Aug. 27, 1940. B. W. McCUNE 2,212,784

WELL CASING PERFORATION CLEANER

Filed Feb. 24, 1940

Fig. 1

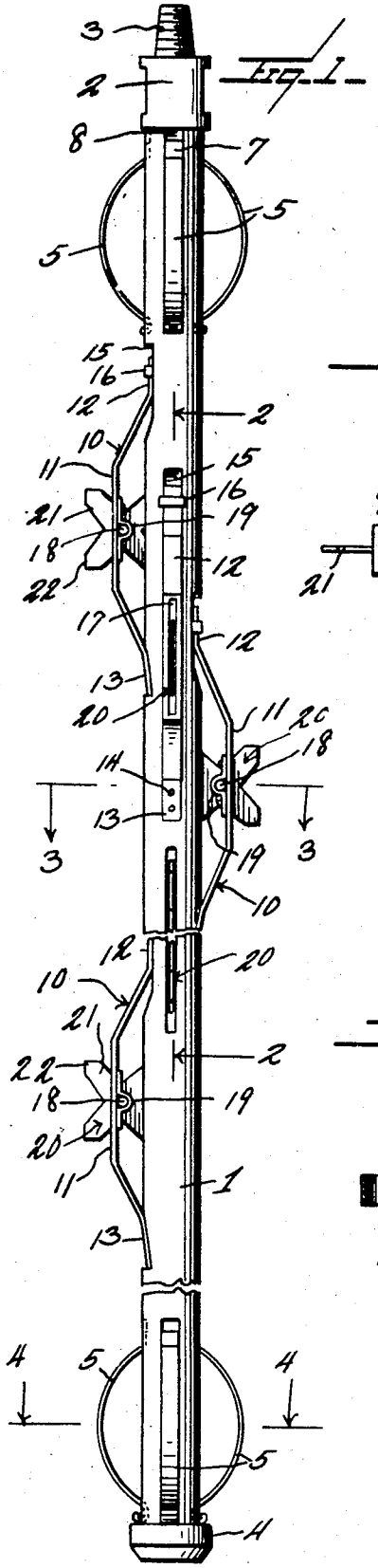


Fig. 2

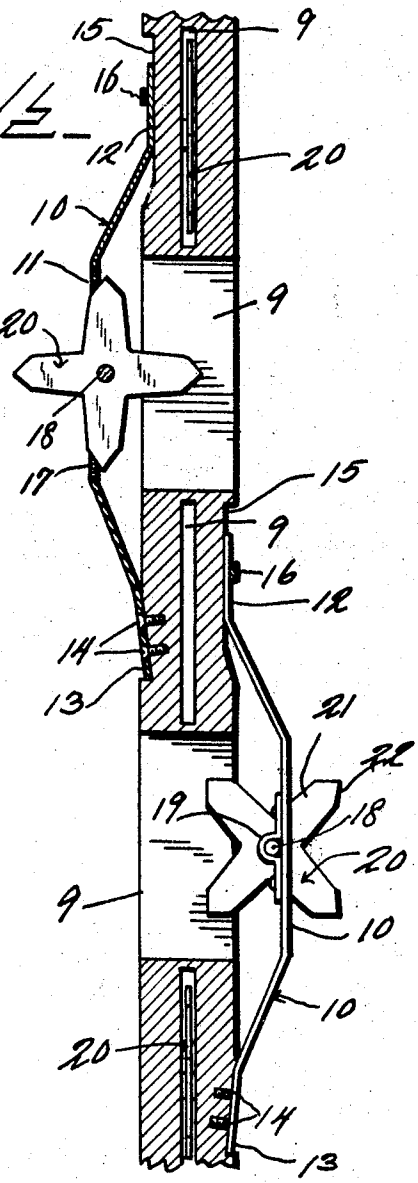


Fig. 3

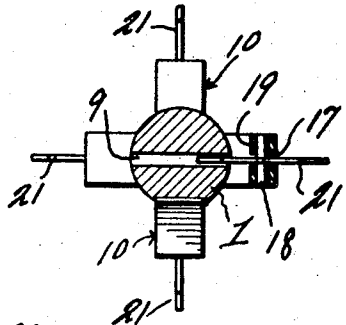
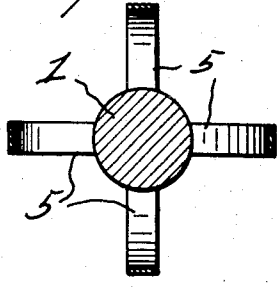


Fig. 4



Inventor

B. W. McCune

By Watson E. Coleman

Attorney

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WELL CASING PERFORATION CLEANER

Burton W. McCune, Bakersfield, Calif.

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4 Claims. (Cl. 166—18)

This invention relates to the class of well drilling apparatus and pertains particularly to an improved perforation cleaner.

In the operation of oil wells, the well casing in the area from which the oil is drawn is provided with strainer perforations which function to permit the oil to pass through without allowing sand or stones to enter the casing, and these perforations frequently become filled up or clogged and have to be opened so that the desired flow of oil may be maintained.

The present invention has for its primary object to provide a cleaner for such casing perforations which will function efficiently to remove material which has filled up the perforations, without puncturing or otherwise damaging the casing in which the perforations are formed.

Another object of the invention is to provide a perforation cleaner in which the cleaning units forming a part of the cleaner structure are constantly maintained with firm pressure against the inner surface of the casing to be projected as may be necessary when points of the units pass over perforations with sufficient force to quickly and thoroughly remove sand, rocks or other material from the opening.

A still further object of the invention is to provide a well casing perforation cleaner consisting of a carrier body adapted to be moved up and down in the casing, to which are attached a plurality of resilient loops which are bowed outwardly from the carrier toward the casing and which support rotatable pointed units in such a position that the points thereof will be forcibly extended through the casing perforations by the resilient loops when such points come into position before the casing perforations, thereby punching out any material which may be secured or wedged in the perforation.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawing forming part of this specification, with the understanding, however, that the invention is not to be confined to any strict conformity with the showing of the drawing but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawing:

Fig. 1 is a view in elevation of the perforation cleaner embodying the present invention, the middle portion of the same being broken away.

Fig. 2 is a longitudinal sectional view through a portion of the cleaner structure taken on the line 2—2 of Fig. 1.

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

Fig. 4 is a transverse section taken on the line 4—4 of Fig. 1.

Referring now more particularly to the drawing, the numeral 1 generally designates the body of the perforation cleaner structure which consists of a rod of substantial length, which is preferably of circular cross-section, as shown. Upon the upper end of this rod is a head 2 provided with a threaded stem 3 by means of which a rod line may be coupled to facilitate raising and lowering the body in the well casing. The lower end of the body may have a finishing off foot piece 4 attached thereto or formed integrally therewith.

Adjacent the upper and lower ends of the body there are secured in equi-distantly spaced relation thereabout, the outwardly bowed resilient guide springs 5, each of which is preferably formed of a strip of resilient band-like metal having one end looped, as indicated at 6, to be pinned or otherwise suitably hingedly secured in a receiving recess in the wall of the body while at its other end it is straightened out to provide a foot piece 7 which is slidably engaged in a channel 8 formed longitudinally in the body. As will be readily apparent, these four guide springs at the upper and lower ends of the body 1 function to maintain the body in the center of the well casing, the springs yielding as the body is inserted to adjust themselves to the casing diameter.

Between the upper and lower groups of guide springs, the body 1 is provided with longitudinally spaced, longitudinally extending through slots 9, here shown as arranged or divided into two groups, those of one group being all disposed in a common plane which is perpendicular to a plane common to those of all of the other groups. As shown clearly in Fig. 2, the slots of one group alternate with the slots of the other group, thus providing for the novel arrangement of the perforation cleaner units about to be described.

Secured to the body 1 is a series of outwardly bowed spring carriers, each of which is indicated generally by the numeral 10. Each of these carriers consists of a relatively long strip of resilient band-like material which is arranged to extend longitudinally of the body and to extend

longitudinally of and over a side of an opening 9. These carriers are shaped so as to have a central or intermediate portion 11 which is offset from a sliding foot portion 12 formed at one end and a fixed foot portion 13 formed at the opposite end and the fixed foot portions of the carriers are each secured by screws 14, as shown in Fig. 2, within a suitable recess below the end of the slot over which the carrier lies while above the same slot, the wall of the body is provided with a guide groove 15 in which the sliding or movable foot portion of the carrier positions, the sliding foot portion being maintained in place in its guide groove by a guide band or loop 16 which is secured across it and across the groove in which it is located. Thus it will be seen that each carrier has its offset intermediate portion 11 disposed over and longitudinally of one side of a slot 9 of the tool body 1, and that this offset portion of the carrier may be moved relatively to the body under the application of pressure.

Each carrier 10 is provided in the offset central portion 11 with a longitudinal slot 17 across which extends, upon the inner side of the carrier, a pivot pin 18 which is maintained in position by the engagement across its ends of bearing loops 19. Each of these pivot pins carries a pointed wheel indicated generally by the numeral 20, such wheel having a series of arms 21, each of which terminates in a point 22. Each of the wheels is formed of flat material so that the wheel may rotate in the relatively narrow adjacent slot 9. By this mounting arrangement for the pointed wheels, it will be readily seen that each point of each wheel may be brought into a position where it extends directly radially with respect to the body 1 on which it is carried.

In the operation of the present tool, the body is inserted into the well casing, being centered by the upper and lower groups of spring guides 5 and as it is lowered in the casing, the points of the wheels will engage the wall of the casing so that the wheel will turn and the spring carriers for the wheels will be forced inwardly so as to accommodate the wheels to the casing diameter. When the perforated area of the casing is reached, the points of the wheels as they come into line with the casing perforations, will be forced outwardly by the spring carriers through the perforation and will thus function to punch out any sand or stones which may be stuck in the opening. As the end of the perforation is reached by the end of the pointed arm, the wheel will turn and will then continue to rotate against the inner side of the casing until another perforation is reached and is in the proper position for the projection of a point of the wheel therethrough, whereupon the punching operation will be repeated for the removal of material from the opening.

It will be noted that whereas the carrier springs are of sufficient strength to effectively punch out material which may be stuck in the perforations, they are not of such strength as to cause the points of the wheels to puncture or otherwise damage the casing walls, so that the device will not produce new perforations in the casing but will merely operate to clean out those which are already formed therein.

It will also be noted that by arranging the slots 9 in the manner stated, the cleaner wheels can be disposed around the body 1 substantially in a spiral path, thus insuring that as the body 1 is lowered in the casing, the casing wall entirely around the body will be engaged at some point by an arm of a wheel.

What is claimed is:

1. A well casing perforation cleaner, comprising an elongated body adapted to be lowered longitudinally into a well casing, a plurality of wheel members each having a number of pointed arms, and means for supporting said wheel members on said body throughout the length thereof for rotation on axes extending transversely of the body and for movement radially with respect to the body independently of its rotary motion.

2. A well casing perforation cleaner, comprising a rod-like body, means at one end of the body facilitating the attachment of a supporting line therewith, resilient means adjacent each end of the body for centering the same longitudinally in the casing, a plurality of carriers secured to the body between said centering means and each being normally resiliently held in spaced relation with the body, and a flat wheel having a plurality of pointed arms rotatably supported upon each carrier for turning upon an axis extending transversely of the rod body.

3. A well casing perforation cleaner, comprising a rod-like body, means at one end of the body facilitating the attachment of a supporting line therewith, resilient means adjacent each end of the body for centering the same longitudinally in the casing, a plurality of carriers secured to the body between said centering means and each being normally resiliently held in spaced relation with the body, a flat wheel having a plurality of pointed arms rotatably supported upon each carrier for turning upon an axis extending transversely of the rod body, and said rod body having a slot cut therein and extending longitudinally thereof beneath each carrier to receive the arms of the adjacent wheel as the latter turns.

4. A well casing perforation cleaner, comprising a rod body, means at one end of the same for coupling a suspension line thereto, said rod body having a plurality of longitudinally spaced, longitudinally extending slots formed therein, an elongated bowed carrier extending longitudinally of and over each slot, each carrier having one end secured against movement to the body and having its other end slidably engaging the body, each carrier having an intermediate portion which is offset from the body, the offset portion of each carrier having a longitudinal slot therein alining with the adjacent body slot, a pivot pin carried by an intermediate portion of each carrier and extending across the slot thereof, a flat wheel having a plurality of pointed arms rotatably supported upon each pin and extending through the adjacent carrier slot, the body slot adjacent each wheel receiving the ends of the arms thereof as the wheel is rotated, and means at each end of the rod body for centering the same in a well casing.

BURTON W. McCUNE.