

June 27, 1944.

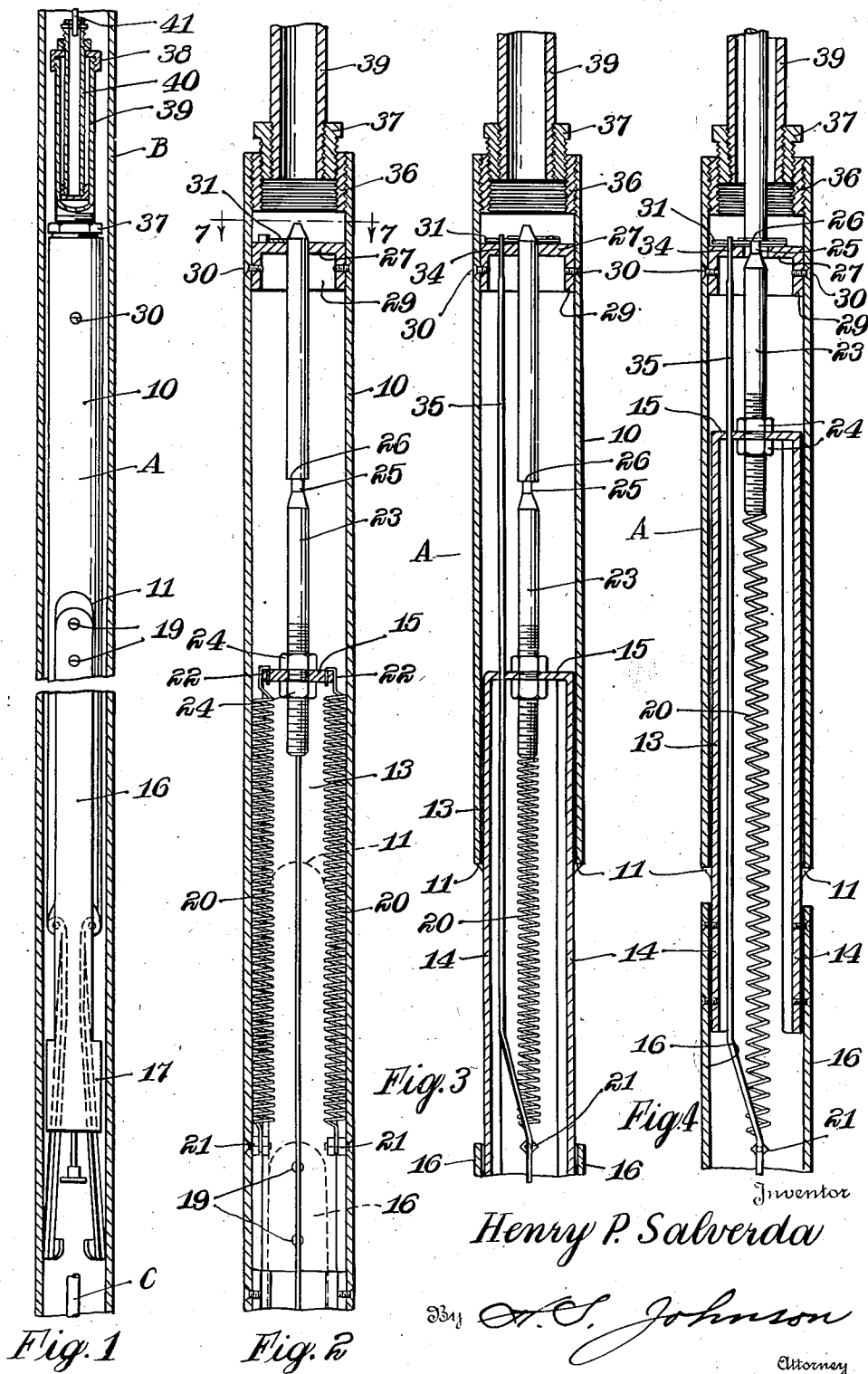
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WELL TOOL EXTRACTING DEVICE

Filed April 29, 1942

2 Sheets-Sheet 1



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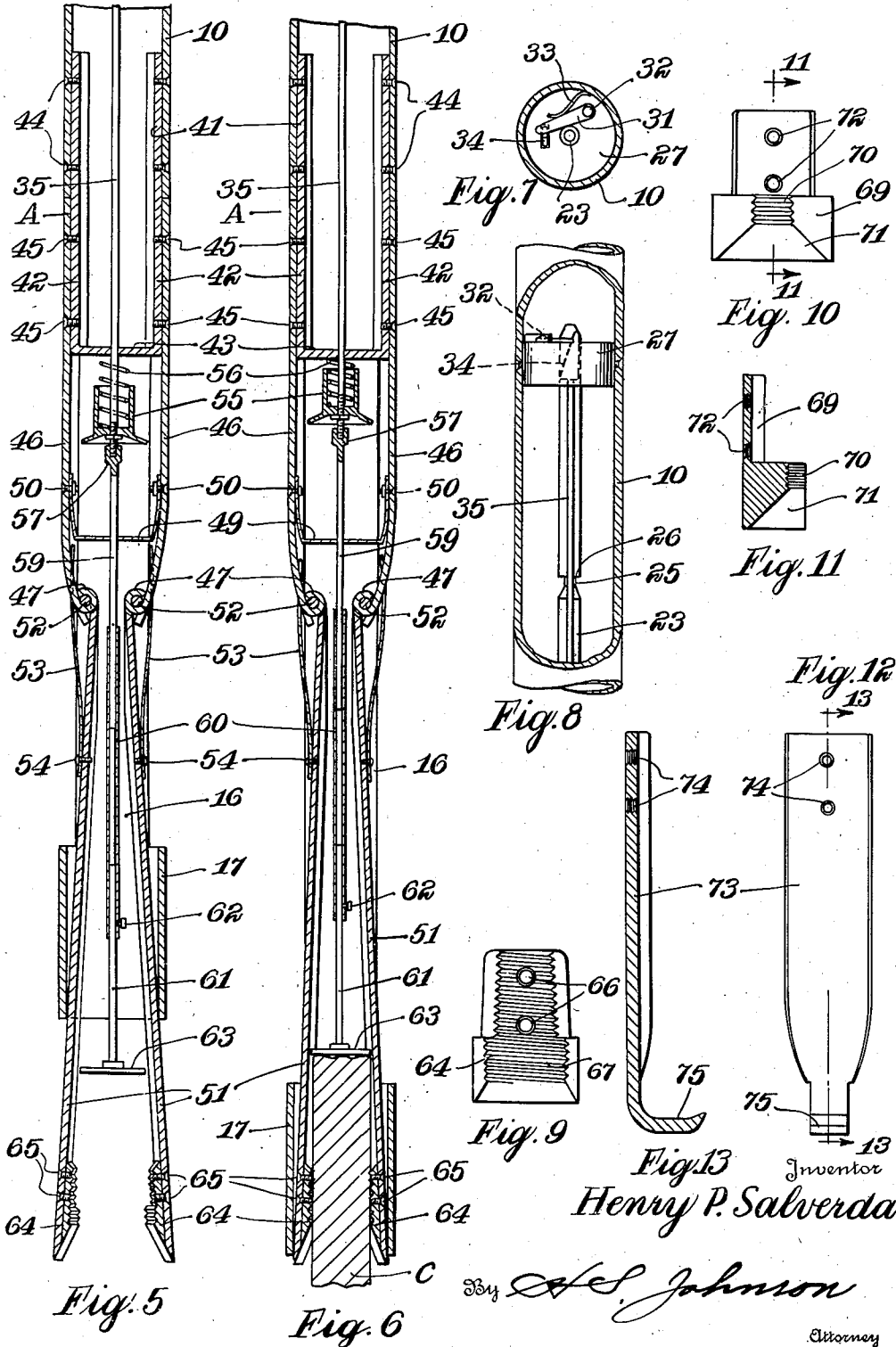
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UNITED STATES PATENT OFFICE

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WELL TOOL EXTRACTING DEVICE

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7 Claims. (Cl. 294—100)

My invention relates to an improvement in well tool extracting device, particularly designed to remove broken tools and instruments from a well or tubular receptacle.

In the process of digging wells and in operating the same, it often happens that a tool or rod becomes broken off at a point considerably below the surface of the ground, making the broken portion of the tool extremely difficult to remove. In my previous application, Serial Number 420,529, filed November 26, 1941, for "Pump rod extracting device," I described an instrument suitable for use in removing pump rods and the like. While this device is extremely well suited for its prescribed purpose, it sometimes happens that the tool or rod broken is of small diameter relative to the diameter of the well or tubular casing in which it is located. Accordingly, it is the purpose of the present invention to provide a device similar to my previous construction, but designed for use in extracting rods of relatively small diameter if it is deemed advisable.

It is a purpose of the present invention to provide a tool or instrument having removable jaws which may be of a size to engage a relatively small rod or tool. My construction is so designed that even if a short portion of this rod or tool is exposed my tool will definitely engage the same and permit removal thereof.

It is an object of the present invention to provide an extracting device including a pair of normally spaced jaws used in combination with a means for contracting the jaws to clamp the same together. This means in preferred form comprises a sleeve which is slidable over the jaws to draw the jaws together into engagement with the broken section of the rod or tool.

A feature of the present invention lies in the provision of a trigger operating mechanism which is positioned inwardly of the jaws. As a result, there is little danger of the trigger being actuated to clamp the jaws together until the rod or tool to be clamped is in position between the jaws.

A further feature of the present invention lies in the provision of a means for adjusting the position of the trigger actuating means with respect to the jaws. Thus, if a long section of rod is to be extracted, the trigger may be set so that a considerable length of rod will pass between the jaws before the clamping action takes place. On the other hand, if the broken section is relatively short the trigger operating means may be set close to the jaws so as to clamp the jaws together as soon as the same has passed between the jaws.

These and other objects and novel features of my invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of my specification:

Figure 1 is a sectional view through a well casing, or the like, showing my extracting device in position therein.

Figure 2 is a cross sectional view longitudinally through the upper portion of my extracting device.

Figure 3 is a view similar to Figure 2, the position of the section being on a plane at right angles to the plane of the section in Figure 2.

Figure 4 is a sectional view similar to Figure 3, but showing the parts in a different relative relationship.

Figure 5 is a longitudinal section on a vertical plane through the lower portion of my extracting device.

Figure 6 is a view similar to Figure 5, but showing the clamping jaws in clamping position.

Figure 7 is a cross-sectional view through the extracting device, the position of the section being indicated by the line 7—7 of Figure 2.

Figure 8 is a side elevational view of a portion of the extracting device, showing the casing of the device partly in section.

Figure 9 is an elevational view of a jaw which may be used in connection with my device.

Figure 10 illustrates a modified form of jaw construction.

Figure 11 is a vertical section through the view shown in Figure 10, the position of the section being indicated by the line 11—11 of Figure 10.

Figure 12 is an elevational view of a modified form of jaw construction.

Figure 13 is a vertical section through the jaw shown in Figure 12, the position of the section being indicated by the line 13—13 of Figure 12.

The extracting device A is designed to fit within a tubular casing B, such as a well casing, or the like. The device A includes a tubular housing 10 having a pair of oppositely disposed elongated slots 11 therein. An inverted U-shaped element 13, best illustrated in Figures 3 and 4 of the drawings, is provided within the casing 10. This U-shaped slidable element 13 includes a pair of opposed sides 14 connected by a top connecting member 15. This U-shaped slidable bracket 13 supports a pair of tongues 16 extending upwardly from a cylindrical sleeve 17. Bolts 19 or other suitable means connect the tongue 16 to the U-shaped slidable member 14 so that the sleeve 17

slides longitudinally of the casing 10 together with the inverted U-shaped bracket 13.

A pair of springs 20 are provided within the cylindrical casing 10. One end of each of the springs 20 is anchored at 21 to the casing 10. The other end of each spring 20 is hooked at 22 onto the sides of the cross member 15 of the bracket 13. These springs 20 normally tend to pull the slidable bracket 13 downwardly, thus moving the sleeve 17 downwardly with respect to the casing 10.

A means is provided to hold the U-shaped bracket 13 in an elevated position with respect to the casing 10 when it is so desired. A rod 23 extends through the connecting member 15 of the bracket 13 and is adjustably supported in position by nuts 24. A portion 25 of the shaft is of reduced diameter providing a shoulder 26 in the rod. This shoulder is designed to engage a trigger lever which will now be described in detail.

A bearing wall 27, provided with a cylindrical skirt 29, is provided within the casing 10 near the upper extremity thereof. Bolts 30 extend through the casing 10 and to the skirt 29 to hold the wall 27 in place. The upper extremity of the rod 25 extends through this wall and is slidably supported thereby.

As best illustrated in Figure 7 of the drawings, a trigger lever 31 is pivoted at 32 to the wall 27 and is urged against the rod 23 by means of a spring 33. When the bracket 13 is slidably moved upwardly with respect to the casing 10 until the rod 23 extends through the wall 27 a sufficient distance, the trigger 32 engages the shoulder 26 and prevents the springs 20 from pulling the bracket 13 downwardly into the position shown in Figure 6 of the drawings. In other words, when the shoulder 26 is in engagement with the lever 31, as illustrated in Figure 4 of the drawings, the sleeve 17 is in the elevated position illustrated in Figure 5 of the drawings. However, when the shoulder 26 is released from the trigger 31 the springs 20 pull the bracket 13 and the sleeve 17 downwardly into the clamping position illustrated in Figure 6 of the drawings.

In order to operate the lever 31, I provide a wedge-shaped cam 34 which is supported on the upper extremity of a rod 35. When the rod 35 is moved upwardly with respect to the wall 27 the wedge-shaped cam 34 will engage against the lever 31 to disengage this lever from the shoulder 26. When in the lowered position illustrated in Figures 3, 4, and 8 of the drawings, the lever 31 may be urged into engagement with the shoulder 26.

At the upper extremity of the casing 10, I provide an internally threaded nipple 36 into which the reducer 37 is secured. A tubular extension 39 extends upwardly from the reducer 37 and is closed at its upper extremity with a cap 38. A plunger 40 is slidable between limits within the extension 39. This plunger 40 is adaptable for engagement with an actuating rod or a cable 41.

With reference now to Figures 5 and 6 of the drawings, it will be noted that a U-shaped support 41 is secured within the tubular casing 10 at the lower extremity thereof. The support or bracket 41 includes a pair of opposed sides 42 connected by a connecting element 43. Bolts 44 secure the bracket sides 42 to the lower extremity of the casing 10. Bolts 45 connect the sides 42 of the bracket 41 with extension arms 46. These arms 46 terminate in a pair of parallel journals 47 supported in spaced relation. A U-shaped con-

necting element 49 is secured between the arms 46 by bolts 50 to form a journal for the trigger operating rod, as will be later pointed out in detail.

A pair of elongated arms 51 are pivotally secured by pivots 52 to the journals 47. Springs 53 secured to the arms 51 at 54 tend to hold the arms normally spread apart. The arms 51 extend through the sleeve 17, as shown in the drawings.

The trigger operating rod 35 passes through the U-shaped connecting bracket 41 at its base 43 and an enlarged cup 55 encircles the rod 35 beneath this cross member 43. A spring 56 is interposed between the cup 55 and the bottom of the cross connecting portion 43 of the bracket 41. The elevation position of the rod 35, in which position the wedge-shaped cam 34 is operated to disengage the trigger lever 31, the cup 55 is positioned more closely adjacent the cross member 43 than would otherwise be the case. The spring 56 tends to lower the cam 34 when the rod is not held in elevated position.

The rod 35 is threaded at its lower extremity to engage into a socket 57 on the upper extremity of a rod 59. The rod 59 is secured to a tubular element 60 which extends downwardly therefrom and is arranged in telescopic relation to the rod 61. A set screw 62 through the tubular element 60 holds the rod 61 in adjusted position. A disc or plate 63 is provided on the lower extremity of the rod 61 for engagement with the broken section of a rod or tool within the well casing B.

In operation the device A is lowered into the well casing B, either by rigid means, such as rods, or by a cable such as 41. The lowering action continues until a pump rod or tool, indicated in general by the letter C, passes between the jaws 64 on the lower extremities of the arms 51. When the element C engages the disc 63 the rod 61 is urged upwardly, carrying the tubular element 60 and the rod 59 therewith. This movement compresses the spring 56 and urges the rod 35 upwardly, thus raising the wedge-shaped cam 34 and releasing the trigger lever 31 from the shoulder 26. The springs 20 then slide the bracket 13 downwardly, the sleeve 17 sliding downwardly over the arms 51 and pivoting them together. The jaws 64 are clamped against the drill rod or tool by this movement.

Figure 9 illustrates one of the jaws 64 removed from its arm 51. The jaws 64 are held in place by a pair of bolts 65 or other suitable means which extend into threaded openings 66 in the jaws 64. The inner surface of the jaws are threaded or transversely grooved as illustrated at 67, so that the instruments engaged will not slip with respect to the jaws.

In Figures 10 and 11 of the drawings, I disclose another construction of jaw 69, which may be used on the ends of the arms 51 in place of the jaw 64. The jaw 69 is similar to the jaw 64 with the exception that the aperture 70 between the jaws is relatively small for engagement with a relatively small diameter tool or rod. The lower extremity 71 of each jaw is conically shaped so as to direct the rod or tool toward the aperture in the jaw. Threaded openings 72 are provided which may engage the bolts 65 to hold the jaws in place.

In Figures 12 and 13 of the drawings, I disclose another type of jaw which may be used in place of either of the jaws illustrated. The construction described in Figures 12 and 13 discloses an elongated body 73, provided with a pair of

apertures 74 at one end thereof for engagement with the bolts 65. An inwardly extending prong 74 is provided in the lower end of each body portion 73 for engagement into the body of the element being engaged. These prongs 75 form a hook which is extremely desirable in some instances.

In accordance with the patent statutes, I have described the principles of construction and operation of my device, and while I have endeavored to set forth the best embodiments thereof, I desire to have it understood that obvious changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A rod extracting device for extracting a rod or the like from an elongated tubular casing, the extractor comprising a body designed to fit within said tubular casing, a pair of opposed arms pivoted to said body and projecting downwardly therefrom, a sleeve encircling said arms, means slidably connecting said sleeve to said body and movable between two extreme positions, said sleeve in one extreme position allowing said arms to spread and pivoting said arms together upon movement toward the other extreme position, jaw means on said arms to clamp a rod or the like therebetween as said arms are pivoted together, and spring means urging said sleeve toward said other extreme position.

2. A rod extracting device for extracting a rod or the like from an elongated tubular casing, the extractor comprising a body designed to fit within said tubular casing, a pair of opposed arms pivoted to said body and projecting downwardly therefrom, a sleeve encircling said arms, means slidably connecting said sleeve to said body and movable between two extreme positions, said sleeve in one extreme position allowing said arms to spread and pivoting said arms together upon movement toward the other extreme position, jaw means on said arms to clamp a rod therebetween as said arms are pivoted together, trigger means holding said sleeve in said one extreme position, and spring means urging said sleeve toward said other extreme position.

3. A rod extracting device for extracting a rod or the like from an elongated tubular casing, the extractor comprising a body designed to fit within said tubular casing, a pair of opposed arms pivoted to said body and projecting downwardly therefrom, a sleeve encircling said arms, means slidably connecting said sleeve to said body and movable between two extreme positions, said sleeve in one extreme position allowing said arms to spread and pivoting said arms together upon movement toward the other extreme position, jaw means on said arms to clamp a rod therebetween as said arms are pivoted together, trigger means holding said sleeve in said one extreme position, spring means urging said sleeve toward said other extreme position, and trigger release means engageable with the rod when between said jaws.

4. A rod extracting device for extracting a rod or the like from an elongated tubular casing, the extractor comprising a body designed to fit with-

in said tubular casing, a pair of opposed arms pivoted to said body and projecting downwardly therefrom, a sleeve encircling said arms, means slidably connecting said sleeve to said body and movable between two extreme positions, said sleeve in one extreme position allowing said arms to spread and pivoting said arms together upon movement toward the other extreme position, jaw means on said arms to clamp a rod therebetween as said arms are pivoted together, trigger means holding said sleeve in one extreme position, spring means urging said sleeve toward the other extreme position, means normally urging said arms apart, and trigger release means engageable with said trigger to release the same, said release means engageable with the rod between said jaws.

5. A rod extracting device for use in extracting a rod or the like from an elongated tubular casing, the extractor comprising a body designed to fit within said casing, a plurality of arms pivoted upon spaced parallel opposed pivots to said body and extending downwardly therefrom, means normally urging said arms apart, means encircling said arms and slidably supported with respect to said body, said encircling means in one position allowing said arms to spread and operable upon a sliding movement to clamp said arms together, resilient means normally urging said encircling means toward clamping position, and trigger means extending between said arms and engageable with the rod when between said arms for controlling movement of said encircling means.

6. A rod extracting device for use in extracting a rod or the like from an elongated tubular casing, the extractor comprising a body designed to fit within said casing, a plurality of arms pivoted to said body and extending downwardly therefrom, means normally urging said arms apart, means encircling said arms and slidably supported with respect to said body, said encircling means in one position allowing said arms to spread, and operable upon a sliding movement to clamp said arms together, resilient means urging said encircling means into position to clamp said arms together, and trigger means actuated by said rod when between said arms for controlling movement of said encircling means.

7. A rod extracting device for use in extracting a rod or the like from an elongated tubular casing, the extractor comprising a body designed to fit within said casing, a plurality of arms pivoted to said body and extending downwardly therefrom, means normally urging said arms apart, means encircling said arms and slidably supported with respect to said body, said encircling means in one position allowing said arms to spread and operable upon a sliding movement to clamp said arms together, resilient means urging said encircling means into position to clamp said arms together, trigger means engageable with the rod when between said arms for controlling movement of said encircling means, and removable jaws mounted on said arms.

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