Nov. 8, 1927. 1,648,039

M. T. ARCHER

CONTROL CASING HEAD

Filed Feb. 1, 1927 2 Sheets-Sheet 1

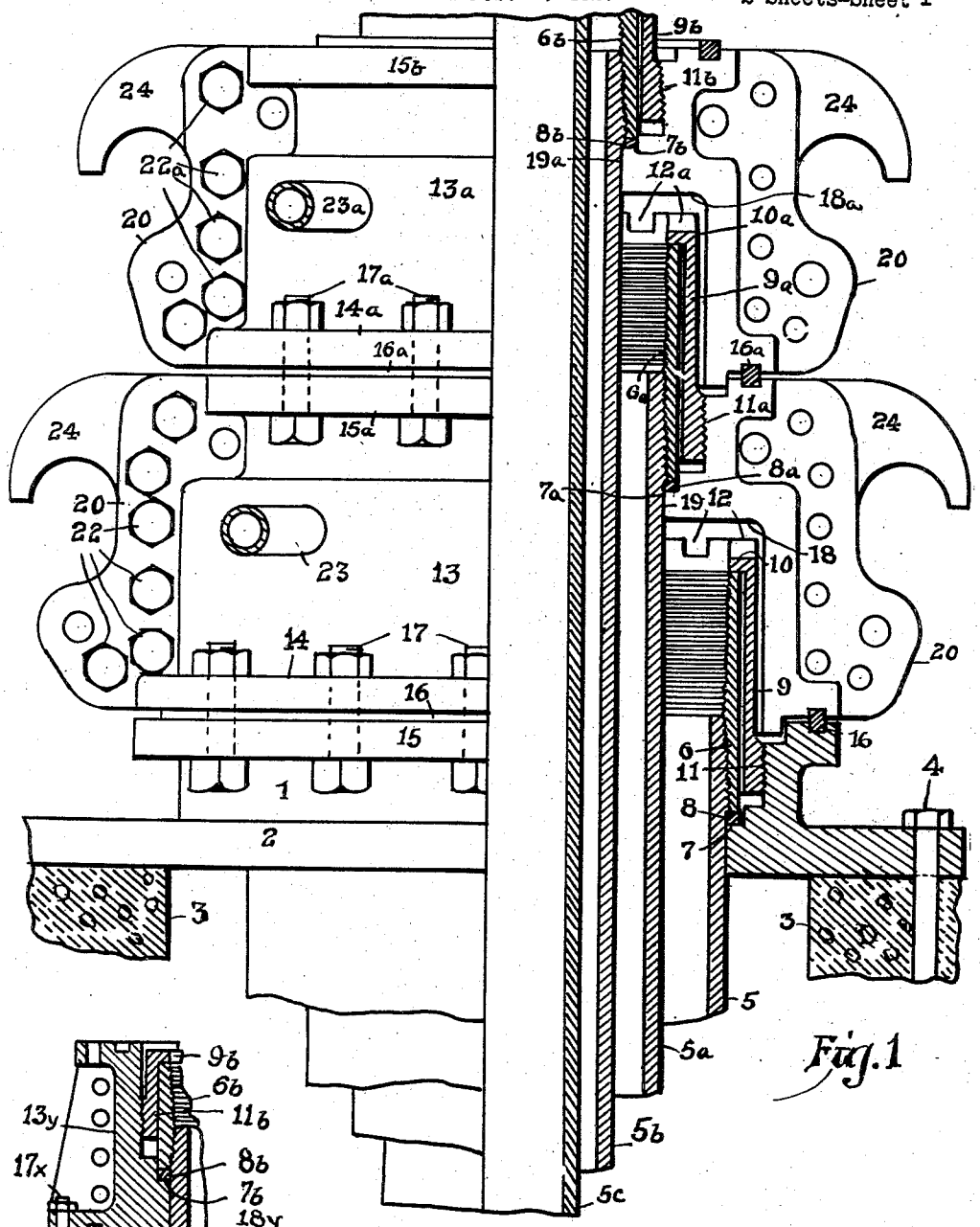


Fig. 1

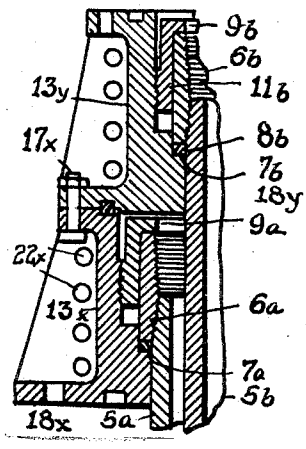


Fig. 4

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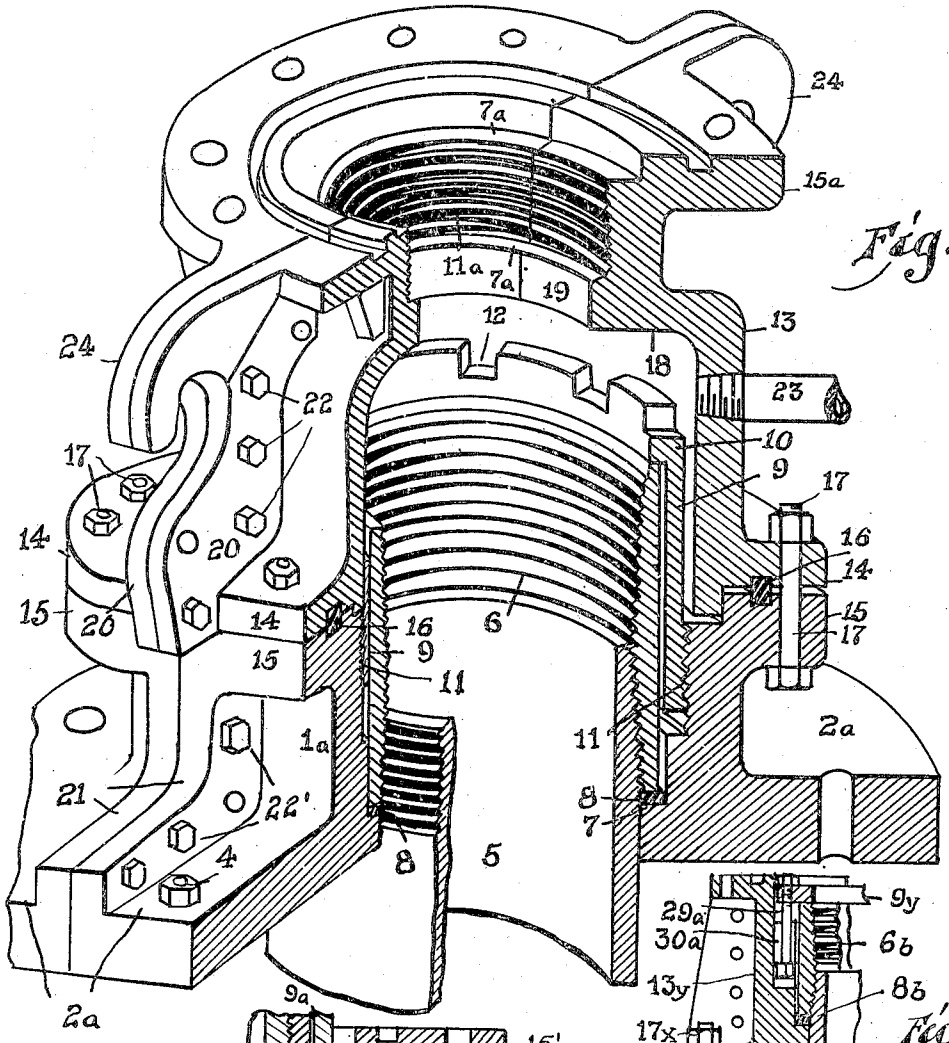


Fig. 2

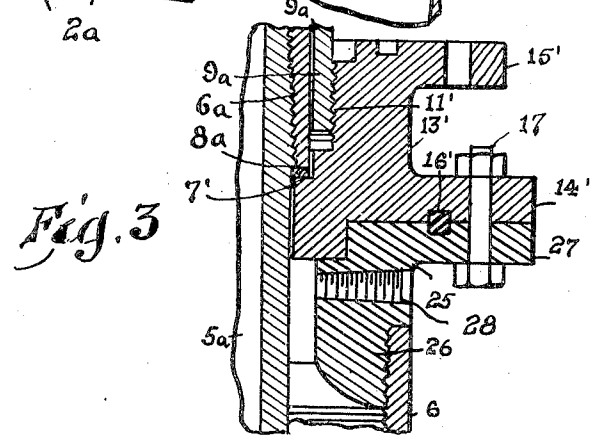


Fig. 3

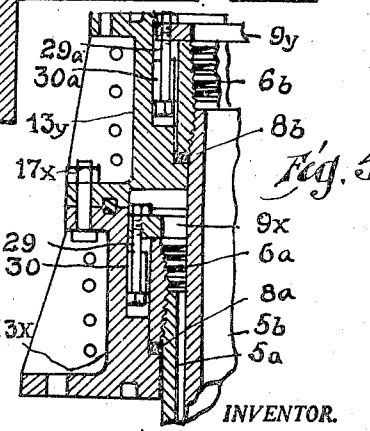


Fig. 5

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Patented Nov. 8, 1927. 1,648,039

UNITED STATES PATENT OFFICE.

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CONTROL CASING HEAD.

Application filed February 1, 1927. Serial No. 165,102.

My invention relates to control casing heads for oil wells. In drilling oil wells the hole is in many cases lined with several concentric strings of pipe or casing, the largest pipe being at the top and the smaller sizes within the larger sizes and extending to greater depths, each size being cemented off at its lower end. As each string of casing reaches the top of the well, means must be provided for suspending the several strings so that, in case gas under high pressure is encountered, it will not damage the well. The object of this invention is to provide a novel means for suspending the several strings of casing, and for uniting the several strings into a unit which can not be accidently displaced or separated. My invention comprises also the novel idea of making the base and the string suspending members in lateral sections which may be readily connected into rigid annular members and as readily separated into their constituent sections. Other objects appear hereinafter.

Referring to the accompanying drawings, Fig. 1 is a fragmentary view of a control casing head showing my invention, the left side being a side elevation and the right side a vertical section. Fig. 2 is a perspective view of a portion of the apparatus shown in Fig. 1 with portions of the casing 5 and the coupling 6 broken away to show the internal structure, the base ring 1^a being shown in lateral sections. Fig. 3 is a fragment showing in vertical section a modification wherein the largest string of casing is supported differently from the manner shown in the other views. Figs. 4 and 5 are fragmentary vertical sectional views of two other modifications of the invention.

On Figs. 1 and 2, 1 designates an annular base or ring having the horizontal flange 2 resting on a suitable support, as cement 3, to which it is connected, as by bolts 4. The internal diameter of the base 1 is such that it will receive the largest casing 5 to be used in a well. This casing 5 is screwed into a standard coupling 6 which rests on the internal seat, shoulder, or ledge 7 in the base 1, a packing ring 8 being interposed between the shoulder and the lower end of the coupling. A locking collar 9 surrounds the coupling 6 and has an inturned flange 10 resting on the top of the coupling. It is threaded externally at its lower end and screws into the internal threads 11 in the base 1 somewhat above the shoulder 7. The upper end of the collar 9 is provided with the notches 12, in some of which a bar may be placed to serve as a wrench for turning the collar. By turning the collar down tightly the joint at the packing 8 is made fluid-tight, and the casing 5 and the coupling 6 are prevented from rising in the base 1 in case of excessive gas pressure, that is, a blow-out is prevented so far as the casing 5 and its coupling 6 are concerned.

The base 1 serves as a support or seat for the next head or ring 13, the outwardly extending flange 14 at the lower end of the ring 13 resting on the corresponding flange 15 at the upper end of the base. The packing ring 16 between the flanges makes the joint between the base and the ring fluid-tight after the flanges are drawn tightly toward each other by the bolts 17. The ring 13 surrounds the collar 9 above the threads 11 and above the said collar turns inwardly to form the annular roof 18 whose central opening 19 is made of a diameter to receive the casing 5^a which has a smaller diameter than the casing 5.

The upper end of the casing 5^a is screwed into the coupling 6^a which rests on the ring packing 8^a on the seat or shoulder 7^a on the interior face of the ring 13. The ring 13 surrounds the locking collar 9^a having the inturned flange 10^a resting on the top of the coupling 6^a and provided with external threads screwed in the internal threads 11^a in the ring 13 somewhat above the packing ring 8^a, so that the casing 5^a and the coupling 6^a are rigidly attached to the ring or head 13 and the joint at the packing ring 8^a is made fluid-tight. The top of the collar 6^a is provided with the notches 12^a for the application of a bar or lever.

The top of the head or ring 13 serves as a base or support for the head or ring 13^a, the heads or rings being provided with the registering external flanges 14^a and 15^a, which are secured together by the bolts 17^a, the packing ring 16^a being seated between the flanges. The ring 13^a has the annular roof 18^a which overhangs the collar 9^a and has

the opening 19^a to receive the casing 5^b which has a smaller diameter than the casing 5^a.

The upper end of the casing 5^b is screwed into the coupling 6^b which rests on the packing ring 8^b on the internal shoulder 7^b in the ring 13^a. The collar 9^b (only the lower portion shown) for clamping the coupling 6^b to the ring 13^a is screwed into the internal threads 11^b in the ring 13^a.

The top of the ring or head 13^a may serve as a base or support for another ring for suspending a still smaller pipe 5^c, or for supporting the usual casing head cap. Any desired number of heads or rings may be superposed in the manner described, for suspending concentric strings of casing.

I prefer to divide the heads or rings into lateral halves provided with registering vertical flanges 20, to which bolts 22 are applied for drawing the halves tightly together.

The ring or head 13 is provided with a suitable number of later pipes 23 which communicate with the space beneath the roof 18, and the ring 13^a has a suitable number of similar pipes 23^a (only one shown) communicating with the space beneath the roofs 18 and 18^a. These pipes and their function are old and need not be further described.

The base 1 or 1^a being in place, the ring of packing 8 being on the shoulder 7, the assembled casing 5 and coupling 6 being suspended by a derrick hoist attached in the usual manner to a pipe or nipple (not shown) screwed into the upper end of the coupling 6, the assembled casing and coupling are lowered with the casing 5 in the base until the lower end of the coupling rests on the packing ring 8. A pipe wrench is connected to the coupling to hold it from turning while the said nipple is screwed out of the coupling. The locking ring 9 is then slid down on the coupling 6 and screwed in the threads 11 until the flange 10 has engaged the top of the coupling and caused the coupling to make a gas-tight joint at the packing ring 8.

The casing 5^a having the coupling 6^a screwed on its upper end is then suspended from a hoist by a nipple screwed into the coupling 6^a. The assembled pipe and coupling are lowered with the casing 5^a in the casing 5 until the lower end of the coupling 6^a is somewhat above the level at which the shoulder 7^a will be when the ring 13 is placed on the ring 1 or 1^a. The casing 5^a and the coupling 6^a being suspended with a the shoulder 7^a at the said level, the sections of the ring 13 are moved in laterally so as to surround the locking ring 9, the casing 5^a, and the lower end of the coupling 6^a, and to be seated on the ring 1 or 1^a. The flanges 14 and 15 are fastened together by the bolts 17, and the flanges 20 are secured together by the bolts 22. The casing 5^a is then lowered so that the coupling 6^a rests on the packing 8^a on the seat 7^a. A pipe wrench holds the coupling 6^a while the nipple is being screwed out of the coupling; the locking ring 9^a is applied to the threads 11^a to lock the coupling 6^a to the ring 13. The pipe 5^b with its coupling 6^b is applied to its seat on the packing ring 8^b in the manner already described with respect to the casings 5 and 5^a and their couplings, the sections of ring 13^a having been assembled in an obvious manner around the casing 5^a and the locking ring 9^a and secured together by the bolts 22^a and to the ring 13 by the bolts 17^a extending through the flanges 14^a and 15^a.

As shown in the lower end of Fig. 2, the base 1^a may be divided into lateral sections secured together by the bolts 22′ passed through the vertical flanges 21 thereon, the base 1^a having the divided horizontal flanges 2^a. The split base provides means whereby the sections may be moved laterally beneath the coupling 6 while it and the casing 5 are suspended by the usual nipple, not shown.

In the manner above described other strings of casing may be seated on still smaller rings superposed on the ring 13^a.

If preferred, each casing and its coupling may be assembled in its assembled ring or head and then all three lowered to their places by means of a hoisting device connected to the hooks 24. By this method the described nipples are not screwed into the upper ends of the couplings.

In Fig. 3, a ring 25 has a bottom flange 26 threaded externally and screwed into the top of the coupling 6, the inner face of the ring being spaced from the casing 5^a. The ring 25 has the outwardly extending flange 27, bolted to the flange 14′ on the ring or head 13′, there being a packing ring 16′ between the flanges. The collar 9^a is screwed on the threads 11′ on the inner face of the ring 13′. The top of the ring 13′ forms a seat for the next ring or head like 13^a, 15′ being a flange on the ring 13′ for coupling the ring 13′ to the flange 14^a on the ring 13^a. The ring 25 has openings, only one, marked 28, being shown, which communicates with the space between the casing 5^a and the coupling 6, to which opening an off-take tube like 23 may be attached.

In Figs. 4 and 5 the same reference characters are used as in Fig. 1 where the parts are identical. When the same numerals are used as in Fig. 1 but with different letters, the parts are similar in structure but those of Figs. 4 and 5 are somewhat modified.

In Fig. 4, the rings 13^x and 13^y have plane horizontal bases or roofs 18^x and 18^y which lie directly on the tops of the next lower rings, the tops of the rings being extended up above the tops of the adjacent locking collars. This form of the invention is somewhat more easily manufactured, but does not

allow tongs to be used as in the form of invention shown in Fig. 1.

In Fig. 5, the parts are substantially as in Fig. 4, except that the locking rings 9^x and 9^y are merely plain rings seated on the tops of the couplings 6^a and 6^b and drawn down on the tops thereof by the bolts 29 and 29^a carried by the lugs 30 and 30^a on the interior surfaces of the rings 13^x and 13^y.

I claim—

1. In a device of the class described, a ring having an opening to receive a well casing and provided with an internal shoulder to support a coupling screwed on the upper end of the casing, a collar surrounding the coupling and adapted to engage the top of the coupling and having rigid connection with the ring, and a second ring surrounding the collar and attached to the first ring, the second ring having an internal shoulder to support a coupling screwed on the upper end of a second well casing concentric with the first casing.

2. In a device of the class described, a ring having an opening to receive a well casing and provided with an internal shoulder to support a coupling screwed on the upper end of the casing, a collar surrounding the coupling and adapted to engage the top of the coupling and having rigid connection with the ring, and a second ring surrounding the collar attached to the first ring, the second ring having an internal shoulder to support a coupling screwed on the upper end of a second well casing concentric with the first casing, the said rings being made in lateral sections, whereby the sections may be assembled into complete rings around the casings while the casings are suspended and the bottoms of the collars are held above the said shoulders.

3. In a device of the class described, a ring having an opening to receive a well casing and provided with an internal shoulder to support a coupling screwed on the upper end of the casing, a collar engaging the top of the coupling and having rigid connection with the ring, and a second ring surrounding the collar and attached to the first ring, the second ring having an internal shoulder to support a coupling screwed on the upper end of a second well casing concentric with the first casing.

4. In a device of the class described, a ring having an opening to receive a well casing and provided with an internal shoulder to support a coupling screwed on the upper end of the casing, a collar engaging the top of the coupling and having rigid connection with the ring, and a second ring surrounding the collar and attached to the first ring, the second ring having an internal shoulder to support a coupling screwed on the upper end of a second well casing concentric with the first casing, the said rings being made in lateral sections, whereby the sections may be assembled into complete rings around the casings while the casings are suspended and the bottoms of the collars are held above the said shoulders.

5. In a device of the class described, a ring having an opening to receive a well casing and provided with an internal shoulder to support a coupling screwed on the upper end of the casing, a collar to hold the coupling on the shoulder, a second ring having an internal shoulder to support a coupling screwed on the upper end of a second well casing concentric with the first casing, and a collar to hold the second coupling on the second shoulder, the said rings being made in lateral sections, whereby the sections may be assembled into complete rings around the casings while the casings are suspended and the bottoms of the collars are held above the said shoulders.

6. In a device of the class described, a ring having a central opening to receive a well casing and an internal shoulder to support a coupling on the casing in said opening, a collar connected to the ring and clamping the coupling to the shoulder, a second ring supported on the first ring and having a top wall over the said casing and coupling and having a central opening for a second well casing within and concentric with the first casing and an internal shoulder around the opening, a coupling connected to the top of the second casing and resting on the second shoulder, and means attached to the second ring for locking the second coupling in fixed relation with the second internal shoulder.

7. In a device of the class described, a ring having a central opening to receive a well casing and an internal shoulder to support a coupling on the casing in said opening, a collar connected to the ring and clamping the coupling to the shoulder, a second ring supported on the first ring and having a top wall over the said casing and coupling and having a central opening for a second well casing within and concentric with the first casing and an internal shoulder around the opening, a coupling connected to the top of the second casing and resting on the second shoulder, and means attached to the second ring for locking the second coupling in fixed relation with the second internal shoulder, the rings being made in lateral sections for assembly around the casings with their internal shoulders beneath couplings on the casings while the casings are suspended.

8. In a device of the class described, a ring having an opening to receive a well casing and provided with an internal shoulder around the opening, to support a coupling screwed on the upper end of the casing, a packing ring between the shoulder and the lower end of the coupling, a collar surrounding the coupling, engaging the top of

the coupling, and having adjustable connection with the ring, and a second ring surrounding the collar and seated on the first ring, the second ring having an internal shoulder to support a coupling screwed on the upper end of a second well casing concentric with the first casing.

9. In a device of the class described, a ring having an opening to receive a well casing and provided with an internal shoulder to support a coupling screwed on the upper end of the casing, a collar surrounding the coupling and adapted to engage the top of the coupling and have rigid connection with the ring, and a second ring supported by the first ring, the second ring adapted to support a second well casing within and concentric to the first casing.

10. In a device of the class described, a ring having an opening to receive a well casing and provided with an internal shoulder to support a coupling screwed on the upper end of the casing, a locking collar adapted to engage the top of coupling, means for substantially connecting said locking collar to the ring, and a second ring supported by the first ring, the second ring adapted to support a second well casing within and concentric to the first casing.

11. In a device of the class described, a ring having a central opening to receive a casing and an internal shoulder around the opening to support the casing, a collar around the casing and adapted to engage the top of casing and having rigid connection with the ring, a second ring, a seat on the top of the first ring for receiving the second ring, and top and bottom external flanges for attaching the first ring to its support and to the second ring.

12. In a device of the class described, a ring having a central opening to receive a casing and an internal shoulder around the opening to support the casing, a collar around the casing and adapted to engage the top of casing and having rigid connection with the ring, a second ring, a seat on the top of the first ring for receiving the second ring, and top and bottom external flanges for attaching the first ring to its support and to the second ring, the rings being made in lateral sections for assembly around the casings with their internal shoulders beneath couplings on the casings while the casings are suspended.

13. In a device of the class described, a series of superimposed concentric rings of progressively smaller diameters from below upwardly, each ring having an internal annular shoulder for supporting a string of casing, the diameter of the shoulders being such as to pass the casing but not a coupling thereon, and a collar having rigid connection with each ring and positioned around the coupling supported by the ring and adapted to engage the top of the coupling.

14. In a device of the class described, a series of superimposed concentric rings of progressively smaller diameters from below upwardly, each ring having an internal annular shoulder for supporting a string of casing, the diameter of the shoulder being such as to pass the casing but not a coupling thereon, a collar having rigid connection with each ring and positioned around the coupling supported by the ring and adapted to engage the top of the coupling, the rings and collars being made in lateral sections so that they may be assembled around the the casings with the shoulders beneath the coupling while the casings are suspended.

In testimony whereof, I hereunto affix my signature.

MERTON T. ARCHER.