No. 814,663. PATENTED MAR. 13, 1906.

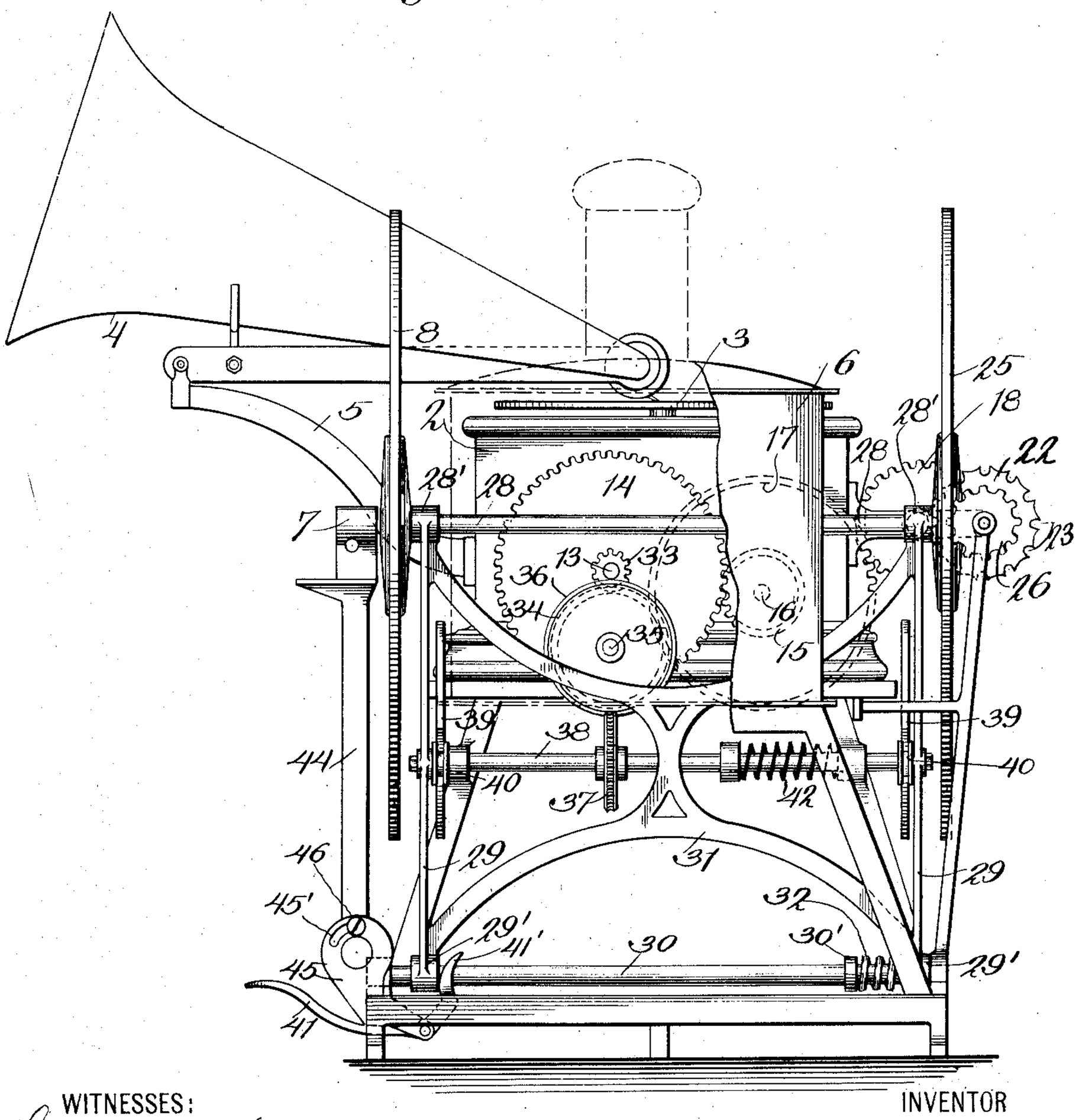
W. H. BAKER.

PICTURE AND SOUND REPRODUCING APPARATUS.

APPLICATION FILED MAR. 17, 1904.

3 SHEETS—SHEET 1.

Fig. 1.



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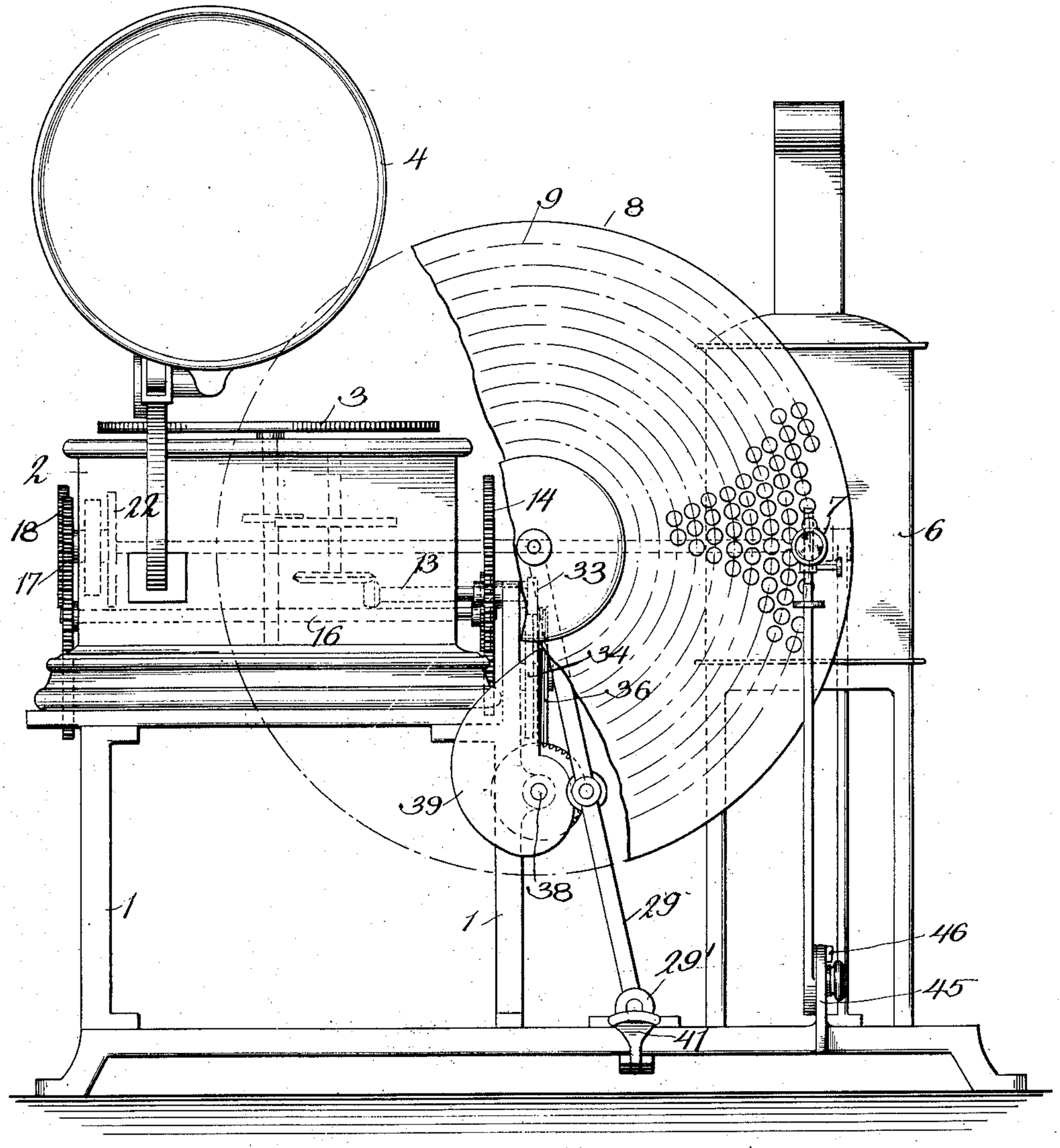
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3

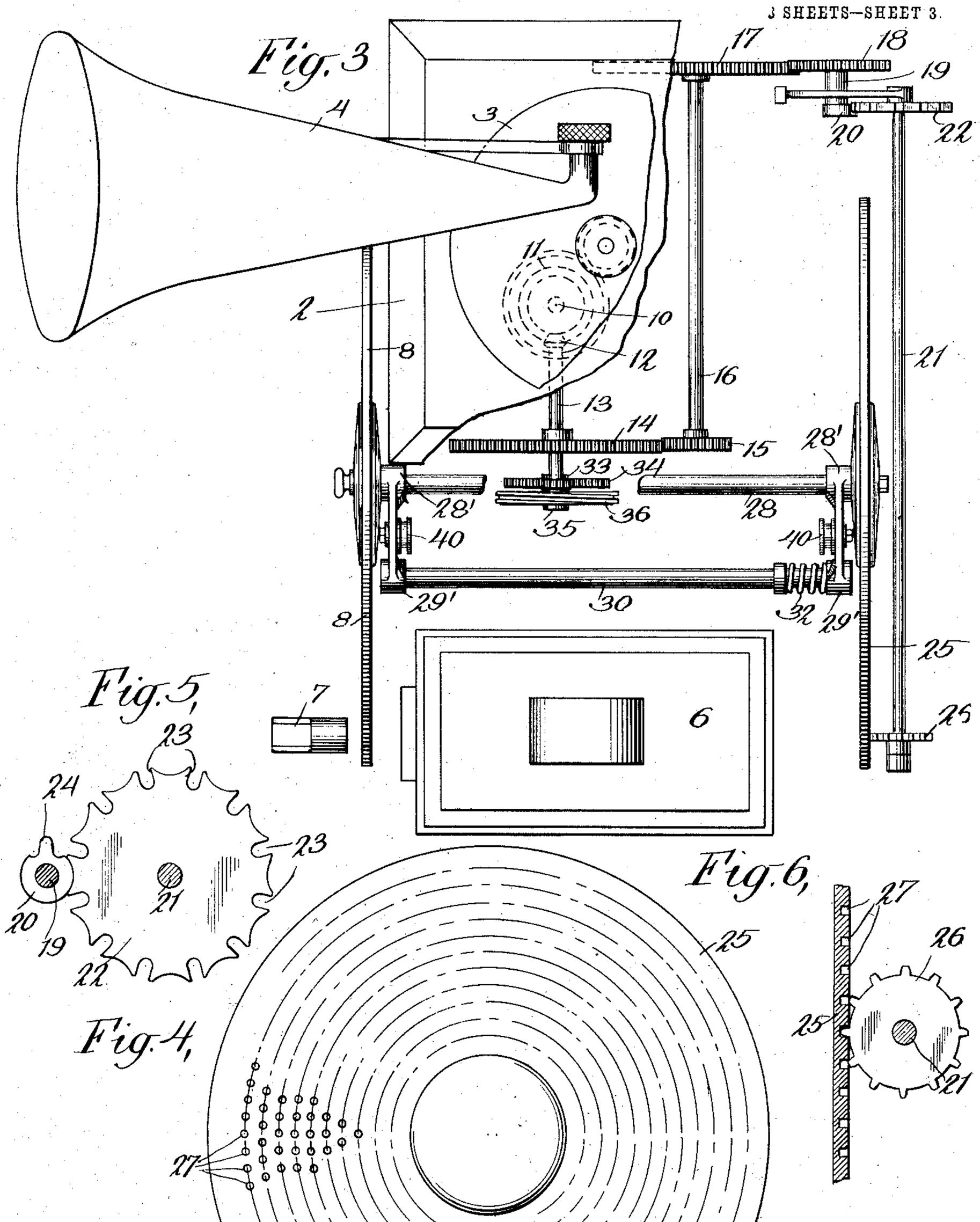

Fig. 5,

Fig. 4,

Fig. 6,

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PICTURE AND SOUND REPRODUCING APPARATUS.

No. 814,663. Specification of Letters Patent. Patented March 13, 1906

Application filed March 17, 1904. Serial No. 198,589.

To all whom it may concern:

Be it known that I, WILLIAM H. BAKER, a citizen of the United States, and a resident of Central Falls, Providence county, State of Rhode Island, have invented certain new and useful Improvements in Picture and Sound Reproducing Apparatus, of which the following is a specification.

The present invention has for its object to combine a kinematograph or similar apparatus for exhibiting pictures in which the impression is given to the eye of objects in motion with a graphophone or similar sound-reproducing apparatus in such manner that the two devices or sets of apparatus shall be operated in synchronism.

In an application filed by me February 6, 1904, Serial No. 192,311, I have described a kinematograph in which the pictures are arranged in a spiral or helical path upon a glass or other suitable disk and the disk rotated intermittently in front of a lantern-lens and at the same time moved toward or away from the optical axis of the lens at a uniformly-varying rate of speed. For the purpose of illustrating the present invention I have shown a kinematograph similar in construction and mode of operation as that described in my said application and have combined therewith in carrying out the present invention a graphophone or similar sound-reproducing apparatus of any well-known type.

The invention will be understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of one embodiment of my invention; Fig. 2, a front view, and Fig. 3 a top view. In these three figures certain of the parts are broken away for the sake of clearness. Fig. 4 is a side view of the rack-disk, and Figs. 5 and 6 are detailed views.

Similar reference-numerals indicate similar parts in the several views.

Referring to the drawings, the numeral 1 designates a framework upon which is mounted the parts hereinafter described.

2 designates a box or casing inclosing the motor or other driving mechanism of a sound-reproducing apparatus adapted to drive the sound-record 3 in a well-known manner.

4 designates the sound-horn, which may be supported upon a bracket 5.

6 designates a lantern of any well-known type having a lens 7.

8 designates a picture-disk adapted to be rotated and advanced laterally in front of the lens 7. The pictures upon this disk consist of photographically-produced positives with a black or opaque ground. The disk is of glass or celluloid and may, if desired, be clamped between suitable plates, and the pictures are arranged thereon in a spiral or helical path, as indicated by the broken line 9 in Fig. 2, a few of the pictures being indicated by circles. By assembling the pictures in this manner a very large number may be contained in a small compass, overcoming many objections incident to the generally-used continuous films, and particularly in that a greater number of pictures may be exposed per unit of time than is practically possible with a film, thus giving a better-defined and more life-like impression upon the eye.

In the present instance I utilize the motor of the sound-reproducing apparatus to rotate the sound-record and also to rotate and advance laterally the picture-disk. This is accomplished by the following means: 10 designates a shaft of the motor inclosed within the casing 2, and 11 a gear-wheel secured to said shaft, said gear meshing with a gear-wheel 12 on a shaft 13, which projects outside of the casing 2 and has a bearing in the framework. Secured to the shaft 13 is a spur-gear 14, meshing with a similar gear 15, secured on a shaft 16, having suitable bearings in the framework. Upon the other end of the shaft 16 is secured a spur-gear 17, meshing with a similar gear 18 on the shaft 19, which shaft carries a single-toothed pinion 20, constituting one member of a well-known form of stop-motion. Mounted on the shaft 21, which shaft is parallel with the shaft 16, is the second member 22 of the stop-motion. The member 22 is in the form of a wheel provided with radial recesses 23 in the periphery thereof, (see Fig. 5,) adapted to be engaged by the tooth 24 of the pinion 20 to impart to said wheel an intermittent rotary motion. The shaft 21 extends across the center of a disk 25 and carries at its other end a toothed wheel 26, having as many teeth thereon as there are notches or recesses in the wheel 22 of the stop-motion. The disk 25, which is preferably of metal, is perforated or recessed,

as shown at 27 in Fig. 6, the perforations or recesses being arranged in a spiral path and corresponding in position and number to the pictures on the disk 2. The toothed wheel 26 is on the optical axis of the lantern 6, and said disk 25 is intermittently rotated by said toothed wheel engaging successive perforations or recesses 27 when said wheel is intermittently rotated through the train of gearing above described. The disk 25 is, in effect, a rack-disk, and it is obvious that a continuous rack having teeth to coöperate with a proper gear or pinion may be used. The intermittent rotary motion of the disk 25 is transmitted to the picture-disk 8 through the shaft 28, on which both disks are mounted. Said shaft 28 is mounted in bearings 28′, which form part of a swinging frame comprising side arms 29, pivotally mounted at 29′ on a shaft 30, having bearings in the framework. The side arms 29 are connected by a suitable web 31. A collar 30′ is secured to the shaft 30, and between said collar and one of the bearings 29′ is a spring 32, which serves to hold the disk 25 up against its driving-wheel 26.

Not only must a rotary motion be imparted to the picture-disk 8, but said disk must be advanced toward the optical axis of the lens, and this latter movement is effected by the following means: On the outer end of the shaft 13 is a pinion 33, which meshes with a wheel 34 on a shaft 35, which shaft carries a worm 36, meshing with a worm-wheel 37 on a shaft 38, having bearings in the framework. On the ends of the said shaft 38 are mounted two constant-progression cams 39, which are adapted to bear against rollers 40, mounted on studs midway of the length of the side arms 29 of the swinging frame.

The operation of the mechanism so far described is as follows: The rotary motion of the gear 11 by means of the motor within the casing 2 is communicated through the gears 12, 14, 15, 17, and 18 to the single-toothed pinion 20, and by the latter an intermittent rotary motion is imparted to the rack-disk 25 and a corresponding movement to the picture-disk 8. As the perforations or recesses in the disk 25 correspond in arrangement, position, and number to the pictures on the disk 8, it is obvious that each engagement of a tooth on the wheel 26 with a perforation or recess in the disk 25 will impart an intermittent rotary movement to said disk and will bring a picture on the disk 8 into and allow the same to remain in the illuminated field for an interval of time, the interval of exposure necessarily being greater than the time required to effect a change from one picture to another, owing to the employment of the described stop-motion 20 22. Simultaneous with the intermittent rotary movement the swinging frame is moved and in consequence the picture-disk 8 is advanced laterally across the optical axis of the lens through the action of the cams 39 on the rollers 40. This lateral movement is uninterrupted and at a uniformly-varying rate of speed. In the position shown in the drawings the exposure is begun with the pictures on the outer convolution of the spiral, so that for every unit of angular advance of the cams 39 the disk 8 is advanced a unit of lateral movement. The contiguous convolutions of the spiral are placed as near as possible to each other to save space, and the cams 39 are so constructed that for each complete rotation of the disk 8 said disk will be advanced laterally a distance equal to the distance between contiguous convolutions of the spiral or a distance equal to the diameter of one picture, if the pictures are so disposed that those on contiguous convolutions contact with each other. For example, if the distance between two contiguous convolutions of the spiral is one-quarter of an inch then the disk 8 will be advanced that distance for each convolution of the spiral or for each complete rotation of the disk 8. When beginning at the outer end of the spiral, every unit of advance along the spiral—that is, from the center of one picture to the center of the next succeeding picture—involves a varying angular speed of the disk 8 due to the approach of the spiral toward its center. This angular speed increases and because the progress of the spiral toward the center is constant, owing to the particular stop-motion, therefore the increase of the angular speed of the disk 8 will be uniformly accelerated, but the time of exposure will be constant. If the pictures should be arranged on the disk 8, beginning at the center of the spiral, it is obvious that the angular speed of rotation would be uniformly decreased in traveling to the outermost convolution and that the axis of said disk would be moved away from the optical axis at a uniformly-varying rate by the constant-progression cams 39. Such changes in the described mechanism to meet the condition in which the pictures are arranged, beginning at the center of the spiral, are obvious. When a series of pictures has been exhibited and the end of the spiral reached, the disk 8 will have been advanced until the last picture is in line with the optical axis of the lantern-lens and the swinging frame will have reached the limit of its movement. In order to return the frame to its initial position, I provide a lever 41, pivoted on the framework and having one arm 41′ engaging one of the bearings 29′ of the swinging frame, as shown in Fig. 1. By depressing the outer end of lever 41 the entire swinging frame carrying the picture-disk 8, cams 39, &c., will be moved forward or in the direction of the screen. The effect of this is to release the rack-disk 25 from engagement with its driving-wheel 26 and to release the worm-wheel 37 from engagement

with the worm 36. This permits the spring 42, secured at its ends to fixed collars on the shaft 38, to rotate the shaft 38, thereby returning the cams 39 to their initial position and also permitting the frame to be swung on its pivotal supports 29′ to restore the picture-disk 8 and the rack-disk 25 to the starting position.

Any suitable means may be employed to secure the picture-disk on the shaft 28 and to permit the ready removal of one disk and its replacement by another. As shown in the drawings, the lens 7 of the lantern is mounted upon a standard 44, supported upon a bracket 45, secured to the framework. A slot 45′ in said bracket permits the standard 44 and lens 7 to be swung forward to allow of easy access for removing and replacing the picture-disk. A set-screw 46 or other means may be employed to retain the standard in position.

Inasmuch as the present apparatus is designed for use with a photographic picture-disk having the ground black or opaque and as the period of change from one picture to the next on the disk is so infinitesimal as not to be perceived by the eye, there will be no necessity for the use of a shutter. If, however, this is found necesssary, any of the well-known forms of shutters may be used.

While I have described my invention in connection with an apparatus for projecting a picture upon a screen, it is to be understood that the mechanism may be mounted in a suitable casing, so that the pictures fixed upon the disk may be viewed directly by the eye, as in well-known types of mechanism of this class, and such mechanism may be connected up with the sound-reproducing apparatus, so as to operate the two in synchronism.

One drawback to the enjoyment of a picture-exhibiting apparatus alone or of a sound-reproducing apparatus alone is that but one sense is affected—that is, either the sight or the hearing. In viewing the reproduction of an animated scene the absence of the sounds accompanying that scene detract materially from the enjoyment. My invention makes it possible to convey to the senses not only the action of a public speaker or of a traveling railway-train, but the actions of a speaker may be accompanied by a reproduction of his voice and words, or the movement of the train may be accompanied by the noises made by the train, giving thereby more life to the representations.

The sound-reproducing apparatus may be of any well-known type, employing either a disk or cylinder for the sound-record and in which the sound-record is given a constant rotary movement.

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

1. In an apparatus of the character described the combination of a picture-exhibiting mechanism comprising a disk having pictures arranged thereon in a spiral path, a sound-reproducing mechanism comprising a sound-record, a motor, means actuated by said motor to impart to said sound-record a continuous rotary movement, and means also actuated by said motor to impart to said picture-disk an intermittent rotary movement at a uniformly-varying rate of speed, and a continuous lateral movement toward or away from the optical axis.

2. In an apparatus of the character described the combination of a picture-exhibiting mechanism comprising a disk having pictures arranged thereon in a spiral path, a sound-reproducing mechanism comprising a sound-record, a motor, means actuated by said motor to impart to said sound-record a continuous rotary movement, and means also actuated by said motor to intermittently rotate said picture-disk, and also to move said disk laterally toward or away from the optical axis continuously at a uniformly-varying rate of speed.

3. In an apparatus of the character described the combination of a picture-exhibiting mechanism comprising a disk having pictures arranged thereon in a spiral path, a sound-reproducing mechanism comprising a sound-record, a motor, means actuated by said motor to impart to said sound-record a continuous rotary movement, and means also actuated by said motor to intermittently rotate said picture-disk at a uniformly-varying rate of speed, and simultaneous with said rotary movement to continuously advance said disk laterally toward or away from the optical axis at a uniformly-varying rate of speed.

4. In an apparatus of the character described the combination of a picture-exhibiting mechanism comprising a disk having pictures arranged thereon in a spiral path, a sound-reproducing mechanism comprising a sound-record, a motor and means actuated thereby to impart a continuous rotary movement to said record, a shaft geared to said motor, a train of gears connected to said shaft to intermittently rotate said disk at a uniformly-varying rate of speed, and a second train of gears connected to said shaft to continuously advance said disk toward or away from the optical axis at a uniformly-varying rate of speed.

5. In an apparatus of the character described the combination of a sound-reproducing mechanism comprising a sound-record, a motor and means actuated thereby to impart a continuous rotary movement to said record, a picture-exhibiting mechanism comprising a disk having pictures arranged thereon in a spiral path, a pivotally-supported

frame for said disk, a rack-disk also supported by said frame on the same shaft as the picture-disk, a train of gears actuated by said motor to intermittently rotate said rack-disk and thereby the picture-disk at a uniformly-varying rate of speed, cams adapted to bear against said pivoted frame and a train of gears also connected to said motor to continuously rotate said cams so as to rock said frame on its support to advance the picture-disk toward or away from the optical axis at a uniformly-varying rate of speed.

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

WILLIAM H. BAKER.

Witnesses:
H. P. SHOOBRIDGE,
JOHN A. MIDDLETON.