

(No Model.)

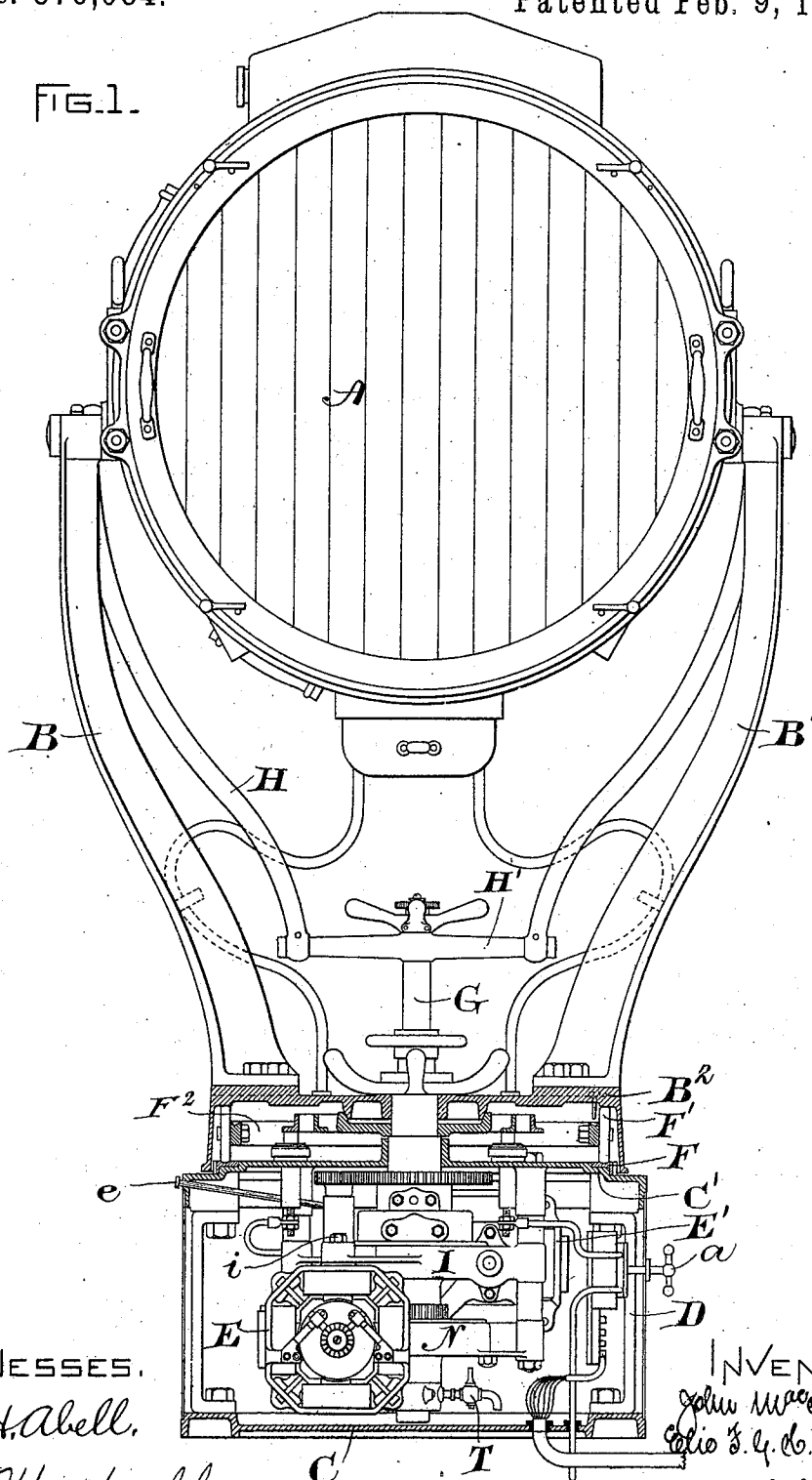
3 Sheets—Sheet 1.

J. MACHAFFIE & E. F. G. H. FAURE.
PROJECTOR.

No. 576,684.

Patented Feb. 9, 1897.

FIG. 1.



WITNESSES.

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(No Model.)

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FIG. 2.

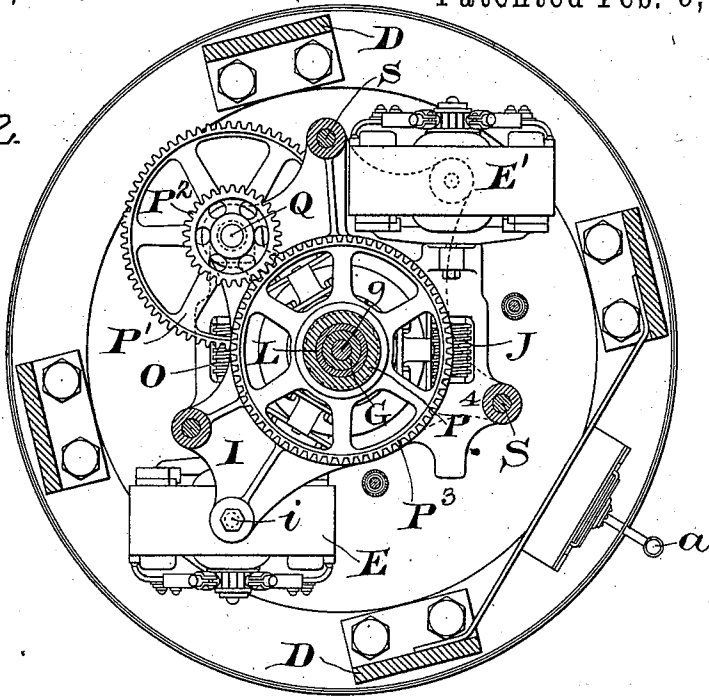
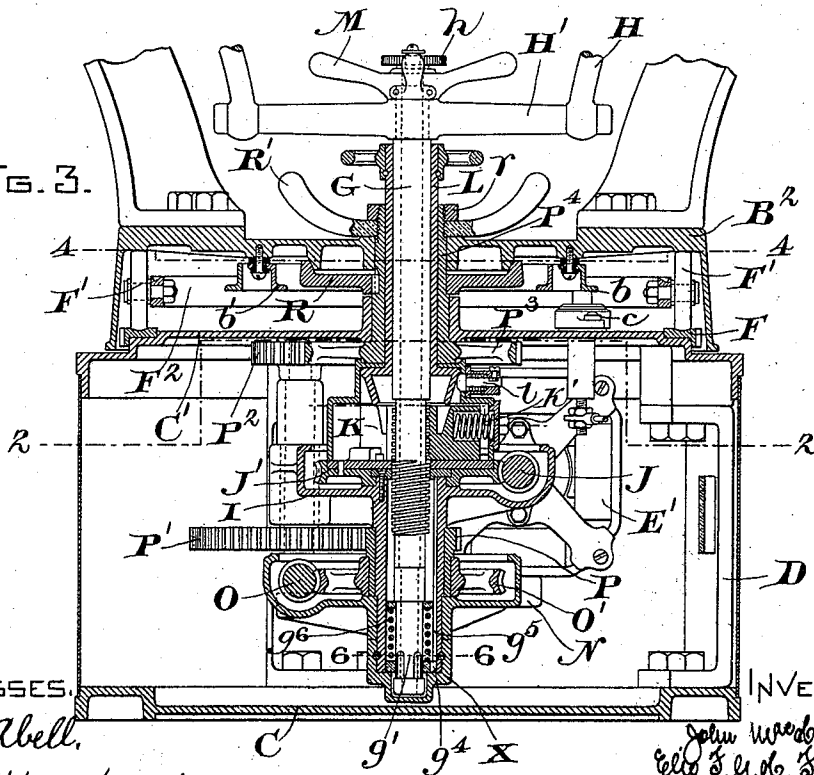


FIG. 3.



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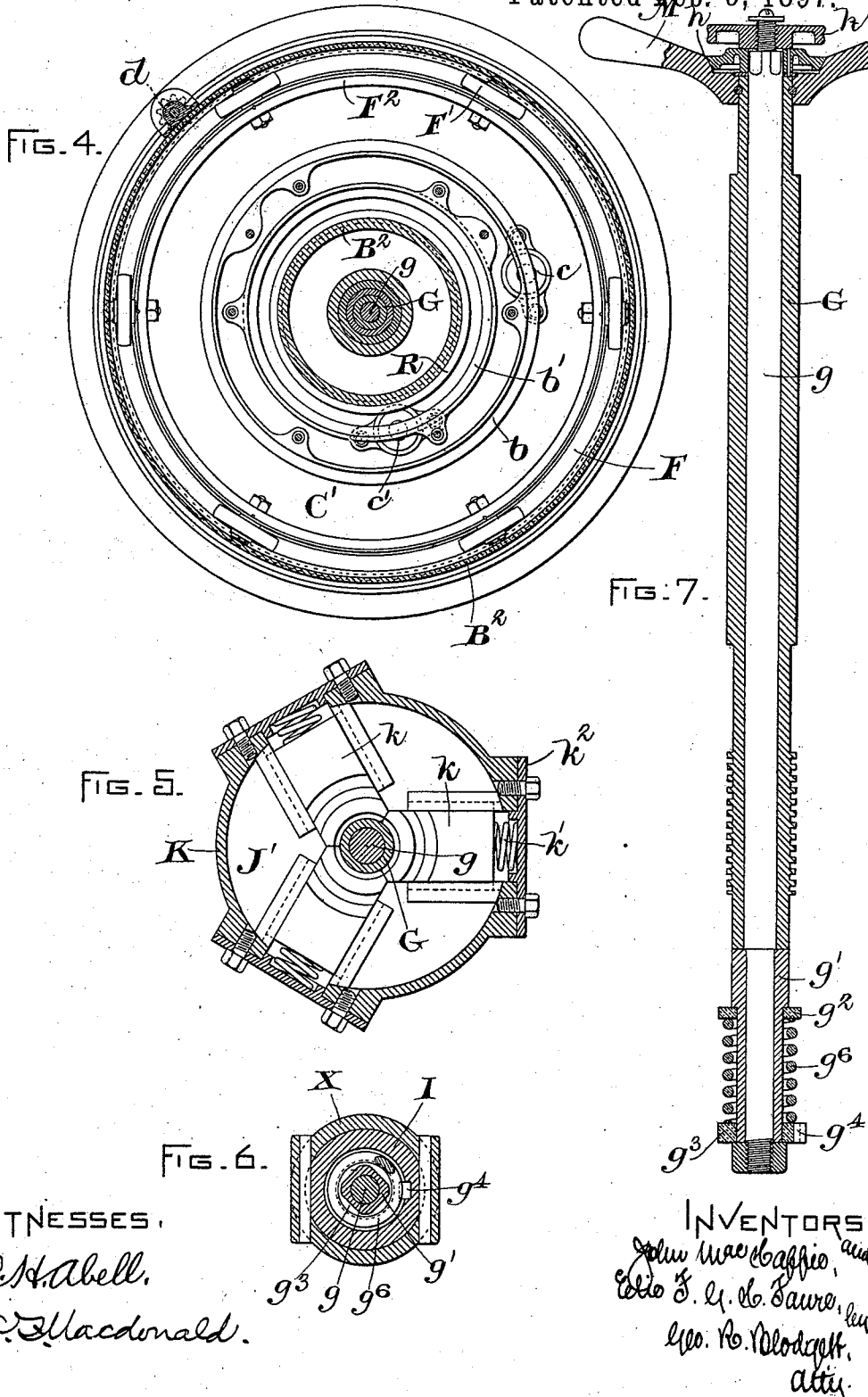
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UNITED STATES PATENT OFFICE.

JOHN MACHAFFIE AND ELIE F. G. H. FAURE, OF SCHENECTADY, NEW YORK,
ASSIGNORS TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

PROJECTOR.

SPECIFICATION forming part of Letters Patent No. 576,684, dated February 9, 1897.

Application filed April 22, 1896. Serial No. 588,552. (No model.)

To all whom it may concern:

Be it known that we, JOHN MACHAFFIE, a subject of the Queen of Great Britain, and ELIE F. G. H. FAURE, a citizen of the Republic of France, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Projectors, (Case No. 393,) of which the following is a specification.

10 The present invention relates to projectors, and has for one of its objects to support the operating mechanism from the top of the base instead of the bottom, as in other projectors with which we are familiar. By supporting

15 the motors, gearing, &c., from the top instead of the bottom of the base any accident which would throw the parts of the base out of parallel with each other does not affect the proper working of the operating mechanism and revolving drum, they being provided with a

20 common support. This obviates all the cramping effect between the operating mechanism and the drum which is so common in types of projector in which the operating mechanism

25 is supported at the bottom of the base and the revolving drums from the top of the base. In the type of projector last mentioned the operating mechanism has to be made heavier than in the present construction, as a large

30 portion of the strain between the parts has to be taken thereby. This increases the cost of construction, whereas in the present invention the apparatus is made lighter, stronger, and less liable to get out of order.

35 The invention further relates to the construction and operation of the parts when motors are used to actuate them, reference being made particularly to the vertical training. In other constructions commonly used

40 automatic means have been employed to interrupt the circuit of the actuating-motor when the drum carrying the focusing-lamp has reached its limit, either up or down. This we have found to be objectionable on account

45 of the arcing at the switch-points and the care necessary to maintain them in good working condition. In carrying out this part of the invention mechanical means are employed to limit the movement of the drum in the ver-

50 tical training, while permitting the motor to

run until stopped by means of a controlling device located at any convenient point. To accomplish this, a center sleeve is provided, on which is cut a short section of screw-thread, the latter being adapted to engage with a

55 split nut driven by a motor when it is desired to train the projector in a vertical direction. The screw-thread occupies a central position with respect to the nut when the drum is in a horizontal position and works up or down, de-

60 pending upon the direction of rotation of the motor. The screw-thread on the sleeve having a limited length can only move up or down a certain distance. As soon as it has moved

65 this distance it is no longer in engagement with the nut. Consequently the movement of the drum ceases, but the motor may continue to revolve as before. A spring is used to force the screw-threaded sleeve into engagement

70 with the nut as soon as the motor is reversed, and the drum is moved in the opposite direction.

The invention further relates to the means for supporting the drum and frame, permitting them to revolve in a horizontal plane.

75 A "live" ring is provided, to which are secured a number of rollers having a curved or cone-shaped surface at their periphery and adapted to travel in a circular track on the base having a corresponding groove. No hub

80 or center support is needed for this ring, the surface of the circular track in the base preventing any radial movement of the ring.

The invention further relates to details of construction more fully pointed out and ex-

85 plained hereinafter.

In the accompanying drawings attached to and made a part of this specification, Figure 1 is a front end elevation, partially in section. Fig. 2 is a cross-section on the line 22 of Fig. 3.

90 Fig. 3 is a vertical section through the center of the base. Fig. 4 is a cross-section on the line 44 of Fig. 3. Fig. 5 is a detail view of the split nut. Fig. 6 is a section on the line 66 of Fig. 3. Fig. 7 is a detail view

95 of the clutch used in vertical training.

A represents a drum of the usual construction, in which is located an arc-lamp of any suitable make. Two arms B and B' are secured to a cylindrical base B², and at the up-

100

per ends are provided with bearings for supporting the trunnions of the drum A. The base proper consists of a cast-metal plate C, adapted to be secured to the deck or other
5 suitable support, and extending upward therefrom are struts D, forming a support for the top plate C' of the base, and secured to the base by suitable means are the two motors E E' and the various parts of the operating
10 mechanism hereinafter described.

Mounted on the top plate is a ring F, provided with a groove in which the wheels or rollers F' are adapted to travel. These rollers are supported by a live-ring structure F²,
15 which is free to revolve about its center independent of any movement of the projector. The base B² is provided with a surface which rests on the rollers F', and on these it is adapted to turn around the vertical sleeve G as a
20 center. As the top plate C', which supports the ring F, and the casting B² are secured together at the center against separation the rollers F' cannot get out of the groove in F without lifting the casting B², and this is pre-
25 vented by the construction explained above.

Referring now to Figs. 2 and 3, the parts are shown in the position which they occupy when the drum A has been rotated in its supports to its extreme upward position. The
30 curved rods H are secured to the head H', the latter being provided with a bearing on the sleeve G, and at their upper ends to the drum A at a point some distance from the center of rotation, so that a movement in a
35 vertical direction will impart a vertical movement to the drum.

The motors E and E' are of any suitable construction, those shown in the drawings being of the four-pole continuous-current
40 type. The motor E is secured to a casting I by means of a bolt *l*. The casting I also forms a support for the worm J, which is rotated by means of the motor E'. In addition to this it forms a tray in which the worm J and the
45 worm-wheel J' rotate in oil.

The worm-wheel J' furnishes a support for the split nut K, composed of three parts *k*, working in suitable guides and forced in toward the center by means of spring *k'*. The
50 sections of the nut K are drilled out in the back, after which the spring *k'* is placed in position. The sections are then put in the guides and the plates *k*² secured to the cylindrical casting by means of bolts. The sections
55 are normally in position to cooperate with the screw-threaded portion of the sleeve G; but under certain conditions, explained hereinafter, it is desirable to force them outward, and this is accomplished by means of the
60 sleeve L, which is provided at one end with a cone-shaped enlargement adapted to engage with a corresponding groove cut in the sections of the nut K. To force the sections of the nut K away from the center, the cone is
65 forced downward by means of the handle at the upper end of the cone-sleeve. To prevent the cone dropping down and forcing the nut

apart when in engagement with the screw-thread on the sleeve G, a spring-pressed plunger *l* is mounted in a suitable manner and en-
70 gages with a flange on the top portion of the cone.

In the center of the screw-threaded sleeve G is a shaft *g*. The sleeve *g'* is provided with collars *g*² and *g*³, the latter being secured
75 against rotation to the sleeve *g'* and provided with a feather *g*⁴, adapted to slide in a vertical groove *g*⁵. Between the two collars *g*² and *g*⁴ is a spring *g*⁶. This is compressed by a ver-
80 tical movement of the sleeve G and forms a cushion-stop for the drum in both directions. At the top of the shaft *g* is a hand-nut *h*. When this is screwed down, it forces the fric-
85 tion-cone *h'* into engagement with a corresponding surface on the handle M and also causes the sections G and *g'* of the sleeve to grip each other at their point of contact. This
is done for the vertical motor-training.

The motor E' for actuating the vertical-training mechanism is supported from a cast-
90 ing N, which forms a support for the worm O, actuated by the motor E. In addition to the above it forms a tray in which the worm O and the worm-wheel O' are run in oil. Formed
integrally with the worm-wheel O' is a pinion
95 P, engaging with a gear P', which is secured to the bottom of a vertical shaft Q, mounted in suitable bearings. At the top of the shaft is a pinion P², carried by a sleeve P⁴, sur-
100 rounding the vertical training-sleeve G. Secured to the sleeve P⁴ is a friction-cone R, which engages with a corresponding surface on the bottom of the casting B². To lock these
cone-surfaces into engagement, a wing-nut R' is provided, and to prevent the nut from com-
105 ing off a check-nut *r* is provided.

It will be noted, in connection with the mechanism already pointed out, that it is separated into sections and the sections se-
110 cured to the top plate of the base by means of bolts S; for example, the casting N, which serves as a support for the motor E' and at the same time forms a tray in which the worm O and the worm-wheel O' run. The same is
115 true of the casting I, which supports the motor E and forms a tray in which the worm J and the worm-wheel J' run. Suitable spacing-blocks are provided to preserve the proper distance between the sections.

A switch *a*, Fig. 2, is provided to break the
120 circuit to the motors and lamp-terminals.

Connection is made between the terminals in the base and the moving contact-rings *b*
125 *b'* by means of suitable spring-pressed contacts *c c'*.

The outer periphery of the ring F is provided with teeth, which mesh with a pinion
130 *d*, Fig. 4. By means of this gear and a suitable handle the beam of light is slowly trained in a horizontal plane.

In Fig. 4 the parts are shown on an enlarged scale. The rollers F' are secured to the ring F² by means of studs which permit them to revolve freely, and the ring F², as a

whole, is free to travel on the ring F independent of any movement of the base B². The pinion *d* is supported by means of a lug secured to any convenient part of the base B².
 5 The contact-rings *b* and *b'* are secured to the base B² and suitably insulated therefrom, and engaging with them are contacts *c* and *c'*, carried by the top plate C' of the base.

Fig. 5 shows an enlarged detail view of the
 10 nut K, composed of segments *k*, which are adapted to slide to and fro in guides secured to the worm-wheel J'. The springs *k'* tend to force the segments *k* toward the sleeve G, and the plates *k*² furnish end supports for
 15 them.

In Fig. 6 the sleeve *g'* is provided with flattened portions, and the collar *g*³ is fitted thereto and prevented from turning. In the casting I is provided a groove in which the
 20 key *g*⁴, secured to the collar *g*³, is adapted to move. To furnish a bearing for the collar *g*³ when the sleeve G is forced downward, a cap X is provided and secured to the downwardly-projecting portion of the casting I by means
 25 of pins.

Fig. 7 shows an enlarged detail view of the clutch mechanism used for hand and motor control. The handle M is secured to the sleeve G by means of pins. The shaft *g* carries at
 30 its upper end a nut *h*, engaging with a cone, which is secured to the shaft *g* and is adapted to engage in frictional contact with the handle M when the nut *h* is screwed down. When the nut *h* is screwed down, it also brings
 35 the sleeve *g'* into frictional engagement with the sleeve G. The sleeve *g'* and the nut at the bottom of the shaft form supports for the collars *g*³ and *g*², and between them is located the compression-spring *g*⁶.

The operation of the apparatus will now be described. In Fig. 3 the screw-threaded sleeve G is shown in its lowest position, which indicates that the beam of light is trained upward to its greatest elevation, the rods H being connected back of the center of the drum. The screw-threaded portion of the sleeve G is below the segmental nut K, the parts of which are forced inwardly by means of the springs *k'*. The spring *g*⁶ is compressed to a certain
 50 extent by this downward movement of the sleeve, forming a cushion-stop, and as the nut K is no longer in engagement with the screw-thread the motor E' and its revolving parts are free to operate without affecting the position of the drum. If it is desired to train the beam from its extreme upward position, the motor E' is reversed, and the spring *g*⁶ being under compression will force the screw-threaded sleeve *g'* into engagement with the
 60 split nut, and the sleeve will be fed upward until the screw-thread on the sleeve leaves the nut. In this case the spring *g*⁶ will be compressed from the opposite end, the collar *g*², engaging with a portion of the worm-wheel J', again forming a cushion-stop. When the collar reaches this point, the screw-thread will be out of engagement with the nut, and the

motor E' is free to revolve. When it is desired to train the beam upward, the motor is reversed, and the spring *g*⁶ again forces the threaded portion of the sleeve G into engagement with the nut. Assuming now that the drum is in the position shown in Fig. 1 and it is desired to train it slowly in a vertical plane, the sleeve G is released from its frictional connection with the shaft *g* and the sleeve *g'*, and as the nut K is stationary a movement of the wing-nut M will move the drum up or down, as desired. If it be desired to train the beam rapidly in a vertical plane, the parts remain as before, with the exception that the cone-sleeve L is forced downward, thus spreading the sections of the nut K. This permits of a free movement of the beam in a vertical plane by means of the handles mounted on the drum. The horizontal training is accomplished by means of the motor E, worm O, worm-wheel O', gears P P' P² P³, and clutch R. The drum in this case is free to turn completely around. When it is desired to revolve the drum freely in a horizontal plane, the clutch R is released by means of the wing-nut R', and when it is desired to revolve it slowly by hand the pinion *d* is operated by means of a suitable handle.

It is evident from the above that the beam of light can be trained simultaneously in a horizontal and vertical plane by the motors E E', by hand, or by a combination of hand and motor.

The particular way in which motors are started, regulated, and stopped forms no part of the present invention. The preferred method of accomplishing this has already been patented to Faure, MacHaffie and Libby, No. 539,863, dated May 28, 1895.

The oiling of the various parts is accomplished by means of tubes *e*, only one being shown, which extend from the outside to the trays. These trays restrict the passage of oil and at the same time permit it to flow toward the center of the column and down, where it may be drawn from the stop-cock T by any suitable means.

What we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a projector, a base provided with top and bottom members, the top member supporting the drum-frame from its upper side and the operating-motors from its under side.

2. In a projector, the combination of a base provided with top and bottom plates, struts between the plates, and motors and intermediate actuating mechanism carried by the under side of the top plate.

3. In a projector, the combination of top and bottom plates, motors supported from the under side of the top plate, rollers between the top plate and the drum-frame, and means for securing the drum-frame to the top plate.

4. In a projector, the combination of a base composed of two members, means for separating the members, motors and operating mechanism divided into sections, and means

for securing the sections to the top member of the base.

5. In a projector, the combination of a base composed of top and bottom plates, struts between the plates, motors and operating mechanism divided into sections and secured to the top plate by bolts, and trays in which portions of the operating mechanism are adapted to revolve.

6. In a projector, the combination of a center screw-threaded sleeve, a split nut adapted to engage therewith, springs for forcing the sections of the nut toward the center, and means for rotating the nut around the sleeve to move it in a vertical direction.

7. In a projector, the combination of a screw-threaded sleeve adapted to actuate the drum, a split nut engaging therewith to move it up and down, and means for releasing the screw-threaded sleeve from the split nut when it is desired to operate the drum by hand.

8. In a projector, the combination of a center sleeve provided with a screw-threaded portion, a split nut adapted to engage therewith, springs for forcing the segments of the nut into engagement with the sleeve, a worm-wheel, guides on the wheel for the nut, and a device for forcing the nut out of engagement with the feed-screw.

9. In a projector, the combination of a screw-threaded sleeve made in sections and adapted to move the drum in a vertical plane, and a clutch for preventing the rotation of the sleeve.

10. In a projector, the combination of a screw-threaded sleeve made in sections and adapted to move the drum in a vertical plane, a shaft inside of the sleeve, friction-surfaces between the shaft and the sleeve, and means carried by a section of the sleeve for preventing rotation of the sleeve when the friction-surfaces are in contact.

11. In a projector, the combination of a shaft, a sleeve surrounding the shaft made in sections, screw-threads cut on one section of the sleeve, one section of the sleeve being adapted for rotation and vertical movement, the other section being limited to a vertical movement.

12. In a projector, the combination of a vertically-movable actuating device secured to the drum, a motor for actuating the device, and a cushioned stop for limiting the vertical movement of the drum.

13. In a projector, the combination of a vertically-movable actuating device secured to the drum, a nut for actuating the device, a motor for revolving the nut, a cushion-stop for limiting the vertical movement of the drum in either direction, and a spring for pressing the nut into engagement with the actuating device when the motor is reversed.

14. In a projector, the combination of a screw-threaded sleeve, a motor for revolving

the nut about the sleeve, and a spring adapted to bring the screw-threaded portion of the sleeve into engagement with the nut when the motor is reversed at the end of the up or down movement of the sleeve.

15. In a projector, the combination of a vertical actuating device, means for operating the device propelled by a motor, and a mechanical stop for the device limiting its movement, but permitting a continuous rotation of the motor.

16. In a projector, the combination of an actuating device secured to the drum and adapted to move up or down, means propelled by the motor for operating the device, and a stop provided with a compression-spring adapted to limit the movement of the actuating device in either direction and at the same time permit a continuous rotation of the motor.

17. In a projector, the combination of a shaft or sleeve secured to one element for movement in one plane, a sleeve surrounding it and secured to a second element for movement in another plane, and motors supported from the top part of the base for imparting movement to the operating mechanism.

18. In a projector, the combination of a drum-supporting frame adapted for horizontal movement, a base provided with top and bottom plates, a motor secured to the top plate of the base, gearing between the motor and the frame, and a friction-clutch for throwing the gearing into operative relation with the frame.

19. A screw-threaded sleeve, a nut cooperating therewith, means for securing the nut and rotating the sleeve, and means for preventing rotation of the sleeve and rotating the nut; whereby the sleeve may be moved vertically by two different mechanisms, substantially as described.

20. In a projector, the combination of a vertically-movable sleeve secured to the drum and adapted to be actuated by a rotary movement or by securing the sleeve against rotation and revolving a nut around a screw-threaded portion of the sleeve.

21. A screw-threaded sleeve adapted to be fed in a vertical plane by three separate means; first, by securing the sleeve against rotation and feeding it by means of a nut driven by a motor; second, by securing the nut against rotation and revolving the sleeve, and third, by releasing the sleeve from the nut and moving it up and down by hand.

In witness whereof we have hereunto set our hands this 20th day of April, 1896.

JOHN MACHAFFIE.
ELIE F. G. H. FAURE.

Witnesses:

B. B. HULL,
GENEVIEVE HAYNES.