

July 26, 1932.

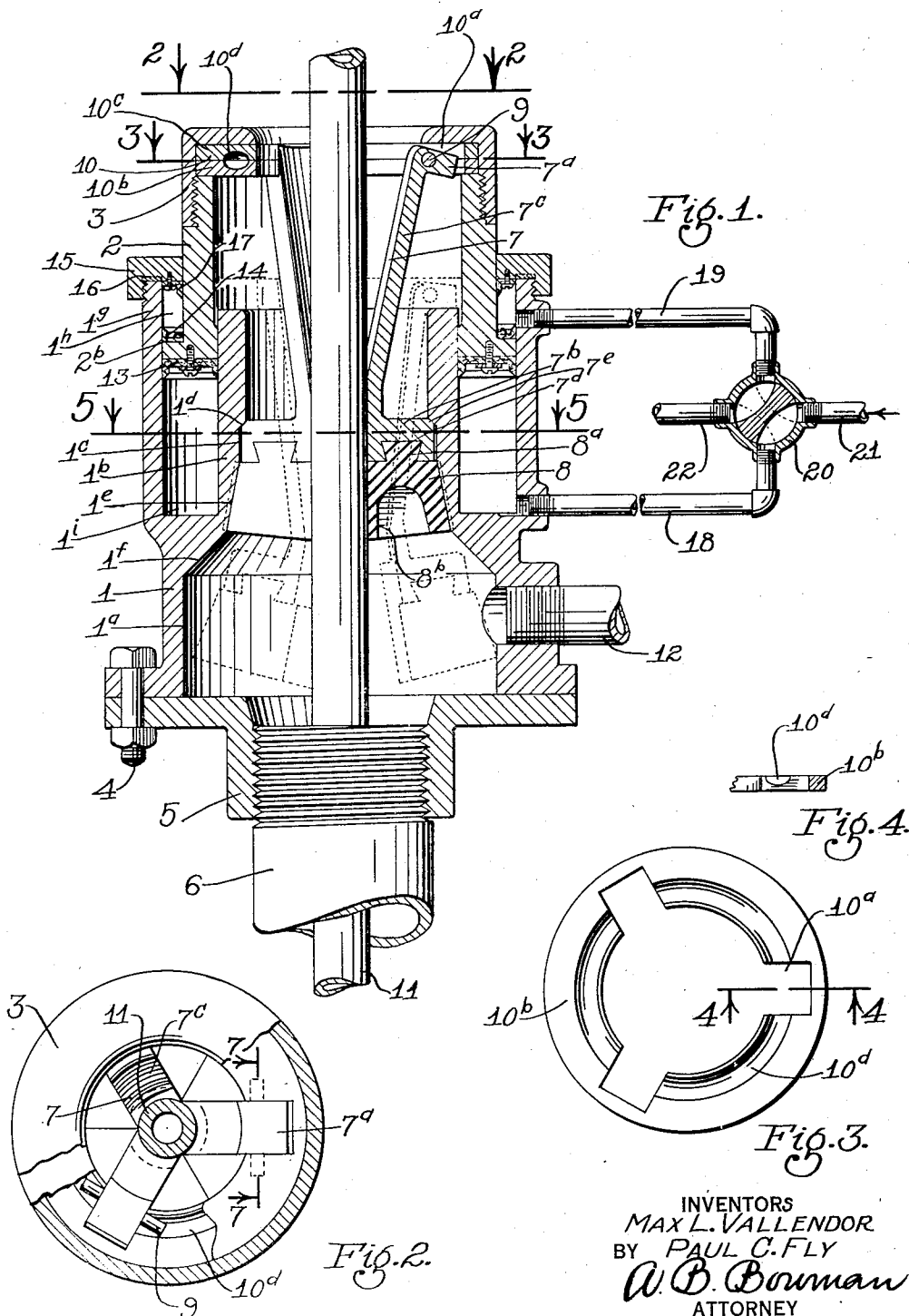
M. L. VALLENDOR ET AL

1,869,345

WELL SEALING HEAD

Filed March 13, 1930

2 Sheets-Sheet 1



INVENTORS  
 MAX L. VALLENDOR  
 BY PAUL C. FLY  
 A. B. Bowman  
 ATTORNEY

**July 26, 1932.**

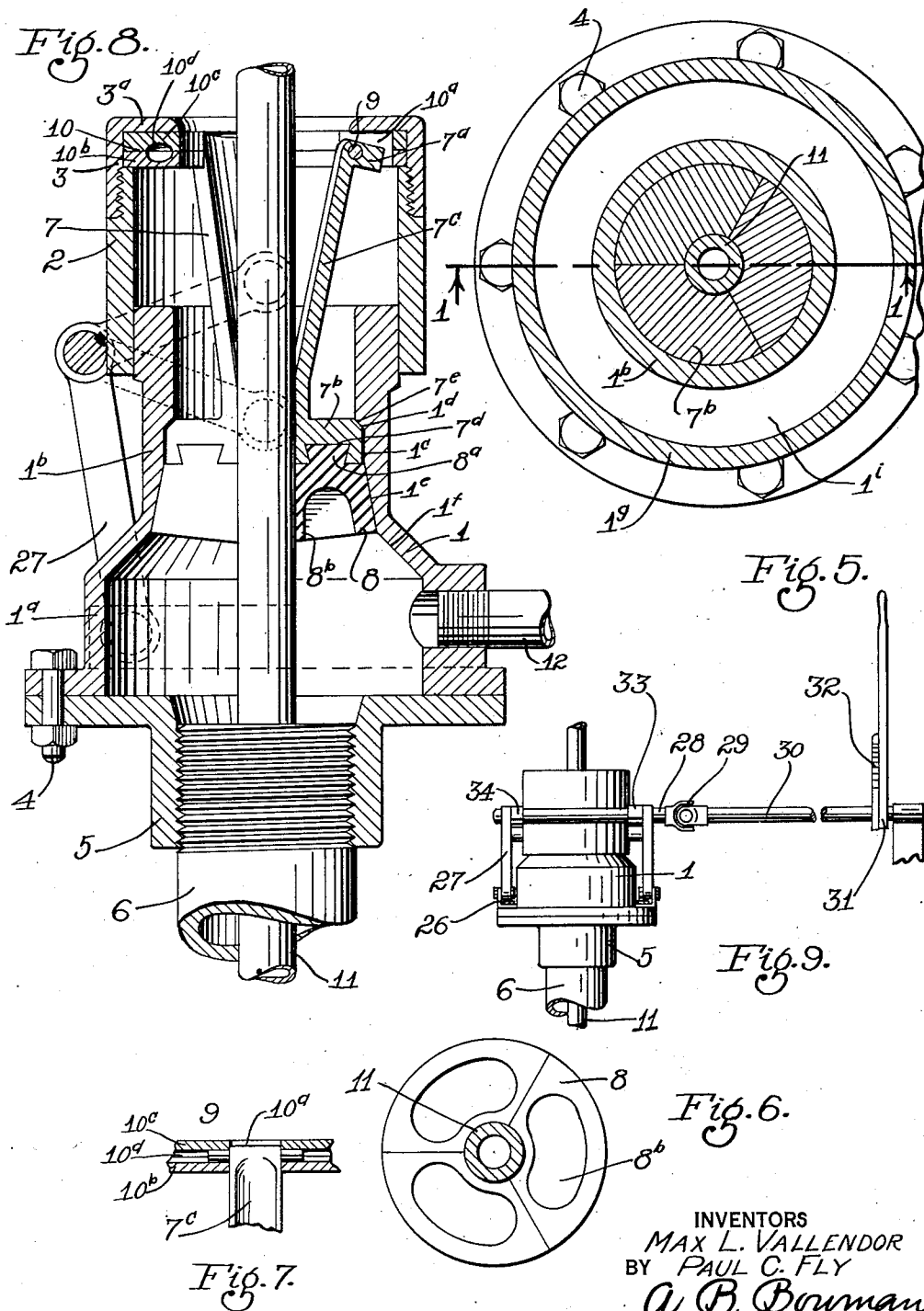
M. L. VALLENDOR ET AL

**1,869,345**

## WELL SEALING HEAD

Filed March 13, 1930

2 Sheets-Sheet 2



## UNITED STATES PATENT OFFICE

MAX L. VALLENDOR AND PAUL C. FLY, OF VENTURA, CALIFORNIA

## WELL SEALING HEAD

Application filed March 13, 1930. Serial No. 435,473.

Our invention relates to well appliances, and relates more particularly to sealing heads adapted to be applied to the upper ends of oil well casings for preventing the trouble-  
5 some and dangerous gas and oil blow-outs resulting from abnormal gas and oil pressures which frequently occur or develop during the drilling and operation of wells.

The objects of our invention are: first, to  
10 provide a sealing head or blow-out preventer for wells which is very simple and economical of construction; second, to provide a sealing head of this class which may be easily attached and held in place at the upper end of  
15 a well casing, a sealing head of this class which can be easily and quickly manipulated for sealing the well, and one which forms an efficient seal against the escape of fluid from the well; third, to provide a device of this  
20 class wherein the pressure developed within the casing is utilized for producing a fluid pressure tight joint between the sealing elements and drill tube and the bowl or housing which forms the body of the sealing head;  
25 fourth, to provide a device of this class having movable closing or sealing elements so constructed and arranged that, when not in their sealing positions, they will in nowise interfere with the normal operation of the  
30 drill string, pump rods, or the like; fifth, to provide novel construction and mounting of and for the sealing elements of the head; sixth, to provide novel and simple means for forcing the sealing elements out of the way  
35 when not in use and for holding such sealing elements in their out of the way positions; seventh, to provide novel, simple and efficient means for quickly forcing the sealing elements into their sealing positions; and,  
40 eighth, to provide as a whole a simple, practical, and effected blow-out preventer or sealing head for wells which is durable and which will not readily deteriorate or get out of order.

45 With these and other objects in view, our invention consists of certain novel features of construction, combination and arrangement of parts and portions, as will be hereinafter described in detail and particularly set forth  
50 in the appended claims, reference being had

to the accompanying drawings and to the characters of reference thereon which form a part of this application in which:

Figure 1 is a vertical sectional view taken longitudinally through one form of our well  
55 sealing head, showing the same secured to a well casing and the sealing elements in sealing position around the drill casing, and also showing by dotted lines the sealing elements in their inoperative position; Fig. 2 is an upper  
60 end view thereof, showing certain parts and portions broken away and in section to facilitate the illustration; Fig. 3 is an upper side view of the annular supporting member for the movable sealing elements; Fig. 4 is a  
65 fragmentary sectional view of such annular supporting member taken through 4-4 of Fig. 3; Fig. 5 is a fragmentary transverse sectional view thereof taken through 5-5 of  
70 Fig. 1 showing the positions of the sealing elements with respect to the sealing head housing and the drill casing when the sealing elements are in their sealing position; Fig. 6 is an end view of the inner end of the  
75 sealing elements in their sealing position; Fig. 7 is a fragmentary sectional view taken through 7-7 of Fig. 2, showing the relation of the sealing elements and the supporting means therefor; Fig. 8 is a vertical sectional  
80 view taken longitudinally through a modified form of construction of our well sealing head; and Fig. 9 is an elevational view of the modification of our well sealing head shown in Fig. 8 with remote control means therefor,  
85 parts being broken away.

Like characters of reference refer to similar parts and portions throughout the views of the drawings.

In the preferred embodiment of our invention, as illustrated in the drawings, our well  
90 sealing head is substantially enclosed within a casing comprising essentially a lower casing member or bowl 1, a sleeve 2 movably mounted at the upper end of the member 1, and a  
95 cap 3 at the upper end of the sleeve. The lower end of the casing member or bowl 1 is flanged and is secured by bolts 4 to the upper side of a flanged plate 5 which is screwed to the upper end of the well casing 6.

The casing member 1 consists essentially of 100

a lower bowl portion 1a and a tubular portion 1b of smaller diameter positioned above and concentric with the bowl portion. On the inner side of the tubular portion 1b is a short cylindrical wall 1c at the upper end of which is provided an upwardly converging conical seat 1d, and at the lower end of which is provided a downwardly diverging conical seat 1e of relatively slight angularity. The lower end of the seat 1e is joined with the cylindrical inner wall of the bowl portion 1a by a downwardly diverging conical surface of greater angularity, the latter surface being designated 1f.

Within the casing or enclosure of our sealing head are mounted a plurality of sealing elements. These sealing elements consist of depending arms 7 and yieldable and resilient sealing members 8 secured to the lower end of the arms. The arms 7, there being preferably three in number, are each provided with an outwardly extending lug 7a at the upper end, an enlarged portion 7b in the form of a circular ring sector at the lower end, and a substantially straight shank portion 7c intermediate and connecting the lug and enlarged portion. The lugs 7a, which extend radially outwardly relative to the vertical axis of the device, are provided adjacent their inner ends with supporting and fulcrum pins 9. The lugs 7a at the upper ends of the depending arms freely fit into recesses or notches 10a in an annular support 10 which rests at the upper end of the sleeve 2. The annular support 10 includes a pair of superimposed annular plates 10b and 10c which are provided at their adjacent sides with grooves 10d which extend to the opposite sides of the notches or recesses 10a, as shown in Figs. 1, 2, 3 and 4. Into these grooves extend the ends of the pins 9 which form pivotal supports for the sealing elements, the lugs 7a being permitted to freely pivot about the axes of the pins 9 within the grooves 10d. The plates 10b and 10c of the annular support 10 are held together by the cap 3 which is screwed to the upper end of the sleeve 2. The cap 3 is provided with an inwardly extending flange which fits over the upper side of the upper plate 10c of the annular support, to hold the annular support 10 stationary relative to the sleeve 2.

When the sleeve 2 is raised and lowered with respect to the casing member 1, the sealing elements 7 are also raised and lowered. When the sealing members are in their raised position, the enlarged portions 7d at their lower ends are adapted to engage a drill rod or pipe 11 and the inner walls of the casing member 1. When the sleeve 2 is lowered to such an extent that the lugs 7a, which may normally project below the annular support 10, engage the upper end of the portion 1b of the casing member 1, the sealing members pivoted outwardly so that the sealing portions 7b and 8 are moved outwardly to

their out of the way positions, as shown by dotted lines in Fig. 1.

The enlarged portions or circular ring sectors 7b are provided at their under sides with arcuate dovetail grooves 7d into which extend arcuate dovetail tongues 8a of the sealing members 8 whereby the latter are removably connected to the former. The sealing members 8 are circular ring sectors of elastic compressible material, preferably rubber, or other compressible composition or material. The sealing members 8 are slightly wider than the enlarged portions 7b which support them and the inner and outer arcuate sides project, respectively, inwardly and outwardly from the corresponding sides of their supporting portions 7b. The arcuate inner sides of the sealing members are substantially cylindrical and are adapted to engage the drill stem or pipe 11, while the arcuate outer sides of said sealing members are inclined or conical and are adapted to engage the conical seats 1e of the tubular portion of the casing member 1. When the arms 7 are drawn upwardly, the inner sides of the portions 7b and the packing 8 embrace and grip the drill rod or pipe 11. When said arms so engage the drill rod or pipe 11, the beveled edges 7e formed at the juncture between the upper faces of the circular ring sectors 7b and the peripheral cylindrical faces thereof, engage the beveled or conical seats 1d of the casing member 1; and, when said arms so engage the drill stem or pipe, the peripheral cylindrical faces at the outer sides of the circular ring sectors 7b are spaced from the cylindrical wall 1c of the casing member 1, as shown.

Thus, it will be seen that when the sealing members are raised from the position illustrated by dotted lines in Fig. 1, the beveled edges 7e first engage the conical surfaces 1f forcing the lower ends of the sealing members radially inwardly. As the sealing elements are drawn further, the beveled edges 7e engage the slightly conical seat 1e forcing the lower ends of the sealing elements still further toward the drill rod or pipe until the resilient sealing members 8 engage such drill rod or pipe and the conical seats 1e. As the sealing elements are drawn still further upwardly so that the circular ring sectors or sockets 7b reach the end of the cylindrical portion 1c, the beveled edges 1e engage the conical seat 1d forcing the peripheral surfaces of the sockets inwardly from the cylindrical walls 1c to bring the inner sides of the lower ends of the arms 7 in engagement with the drill rod or pipe 11, and tightly compressing the sealing members 8 against the drill pipe so that they are changed from their expanded shapes, as shown by dotted lines in Fig. 1, to their compressed shape shown by the full lines. When the sealing elements are drawn upwardly the maximum extent, the ends of the sealing members 8

are in tight abutted relation, as shown in Fig. 5. In the under sides of the sealing members 8 are large arcuate recesses 8b which form relatively thin downwardly projecting side walls on the sealing members 8. The fluid pressure in the upper end of the well casing is adapted to act upon the packing 8 to cause it to seal against the drill rod or pipe, against the conical seat 1e, and at the abutted ends of the sealing members, thus tightly sealing the upper end of the well casing against the escape of fluid therefrom.

To the bowl portion of the casing member 1, is connected a pipe or pipes 12 which serve as outlets for the fluid from the well which may be forced upwardly under pressure through the well casing while the latter is sealed off by the sealing head.

The sleeve 2, shown in Fig. 1, is forced upwardly by hydraulic pressure. In this instance the lower end of the sleeve 2 is mounted for reciprocation in an annular cylinder opening between two spaced cylinder parts, the inner cylinder part being the tubular portion 1b and the outer cylinder part being an upward extension of the outer wall of the bowl portion of the casing member 1. To the lower end of the sleeve 2 is secured a double acting cup leather 13 which engages the opposite cylindrical walls between which it slides, the cup leather 13 being in annular form and extending around the whole of the lower end of the sleeve 2.

The lower end of the sleeve 2 is considerably wider than the main portion of the sleeve extending upwardly therefrom, there being provided an outwardly projecting flange forming an upwardly facing shoulder 2b near the lower end of the sleeve. The flange slidably engages the outer wall of the cylindrical opening to provide a chamber 1a above the shoulder 2b. To the shoulder 2b is secured a cup leather 14 which extends upwardly and engages the inner wall of part 1g. To the upper end of the cylinder part 1g is secured a cap 15 which is sealed relative thereto by a gasket 16. To the inner side of the cap 15 is also secured a cup leather 17 which extends inwardly and engages the outer wall of the sleeve 2.

Fluid pressure is admitted to the lower end of the cylinder opening or chamber 1a by a conductor 18. Fluid pressure is also admitted to the upper end of the cylinder opening or chamber 1b by a conductor 19. The passage of fluid through the conductors 18 and 19 is controlled by a four-way valve 20 which is connected by a pipe 21 to a source of fluid under pressure and to a discharge pipe 22. When the valve 20 is in the position shown, the fluid under pressure is passed into the chamber 1a forcing the sleeve 2 upwardly and sealing or operating the casing head. When desiring to unseat the sealing means and to force the sleeve 2 downwardly,

the valve is operated to the dotted line position, to pass fluid under pressure into the chamber 1b and discharge the fluid from the chamber 1a.

In the modified structure shown in Figs. 8 and 9, the sleeve 2 is operable by mechanical means. In this instance there is secured to two of the bolts 4 angle members or other suitable supports 26. To these angles or supports are pivoted arms 27. In the upper ends of the arms 27 is rotatably mounted a rod or shaft 28. The shaft 28 may be connected, by a universal joint 29, to a long rod 30 extending a considerable distance from the casing head. To the outer end of the rod 30 is connected a manually operated lever 31 which is adapted to be engaged and held by a quadrant 32 when in its operated position. To the shaft or rod 28 is fixedly secured a pair of arms 33 which are pivoted at their outer ends on trunnions 34 extending to diametrically opposite sides of the sleeve 2. When the lever 32 is moved through an arc of approximately forty-five degrees, the sleeve is raised to its extreme up or raised position, as shown in Fig. 8.

Though we have shown and described a particular construction, combination and arrangement of parts and portions, and a certain modification thereof, we do not wish to be limited to this specific construction, combination and arrangement, nor to the modification, but desire to include in the scope of our invention the constructions, combinations and arrangements that may fall within the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a means of the class described, the combination, of an enclosure to be mounted at the upper end of a well casing, the upper portion of the enclosure being of smaller diameter than the lower portion, a support surrounding the upper portion of the enclosure and movable vertically thereon, sealing members carried by the support and projecting into the enclosure and sealing portions on the lower ends of the members located normally in the enlarged lower end of the enclosure and adapted to be forced into the upper smaller portion of the enclosure when said support is drawn upwardly therefrom.

2. In a means of the class described, the combination, of an enclosure to be mounted at the upper end of the well casing, the upper portion of the enclosure being of smaller internal diameter than the lower portion and being provided with an upwardly converging conical seat, a support surrounding the upper portion of the enclosure and movable vertically thereon, arms depending from the support and projecting into the enclosure, and sealing members at the lower ends of the

arms located normally within the enlarged portion of the enclosure, said sealing members being adapted to be forced against said conical seat to be moved inwardly when said support is raised.

3. In a means of the class described, an enclosure adapted to be secured to the upper end of a well casing, a supporting member surrounding the upper portion of said enclosure and movable vertically thereon, a plurality of sealing members in the enclosure and pivotally connected to the supporting member so as to be contractible relative to each other upon the upward movement of the supporting member, and sealing portions on the lower ends of the sealing members yieldable and resilient for sealing the space between the enclosure and a drill pipe extending upwardly from the well casing upon contraction of the member.

4. In a means of the class described, the combination with a well casing, of an enclosure at the upper end of the well casing, the upper portion of the enclosure being of smaller internal diameter than the lower portion, a support surrounding the upper portion of the enclosure and movable vertically thereon, a plurality of arms pivotally carried by the support, and projecting downwardly into the enclosure and sealing members at the lower ends of the arms normally located in the enlarged lower end of the enclosure and adapted to be forced into the upper smaller portion of the enclosure when said support is moved upwardly, said sealing members being yieldable and resilient for sealing the space between the enclosure and a drill pipe extending upwardly from the well casing.

5. In a means of the class described, an enclosure adapted to be secured to the upper end of a well casing, a supporting member mounted for vertical movement on the upper portion of said enclosure, and a plurality of sealing members connected to the supporting member and contractible relative to each other with the upward movement of the supporting member, said sealing members being yieldable and resilient for sealing the space between the enclosure and a drill pipe extending upwardly from the well casing, said sealing members having at their under sides upwardly extending recesses for admitting fluid under pressure from the well casing for expanding said sealing members against the enclosure, the drill pipe and against each other.

6. In a means of the class described, the combination with a well casing, of an enclosure at the upper end of the well casing, the upper portion of the enclosure being of smaller diameter than the lower portion, a support at the upper portion of the enclosure and movable vertically with respect thereto, sealing members carried by the support and having at their lower ends sealing portions

located normally in the enlarged lower end of the enclosure and adapted to be forced into the upper smaller diameter portion when said support is drawn upwardly therefrom, said sealing members being yieldable and resilient for sealing the space between the enclosure and a drill pipe extending upwardly from the well casing, said sealing members having at their under sides upwardly extending recesses for admitting fluid under pressure from the well casing for expanding said sealing members against the enclosure, the drill pipe and against each other.

7. In a means of the class described, the combination with a well casing, of an enclosure at the upper end of the upper end of the casing, and a plurality of yieldable and resilient sealing members in the form of circular ring sectors located within the enclosure and adapted to seal the space between said enclosure and a drill pipe extending upwardly from the well casing, said sealing members having at their under sides upwardly extending recesses for receiving fluid under pressure from the well casing for expanding the sealing members against said enclosure, said drill pipe and against each other.

8. In a means of the class described, the combination with a well casing, of an enclosure having a relatively large lower cylindrical portion, a gradually inclined conical seat, a conical surface connecting the cylindrical portion with the conical seat, a cylindrical wall portion upwardly from the conical seat, and a short upwardly converging conical seat at the upper end of the latter cylindrical portion, a support movable longitudinally with respect to the enclosure and sealing elements depending from the support having enlarged sealing portions at their lower ends and adapted normally to be located in the enclosure below the first conical seat, said sealing portions being adapted to engage said conical surface, said first conical seat, said second cylindrical wall portion and said short second conical seat when the sealing elements are drawn upwardly, the lower portion of the sealing portions engaging the first conical seat and the drill pipe adapted to extend upwardly from the well casing.

9. In a means of the class described, the combination with a well casing, of an enclosure having a relatively large lower cylindrical portion, a gradually inclined conical seat, a conical surface connecting the cylindrical portion with the conical seat, a cylindrical wall portion upwardly from the conical seat, and a short upwardly converging conical seat at the upper end of the latter cylindrical portion, a support movable longitudinally with respect to the enclosure, sealing elements depending from said support and comprising arms having circular ring sectors at the lower ends and yieldable seal-

ing members in the form of circular ring sectors secured to the lower ends of the sectors of the arms, the sectors of the arms being adapted to engage said conical surface, said  
 5 first conical seat, said second cylindrical wall, and said short conical seat upon upward movement of said support, the engagement of the sectors of the arms with the second conical seat forcing the sectors of the arms  
 10 inwardly around a drill pipe extending upwardly from the well casing, and said yieldable sealing members engaging said first conical seat and said drill pipe.

10. In a means of the class described, the  
 15 combination with a well casing, of an enclosure at the upper end of the well casing, a support slidably mounted on the enclosure for vertical movement, a plurality of sealing members depending from said support and  
 20 movable with said support relative to said enclosure, and means for moving said sealing members into engagement with an object passing through the enclosure when said support is moved upwardly.

25 11. In a means of the class described, a casing having an enlarged portion at its lower end and a constricted open portion at its upper end and spaced apart cylindrical walls at its upper end, a sleeve reciprocally mounted  
 30 between the spaced apart cylinders and extending upwardly therefrom, a support carried by the sleeve, and sealing members depending from the support into the casing.

12. In a means of the class described, a  
 35 casing having an enlarged portion at its lower end and a constricted open portion at its upper end and spaced cylindrical walls at its upper end, a sleeve reciprocally mounted between the said spaced walls and extending  
 40 upwardly therefrom, a support carried by the sleeve, arms depending from the support, and yieldable sealing members secured to the lower ends of the arms, said sealing members being normally located in the enlarged  
 45 portion of the casing and adapted when forced upwardly by said sleeve to enter said constricted portion of the casing.

13. In a means of the class described, a casing adapted to be secured to a casing head  
 50 and provided with a seat therein, a sleeve reciprocally mounted in an annular cylinder opening in the casing and projecting upwardly therefrom, sealing members connected with the projecting end of the sleeve and  
 55 adapted to be forced upwardly into sealing engagement with said seat, and fluid pressure means for reciprocating said sleeve.

14. A control device of the character described including, a tubular body adapted to  
 60 be mounted at the upper end of a well casing, a support vertically movable on the exterior of the body, a plurality of arms pivotally connected to the support and depending therefrom into the casing, sealing means on  
 65 the lower ends of the arms, means for forcing

the sealing means inwardly upon upward movement of the support, and means for holding the arms and sealing means in out  
 inoperative positions prior to upward movement of the support.

15. A device of the character described including, a tubular body adapted to be mounted on a well casing, a support movable vertically on the body, the support normally  
 75 having its upper end adjacent the upper end of the body, arms pivotally connected to the upper end of the support and depending into the body, packing means on the arms operable to seal between the inner walls of the body  
 80 and an object extending through the body upon upward movement of the support, and lugs on the arms adapted to cooperate with the upper end of the body to hold the arms  
 85 and packing means inoperative when the support is in the normal unactuated position.

16. A device for use on a well casing including, a tubular body adapted to be mounted on the well casing, the body having an  
 90 internal inclined seat, and expansible sealing members in the body operable to positions where they seal between the seat and an object extending through the body, there being  
 95 recesses in the ends of the sealing members adapted to receive fluid under pressure from the interior of the body to expand the members.

17. A device for use on a well casing including, a tubular body adapted to be mounted on the well casing, the body having an  
 100 internal inclined seat, and expansible sealing members in the body operable to positions where they seal between the seat and an object extending through the body, there being  
 105 recesses in the lower ends of the sealing members adapted to receive fluid under pressure from the interior of the body to expand the members against the seat and object.

18. A device for use on a well casing including, a tubular body adapted to be mounted on the well casing, the body having an  
 110 internal inclined seat, and expansible sealing members in the body operable to positions where they seal with the said seat, there being recesses in the lower ends of the sealing members  
 115 adapted to receive fluid under pressure to expand the members against the seat.

In testimony whereof, we have hereunto set our hands at Ventura, California, this 21st day of February, 1930.

MAX L. VALLENDOR. 120  
 PAUL C. FLY.

125

130