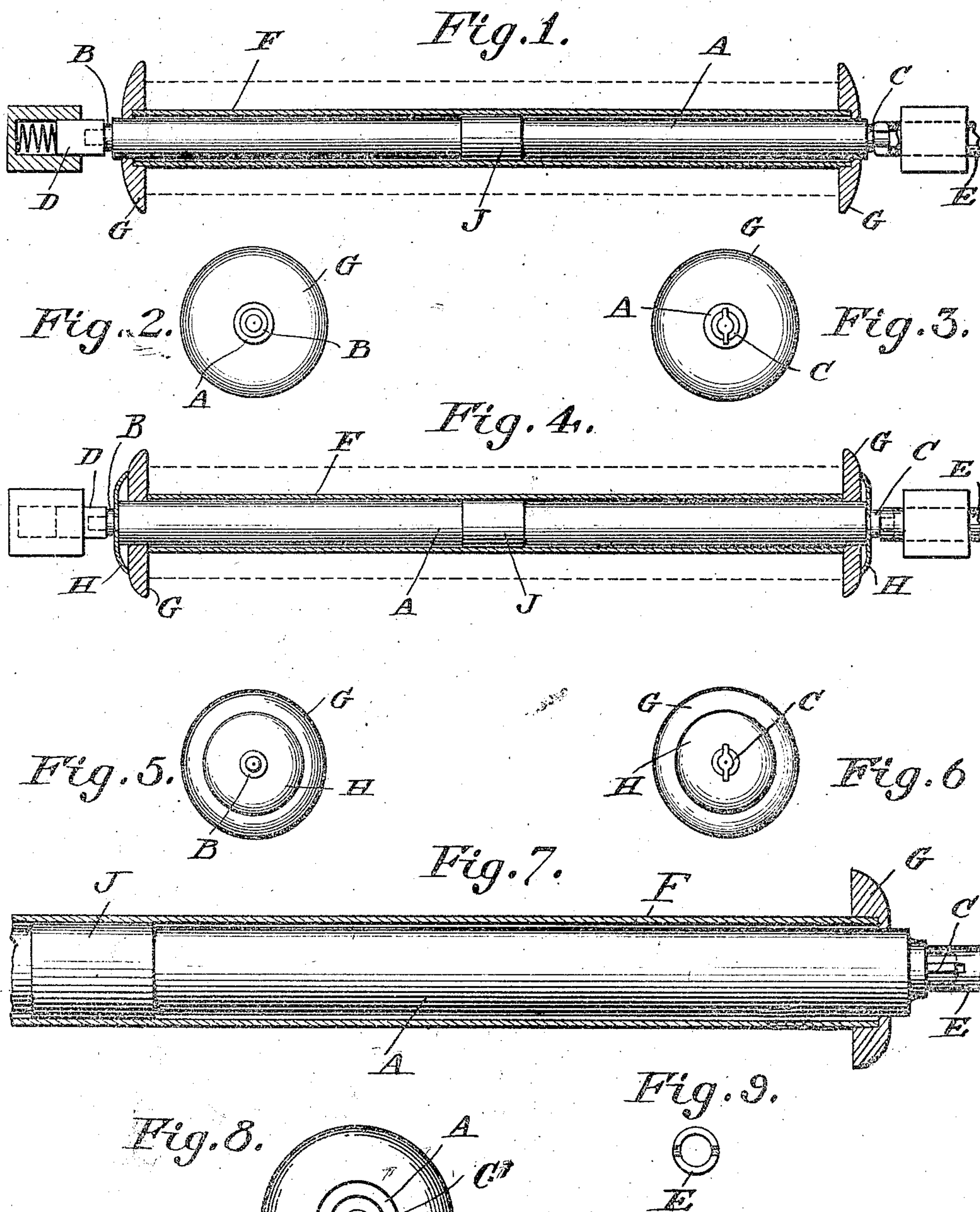


H. P. BALL.
MUSIC ROLL FOR MECHANICAL MUSICAL INSTRUMENTS.
APPLICATION FILED JAN. 29, 1902.

948,806.

Patented Feb. 8, 1910.

2 SHEETS—SHEET 1.

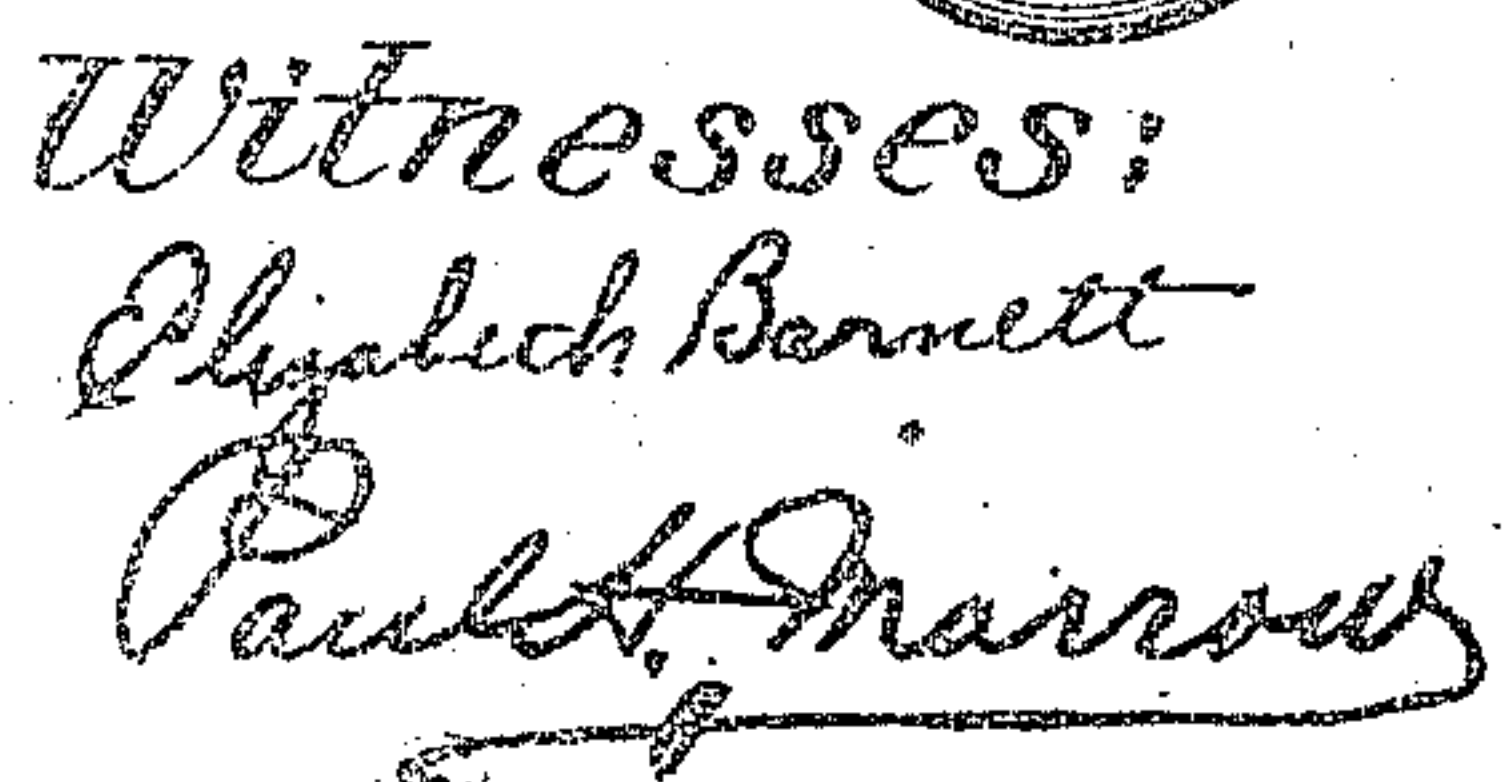
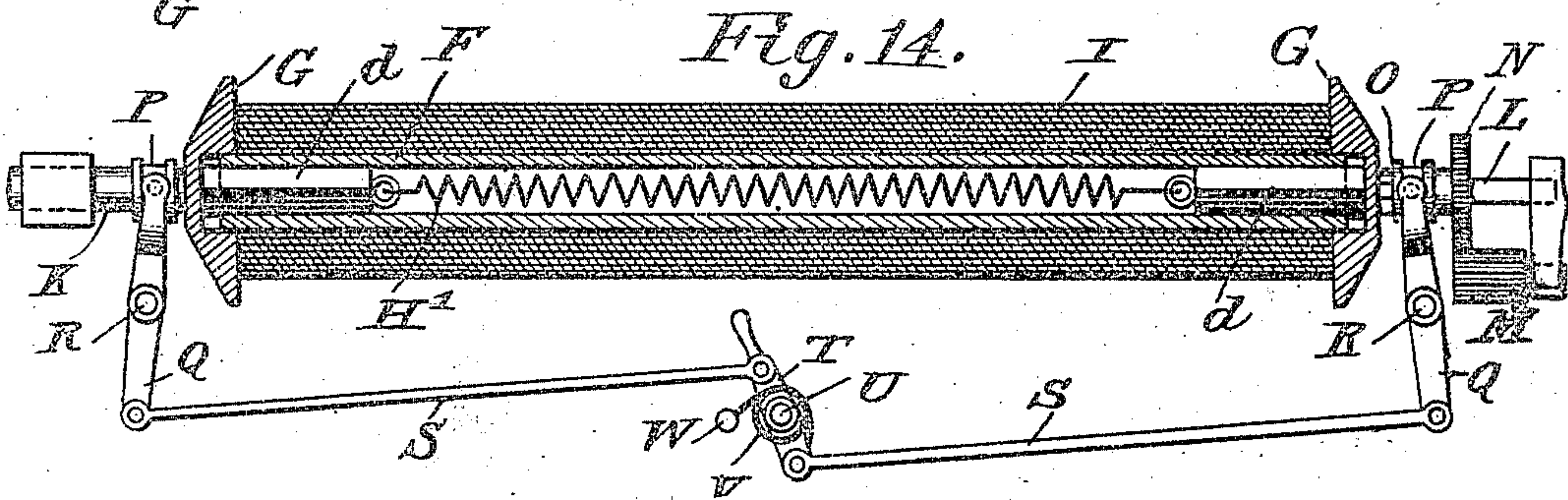
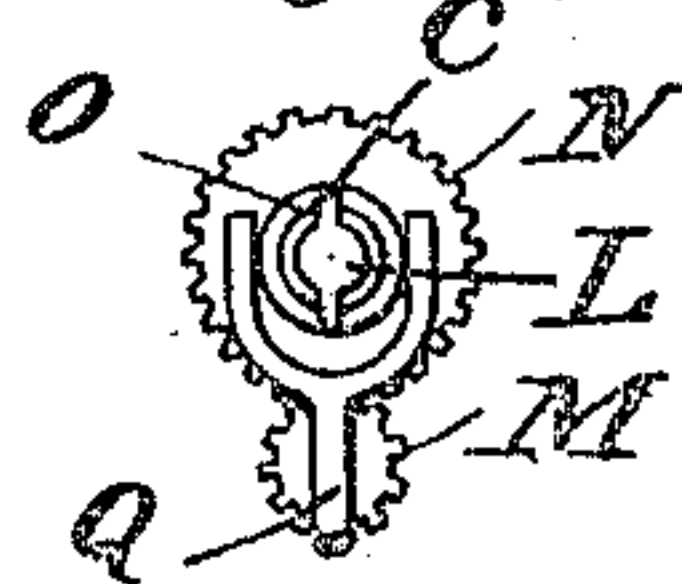
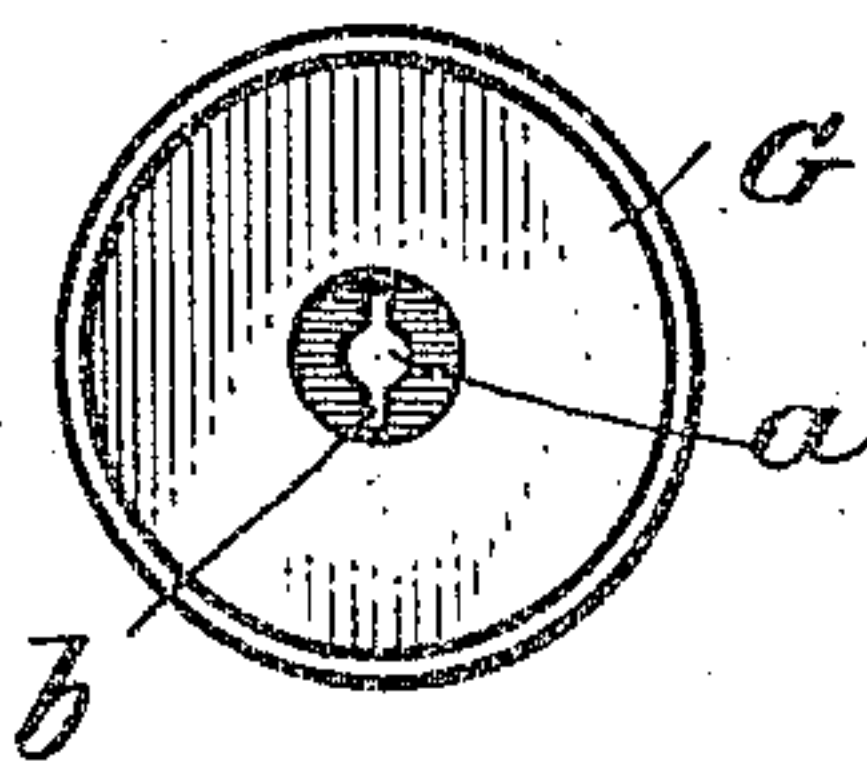
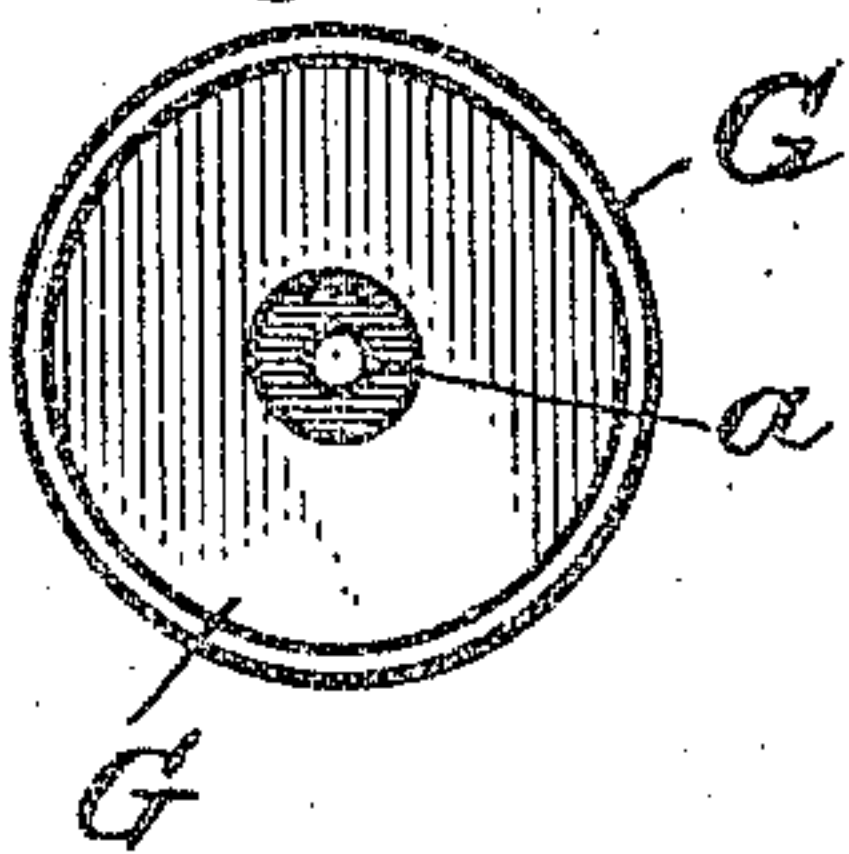
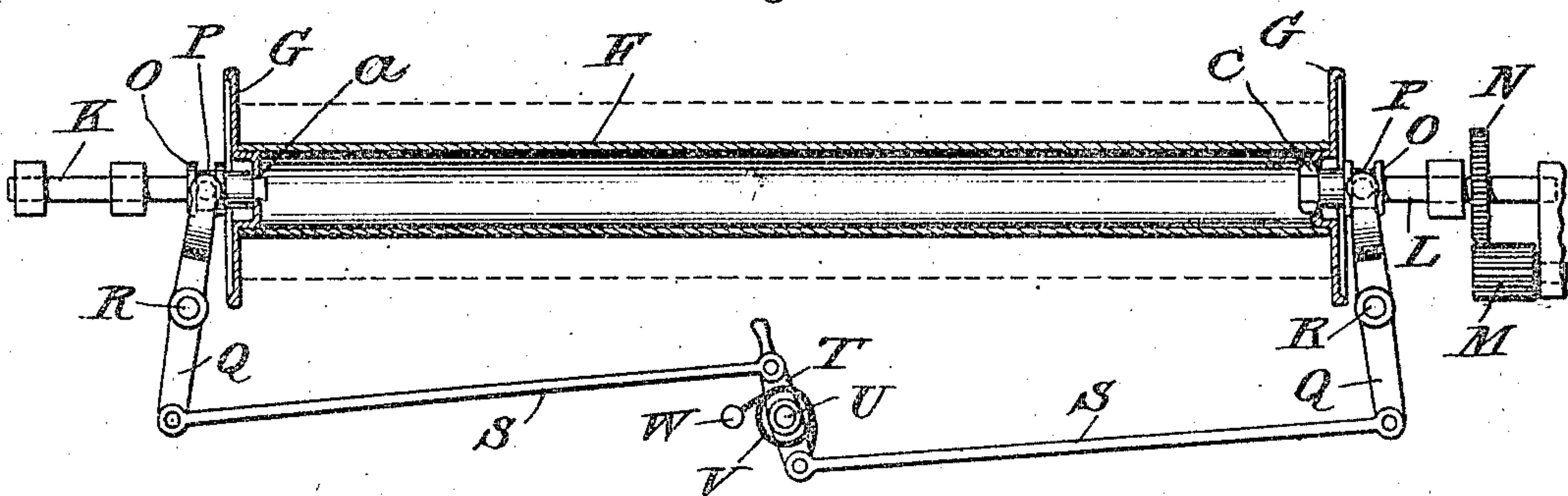


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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

HENRY PRICE BALL, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO SAMUEL INSULL, OF CHICAGO, ILLINOIS.

MUSIC-ROLL FOR MECHANICAL MUSICAL INSTRUMENTS.

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Specification of Letters Patent.

Patented Feb. 8, 1910.

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To all whom it may concern:

Be it known that I, HENRY PRICE BALL, a citizen of the United States, residing at New York city, county and State of New York, have invented certain new and useful Improvements in Music-Rolls for Mechanical Musical Instruments, of which the following is a specification.

My invention consists in a music roll constructed to automatically adjust the distance between its guiding flanges to compensate for variations in width of the perforated music strip or of the roll upon which the music strip is wound.

My invention also consists in the combination with such music roll and perforated music strip of a device designed to maintain a point on the longitudinal axis of the perforated music strip, in the center of the tracker-board, as the perforated strip moves over such board.

The object of my invention is to cause the perforations of the perforated music strip, to accurately register at all times, with the desired openings in the tracker-board, and thus overcome the objectional irregularity of the movement of the perforated strip over the tracker-board and the consequent mingling or lack of definition of sounds, now common in all musical instruments employing a perforated music strip and a tracker-board.

The accompanying drawings will serve to illustrate my invention, and in which similar letters indicate like parts.

Figure 1 is a longitudinal section and partial elevation of one form of my improved music roll and its supports. Fig. 2 is an end view of Fig. 1 looking from the left. Fig. 3 is an end view of Fig. 1 looking from the right. Fig. 4 is a longitudinal section and partial elevation showing a modified form of my improved music roll and its supports. Fig. 5 is an end view of Fig. 4 looking from the left. Fig. 6 is an end view of Fig. 4 looking from the right. Fig. 7 is an enlarged section and elevation of the right hand end of Fig. 1. Fig. 8 is an end view of Fig. 7, looking from the right. Fig. 9 is an end view of the rotating shaft looking from the left. Fig. 10 is a longitudinal section of a modified form of music roll, also illustrating means for centering the music roll. Fig. 11 is an end view of Fig.

10, looking from the left. Fig. 12 is an end view of Fig. 10, looking from the right. Fig. 13 is an end view of the rotating shaft, driving gears, and adjusting yoke, looking from the left. Fig. 14 is a longitudinal section of a music roll showing a further modification with the music strip wound thereon. Fig. 15 is an end view of Fig. 14, looking from the left.

In the drawings: (Figs. 1, 4, and 7) A indicates a cylinder of wood or other suitable material, provided with pins B, C, by means of which it is supported in and rotated by the mechanism of the mechanical musical instrument upon which it is used.

In Figs. 1 and 2, the cylinder A is centered by means of the spring-pressed bearing D at the left and rotated through the shaft E at the right, co-acting with the wing-pin C at the right of the cylinder. The music roll, so far as described, is that which is commonly used in mechanical musical instruments, such as the "Pianola", "Angelus", etc., and presents no features of novelty.

Mounted on and inclosing the cylinder A, Figs. 1, 4, and 7, is a second hollow cylinder F, formed of paper or other material, which under atmospheric conditions, will have the same co-efficient of expansion and contraction as that of the music strip carried by the music roll.

In Figs. 10 and 14, the solid cylinder A is omitted. Situated at opposite ends of the hollow cylinder F are guiding flanges G. In Figs. 1, 7, and 10 the guiding flanges are shown as secured to the hollow cylinder F. In Figs. 4 and 14 the guiding flanges are separate from the hollow cylinder F. In order to press the separate guiding flanges G into contact with the cylinder F, the springs H or H' are employed. In Fig. 4 these springs take the form of disks H, and in Fig. 14 that of a helix H'. In Figs. 1, 4, and 7, the hollow cylinder F is shown as secured to the solid cylinder A at J. It will, therefore, be apparent that when the hollow cylinder F expands and contracts under atmospheric conditions, it will be to and from the point of support J. In Figs. 10 and 14 the hollow cylinder F and music strip I are shown as supported by cylindrical bearing rods K, L, which are longitudinally movable in their bearings.

Motion is transmitted to the music roll in these figures through the bearing rod L, which receives its motion from a narrow faced gear N, in mesh with a broad-faced gear M, which latter receives its motion from any suitable source of power.

The guiding flanges G, as shown in Figs. 1 and 7 are plain on their inner surface and convex on their outer surface. As shown in Fig. 4, plain on both surfaces, with a rounded periphery. As shown in Fig. 10, the guiding flanges are plain on both surfaces and are cupped at the center and the cups situated within the ends of the hollow cylinder. The flange at the left is provided with a central opening *a*, adapted to receive the left hand end of the cylindrical bearing rod K. The flange at the right is provided with a central opening *a*, with radial slots *b*, adapted to receive the winged end *c* of the cylindrical bearing rod L, which enters the slots *b*.

In Fig. 14, the guiding flanges G are plain on their inner surface and at the middle portion of their outer surface and inclined from the middle portion from without inward. These flanges are connected to rectangular pins *d*, situated within the hollow cylinder F. The pin at the left is provided with a central opening *a*, adapted to receive the end of the bearing rod K, and the pin at the right may be coupled by means of any ordinary connection with the left hand end of the bearing rod L.

As it is essential that the music strip I, whatever its width, *i. e.*,—contracted or expanded, shall be centered relative to the tracker-board of the instrument upon which it is used, I may employ in connection with a solid cylinder A, shown in Figs. 1, 4, and 7, the spring-pressed bearing D. This bearing will serve to maintain a point on the cylinder A, for instance, J, at the center of the tracker-board; or I may employ in connection with the hollow cylinder F, as shown in Figs. 10 and 14, a centering device. This device consists of slotted collars O, secured to or forming a part of the cylindrical bearing rods K, L. Co-acting with the slots P of these collars are the yokes Q, pivoted at R, and provided with pins which take in the slots P. These yokes are connected through links S to a lever T, pivoted at U, in the frame of the mechanical musical instrument. Connected to one end of the lever T is a spiral spring V, the other end of which is connected to a fixed support W, which may be the body of the mechanical musical instrument.

The operation of my device is as follows: The hollow cylinder F will expand and contract when influenced by atmospheric changes. In the construction shown in Figs. 1, 4, and 7, where the hollow cylinder F is secured at J to the solid cylinder A,

the expansion and contraction will be horizontal in opposite directions from the point of attachment J.

In Figs. 1, 7, and 10, where the flanges G are directly attached to the hollow cylinder F, the flanges will be moved both outwardly and inwardly by the expansion and contraction of the cylinder. In Figs. 4 and 14, where the flanges G are not attached to the hollow cylinder F, they will be moved outward by the expansion of the hollow cylinder F, or the music strip I on the hollow cylinder, and inward by the action of the springs H, Fig. 4, or helix H', Fig. 14.

Centering of the roll when constructed as shown in Figs. 1 and 2 is accomplished by means of the spring-pressed bearing D, which maintains a point on the longitudinal axis of the cylinder A, *i. e.*, J., opposite the center of the tracker-board, and when constructed as shown in Figs. 10 and 14, by means of the spring V, lever T, links S and levers Q, acting upon the collars O, which serve to move cylindrical bearing rods K, L, longitudinally in their beds.

It will be observed that in each form of construction shown and described, the hollow cylinder F is subjected to the action of the atmosphere not only upon its external, but its internal surface, the object of which arrangement is to obtain uniform action of the atmosphere upon the cylinder.

I wish it understood that I do not limit myself in this application to the specific construction described and shown for the music roll, or for centering the music roll, as it will be evident that many changes may be made therein without departing from the intent of my invention.

Having thus described my invention, I claim:

1. The combination with a mechanical musical instrument having a tracker-board, a music roll comprising a tubular body adapted to expand and contract under atmospheric conditions, a removable music strip wound thereon, guiding flanges situated at the ends of the music strip, means whereby said flanges will follow the movements of the music strip in expanding and contracting, and means for centering the music roll as a whole relative to the tracker-board of the instrument.

2. The combination with a mechanical musical instrument having a tracker-board, a music roll, longitudinally movable bearing rods for supporting said roll, collars on said rods, levers coacting with said collars, a pivoted lever, means for exerting a constant tension in one direction upon said lever, and links interposed between said lever and said links.

3. The combination with a mechanical musical instrument having a tracker-board, a music roll, means not secured to the roll

for supporting the roll and centering it in relation to the tracker-board, said means comprising supporting pins, flanges mounted on said pins, and means for effecting longitudinal movement of the pins.

4. The combination with a mechanical musical instrument having a tracker-board, a music roll, guiding flanges not connected to the roll, means for effecting a constant inward tension upon the flanges, supporting pins operatively arranged relative to the flanges, bearings in which said pins are longitudinally movable, means for centering the roll with relation to the tracker-board, and means for rotating the roll irrespective of its position relative to its supporting bearings.

5. The combination with a mechanical musical instrument, of a music roll comprising a tube having the same expansion and contraction as the material to be wound thereon, means for maintaining the tube operatively centered in the instrument, and a flange pressed against each end of the tube.

6. The combination with a tracker-board, of a music roll comprising a supporting body having a flange at each end thereof and a perforated music strip wound thereon, said strip being formed of material which will coincidentally expand and contract under atmospheric changes, spindles directly engaging the flanges, and means for effecting longitudinal movement of said spindles to maintain a point on the music roll at the center of the tracker-board.

7. The combination with a music roll, of longitudinally movable supports therefor, and means external to the roll for producing equal longitudinal travel of said supports.

8. A music roll comprising a tubular body variable in length under atmospheric conditions, structurally independent spindles at the ends of the roll, a music strip wound on the roll, flanges mounted on the spindles, and means whereby the flanges will exert an inward pressure upon the ends of the music strip and irrespective of the width of the music strip.

9. A music roll comprising a tubular body formed of a material capable of longitudinal expansion and contraction due to atmospheric changes, flanges loosely fitted over the ends of the body, studs upon the flanges projecting into the body, and journal pins supporting the roll.

10. A music roll comprising a tubular body formed of a material capable of longitudinal expansion and contraction due to atmospheric changes, flanges loosely fitted over the ends of the body, terminal bearings for the body, the ends of said body being included between the flanges and terminal bearings, and suitable journaling means at each end of the roll.

11. A music spool comprising a tubular body formed of a material capable of longitudinal expansion and contraction due to atmospheric changes, flanges loosely fitted over the ends of the body, bearings connected to the flanges and projecting into the ends of the body, and journaling means at each end of the spool.

12. In a mechanical musical instrument, the combination of a music roll comprising a tubular body, opposed flange members adjustable toward and from each other; of means operatively connecting said flange members and arranged to insure their reciprocatory movement in definite relation to each other.

13. The combination with a mechanical musical instrument, of a music roll comprising a tubular body, guiding flanges situated at the ends of the body and recessed to receive the body, a music strip wound on the tubular body, and rotating and supporting means for the roll.

14. The combination with a tracker-board, of a music roll comprising a tubular body capable of expansion and contraction under atmospheric conditions, means for maintaining said body centered relative to the tracker-board, flanges located at the ends of said body and adapted to follow the movements thereof in expanding and contracting, and a music strip wound upon said body and formed of a material independent of that of which the body is made.

15. The combination with a tracker-board, of a music roll comprising a tubular body made of a material which will maintain the tubular form of the body and permit longitudinal expansion and contraction of the body under atmospheric conditions, means acting automatically to center the body relative to the tracker-board, guiding flanges at the ends of the body, and a music strip secured at one end to the body and wound thereon.

16. The combination with a tracker-board and a supporting and rotating spindle, as adapted for use in a mechanical musical instrument, a music roll consisting of a cylindrical tube formed of a material which will maintain its tubular shape and expand and contract under atmospheric conditions, means acting automatically to center said body relative to the tracker-board, a music strip wound thereon, and guiding flanges at the ends of the tubular body.

17. A spool for a music roll comprising a tubular body, supporting spindles therefor, bearings for said spindles, together with means for adjusting said spindles longitudinally in the bearings.

18. The combination with a spool for a music roll, of supporting spindles therefor, bearings for said spindles, means for longitudinally adjusting said spindles in said

bearings, and means for rotating one of said spindles and through it the spool.

19. The combination with a spool for a music roll, of a two-part spindle therefor external to the spool, one member of the spindle being longitudinally movable in a direction opposite to that of the other member.

20. The combination with a spool for a music roll, of a two-part spindle therefor, the members of the spindle being provided with means external to the spool to produce relative longitudinal movement of one member of the spindle in a direction opposite to that of the other member.

21. The combination with a spool for a music roll, of a two-part spindle therefor provided with means for automatically centering the spool with respect to the tracker-board.

22. The combination with a spool for a music roll, of terminal supports for the spool, and means external to the spool connecting the supports.

23. The combination with a spool for a music roll, of terminal supports for the spool, and means external to the spool connecting the supports to simultaneously adjust them in accordance with variations in length of the spool.

24. The combination with a spool for a

music roll, of supports therefor, together with means for moving said supports in opposite directions the same or proportional amounts at the same time.

25. In combination with a music roll, of independent means external to the roll self-acting to center the roll in relation to the tracker-board.

26. The combination with a music roll of variable width, of automatic means external to the roll and independent of its width for centering it in relation to the tracker-board.

27. The combination with a music roll, of external, self-acting mechanical means for centering it with respect to the tracker-board.

28. The combination with music rolls of various widths, of self-adjusting external means for centering them singly to a tracker-board and independently of their widths.

29. The combination with music rolls of various widths, of automatic external means acting independently of their widths to center them at one time to a tracker-board.

In testimony whereof, I affix my signature, in the presence of two witnesses.

HENRY PRICE BALL.

Witnesses:

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C. E. STECHER.