

Sept. 10, 1929.

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1,727,583

CASING HEAD FOR OIL WELLS

Filed Feb. 16, 1925

2 Sheets-Sheet 1

Fig. 1

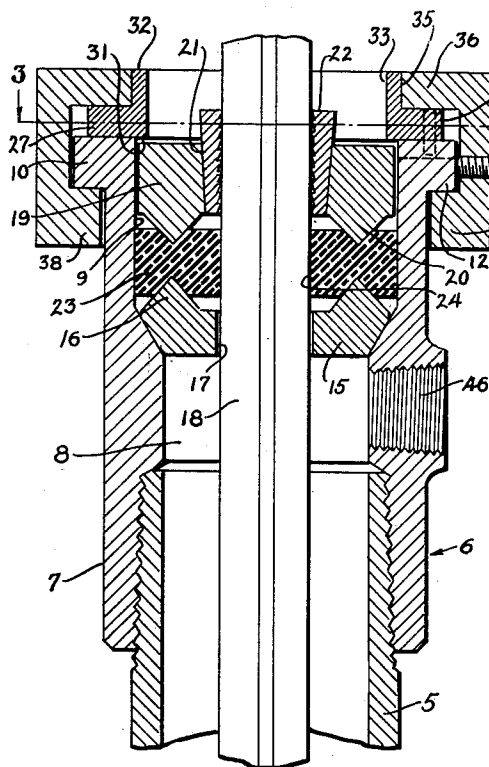


Fig. 2

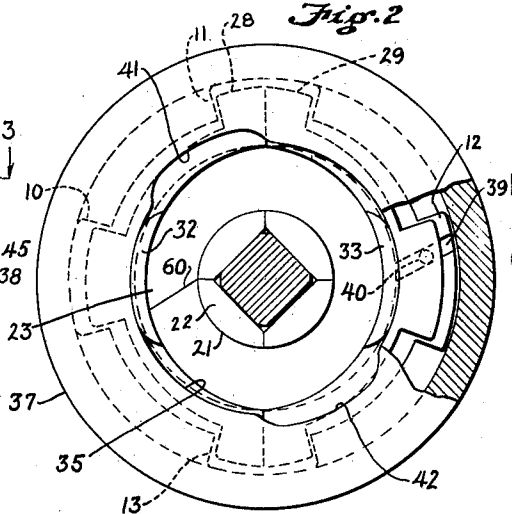


Fig. 3

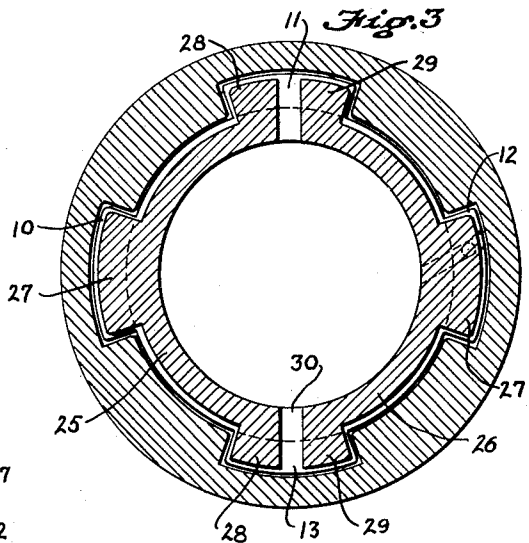
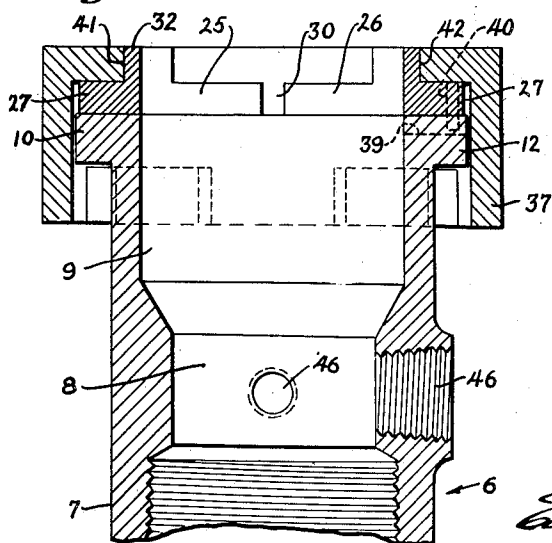


Fig. 4



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Fig. 5

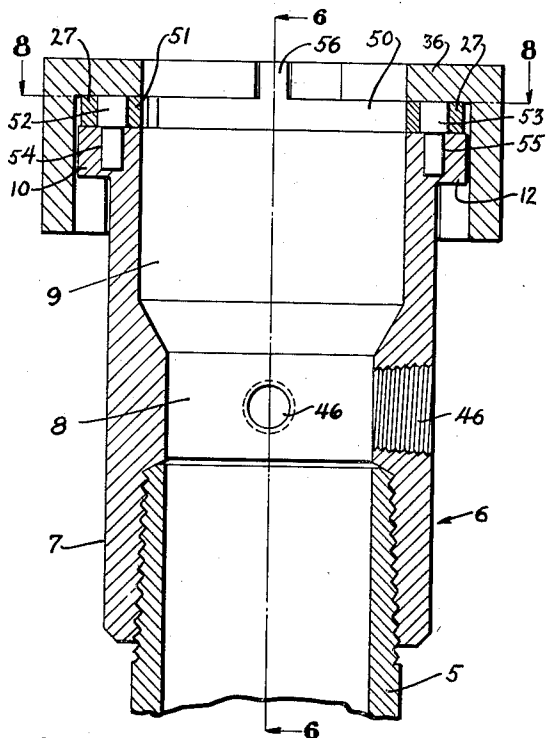


Fig. 7

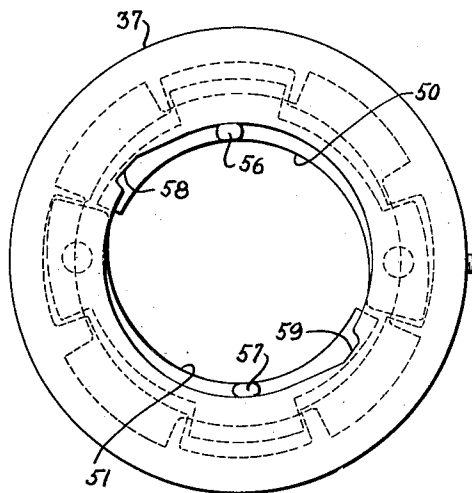
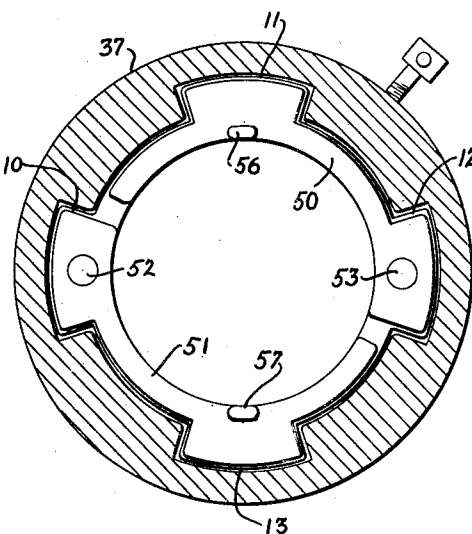
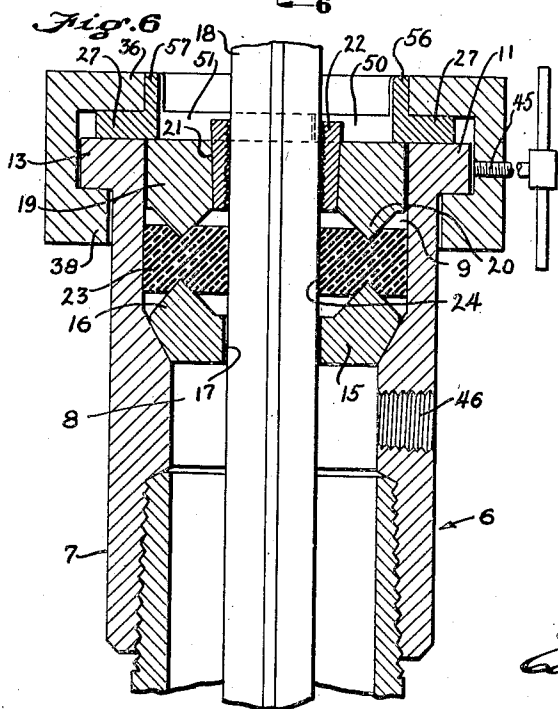


Fig. 8



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CASING HEAD FOR OIL WELLS.

Application filed February 16, 1925. Serial No. 9,819.

This invention relates more specifically to a casing head construction provided with means to prevent accidental "blow outs" during a well drilling operation.

5 It is of the objects of this invention to provide a casing head construction having means to effectually control an unexpected flow of oil or gas from a well during a drilling operation.

10 A further object is to provide a well packer that is of simple construction, that may be quickly disassembled when it is desired to withdraw the drill pipe from the casing to add additional stands thereto.

15 In the drilling of oil wells by the rotary method, large quantities of semi-fluid mud are pumped into the well through the rotary "kelly" and drill pipe attached thereto in order to control and prevent a premature
20 flow of oil or gas from the well during the drilling operation. Oftentimes large "gas pockets" are encountered as the drilling progresses, frequently resulting in what is commonly known as "blow outs". These "blow
25 outs" are oftentimes of an exceedingly dangerous character, frequently destroying or wrecking the drilling rig, and at the same time wasting enormous quantities of valuable oil, unless the operators can "shut off", or
30 control the excessive flow of oil and gas from the well.

By employing my improved packing device in connection with the drilling mechanism, all danger of unexpected "blow outs" can be
35 readily and easily avoided, the device absolutely controlling the flow of mud, gas, and oil from the well until the gas pressure has been sufficiently reduced to again enable the operators to resume drilling operations.

40 Broadly the invention preferably consists of a counter bored sleeve that is secured to the upper end of a well casing, the string of well boring tools passing therethrough. Mounted in the upper end of the sleeve and detachably secured thereto is a packing mechanism consisting of a deformable packing
45 disk interposed between a pair of metallic disks, each of the disks including the deformable being provided with a centrally disposed opening for the passage therethrough
50

of the drilling pipe and "kelly". The packing mechanism is maintained in locked and operative engagement with the packer sleeve by means of a pair of abutment collars. When an excess pressure develops in the well, a plurality of "slips" are inserted in the opening of the upper metal disk, their serrated faces engaging the "kelly", at the same time the drilling supporting means is released, thus resting the weight of the "drill pipe" upon the packing mechanisms. As the weight of the "drill pipe" is carried by the upper metal disk, the deformable disk therebelow will be expanded to completely seal the upper end of the casing against the flow
60 of oil or gas therethrough, valve controlled pipe lines secured to the wall of the packer sleeve permitting the excess fluid pressure from the well to flow therefrom until the well regains its normal condition.

Should the upper pressure occasioned by a "blow out" exceed the downward pressure exerted by the weight of the string of drilling tools, which is usually the case, the adjustable segmental abutment rings at the upper end of the sleeve will prevent a displacement of the packing disks, the pressure thereagainst expanding the deformable disk to pack the casing as heretofore explained.

Other objects and advantages, not at this time particularly enumerated, will be clearly understood from the following detailed description of the present invention, and the drawings attached hereto, in which:

Fig. 1 is a central vertical section through the well packing mechanism secured to the upper end of a well casing showing the packer in operation.

Fig. 2 is a top plan view of the packer, parts being broken away and in dotted lines to more clearly illustrate the mechanism.

Fig. 3 is a transverse section taken on line 3-3 of Fig. 1.

Fig. 4 is a central vertical section through the packer sleeve or casing with the packing means removed therefrom.

Fig. 5 is a central vertical section of a modified form of adjustable abutment collars in an inoperative position and the packing mechanism removed.

Fig. 6 is a similar view taken on line 6—6 of Fig. 5, with the packing mechanism in position and the abutment collars in an operative position.

Fig. 7 is a top plan view of the modified form of packer.

Fig. 8 is a transverse section of the modified form taken on line 8—8 of Fig. 5, the abutment collars in an inoperative position.

Referring more particularly to the accompanying drawings, and especially to Fig. 1, the reference character 5 designates the exteriorly threaded upper end of a well casing of usual form, to which the well packer mechanism 6, is secured. This mechanism preferably consists of a cylindrical sleeve 7, having a cylindrical bore 8 interiorly threaded at its lower end, and an enlarged counter bore 9 at its upper end, the bottom portion of its circular wall being bevelled to form a seat for one of the metal disks of the packer mechanism. Formed integrally with the upper end of the packer sleeve, and projecting transversely from its peripheral wall are a plurality of locking lugs 10, 11, 12, 13, equally spaced apart.

Bore 9 carries the packing mechanism which is substantially of the same general form now employed, and consists of a metal disk 15 having a bevelled edge similar to the bevelled seat of the bore 9 on which it rests. The upper face of disk 15 is provided with an annular ridge 16 conical in cross section, and a centrally disposed aperture 17 provides means for the passage therethrough of the drilling pipe and "kelly" 18 attached thereto. Another metal disk 19 having an annular ridge 20 on its under face similar in form to the ridge formed on disk 15, is disposed in the upper end of bore 9. This disk has a vertical side wall, and its diameter is such that it will freely move within the bore 9 when actuated by pressure to pack the well. Disk 19 has a central downwardly tapered opening 21 for the reception of a plurality of tapered slips 22 of usual form, designed to support the drill pipe when released from its supporting lines.

Interposed between disks 15, 19, is a thick circular packing disk 23, preferably formed of rubber or similar deformable material, having a central opening 24 for the passage of the drilling pipe.

As the packing mechanism just described is loosely mounted in the bore 9 of the casing it will be apparent that provision must be made for maintaining the same against disengagement when an upward pressure is exerted against the same, as in the case of a well "blow out". To this end a pair of semi-circular abutment rings 25, 26, are provided, each having a lug 27 projecting from its outer peripheral wall midway its ends, the lugs being of a configuration similar to the lugs formed on the upper end of the casing. The

ends of each ring are also provided with lugs 28, 29, the length of the lugs being less than one-half of the length of the lugs 27 in order to form a space 30 between the ends of the rings when the same are mounted on the upper end of the casing, and to permit of a movement of the same toward each other in order to form oppositely disposed ledges or abutments 31 for the metal disk 19 to bear against when forced upwardly by pressure therebelow. Each ring 25, 26, is provided on its upper edge midway its ends with an upwardly extending segmental flange 32, 33. These flanges engage circular openings 35, formed in the end wall 36 of a circular collar 37, that serves to shift the abutment rings into a locked position, as will be more fully explained hereinafter. Collar 37 is provided on its inner peripheral wall, adjacent the lower edge thereof with a plurality of locking lugs 38 of a form similar to the lugs 10, 11, 12, 13, of the casing, being similarly spaced.

The abutment rings 25, 26, are disposed upon the upper end of the casing 6, the diameter of the circular ring formed by the rings when the same are drawn apart equalling the diameter of the bore 9 of the casing, as clearly shown in Fig. 3. In order to prevent a rotation and a consequent displacement of the rings when the collar 37 is rotated to shift the rings towards each other to form the abutments 31, an inclined cam slot 39 is formed on the upper end of the casing sleeve passing through lug 12 and terminating in the bore 9 of the sleeve, a pin 40 formed on the under face of ring 26 engaging the slot prevents a rotary movement and a consequent displacement of the ring, when the rings are shifted toward each other to form the abutments.

Diametrically disposed in the edge of the circular opening 35 formed in the head of collar 37, are recesses 41, 42, designed to chamber the segmental flanges 32, 33, formed on the rings 25, 26, when the same are shifted together to withdraw the abutments from the bore 9 of the sleeve and permit the removal of the packing mechanism therefrom.

In Figs. 5 to 8 inclusive is shown a modified form of packer mechanism, all the parts being exactly similar to, and operating like the form first described, with the single exception of the abutment rings 50, 51. These rings are each segmental in form and are each provided at one end thereof with a pivot pin 52, 53, adapted to seat in cylindrical recesses 54, 55, formed in the upper end of the sleeve 7, as clearly shown in Fig. 5 of the drawings.

Projecting upwardly from each of the upper faces of the rings or collars 50, 51, are lugs 56, 57, that engage cam shaped notches 58, 59, formed in the vertical wall of the opening 36, of the collar 37, when the rings are shifted or swung on their pivots to permit of the insertion of the packing mechanism in the

bore 9, or its removal therefrom. When the packing disks are dropped into the bore 9 of the sleeve to pack the well, the collar 37 is rotated, the cam notches 58, 59, swinging the rings 50, 51, on their pivots and forcing the same towards each other to form the locking abutments for the upper disk to bear against, as in the first form described.

The operation and method of assembling the casing head will be readily understood from the following description. The sleeve is first secured in screw threaded engagement with the upper end of the well casing. The metal disks 15, 19, are loosely mounted on the "kelly" 18 above the rotary table (not shown). It will be understood that the abutment rings in both forms are in an expanded position on the upper edge of the packer sleeve, thus permitting a ready insertion of the packing mechanism into the bore 9 of the sleeve the moment a "blow out" is indicated. As soon as such pressure is noted by the drillers, operations are instantly suspended, and the rubber packing disk is inserted on the "kelly" between the metal disks (the split 60 in the ring permitting of such an attachment), and after the slips in the rotary table have been removed the rings are dropped downwardly into the bore 9 of the packer sleeve. The collar 37 of the sleeve is then rotated to shift or swing the abutment rings to lock the packing mechanism therein. Slips 22 are then placed in the opening formed in the upper metal disk to support the released weight of the drill pipe, and the collar 37 is again rotated to bring its lugs 38, into register with the lugs 10, 11, 12, and 13, of the sleeve 6 to lock the same thereto, the collar being held against accidental rotation by means of the set screw 45.

From the above description it will be apparent that should a "blow out" occur in a well provided with such mechanism, the packing disk may be quickly brought into operative relation with the packer casing to quickly and effectively divert the unexpected excessive pressure developed through valve controlled pipe lines secured to the packer head.

What I claim is:

1. A packing mechanism for oil well casing heads comprising a casing head of usual form having an annular internal seat in its upper end, a packing mechanism mounted on said seat, a two part abutment ring mounted on said head above the packing mechanism, said ring being movable laterally to limit or permit upward movement of the packing mechanism.

2. A packing mechanism comprising a casing head adapted to be detachably secured to the upper end of an oil well casing, a packing mechanism mounted in said head, a pair of shiftable segmental abutment rings mounted on said head for preventing a displacement of the packing mechanism on a sudden development of pressure below said packing

mechanism, a rotatable collar engaging the casing head and bearing against the segmental rings to prevent a displacement of said rings, and means formed on said collar for shifting the rings into and out of engagement with the packing mechanism.

3. In a casing head packing mechanism a control head adapted to be secured to the upper end of a well casing, said head having a seat formed intermediate its ends and fluid discharge outlets disposed therebelow, a disc formed of an elastic material interposed between metallic discs disposed on said seat, said discs being provided with openings for the passage therethrough of a well drilling mechanism, a two part abutment ring laterally movable mounted on said head for locking the packing discs in the head, a collar rotatably secured to the upper end of the head for operating the abutment ring, and independent means carried by said discs for supporting the weight of the drilling mechanism to expand the elastic packing discs to divert the flow of fluid through the discharge outlets of the head.

4. A packing mechanism for well casings comprising a control head detachably secured to the upper end of a well casing, an expandible packing mechanism mounted therein having an opening for the passage therethrough of drill tubes, a laterally movable locking means mounted on said sleeve for preventing a displacement of the packing mechanism on a development of an upward expansive pressure in the well, a collar secured to the upper end of said sleeve and engaging said locking means for shifting the same laterally to a locked or unlocked position, and tubing slips to transfer the weight of the drilling tube to the packing means to expand the same.

5. A packing mechanism for well casings comprising a control head adapted to be detachably secured to the upper end of a well casing, said head having a counterbore in the upper end thereof forming a seat and an outlet opening therebelow, an expandible packing ring mounted in said bore having an opening therethrough for the passage of a drill stem, abutment rings mounted on said head for locking the packing ring to the head on an expansive movement of the same, and means secured to said collar for shifting the abutment rings out of engagement with the packing ring to permit of a withdrawal of the same from the sleeve.

In witness that I claim the foregoing I have hereunto subscribed my name this 19th day of January, 1925.

DAVID A. CANT.