No. 715,476. Patented Dec. 9. 1902.

J. F. HARDY.

ELEVATING AND CONTROLLING MECHANISM.

(Application filed Jan. 14, 1902.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

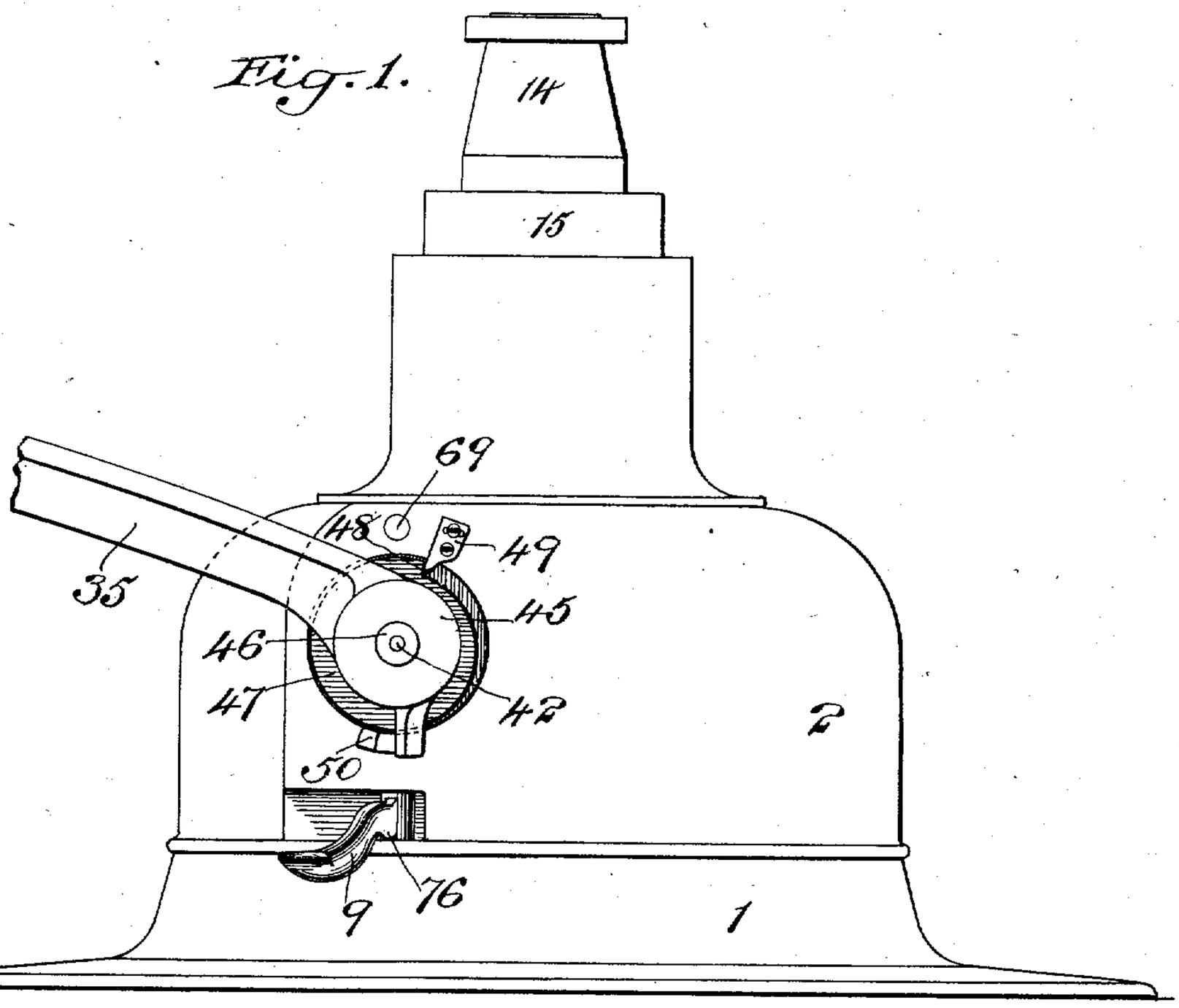


Fig. 2.

Witnesses:-
Henry Thieme.
Fred Haynes

Inventor:-
James F. Hardy
by attorneys
Brown & Seward

No. 715,476. Patented Dec. 9. 1902.

J. F. HARDY.

ELEVATING AND CONTROLLING MECHANISM.

(Application filed Jan. 14, 1902.)

(No Model.) 3 Sheets—Sheet 2.

Fig. 3.

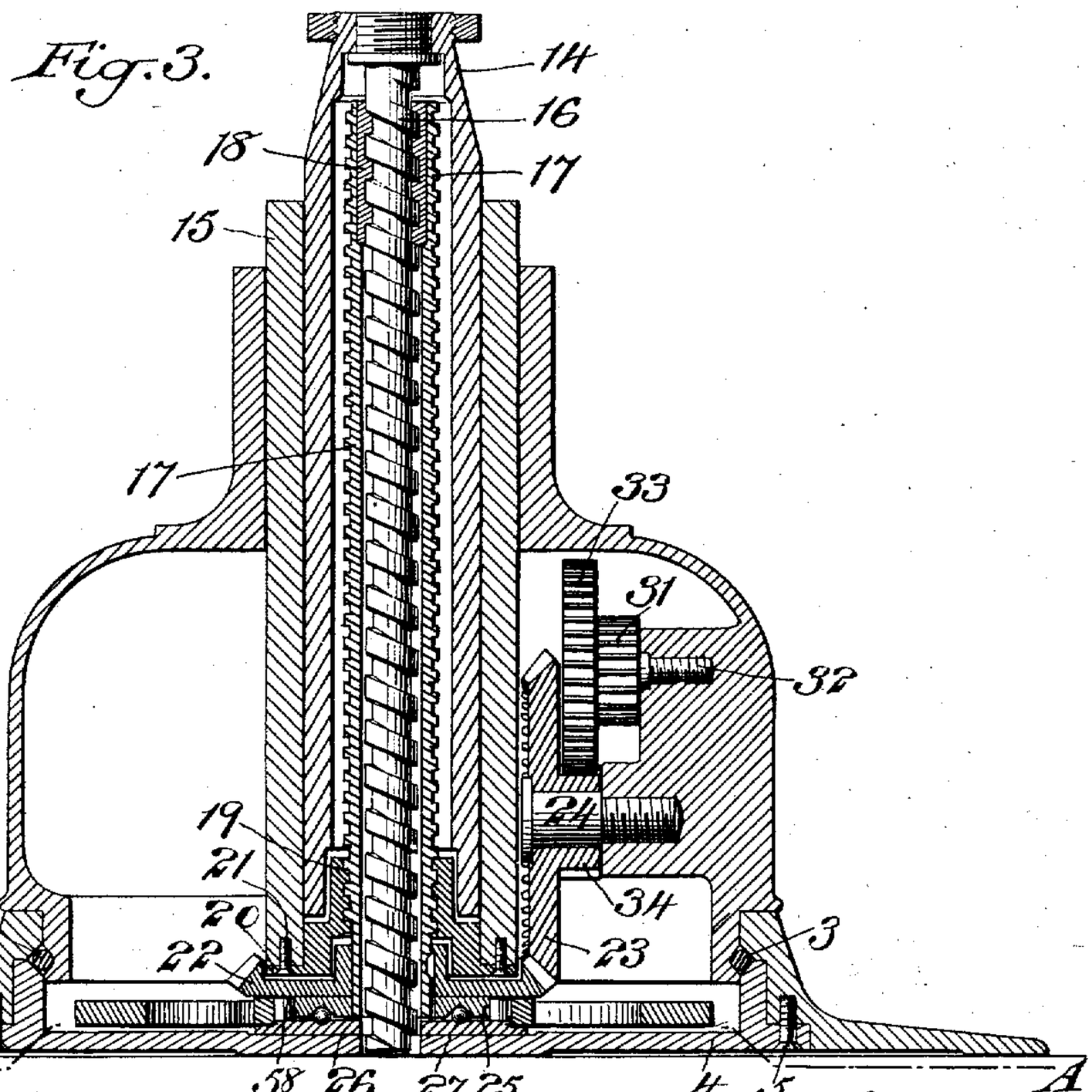
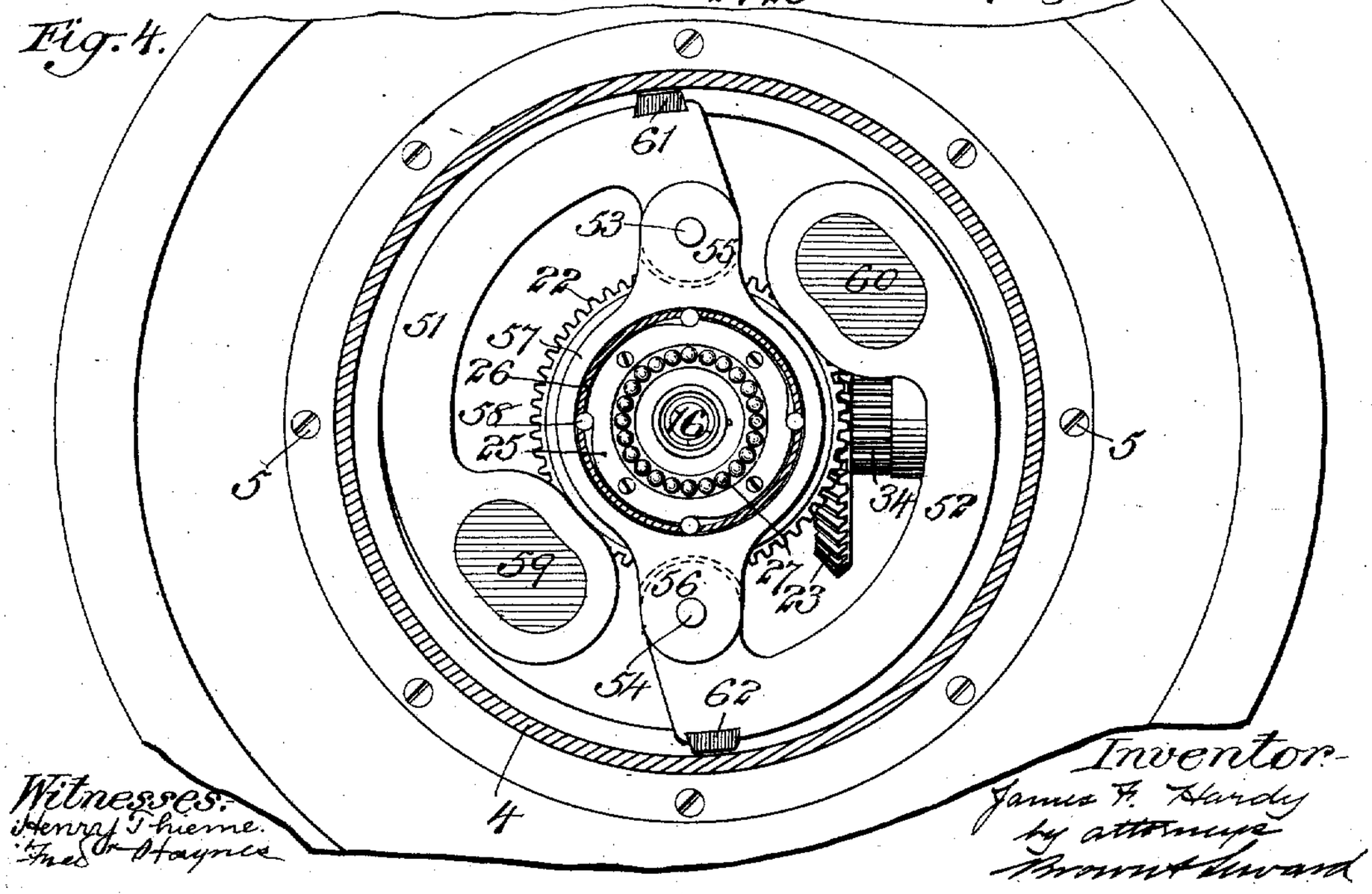


Fig. 4.



Witnesses:
Henry J. Thieme.
Fred'k Haynes

Inventor:
James F. Hardy
by attorneys
Brown & Seward

No. 715,476. Patented Dec. 9, 1902.

J. F. HARDY.

ELEVATING AND CONTROLLING MECHANISM.

(Application filed Jan. 14, 1902.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 5.

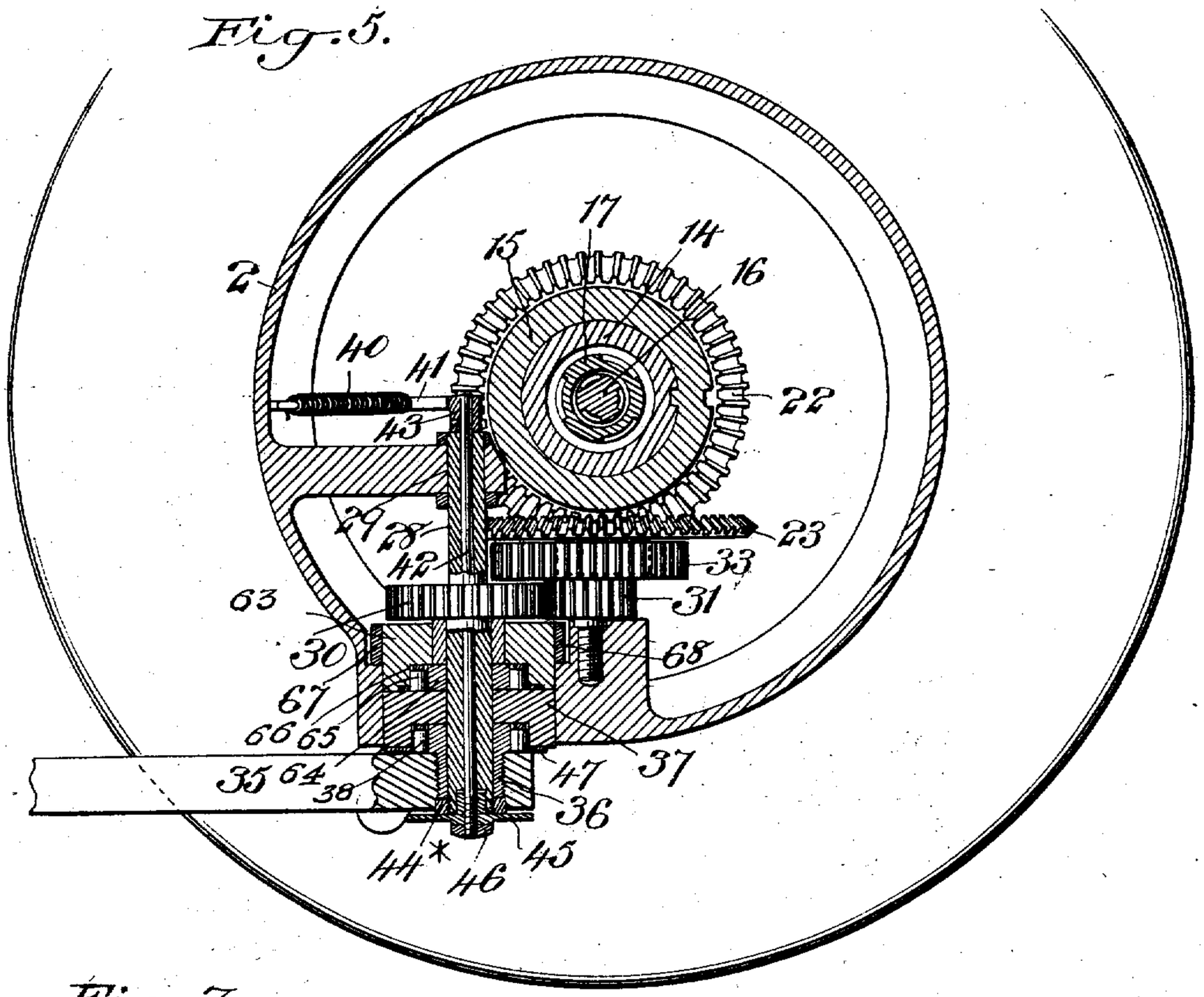


Fig. 7.

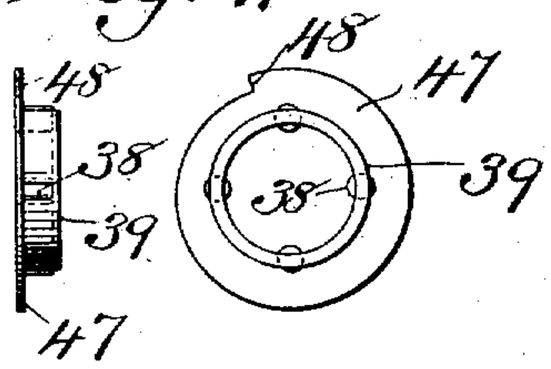


Fig. 6.

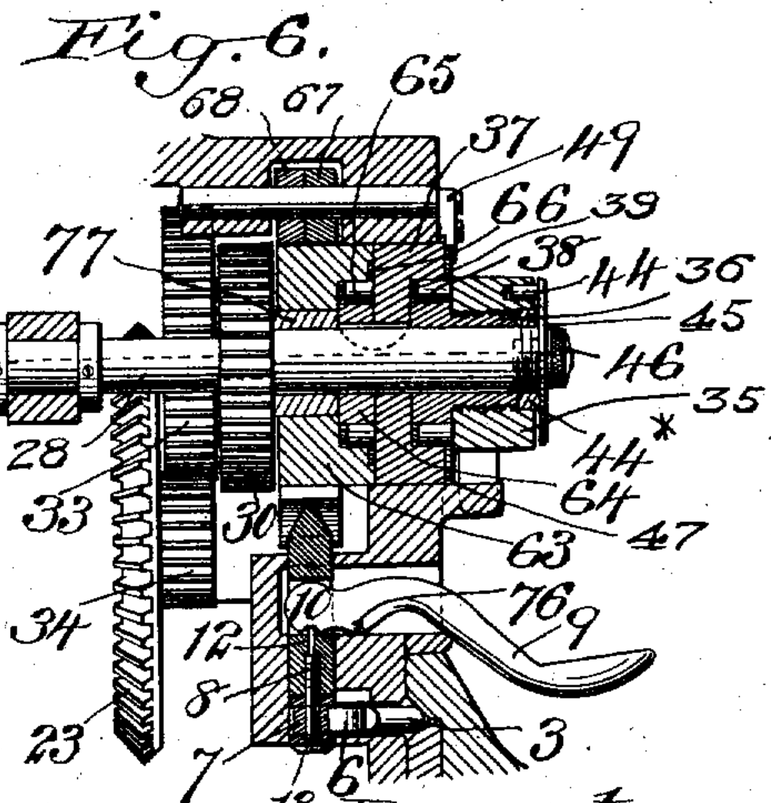


Fig. 8.

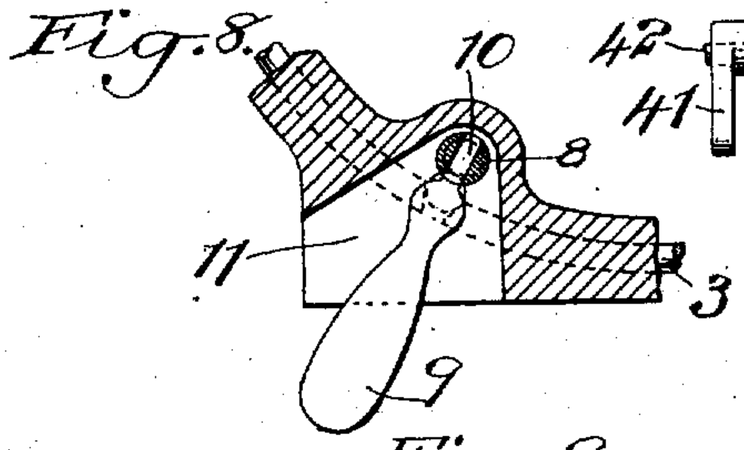
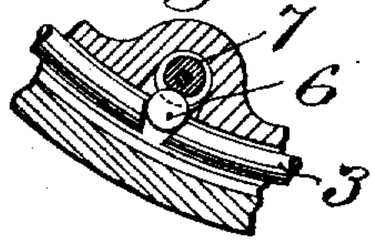


Fig. 9.



Witnesses:-
Henry Thieme.
Fred. Haynes

Inventor
James F. Hardy
by attorneys
Brown & Ward

UNITED STATES PATENT OFFICE.

JAMES F. HARDY, OF NEW YORK, N. Y., ASSIGNOR TO CONSOLIDATED DENTAL MANUFACTURING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ELEVATING AND CONTROLLING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 715,476, dated December 9, 1902.

Application filed January 14, 1902. Serial No. 89,651. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. HARDY, a citizen of the United States, and a resident of the borough of Manhattan, in the city and State of New York, have invented a new and useful Improvement in Elevating and Controlling Mechanism, of which the following is a specification.

My invention relates to an improvement in elevating and controlling mechanism, and has more particularly for its object to provide certain new and useful improvements in mechanism for elevating and controlling surgical and dental chairs.

The object of my invention is to provide certain improvements in mechanically-operated means for raising a chair to a predetermined height, together with improved means for automatically controlling the speed with which the chair may be lowered, together with means for locking the chair in any desired position.

A further object is to provide a single lever for controlling the means for connecting and disconnecting the rotary and stationary sections of the base and also for locking and releasing the chair-supporting posts.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 is a view in side elevation of so much of a chair as is embodied in my present invention. Fig. 2 is a view in side elevation of the base of the chair, a portion of the base being broken away and portions of the interior mechanism being shown in section to more clearly illustrate the operation of the mechanism. Fig. 3 is a vertical central section through the lower portion of the chair. Fig. 4 is a partial inverted plan view taken in the plane of the line A A of Fig. 3 to show the means for controlling the downward speed of the chair-supporting posts. Fig. 5 is a horizontal section through the chair-base. Fig. 6 is a detail sectional view showing more clearly the means for controlling the elevation and descent of the chair and the means for connecting and disconnecting the rotary and stationary sections of the base. Fig. 7 shows the face and edge views of one of the roller-retaining rings, and Figs. 8 and 9 are detail sectional views showing the construction and arrangement of the lever for operating the means for controlling the downward movement of the chair-supporting posts and the means for connecting and disconnecting the rotary and stationary sections of the base.

The lower or stationary section of the hollow base is denoted by 1 and the upper section by 2, which upper section is mounted to rotate upon the lower section. A split bearing-ring 3 is interposed between the adjacent vertical walls of the upper and lower sections of the base and the upper end of a cup 4, which is secured in the lower section of the base by means of suitable fastening devices—such, for instance, as screws 5. The rotary and stationary sections of the base are connected and disconnected by the following mechanism: A roller 6 is interposed part way between the ends of the split ring 3, which roller may be forced outwardly for expanding the ring by means of a cam 7, carried by a vertically-sliding bar 8, which is mounted in the rotary section, so as to be permitted a limited rotary movement therein. This bar 8 is rocked on its longitudinal axis by means of a foot-lever 9, having its head 10 engaged with the bar 8, which lever projects outwardly through a flaring recess 11 in the rotary section 2 of the base. This lever may be held in its engagement with the bar by means of a pin 12, bearing against the head 10 and held in position by means of a set-screw 13. The cam-section 7 may be formed separate from the bar 8 and secured thereto by the screw 13, as shown.

The chair-seat-supporting tubular post is denoted by 14, and it is fitted to slide vertically in a secondary tubular post 15, which post is in turn fitted to slide in the upper or rotary section 2 of the base. A stationary exteriorly-cut screw 16 is permanently secured at its upper end in the upper end of the inner tubular post 14 and projects downwardly therein to a point at the bottom of the base when the post 14 is in its lowered position. A hollow exteriorly-threaded rotary screw 17 surrounds the stationary screw 16. This rotary screw 17 has fixed thereto in its upper end an interiorly-screw-threaded nut 18, which fits the screw 16, so that when the screw 17 is ro-

tated the screw 16, and thereby the hollow post 14, is moved up or down, according to the direction in which the screw 17 is rotated. These screws 16 and 17 are threaded in the same direction, but have different pitches for sending the two posts 14 and 15 up or down at different speeds. An interiorly-screw-threaded traveling nut 19 is interposed between the tubular post 15 and the rotary screw 17 and is fitted to the exterior thread on the said screw. This traveling nut 19 is provided with an outwardly-extended flange 20, which is secured rigidly to the lower end of the hollow post 15, in the present instance by screws 21, so that when the screw 17 is rotated the hollow post 15 will be moved up or down, according to the direction in which the screw 17 is rotated. A bevel-gear 22 is fixed to the lower end of the rotary screw 17, which bevel-gear intermeshes with a driving bevel-gear 23, loosely mounted on a stud-axle 24, projected inwardly from the side wall of the upper section 2 of the hollow base.

An antifriction-support for the posts and screws is constructed and arranged as follows: The bevel-gear 22 is provided with a bearing-plate 25, and the cup 4 is provided with a bearing-plate 26, between which is interposed an annular series of bearing-rollers 27.

The mechanism which I employ for raising the chair is constructed and arranged as follows: A foot-lever shaft 28 extends inwardly from the exterior to the interior of the upper section 2 of the base, the inner end of which shaft is mounted in suitable bearings 29. This shaft 28 has fixed thereon a spur-gear 30, which meshes with a smaller gear 31, carried by a stud-axle 32, projecting inwardly from the upper section 2 of the base. This spur-gear 31 is rigidly connected to a larger spur-gear 33, which in turn intermeshes with a smaller spur-gear 34, forming a part of the bevel-gear 23, mounted upon the stud-axle 24, hereinabove referred to.

The foot-lever for controlling the elevating mechanism is denoted by 35, which lever 35 and shaft 28 are connected and disconnected as follows: A sleeve 36 is loosely mounted upon the shaft 28 and is screw-threaded into the foot-lever 35. This sleeve forms one section of a clutch, the other section of which (denoted by 37) is keyed to the shaft 28. An annular series of clutching-rollers are interposed between the clutch-sections 36 and 37, which rollers are seated in a retaining-ring 39.

The clutch above described is arranged to cause the foot-lever 35 to rotate the shaft 28 when depressed, but releases the lever from engagement with the said shaft when the lever is raised.

The lever 35 is automatically returned to its raised position by means of a retracting-spring 40, one end of which is secured to the inner wall of the upper section 2 of the base and the other end of which is connected to an arm 41, secured to the lever 35 in the following manner: A pin 42 extends longitudinally through the shaft 28, the inner end of which pin is secured to the hub 43 of the arm 41. The outer end of the pin 42 is screw-threaded, and it is locked to the lever 35 by means of a pin 44, projecting inwardly from a cap-plate 45, which is locked to the pin 42, in the present instance by screw-threading it onto the end of the pin and providing a lock-nut 46 therefor. A nut 44* has a screw-threaded engagement with the outer end of the shaft 28 between the outer end of the inner section 36 and the cap-plate 45. By this arrangement the angle of the arm 41 with respect to the foot-lever 35 may be increased or diminished to vary the tension of the spring 40 by simply loosening the lock-nut 46.

I have provided means for positively holding the rollers 38 out of clutching engagement when the lever 35 is returned to its normal raised position to prevent the "chattering" of the rollers as the chair is lowered, which means is constructed and operated as follows: The roller-retaining ring 39 is provided with a flange 47, located in close proximity to the outer face of the outer section 37 of the clutch, which flange 47 is provided with a shoulder 48 on its periphery arranged to engage an adjustable stop 49, secured to the exterior of the upper section 2 of the base, just before the foot-lever 35 reaches the limit of its upward movement. The further slight upward movement of the lever until it is arrested by the fixed stop 50 on the exterior of the section 2 will cause the retaining-ring to force the rollers 38 away from their engagement with the section 37 and hold them there until the lever is again depressed.

The stop 49 may be adjusted so as to engage the shoulder 48 upon the roller-retaining ring at just the point desired to accomplish the above result.

The means which I employ for governing the speed of the downward movement of the chair is constructed and operated as follows: A pair of outwardly-swinging arms 51 52 are hinged at 53 to lugs 55 56, projected outwardly from a ring 57, which forms the outer member of a clutch, the inner member of which is the bearing-plate 25, hereinabove referred to. An annular series of clutching-rollers 58 is interposed between the plate 25 and the ring 57 for locking the ring 57 to the plate 25 when the rotary screw 17 is rotated in a direction to lower the chair. The ring 57 will be released from its locked engagement with the plate 25 when the screw 17 is rotated in a direction to elevate the chair. The free ends of the arms 51 52 of the governor may be weighted, as shown at 59 and 60, and the said arms may be provided adjacent to their hinged connections 53 54 with friction-blocks 61 62, arranged to be brought into frictional engagement with the inner wall of the cup 4 in the lower or stationary section of the base as the arms 51 52 of the governor are swung outwardly, due to the downward movement of the chair.

The mechanism which I employ for locking and releasing the chair in any of its positions is constructed and arranged as follows: A friction-drum 63 loosely surrounds the shaft 28, adjacent to the outer section 37 of the lever-clutch, which drum 63 forms the outer section of the drum-clutch, the inner section 64 of which is keyed to the shaft 28, preferably by the same key which keys the outer clutch-section 37 to the said shaft. An annular series of clutching-rollers 65 is interposed between the brake-drum 63 and inner section 64, which rollers are retained in position by a roller-retaining ring 66 of usual construction. These clutch-rollers 65 are so arranged that when the shaft 28 is rotated by the downward movement of the chair the brake-drum 63 or outer section of the clutch will be locked to the shaft and rotated thereby. A pair of semicircular brake-arms 67 68 nearly surround the brake-drum 63, which arms are hinged on a pin 69, carried by the upper section 2 of the base. These arms are held in frictional engagement with the drum sufficient to lock the drum, and thereby the chair, against downward movement by means of expansion-springs 70 71, which bear against the outer ends of the arms 67 68. The tension of these springs may be increased or diminished by means of an adjusting-screw 72, which extends through to the exterior of the upper section 2 of the base.

The foot-lever 9, which locks and releases the rotary section 2 of the base by a lateral movement, also locks and releases the brake by a vertical sliding movement in the following manner: The upper end of the bar 8 is tapered, as shown at 73, and engages beveled faces 74 75 on the free ends of the brake-arms 67 68. The foot-lever 9 is provided with a projection 76, adjacent to its rod 10, which forms a fulcrum upon which the lever 9 may be rocked vertically in any of its lateral positions. As the outer end of the lever 9 is depressed the tapered end 73 of the bar 8 will be forced upwardly, thus forcing the spring-actuated brake-arms 67 68 apart, and thereby releasing the drum. This will permit the seat to lower under its own weight.

By the use of the brake-drum clutch it will be seen that when the chair is being elevated the drum is held stationary, because of the disconnection between the drum and the section of the clutch which is keyed to the elevating-shaft 28.

From the above description it will be seen that while the inner end of the shaft 28 is supported in the bearing 29 the outer end of the shaft is supported by means of the clutches, the outer sections of which have suitable bearings in the upper section 2 of the base.

A bearing-sleeve 77 may be interposed between the outer face of the gear 30 and the inner face of the inner section 64 of the brake-clutch.

The operation of the several parts having been described in detail, the operation of the whole may be briefly stated as follows: If the rotary section 2 of the base is released from the rotary section 1, the chair may be swung around until it reaches the desired position. The foot-lever 9 may then be rocked laterally, thus causing the roller 6 to expand the locking-ring 3, thereby locking the section 2 to the section 1 of the base. The chair may then be elevated to the required point by repeated depressions of the foot-lever 35. When it is desired to lower the chair, the foot-lever 9 may be rocked in a vertical direction, thus releasing the brake-arms, and thereby permitting the rotation of the shaft 28 and its connecting-gears. The governor at the base of the chair will prevent a too rapid downward movement of the chair, and the chattering of the rollers 38 is prevented by the means hereinabove described. Whenever it is desired to stop the downward movement of the chair, the foot-lever 9 may be released, thus causing the brake on the shaft 28 to operate.

It is evident that changes might be resorted to in the form, construction, and arrangement of the several parts without departing from the spirit and scope of my invention. Hence I do not wish to limit myself strictly to the structure herein shown and described; but

What I claim is—

1. A base comprising a lower stationary section, an upper rotary section and means for locking the two sections together comprising a split ring interposed between the two sections, a roller and a cam arranged to force the roller laterally between the ends of the split ring to force them apart as the cam is rocked, substantially as set forth.

2. A base comprising a lower stationary section, an upper rotary section, and means for locking the two sections together comprising a split ring interposed between the two sections, a roller, a rocking bar having a cam engaging the roller and means for rocking the bar to cause the cam to force the roller laterally between the ends of the split ring to force them apart, substantially as set forth.

3. A base comprising a lower stationary section, an upper rotary section and means for locking the two sections together comprising a split ring interposed between the two sections, a roller, a rocking bar having a cam engaging the roller, and a lever arranged to rock the bar for causing the cam to force the roller laterally between the ends of the split ring to force them apart, substantially as set forth.

4. An elevating mechanism comprising an elevating-screw, a shaft geared to the screw, a lever, a clutch for connecting and disconnecting the lever and shaft and means for positively holding the clutch released when the lever is in its raised position, substantially as set forth.

5. An elevating mechanism comprising an

elevating-screw, a shaft geared to the screw, a lever, a roller-clutch for connecting and disconnecting the lever and shaft and means for positively holding the rollers out of their clutching position when the lever is in its raised position, substantially as set forth.

6. An elevating mechanism comprising a base, an elevating-screw, a shaft geared to the screw, a lever, a roller-clutch for connecting and disconnecting the lever and shaft and means for positively holding the rollers out of their clutching position when the lever is in its raised position, comprising a stop carried by the base and a roller-retaining ring having a shoulder arranged to engage the stop, substantially as set forth.

7. An elevating mechanism comprising a base, a screw, a shaft geared thereto, a lever, a roller-clutch for connecting and disconnecting the lever and shaft and means for holding the rollers out of their clutching position when the lever is in its raised position, comprising an adjustable stop carried by the base and a roller-retaining ring having a shoulder arranged to engage the said stop, substantially as set forth.

8. An elevating and controlling mechanism comprising an elevating-screw, a shaft geared to the screw, a brake-drum, a clutch for connecting and disconnecting the shaft and brake-drum and means for gripping and releasing the drum, substantially as set forth.

9. An elevating and controlling mechanism comprising an elevating-screw, a shaft geared to the screw, a brake-drum, a clutch for connecting and disconnecting the shaft and brake-drum and brake-arms for gripping and releasing the drum, substantially as set forth.

10. An elevating and controlling mechanism comprising an elevating-screw, a shaft geared to the screw, a brake-drum, a clutch for connecting and disconnecting the shaft and brake-drum, brake-arms normally gripping the drum and means for forcing the brake-arms apart to release the drum, substantially as set forth.

11. An elevating and controlling mechanism comprising an elevating-screw, a shaft geared thereto, a brake-drum, a clutch for connecting and disconnecting the shaft and brake-drum, spring-actuated brake-arms arranged to normally grip the drum and means for forcing the arms apart to release the drum comprising a vertically-sliding bar and a foot-lever arranged to operate the bar, substantially as set forth.

12. An elevating and controlling mechanism comprising an elevating-screw, a shaft geared thereto, a brake-drum, a clutch for connecting and disconnecting the shaft and brake-drum, brake-arms, adjustable springs forcing the arms inwardly into gripping contact with the drum and means for forcing the arms away from the drum, substantially as set forth.

13. An elevating and controlling mechanism comprising an elevating-screw, a shaft geared thereto, a brake-drum and a clutch for connecting and disconnecting the shaft and brake-drum comprising the drum as an outer section, an inner section keyed to the shaft and an interposed annular series of rollers arranged to grip the drum when the shaft is rotated in one direction and to release the drum when the shaft is rotated in the opposite direction, substantially as set forth.

14. An elevating and controlling mechanism comprising an elevating-screw, a shaft geared thereto, a lever, a brake-drum, a clutch for connecting and disconnecting the lever and shaft, a clutch for connecting and disconnecting the brake-drum and shaft and means for gripping and releasing the drum, substantially as set forth.

15. In combination, an elevating-screw, a shaft geared thereto, a lever, means for connecting and disconnecting the lever and shaft and means for returning the lever to its normal raised position comprising a pin extended lengthwise entirely through the shaft, secured at one end to the lever and having a crank-arm at its other end and a retracting-spring engaging the crank-arm, substantially as set forth.

16. In combination, a base comprising a stationary section, a rotary section, a split ring interposed between the two sections, an elevating-screw, a shaft geared thereto, a brake-drum, means for connecting and disconnecting the brake-drum and shaft, brake-arms arranged to normally grip the drum and a single operating means arranged to release the drum and clamp the rotary and stationary sections of the base together, substantially as set forth.

17. In combination, a base comprising a stationary section, a rotary section, a split ring interposed between the two sections, a roller adjacent to the ends of the split ring, an elevating-screw, a shaft geared thereto, a brake-drum, means for connecting and disconnecting the brake-drum and shaft, brake-arms normally gripping the drum, a rocking and longitudinally-sliding bar having a cam arranged to force the roller between the ends of the ring to force the ends apart when the bar is rocked and arranged to force the brake-arms away from their gripping engagement with the drum when the bar is moved longitudinally and a single operating-lever for rocking the bar and moving it longitudinally, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 11th day of January, 1902.

JAMES F. HARDY.

Witnesses:
FREDK. HAYNES,
HENRY THIEME.