Oct. 18, 1927. 1,645,766

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DEVICE FOR PREVENTING CAVINGS

Original Filed March 20, 1923

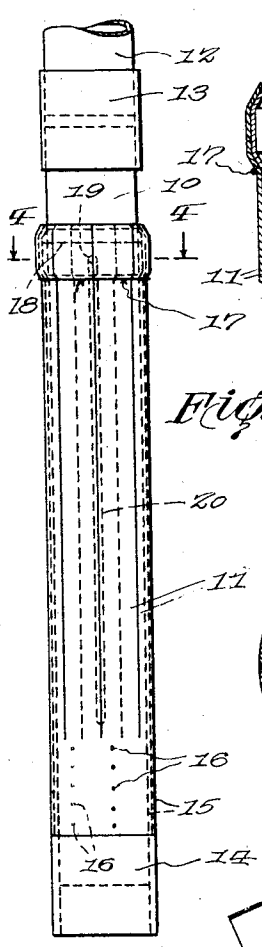


Fig. 1.

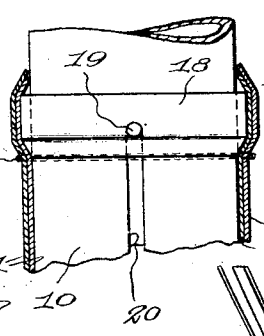


Fig. 5.

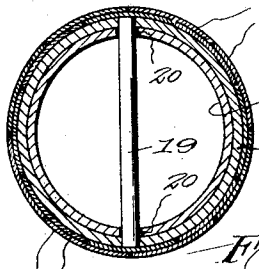


Fig. 4.

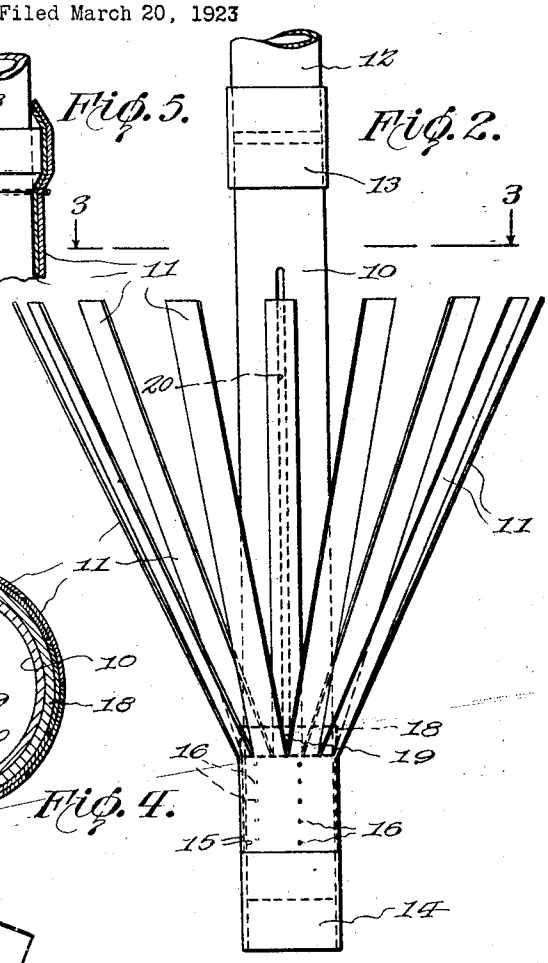


Fig. 2.

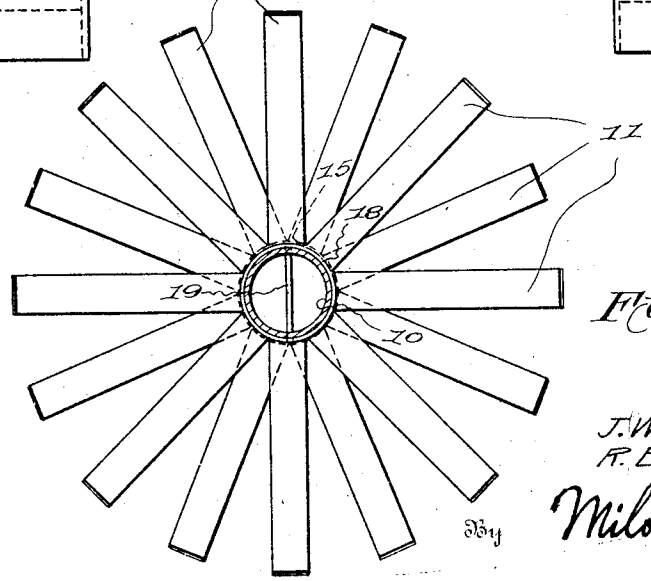


Fig. 3.

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UNITED STATES PATENT OFFICE.

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DEVICE FOR PREVENTING CAVINGS.

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An important object of this invention is to provide simple means to arrest and pack cavings which occur in well drilling operations whereby the cavings are prevented from interfering with the continuation of the drilling operation.

A further object of the invention is to provide a cavings arrester and packer which may be interposed in an ordinary string of casing without substantially altering the construction of the same and without involving a radical departure from standard drilling operations.

A further object is to provide a cavings arrester which closely hugs the casing prior to being expanded so that the casing may be moved up or down for properly positioning the arrester.

A further object is to provide a drilling accessory of the character specified which may be conveniently expanded from the surface so as to positively arrest and pack the cavings from above so that when drilling in cavy formations the drilling operation will not be frequently interrupted.

In order that the invention may be better understood, reference is had to the accompanying drawing, wherein—

Figure 1 is an elevation of the device; Fig. 2 is a similar view showing the device spread; Fig. 3 is a horizontal section on the line 3—3 of Fig. 2; Fig. 4 is an enlarged cross-section on the line 4—4 of Fig. 1, and Fig. 5 is an enlarged elevation of the upper end of the device, with parts shown in section.

Referring specifically to the drawing, the device comprises a tubular supporting member 10 carrying a plurality of wings 11 which are adapted to be spread radially for the purpose of catching the cavings from above, as will be presently described. The member 10 is connected to a string of ordinary casing whereby the device is supported and lowered into the well hole. A fragment of one of the casing sections is shown at 12. The connection is made by means of an ordinary coupling sleeve 13. A similar sleeve 14 is fitted to the lower end of the member 10.

The wings 11 are produced by longitudinally slitting a pair of sleeves 15 fitting one within the other around the member 10. The slits do not extend throughout the entire length of the sleeves, but terminate short of the lower ends of the latter, and the sleeves are here riveted or otherwise rigidly fastened, as shown at 16, to the member 10 and abut against the top edge of the coupling sleeve 14. The slits of the sleeve 15 alternate, and hence the wings of one sleeve lap the wings of the other sleeve.

The wings 11 are normally contracted to obtain sleeve-like or tubular structures surrounding the member 10, and they are so held by a piece of soft wire 17 tied around the same at their upper free ends.

On the member 10 is slidably mounted a wing-spreader ring 18, the same being normally located inside the two circular series of wings 11 at the upper ends thereof. This ring is beveled at the bottom to assure spreading of the wings when it is forced down the member 10. A frangible pin 19 spans the ring 18 and seats in diametrically opposite guide slots 20 in the member 10 to extend across the inside of the latter, said slots terminating a short distance above the lower ends of the wings 11 where they are joined to the sleeves 15.

Fig. 1 shows the device ready for operation, the wings 11 being in retracted position and so held by the tie-wire 17 so that the device may be set in the well-hole without disturbing the wings. When it is desired to spread the wings 11, after the device is set, the drilling tool is lowered down the string of casings 12 and into the member 10 and upon reaching the cross-pin 19, the weight of the tool resting thereon forces the spreader ring 18 down the member 10. This movement of the spreader ring first breaks the tie-wire 17 and releases the wings 11, and as the ring continues to descend it spreads the wings 11 so that their upper ends come into contact with the well-hole. The wings have now assumed somewhat the shape of an inverted umbrella, and they catch all loose dirt dropping down from above. The cross-pin 19 has now also reached the lower end of the guide slots 20, and upon giving the tool a slight jar, the pin is broken to allow the tool to continue its downward travel to the bottom of the well-hole for drilling. The dirt dropping on the spreading wings packs on the same, thereby stopping the well-hole from caving and packing the caving at the site of the device in the well-hole.

The device will be made in various sizes

and lengths according to the size of the well-hole in which it is to be used.

Figure 1 illustrates the improved cavings arrester and packer in its folded or inoperative position and the wire 17 which binds the several staves or wings together holds the staves closely about the casing 10 so that the casing may be conveniently raised or lowered for properly locating the device with reference to the caving formation.

The binder wire 17 not only holds the wings or staves 11 closely about the tubular member 10 but also holds the spreader ring 18 in an elevated position as clearly illustrated in Fig. 5. When it is desired to open up the staves or wings in the hole after the packer is set in the proper position a string of tools is lowered into the hole and engaged with the spreader ring pin 19. As the tools are very heavy pin 19 is forced downwardly with the spreader-ring 18 and the binder wire 17 is thereby broken for releasing the spreader ring and the staves. As the string of tools continues downwardly it moves the pin 19 and the ring 18 connected thereto downwardly also, and the wings 11 are moved outwardly to the position illustrated in the Fig. 2 for arresting and packing the cavings detached from the wall of the hole.

When the ring spreader 18 reaches the limit of its downward movement as illustrated in Fig. 2 the entire weight of the string of tools above is borne by the pin 19 and the pin is broken. The sudden engagement of the pin 19 with the bottom walls of the slots 20 causes the pin to break under weight above. The tools may now descend to the bottom of the hole and the drilling operation may be proceeded with.

With reference to the foregoing description taken in connection with the accompanying drawing it will be seen that the cavings are positively prevented from descending to the point of drilling and consequently the drilling operation is not in any way interfered with. As the casing is permanently located in the hole it is not necessary to provide means for the removal of the wings or staves 11.

We claim:

1. A cavings arrester comprising a supporting member, a plurality of radially spreadable wings secured at their lower ends to said member and free at their upper ends, means for holding the wings contracted around the supporting member, and a wedge ring slidable downwardly on said member for releasing the wings and spreading the same.

2. A cavings arrester comprising a supporting member, a plurality of radially spreadable wings secured at their lower ends to said member and free at their upper ends, means for holding the wings contracted around the supporting member, and wedge means for releasing and spreading the wings.

3. A cavings arrester comprising a supporting member, a plurality of radially spreadable wings secured at their lower ends to said member and free at their upper ends, means for holding the wings contracted around the supporting member, and a spreader ring encircled by the free ends of the wings, and slidably mounted on the supporting member for releasing the wings and spreading the same.

4. A cavings arrester comprising a supporting member, a plurality of radially spreadable wings secured at their lower ends to said member and free at their upper ends, means for holding the wings contracted around the supporting member, a spreader ring encircled by the free ends of the wings and slidably mounted on the supporting member for releasing the wings and spreading the same, the supporting member being tubular and having longitudinal slots, and a cross-pin carried by the spreader ring and extending through the slots and across the inside of the supporting member.

5. A device of the character described comprising a supporting member, a plurality of radially spreadable wings secured at their lower ends to said member and free at their upper ends, a tie-device passing around the free ends of the wings for holding said wings contracted around the supporting member, and a spreader ring slidable downwardly on the supporting member for breaking the tie-device and spreading the wings.

6. A device of the character described comprising a supporting member, a plurality of radially spreadable wings secured at their lower ends to said member and free at their upper ends, a tie-device passing around the free ends of the wings for holding said wings contracted around the supporting member, a spreader ring encircled by the free ends of the wings and slidably mounted on the supporting member for breaking the tie-device and spreading the wings, the supporting member being tubular and having longitudinal slots, and a cross-pin carried by the spreader ring and extending through the slots and across the inside of the supporting member.

7. A caving arrester for oil well operations comprising a tubular body, a plurality of staves connected at their lower ends to the body, a binder to connect the upper portions of the staves to the tubular body, and means operable from within said body for breaking said binder and urging said staves outwardly.

8. A caving arrester for oil well operations comprising a tubular body, a plurality of staves connected at their lower ends to the body, a binder to connect the upper portions of the staves to the tubular body, and

a wedge ring surrounding the tubular body and adapted for moving the staves outwardly.

9. A caving arrester for oil well operations comprising a tubular body, a plurality of staves connected at their lower ends to the body, a binder to connect the upper portions of the staves to the tubular body, a spreader ring surrounding the tubular body and adapted for moving the staves outwardly, and a tool operated pin extending across the body and connected to the spreader ring.

10. A caving arrester for oil well operations comprising a tubular body, a plurality of staves connected at their lower ends to the body, a binder to connect the upper portions of the staves to the tubular body, a spreader ring surrounding the tubular body and adapted for moving the staves outwardly, and a tool operated pin extending across the body and connected to the spreader ring, said body being provided with a slot receiving said pin and having a lower end wall in the path of travel of the pin to limit the descent of the pin.

11. A caving arrester and packer comprising a tubular body, a plurality of staves connected at their lower ends to the body, a frangible binder surrounding the staves and holding the same approximately parallel to the axis of the body, a spreader member arranged between the body and the staves and held in an elevated position by said binder, and a tool operated member connected to said spreader and adapted for forcing the spreader downwardly for moving the staves outwardly.

12. A caving arrester and packer comprising a tubular body, a plurality of staves connected at their lower ends to the body, a frangible binder surrounding the staves and holding the same approximately parallel to the axis of the body, a spreader member arranged between the body and the staves and held in an elevated position by said binder, and a tool operated member connected to said spreader and adapted for forcing the spreader downwardly for moving the staves outwardly, said body being provided with means limiting the descent of said tool operated member.

13. A caving arrester for oil well operations comprising a tubular body, a plurality of staves connected at their lower ends to the body, and means operable from within the body for positively actuating said staves outwardly to operative position.

14. A caving arrester for oil well operations comprising a tubular body, a plurality of staves connected at their lower ends to the body, and slidable means operable from within the body for positively actuating said staves outwardly to operative position.

In testimony whereof we affix our signatures.

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