

Jan. 1, 1935.

A. J. PENICK ET AL

1,986,284

ELEVATOR

Filed April 3, 1934

3 Sheets-Sheet 1

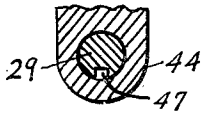
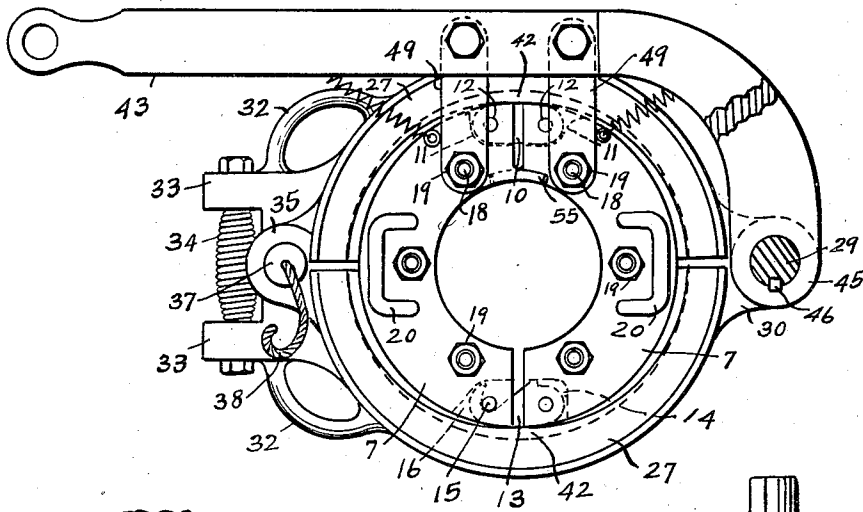


Fig. 3.

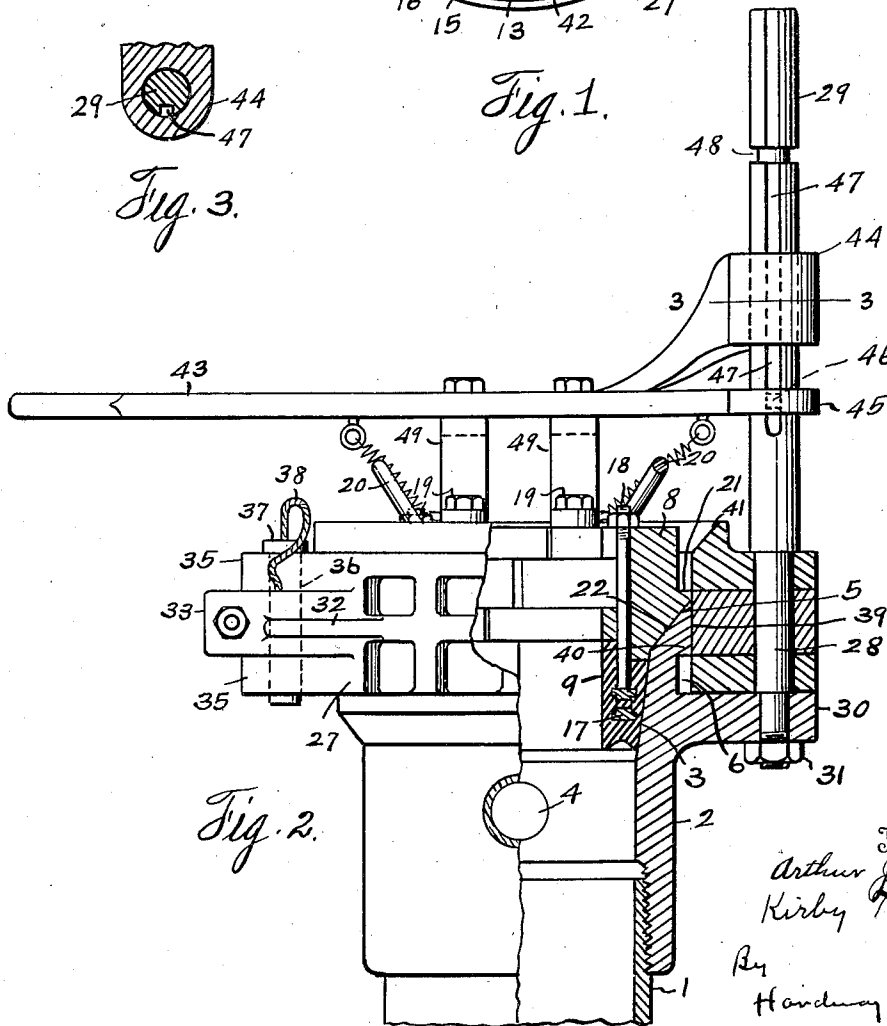


Fig. 2.

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3 Sheets-Sheet 2

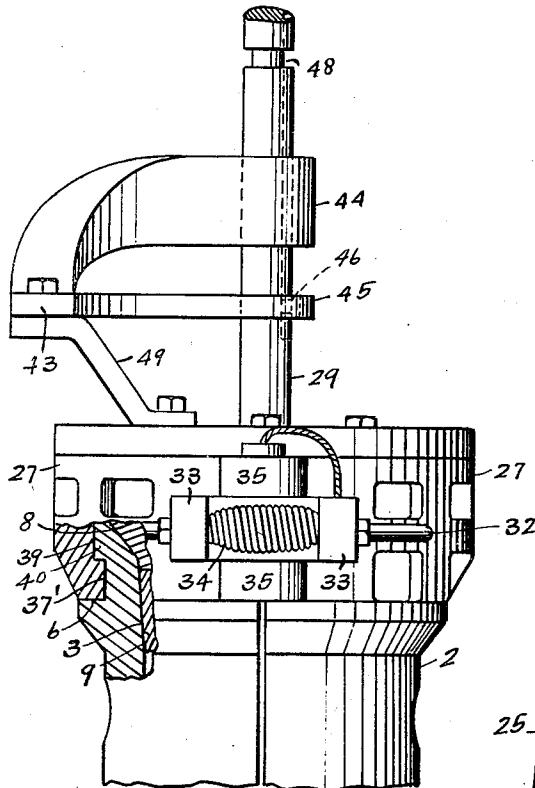


Fig. 4.

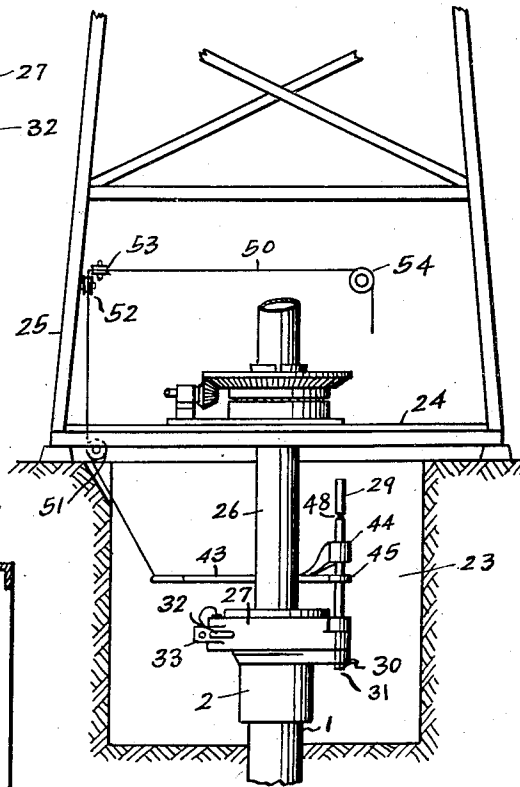


Fig. 5.

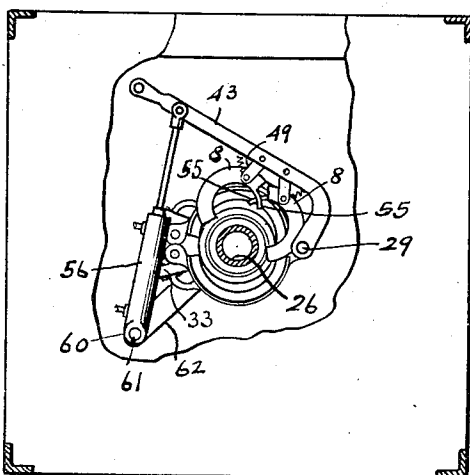


Fig. 6.

334

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3 Sheets-Sheet 3

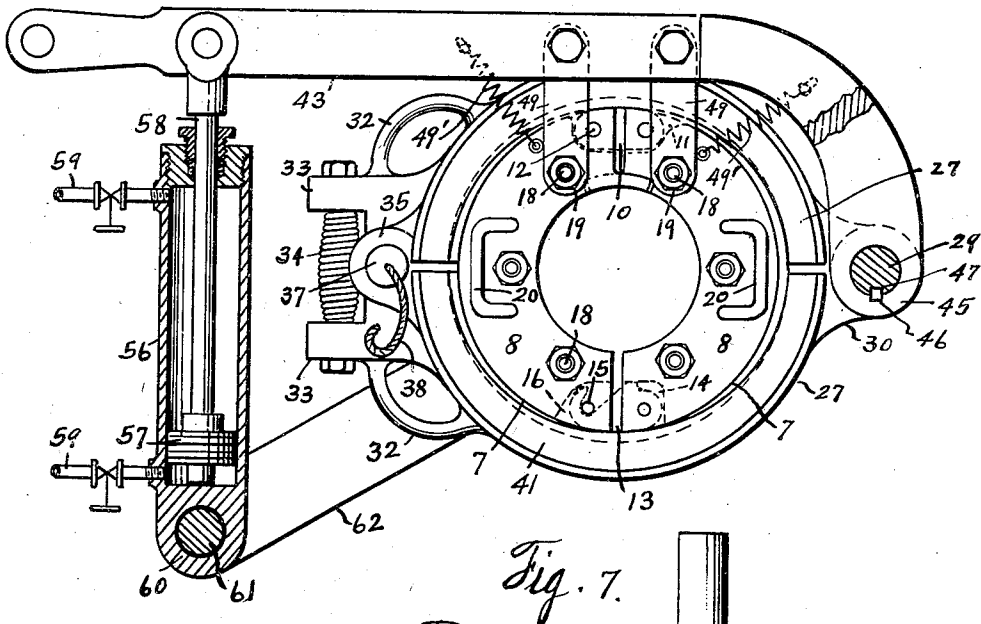


Fig. 7.

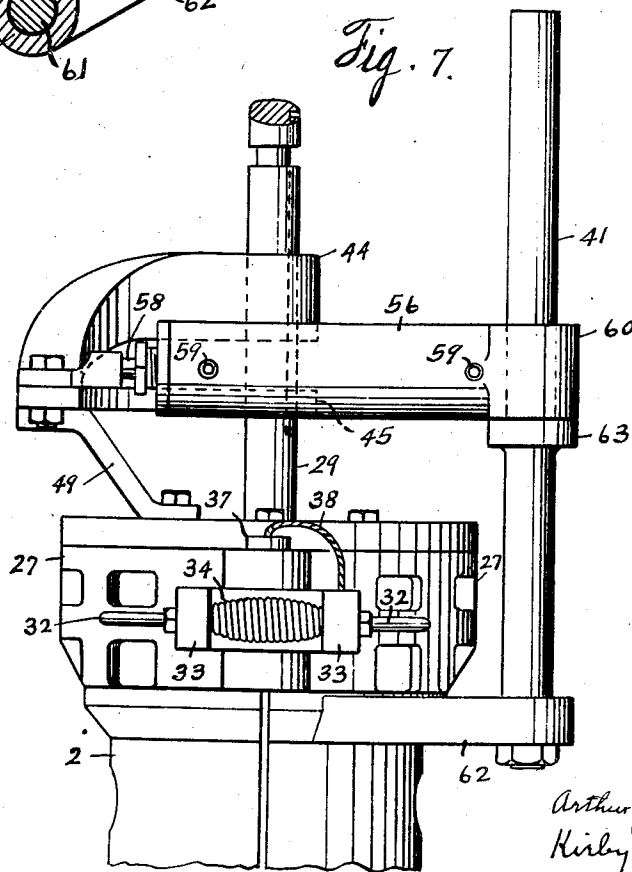


Fig. 8.

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UNITED STATES PATENT OFFICE

1,986,284

ELEVATOR

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Application April 3, 1934, Serial No. 718,806

13 Claims. (Cl. 136-14)

This invention relates to an elevator.

An object of the invention is to provide apparatus of the character described for supporting and handling the packing unit of a blowout preventer.

The invention herein described constitutes certain improvements over that type of elevator described in our co-pending application filed September 26, 1933, under Serial No. 691,020.

Another object of the invention is to provide an elevator whereby the packing unit of a blowout preventer may be maintained suspended in position to be readily applied to a pipe in a well, and which will permit the packing unit, when applied to the pipe, to descend with the pipe into position within the casing head of the well casing.

A further object of the invention is to provide an elevator of the character described which may be readily manipulated by the operator from the derrick floor to carry the packing unit into position around said pipe, and the invention also includes means for automatically causing the packing unit to close about the pipe when the packing unit is so swung into active position.

The invention also comprehends a novel combination including power means for manipulating the elevator to swing the packing unit into active or inactive position.

With the above and other objects in view, the invention has particular relation to certain novel features of construction, operation, and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings wherein:

Figure 1 shows a plan view of the blowout preventer, showing elevator associated therewith and partly in section.

Figure 2 shows a side elevation thereof partly in section.

Figure 3 shows a cross sectional view, taken on the line 3-3 of Figure 2.

Figure 4 shows a front elevation partly in section.

Figure 5 shows a fragmentary side elevation of a drilling apparatus, showing the elevator applied to the casing head.

Figure 6 shows a plan view of the elevator and blowout preventer, embodying a power cylinder for manipulating the elevator.

Figure 7 shows an enlarged plan view of the form shown in Figure 6 partly in section, and

Figure 8 shows a front elevation thereof.

Referring now more particularly to the draw-

ings, wherein like numerals of reference designate the same parts in each of the figures, the numeral 1 designates a well casing having the casing head 2 secured to the upper end thereof and provided with a downwardly tapering seat 3. The casing head has a laterally tapped hole beneath said seat for the connection of a pipe 4 thereto through which the fluid in the well may be discharged, or through which fluid under pressure may be forced in the well as desired. At its upper end, the seat 3 is outwardly flared as at 5, and beneath said flared portion the casing head has an annular external groove 6.

There is a packing unit or assembly formed of arcuate confronting segments indicated generally in Figures 1, 6 and 7 by the numerals 7, 7. Each segment is composed of an arcuate metallic anchor 8, and an arcuate packing ring 9, secured to the under side of said anchor.

The anchors 8 are hinged together at one side by means of the hinge plate 10, whose ends are seated in the slots 11 at the adjacent ends of said anchor and pinned in place by the pins 12.

At the opposite side of the packing unit there is a latch, 13, hook-like in form, one end of which is pivoted in the slot 14 in one of said anchors, and whose hooked end is adapted to engage a pin 15 extending through a slot 16 in the adjacent end of the other anchor. The packing unit is so shaped that when latched around the drill stem, or other inner pipe, it will completely surround said inner pipe and the outer surface of the packing 9 is tapered to conform to the shape of, and to fit closely within the seat 3.

Embedded within the packing 9, of each segment, there is a rigid reinforcing member 17, preferably formed of metal, and upstanding from this reinforcing member are the anchor rods 18, 18, which extend up through the anchors 8 above, and whose upper ends are threaded to receive the nuts 19 whereby the packing may be maintained in place. Each segment 7 has the handle 20, by means of which the packing units may be handled.

The upper ends of the anchors 8 of the packing unit are reduced, forming an annular external shoulder 21 all the way around said unit, and beneath said shoulder the anchors 8 have the annular tapering face 22, shaped to fit to the form of, and to seat closely into the flared upper end 5 of the seat 3.

The casing head 2 will usually be located in the cellar 23 beneath the floor 24 of the derrick 25, and when it may be desired to set the pack-

ing unit in the casing head, the segments of the packing unit may be closed around the inner pipe 26 in the manner hereinafter described, and latched and the inner pipe then lowered
 5 and the packing unit will be carried downwardly into the casing head and seated therein with the packing seated in the seat 3 and completely closing the space between the inner pipe 26 and the casing head, and with the tapering face
 10 22 seated on the flared portion 5 of the seat 3.

There are the arcuate clamps 27, 27, which are hinged together at one side by the hinge pin 28 formed on the lower end of the upstanding post 29, said hinge pin passing also through
 15 the laterally extending lug 30 formed integrally with the casing head 2, whereby the clamps 27, 27, are supported hingedly on the casing head. The pin 28 is secured in place by a suitable nut 31 screwed on to the lower end thereof.

At their other ends the clamps 27 have the grips 32, 32 and parallel outwardly projecting extensions 33, 33, which are connected by means of a pull spring 34. Between the extensions 33, the clamps 27 have the inter-meshing lugs
 20 35 provided with the pin bearings 36 which register when the clamps are secured around the casing head, and through which a pin 37 may be inserted to hold the clamps in secure position. This pin 37 may be secured against
 30 loss by means of a cable or other flexible tie member 38. Each clamp member has an inside rib 37' to fit into the groove 6, and also has an inside groove 39 to receive an external annular rib 40 on the casing head 2 and the external
 35 shoulder 21 of the anchors 8 project into this groove 39, whereby the clamp members and the packing unit are secured in place on the casing head.

The clamps 27 are flared upwardly, as at 41, and when the packing unit is fastened around the pipe 26, and the pipe is lowered, the packing unit will enter between the clamps 27, and the tapering faces 22 will contact with the correspondingly flared portion 41 of said clamps, and
 45 the packing unit will be guided into the casing head, and the clamps 27 will be spread apart, the spring 34 yielding to permit this, and when the shoulder 21 registers with the groove 39, said clamps will be drawn together with the said
 50 spring 34 causing the upper side of the groove 39 to engage over the shoulders 21 whereby the packing unit will be locked in place, and the pin 27 may then be inserted through the bearing 36 to secure said clamps against spreading
 55 whereby the packing unit will be secured in place against danger of displacement by the internal well pressure.

It should be noted that the shoulders 42 forming the upper side of the groove 39, engage
 60 over the shoulders 21 of the packing unit at diametrically opposite sides of the packing unit only, as shown in Figure 1, that is to say, at opposite points approximately midway between the hinged ends of the clamps 27 and the opposite ends thereof, so that when it is desired
 65 to release the packing unit, the pin 37 may be withdrawn and the grips 32 pulled apart until the shoulders 21 are cleared by the shoulders 42 to the end that the clamps 27 need only be
 70 partially open to release the packing unit.

There is an arm 43 mounted to swing in a horizontal plane. This arm is arranged along side and slightly above the blowout preventer, and at one end is divided, forming the upper and
 75 lower bearings 44, 45, which receive the upright

post 29. The lower bearing 45, has an inwardly projecting key, 46, which projects into a vertical keyway, 47, in the post 29 and the upper end of said keyway terminates in an annular external groove 48 around the post. A pair of
 5 supporting links 49, 49, are pivoted at one end to the arm 43, and their other ends have bearings to receive the upper ends of the anchor rods 18 on opposite sides of the hinge plate 10 in the adjacent side of the packing unit, and these
 10 links are retained on said rods by the corresponding nuts 19.

In operation, when it is desired to release and elevate the packing unit, the pin 37 may be removed and the clamp members opened sufficiently to release the shoulders 42 from the
 15 shoulders 21, as illustrated in Figure 6, and the packing unit, being released, may be manually elevated, the key 46 moving along the keyway 47, and when said key reaches the groove 48, the
 20 latch 13 may be released and the sections of the packing unit will be swung open by the pull springs 49', 49', attached at their outer ends to the arm 43 and at their inner ends to the
 25 respective links 49 and the arm 43, together with the packing unit, may be swung around carrying said key out of alignment with the keyway, and the key will be supported in the groove
 30 48, and the packing unit will be held supported and maintained in readiness to be again applied to the pipe and seated and secured in the casing head in case of an impending blowout.

A cable 50 is attached at one end to the free end of the arm 43, and this cable passes up through the derrick floor around the pulley 51, and over the pulleys 52, 53 and 54 in the derrick, with its free end accessible to the operator. In case it is desired to apply the packing
 35 unit to the pipe 26, the operator may exert a pull on the cable 50, and the arm 43 will thereby be swung inwardly toward the pipe 26, carrying the sections of the packing unit about said pipe 26. The hinged ends of the anchors 8 have the overlapping, finger-like, extensions 55, 55, said extensions of each anchor seating into a
 45 correspondingly counter-sunk portion of the other anchor when the packing unit is closed around the pipe, as shown in Figure 1. When the sections of the packing unit are open, the extensions 55 will extend inwardly and when
 50 the unit is into position to close about the pipe the extensions 55 will strike the pipe and operate to automatically close said sections closely about the pipe, and said packing unit may then be latched about the pipe. When the packing
 55 unit is swung about the pipe, the key 46 will move around the groove 48 into alignment with the keyway 47 and when the pipe is then lowered, said unit will move downwardly with it until the unit seats within the casing seat, as
 60 hereinabove explained the key 46 moving downwardly in the keyway 47. When so seated, the spring 34 will cause the rib 37 to seat in groove 6, and the shoulders 42 to engage over the shoulders 21 to maintain the packing unit in
 65 place, and the pin 37 may then be reinserted through the bearings 36 to lock the clamps 27 against spreading.

As shown in Figures 6, 7 and 8 a power jack is provided for manipulating the arm 43. This
 70 jack comprises a cylinder 56 having a piston 57 therein and attached to a piston rod 58 whose outer end is connected to the arm 43. Steam lines 59, 59 enter opposite ends of the cylinder to supply and relieve steam or the like into and
 75

from said cylinder to actuate the piston. The arm 43 may thus be manipulated by suitably controlling the application of steam to said cylinder. One end of the cylinder has a bearing 60 which is vertically slidable on the post 61 which is anchored to the bracket 62 extending out laterally from the casing head. The post 61 has a stop 63 to support said cylinder. As the arm 43 and packing unit move up and down the cylinder may move with them the lines 59 being flexible for this purpose.

The drawings and description disclose what is now considered to be a preferred form of the invention, by way of illustration only, while the broad principle of the invention will be defined by the appended claims.

What we claim is:—

1. The combination with a blowout preventer having a removable packing unit, of an upstanding post, an arm swingable and vertically movable on the post, means connecting the arm to the packing unit and releasable means for locking the arm in elevated position on the post.

2. The combination with a blowout preventer having a removable packing unit, of an upstanding post, an arm vertically movable on the post and connected to the packing unit, interlocking means engageable upon a partial rotation of the arm about the post and effective to secure the arm and packing unit in elevated position, said interlocking means being releasable to permit the arm and unit to descend.

3. The combination with a blowout preventer having a removable packing unit, of an upstanding post, an arm vertically movable on the post and connected to the packing unit, interlocking means engageable and releasable by appropriate movements of the arm on the post and effective, when engaged, to hold the arm and unit elevated.

4. The combination with a blowout preventer having a removable packing unit, of an upstanding post, an arm vertically movable on the post and connected to the packing unit, interlocking means engageable and releasable by appropriate movements of the arm on the post and effective, when engaged, to hold the arm and unit elevated, and when released, to permit the arm and unit to descend.

5. The combination with a blowout preventer having a seat and a removable packing unit therein, means for releasably securing the unit on the seat, means arranged to hold the unit elevated above the seat, said holding means being adapted to permit the unit to descend upon an appropriate swinging movement of the holding means about a vertical axis.

6. The combination with the packing unit of a blowout preventer, of an upstanding post, an arm vertically movable on the post and connected to the unit, said arm when elevated on the post being swingable about the post, means arranged to interengage upon such swinging movement and effective to hold said arm and unit elevated.

7. The combination with a packing unit shaped to be fitted to a seat about an inner pipe in a well, of an upstanding post having a vertical keyway and a lateral keyway into which the vertical keyway merges, an arm vertically movable on the post and connected to said unit and having a key arranged to move in said keyways.

8. In a blowout preventer having a head on a casing in a well, said head having a seat and a removable packing unit shaped to fit said seat and to surround an inner pipe in the casing; an elevator comprising an upstanding support, means movable on the support and connected to said unit for supporting and guiding the unit, and releasable interengaging means carried by the support and guide means respectively arranged to be engaged upon elevation of the latter whereby said unit is maintained in elevated position.

9. In a blowout preventer having a packing unit formed of sections hinged together and shaped to fit into a seat around a pipe in a well; an elevator comprising an upstanding support, said means and support having interengaging parts arranged to hold said means and unit elevated, said supporting means being swingable about a vertical axis whereby the packing unit may be moved to position about the pipe, the sections of said unit having inside projections arranged to strike the pipe, upon such movement, to cause said sections to close about the pipe.

10. The combination with a blowout preventer having a removable packing unit, of an upstanding post, an arm swingable and vertically movable on the post, means connecting the arm to the packing unit, and power means for swinging the arm about a vertical axis.

11. The combination with a blowout preventer having a removable packing unit, of a pair of upstanding posts, an arm vertically movable on one post and connected to the packing unit, and a power device connected to the arm and vertically movable on the other post.

12. The combination with a blowout preventer having a removable packing unit, of an upstanding post, an arm vertically movable on the post and connected to the packing unit, a cylinder having a piston therein, means connecting the piston to said arm and means for supplying an operating fluid to the cylinder to actuate the piston.

13. In a blowout preventer, a removable packing unit formed of sections hinged together, an upstanding post, an arm swingable and vertically movable on the post, links connecting said sections to said arm and a pull spring connected at one end to each section and whose other ends are connected to said arm.

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