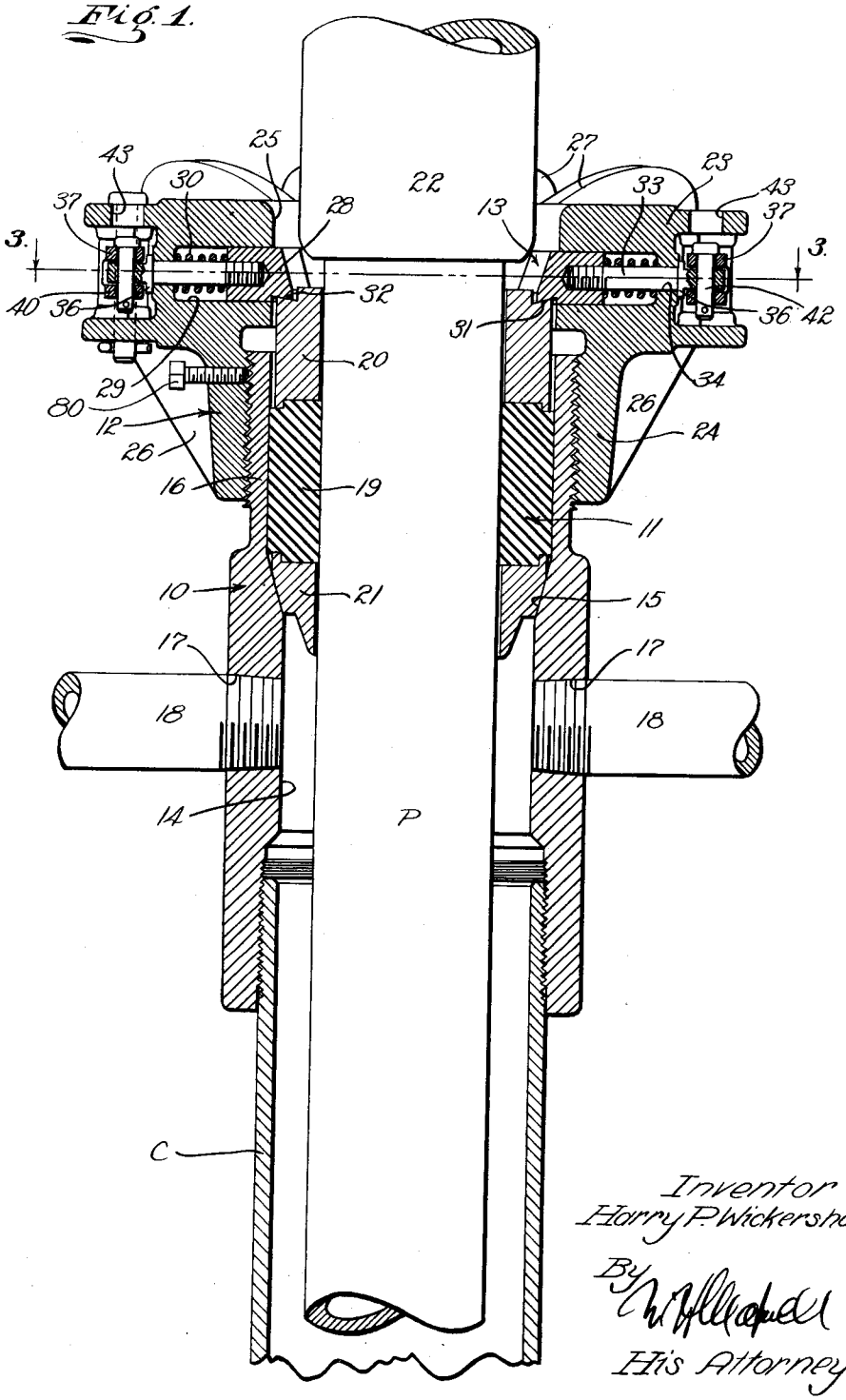
June 20, 1933. H. P. WICKERSHAM 1,914,472

CASING HEAD

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Fig. 1.



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Fig. 2.

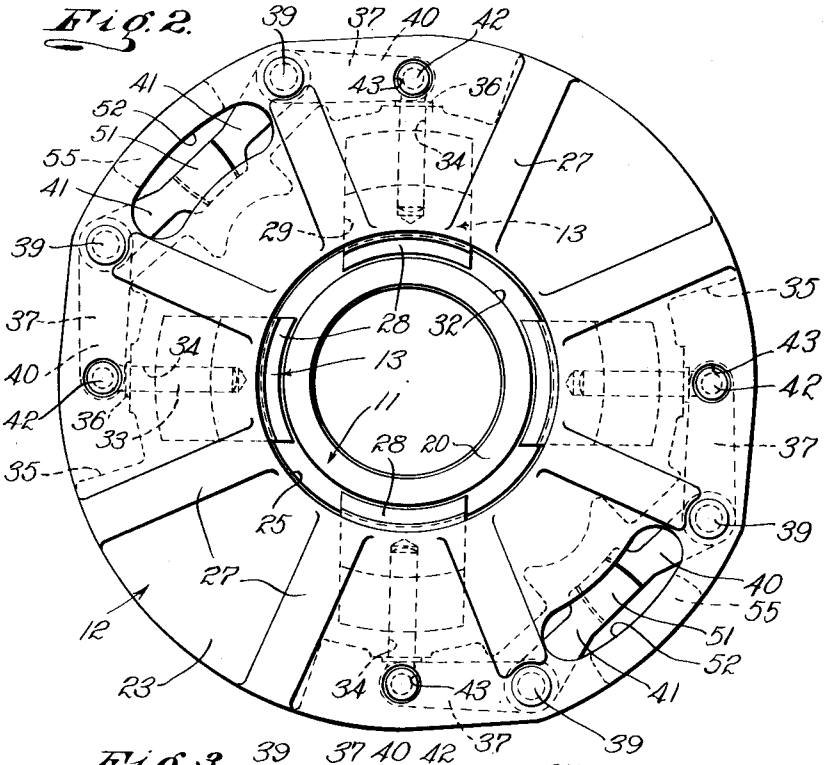
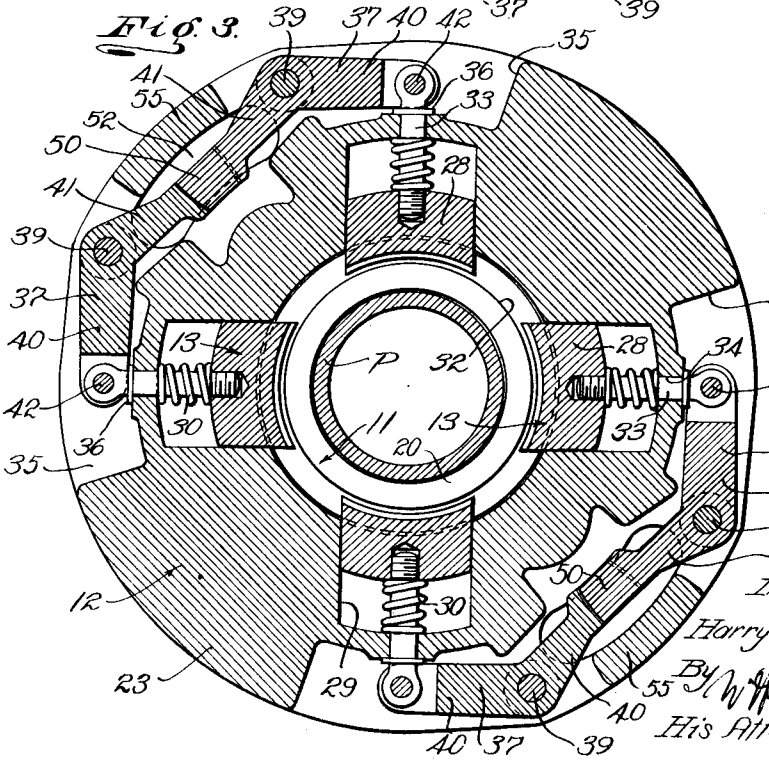


Fig. 3.



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UNITED STATES PATENT OFFICE

HARRY P. WICKERSHAM, OF WALNUT PARK, CALIFORNIA

CASING HEAD

Application filed December 14, 1931. Serial No. 580,847.

This invention relates to well drilling apparatus and relates more particularly to a casing head or blowout preventer. A general object of the present invention is to provide a simple, practical and effective blowout preventer by means of which a well casing may be very quickly packed off to prevent the discharge or blowing off of fluid from the well.

In the drilling of deep wells, for example, oil wells and gas wells, there is considerable danger of the well blowing out through the casing. Excessive gas pressures often develop in a well very quickly and with little or no warning, and the well may get out of control before the necessary steps can be taken to close or pack off the upper end of the well casing.

An object of this invention is to provide a casing head or blowout preventer for application to a well casing that is at all times adapted to instantly receive a packing assembly and to hold the packing in the sealing position about a drill pipe, or the like, extending into the casing. The control head provided by this invention is adapted to employ different forms of packers or packing assemblies and packing devices for packing off the well casing when the drill pipe or other tools are extending into the casing or when the casing is free of tools.

Another object of the invention is to provide a blowout preventer that includes holding means or latches operable to automatically engage and hold the packing assembly against upward movement upon the packing assembly being lowered into an operating position, and also operable to actuate or compress the packing assembly.

Another object of the invention is to provide a casing head or blowout preventer of the character mentioned in which the latch means may be readily released or disengaged from the packing assembly when desired.

Another object of the invention is to provide a blowout preventer of the character mentioned that is simple and inexpensive of construction and that does not interfere with drilling operations when in position on the casing.

A further object of the invention is to provide an appliance or attachment adapted for use on the body or housing of a typical casing head that includes a sleeve for threading on the head, and latches carried by the sleeve for automatically engaging and holding the packing lowered into the head and for actuating the packing.

Other objects and features of the invention will be best and more fully understood from the following detailed description of a typical form and application of the invention, throughout which description reference is had to the accompanying drawings in which:

Fig. 1 is a vertical detailed sectional view of the device provided by this invention showing its parts in the operative position. Fig. 2 is a top or plan view of the blowout preventer. Fig. 3 is a horizontal detailed sectional view taken as indicated by lines 3—3 in Fig. 1.

The control head or blowout preventer provided by my invention includes, generally, a body 10 for mounting on a well casing C, a packing assembly 11 adapted to be lowered into the body 10 to pack about a drill pipe P, or the like, a sleeve 12 on the body 10, and latch means 13 carried by the sleeve 12 for holding the packing device 11 in the body.

The body 10 is a simple tubular structure adapted to be applied to the upper end of the well casing C. A central longitudinal opening 14 is provided in the body 10 to register with the well casing C and to pass the drilling tools. In the particular case illustrated in the drawings, the body 10 is screw threaded on the upper end of the casing C. An upwardly and outwardly tapered annular seat 15 is provided on the wall of the body opening 14. The seat 15 is spaced a considerable distance below the upper end of the body, and the portion of the opening 14 above the seat is adapted to receive the packing assembly 11. The upper end portion 16 of the body 10 is of reduced external diameter and is externally screw-threaded to receive or connect with the sleeve 12. Openings or ports 17 are provided in the

walls of the body 10 at points spaced below the seat 15 to receive the end of pipes 18 adapted to discharge fluid from the well casing.

In accordance with the preferred embodiment of the invention, any specific or desired type of packing device or packing assembly may be employed in connection with the blowout preventer. In the drawings I have illustrated a more or less typical packing assembly 11, consisting of an annular body 19 of packing and compression collars 20 and 21 on the upper and lower ends of the packing 19. The packing 19 and collars 20 and 21 are proportioned to readily pass into the upper end of the opening 14 and to normally freely fit about the drill pipe P. It is to be understood that the packing assembly 11 may be longitudinally split or divided, in accordance with the common practice, to facilitate its arrangement about the drill pipe P before its insertion in the body 10. The periphery of the lower collar 21 is tapered downwardly and inwardly to cooperate with the seat 15 so that the packing assembly 11 is supported on the seat 15 when within the body 10.

The two metal collars 20 and 21 are engageable by couplings 22 or other projecting parts on the drill pipe P to compress the packing 19. The weight of the drill pipe P, or a portion of the weight of the drill pipe may be put on the packing assembly 11 through a coupling 22 engaging the upper collar 20 to compress the packing 19 into effective sealing engagement with the drill pipe P and with the walls of the body opening 14. Pressures within the well may act on the lower collar 21 to compress or aid in compressing the packing 19. If desired or found necessary, an up-pull may be maintained on the drill pipe P after the packing assembly 11 has been latched in the body so that a coupling or the like, on the drill pipe may press upwardly against the lower collar 21 to actuate the packing 19.

The sleeve 12 is provided primarily to carry the latch and packing actuating means 13 and is threaded on the reduced upper end portion 16 of the body. The sleeve 12 is an integral member including a main or upper portion 23 and a reduced lower portion 24. The lower portion 24 of the sleeve is internally threaded to cooperate with the thread on the upper end portion 16 of the body. The opening 25 in the main portion 23 of the sleeve is proportioned to readily pass the packing assembly 11. The upper end portion 23 of the sleeve is of enlarged diameter projecting radially outward around the upper end of the sleeve. Braces or reinforcing ribs 26 extend between the lower portion 24 and the under side of the main portion 23 to strengthen and reinforce the sleeve. Circumferentially spaced ribs 27 project upwardly from the upper side of the sleeve to strengthen the construction and to facilitate the turning of the sleeve. A stop screw 80 may be provided to limit threading of the sleeve on the body. It is a feature of the present invention that the sleeve 12 may be constructed for use on the body or housing of any typical blowout preventer or casing head. It will be apparent how the sleeve 12 may be constructed to readily thread on to or otherwise connect with a typical casing head body.

The latch means 13 is provided to retain the packing assembly 11 in the body 10 and also is operable to actuate or compress the packing assembly 11. The latch means 13 is automatic in its operation, being adapted to automatically engage and hold the packing assembly 11 in the body when the assembly is lowered into the body opening 14. In accordance with the invention the latch means 13 includes a plurality of like latches 28, slidable radially in circumferentially spaced slots or guideways 29 in the sleeve. In the particular embodiment of the invention illustrated in the drawings, there are four dogs or latches 28 arranged in equally or symmetrically spaced slots 29. The slots 29 communicate with the sleeve opening 25 and the latches 28 normally project into the sleeve openings. The latches 28 are shaped and proportioned to slidably fit the slots 29 so as to be effectively supported and guided in the slots. Springs 30 are provided between the outer ends of the latches 28 and the outer ends of the slots 29 to normally yieldingly hold the latches in positions where they project into the sleeve opening 25. The springs 30 may be in the nature of helical or spiral springs as illustrated throughout the drawings. The inner or packer engaging ends of the latches 28 are shaped so as to cause outward movement or retraction of the latches upon the packing assembly 11 being lowered through the sleeve.

The inner ends of the latches 28 are inclined downwardly and inwardly so that cooperation between the tapered collar 21 and the latches 28 causes outward retraction of the latches allowing the packing assembly 11 to pass downwardly into the body 10. The latches 28 may be formed so as to have effective engagement with the upper collar 20 of the packing assembly. Notches 31 with upwardly and outwardly inclined lower walls are provided in the under sides of the latches to cooperate with an annular recess 32 in the upper end of the collar 20. Upon lowering of the packing assembly 11 into the body 10, the lower compressing collar 21 engages the latches 28 causing the latches to move outwardly in the slots 29 so that the packing assembly may readily pass into the body opening 14. After the packing assembly 11 has been arranged in the opening

where it is supported on the seat 15, the latches 28 automatically return to their normal or operative positions where they project into the opening 25 and are adapted to engage the upper end of the collar 20.

After the sleeve 12 is in a position where the latches 28 are above the collar 20 when the packing assembly is seated in the body the sleeve may be threaded on the body so that the latches 28 are brought into holding engagement with the collar 20. If desired, the collar 12 may be threaded downwardly on the body 10 to actuate or compress the packing 19. The weight or a portion of the weight of the drill pipe P may be suspended on the packing assembly 11 through the collar 22 in order to compress the packing 19 to seal between the drill pipe and the body. After the packing assembly is thus actuated by the weight of the drill pipe P the sleeve 20 may be further threaded down on the body to bring the latches 28 into cooperation with the upper end of the collar 20 so as to hold or aid in holding the packing assembly in its compressed condition.

The invention provides means for retracting the several latches 28 to disengage them from the collar 20 to allow the packing assembly 11 to be removed from the body 10. Radially projecting stems 33 are provided on the outer ends of the latches 28. The stems 33 slidably pass through openings 34 in the outer end walls of the slots 29 to project into recesses 35 in the periphery of the sleeve 12. The stems 33 extend through and guide the springs 30. In the preferred construction there are two diametrically opposite recesses 35, each recess receiving the outer ends of two stems 33. Stop shoulders 36 are provided on the stems 33 to limit the inward movement of the latches 28.

Lever means is provided in each recess 35 for simultaneously retracting two latches 28. Each of the lever means includes two levers 37 pivotally mounted in a recess 35. The levers 37 are pivotally mounted on two vertical pivot pins 39. Each lever 37 has two angularly related arms 40 and 41. The outer end of each lever arm 40 is pivotally connected with a stem 33. In the particular case illustrated, the outer ends of the arms 40 are yoked and pivot pins 42 pass through openings in the stems and in the yoked arms. Openings 43 may be provided in the sleeve 12 to facilitate the assembling or connection of the stems and levers.

The two arms 41 of each pair of levers 37 are adapted to be simultaneously engaged by a pinch bar or similar tool to operate or retract two latches 28. The outer end portions of each pair of arms 41 mesh or overlap. In the form of the invention illustrated in the drawings, one of the arms 41 has a tongue 50 freely passing between spaced yoke parts 51 on the other arm 41. Vertical openings 52 are provided in the upper wall of the main sleeve portion 23 directly above the adjoining or meshing portions of the lever arms 41. The openings 52 are provided to render the lever arms 41 accessible so that they may be engaged by a pinch bar or the like. Vertical webs 55 may extend through the recesses 35 immediately outward of the openings 52 to strengthen the sleeve structure. The openings 52 are shaped and proportioned to permit the levers 41 to be readily engaged and operated by a pinch bar or similar tool passed downwardly into the openings 52 and forced inwardly against the outer edges of the lever arms. It will be apparent how inward pressure applied to the outer edges of the lever arms 41 causes pivoting of the levers 37 and retraction or outward movement of the latches 28. As two of the lever arms 41 are simultaneously engaged and operated the latches operatively connected with the levers are operated outwardly in unison.

It is believed that the utility and practicability of the blowout preventer provided by this invention will be readily apparent from the foregoing detailed description.

The body 10 carrying the sleeve 12 may be mounted on the well casing C in the manner illustrated in the drawings. When high gas pressures develop in the well or are thought to be developing in the well, the packing assembly 11 may be arranged about the drill pipe P above the blowout preventer and then lowered into the body 10. Upon the lowering of the packing assembly into the body the tapered lower collar 21 engages the pivoted ends of the several latches to cause the retraction of the latches so that the packing assembly has free passage into the body opening 14. After the packing assembly has been seated in the body the latches 28 project into the sleeve opening to be in position to prevent upward movement or displacement of the packer 11. In the event that the latches 28 are normally spaced above the collar 20 of the seated packing assembly, the sleeve 12 may be threaded down to bring the latches into engagement with the collar. In this position the latches 28 positively prevent upward movement and displacement of the packing assembly 11. The packing assembly may then be actuated in any desired manner. If found necessary or desirable, the sleeve 12 may be threaded down to cause compression of the packing 19. The weight of the drill pipe P may be suspended on the packing assembly 11 to compress the packing 19 in which event the sleeve 12 may be brought to a position where the latches 28 are in engagement with the collar 20.

When it is desired to remove the packing assembly 11 from the body 10 pinch bars may be inserted in the two openings 52 and brought into engagement with the meshing ends of the lever arms 41 to pivot the levers.

Pivoting of the levers 37 in this manner causes the simultaneous retraction of the latches and allows the packing assembly 11 to be drawn upwardly out of the body.

Having described only a typical preferred form of my invention, I do not wish to limit myself to the specific details set forth, but wish to reserve to myself any changes or variations that may appear to those skilled in the art, or fall within the scope of the following claims.

Having described my invention, I claim:

1. A device of the character described including, a body adapted to be applied to a well casing and having an opening, packing means to be lowered into the opening, a plurality of movable latches on the body normally projecting into the opening to engage the packing means and automatically retractable upon lowering of the packing means into the opening, and manually operable lever means for retracting the latches from the opening including pivoted levers connected to the latches and having adjacent parts adapted to be engaged by an operating member.

2. A device of the chracter described including, a body adapted to be applied to a well casing and having an opening, packing means to be lowered into the opening, a plurality of retractable latches on the body normally projecting into the opening to engage the packing, and means for simultaneously retracting the latches to disengage them from the packing means including pivoted levers connected with the latches.

3. A device of the character described including, a body adapted to be applied to a well casing and having an opening to register with the casing, a recess in its exterior and slots connecting the recess and opening, packing means to be lowered into the opening, a plurality of retractable latches movable in the slots and normally projecting into the opening to engage the packing, and lever means for simultaneously retracting the latches to disengage them from the packing means including levers pivoted in the recess and connected with the latches.

4. A casing head including, a body to be mounted on the upper end of a well casing and having an opening to carry packing for sealing off the well casing, a member threaded on the body, a plurality of radially movable latches on said member, means yieldingly holding the latches in positions where they project into the opening to engage the packing, and means on said member for simultaneously retracting the latches from the opening, the said means including, pivoted levers connected with the latches.

5. A casing head including, a body to be mounted on the upper end of a well casing and having an opening to carry packing for sealing off the well casing, a member threaded on the body, a plurality of radially movable latches on said member, means yieldingly holding the latches in positions where they project into the openings to engage the packing, and means on said member for simultaneously retracting the latches from the opening, the said means including levers pivoted in a recess in said members, the levers having overlapping portions, and operative connections between the levers and the latches, there being an opening in said member through which the overlapping portions of the levers may be engaged by an operating tool.

6. A casing head including, a body to be mounted on the upper end of a well casing and having an opening to carry packing for sealing off the well casing, a sleeve threaded on the upper end of the body, the sleeve having slots in its inner wall and having a recess in its periphery, slidable spring pressed latches in the slots normally projecting from the inner wall of the sleeve to engage the packing, and levers pivoted in the recess and connected with the latches operable to retract the latches.

7. A casing head including, a body to be mounted on the upper end of a well casing and having an opening to carry packing for sealing off the well casing, a sleeve threaded on the upper end of the body, the sleeve having slots in its inner wall and having a recess in its periphery, slidable spring pressed latches in the slots normally projecting from the inner wall of the sleeve to engage the packing, levers pivoted in the recess and having overlapping portions, and operative connections between the levers and latches whereby the levers are operable to simultaneously move the latches outward, there being an opening in the sleeve through which the said overlapping portions are engageable by an operating tool.

8. An attachment for a casing head including, a sleeve adapted to be threaded on the body of a casing head, radially shiftable latches normally projecting from the interior of the sleeve, and means for retracting the latches including pivoted levers on the sleeve operatively connected with the latches.

9. An attachment for a casing head including, a sleeve adapted to be threaded on the body of a casing head, shiftable latches normally projecting into the interior of the sleeve, and means on the sleeve for simultaneously retracting the latches including pivoted levers on the sleeve connected to the latches, the levers having contiguous parts adapted to be engaged by an operating member.

10. A casing head including a body to be applied to a well casing, the body having an opening to register with the casing, a recess in its exterior and slots connecting the opening and recess, latches shiftable in the slots

and normally projecting into the opening, and means for simultaneously retracting the latches including levers pivoted in the recess and connected to the latches, the levers having overlapping portions, there being an opening in the body through which the said overlapping portions may be engaged by an operating tool.

11. A casing head including a body to be applied to a well casing, the body having an opening to register with the casing, a recess in its exterior and slots connecting the opening and recess, latches shiftable in the slots and normally projecting into the opening, and means for simultaneously retracting the latches including latch operating members pivoted in the recess and operatively connected with the latches.

In witness that I claim the foregoing I have hereunto subscribed my name this 9th day of December 1931.

HARRY P. WICKERSHAM.