Nov. 1, 1927. 1,647,630

F. R. HYER

WELL

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Fig. 1.

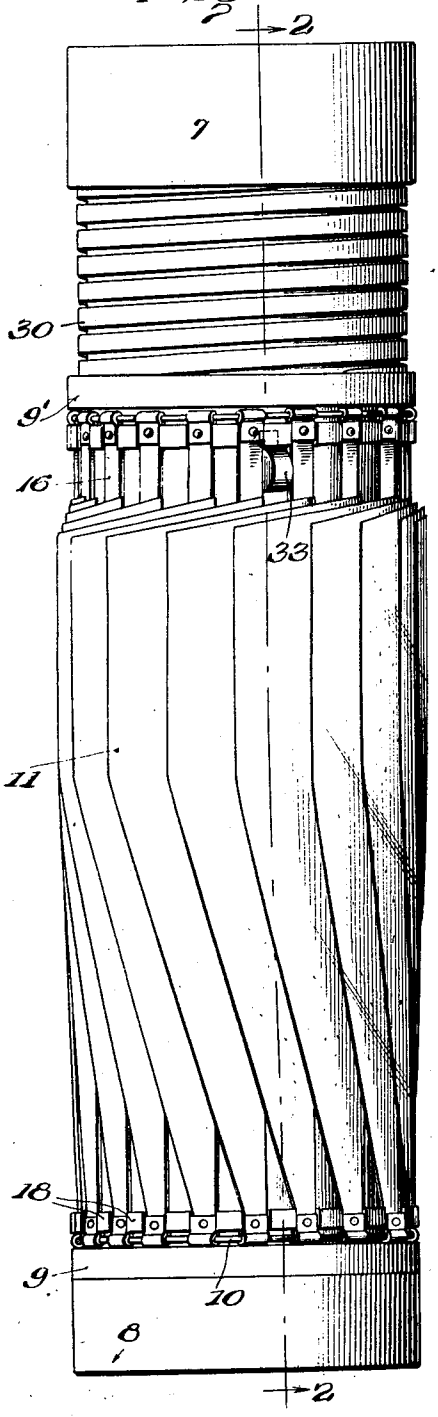
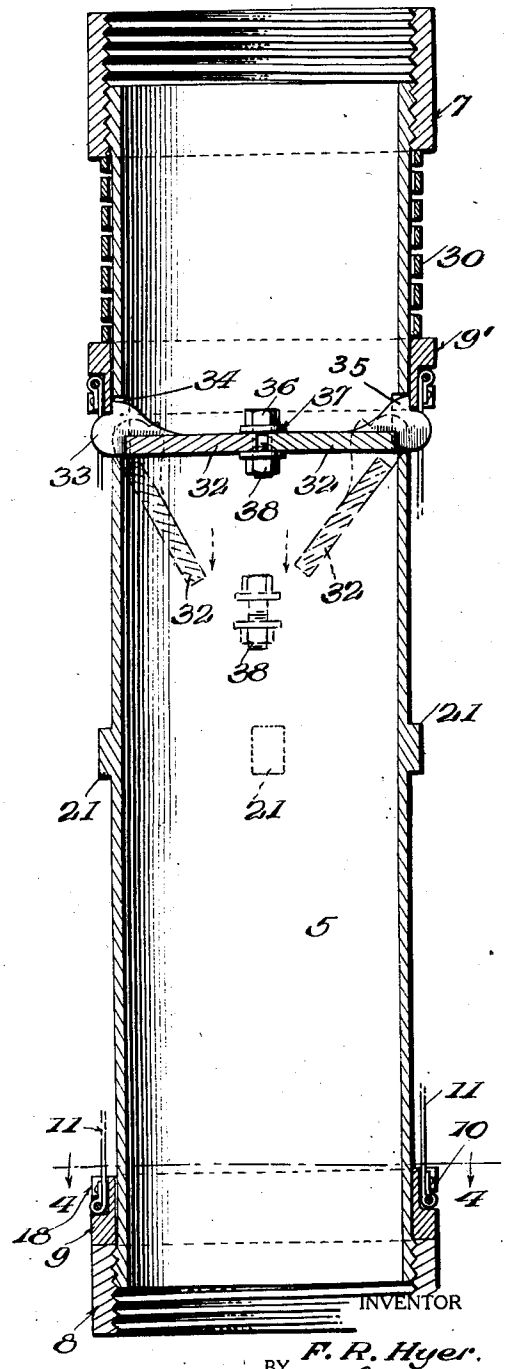


Fig. 2.



INVENTOR

BY F. R. Hyer.

ATTORNEY

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F. R. HYER

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Fig. 3.

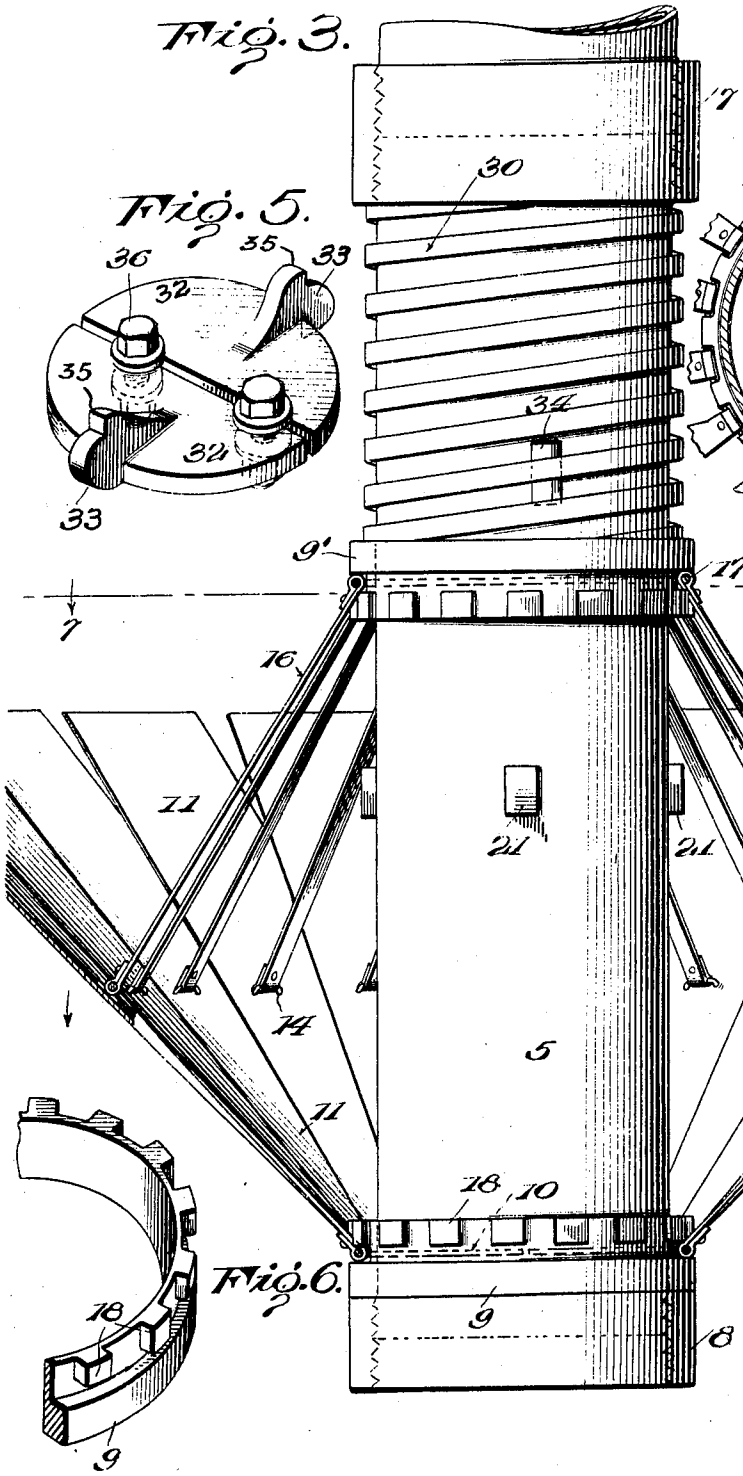


Fig. 4.

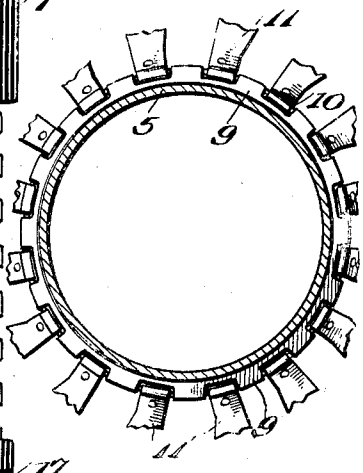


Fig. 5.

Fig. 6.

INVENTOR
F. R. Hyer.
BY
ATTORNEY

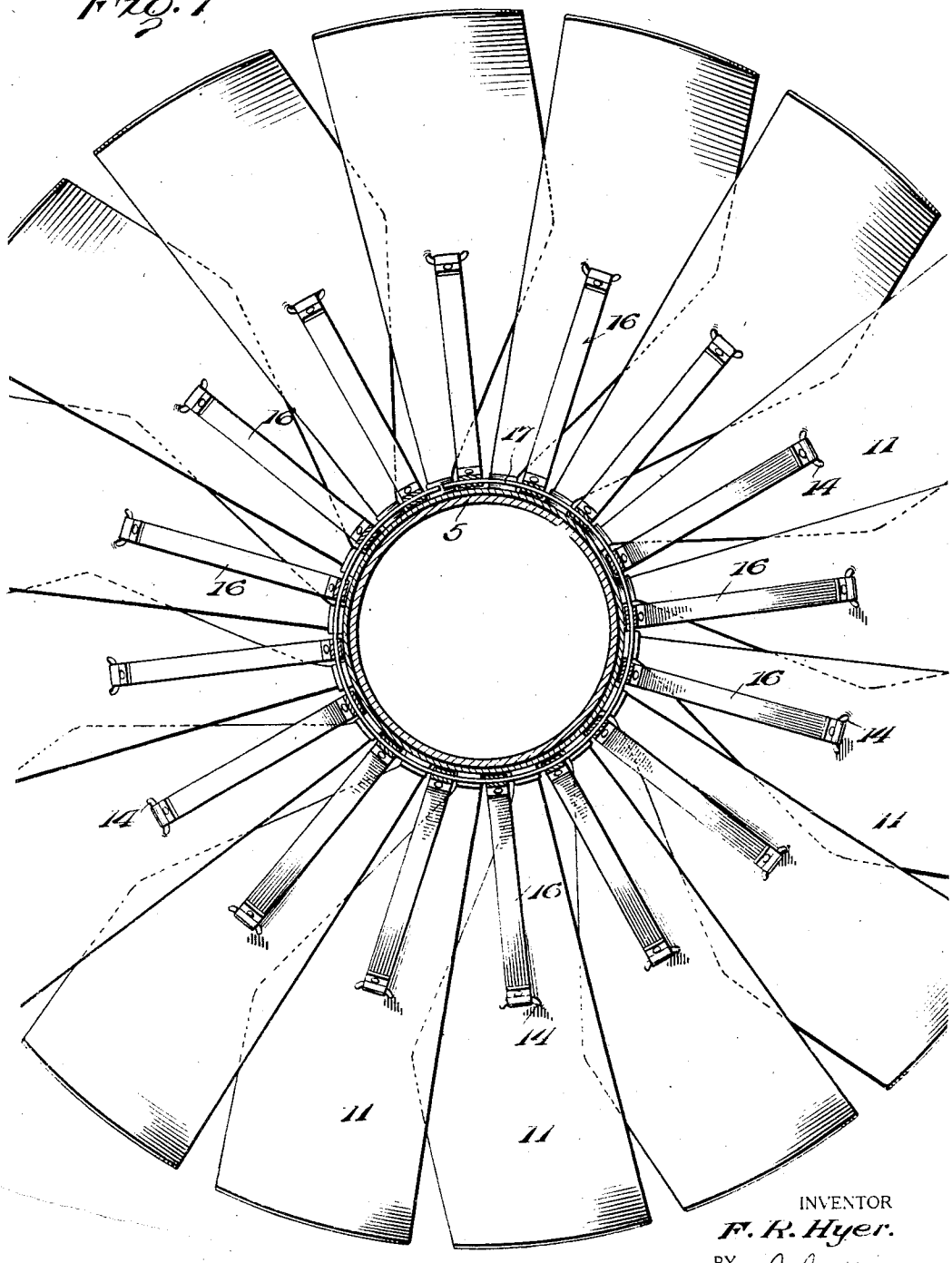
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F. R. HYER

WELL

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Fig. 7



INVENTOR
F. R. Hyer.
BY
A. G. Quesada
ATTORNEY

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UNITED STATES PATENT OFFICE.

FLOYD R. HYER, OF BOYNTON, OKLAHOMA.

WELL.

Application filed June 17, 1925. Serial No. 37,702.

This invention relates to wells and more particularly to a means to prevent cavy formations from dropping into the productive strata and interfering with production.

An important object of this invention is to provide a cavings catcher having simple means whereby the same may be accurately positioned at a desired point in a well and positively opened to arrest the descent of the cavings which would otherwise drop into the productive strata and seriously interfere with the flow of fluid.

A further object is to provide a cavings catcher which may without possibility of damage either to itself or the equipment of the well be raised or lowered preparatory to opening the same and which when opened will provide a substantially positive seal to prevent the cavings from dropping into the productive strata.

A further object of the invention is to provide a cavings catcher which may be employed in connection with standard equipment and which will therefore involve no radical departure from established and accepted practices in so far as the other well equipment is concerned.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevation of the improved cavings catcher in its closed position,

Figure 2 is a vertical sectional view through the improved cavings catcher, a sectional knockout disk being shown in its full and dotted line positions,

Figure 3 is a fragmentary side elevation of the improved cavings catcher in its open position so as to arrest the descent of cavy formations,

Figure 4 is a horizontal sectional view taken on line 4—4 of Figure 2,

Figure 5 is a perspective of a sectional knock-out disk embodied in the invention and which is employed to normally hold the parts in their folded positions,

Figure 6 is a fragmentary perspective of one of a pair of rings embodied in the invention,

Figure 7 is a horizontal sectional view taken on line 7—7 of Figure 3.

In the drawing wherein for the purpose of illustration is shown a preferred embodiment of the invention the numeral 5 designates a tubular body which may be incorporated in a string of casing or the like and lowered into a well to a point beneath or within a cavy formation directly above the productive strata so that when the improved cavings catcher is opened as will be fully described the descent of the cavings will be arrested.

Figure 3 plainly illustrates that the ends of the tubular body 5 may be provided with coupling members 7 and 8 by means of which the tubular body is connected to a string of casing. Figure 3 also illustrates that a ring 9 is mounted on the tubular body directly above and preferably in engagement with the coupling 8 and is provided with a holding wire or pivot element 10 to which the lower ends of an annular series of wings 11 are connected. When the wings are open as shown in Figures 3 and 7 the same are overlapped at their side edges so as to provide a firm stop or barrier to support and limit the descent of the cavings. The intermediate portions of the wings 11 have pivotal connection as indicated at 14 with connecting links 16, the upper portions of which are connected to a hinge member or holding wire 17 which may be the same as the wire 10 and which is positioned in an annular groove in a holding ring 9′. It will be seen with particular reference to Figures 3 and 6 that the rings 9 and 9′ are provided with an annular series of lugs 18 arranged in spaced relation to define a plurality of spaced recesses for the reception of the adjacent portions of the wings 11 and the links 16. The lugs 18 also form a means of holding the wires or hinge members 10 and 17 in position.

At this point it might be stated that the upper ring 9′ is movable on the tubular body 5 and when held in its elevated position as illustrated in Figure 1 will hold the links 16 and consequently the wings 11 closely about and in substantially parallel relation to the tubular body 5 so that the device may be raised or lowered to exactly the proper position in the well. Figure 3 illustrates that the descent of the ring 9′ is limited by a plurality of lugs 21 on the intermediate portion of the body 5. The lugs are in the path of travel of the ring 9′ and

consequently limit the downward movement of the ring 9′ and the spreading of the wings. When the ring 9′ is resting on the lugs 21 the wings 11 will be in their operative positions at approximately fifteen degrees above the horizontal. However, the wings may be positioned at any point desired without in any way departing from the spirit of this invention. Also an annular shoulder or other suitable stop may be employed in lieu of the lugs 21.

Attention is now directed to Figures 1 and 2 which plainly illustrate that a suitably stout helical spring 30 is confined between the ring 9′ and the coupling member 7 so that the moment the ring 9′ is released the spring will expand and move the parts to open position as fully illustrated in Figures 3 and 7. It will be seen that the coupling member 7 not only functions as such but as a stop or abutment for one end of the spring 30.

The upper ring 9′ is normally held in its elevated position as illustrated in Figures 1 and 2 by a knock-out disk consisting of separate sections 32 having lugs or ears 33 which extend through oppositely located openings 34 in the body and engage beneath the ring 9′ to hold the same up against the influence of the coil spring 30. The upper edges of the lugs 33 are provided with more or less triangular ears or projections 35 which contact with the inner side of the ring 9′ as shown in Figure 2.

The sections 32 of the knock-out disk are detachably connected by means of screw bolts 36 having washers 37 positioned on opposite sides of the sections 32. Nuts 38 are threaded on the bolts 36 to hold the sections 32 normally together.

In preparing to lower the apparatus into a well the same is incorporated in a string of casing and set or positioned as illustrated in Figure 1. That is to say the sectional knock-out disk is placed in position so that the wings will occupy their closed position as illustrated in Figure 1. This figure plainly illustrates that the wings do not protrude an objectionable extent when in their closed position and consequently the apparatus may be raised or lowered with freedom and without possibility of damage to the wings or any other part of the apparatus.

When the improved cavings catcher has been positioned properly with respect to the cavy formation a tool or other object is let down in the well to strike the knock-out disk and thereby separate the sections 32 of the same as illustrated in dotted lines in Figure 2. As soon as the sections 32 are separated the lugs 33 which, incidentally, are provided with curved outer edges will move inwardly through the openings 34 and the sections 32 will drop to the bottom of the well. This permits the spring 30 to immediately drive the ring 9′ down with a substantial force so that the wings are positively moved out to their operative positions as illustrated in Figures 3 and 7. When the wings are thus positioned they will provide a generous bearing surface and will collect and arrest the cavings from above so that the same cannot drop into the productive strata.

As stated in the objects of this specification by arresting the descent of the cavings the productive stratum is protected so that the flow of fluid is in no way interfered with.

A cavings catcher constructed in accordance with this invention may be easily embodied in standard equipment without an elaborate alteration of the equipment and without the exercise of unusual skill.

Having thus described the invention, what is claimed is:

1. A cavings catcher for wells comprising a body, wings pivotally associated with the body and increased in width toward the upper terminals thereof to form stops in the path of descent of cavings from the wall of the well, links connected to said wings, and means normally holding the links and wings in inoperative position.

2. A cavings catcher for wells comprising a body, wings pivotally associated with the body and having the upper terminal portions thereof increased in width and being free whereby the same may be moved outwardly into the path of descent of cavings from the wall of the well to arrest the descent of such casings, links connected to said wings, and means normally holding the links and wings in inoperative position in substantially parallel relation to the body.

3. A cavings catcher for wells comprising a body, wings pivotally associated with the body and having the upper terminals thereof increased in width and being free to be moved outwardly to form stops in the path of descent of material which becomes detached from the wall of the well above, links connected to said wings, means normally holding the links and wings in inoperative position in substantially parallel relation to the body, and a spring to move said links and wings outwardly to operative position upon the release of said means.

4. A cavings catcher for wells comprising a body, wings pivotally associated with the body, links connected to said wings for moving the same outwardly, a ring movable on said body and having connection with said links, and a knock-out member extending through said body and normally engaging said ring to hold the same in its inoperative position whereby to hold the wings and the links in substantially parallel relation to the body.

5. A cavings catcher for wells comprising a body, wings pivotally associated with the body, links connected to said wings for mov-

ing the same outwardly, a ring movable on said body and having connection with said links, a knock-out member extending through said body and normally engaging said ring to hold the same in its inoperative position whereby to hold the wings and the links in substantially parallel relation to the body, and a spring urging said ring to its operative position.

6. A cavings catcher for wells comprising a body, wings pivotally associated with the body, links connected to said wings for moving the same outwardly, a ring movable on said body and having connection with said links, a knock-out member extending through said body and normally engaging said ring to hold the same in its inoperative position whereby to hold the wings and the links in substantially parallel relation to the body, and a spring urging said ring to its operative position, said knock-out member consisting of detachably connected sections.

7. A cavings catcher for wells comprising a body, pivoted wings arranged about the body, links connected to the wings at points spaced from their lower ends, a ring movable on the body and having connection with said links, a spring urging said ring to operative position on said body whereby to move said wings to operative position to arrest the descent of cavings, and breakable means carried by the body and holding the ring in elevated position, there being means on the body to limit the movement of the ring under the influence of the coil spring.

8. A cavings catcher for wells comprising a tubular body having openings, a sectional knock-out member having lugs extending through said openings, a ring mounted on said body and normally held in an inoperative position by said lugs, a spring urging said ring to operative position, and cavings arresting units having connection with said ring.

9. A cavings catcher for wells comprising a tubular body having openings, a sectional knock-out member having lugs extending through said openings, a ring mounted on said body and normally held in an inoperative position by said lugs, a spring urging said ring to operative position, material arresting units having connection with said ring, said knock-out member consisting of a pair of sections and means detachably connecting the sections.

10. A cavings catcher for wells comprising a tubular body having openings, a sectional knock-out member having lugs extending through said openings, a ring mounted on said body and normally held in an inoperative position by said lugs, a spring urging said ring to operative position, material arresting units having connection with said ring, said knock-out member consisting of a pair of sections and means detachably connecting the sections, there being means to limit the movement of said ring.

11. A cavings arrester comprising a ring, wings pivotally associated with said ring and adapted to be moved outwardly to form a barrier to stop the descent of cavy formations, links connected to said wings, a second ring having connection with said links, breakable means engaging one of said rings to normally hold the same in an inoperative position, and a spring to urge one of said rings to operative position immediately upon being released.

12. A cavings arrester comprising a tubular body having stops, a ring mounted on said body and engaged with one of said stops, wings pivotally connected to said ring, means for normally holding said wings in overlapped position about said body, and a spring to move the wings to material arresting position immediately upon being released, the other one of said stops constituting an abutment for said spring.

13. A cavings arrester for use in wells, comprising an expansible cavings arresting member and having the upper terminal thereof free whereby the same may be moved outwardly to an inclined position to catch material dropping from above, a restraining device for releasably holding the cavings arresting member in collapsed position, and means for urging the cavings arresting member to expanded position upon the release of said restraining device, there being means limiting the expansion of said cavings arresting member.

14. A cavings arrester for use in wells, comprising a hollow body, an expansible cavings arresting member arranged about the body and adapted to be opened at the upper portion thereof to collect and arrest the descent of loose material dropping from above to limit the descent of material from above, a breakable restraining device holding the expansible cavings arresting member in collapsed position about the body, said restraining device being partly within the body whereby the same may be broken by an object lowered from the surface for releasing the expansible cavings arresting member, and a spring for moving the expansible cavings arresting unit outwardly upon the release of the same.

FLOYD R. HYER.