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3 SHEETS—SHEET 1.



Witnesses  
 R. D. Little  
 F. M. Cornstien

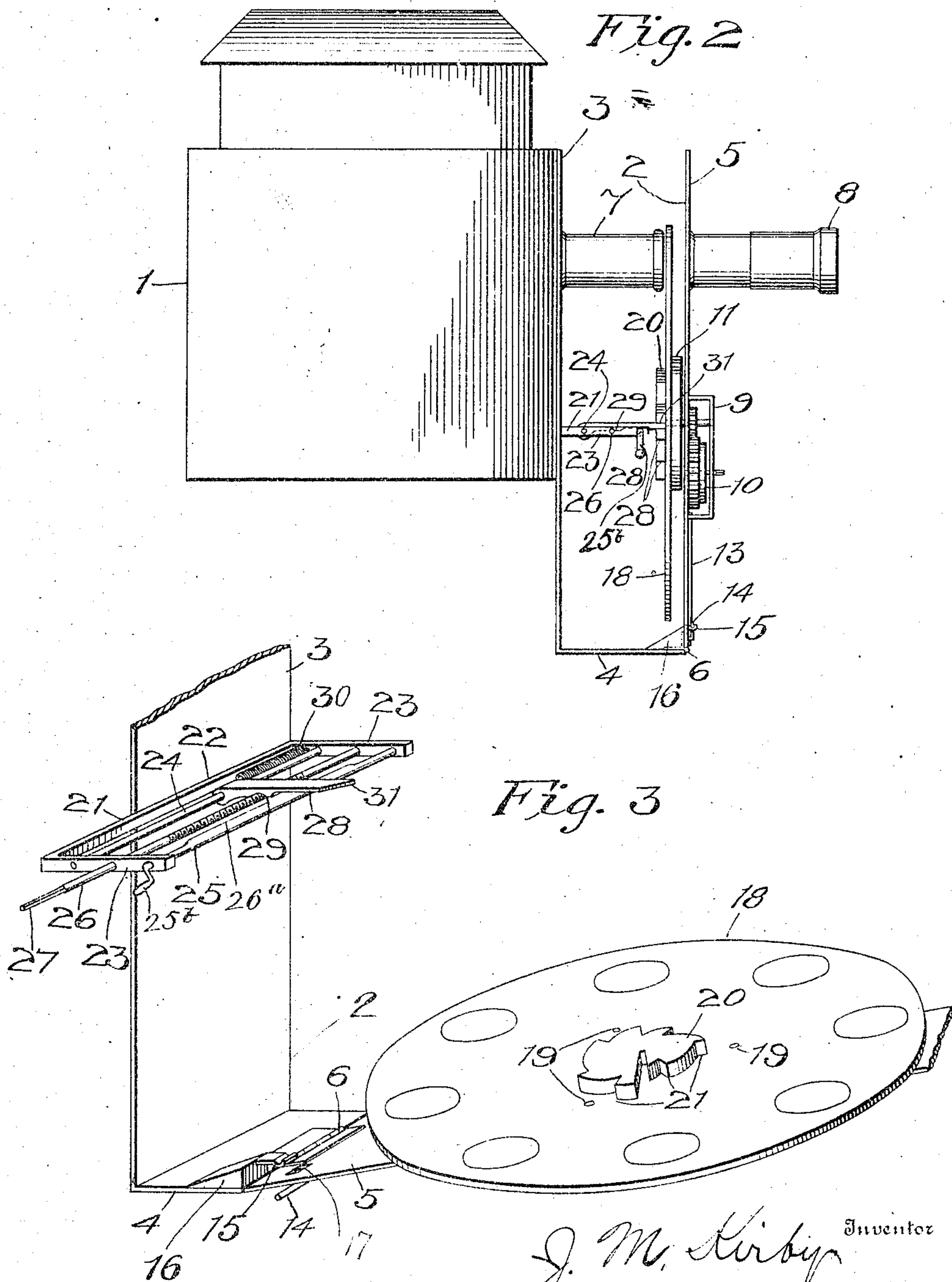
Inventor  
J. M. Kirby  
Watson E. Coleman  
Attorney

J. M. KIRBY.  
 PICTURE PROJECTING APPARATUS.  
 APPLICATION FILED FEB. 24, 1908.

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Patented Mar. 16, 1909.

3 SHEETS—SHEET 2.



Witnesses  
 L. J. Little  
 H. M. Brustine

J. M. Kirby Inventor  
 By Watson E. Coleman Attorney

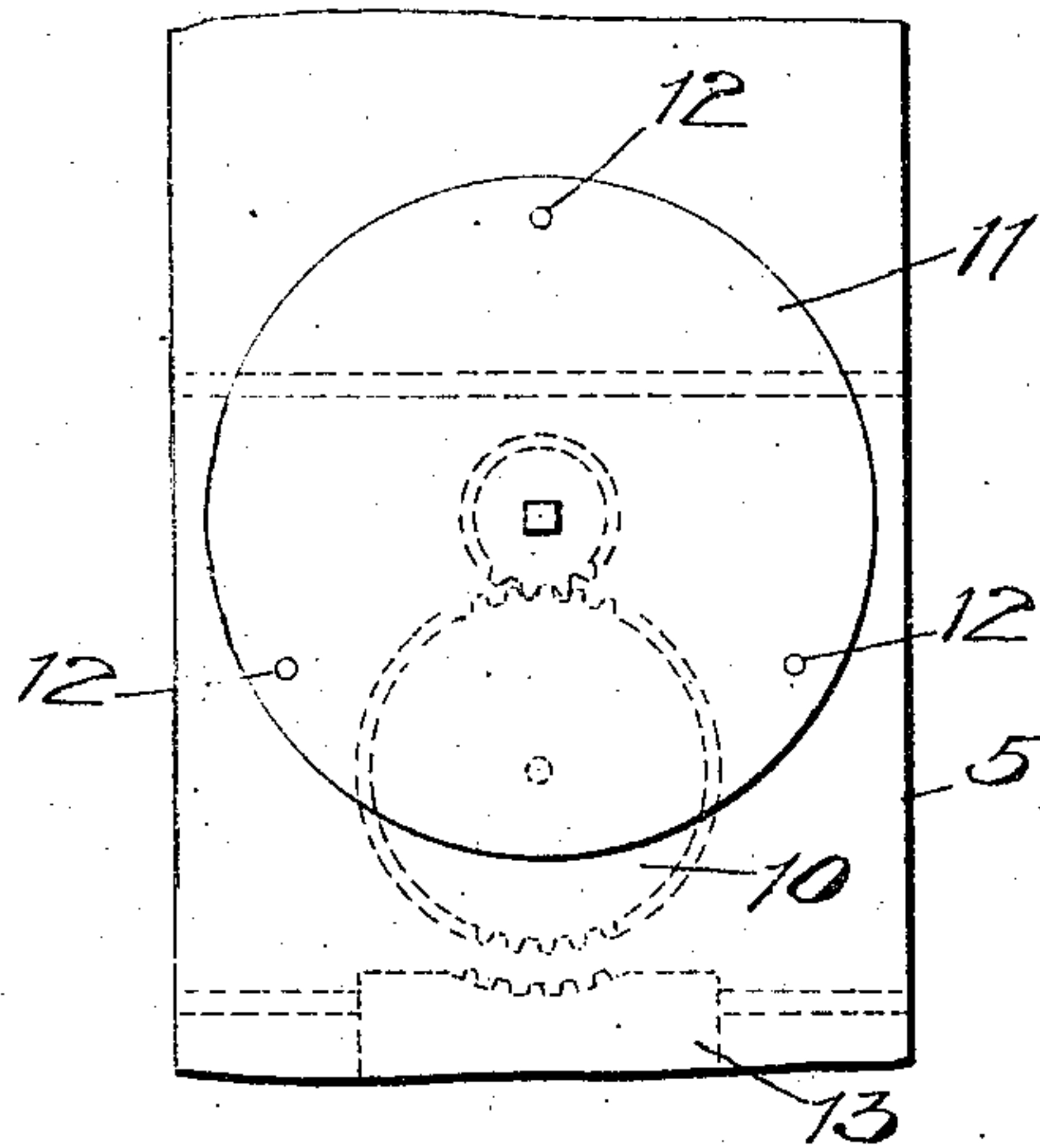
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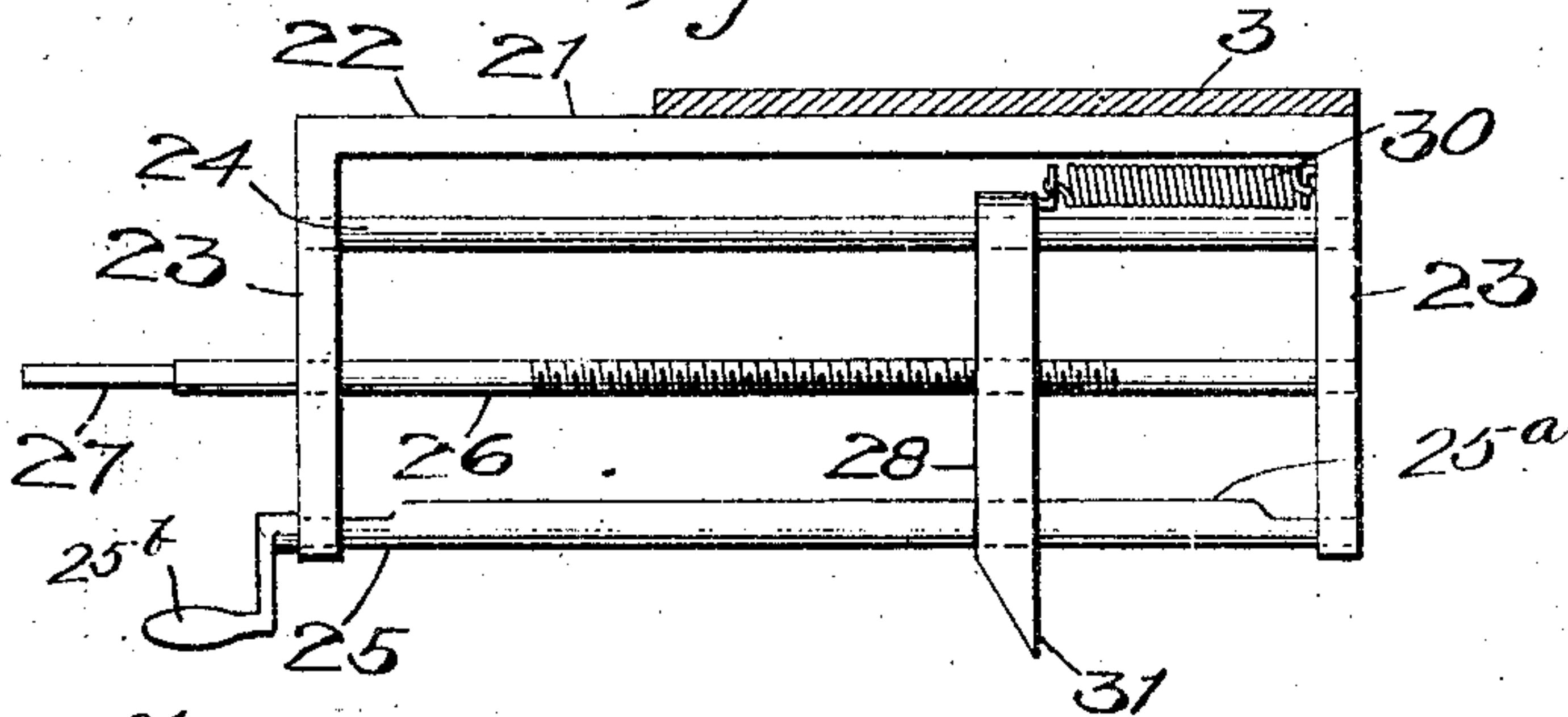
Patented Mar. 16, 1909.

3 SHEETS—SHEET 3.

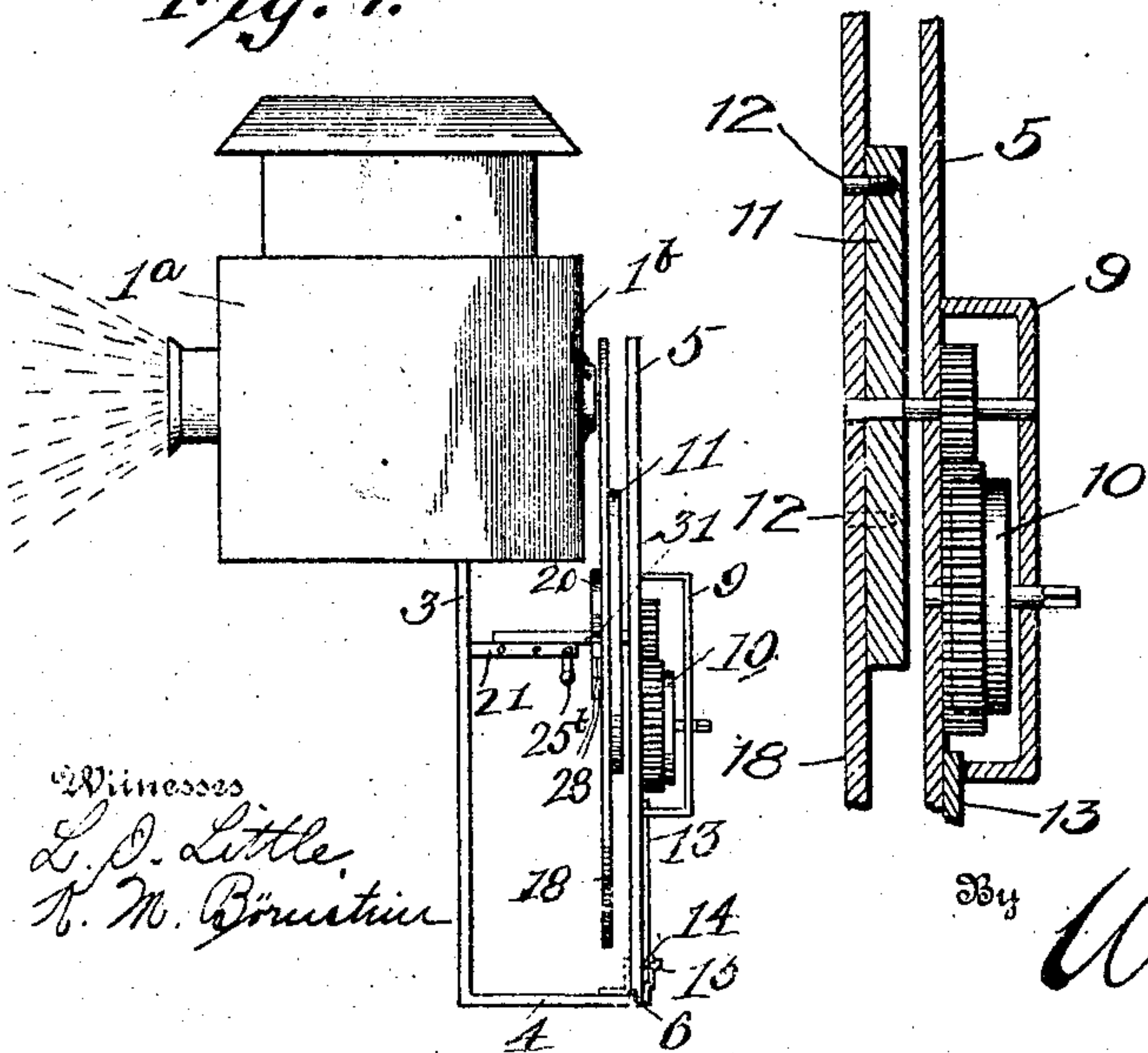
*Fig. 4*



*Fig. 5*



*Fig. 7.*



*Fig. 6.*

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## UNITED STATES PATENT OFFICE.

JOSEPH M. KIRBY, OF LONGMONT, COLORADO.

## PICTURE-PROJECTING APPARATUS.

No. 915,359.

Specification of Letters Patent.

Patented March 16, 1909.

Application filed February 24, 1908. Serial No. 417,345.

*To all whom it may concern:*

Be it known that I, JOSEPH M. KIRBY, a citizen of the United States, residing at Longmont, in the county of Boulder and State of Colorado, have invented certain new and useful Improvements in Picture-Projecting Apparatus, of which the following is a specification, reference being had to the accompanying drawings.

The invention relates to an improvement in picture projecting apparatus, and is primarily directed to the combination of a phonograph or other sound reproducing machine and a picture projecting machine, so that the picture exhibition may be directly controlled by and timed in accordance with the reproduction on the phonograph.

The main object of the present invention is the production of a series or intermittent picture projecting machine in which the operation of the picture carrying slide or slides is automatically controlled by the operation of the phonograph, with the effect to exhibit the successive pictures in direct and concurrent timing with the particular characteristics of the rendition by the phonograph.

The invention will be described in the following specification, reference being had particularly to the accompanying drawings, in which—

Figure 1 is a perspective view illustrating my improvement. Fig. 2 is a side elevation of the picture projecting machine. Fig. 3 is an enlarged perspective of the slide carrier operating mechanism of my improved machine, the slide carrier being shown turned down or in inoperative position. Fig. 4 is a rear elevation of the slide carrier supporting member of the frame. Fig. 5 is a plan of the dog operating mechanism. Fig. 6 is a vertical sectional view through the supporting frame, the slide carrier being shown in position; and Fig. 7 is a view similar to Fig. 2, showing the invention applied to a different style of picture projecting machine.

Referring particularly to the accompanying drawings, my improvement is designed primarily as an addition to an ordinary stereopticon or other picture projecting machine. The detailed structure of the machine other than in the particulars hereinafter described is not important so far as the present invention is concerned and it is to be understood that I contemplate the use of any picture projecting machine desired.

For the purposes of the present invention

the forward or face section of the machine is provided with a supporting frame 2, including a back plate 3 secured to or forming the face section of the machine and depending below the same, a bottom plate 4 extending at right angles and forwardly from the lower end of the back plate, and a front or disk receiving plate 5, said plate 5 being practically co-extensive in dimensions with the plate 3 but having a hinged connection at 6 with the forward edge of the bottom plate, so that the front plate can be turned down into approximately the same plane as the bottom plate. The condensing lens 7 of the picture machine is carried by or projects through the back plate 3 while the objective lens 8 is carried by the front plate 5, said lens being of any usual or preferred type and being so arranged that when the front plate is in elevated or operative position the respective lenses are aligned to permit the projection upon a screen or the like of a picture disposed between them.

Secured upon the forward face of the front plate 5 at a point below the condensing lens is a casing 9, within which is arranged a motor, as a spring motor 10, which may be of any usual or preferred type. The main shaft of the motor projects through the front plate and is provided in rear of said plate with a supporting disk 11 fixed to the shaft to be revolved by the motor and carrying adjacent its peripheral edge a series of laterally projecting pins 12, for a purpose which will presently appear. Arranged upon the forward face of the front plate 5 is a slide plate 13, adapted to project through the lower wall of the casing 9 and engage the main wheel of the motor, whereby in one position of the slide its function is to brake and thereby stop the motor. The slide is controlled by a handle 14 projecting from the slide near the lower edge of the latter, said handle or rod also serving to secure the back plate in elevated or operative position, being adapted for this purpose to engage a hook or upturned member 15 carried on the forward edge of a member 16 secured to the bottom plate, the front plate 5 being formed with an aperture 17 through which the hook 15 is adapted to pass when the plate 5 is in elevated or operative position. By this construction it will be apparent that as the brake 13 is moved downward to free the motor, the rod 14 will ride into the hook or keeper 15 and thereby secure the front plate in operative position, the reverse movement of the rod freeing the front



plate to permit the same to be swung down upon its hinged connection with the bottom plate and at the same time braking the motor against further movement.

5 For the purposes of the present invention the pictures are preferably arranged upon a slide carrier 18 of disk form, the pictures being arranged in series adjacent the peripheral edge of the slide. These pictures are, of  
10 course, of a character to accord with the particular selection rendered by the phonograph and are of a size to be properly projected by the lens of the picture machine when arranged between the same in the usual  
15 manner. The disk slide carrier is formed with a central opening to fit over the end of the motor shaft, and with a series of openings 19 to engage the pins 12 on the motor disk 11, so that the disk slide carrier may be secured to  
20 the motor disk and revolved directly by the latter under the influence of the motor.

The present invention is directed more particularly to an accurate and concurrent timing of the picture exhibition with the  
25 rendition on the phonograph, to gain which result it will be obvious that one or more of the pictures in the particular series corresponding to the phonograph rendition will be maintained upon the screen much longer  
30 than the others. For this purpose a regular and uniform advance of the successive pictures would be of no value, and means must be provided for arranging the particular picture in exhibiting position and maintaining it  
35 in such position in accordance solely with the requirements of the phonograph rendition. To accomplish this result I secure upon the rear face of the disk slide carrier a controlling ratchet 20 formed with a series of teeth 21  
40 corresponding in number to the number of pictures on the slide carrier and having irregular spacings with relation to each other and with the center of the slide carrier, that is one tooth will be spaced farther from the  
45 center of the slide carrier and a greater distance from the adjacent tooth than under regular arrangement.

To control the movement of the disk I arrange an operating mechanism including a  
50 rectangular frame 21 having a side bar 22 and end bars 23. The frame is secured to the rear plate 3 at a point below the motor shaft, and the end bars 23 are connected by guide rods 24 and 25, the former being ar-  
55 ranged in advance of the side bar 22 and the latter adjacent the free or outer edges of the end bars. Intermediate the guide bars 24 and 25 is arranged an operating rod 26, which is mounted for rotation in the end bars  
60 and is threaded throughout its length intermediate said bars. The operating bar projects beyond one of the end bars 23 and is terminally squared at 27, or otherwise formed for the connection of a second operating bar  
65 to be later described. A dog 28 is arranged

for cooperation with the frame 21, said dog comprising a metallic section formed at one end with a transverse opening to slidably engage the rear guide bar 24 and adapted to rest upon the forward guide bar 25. Inter-  
70 mediate the points of contact with the guide bars the dog is formed with a semicylindrical depression 29 in its under surface arranged to engage the threaded portion of the operating rod 26, said depression being threaded to  
75 cooperate with the threads on the operating rod to insure a longitudinal movement of the dog relative to the frame 21 in the operation of the rod. A spring 30 is terminally connected to the dog and to one of the end bars  
80 23 of the frame 21, said spring tending to move the dog in opposition to its movement under the influence of the operating rod and being effective to return the dog to normal  
85 position upon its disconnection from the rod. Said guide bar 25 is formed with a longitudinally extending, radially disposed rib 26<sup>a</sup>, and it is pivoted in the end pieces 23 so that when it is rotated the rib or projection 26<sup>a</sup>  
90 acts as a cam to elevate the dog 28 and disengage it from the screw threads of the operating rod 26. Upon the outer end of the rod 25 is a lever or crank handle 25<sup>b</sup> by means of which it may be readily rotated. The forward or nose end 31 of the dog projects be-  
95 yond the forward guide bar 25 and is adapted for cooperation with the teeth of the controlling ratchet.

The operating rod 26 is designed to be actuated by a phonograph or other sound re-  
100 producing instrument 32, and to provide for such control I arrange a second operating rod 33 terminally formed to engage the squared end 27 of the operating rod 26. The opposite end of the rod 33 is appropriately  
105 formed for frictional or other engagement with a moving part of the phonograph so that the latter will continuously revolve the operating rod 33 and thereby the operating rod 26. The detailed construction of the con-  
110 nection between the operating rod 33 and the phonograph is immaterial so far as the present invention is concerned, and the use of any mechanical construction for this purpose is contemplated.  
115

With the parts constructed and arranged as described, the picture disk in place, the dog nose 31 engaging the initial or first tooth of the controlling ratchet, and the operating  
120 rods actuated by the phonograph, the operation of my improved picture exhibiting machine is as follows. As the phonograph continues its rendition, the operating rod 26 is rotated with the effect to feed the dog longitudinally of the guide rods 24 and 25. This  
125 movement gradually disengages the dog from the initial ratchet tooth of the controlling ratchet and permits the motor to move the picture slide until the second or next adjacent tooth engages the dog. As these  
130



teeth are arranged in accordance with the arrangement of the pictures on the slide, the engagement of the dog with the second tooth arranges the second picture in position to be projected upon the screen. This movement is continued until the pictures are exhausted or the operation of the phonograph stopped.

When it is desired to reset the device the crank handle 25<sup>b</sup> is operated to lift the cam projection 25<sup>a</sup>, which latter swings the dog upon the guide bar 24 so as to lift its screw threaded portion or half nut out of mesh with the screw threaded operating rod 26, whereupon the spring 30 will return the dog to its starting point and when the crank handle 25<sup>b</sup> is released said dog will drop into engagement with said operating rod or screw.

It will be particularly noted that the movement of the operating rod 26 is uniform and continuous, but that the respective teeth of the ratchet are irregularly disposed. From this arrangement it is at once apparent that some of the pictures will be maintained in picture exhibiting position a greater length of time than other of the pictures. As each picture slide will correspond to and be arranged with relation to the rendition of the phonograph, the controlling ratchet of each slide will also be arranged to maintain the certain particular pictures on the slide in picture exhibiting position the exact length of time required by the phonograph rendition. The pictorial representation indicative of the song or composition being rendered by the phonograph will, therefore, accord exactly with such rendition, the spacing of the teeth of the controlling ratchet relative to each other and to the center of the picture slide insuring such operation.

The particular construction of the picture slide carrier or picture carrier is not material to the present invention as I contemplate its construction in any manner best adapted for the particular picture machine used.

In Fig. 7 of the drawings I have shown the invention applied to a polyopticon or picture projecting machine 1<sup>a</sup> in which the pictures to be reproduced are disposed opposite an opening 1<sup>b</sup> at the rear of the body of the machine. The pictures to be projected are pasted or otherwise secured upon the front face of the disk 18, which latter serves as a carrier for the pictures and as it is rotated brings them successively opposite the opening 1<sup>b</sup> at the back of the machine so that the reflecting and projecting apparatus within the latter will project the images out of the front of the machine and upon the screen. In this form of the invention the frame 2 is so disposed that its member 3 is beneath the body of the machine.

Having thus described the invention, what is claimed as new, is:—

1. The combination of a sound producing machine, a picture projecting apparatus, a rotary picture carrying disk provided with an annular row of pictures, means for rotating said carrier disk, the ratchet plate 20 concentrically arranged and secured to one side of said disk and having its edge or periphery cut to form the ratchet teeth 21 arranged at different distances from the center of said plate, the dog 28 slidably mounted to permit it to successively release the ratchet teeth 21 and pivotally mounted to permit it to be swung away from and out of engagement with said ratchet teeth, means actuated by the sound producing machine for sliding said dog and means for swinging said dog to disengage it from said actuating means and said ratchet teeth.

2. The combination of a sound producing machine having a rotary shaft, a picture projecting apparatus, a movable picture carrier, means for actuating said carrier, a controlling ratchet for said carrier consisting of a plate having its edge formed with ratchet notches disposed at different distances from its center, a guide, a dog slidably and pivotally mounted on said guide and adapted to co-act with said ratchet, a half nut carried by said dog, a screw shaft engaged by said half nut, and a coupling between said screw shaft and the shaft of the sound producing machine.

3. The combination of a sound producing machine having a rotary shaft, a picture projecting apparatus, a movable picture carrier, means for actuating said carrier, a controlling ratchet for said carrier consisting of a plate having its edge formed with ratchet notches disposed at different distances from its center, a guide, a dog slidably and pivotally mounted on said guide and adapted to co-act with said ratchet, a half nut carried by said dog, a screw shaft engaged by said half nut, a coupling device between the screw shaft and the shaft of the sound producing machine, said screw shaft being adapted to slide the dog in one direction upon its guide, a spring for actuating the dog in the other direction, and a pivoted cam co-extensive in length with the threaded portion of the screw shaft and adapted to engage said dog and disengage its half nut from the screw shaft.

4. The combination of a sound producing machine having a rotary shaft, a picture projecting apparatus, a movable picture carrier, means for actuating said carrier, a controlling means for the actuating means, said controlling means including a rotary shaft and a connecting means between the latter and the shaft of the sound producing machine.

5. The combination of a sound producing machine having a rotary shaft, a picture projecting apparatus, a support having stationary and movable members, a movable



picture carrier upon said movable member, means upon said movable member for actuating said carrier, a controlling ratchet for said carrier and carried by the movable member, a dog carried by the stationary member and adapted to co-act with said ratchet, a screw shaft for actuating said dog and a coupling device between the screw shaft and the shaft of the sound producing machine.

6. The combination of a sound producing machine, a picture projecting apparatus, a support having stationary and movable members, a picture carrier upon the movable member, means upon the movable member for actuating said carrier, a controlling ratchet for the carrier carried by the movable member, a dog to co-act with the ratchet and carried by the stationary member and means for actuating said dog operatively connected to the sound producing machine and adapted to be actuated thereby.

7. The combination of a support having stationary and movable members, a picture carrier upon the movable member, means for actuating said carrier, a controlling ratchet for the carrier, a dog to co-act with the ratchet carried by the stationary member, a screw shaft for actuating said dog, means for retracting said dog and means for disengaging the dog from said screw shaft.

8. The combination of a support, the guide rod 24, the screw shaft 25, the dog 28 slidably and pivotally mounted on said guide rod and provided with a half nut to engage the screw, a coil spring 30 for retracting the dog, the pivoted cam 26<sup>a</sup> for disengaging the dog from the screw shaft, a picture carrier, means for actuating the latter, and a controlling ratchet for said carrier adapted to co-act with said dog.

9. A picture projecting apparatus including a frame comprising a back plate, a bottom plate, and a front plate having hinged connection with the bottom plate, a motor carried by the front plate, a receiving disk operated by the motor, a picture slide carrier arranged for connection with the receiving disk, a controlling ratchet carried by the picture slide carrier, a frame carried by the back plate, an operating rod mounted in said frame, and a dog supported by the frame and actuated by the operating rod, said dog being adapted to engage the teeth of the ratchet in succession.

10. The combination with a support having a stationary member and a movable member movable toward and from the sta-

tionary member, a picture carrier detachably mounted upon said movable member, means for actuating said carrier, a controlling ratchet upon the carrier, a dog to co-act with the ratchet carried by the stationary member of the support, and means for actuating said dog.

11. The combination with a support having a stationary member and a movable member movable toward and from the stationary member, a picture carrier detachably mounted upon said movable member, means for actuating said carrier, a controlling ratchet upon the carrier, a dog to co-act with the ratchet carried by the stationary member of the support, means for actuating said dog, and means for securing the movable member of the support with said dog and said ratchet in operative relation.

12. The combination of a picture projecting apparatus, a support movable toward and from the same, a motor driven element on said support, a picture carrier detachably mounted on said element and provided with a controlling ratchet and a dog to co-act with said ratchet.

13. The combination of a picture projecting apparatus, a support movable toward and from the same, a motor driven plate rotatably mounted on said support and provided with pins, a picture carrying disk apertured to receive said pins whereby it is detachably mounted on said plate, said disk carrying a controlling ratchet, and a dog to co-act with said ratchet.

14. The combination of a picture projecting apparatus, a support movable toward and from the same, a motor driven element on said support, a picture carrier detachably mounted on said element and provided with a controlling ratchet, a dog to co-act with said ratchet, a sound producing machine and means actuated by the latter for operating said dog.

15. As an article of manufacture, a picture carrying disk having an annular row of pictures and a ratchet plate arranged concentrically on one face of the disk and provided with an annular row of ratchet teeth disposed at different distances from its center and corresponding in number to the pictures on said disk.

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

JOSEPH M. KIRBY.

Witnesses:

THOS. RICHARDS,  
S. L. RICHARDS.