

Oct. 25, 1932.

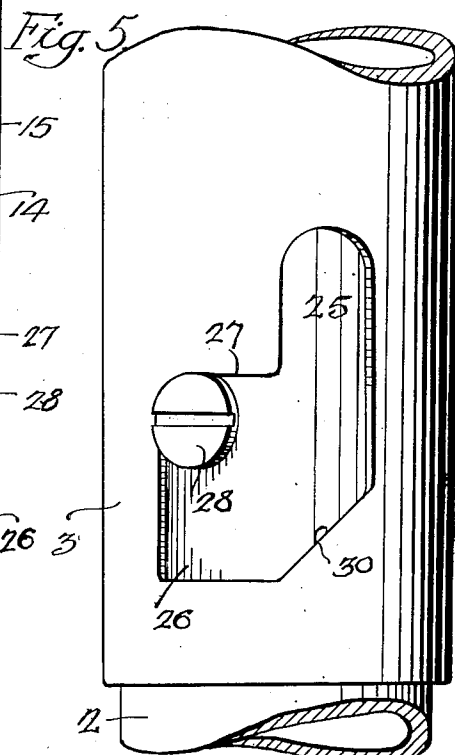
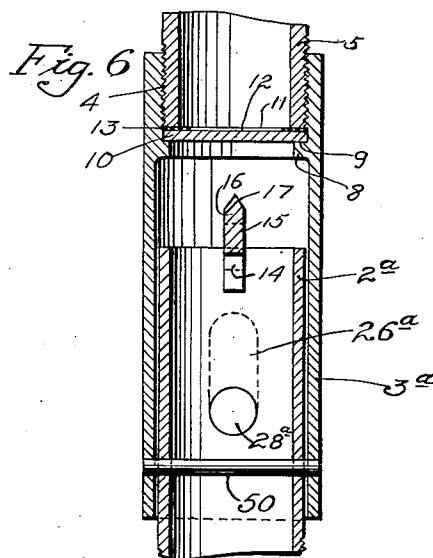
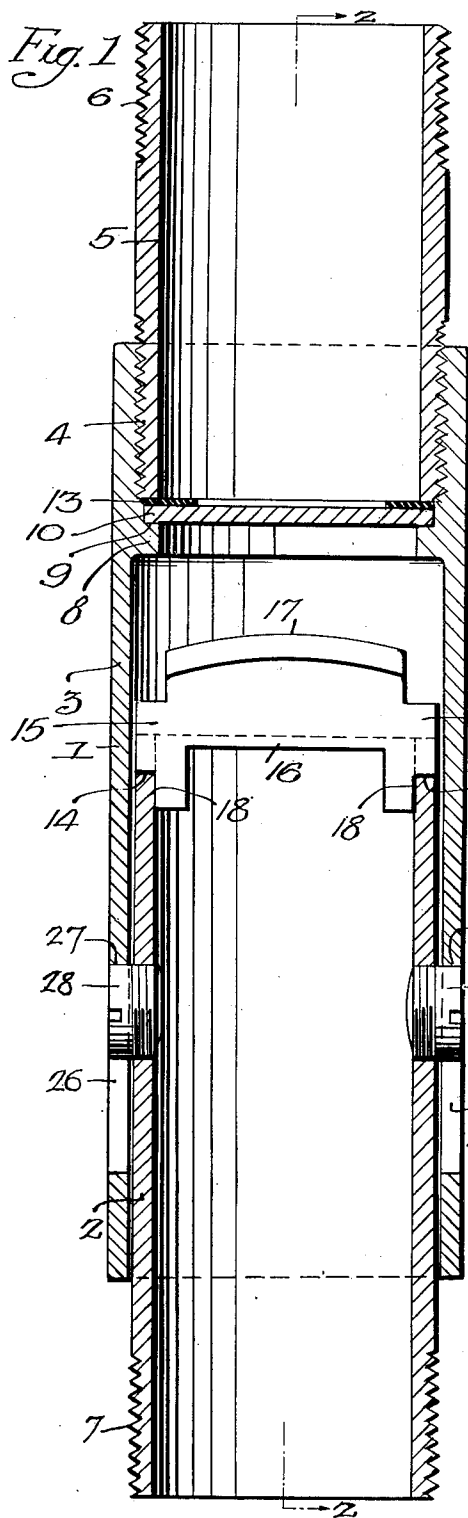
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1,884,165

TEMPORARY SEAL FOR WELL TUBING

Filed Sept. 26, 1929

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

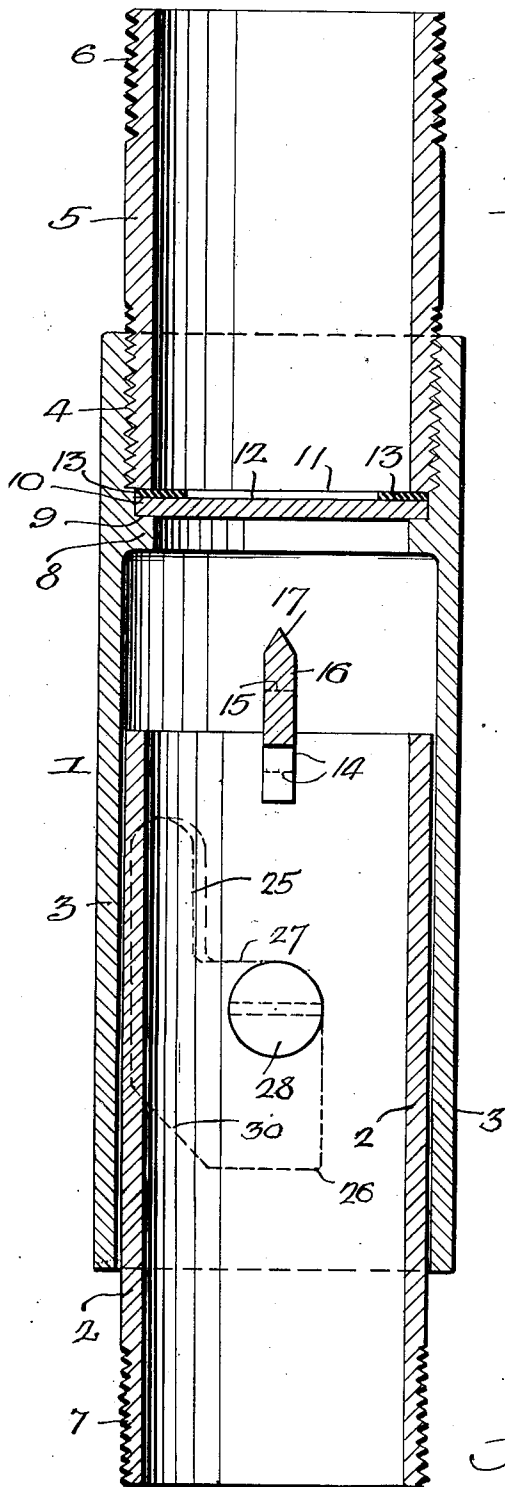


Fig. 2.

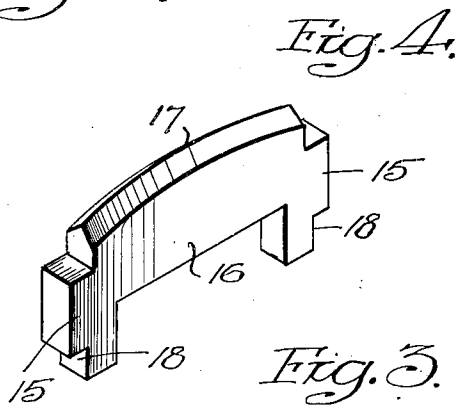


Fig. 4.

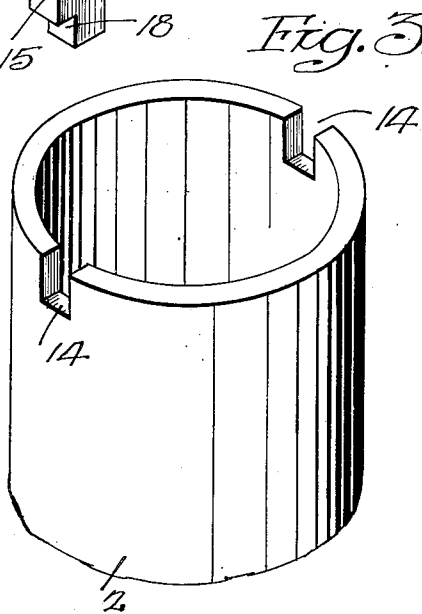


Fig. 3.

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UNITED STATES PATENT OFFICE

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TEMPORARY SEAL FOR WELL TUBING

Application filed September 26, 1929. Serial No. 395,313.

This invention relates to a temporary seal for well tubing, and to means for breaking the seal after the tubing has been inserted within a well casing, substantially as shown and described in my co-pending application, Serial No. 395,315, filed September 26, 1929.

The construction and operation of my improved tubing seal will be fully disclosed hereinafter, reference being had to the accompanying drawings, of which:

Fig. 1 is a longitudinal sectional elevation of the device made in accordance with the principles of my invention;

Fig. 2 is a longitudinal sectional elevation taken on the line 2—2, Fig. 1;

Figs. 3 and 4 are detached perspective views of details of the invention;

Fig. 5 is a side elevation of a portion of the device shown in Fig. 1; and

Fig. 6 is a sectional elevation of a modification of the invention.

As shown in the drawings, the device 1 comprises a pair of telescoping sleeves 2 and 3, the inner sleeve 2 being adapted, under certain conditions which will be fully explained hereinafter, for axial movement relative to the outer sleeve 3.

The upper end of the outer sleeve 3 is internally threaded as indicated at 4 for reception of corresponding external threads formed on one end of a nipple, or other pipe unit 5.

The device 1 is adapted to be included in a string of tubing which is to be inserted into a well casing containing gas or oil under extremely high pressures, as set forth in the above mentioned co-pending application.

The upper portion of the string of tubing is adapted to be threaded onto the externally threaded upper end 6 of the pipe unit 5 and the lower portion of the string of tubing is adapted to be threaded onto the externally threaded lower end 7 of the inner sleeve 2 of the device.

Intermediate its respective ends the outer sleeve 3 is provided with an inwardly extending annular flange 8. This flange 8 is provided with a seating surface 9 for the reception of a sealing disc 10.

The sealing disc 10 is intended to be com-

posed of a relatively brittle material, for example, cast iron may be used.

Intermediate the lower end 11 of the pipe unit 5 and the upper surface 12 of the sealing disc 10 is located a packing ring or washer 13 which, when the pipe unit 5 is pulled down tightly in the upper end 4 of the outer sleeve 3, absolutely seals the upper end of the string of tubing against the passage thereinto of the high pressure fluids rising within and from the lower end of the string of tubing.

In the upper end of the inner sleeve 2 and in diametrically opposed relation to each other are two rectangular notches 14, 14 which are respectively adapted to receive lugs 15, 15 formed on the outer ends of a bridge element 16, which is provided with an arcuate and bevel-edge blade 17, or other equivalent relatively sharp vertically extending projection, the bridge element 16 extending across the open end of the inner sleeve 2, and maintaining the upper end of the striker carried thereby in a position under, and spaced below, the sealing disc 10.

The bridge element 16 is held with its arcuate beveled edge blade 17 in an upright position, by the sides of the lugs 15, 15 engaging the sides of the rectangular notches 14, 14 in the inner sleeve 2.

Endwise movement of the bridge element 16 with respect to the inner sleeve 2 is prevented by shoulders 18, 18, formed respectively in the opposite ends thereof and engaging the inner wall of the inner sleeve 2 at the opposite sides thereof.

To prevent such relative axial movement between the inner sleeve 2 and the outer sleeve 3 as would cause the disc breaking element 17 to engage the disc 10, while the tubing is being inserted into the well casing, the said outer sleeve is provided with longitudinally extending slots 25 having laterally extending enlargements 26 which provide horizontally extending shoulders 27 in the said outer sleeve.

The inner sleeve 2 is provided with lugs or screwheads 28 which project into the slots in the outer sleeve and normally lie under

the shoulders 27, within the lateral extensions or enlargements 26 of the said slots 25.

The walls of the slots 25 are inclined at their bottoms, as indicated at 30, so as to guide the lugs or projections 28 into the lateral extensions 26 of the slots 25, and into a position directly under the horizontal shoulders 27, when the inner sleeve is permitted to drop relative to the outer sleeve, such as occurs when the string of tubing, in which the device is included, is first placed in a vertical position preparatory to its being lowered into the well.

When the pressure in the well, or other condition, causes the inner sleeve 2 to be raised relative to the outer sleeve 3 the projections 28 will then engage the shoulders 27 and prevent the striker element 17 from engaging the disc 10.

When it is desired to break the disc 10 the outer sleeve 3 is rotated relative to the inner sleeve 2, to bring the projections 28 into alignment with those portions of the slots 25 lying above the shoulders 27, whereby axial movement of the sleeve 3 is permitted relative to the inner sleeve 2, which remains stationary.

Movement of the outer sleeve 3, with the disc 10, toward the breaker or striker element 17, or vice versa, causes the said striker to break the disc, thereby permitting fluid to pass through the device from one end to the other end thereof.

From the above, it will be obvious that a simple and efficient means has been provided for breaking the temporary seal in a string of tubing after the same has reached the desired depth within the well casing and that the breaking operation forms a subsequent part of the inserting operation and obviates the necessity of performing a separate operation for breaking the temporary seal.

Ordinarily the breaking of temporary seals in well tubings is performed by dropping a weight down through the tubing after the same has been set, which for many well known reasons is a very unsatisfactory and rather dangerous practice.

Fig. 6 shows a modification of the invention, wherein a shear pin 50 passes through the sleeves 2a and 3a to prevent a relative disc breaking movement therebetween under normal conditions. Pressure applied to the upper end of the string of tubing after the lower end has been seated on the bottom of the well will cause the pin 50 to be sheared, thereby permitting the relative axial movement between the sleeves for breaking the disc 10 as above noted. The pins 28a ride in the slots 26a so that the lower end of the string of tubing may be withdrawn by the upper section thereof when the same is removed from the well casing.

I claim:

1. A device for temporarily sealing a string

of well tubing, comprising a pair of telescoping sleeves, means on the opposite ends of the sleeve assembly adapted to be applied to separate sections of said string of tubing respectively, a disc carried by one of said sleeves for sealing the tubing, and means permanently carried by and rigidly secured to the other of said sleeves and adapted to engage said disc substantially at the center thereof and progressively across the disc to its opposite side edges for breaking the disc upon relative axial movement between the sleeves.

2. A device for temporarily sealing a string of well tubing, comprising a pair of telescoping sleeves, means on the opposite ends of the sleeve assembly adapted to be applied to separate sections of said string of tubing respectively, a disc carried by one of said sleeves for sealing the tubing, means permanently carried by and rigidly secured to the other of said sleeves and adapted to engage said disc substantially at the center thereof and progressively across the disc to its opposite side edges for breaking the disc upon relative axial movement between the sleeves, and means for normally preventing said relative axial movement.

3. A device for temporarily sealing a string of well tubing, comprising a pair of telescoping sleeves, means on the opposite ends of the sleeve assembly adapted to be applied to separate sections of said string of tubing respectively, a disc carried by one of said sleeves for sealing the tubing, means permanently carried by and rigidly secured to the other of said sleeves and adapted to engage said disc substantially at the center thereof and progressively across the disc to its opposite side edges for breaking the disc upon relative axial movement between the sleeves, and means for slidably connecting said sleeves to permit of said relative axial movement.

4. A device for temporarily sealing a string of well tubing, comprising a pair of telescoping sleeves, means on the opposite ends of the sleeve assembly adapted to be applied to separate sections of said string of tubing respectively, a disc carried by one of said sleeves for sealing the tubing, means permanently carried by and rigidly secured to the other of said sleeves and adapted to engage said disc substantially at the center thereof and progressively across the disc to its opposite side edges for breaking the disc upon relative axial movement between the sleeves, means for slidably connecting said sleeves to permit of said relative axial movement, and means for normally preventing said relative axial movement.

5. A device for temporarily sealing a string of well tubing, comprising a pair of telescoping sleeves adapted to be applied to separate sections of said string of tubing respectively, a bridge element permanently and rigidly secured at its opposite ends in and extending

across one of said sleeves, and a striker element carried by said bridge element and adapted to engage and break the disc carried by the other of said sleeves when relative axial movement between said sleeves is effected.

6. A device for temporarily sealing a string of well tubing, comprising a pair of telescoping sleeves adapted to be applied to separate sections of said string of tubing respectively, and a blade permanently and rigidly secured at its opposite ends in and extending across one of said sleeves and adapted to engage and break the disc carried by the other of said sleeves when relative axial movement between said sleeves is effected.

7. A device for temporarily sealing a string of well tubing, comprising a pair of telescoping sleeves adapted to be applied to separate sections of said string of tubing respectively, and a blade permanently and rigidly secured at its opposite ends in said inner sleeve and having a beveled and arcuate edge extending across and projecting beyond the end of the inner sleeve, adapted to engage and break the disc carried by the outer sleeve when relative axial movement between the said sleeves is effected.

8. A device for temporarily sealing a string of well tubing, comprising a pair of telescoping sleeves adapted to be applied to separate sections of said string of tubing respectively, and a blade permanently and rigidly secured at its opposite ends in said inner sleeve and having a beveled and arcuate edge extending across and projecting beyond the end of the inner sleeve, adapted to engage and break the disc carried by the outer sleeve when relative axial movement between the said sleeves is effected, the end of said inner sleeve being notched to receive the opposite ends of said blade and the ends of said blade having shoulders to engage the walls of the sleeve, to maintain said blade in operative position relative to the said inner sleeve.

9. A device for temporarily sealing a string of well tubing, comprising a pair of telescoping sleeves adapted to be applied to separate sections of said string of tubing respectively, a disc carried by one of said sleeves for sealing the tubing, means carried by the other of said sleeves for breaking the disc upon relative axial movement between the sleeves, laterally extending projections on one of said sleeves and extending into slots formed in the other of said sleeves, and shoulders formed in said slots and adapted to be engaged by said projections for normally preventing relative axial movement between said sleeves.

10. A device for temporarily sealing a string of well tubing, comprising a pair of telescoping sleeves adapted to be applied to separate sections of said string of tubing respectively, a disc carried by one of said sleeves for sealing the tubing, means carried by the

other of said sleeves for breaking the disc upon relative axial movement between the sleeves, a projection extending laterally from the inner sleeves and into a longitudinally extending slot formed in the outer sleeve to slidably connect said sleeves and permit of said axial movement therebetween, and a horizontally extending shoulder formed at one side of said longitudinal slot and adapted to be engaged by said projection for normally preventing said axial movement.

11. A device for temporarily sealing a string of well tubing, comprising a pair of telescoping sleeves adapted to be applied to separate sections of said string of tubing respectively, a disc carried by one of said sleeves for sealing the tubing, means carried by the other of said sleeves for breaking the disc upon relative axial movement between the sleeves, a projection extending laterally from the inner sleeve and into a longitudinally extending slot formed in the outer sleeve to slidably connect said sleeves and permit of said axial movement therebetween, and a horizontally extending shoulder formed at one side of said longitudinal slot and adapted to be engaged by said projection for normally preventing said axial movement, one wall of said slot being inclined below said shoulder to normally direct said projection thereunder.

12. A device for temporarily sealing a string of well tubing, comprising a pair of telescoping sleeves adapted to be applied to separate axially aligned sections of said string of tubing, an annular flange formed in the outer sleeve, a sealing disc adapted to be rigidly seated on said flange by the end of that portion of the string of tubing to which the outer sleeve is applied, a blade carried by and extending beyond the end of the inner sleeve adjacent the disc and adapted to engage and break the disc when relative axial movement between the sleeves is effected, lugs extending laterally from said inner sleeve into longitudinal slots formed in said outer sleeve for slidably connecting said sleeves and permitting said axial movement therebetween, when said axial movement between the sleeves is effected, and a shoulder formed in one wall of each of said longitudinal slots adapted to be engaged by said projections for normally preventing such relative movement between said sleeves.

13. A device for temporarily sealing a string of well tubing, comprising a pair of telescoping sleeves adapted to be applied to separate axially aligned sections of said string of tubing, an annular flange formed in the outer sleeve, a sealing disc adapted to be rigidly seated on said flange by the end of that portion of the string of tubing to which the outer sleeve is applied, a blade carried by and extending beyond the end of the

inner sleeve adjacent the disc and adapted to engage and break the disc when relative axial movement between the sleeves is effected, lugs extending laterally from said inner sleeve into longitudinal slots formed in said outer sleeve for slidably connecting said sleeves and permitting said axial movement therebetween, when said axial movement between the sleeves is effected, and a shoulder formed in one wall of each of said longitudinal slots adapted to be engaged by said projections for normally preventing such relative movement between said sleeves, the opposite wall of each slot having an inclined portion adapted to direct the said projections under said shoulders.

14. The combination of a pair of relatively movable flow sections incorporated in a string of well tubing, a disc rigidly secured in one of said sections and normally closing the tube against flow therethrough, and means permanently secured to the other section and arranged for engagement with the disc from side to side thereof on a line extending across the disc to break the disc and permit unrestricted flow through the tubing at opposite sides of said braking means upon relative axial movement between said sections.

15. The combination of a pair of relatively movable flow sections incorporated in a string of well tubing, a disc rigidly secured in one of said sections and normally closing the tube against flow therethrough, means permanently secured to the other section and arranged for engagement with the disc from side to side thereof on a line extending across the disc to break the disc and permit unrestricted flow through the tubing at opposite sides of said braking means upon relative axial movement between said sections, and readily releasable means for normally preventing said axial movement.

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