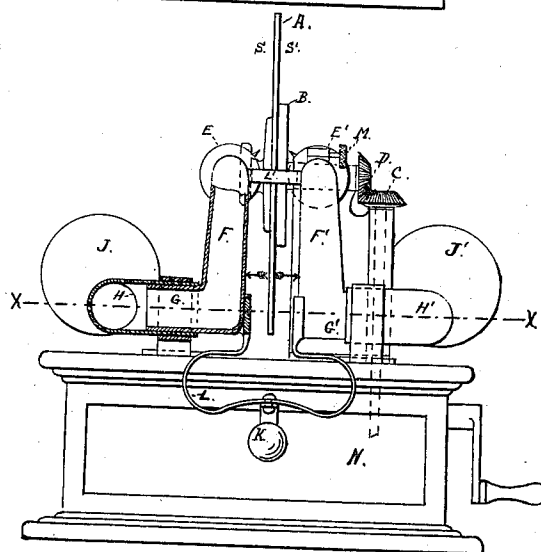


Fig 5.



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3 SHEETS—SHEET 3.

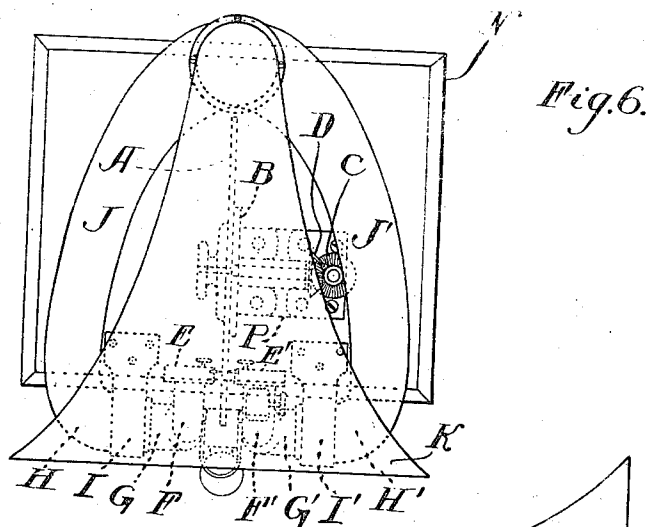


Fig. 6.

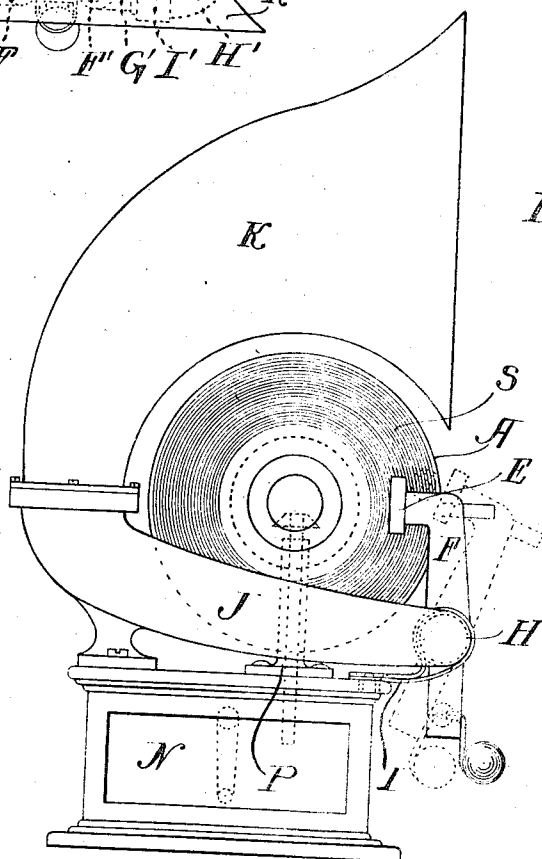


Fig. 7.

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UNITED STATES PATENT OFFICE.

GUSTEN JUNGREN, OF ST. PAUL, MINNESOTA, ASSIGNOR OF TWO-FIFTHS TO
FREDERICK G. BRADBURY, OF ST. PAUL, MINNESOTA.

SOUND RECORDING AND REPRODUCING MACHINE.

995,680.

Specification of Letters Patent. Patented June 20, 1911.

Application filed February 27, 1905. Serial No. 247,625.

To all whom it may concern:

Be it known that I, GUSTEN JUNGREN, a citizen of the United States, residing at St. Paul, Ramsey county, State of Minnesota, have invented a new and useful Sound Recording and Reproducing Machine, of which the following is a specification.

My invention is a sound-recording and reproducing machine, in which a musical composition or other combination of sounds is recorded in plural and unlike or similar parts or portions on plural recording surfaces, one surface for each part. These parts or portions of the record are then reproduced at the same time and together so that the corresponding elements of tone and rhythm in them coincide making the effect like that of the original production.

The object of my invention is to give more volume, clearness and strength to the reproduction of sounds and also to bring out the musical harmonies more fully than can be done by the method now in use of recording the sounds on one surface only.

In the accompanying drawings, Figure 1 is an elevation of my invention, partly in section along the line Y—Y (Fig. 2); Fig. 2 is a top plan, showing the sound conveying tubes partly broken away; Fig. 3 is a section of the upper end of one of the tubular arms, supporting a sound-box; Fig. 4 is a side view of Fig. 1; Fig. 5 is a view similar to Fig. 1, with the sound-boxes spread apart; Fig. 6 is a plan of my invention with a single amplifying horn, and Fig. 7 is a side elevation of the construction illustrated in Fig. 6.

These drawings and the following detailed description relate to a style of my invention wherein only two disk-surfaces are used for the recording and reproducing simultaneously of the musical composition or other combination of sounds selected. The sound waves from the original production are divided into two parts and by means of receiving funnels or horns, conveyed to and simultaneously recorded upon two disk-surfaces, one part on each surface, said surfaces being of the same size and rotating at exactly the same speed, one from left to right, the other from right to left and presenting a material, and other conditions, favorable for and usually employed for the recording of sounds. These two parts or halves, together constituting the record in

full of the selection are then reproduced at the same time, the corresponding elements of tone and rhythm in them simultaneously, so that the effect will be like the original production. The recording of the two parts of the record may be done upon the surfaces of two separate disks of equal conditions as to size, speed, etc., the two parts, in the duplication of the first record may be transferred later upon the two surfaces of one disk, corresponding convolutions of the spiral sound-grooves and the elements of sound therein exactly opposite each other; or it may be done at once upon the two faces of one disk which will then constitute a master record from which others may be duplicated. The two parts or halves of the record may be made similar or unlike, phonetically, and I do not wish to limit myself to either of these two alternatives but I prefer an arrangement whereby dissimilar parts of the musical composition or other combination of sounds selected are recorded upon the two surfaces. Such an arrangement enables me to bring out the various parts more distinctly and unmixed thus rendering the musical harmonies more clear and like those of an original production. The following is a brief description of such an arrangement: The performers of the sounds to be recorded and reproduced must all perform at once and under the usual conditions for recording sounds upon disk-surfaces; only that they are divided into two groups within hearing distance of each other so that the selection may be well rendered as to rhythm, expression, and so forth, but far enough apart so that the sound waves from each of these two groups may be gathered and conveyed, by means of receiving horns, to two disk-surfaces, in the spiral sound-grooves of which they are recorded, without being in a great degree commingled with the vibrations from the other part. In the grouping of the performers those producing sounds mostly alike as to pitch, volume, and so forth, should be placed together. In the case of a band of wind instruments or an orchestra, the trebles on one side, and the basses on the other; if a vocal duet, the high voice may be placed and recorded on the one surface, the lower pitched voice on the other, and the accompaniment with the latter, or divided, as its nature may require; if a male quartet the tenors should sing to-

gether to the one surface, the basses being recorded upon the other and so forth.

In the accompanying drawings, A represents a disk-record conforming to the above requirements, having upon its surfaces S S', in two parts, a record of a musical selection.

C D are bevel gears transmitting the motion from the motor (not shown) in the cabinet N to the turn-table B, onto which the disk is secured. P is a supporting frame, secured to the top of the cabinet and having journal bearings for the two shafts of said bevel gears.

E E' are two sound-boxes of ordinary construction, having their reproducing-needle-points exactly opposite to each other on the two surfaces S S'.

F F' are two tapering tubular arms receiving and supporting the two sound-boxes and bent at their upper ends at right angles so as to hold the sound-boxes in the proper position to the disk-surfaces. The sound vibrations from the sound-boxes are conveyed through the tubular elbows formed by the attachment of the tubes C C', at right angles to the arms F F', and then through the tubular fittings H H', which are secured to the cabinet by means of the brackets I I', and through the tapering tube J J'; the latter may serve to convey the sound directly to the auditors but I recognize it as a desirable construction to add a swivel amplifying-horn K into the smaller end of which the larger terminals of the tubes J J' then should converge. Such horn is shown in Figs. 6 and 7.

The tubular arms F F', with the tubes C C' firmly joined to them and to sound-boxes at their upper ends, are joined together by means of two springs L L' which, being shaped so as not to interfere with the interposing disk, press the reproducing-needles against the disk-surfaces. By means of these springs the parts E, F, G, L, G', F', and E' move together as one piece, which may either slide right and left in the tubular bearings H H', to compensate for uneven motion in the disk, or swing parallel with the disk as the needle-points move in the spiral sound-grooves upon the disk toward the center, or both. By this means of connecting the tubular arms may be distanced from each other by forcing the springs to spread and thus the adjustment and replacement of reproducing-needles in the sound-boxes is facilitated.

The cycles of the spiral grooves upon the disk-surfaces being very close together, ninety or more of them to an inch, the main difficulty to overcome in my method of sound-reproduction is to get, with certainty, the two reproducing-needle-points to run at the same time in the corresponding convolutions of the spiral grooves upon the two surfaces. This difficulty I overcome in the

following manner: One, or both, of the sound-boxes—for example I will choose E'—is movable, in and out, in its tubular supporting arm F', by means of a rack Q (Fig. 3) having teeth secured thereto and a pinion, or worm R, provided with a milled head M, fastened upon the tubular arm and working in the teeth of said rack Q. When the needles have been replaced the operator holds the sound-boxes close to the edge of the disk, but disengaged therefrom (this position is indicated in Fig. 4 by dotted lines) and looking down upon the points of the reproducing-needles, he turns the milled head M, adjusting the two points as nearly opposite as he is able. As this cannot be deemed sufficient for accuracy, for in making of the record, the corresponding cycles of the sound-grooves may not have been placed exactly opposite each other on the two surfaces, as intended, I have provided the disk-record, hereinbefore partially described, with a signal prefacing the main record, said signal consisting of numerals, letters, syllables, or words constituting a series of numbers, letters, a word, words or a phrase and recorded in quick succession alternatively upon the two disk-surfaces. For illustration I will say that the signal consists of the compound word "all-right". The word "all" is then recorded upon the surface S and the word "right" is recorded upon the surface S'. These words need not be loud, merely sufficient to be heard by the operator. As soon as the reproducing-needles engage the sound-groove of the revolving disk the word "all-right" will be heard provided the needle-points have the proper relation to each other. If the machine calls out "right-all" the operator, being duly instructed as to what the signal should be will understand that the sound-box E' engages the record ahead of its companion sound-box E and that it therefore should be drawn back the width of one sound-groove or more, as indicated by the separateness of the two words, by means of slightly turning the milled head M. Again, should the effect be "all—right" the distancing of the words would indicate that the sound-box E is in advance and hence that E' should be moved in the opposite direction to that in the previous case. By having "one" recorded upon the surface S "two" upon S', "three" upon S, and "four" upon S' in close succession the purpose in view may be still easier attained.

An additional advantage offered by my method of recording and reproducing sounds and adding a new feature to disk-record machines is that the reproduction of the record may be done backward, employing the same mechanism (but for a provision to turn the sound-boxes in their sockets, so as to get the right angle of the needles to the

disk) by reversing the disk upon the turntable and starting the reproducing at the inner, or central, instead of the marginal, ends of the spiral sound-grooves. Records intended to be used in this manner should be provided with a signal, as hereinbefore described, at the close of the record proper, in addition to the marginal signal. The reversing of records will in many instances cause amusing effects and may give musicians the clue to new melodies and harmonies and afford scientists better opportunities to analyze the principles of sound.

For the convenience of the operator all disk-records for the class of machines as set forth may be labeled in a manner to readily distinguish the two faces from each other.

My invention is applicable to sound-recording and reproducing machines, broadly; and while, in producing sounds from a disk-record of the class hereinbefore described, I deem that the vertical position of the disk, as shown, is most advantageous, the method and principle as set forth are also applicable to a horizontal or other position of the disk, with slight adaptation of details in the mechanism. I do not wish, therefore, to be understood as limiting myself to the style and arrangement as shown in the accompanying drawings.

I am not aware of the use, nor invention, prior to mine, of a sound-recording and reproducing machine having plural parts, or portions of the same selection of sounds upon plural recording surfaces, said parts recorded at the same time, and reproduced simultaneously, in such a manner that the corresponding elements in them coincide; or of a double-faced disk-record having phonetically unlike or similar parts of the same sound-record, one upon each surface to be simultaneously reproduced, corresponding elements of sound and rhythm in them coinciding; or any mechanism for reproducing sounds from such disk-records.

What I claim as new, therefore, and desire to secure by Letters Patent, is—

1. A sound recording and reproducing machine, comprising a rotatable record disk, having sound-records upon its opposite faces, and sound boxes having styluses simultaneously engaging said sound-records.

2. A sound recording and reproducing machine, comprising a movable record, having sound-records upon its opposite faces, and sound boxes having styluses simultaneously engaging said sound-records.

3. In a machine for reproducing sound, a record operatively exposed on two sides and means for producing sound from said record, comprising a pair of oppositely disposed reproducers adapted to be simultaneously influenced by said record.

4. In combination with a sound record

disk, means for simultaneously subjecting the opposite faces of said disk to sonorous vibrations, for the purposes specified.

5. In a machine for reproducing sound, a flat record operatively exposed on two sides, sound reproducers adapted to simultaneously engage said record on its opposite sides, and means for causing substantially equal pressure by said reproducers against the opposite sides of said record.

6. A machine of the class set forth, comprising a rotatable record disk, having sound-records upon its opposite faces, sound boxes, having styluses simultaneously engaging said sound-records, and means for causing a spiral line to be traced on the faces of said disk by the styluses.

7. In a machine of the class set forth, a disk record provided with sound grooves in each of its opposite faces, said grooves having coinciding and dissimilar phonetic parts, and means for simultaneously reproducing sound from said grooves.

8. In a machine of the class set forth, a disk record provided with sound grooves in its opposite faces, each groove recording a part of a combination of sounds, and means for simultaneously reproducing sound from said grooves.

9. In a machine of the class set forth, a disk record having a pair of sound reproducing grooves in its opposite faces, means for revolving said record in a vertical plane, a pair of styluses tracing in said grooves, and means for adjusting said styluses to register with corresponding phonetic parts in said grooves.

10. In a sound recording and reproducing machine, a sound record provided with opposed sound grooves, sound boxes provided with styluses coacting with said sound grooves to simultaneously reproduce parts of a combination of sounds, and a phonetic signal, recorded in said grooves, indicating the relative positions of said styluses.

11. In a sound recording machine, a record disk and simultaneously operable recorders having points adapted to inscribe sound grooves on the opposite faces of said disk.

12. In a sound recording and reproducing machine, a record disk provided with sound grooves in its opposed faces, sound boxes having points engaging the grooves in said disk, and means for adjusting said points in said sound grooves.

13. In a sound recording and reproducing machine, a record disk provided with sound grooves in its opposed faces, sound boxes having points engaging said sound grooves, and means for independently adjusting said points with relation to said grooves.

14. In a sound recording and reproducing machine, a record disk provided with sound grooves in the opposed faces thereof, sound

boxes having styluses tracing in said sound grooves, means for rotating said disk, and means for adjusting said sound boxes with their points in the sound grooves of said disk.

15. In a machine of the class set forth, a vertical turn table for holding a disk, means for actuating said turn table to turn said disk in a vertical plane, means for detachably holding said disk on said turn table, and sound boxes having styluses tracing upon the opposite faces of said disk.

16. In a machine of the class set forth, a record disk, having sound-records upon its opposite faces, means for rotating said disk in a vertical plane, and sound boxes having styluses simultaneously engaging said sound-records.

17. In a machine of the class set forth, the combination of a record disk, having sound-records upon its opposite faces, means for rotating said disk in a vertical plane, sound boxes, having styluses simultaneously engaging said sound-records, and means for amplifying the sounds reproduced by said boxes.

18. In a machine of the class set forth, the combination of a disk adapted to receive sound-records upon its opposite faces, means for rotating said disk in a vertical plane, sound boxes, having cutting tools simultaneously engaging the opposite faces of said disk, and means for conveying sound to said boxes.

19. A machine of the class set forth, comprising a movable record, having plural sound-records pertaining to the same phonetic composition, arranged to operate together and provided with a phonetic signal, and sound boxes having styluses simultaneously engaging said sound-records.

20. A sound record tablet provided with right and left hand spiral sound grooves and means for simultaneously reproducing sound from said grooves.

21. In a machine of the class set forth, a sound record tablet and means for simultaneously inscribing right and left hand sound grooves in said tablet.

22. In a machine of the class set forth, a sound record tablet and means for simultaneously inscribing right and left hand sound grooves in the opposite faces of said tablet.

23. In a machine for reproducing sound, a record tablet operatively exposed on two sides, sound reproducers adapted to simultaneously engage said record on its opposite sides, and resilient means for holding said

reproducers under equal pressure against the opposite sides of said tablet.

24. In a machine of the class set forth, a sound record tablet provided with right and left hand spiral sound grooves in its opposite faces, said grooves including a phonetic signal preceding the main part of the record, and means for simultaneously reproducing sound from said grooves.

25. In a sound reproducing apparatus, a traveling tablet having a sound record formed on each side thereof, a reproducing stylus shaped for engagement with one of said records and free to be vibrated and propelled by the same, and a reproducing stylus shaped for engagement with the other record and free to be vibrated and propelled by the same.

26. In a machine of the class set forth, a rotatable record disk, having sound records upon its opposite faces, sound reproducers simultaneously engaging said records to simultaneously reproduce from the records upon the opposite sides of said disk and a common amplifying horn connected with said reproducers.

27. In a sound reproducing apparatus, a traveling tablet having a sound record formed on each side thereof, a sound box having a reproducing stylus shaped for engagement with one of said records and free to be vibrated and propelled by the same, a second sound box having a reproducing stylus shaped for engagement with the other record and free to be vibrated and propelled by the same, and an amplifying horn in which said sound boxes have a common outlet.

28. A sound reproducing machine, including a double faced disk record tablet having sound records upon its opposite faces and sound reproducers simultaneously engaging said records to simultaneously reproduce from the records upon the opposite sides of said disk.

29. A sound reproducing machine, including a double faced disk record tablet having sound grooves upon its opposite faces and means for simultaneously reproducing from the records upon the opposite sides of said disk.

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

GUSTEN JUNGREN.

Witnesses:

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F. G. BRADBURY.