

**No. 692,409.**

Patented Feb. 4, 1902.

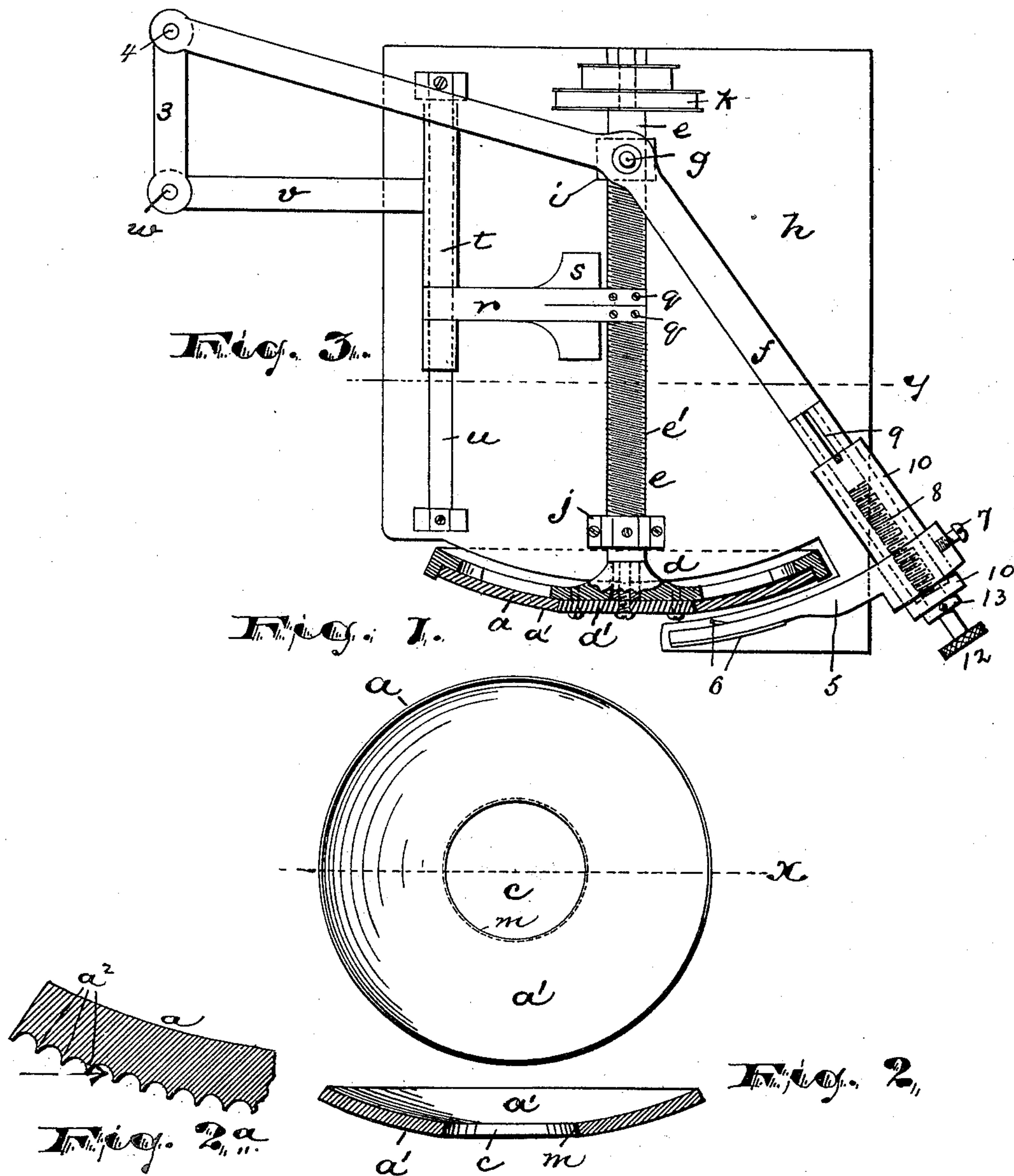
**J. E. ALEXANDER.**

TALKING OR SOUND RECORDING AND REPRODUCING MACHINE.

(Application filed Sept. 28, 1900.)

(No Model.)

**2 Sheets—Sheet 1.**



**WITNESSES:**

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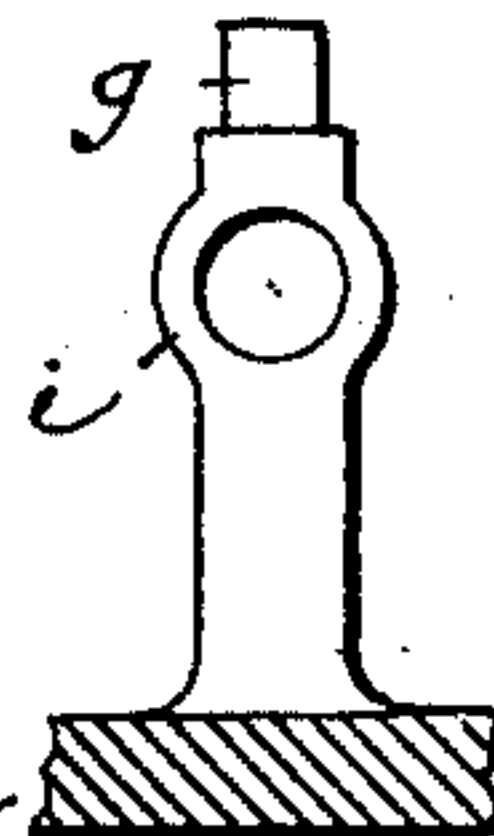
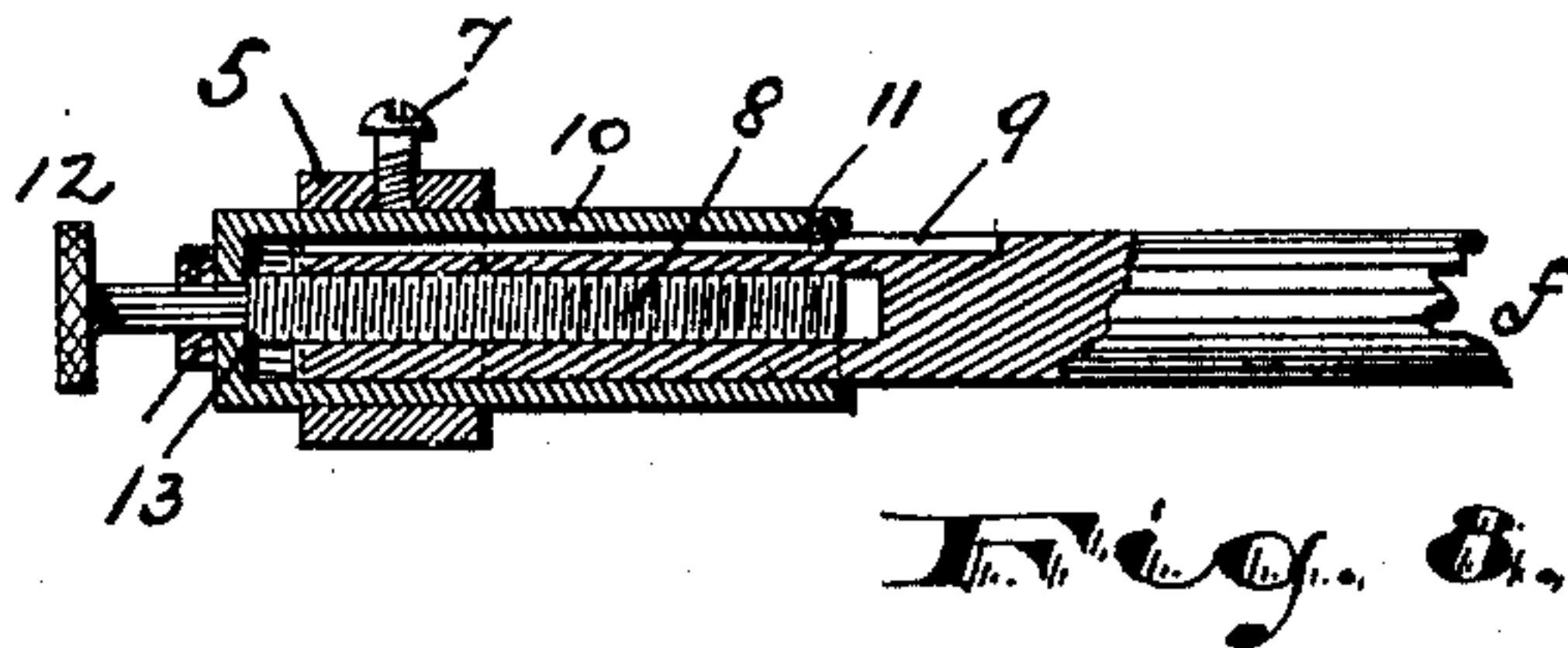
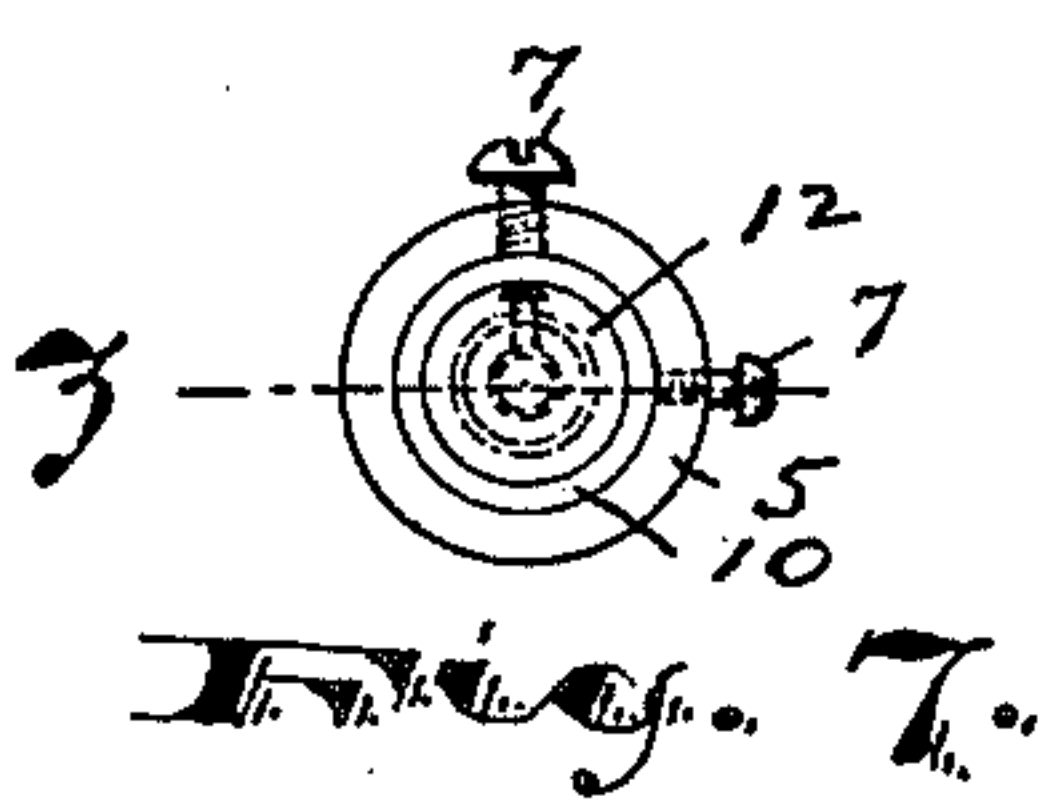
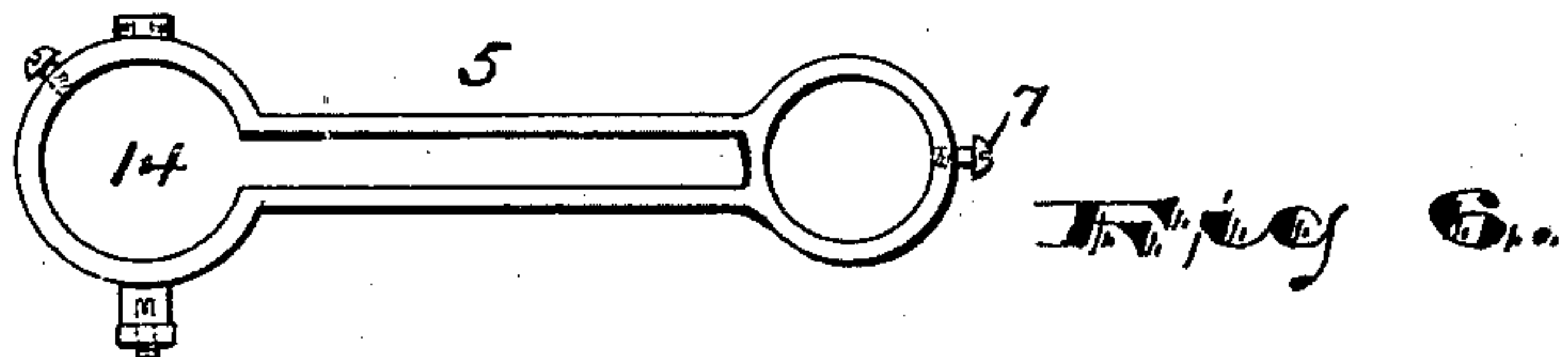
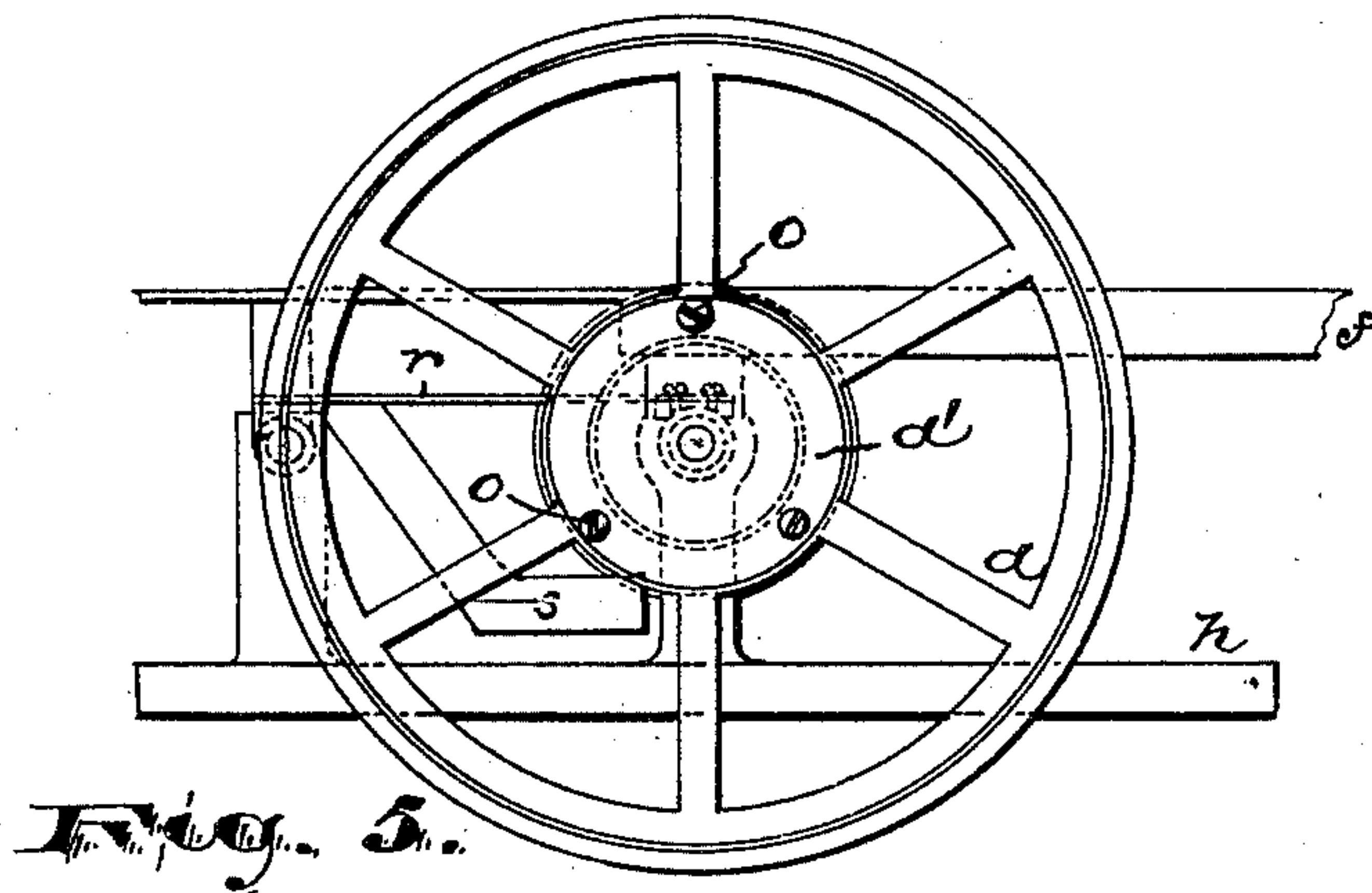
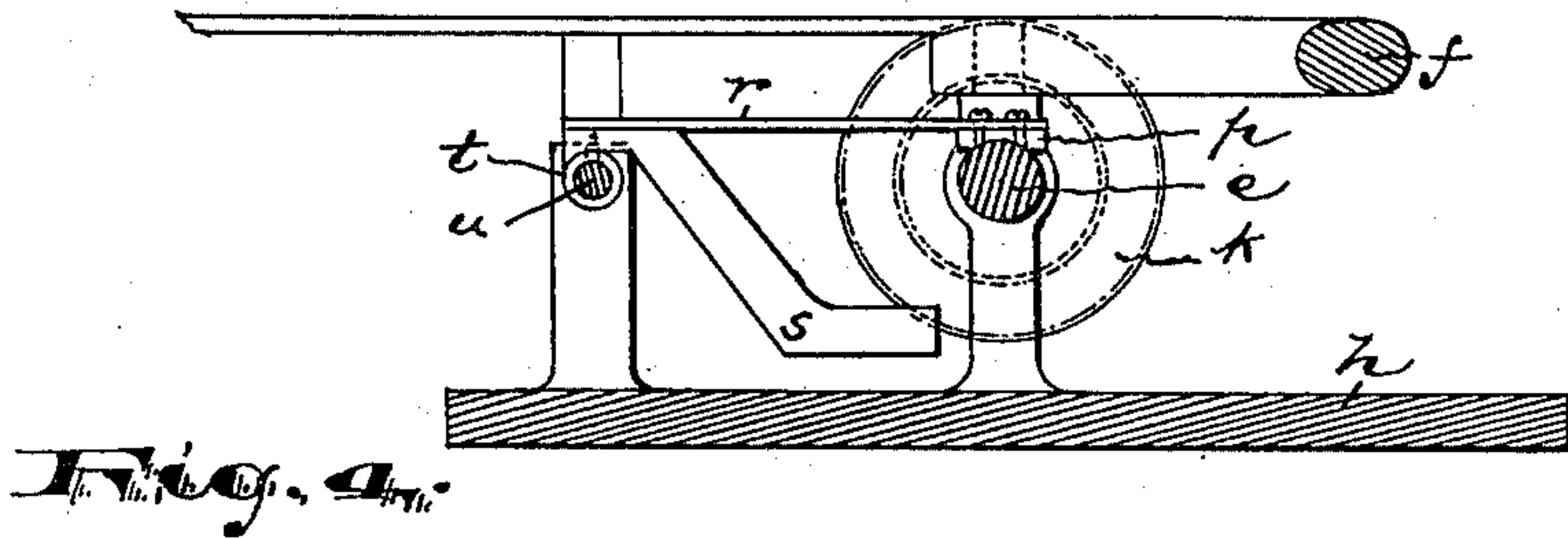
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(No Model.)

2 Sheets—Sheet 2.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## TALKING OR SOUND RECORDING AND REPRODUCING MACHINE.

SPECIFICATION forming part of Letters Patent No. 692,409, dated February 4, 1902.

Application filed September 28, 1900. Serial No. 31,357. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN E. ALEXANDER, a citizen of the United States, residing at West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Talking or Sound Recording and Reproducing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

The objects of this invention are, first, to enable a larger superficial area of reproducing or recording cuts or engravings to be obtained, whereby a high rate of speed, and consequently a greater volume of sound, may be maintained without quickly terminating the period of sound reproduction; to secure greater durability in the record; to secure more perfect reproduction of tone, and to more effectually avoid the tones or sounds not common to the human voice, musical instruments, or other original sounds thrown into the recorder; to prevent warping of the record and to secure a construction thereof better capable of resisting the effects of concussion in handling and transportation; to enable the records to be compactly stored or packed for shipment; to provide a more simple, inexpensive, and durable machine for operating in connection with the improved record to produce the sounds, and to secure other advantages and results, some of which may be referred to hereinafter in connection with the description of the working parts.

The invention consists in the improved sound-reproducing machine and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth, and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like characters of reference indicate corresponding parts in each of the several views, Figure 1 is a plan of the improved record-blank. Fig. 2 is a central section of

the same, taken at line  $x$ , Fig. 1. Fig. 2<sup>a</sup> is a detail, on a large scale, illustrating the engraved surface of a record ready for service. Fig. 3 is a plan of a speaking-machine having the said blank (shown in section) in position therein. Fig. 4 is a section taken at line  $y$ , Fig. 3. Fig. 5 is a detail front elevation to show more particularly the construction of the record-holder. Fig. 6 is a detail of a speaker or sound-box and record-holder. Fig. 7 is a detail front view of the means for adjusting the speaker or sound-box and record-holder. Fig. 8 is a section of the same on line  $z$ , and Fig. 9 is a detail elevation of a post or stud used as a shaft bearing and fulcrum.

In said drawings,  $a$  indicates the record-blank, composed of wax or wax-like composition or other material capable of being engraved or receiving impressions due to the action of sound waves or vibrations, either mechanically, chemically, or electrically, or by any of the methods common in the art of producing talking-machine records. Said blank  $a$  is provided with a spherical surface  $a'$  or a surface resembling in conformation that of a sphere in that the convex curvature of said blank is formed at all effective points at an equal radial distance from a given center. Said blank  $a$  is preferably a segment of a sphere and is centrally perforated, as at  $c$ , to receive the holder  $d$  or the clamp-plate  $d'$  of the holder, whereby the blank or record can be easily and conveniently seated in operative relation, as hereinafter described. In ordinary operation of the machine the blank rotates on an axial mandrel or shaft  $e$ , and the engraving-tool or the tracing instrument of the reproducer or of the speaker moving with its carrier  $f$  on a fulcrum or axial center  $g$ , near or approximately at the axial center of the shaft  $e$ , describes a course concentric with the curvature of the record or blank, the said tool or tracer moving from the periphery of the record inward toward the center. In thus moving inward it may be observed that the tracing instrument bears laterally, as indicated by the arrow, against the partition-walls  $a^2$ , Fig. 2<sup>a</sup>; but because of the convexity of the engraved surface the said



instrument tends to wear not so directly against the thin partitions as heretofore, but into the body of the record, thus tending greatly to increase the durability of the said record, as will be understood.

Upon a bed-plate *h* (shown in plan in Fig. 3) are bearings or journal-boxes *i j*, providing supports for the main shaft *e*, upon which the holder *d* for the record or record-blank *a* is fastened. In the construction of the present case said shaft is provided with screw-threads *e'* and is driven by a pulley *k*, deriving its power from a motor of any ordinary variety. The blank or record holder secured to the said main shaft consists of a convex frame or plate adapted to fit against the (preferably) concave back of the record or blank, said frame or plate rotating with the main shaft as its axis. The blank in the construction shown is beveled at the walls of the central perforation, as at *m*, and against said beveled walls the clamp-plate *d'*, having correspondingly-beveled peripheral edges, bears, said clamp-plate being secured to the holder by screws *o* or attaching means of any suitable construction, the said plate fitting in the perforation, so that the record may be exactly placed in proper operative position.

In the construction preferred for the purposes of this application I arrange on the main shaft a threaded nut or nuts *p*, (shown more clearly in Fig. 4,) the threads of which correspond with those on the main shaft *e*, so that when said main shaft rotates under the power imparted by the pulley *k* said nuts will be caused to move lengthwise of said shaft. Said nuts are attached by means of screws *q* or other suitable means to an arm *r*, preferably having a weight *s*, by which last the nuts are held down in proper operative relation to the screw-shaft. Said arm *r* may be a flat spring or otherwise. Said arm in turn is attached to a sleeve or collar *t*, arranged on a slideway *u*, formed or constructed to lie parallel with the main shaft *e*, and said collar is provided with a second arm or lateral extension *v*, having a pivotal connection at its projecting extremity, as at *w*, with a connecting-rod 3, pivotally connected in turn at 4 with an oscillating lever *f*, fulcrumed at *g* in the line, in plan, of the axis of the main shaft, as shown in Fig. 1. By the arrangement of parts thus described by turning the main shaft and longitudinally moving the nuts, arm *r*, sleeve *t*, and arm *v* together in a direction parallel with the shaft *e* the lever *f*, connected with said moving parts, is turned on its fulcrum lying at the axis of the main shaft, so that its free arm turns or is given an oscillating movement. The convexity of the record attached to its holder and the path of the speaker or sound-box or the recorder arranged upon their holder are concentric or closely approximate a concentric relation, so that as the record or the record-blank rotates on its main shaft and the tracing or speaking instrument or the cutting or engraving in-

strument oscillates the said instrument will maintain a proper operative contact with said record or record-blank.

Upon the free end or arm of the lever is adjustably arranged the holder 5 (shown in plan in Fig. 6) for the speaker or sound-box reproducer or the shaving device, (not shown, excepting in part in Fig. 3, where the stylus of one of said devices appears at 6,) said speaker or sound-box reproducer and shaving device being constructed in any manner common to those now in ordinary and general use. Said holder 5 is adjustably attached by means of a set-screw 7 or other suitable means to an adjustable sleeve arranged at the free end or arm of the lever *f*. Any suitable holder-adjusting means may be employed; but I have used with convenience and advantageous results the construction illustrated in Fig. 8, where the lever *f* is shown to be provided interiorly with a screw 8, engaging a female thread in said lever and at its periphery is longitudinally grooved, as at 9. On said lever is placed the sliding sleeve 10, held from turning on the lever by a pin 11, which projects into the groove 9. Near its forward extremity said screw 8 provides a bearing at which it is loosely connected to the sleeve 10, so that when said screw is turned the said sleeve is moved lengthwise of the arm of the lever on which it is seated, the pin 11 preventing the sleeve from turning on said arm. The turning of the screw is facilitated by means of a finger-piece 12, and longitudinal independence of movement of the screw and sleeve is prevented by shoulders, collars 13, or the like. By turning the screw 8, the sleeve 10, holder 5, which last projects laterally from the sleeve to a point in front of the rotary record, and the speaker, reproducer, or the shaver carried by said holder 10 in the socket or seat 14, Fig. 6, are moved toward or from the face of the record or the record-blank and the speaking, engraving, or shaving tool or instrument may be entered into engagement with the surface of said record or blank with microscopic nicety of adjustment to effect the desired results with perfection.

I am well aware that many changes may be made in the construction of the machine without departing from the spirit of the invention.

Having thus described the invention, what I claim as new is—

1. In a sound-reproducing machine, the combination with a rotary main shaft having means for holding the record, means for rotating said shaft, a lever having a speaker or sound-box holder and being connected with said main shaft and movable simultaneously therewith to cause the speaker to move in a curved path, of a spherically-convex record, the convexity of which is concentric with the path of movement of the speaker, substantially as set forth.

2. In a sound-reproducing machine, the combination with a rotary main shaft having



means for holding the record and effect a rotation of said record, of a lever fulcrumed, in plan, in the axial line of the main shaft, and connection of said main shaft and lever for transmitting movement from one to the other, substantially set forth.

3. In a sound-reproducing machine, the combination with a rotary shaft and its record having a convex surface, of a pivotally-moving speaker-holder adapted to traverse in a curved path the said curved surface, and means for transmitting power from said shaft to said speaker-holder, substantially as set forth.

4. In a sound-reproducing machine, the combination with the threaded main shaft having a record-holder, of a nut engaging said main shaft, a lever carrying a speaker-holder, and connections between said nut and lever, substantially as set forth.

5. In a sound-reproducing machine, the combination with the threaded main shaft having a record-holder, a nut engaging said main shaft, an arm *r*, carrying said nut, a sliding sleeve *t*, and arm *v*, pivoted connections *s*, lever *f*, loosely connected to said connection, and an adjustable speaker-holder, substantially as set forth.

6. The combination with a rotary record-holder, of a speaker or sound-box holder movable

in a curved path on a center coincident, looking in one direction, with the axial center line of the record-holder, and means for rotating said record-holder and moving said speaker or sound-box holder, substantially as set forth.

7. The combination with the stylus, in a sound-reproducing machine, of a segment of a sphere seated at its center upon the extremity of a rotary shaft and means for rotating said shaft and means for effecting a spiral tracing of the stylus on the curved surface of the segment, substantially as set forth.

8. A sound-reproducing device provided with a record comprising the segment of a sphere, said segment being supported on the end of a rotary shaft and movable with said shaft, in combination with reproducing means so supported in connection with said segment as to travel in the arc of a great circle concentric with a curvature of said segment, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 20th day of September, 1900.

JOHN E. ALEXANDER.

Witnesses:

CHARLES H. PELL,

LOUIS A. GREENLEAF.