Dec. 23, 1930. G. A. HUMASON 1,786,407

CASING HEAD

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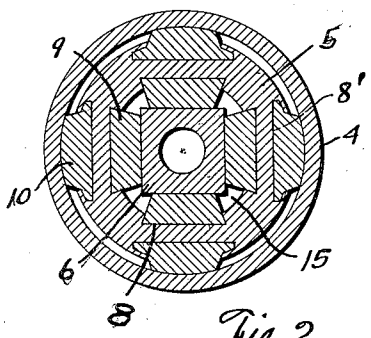


Fig. 2.

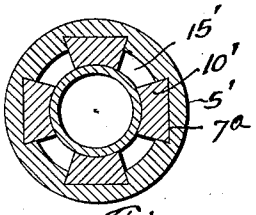


Fig. 4.

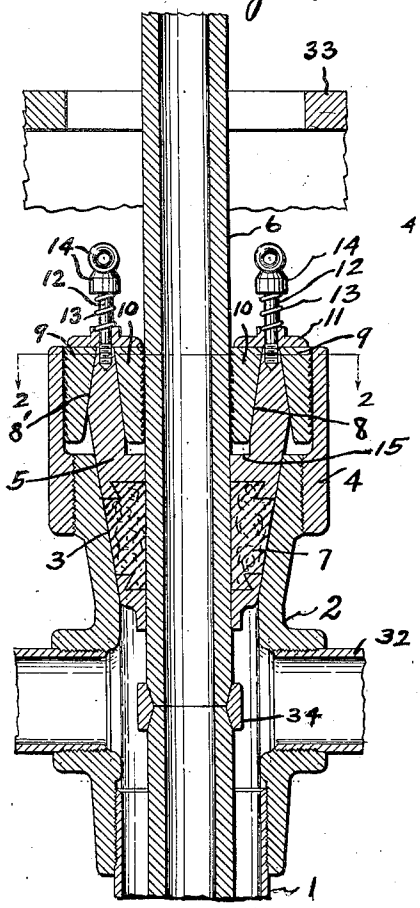


Fig. 1.

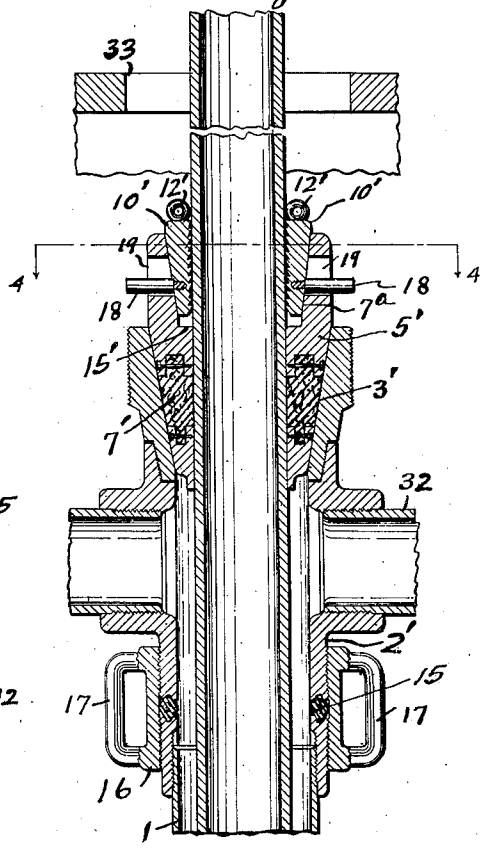


Fig. 3.

INVENTOR.

Granville A. Humason

BY

Hardway & Cathey

ATTORNEYS

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CASING HEAD

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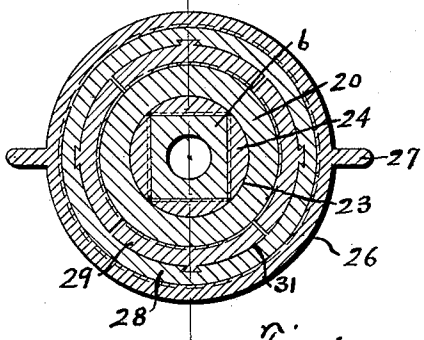


Fig. 6.

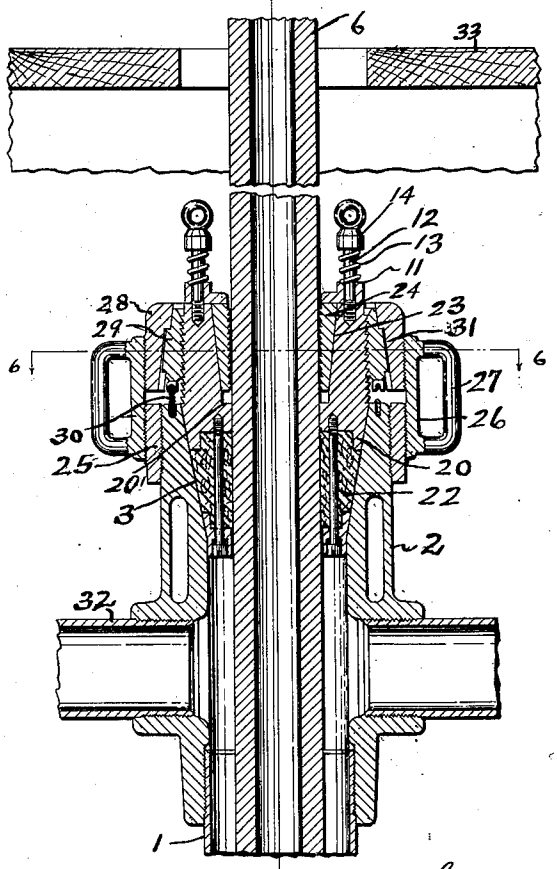


Fig. 5.

INVENTOR.
Granville A. Humason
BY
Hardway & Cathey
ATTORNEYS.

Dec. 23, 1930. G. A. HUMASON 1,786,407

CASING HEAD

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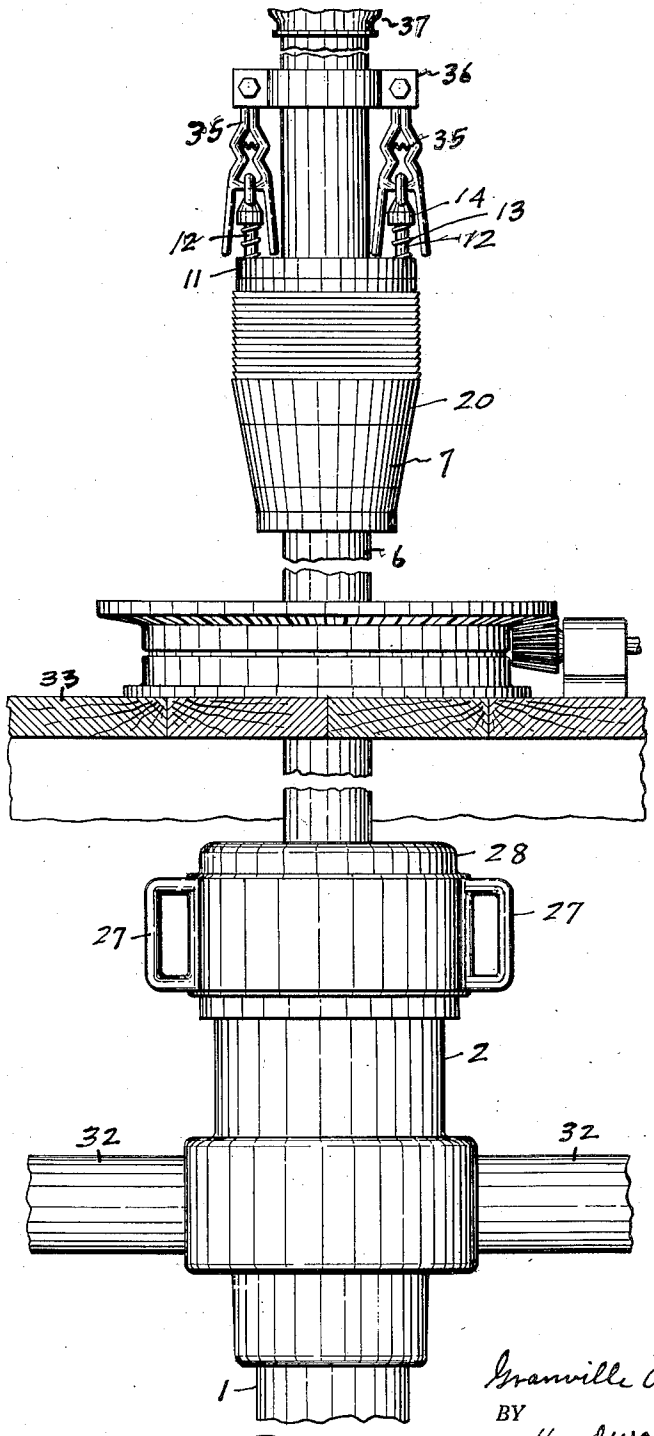


Fig. 7.

INVENTOR.
Granville A. Humason
BY
Hardway & Cathey
ATTORNEYS.

Patented Dec. 23, 1930

1,786,407

UNITED STATES PATENT OFFICE

GRANVILLE A. HUMASON, OF HOUSTON, TEXAS, ASSIGNOR OF ONE-HALF TO J. A. LOGAN, OF HARRIS COUNTY, TEXAS

CASING HEAD

Application filed February 16, 1929. Serial No. 340,492.

This invention relates to new and useful improvements in a casing head.

One object of the invention is to provide a casing head adapted to be connected to the upper end of a casing in a well bore and equipped with means for forming a tight seal between the casing and the drill stem, or other inner pipe, so that in case strong gas pressure be encountered the gas may be prevented from blowing out between the casing and the stem or inner pipe therein.

Another object of the invention is to provide, in a device of the character described, means for securely anchoring the stem, or inner pipe, to the casing so that said stem, or pipe, will not be blown out of the well by said gas pressure.

Another object of the invention is to provide a device of the character described embodying a bowl, or spider anchored to the upper end of a casing in a well bore, and sealing means which may be carried by the drill pipe, or stem, or the grief pipe thereof, in readiness to be lowered and seated in said spider, in case gas pressure is encountered, to form a seal between the casing and said inner pipe as well as to anchor said inner pipe to the casing.

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

Figure 1 shows a vertical sectional view of one form of the device.

Figure 2 shows a cross sectional view thereof, taken on the line 2—2 of Figure 1.

Figure 3 shows a vertical sectional view of another form thereof,

Figure 4 shows a cross sectional view taken on the line 4—4 of Figure 3.

Figure 5 shows a vertical sectional view of still another form of the device.

Figure 6 shows a cross sectional view taken on the line 6—6 of Figure 5, and

Figure 7 shows a side elevation of the device shown in position for carrying on drilling operations.

Referring now more particularly to the drawings, wherein like numerals of reference designates similar parts in each of the figures the numeral 1 designates a casing in a well bore and screwed onto the upper end thereof there is a bowl, or spider, as 2, whose upper end is flared, forming the seat 3, and outwardly threaded. There is a coupling 4 whose lower end is inwardly thickened and threaded onto the upper end of the spider 2. There is a tubular slip carrier 5, formed to fit snugly about the grief stem 6, or other inner pipe and this slip carrier has a section 7 thereof formed of suitable packing material which will form a tight joint with said pipe 6.

The upper end of the carrier 5 is spaced away from the inner pipe and has the downwardly and inwardly tapering inside seats 8, and the downwardly and outwardly tapering outside seats 8′. The inner and outer wedge shaped slips 9 and 10 are dovetailed into said carrier and have vertical movement on said respective inside and outside seats 8 and 8′. An annular plate 11 is secured onto the upper end of the carrier 5 by means of the eye bolts 12 which are fitted therethrough and are screwed into the upper end of the carrier and coil springs 13 surround said bolts and are interposed between the plate 11 and the external shoulders 14 on said bolts. The slips 10 are limited in their downward movement by the internal shoulder 15 of said carrier and the dovetailed mortises in which the slips 9 move have sufficient downward taper to prevent said slips 9 from dropping entirely out when the carrier is suspended from the drill stem, or inner pipe, as hereinafter explained.

In the form shown in Figures 3 and 4 the bowl or spider 2′ has a packing ring 15 interposed between sections thereof said sections being connected by right and left hand threads to the coupling 16 which is turnable through the hand grips 17. The upper of the spider 2′ is detachable and is formed with a downwardly and inwardly tapering seat 3′ to receive the slip carrier 5′. This carrier is formed to fit closely around the inner pipe and has incorporated therein the section 7′ of packing material. The outer side of the carrier 5′ is downwardly tapered to fit snugly into the seat 3′. The upper end of the carrier 5′ is spaced from the inner pipe, forming

the inside annular shoulder 15′ and has the downwardly and inwardly converging mortises 7a into which the wedge shaped slips 10′ are dovetailed. These slips have the eyebolts 12′ attached to the upper end thereof and also have the lateral retaining pins 18 which work in vertical slots 19 in the upper end of the carrier 5′.

In the form shown in Figures 5 and 6 the spider 4 with its upwardly flared internal seat 3 is substantially the same as that shown in Figure 1. In this form the slip carrier 20 is externally tapered to fit the seat 3 and has the packing section 21 therein which is held in assembled relation with the carrier by means of the bolts 22 which are fitted upwardly through the lower end of said carrier and through the packing section 21 and whose upper ends are screwed into the metal of said carrier. The upper end of the carrier is spaced out from the inner pipe 6, forming the inside annular shoulder 20′, and has the downwardly and inwardly converging seat 23 in which the wedge shaped slips 24 are mounted. Beneath the shoulder 20′ the carrier 20 closely surrounds the inner pipe. The slips 24 are limited in their downward movement by the shoulder 20′ and in their upward movement by the annular plate 11′ which is secured on the upper end of the carrier 20 by the eyebolts 12. Around these eyebolts are the coil springs 13 which are interposed between the plate 11′ and the external abutments 14 at the upper ends of said bolts. In this form there is a bushing 25 screwed onto the upper end of the spider and screwed onto this bushing there is a coupling 26 equipped with the hand grips 27. This coupling 26 serves to connect the slip ring 28 to the spider, said connection being effected through the right and left hand threads. The outer side of the upper end of the slip carrier 20 is formed with teeth and mounted in the slip ring 28 are the slip wedges 29, arcuate in horizontal cross sectional contour and mounted on the yieldable seats, as 30, which are interposed between said wedges 29 and the upper end of the carrier 20. These slip wedges 29 are mounted in the downwardly diverging seat 31 in the slip ring 28.

In each form of the apparatus the spider 2 and 2′ has the flow lines 32 leading out therefrom beneath the seal between the casing and inner pipe.

While drilling the slip carrier 5, 5′, or 20, as the case may be, and the parts appended thereto will be attached, in some suitable manner, as illustrated in Figure 7, to the drill stem, or drill pipe, above the derrick floor, through the eye bolts 12, or 12′, and will rotate with said stem in readiness for use in case strong gas pressure is encountered. In case a blowout becomes imminent the driving bushing of the rotary table of the rotary drilling machine is removed and the slip carrier and its appendants, are lowered down through said table and through the derrick floor 33, on which the drilling machine is mounted, until the slip carrier is seated firmly in the spider seat 3, or 3′ and the gas or oil, under pressure, will be prevented from escaping up through the casing around the inner pipe. The rotary drilling machine, above referred to, is in common use and is well known to those familiar with the art of well drilling and its construction, for that reason, has been shown generally, and its specific structure and mode of operation has not been shown or described. The outlet lines 32 are normally equipped with control valves and one or both of said lines may be opened, if desired, to permit the escape of the gas or oil to relieve the pressure in the well.

If the pressure in the well is very strong the drill stem may be elevated thereby and in such case the drill stem coupling 34 beneath the slip carrier, will engage against the lower end of said carrier and tend to force the same upwardly thus causing the slips 9, 10 to engage the coupling 4 and inner pipe 6, respectively, if the form shown in Figure 1 is used, or causing the slips 29, 24 to engage the slip ring 28 and the pipe 6 respectively, if the form shown in Figures 5 and 7 is used, as shown, and the pipe 6 will thus be securely anchored to the casing and will not be forced out of the well by the pressure. The interengaging teeth of the carrier 20 and slips 29 are so pitched as to readily permit said carrier to pass downwardly through said slip when the carrier is lowered, but to interengage to prevent the upward movement of the carrier when the collar 34 engages the lower end thereof and the slips 9, 10 and 10′ are suitably toothed to readily engage the parts intended to be engaged by them.

Referring more specifically to Figure 7, suitable releasable hangers 35, 35 are suspended from a clamp collar 36 which is clamped around the drill stem 6 immediately beneath the conventional swivel 37. These hangers may be engaged through the eyes of the bolts to suspend the slip carrier but may be readily released in an obvious manner when it is desired to permit said carrier to descend as hereinabove stated.

What I claim is:—

1. In well drilling apparatus having a casing set in a well bore, and a drill stem within said casing; a spider carried by the casing having a seat, sealing means carried by said stem adapted to seat against said seat, upon the lowering of said means relative to the casing, to form a seal between said stem and casing, said sealing means including spider engaging slips and stem engaging slips.

2. In well drilling apparatus having a casing set in a well bore, and a drill stem within said casing; a spider carried by the casing having a seat, sealing means carried by said

stem adapted to seat against said seat, upon the lowering of said means relative to the casing, to form a seal between said stem and casing, said sealing means including engaging slips engageable with the spider for preventing the upward movement of the sealing means when seated, and stem engaging slips for preventing the downward movement of the stem through said sealing means.

3. In apparatus of the character described having an outer pipe and an inner pipe within and spaced from the outer pipe, a spider attached to the outer pipe and having a seat, a sealing means about the inner pipe arranged, upon lowering thereof relative to the outer pipe, to seat against said seat and close the space between said pipes and wedge shaped slips effective to secure said sealing means against upward movement, relative to the spider, when said sealing means is seated on said spider seat.

4. In apparatus of the character described having an outer pipe and an inner pipe within and spaced from the outer pipe, a spider attached to the outer pipe and having a seat, a sealing means about the inner pipe arranged, upon lowering thereof relative to the outer pipe, to seat against said seat and close the space between said pipes, engaging slips effective to secure said sealing means against upward movement relative to the spider seat when seated thereon, and other engaging slips effective to hold the inner pipe against downward movement through said sealing means.

5. A casing head including a bowl, or spider, adapted to be attached to a casing in a well bore, and having a seat, a slip carrier formed to surround an inner pipe and seat against said seat to close the space between the outer and inner pipes, outer means around the carrier engageable with the slip carrier and spider and effective to prevent the upward movement of the carrier relative to the spider, and inner means within the carrier engageable with the inner pipe and carrier and effective to prevent the downward movement of the inner pipe through the casing head, said carrier being effective to force said outer means outwardly into engagement with the spider and to force said inner means inwardly into engagement with the inner pipe upon upward movement of said carrier relative to said means.

6. A casing head including a spider adapted to be attached to a casing in a well bore and having a seat, a sealing means formed to surround an inner pipe and rest against said seat and close the space between the casing and pipe, engaging slips associated with the sealing means, some of said slips being engageable with the inner pipe to prevent the downward movement thereof, and other of said slips preventing the upward movement of said sealing means.

7. A casing head including a spider adapted to be attached to a casing in a well bore and having a seat, a sealing means formed to surround an inner pipe and to rest against said seat to close the space between the casing and pipe, engaging slips connected to said sealing means and engageable with said pipe to prevent the downward movement of the pipe through said sealing means and other engaging slips engageable with the casing head and effective to prevent the upward movement of said sealing means.

In testimony whereof I have signed my name to this specification.

GRANVILLE A. HUMASON.