March 29, 1960 H. D. BROWN 2,930,489

LOCK AND RELEASE DEVICE FOR HYDRAULICALLY OPERATED DERRICKS

Filed Aug. 16, 1954 2 Sheets-Sheet 1

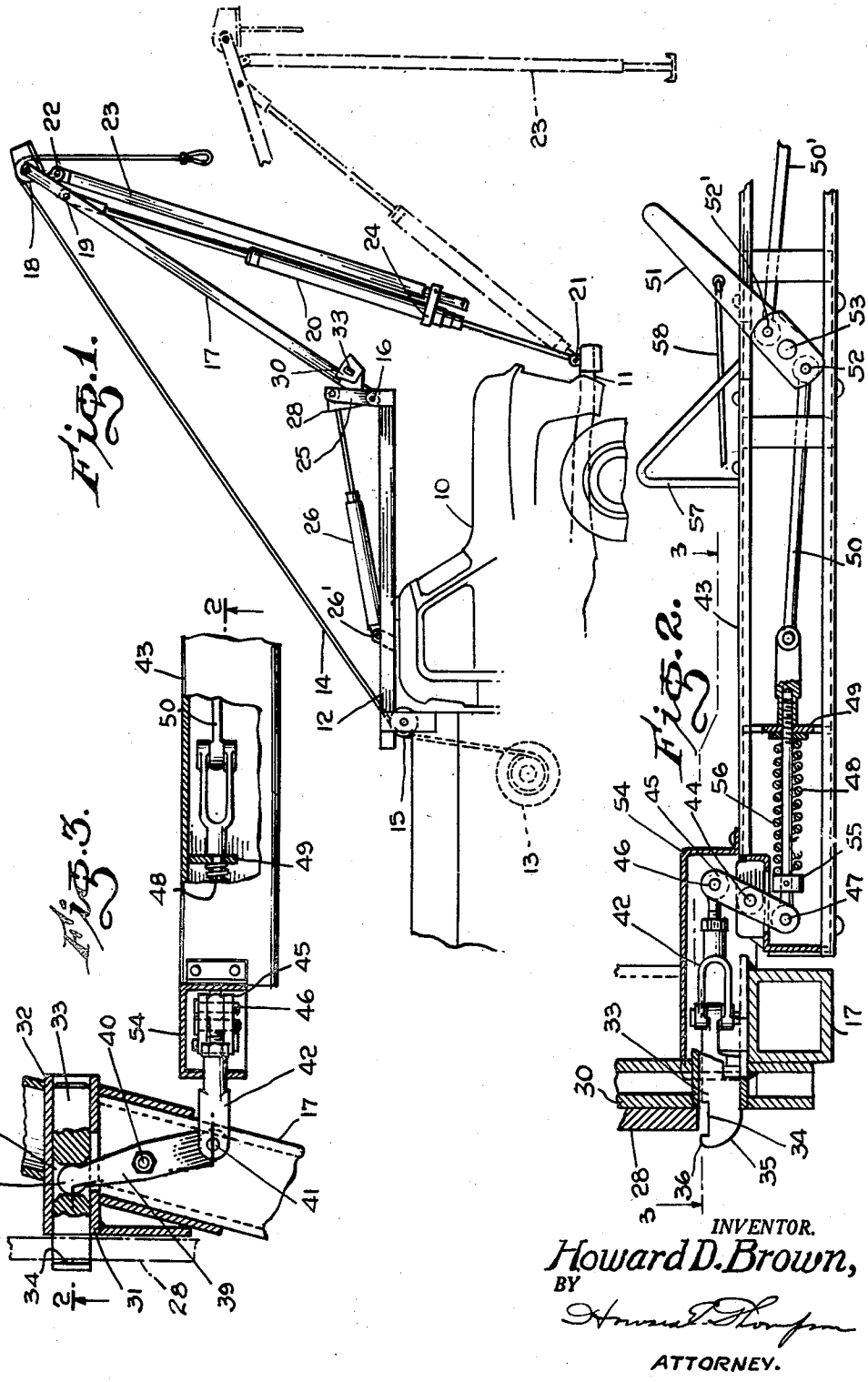

Fig. 1.

Fig. 3.

Fig. 2.

INVENTOR.
Howard D. Brown,
BY
ATTORNEY.

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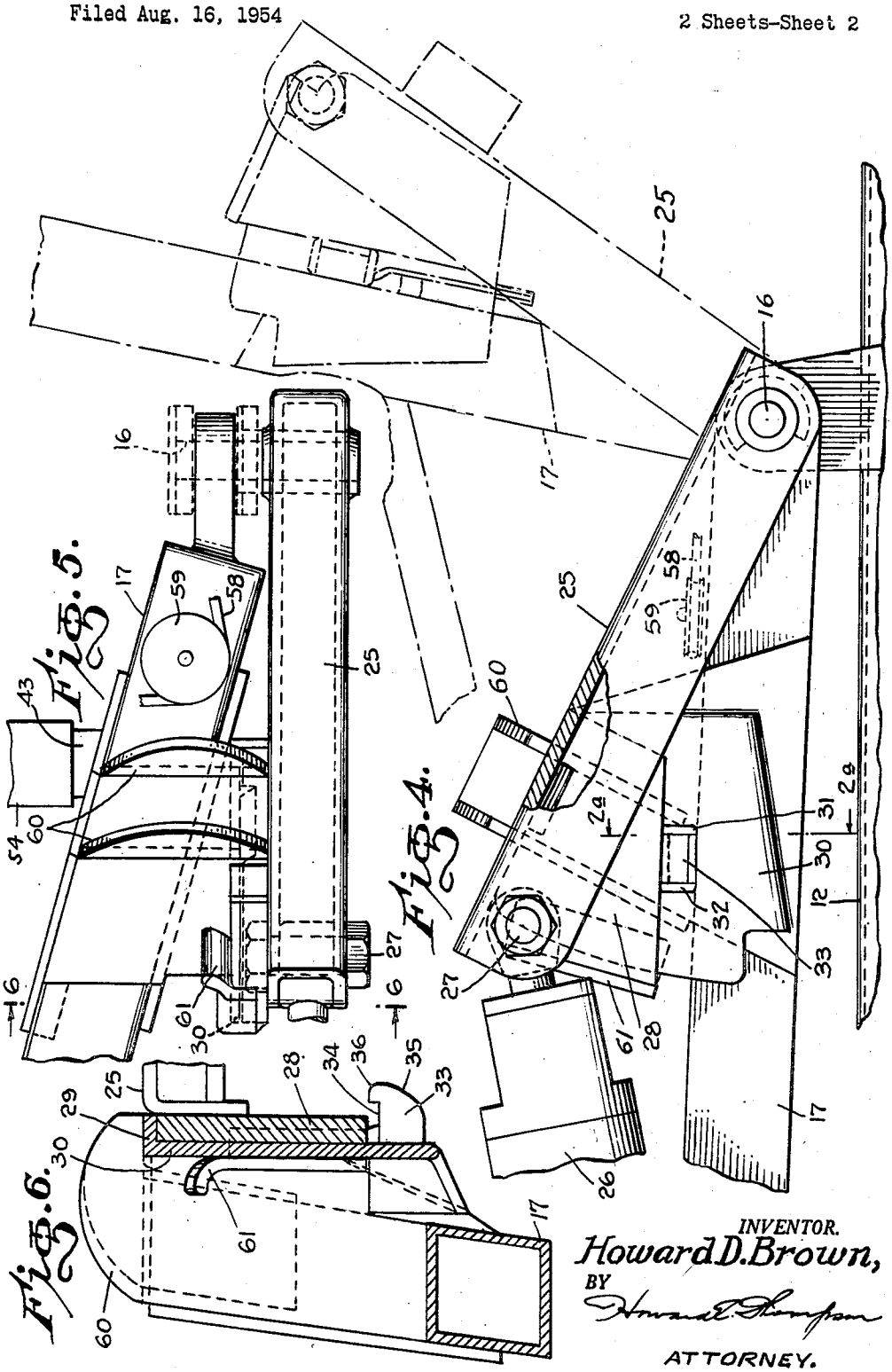

Fig. 5.

Fig. 4.

Fig. 6.

INVENTOR.
Howard D. Brown,
BY
Howard E. Thompson
ATTORNEY.

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LOCK AND RELEASE DEVICE FOR HYDRAULICALLY OPERATED DERRICKS

Howard D. Brown, Westfield, N.J.

Application August 16, 1954, Serial No. 449,953

5 Claims. (Cl. 212—8)

This invention relates to hydraulically operated derricks of the type and kind mounted upon service trucks. More particularly, the invention deals with a lock and release device or mechanism for controlling the setting-up of the derrick from a collapsed position as well as in returning the derrick from a use to a collapsed position.

The novel features of the invention will be best understood from the following description, when taken together with the accompanying drawing, in which a certain embodiment of the invention is disclosed and, in which, the separate parts are designated by suitable reference characters in each of the views and, in which:

Fig. 1 is a diagrammatic side view indicating part of the front of a truck, with one of my improved derricks arranged in operative position and indicating a second use position of the derrick in dot and dash lines.

Fig. 2 is an enlarged broken cross-sectional view through one side portion of the lock and release mechanism employed, with part of the construction shown in elevation, the section being substantially on the broken line 2—2 of Fig. 3, and substantially on the line 2*a*—2*a* of Fig. 4, with the parts in the position shown in full lines in Fig. 4.

Fig. 3 is a plan and sectional view of part of the construction shown in Fig. 2, the section being substantially on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged side elevation of part of the derrick in collapsed position in full lines and in raised locked position in dot-dash lines.

Fig. 5 is a plan view of the structure shown in Fig. 4; and

Fig. 6 is a sectional view substantially on the line 6—6 of Fig. 5, diagrammatically illustrating in section part of the background showing and with parts of the construction broken away.

The derrick structure disclosed in this application is generally similar to the structure disclosed in my prior application, Serial Number 372,324, filed August 4, 1953, now Patent No. 2,838,182 and the general assemblage of the derrick, in one use thereof, is diagrammatically illustrated in Fig. 1 of the drawing. In this figure, 10 represents the front end of a truck, part of the front portion of the chassis being shown at 11 and at 12 is shown a supporting frame, in connection with which the derrick mechanism is mounted. At 13 is indicated in dotted lines the winch for actuating the cable 14 which passes over an idler pulley, as at 15.

Pivoted, as seen at 16, is the main A-frame 17 of the derrick, the upper contracted ends of the frame 17 supporting a pulley 18, over which the cable 14 passes. Pivoted to the upper end portion of the frame 17, as seen at 19, is a main operating hydraulic cylinder 20, which controls raising and lowering of the frame 17 in the operation of the derrick. The lower end portion of the cylinder unit 20 has a detachable pivotal coupling with the chassis 11, as indicated at 21. Also pivoted to the derrick frame 17, as indicated at 22, is a prop 23, the lower end portion of which is normally coupled with the cylinder unit 20 by a yoke-shaped strap 24. By detaching the prop from the strap 24, the prop 23 can be extended to the use position, indicated in dot-dash lines in Fig. 1 of the drawing.

Pivoted to the sides of the frame 12 on the pivots 16 are links 25. In order to simplify the showing, only one of these links, as well as only one of the operating hydraulic cylinders 26, are shown, it being understood that the other side of the derrick structure has a similar unit. The hydraulic cylinders 26 are employed to raise and lower the derrick in controlling movement of the derrick from the collapsed position upon the top of the frame 12 to the upright position, indicated in dot-dash lines in Fig. 4 of the drawing, from which latter position the derrick frame 17 is released from the lock mechanism employed, permitting the derrick to be moved to the operative positions illustrated in Fig. 1. In actuating the derrick from said upright positions to the collapsed position and vice versa, the derrick is maintained in locked assemblage with the lifting mechanism comprising the links 25 and cylinders 26 through the lock and release device later described. The cylinders 26 are pivoted to the frame 12, as seen at 26'.

At this time, it might be well to point out that, in returning the derrick from the use positions shown in Fig. 1 to the collapsed position shown in full lines in Fig. 4 of the drawing, the derrick is first raised from said use positions to a position similar to that indicated in dot-dash lines in Fig. 4 of the drawing, in which operation the frame 17 will automatically be moved into latched or locked coupling with the links 25 and, at this time, the hydraulic cylinder unit 20 is detached from the pivot coupling at 21 and then the hydraulic cylinders 26 take over in lowering the derrick frame, including the cylinder unit 20 with the prop 23 coupled therewith upon the top of the frame 12.

In the reverse operation, the derrick frame 17 is raised from the full line position shown in Fig. 4 to the dot-dash position shown in said figure. The cylinder unit 20 is then coupled with the frame 11 by the pivotal coupling 21; after which, the lock mechanism is released, which allows the derrick frame and its associated parts to swing outwardly to the dot-dash use positions shown in Fig. 1.

It will be apparent from a consideration of Figs. 4 and 5 of the drawing that the links 25 are of channel cross-sectional form with the channels directed downwardly when the derrick is in the collapsed position. The hydraulic cylinders 26 are pivoted in the outer ends of the channel links 25, as seen at 27.

On inner surfaces of the links 25 are welded or otherwise secured plates 28, generally of the form indicated in Fig. 4 of the drawing, and these plates fit beneath flange portions 29 of plates 30 which are welded or otherwise secured to the side members of the frame 17. The plates 30 have rectangular apertures 31 therein, in which are arranged bolt sleeves 32 shown in sectional detail in Fig. 3 of the drawing. At this time, it would be well to bring out that only one of the lock units will be described. As only one is shown, the other companion unit will be identical with the one which is shown.

Slidably mounted in the sleeve 32 is a lock bolt 33, part of which is indicated in Fig. 2 of the drawing, in which figure the notch or recess 34 of the bolt is shown for operative engagement with the plate 28. The lower surface of the outer end of the bolt is rounded, as seen at 35 in Fig. 2 of the drawing, as is also the upper outer corner 36. The roundness at 35 facilitates automatic latch movement of the bolt in passage over the

plate 28; whereas, the rounded corner 36 facilitates outward movement of the bolt after having been depressed by the plate 28.

The bolt 33 has a recess or socket 37 therein for reception of the upper rounded end 38 of a lever 39 pivoted on the frame 17, as seen at 40. Pivoted to the other end of the lever, as seen at 41, is a yoke link 42 which passes over the frame 17, as noted in Fig. 3 of the drawing.

Pivoted in a crossframe 43 of the derrick A-frame 17, as seen at 44, is a lever 45, the upper end of which is pivoted, as seen at 46, to the link 42. The lower end of the lever 45 is pivoted, as seen at 47 to a rod 48 guided in the crossframe 43 by a bearing plate 49. To the inner end of the rod is pivoted a link 50 which, in turn, is pivoted to the lower end of an operating lever 51, as seen at 52. The lever 51 is pivoted, as seen at 53 in the crossframe 43 and another link 50' is pivoted to the lever, as seen at 52', it being understood that the link 50' couples with another rod, similar to the rod 48 in the duplication of the lock bolt mechanism at the other side of the frame 17. The showings in the drawing are, to quite an extent, diagrammatic, insofar as many of the detailed showings are concerned. However, sufficient mechanism has been illustrated in order to clearly understand the invention. In this connection, it will be noted that a raised casing portion 54 is disposed upon the crossframe 43 in housing the links and levers 42, 45 and associated parts.

Fixed to the rod 48 is a collar 55 operating upon a coil spring 56 arranged upon the rod, the spring also engaging the bearing plate 49. The spring operates to normally support the bolt 33 in extended operative position; whereas, actuation of the lever 51 against the action of the spring will withdraw the bolt in the operation of uncoupling the frame 17 to release the same for movement into the operative position shown in Fig. 1 of the drawing.

Centrally of the cross-frame 43 is a saddle 57, in which the cylinder 20 seats when the derrick is in collapsed position. It will also appear that the arrangement of the lever 51 is such that, when the hydraulic cylinder 20 is in the seated position, the lever 51 is rendered inoperative. In other words, it is essential for the cylinder 20 to swing out from the frame 17 before the lever 51 can be operated to withdraw bolts 33. The lever 51 can be directly operated by hand or, if desired, by a cord or cable 58 coupled therewith and passed around a pulley 59 at one side of the frame 17 to extend downwardly for convenient operation from the ground.

The position of the parts as shown in Figs. 2 and 6 of the drawing is what might be termed the non-lift position. However, when the links 25 are actuated by the hydraulic cylinders 26 and the derrick frame 17 is moved into the raised position as the frame passes the upper dead center position and moves outwardly, the plates 28 will drop into the notches 34 of the bolts, thus preventing operation of the bolts by reason of this engagement. As stated above, while the cylinder 20 is still within the range of the saddle 57 and lever 51, the lever cannot be operated. After the frame 17 has moved outwardly sufficiently to clear cylinder unit 20 with respect to the saddle 57 and lever 51, the cylinder unit 20 will then hang downwardly free of the frame 17 and the pivotal coupling, as at 21, can then be established.

During this outward operation of the frame 17, the weight of the derrick frame 17 will still maintain the plate 28 in the notches 34 of the bolts 33. However, after the coupling at 21 has been accomplished and the weight of the frame 17 taken up through the cylinder 20, the plates 28 will return to the position shown in Fig. 2, at which time, the lever 51 can be operated to draw the bolts 33 inwardly to clear the plates 28, thus allowing the frame 17 to move outwardly into the positions shown in Fig. 1 of the drawing, permitting free operation of the

derrick. In the operation of collapsing the derrick, the frame 17 is moved into a raised position to such an extent as to pass the bolts 33 over the plates 28 until the bolts snap into operative position, after which the cylinder unit 20 can be uncoupled and the hydraulic cylinders 26 will then take over in lowering the derrick into collapsed position.

The plates 30 are reinforced by curved top plates 60, noted in Figs. 5 and 6 of the drawing, and the plates 28 and links 25 are guided in movement into coupled position with plates 30 by curved guide plates 61, note Fig. 6, so as to insure positioning of the frame 17 with the links 25 in recoupling the frames with the links, as above mentioned.

From the foregoing, it will be apparent that the direct lift of the derrick from the collapsed to the raised position is not through the medium of the bolts 33 but rather through direct contact of plates 28 with the flanges 29 of the plates 30, as clearly noted in Fig. 6 of the drawing. However, in movement of the derrick frame 17 from the raised or vertical position to the operative positions, the flanges 29 swing away from the plates 28 and the bolts 33 then take over in maintaining coupled relationship of the parts.

The distinct advantages of the lock construction herein employed is to render derricks of the kind under consideration substantially foolproof in operation, particularly in providing a definite and positive control between the functioning of the raising and lowering cylinders 26 and the derrick operating cylinder unit 20 It will thus be apparent that any possible danger of the sudden dropping or loss of control of the derrick is obviated. It will also be understood that, while I have diagrammatically shown in the present disclosure a front end assemblage, the derrick structure is applicable to rear end mountings, as taught in my prior application, hereinbefore referred to.

In movement of the derrick from the operative positions illustrated in Fig. 1 of the drawing to the latched or coupled position with the links 25, the links 25 are free to move slightly laterally as the plates 30 guide plates 28 into position in passage over the curved guide plates 61. It will be apparent, however, that the plates 30 engage the guide plates 61 prior to engagement of the bolts 33 with the plates 28. The bolts 33 are under spring pressure as they move over plates 28. After passing the plates 28, the bolts 33 are moved by the springs 56 into the operative position, shown in Fig. 6 of the drawing.

It will, of course, be apparent that the plates 61 are secured to and form a part of the plates 28.

From the foregoing, it will be apparent that my invention deals generally with what might be termed lift frames or apparatus which have two means of operation, one means swinging the frame or apparatus through one arc, to what may be termed a perpendicular position; whereas, the other means then takes over in controlling movement of the frame or apparatus through another arc with the means provided for coupling and uncoupling the apparatus at the upright or perpendicular position to enable the two distinct means to perform their separate functions.

While frames or apparatus of this type and kind find a distinct practical use in conjunction with vehicles of various types and kinds, the coupling control herein disclosed is applicable to frames or apparatus of the kind under consideration, regardless of the installation thereof.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In collapsible derricks for trucks, a derrick frame, the lower end of which has a fixed pivot on the truck for movement from a collapsed horizontal inoperative position to a vertical position and wide range operative positions beyond said vertical position, a hydraulic cylinder unit pivotally mounted in connection with the upper

end of the derrick frame, said unit having a detachable pivotal mounting on a support for said derrick in controlling wide range operative of the derrick frame, hydraulic means for moving the derrick frame from the collapsed to the vertical position, said means being pivoted to a pair of links mounted on the pivot of said derrick frame, means on said links operatively engaging the derrick frame for movement of the frame by said hydraulic means from a collapsed to a vertical position, bolts movably supported on the derrick frame adjacent the pivot thereon and operatively engaging means on said links to check movement of the raised derrick frame beyond the vertical position, and a single manually operated means in operative engagement with said bolts for simultaneously withdrawing said bolts in releasing the derrick frame from said links for movement into operative positions beyond said vertical position.

2. A derrick as defined in claim 1, wherein said bolts include notches, and said links have plates engaging the notches of said bolts in retaining the bolts against withdrawal movement by said manually operated means.

3. A derrick comprising an upwardly contracted frame, means for pivotally mounting the lower end of the frame in fixed position in connection with a support for movement of the frame from a horizontal collapsed position to a vertical position and wide angled operative positions beyond said vertical position, a hydraulic cylinder unit pivotally mounted in connection with the upper contracted end of the frame and adapted to be pivotally coupled with a fixed pivot means on said support, said unit controlling wide angled operations of said frame, a pair of links arranged upon the pivots of the frame with said support, hydraulic means pivotally mounted on said support and pivoted to said links for actuating said links, means comprising a bolt coupling movably supported in the frame and engaging means on said links during movement of said frame from the collapsed to the vertical position, and manually operated means for withdrawing the bolt coupling from said links to free said frame for operative movement by said unit in wide angle beyond said vertical position.

4. In a collapsible derrick structure of the character described, comprising a derrick frame having a fixed pivot on the structure of a truck and movable from a collapsed horizontal inoperative position at the top of the truck to a vertical position and wide range operative positions beyond said vertical position, of a hydraulic cylinder unit

pivotally mounted in the upper free end of the derrick frame, said unit having a detachable pivotal mounting on the truck and controlling movement of said derrick frame in said wide range operative positions, means supported on the derrick frame adjacent its pivot and cooperating with hydraulically operated means on said pivot for maintaining the derrick frame in a locked control during movement of the derrick frame from collapsed to vertical positions by said last named means, and means for releasing the lock control means during movement of the derrick frame for the vertical position to the operative positions under control of said hydraulic cylinder unit.

5. In a derrick comprising an upwardly contracted frame, the lower end of said frame having a fixed pivotal mounting in connection with a support, means for actuating the derrick frame to move the same from a collapsed horizontal inoperative position to and maintaining the same at a vertical position, said means including a pair of links arranged on the pivot of and engaging the frame, a lock and release mechanism, said mechanism comprising a crossframe fixed to the derrick frame adjacent the pivot end of said derrick frame, a pair of spring actuated bolts movably supported in said crossframe and operatively engaging means on said links during movement of said derrick frame into vertical position, manually operated means for retracting said bolts to clear said links during movement of said derrick frame beyond said vertical position into operative position outwardly beyond said vertical position, means controlling said operative movement of said derrick frame, said crossframe including a saddle portion, in which said last named means is adapted to seat in movement of the derrick frame from the collapsed to the vertical position, and said last named means, when disposed in said saddle, engaging said manually operated means to render the same inoperative.

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