

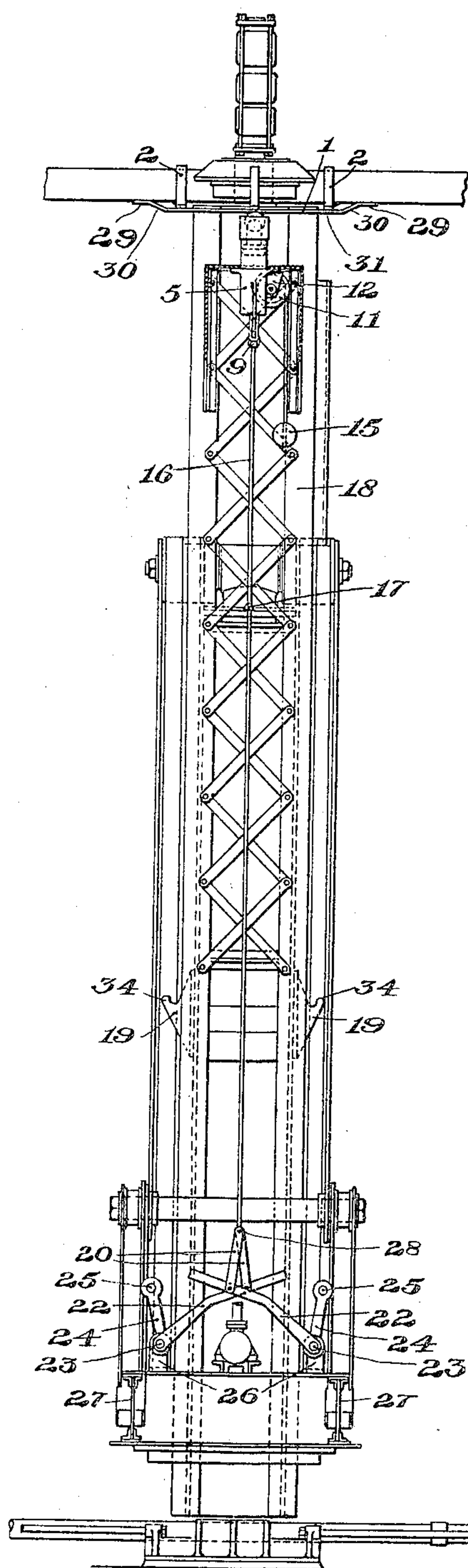
No. 812,565.

PATENTED FEB. 13, 1906.

C. R. HINCHMAN.  
SAFETY LOCKING DEVICE FOR CRANES.

APPLICATION FILED OCT. 20, 1905.

3 SHEETS—SHEET 1.



*Fig. 1.*

WITNESSES  
*R. D. Little*  
*R. A. Baldwin*

INVENTOR  
*Charles R. Hinchman*  
*by Cassidell Byrnes*  
*his Attorneys*

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3 SHEETS—SHEET 2.

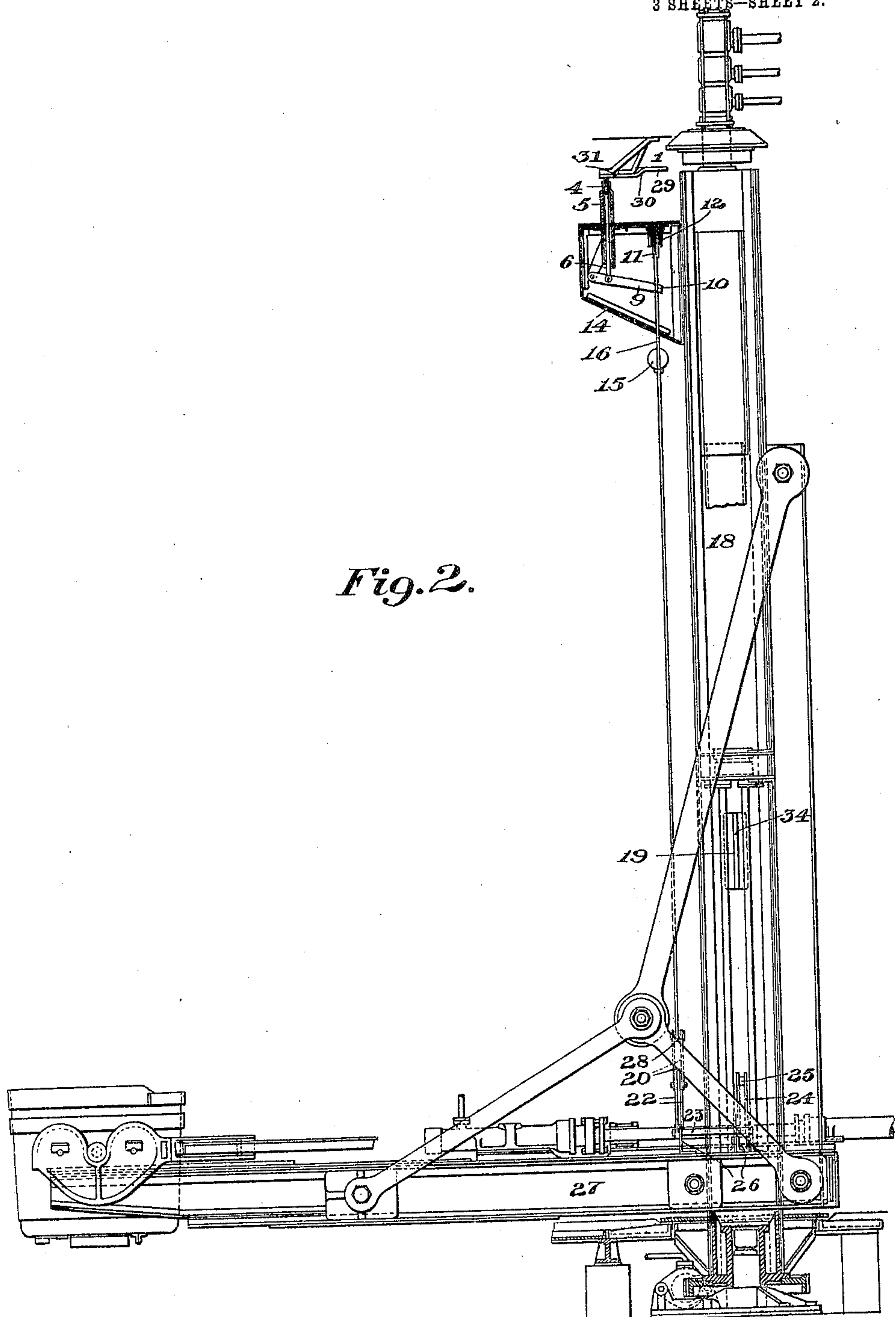


Fig. 2.

WITNESSES

*R. D. Little*  
*R. A. Balderson*

INVENTOR

*Charles R. Hinchman*  
*by Casswell & Byrnes*  
*his Attorneys*

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3 SHEETS—SHEET 3.

Fig. 3.

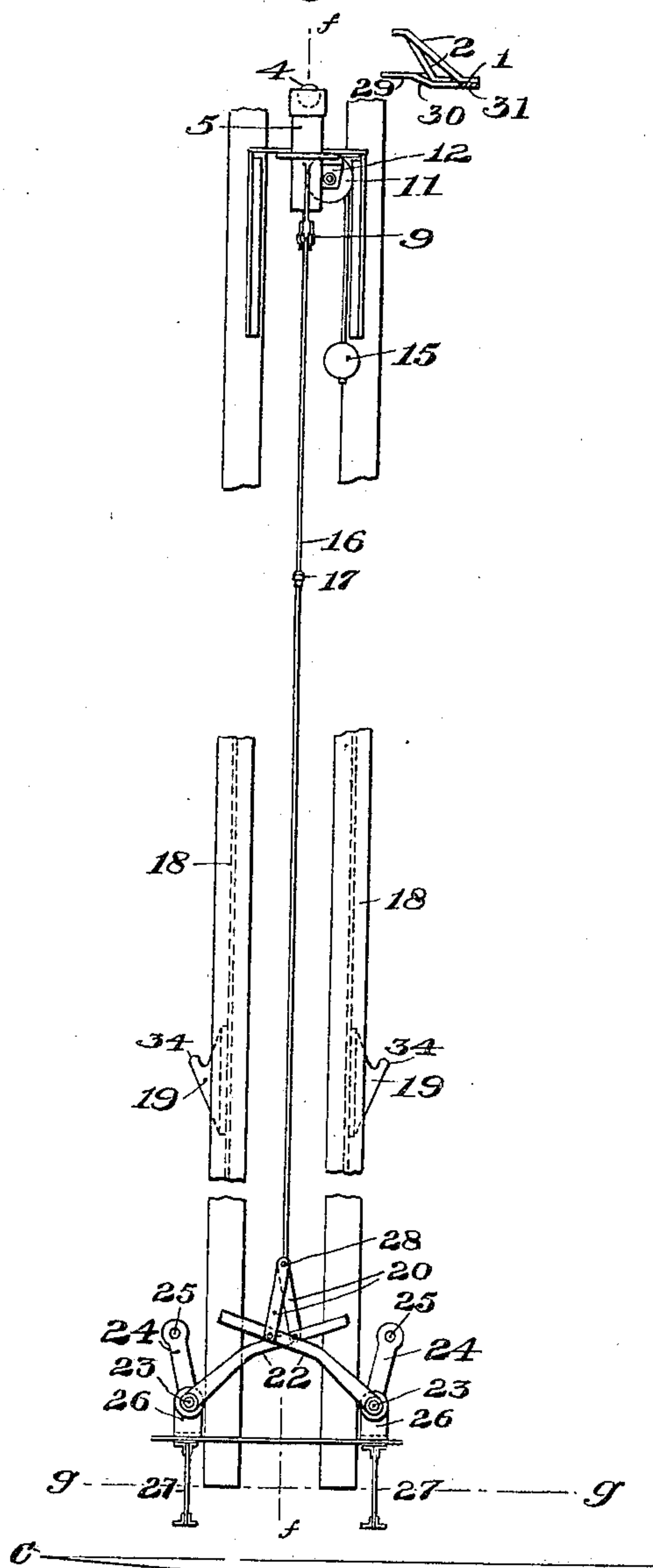


Fig. 4.

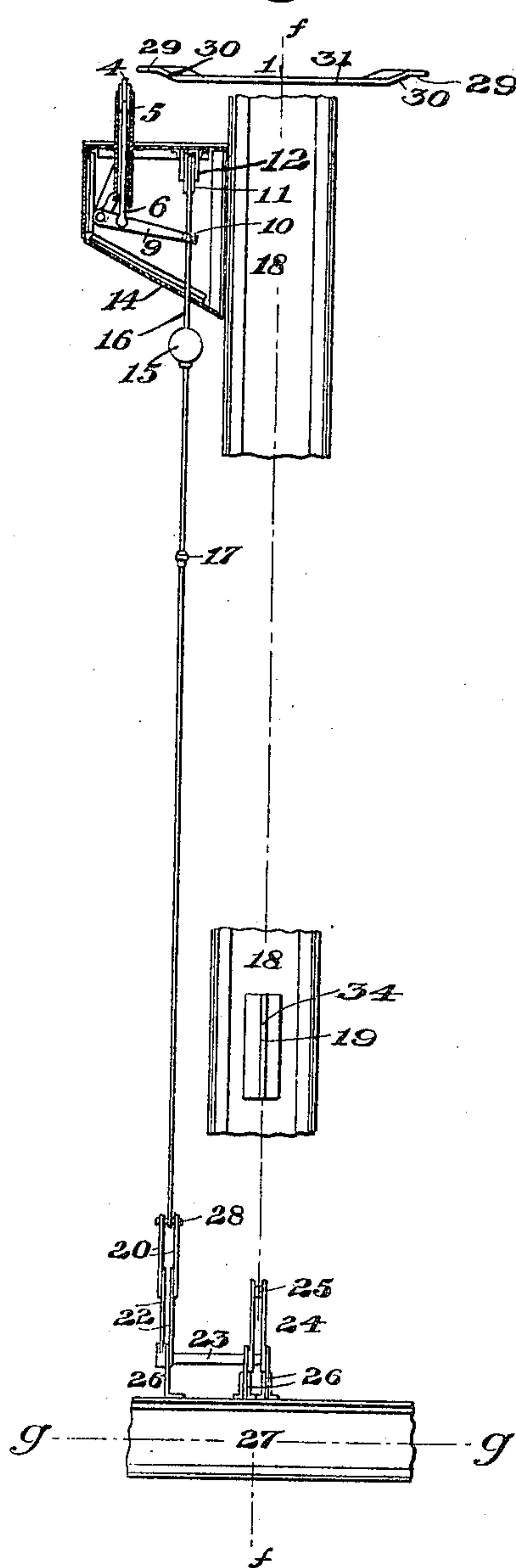
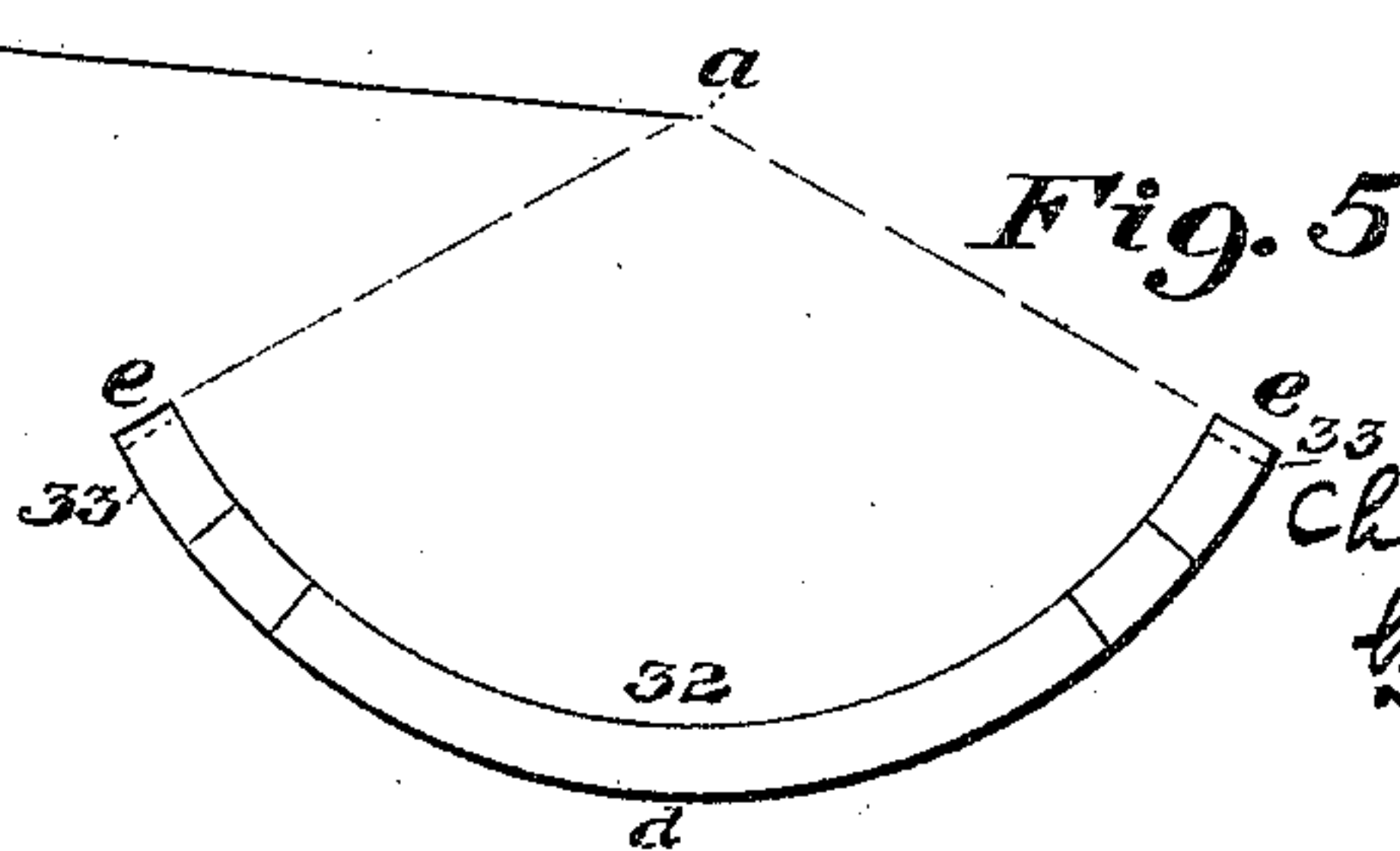


Fig. 5.



WITNESSES

R. D. Little  
R. A. Balderson

INVENTOR

Charles A. Hinchman  
by Oakes & Byness  
his Attorneys



# UNITED STATES PATENT OFFICE.

CHARLES ROBINSON HINCHMAN, OF CLEVELAND, OHIO.

## SAFETY LOCKING DEVICE FOR CRANES.

No. 812,565.

Specification of Letters Patent.

Patented Feb. 13, 1906.

Application filed October 20, 1905. Serial No. 283,646.

*To all whom it may concern:*

Be it known that I, CHARLES ROBINSON HINCHMAN, a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Safety Locking Devices for Cranes; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention consists in an automatic safety locking device for hoisting-cranes, and more especially for ladle-cranes operated by hydraulic or steam power, such as are used in iron, steel, and other works wherein large masses of molten metal have to be moved from one place to another in casting or other similar operations.

The object of my invention is to provide an automatic safety locking device which in the operation of the crane shall prevent the crane-jib with its load, consisting of a ladle or other receptacle filled with molten metal, when in or nearly approaching the position for pouring the metal into the ingot-molds dropping down on the molds, which is liable to happen in case the power or the hoisting mechanism of the crane should fail to sustain the load or if the hydraulic plunger of the crane (when hydraulic power is used) should be inadvertently lowered too far, thereby too far lowering the crane-jib and its load and bringing the ladle into sudden and violent contact with the mold, spilling the molten metal contained in the ladle and endangering the workmen in attendance. Its purpose also is to facilitate the bringing of the ladle carried by the crane-jib at each pouring of the metal to the proper elevation above the top of the molds for casting without loss of time.

To this end my invention consists in a construction of the locking device so that it shall work automatically when the crane-jib reaches the proper location and elevation for casting, thus insuring the workman a greater degree of safety than has heretofore prevailed in the moving and casting of large masses of molten metal in metal-working establishments and without loss of time.

In the accompanying drawings, Figure 1 is a front elevation, and Fig. 2 is a side elevation, of a hydraulic ladle-crane, showing the application of my invention thereto. Fig. 3 is an end elevation of the upper and lower parts of my apparatus as applied to the mast and jib of the crane, and Fig. 4 is a side eleva-

tion of my apparatus in place on the mast and jib of the crane. In Figs. 3 and 4, *ff* represent the center of the crane-mast, and *gg* the center of the crane-jib, parts of the crane being broken away. Fig. 5 is a diagrammatic plan view showing the circular path or arc traveled about the pivotal center *a* of the crane by the crane-jib in taking molten metal from the converters or other metal-containing vessels located at *c* to the ladle-pouring position *d*, the position occupied by the crane-jib during the casting operation. It (Fig. 5) also represents at *e* the circular path or arc traveled by that part of my apparatus which is located at or near the top of the crane-mast.

In the accompanying drawings, forming part of this specification, 5 is a guide which is secured in place on its supporting-cover 14, which in turn is securely fastened to the front of the upper end of the crane-mast 18. Mounted on the guide 5 is a vertically-movable guide-bar 6, having its lower end pivotally attached to a lever 9, the latter having its fulcrum on the lower end of the guide 5. The upper end of the guide-bar 6 is provided with a roller 4, and above the roller 4 is a track 1, which is secured to the bottom chord of the roof of the building by means of the brackets 2. The track 1 is so located that the center of its length is on the horizontal center line through the crane-jib and mast when the crane is in its casting position, and the roller 4 on the upper end of the guide-bar 6 is arranged to contact with the under surfaces 30 31 of the track 1 and by such contact to keep the lever 9, through its connecting guide-bar 6, in its depressed position, the lowest position of the lever 9 being that shown in Fig. 4.

Pivoted in bearings 26, which are mounted on the inner end of the crane-jib 27, are shafts 23, and keyed to each of these shafts is an eyebar 24 and lever 22. Latch brackets or stops 19 are fastened to the mast 18 of the crane at such height that when engaged by the latch-pins 25 in the upper end of the eye-bars 24 the crane-jib and the ladle supported by it will be high enough to clear the top of the molds and will be at the proper elevation for casting.

Secured to the supporting-cover 14 by means of bracket-bearings 12 is a sheave 11, and passing over this sheave is a rope, chain, or cable 16, to one end of which is attached a



counterweight 15, the other end of the rope being fastened by the pin 28 to links 20 and levers 22.

The operation of the apparatus will be readily gathered from the foregoing description. When the crane swings from the converters with the metal-containing ladle and the jib 27 rises to and above the casting elevation, the roller 4 leaves the surfaces 29 to 30 of track 1 and comes under the surface 31 of the track 1, which surface holds the lever 9 in its lowest position, as shown in Fig. 4. Continuing the operation, the cable 16 rises with the jib 27 until the collar 17, which is securely clamped to the cable 16, comes in contact with the sleeve 10 on the lever 9, thus slackening the cable 16 from the sleeve 10 down, and the links 20 and levers 22 combined being of sufficient weight to overbalance the resistance of the eyebars 24 and the latch-pins 25 drop down and throw the latches in against or nearly against the mast 18, and when the jib 27 lowers the latch-pins 25 engage the latch-brackets 19. In the returning of the crane to position *c* at the converters the roller 4 runs on the under surface 30 of track 1 and from thence under surface 29 of track 1, and the weight 15 attached to cable 16 being sufficient to overbalance the resistance of the sheave 11, guide-bar 6, lever 9, links 20, levers 22, shaft 23, eyebars 24, and latch-pins 25 by means of the collar 17 coming in contact with the sleeve 10 on the lever 9 causes levers 22 to lift, thus throwing eyebars 24 away from the mast 18 and disengaging the latch-pins 25 and the latch-brackets 19, and thus allows the crane-jib 27 to travel up and down the crane-mast 18 the full length of the stroke.

It will be apparent that roller 4, guide-bar 6, and lever 9 remain by gravity in their lowest position, as shown in Fig. 4, except when lifted by the collar 17 by means of the weight 15, and it will also be apparent that collar 17 can lift them entirely only when under surface 29 of track 1 and only partly when under the surface 30 of track 1, which surface is comparatively short.

The provision of the surface 29 is a matter of safety in case cable 16 should break. In such an event the surface 29 prevents the roller being shoved up and interfering with the roof. This surface may be dispensed with. The gradual shoving of roller by inclined surface 30, while a desirable feature, may be dispensed with, as the surface 31 is the only one essential to keep the lever 9 in a depressed position, gravity alone doing this in the other positions when the collar 17 is below the lever. While I prefer to use the roller 4, it is obvious that the bar 6 may be provided with any other suitable form of head. By this operation the crane-jib 27, carrying the metal-containing ladle, when in arc 33 near the converters will raise and

lower the full length of the stroke of the crane without bringing into action the latch and latch-pins of the locking device; but if swung into the arc 32 (which is the casting position) while above the casting elevation or if swung into this position and afterward raised above the casting elevation, the latch-pins 25 will engage the latch-brackets 19 and will not disengage until the crane-jib 27 is again swung into the arc 33 (which is outside the casting position) and raised a short distance to clear the point 34 of the latch-brackets 19.

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

1. The combination with a crane-mast and a vertically-movable crane-jib, of a lock for locking the crane-jib and preventing downward movement thereof, and means for automatically moving the lock into and out of its locking position.

2. The combination with a crane-mast and a vertically-movable crane-jib, of a lock for locking the crane-jib and preventing downward movement thereof, and means, actuated by the rotation of the crane, for automatically moving the lock into and out of its locking position.

3. The combination with a rotary crane-mast and a vertically-movable crane-jib, of a lock on the crane for locking the crane-jib at predetermined positions and preventing its downward movement, and means for automatically moving the lock into and out of its locking position.

4. The combination with a rotary crane having a mast and a vertically-movable jib, means for rotating the crane, and means for raising and lowering the jib, of a lock adapted to lock the jib on the mast and prevent its downward movement, means on the mast for operating the lock, means for normally automatically holding the lock in its inoperative position, and a stop adapted to contact with the lock-operating mechanism and automatically hold the lock in its operative position.

5. The combination with a crane and vertically-movable crane-jib, of a lock on the crane-jib, a stop on the crane-mast to be engaged by said lock, automatic devices on the crane-mast to operate said lock and to cause the same to automatically engage said stop and prevent the downward movement of the crane-jib, and to cause said lock to become automatically disengaged from said stop and be held in its inoperative position.

6. The combination with a crane-mast and a vertically-movable crane-jib, of a lock on the crane-jib, a stop on the crane-mast, for engagement with said lock, automatic mechanism on the crane-mast to operate said lock and to cause the same at predetermined positions of the crane-jib to automatically engage the stop and hold the jib at a predetermined elevation, and to cause said lock to automatically disengage from said stop and



permit the normal movement of the crane-jib.

7. The combination with a crane-mast and a vertically-movable crane-jib, means for rotating the crane and raising and lowering the jib, of a roller or the like affixed, by means of suitable connections, to the crane-mast, a track intermittently contacting with said roller and when so contacting exerting downward pressure thereon, a guide-bar connected to said roller, a lever connected to said guide-bar, said lever engaging with a cable connected to and operating safety locking devices for locking the crane-jib at a predetermined position, and means for automatically unlocking and permitting the normal movement of the same.

8. The combination with a crane-mast and a vertically-movable crane-jib, of a bearing device connected by suitable means to the crane-mast, a track intermittently contacting with said bearing device, for operating, through intermediate connections, safety locking mechanism for locking the crane-jib to the crane-mast at a predetermined elevation and position of the crane-jib, and means for automatically unlocking the same and permitting its normal movement and operation.

9. The combination with a crane-mast and a vertically-movable crane-jib, of brackets on the crane-mast, levers connected to bars having latch-pins, the same constituting a locking mechanism and flexibly connected by a cable to automatic lock-operating devices on the crane-mast, whereby the crane-jib is held securely at a predetermined elevation when occupying certain positions in its circular travel, and means for automatically releasing the locking mechanism and permitting the normal operation of the crane.

10. In combination with a crane-mast and vertically-movable crane-jib, stops on the crane-mast, arranged to be engaged by latches on the crane-jib, means for automatically inwardly and outwardly moving said latches at predetermined times at a predetermined elevation of the crane-jib, to cause the engagement and disengagement of said stops and latches.

11. In combination with a crane-mast and vertically-movable crane-jib, stops on the crane-mast, latches on the crane-jib adapted to engage and disengage said stops and means for causing said latches to automatically engage and disengage said stops at predetermined times in the operation of the crane and at predetermined elevations and positions of the crane-jib.

12. In combination with a crane-mast and

vertically-movable crane-jib, a bearing device having connection with and adapted to follow on a concentric path the circular movements of the crane-mast, a track traveled by said device and exerting downward pressure thereon when in certain arcs of its circular travel thereby through intermediate connections, causing latches on the crane-jib to automatically engage with stops located on the crane-mast when the crane-jib assumes certain positions and causing the said latches to automatically disengage said stops when out of such positions.

13. In combination with a crane-mast and a vertically-movable crane-jib, a bearing device having intermediate connection with the crane-mast, tracks traveled by the bearing device and so arranged and at such different elevations that one part of the under surfaces of said tracks shall, at certain times in the rotary movement of the crane-mast and circular travel of the roller, be in contact with the bearing device exerting downward pressure thereon, and at other times in said movement shall be out of contact therewith, a guide-bar connected to said bearing device, a lever connected to said guide-bar, said lever engaging a cable connected to and operating safety locking devices located on the crane-jib and crane-mast for holding the crane-jib at predetermined times at certain predetermined elevations.

14. In combination with a rotary crane-mast and vertically-movable crane-jib, a roller connected by suitable means to the crane-mast and following its rotary movement, said roller traveling on the under surfaces of tracks located above the roller, portions of said track-surfaces being arranged at different elevations so as to contact intermittently with said roller, a guide-bar connected to the roller and also to a lever which is adapted to engage with a counterweighted cable, engaging links pivotally connected to levers mounted on the crane-jib which are keyed to shafts operating eyebars having latch-pins at their upper portions adapted to engage stops mounted on the crane-mast for automatically holding the crane-jib while in certain arcs of its circular travel, at a predetermined elevation, and for automatically releasing it from such engagement and permitting its normal movement and operation.

In testimony whereof I have hereunto set my hand.

CHARLES ROBINSON HINCHMAN.

Witnesses:

GEORGE K. HUDSON,  
R. W. FALKENBURG.