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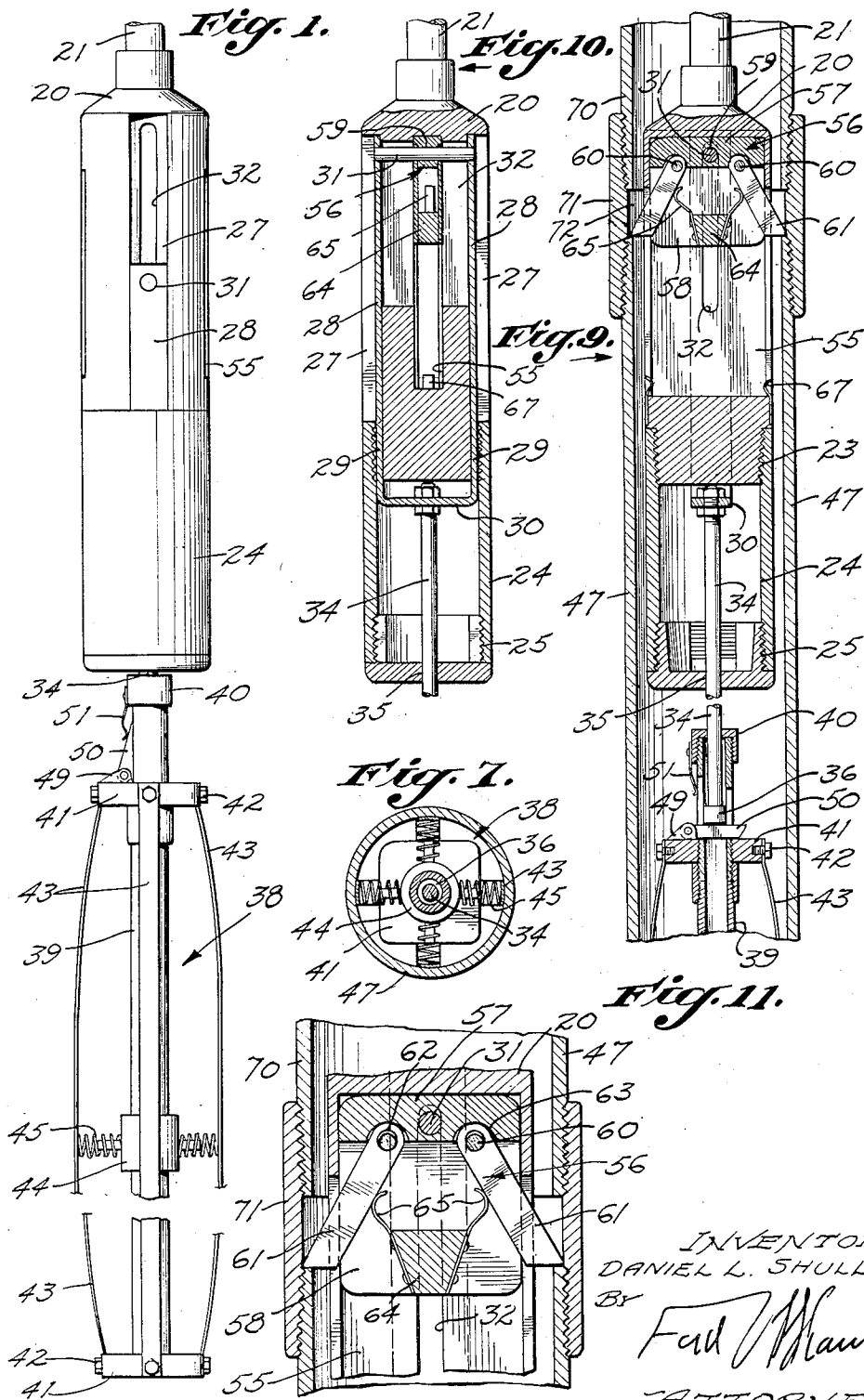
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COLLAR LOCATOR

Filed July 16, 1927

2 Sheets-Sheet 1



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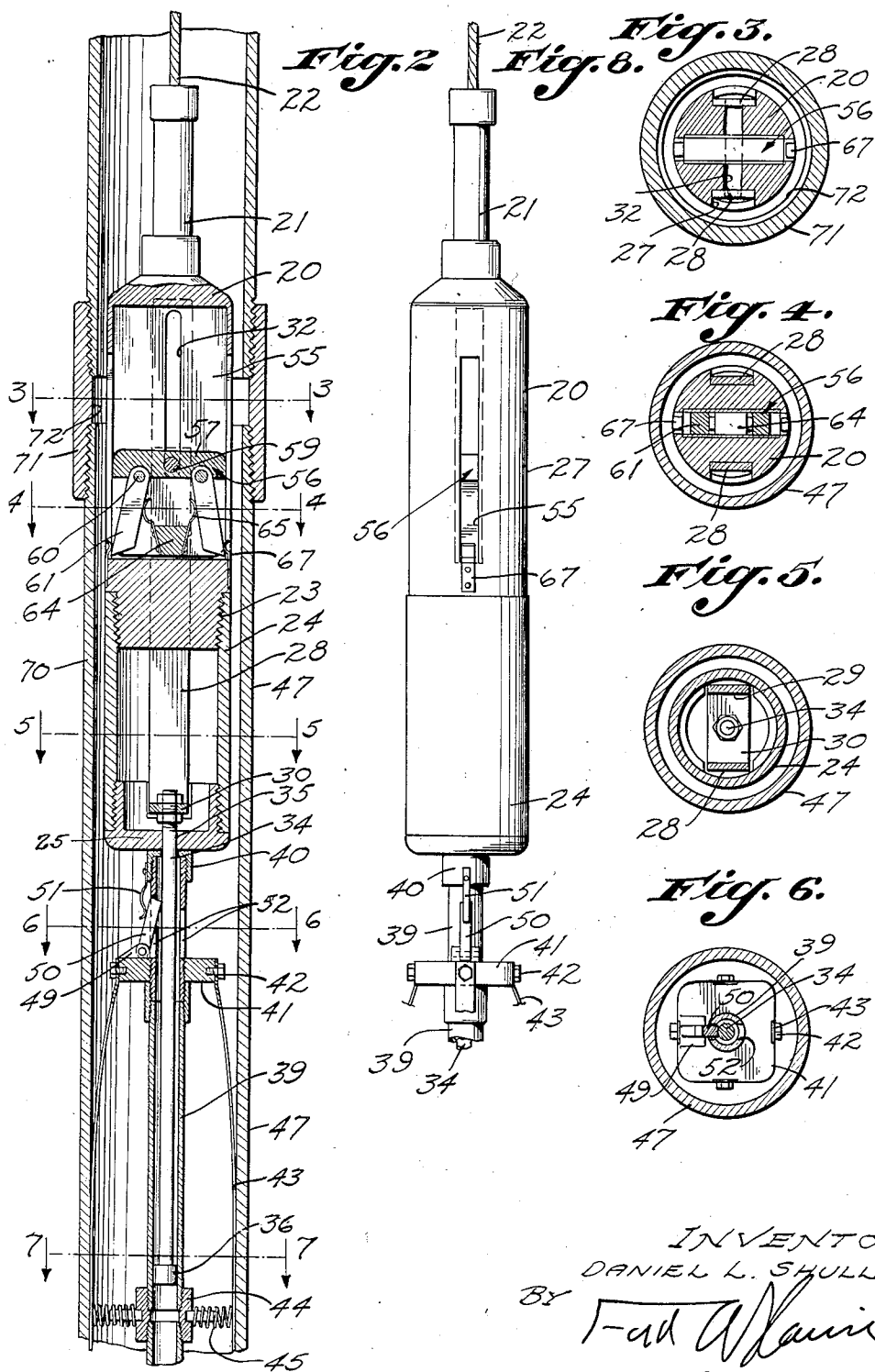
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INVENTOR.
DANIEL L. SHULL
BY *Paul A. Harris*
ATTORNEY.

UNITED STATES PATENT OFFICE

DANIEL L. SHULL, OF BAKERSFIELD, CALIFORNIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO SHELL PERFORATING COMPANY, A CORPORATION OF NEVADA

COLLAR LOCATOR

Application filed July 16, 1927. Serial No. 206,280.

My invention relates to the well drilling industry and relates to a method and apparatus whereby a collar may be located. It should be understood nevertheless that the invention is of utility in other arts. In this specification the invention will be described in connection with the oil drilling industry.

It is the general object of my invention to provide an apparatus which may be inserted into a string of pipe or casing and operated so that the openings between the pipe lengths of the string may be located.

A further object of the invention is to provide an apparatus of this character which is operated by a reciprocatory movement.

A still further object of the invention is to provide an apparatus of this character in which no parts will be locked in protruding position. A further object of the invention is to provide an apparatus of this character which is adapted to locate abrupt irregularities in casings of a well string.

Other objects and advantages will be pointed out in the following description.

Referring to the drawings in which I illustrate a preferred embodiment of the invention.

Fig. 1 is an elevational view.

Fig. 2 is a section showing the parts in non-operative position.

Figs. 3, 4, 5, 6, and 7 are views taken as indicated by the corresponding section lines of Fig. 2.

Fig. 8 is an elevational view taken at right angles to Figs. 1 and 2.

Fig. 9 is a section of the upper portion of the apparatus showing the parts in operative position.

Fig. 10 is a section taken at right angles to Fig. 9.

Fig. 11 is an enlarged detail of the locator elements of the invention.

Referring to the drawings in detail the invention has a body 20 having a connecting means 21 at the upper end thereof, by means of which the apparatus is suspended from the lower end of a flexible member such as a cable 22. Threadedly secured at 23 to the lower end of the body 20 is a sleeve 24. The lower end of this sleeve 24 is closed by a closure

member 25, as shown. Formed vertically on opposite sides of the body 20, as illustrated in Figs. 1, 3, 4 and 5, are channels 27. Adapted to extend into these channels 27 are vertical arms 28 of a yoke 29. The connecting portion 30 of this yoke 29 rests inside the sleeve 24. Carried by the upper ends of the arms 28 is a cross-bar 31. This cross-bar 31 extends through a vertical slot 32 which is formed in the upper part of the body 20.

Secured to the connecting portion 30 of the yoke 29 is a vertical rod 34 which projects downward through an opening 35 in the closure member 25. The lower end of this rod 34, as shown in Figs. 2 and 9, is provided with a head 36. Located below the structure just described is a friction device indicated by the numeral 38. This friction device as shown best in Figs. 2 and 9, has a central tube 39 into which the lower end of the rod 34 extends. The upper end of the tube 39 is provided with a collar 40 to prevent the head 36 from being removed from the tube. Secured to the tube 39 in spaced relation are plates 41, the upper plate 41 being located a short distance below the upper end of the tube 39, and the lower plate 41 being located at the lower end of the tube 39. Secured to these plates 41 by cap screws 42 are spring arms 43. The central part of the tube 39 is provided with a collar 44 and compressed between the collar 44 and the spring arms 43 are compression springs 45 which push the spring arms 43 outward so that they frictionally engage the casing 47 shown in Figs. 2 to 7 and Fig. 9. When the apparatus is in non-operative position and is being lowered into the well, the upper end of the tube 39 is engaged by the closure member 25 and is forced downward against the frictional resistance of the engagement of the spring arms and the casing.

As illustrated best in Figs. 2 and 9, the upper plate 41 is provided with ears 49 to which a latch-bar 50 is pivoted. A flat spring 51, as illustrated in Fig. 2, engages the latch-bar 50 and forces it inward through one of a pair of slots 52 formed in the tube 39 against the rod 34. When the rod 34 is moved upward relative to the friction device 38 the head 36

may move into the upper part of the tube 39, and the latch-bar 50 will swing into the position shown in Fig. 9. When this occurs, the head 36 cannot move from its position in the upper part of the tube 39. If the body 20 is then lowered, the friction device 38 will prevent the rod 34 and the yoke 29 from moving downward. At this time there will be a relative movement between these parts and the body and they will move from the position shown in Fig. 2 into the positions shown in Figs. 9 and 10. The bar 31 carried by the arms 28 moves from a position in the lower part of the slot 32 into a position in the upper part of the slot 32.

Formed vertically in the upper part of the body 20 at right angles to the slot 32 is a transverse opening 55. Resting in the transverse opening 55 is a head 56 which consists of a block 57 to which side plates 58 are secured. The block 57 is provided with an opening 59 through which the rod 31 extends. By this arrangement the head 56 is moved vertically in the opening 55 with the bar 31. Carried by the head 56 are pivot-bars 60 to which locator arms 61 are pivoted. The locator arms have openings 62 through which the pivot-bars 60 extend, these openings being of a larger diameter than the pivot-bars. The block 57 of the head 56 is provided with arcuated shoulders 63 which take all of the thrust imposed by the locator arms 61. The pivot-bars 60 take no thrust but serve only as a means for retaining the upper ends of the locator bars in proper position. Secured to a web portion 64 supported near the lower part of the side plates 58 are extending-springs 65. These extending-springs 65 engage the locator arms 61 and press outward on them, tending to hold them in extended position. Carried by the body 20 at the lower part of the transverse opening 55 are lock members in the form of flat springs 67, which, as shown in Fig. 2, engage the lower end of the locator arms 61 when the apparatus is in non-operative position and retain them in retracted position against the force applied by the extending springs 65.

The operation of my invention is as follows:

In Figs. 1 and 2 the apparatus is shown in non-operative position, in which position it is lowered through the casing 47 to the location where it is desired to locate the exact position of the collars. When this point has been reached the operator pulls the cable 22 upward, moving the body 20 therewith. The friction device, as previously explained, will not move upward with the body 20; consequently there is a relative movement between these parts. The yoke 29 and rod 34, however, move upward until the head 36 carried by the rod 34 engages the collar 40 at the upper end of the tube 39.

When the head 36 moves above the latch-

bar 50, the latch-bar swings into the position shown in Fig. 9. The cable 22 is then lowered so that the body moves downward. The friction device remains stationary and the rod 34 and yoke 29 also remain stationary in view of the fact that the latch-bar 50 has locked the head 36 in the upper part of the tube 39. There will, therefore, be a relative movement between the yoke 29 and body 20, as previously explained, and as the body 20 moves downward with relation to yoke 29 the slot 32 is moved with relation to the rod 31 and the relative motion of the parts finally terminating when the upper end of the transverse opening 55 of the body 20 engages the block 57. During the movement of the body 20 relative to yoke 29 the rod 31 holds the head 56 stationary while the body moves downward from the position shown in Fig. 2 into the position shown in Fig. 9. When the body is moved downward, the locator arms 61 are disengaged from the lock springs 67 and they are urged outward by the extending-springs 65.

The device is now in condition to locate the collars. As illustrated in Figs. 2 and 9, the casing 47 consists of lengths of pipe 70 which are secured together by collars or couplings 71. The adjacent ends of the lengths of pipe 70 always have a space or pocket 72 between them which provides an irregularity in the contour of the interior of the casing 47. This space or pocket 72 may be of the size shown in the drawings or may be very small. The operator lowers the cable 22 until the locator arms 61 extend into a space or pocket 72. The outer ends of the locator arms will engage the shoulder formed by one of the lengths of pipe 70 which will interfere with the lowering of the apparatus. The operator of the apparatus by close observation will be cognizant of any disturbances which occur and will know that a collar has been located. The cable 22 is measured as it is lowered into the well so that the operator will know the exact depth of the apparatus below the surface of the ground. Where the space or pocket 72 is as large as shown in the drawings the device cannot be lowered beyond the position shown in Fig. 9. The operator then raises the apparatus a distance equal to a length of pipe, the locator arms being squeezed inward so that they may pass through the casing. The operator then lowers the cable again until a disturbance caused by the locator arms 61 moving into a space or pocket 72 indicates that another collar is found. The operator will then take a reading of the depth of the collar and moves upward to the next collar.

It should be understood that the spaces or pockets 72 or irregularities provided at the collars are not required to be as large as shown in the drawings. A very small irregularity in the surface of the interior of the casing

may be found. In some cases it may be desirable to use sensitive devices at the upper end of the cable for registering any engagement of the locator arms 61 in irregularities. The invention is not limited to the use of finding collars but may be used for finding other parts of a string. The invention may be used for determining whether or not the shoe of the casing has been lost. It is also useful for finding the welded seams of stovepipe casing which is sometimes used in place of the wrought iron casing.

In the foregoing description I have illustrated a preferred embodiment of the invention. The important part of the invention is the parts which function to indicate to the operator irregularities in the contour of the casing such as are formed at the joints or where any parts are connected together. It should be understood that the principle of this invention may be embodied in various physical reflexes, and therefore I do not wish to be limited to the exact design in this application. A very important part of the invention is that the locator arms 61 are released and are operated by a reciprocatory motion.

I claim as my invention:

1. In a locator of the class described adapted to be moved through a casing, the combination of a body, a head movably carried by said body, locator arms extendable to a diameter greater than the casing bore, means whereby said locator arms are swingably supported by said head, said locator arms being swingable between retracted and extended position, lock means for retaining said locator arms in retracted position, and means operative for releasing said locator arms from said lock means.
2. In a locator of the class described adapted to be moved through a casing, the combination of a body, a head movably carried by said body, locator arms pivoted to said head, said locator arms being swingable between retracted and extended positions, lock means carried by said body for releasably holding said locator arms in retracted position, extending means tending to urge said locator arms into extended position, and means operative for reciprocally moving said body relative to said head so as to release said locator arms from said lock means.
3. In a locator of the class described adapted to be moved through a casing, the combination of a suspension means, a body suspended from said suspension means, a head movably carried by said body, locator arms pivoted to said head, said locator arms being pivoted to said head so that their lower extremities swing below said pivots between retracted and extended positions, lock means carried by said body for releasably holding said locator arms in retracted position, extending means carried by said head tending to urge said locator arms into extended position, a friction means, a lost motion means operatively connecting said head and friction means, and a latch means mounted on said friction means and operative for rendering said lost motion means inoperative.
4. In a locator of the class described adapted to be moved through a casing, the combination of a body, a head movably carried by said body, locator arms extendable to a greater diameter than the bore of the casing, means whereby said locator arms are pivotally supported by said head, lock means for said locator arms, and means for controlling the operation of said lock means.
5. In a locator of the class described adapted to be moved through a casing, the combination of a body, a head movably carried by said body, locator arms extendable to a diameter greater than the casing bore, means whereby said locator arms are pivotally supported by said head, a spring means for extending said locator arms, lock means for locking said locator arms, and means for controlling the operation of said lock means.
6. In a locator of the class described adapted to be moved through a casing, the combination of a body, a head movably carried by said body, locator arms extendable to a diameter greater than the casing bore, means whereby said locator arms are pivotally supported by said head, said locator arms being operable between retracted and extended positions, lock means for retaining said locator arms in retracted position, and means operable for releasing said locator arms from said lock means.
7. In a locator of the class described adapted to be moved through a casing, the combination of a body, a suspension means for the body, a head movably carried by said body, locator arms extendable to a diameter greater than the casing bore, pivotal means whereby said locator arms are supported by said head, said locator arms being disposed to swing about their pivots between retracted and extended positions, lock means for retaining said locator arms in retracted position, means operative for releasing said locator arms from said lock means, and extending means for moving said locator arms into extended position.
8. In a locator of the class described adapted to be moved through a well casing, the combination of a body, a head movably carried by said body, suspension means extending to the surface of the ground above the well for supporting said body, locator arms, pivotal means whereby said locator arms are swingably supported by said head, said locator arms being disposed to swing about their pivots between retracted and extended positions, lock means for retaining said locator arms in retracted position, means operative for releasing said locator arms from said lock

means, and extending means for moving said locator arms into extended position.

9. In a locator of the class described adapted to be moved through a casing, the combination of a body, a head movably carried by said body, locator arms pivoted to said head, said locator arms being operable between retracted and extended positions, lock means carried by said body for releasably holding said locator arms in retracted position, extending means tending to urge said locator arms into extended position, and means operative for moving said body relative to said head so as to release said locator arms from said lock means.

10. In a locator of the class described adapted to be moved through a casing, the combination of a suspension means, a body suspended thereby, a head movably carried by said body, locator arms pivoted to said head, said arms being operable between retracted and extended positions, lock means for releasably holding said locator arms in retracted position, extending means carried by said head and tending to yieldingly urge said locator arms into extended position, and a friction means operatively connected to said head.

11. In a locator of the class described adapted to be moved through a casing, the combination of a suspension means, a body suspended from said suspension means, a head movably carried by said body, locator arms pivoted to said head, said locator arms being operable between retracted and extended positions, lock means carried by said body for releasably holding said locator arms in retracted position, extending means carried by said head tending to urge said locator arms into extended position, a friction device adapted to yieldingly and slidably engage the inner surface of the casing, a lost motion means operatively connecting said head and friction device, and a latch means for said lost motion means.

12. In a locator of the class described adapted to be moved through a casing, the combination of a suspension means, a body suspended thereby, a head movably carried by said body, locator arms pivoted to said head, said locator arms being pivoted to said head so that they may swing about their pivots between retracted and extended positions, locking means connected to said body for releasably holding said locator arms in retracted position, a spring means yieldingly urging said locator arms into extended position, and a friction means yieldingly engaging the side walls of the casing and operatively connected to said head, whereby the suspension means may be operated to cause a relative movement between said body and head for releasing the locator arms from said lock means.

13. A locator adapted to be moved through

a casing and including the combination of a slotted hollow body, a head slidably mounted in said body, locator arms pivotally mounted in said head and arranged when said head is at the upper end of said body to project through the slots in said body, a spring means arranged to yieldingly urge the locator arms into extended position, a yoke having upwardly directed arms pivotally connected at their upper ends to said head, the yoke at its lower end provided with an operating rod having a head, a friction device adapted to yieldingly and slidably engage the inner surface of the casing and having a tube into which said yoke rod with its head is slidably inserted, said tube having means cooperating with said head for preventing said rod from being totally withdrawn from said tube, a latch means arranged to automatically lock said rod in the upper end of said tube when the lower end of said rod has been moved into the upper end of the tube.

14. A locator adapted to be moved through a casing and including the combination of a slotted hollow body arranged to be raised or lowered through the casing, a locator head slidably mounted in said body, locator arms pivotally mounted in said head and arranged when extended to project through said slots in said body, a spring means arranged to yieldingly urge said locator arms into extended position, means for retaining said locator arms in retracted position when said head is in its lowermost position in said body, a yoke pivotally connected at its upper ends to the said locator head and at its lower end provided with an operating rod, a friction device adapted to yieldingly and slidably engage the inner surface of the casing and having a tube into which said yoke operating rod is slidably mounted, and means carried by said tube for preventing said rod from being totally withdrawn from said tube, and a latch means mounted upon said friction device in operative relation with said tube and rod and arranged to automatically lock said rod in the upper end of said tube when the lower end of said rod is in the upper end of the tube.

In testimony whereof, I have hereunto set my hand at Bakersfield, California, this 11th day of July, 1927.

DANIEL L. SHULL.