

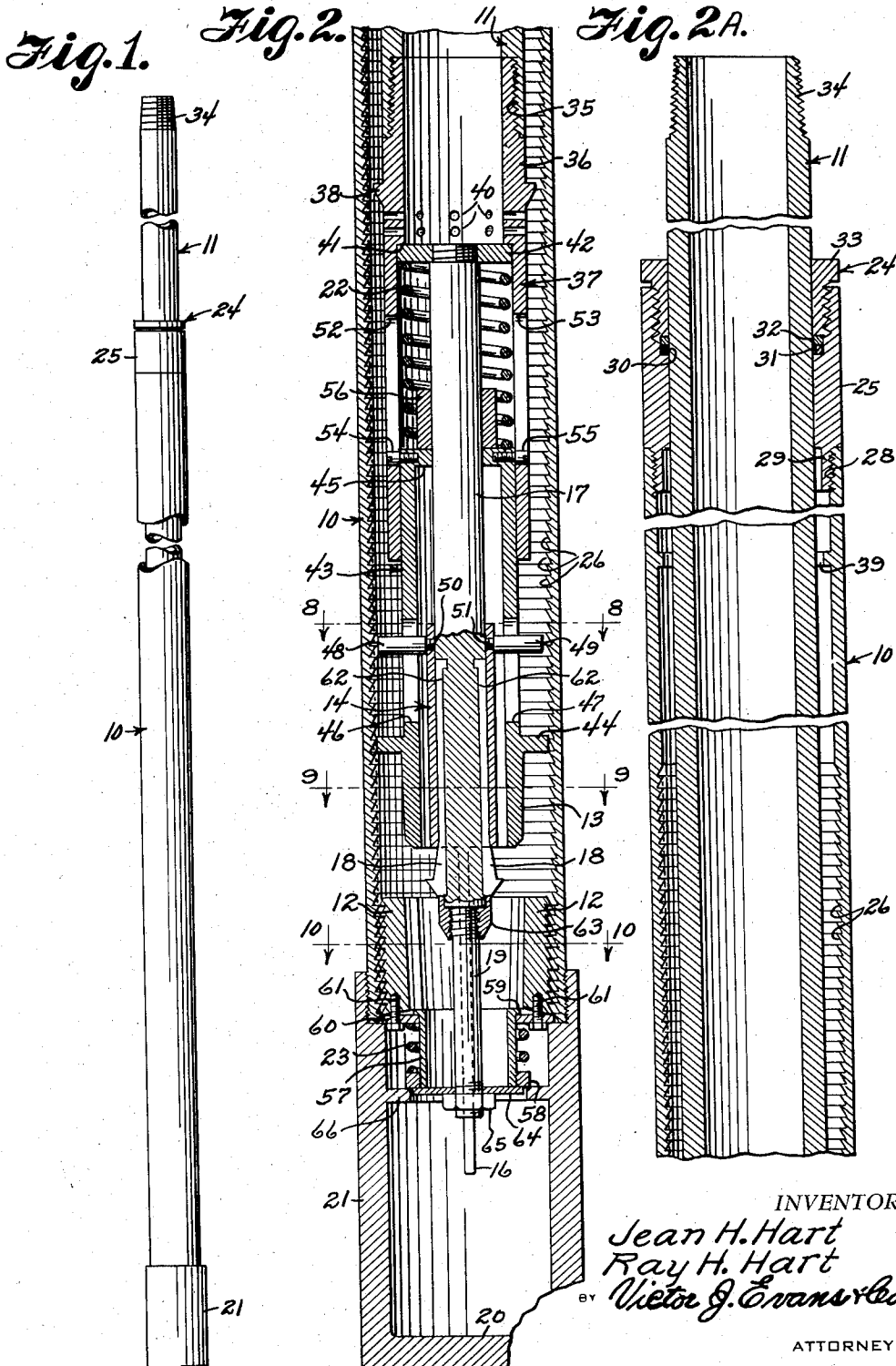
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TELESCOPING TAIL PIPE

2,575,105

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Fig. 3.

Fig. 4.

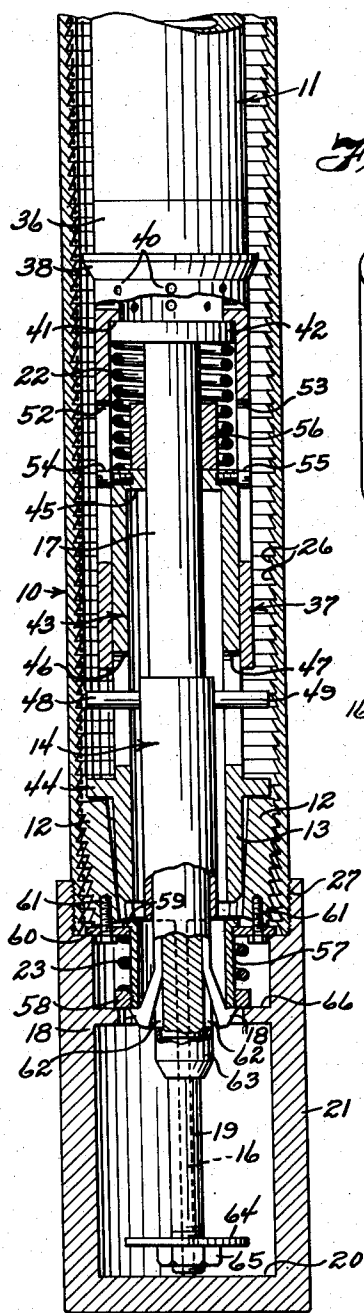
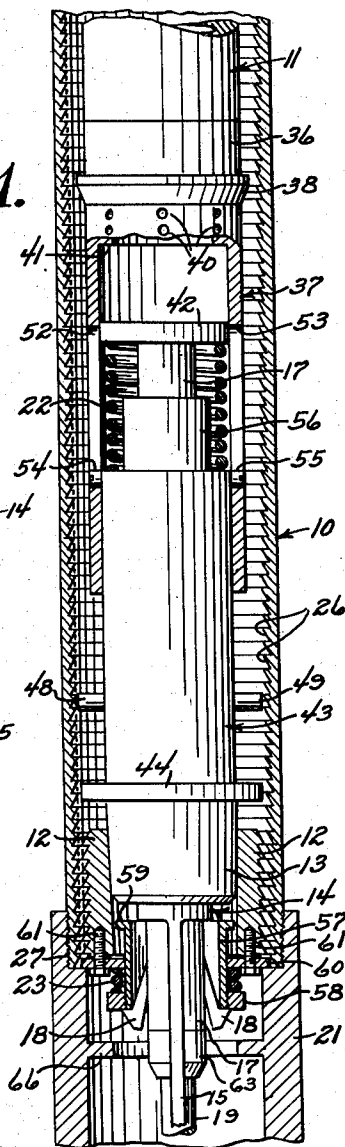
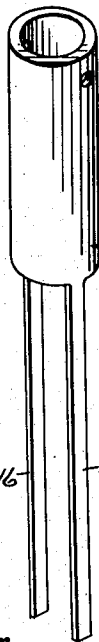


Fig. 11.



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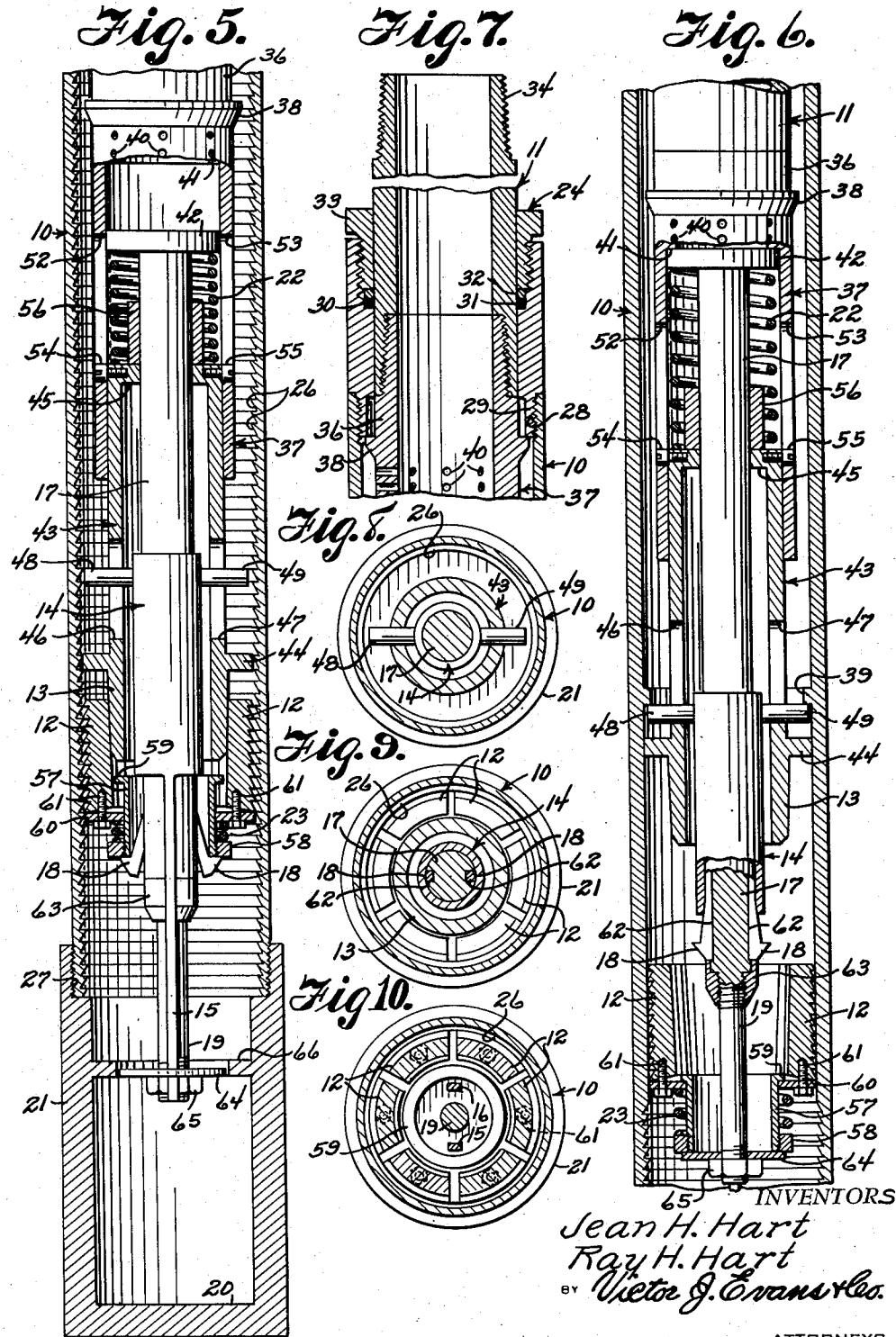
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UNITED STATES PATENT OFFICE

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TELESCOPING TAIL PIPE

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9 Claims. (Cl. 166-4)

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This invention relates to a telescoping anchor or tail pipe used in oil wells for anchoring a tube or packer in an open hole or other formation, and in particular the telescoping anchor pipe includes a section of a stringer pipe that rests upon the bottom of the hole and a sectional string of a smaller diameter than telescopes into the pipe resting upon the bottom of the hole and suitable slips, hooks and other anchoring and operating elements connecting the smaller sectional string to the tubular base or section resting upon the bottom of the hole.

The purpose of this invention is to provide means for lengthening and shortening a string of pipe in an oil well without pulling the pipe from the well.

In the conventional type of well casing it is necessary to pull the casing from the well to lengthen or shorten the string. Furthermore in making tests of fluid at different points in a well it is often desirable to raise or lower the base or tail pipe of a string in a well and ordinarily it is necessary to pull the casing in order to change the elevation of the base or tail pipe. With these thoughts in mind this invention contemplates a combination of slips, anchors and operating means therefor carried by the lower end of a string which telescopes in the tail pipe of a well casing and in which the parts are actuated from the upper end of the string.

The object of this invention is, therefore, to provide an improved connecting structure between a string telescoping in a tail pipe of a well casing and the tail pipe in which the parts may be operated by the upper end of the string and without pulling the string from the well.

Another object of the invention is to provide a method for resetting slips in an anchor or tail pipe of a well casing by contacting the bottom of the tail pipe or tool.

Another object of the invention is to provide an improved telescoping anchor pipe for wells wherein tripping of holding elements in the device is accomplished by contacting the upper end of the anchor or tail pipe.

Another object of the invention is to provide an improved telescoping anchor pipe for well casings in which the inner telescoping joint or elements of the telescoping tube are held by indentations in the inner surface of the anchor or tail pipe.

A further object of the invention is to provide an improved construction of telescoping anchor or tail pipes of well casings in which the parts are of a comparatively simple and inexpensive design.

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With these and other objects and advantages in view the invention embodies an anchor or tail pipe for well casings having inner annular rings positioned to receive peripheral edges of slips carried by the lower end of an inner telescoping tube with suitable dogs and trips positioned to be actuated by raising and lowering the inner tube in relation to the anchor pipe whereby the lower end of the inner tube may be locked at different elevations in the anchor pipe and also whereby the anchor pipe may be raised and lowered by the tube.

Other features and advantages of the invention will appear from the following description taken in connection with the drawings wherein:

Figure 1 is an elevational view with parts broken away showing the inner telescoping tube extended through a packing gland in the upper end of the anchor pipe.

Figure 2 is a vertical section through the lower end of the anchor pipe showing the locking elements and trips in the free positions.

Figure 2a is a similar view showing the upper part of the anchor pipe.

Figure 3 is a view similar to that shown in Figure 2 showing the inner locking elements with the inner telescoping tube clamped in the outer anchor pipe.

Figure 4 is a similar view showing the inner telescoping tube withdrawn slightly wherein the slips are released from the inner threads of the anchor pipe.

Figure 5 is also a similar view showing the parts released whereby the inner holding elements and slips are free to move upwardly in the anchor pipe.

Figure 6 is a view showing the parts with the upper elements released and with the ends of a pin extended from a sleeve on a shaft of the telescoping string in engagement with a ring on the inner surface of the anchor pipe whereby the anchor pipe may be raised by the string.

Figure 7 is a vertical section through the upper end of the anchor pipe illustrating the mounting of the string therein.

Figure 8 is a cross section through the anchor pipe taken on line 8-8 of Figure 2 showing the limit pins extended from the side of a sleeve on the spindle extended from the lower end of the telescoping string.

Figure 9 is a similar section taken on line 9-9 of Figure 2.

Figure 10 is also a similar section taken on line 10-10 of Figure 2 illustrating the segments of the slips.

Figure 11 is a detail illustrating a sleeve with

legs extended downwardly from the sides thereof, in which, with the parts assembled, the legs are positioned to engage the lower end or base of the bull plug carried by the lower end of the anchor pipe.

Referring now to the drawings wherein like reference characters denote corresponding parts the telescoping anchor of this invention includes a pipe 10, which for general use is formed of five foot sections of three inch pipe, an inner telescoping string 11 which may be formed of two inch pipe, a plurality of segments 12 forming slips, a spreader 13 having a conical shaped outer surface, a sleeve 14 having legs 15 and 16 extended downwardly therefrom, a vertically disposed rod 17 having gripping dogs 18 on the lower end, an extension 19 positioned to engage the lower end 20 of a bull plug 21, springs 22 and 23, and a packing gland 24 that is positioned around the string and threaded in the upper end of a spacing sleeve 25 that is threaded in the upper end of the anchor pipe 10.

The anchor pipe 10 is formed as shown with spaced annular rings forming teeth 26 on the inner surface, with the outer surface of the lower end threaded into the upper end of the bull plug or base 21 as shown at the point 27 and with the upper end provided with internal threads 28 into which an annular ring 29 of the spacing sleeve or collar 25 is threaded.

The collar 25 is provided with an annular recess 30 for packing 31 and a bronze ring 32 is positioned to coact with the packing to prevent galling or freezing of the pipe. A packing nut 33 is threaded in the upper end of the collar 25 to retain the ring and packing in position. From the collar 25 the inner tubular string, which is preferably formed of two inch pipe sections is coupled to superimposed sections by suitable coupling members and for this reason the string is provided with threads 34, as shown in Figure 2a.

The lower end of the string 11 is provided with internal threads 35 into which a hub 36 on the upper end of a sleeve or tubular casing 37 is threaded, as shown in Figure 2, and the outer surface of the hub is provided with projections 38 that are positioned to engage an inner annular ring 39 in the upper part of the outer casing or pipe 10. The lower part of the hub 36 is provided with perforations 40 that establish communication between the interior of the string and the interior of the anchor pipe 10. The lower end of the hub 36 is also provided with a shoulder 41 that is positioned to be engaged by a washer 42 on the upper end of the rod 17 with the parts in the position shown in Figure 2, and by this means the inner gripping elements are forced downwardly as the string 11 is moved downward. The washer 42 is threaded on the upper end of the rod 17 and the rod extends downwardly through the conical shaped spreader 13 which is formed on the lower end of a tube 43 that is provided with an outer annular flange 44, spaced from the lower end and an inner annular flange 45 on the upper end. The tube 43 is also provided with elongated slots 46 and 47 through which pins 48 and 49 which are threaded into openings in the sleeve 14 through studs 50 and 51 on the inner ends extend.

The tube 43 is slidably mounted in the tubular casing 37 extended downwardly from the collar or hub 36 and the tubular casing 37 is provided with elongated slots 52 and 53 in which heads of screws 54 and 55, threaded into the upper end of the tube 43 are positioned. A collar 56 is provided on the

flange 45 and the spring 22, the lower end of which is positioned around the collar 56, extends upwardly from the flange 45 to the washer 42. By this means downward movement of the string 11 compresses the spring 22 and permits the heads of the screws 54 and 55 to move upwardly in the slots 52 and 53. Upon continued downward movement of the string 11 the spreader 13 enters the slip segments with the outer tapering surface thereof engaging the conical shaped inner surfaces of the segments 12 of the slips.

The operation is illustrated in Figure 5 wherein the spreader is substantially midway of its downward movement and the action continues until the lower end of the extension 19 engages the surface 20 of the bull plug 21. In this movement, and before the lower end of the extension 19 reaches the surface 20 of the bull plug the lower ends of the legs 15 and 16 of the sleeve 14 contact the surface 20 whereby the sleeve 14 is moved upwardly to release the dogs 18 so that the dogs spring outwardly to engage the lower surface of a bushing 57, the lower end of which is provided with threads on which a ring 58 is positioned and the upper end of which is provided with a flange 59 that is held in position by a ring 60, secured to the lower ends of the segments 12 of the slips by screws 61. With the parts in this position, as illustrated in Figure 3, upward movement of the string 11 draws the sleeve 37 and also the tube 43 upwardly, as shown in Figure 2 and in this movement the spreader 13 is drawn upwardly by the spring 22 thereby releasing the slips.

The dogs 18 nest in spaced longitudinally disposed grooves 62 in the rod 17 and the lower end of the rod is provided with a cone 63, in the lower end of which the extension 19 is threaded.

A washer 64 is secured on the lower end of the extension 19 by a nut 65 and, as illustrated in Figure 2 upon upward travel of the rod 17 the washer 64 engages the lower end of the bushing 57 and collar 58. The anchor pipe 10 is threaded into the upper end of the bull plug or base 21 providing a complete closure member and the inner annular ring 39 provides a stop ring which, positioned to be engaged by the pins 48 and 49 of the sleeve 14 prevents the string 11 being withdrawn from the anchor pipe 10. By this means it is also possible to draw the anchor pipe from the well by the telescoping tube or string.

With the parts arranged in this manner the anchor pipe is picked up and started into the hole or well being held by the slips. These elements are conventional in oil wells of this type. The next joint of the inner tubing or string is secured to the tubing 11 by a collar or the like and the lower section with the anchor pipe thereon is lowered into the well. In the lowering movement the inner tube 11 is telescoped into the anchor pipe. This action is continued until the lower ends of the legs 15 and 16 engage the lower end of the bull plug whereby the sleeve 14 slides upwardly releasing the dogs 18 so that the dogs spring outwardly into gripping relation with the member 57 extending downwardly from the segments of the slips. The end 19 of the rod 17 continues until it also engages the surface 20 of the bull plug, at which time the spreader 13 has forced the slips into engagement with the teeth 26 of the anchor pipe.

To adjust the position of the slips in the anchor pipe the string 11 is drawn upwardly to the position shown in Figure 2 whereby the slips are released and with upward movement of the sleeve

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27 the shoulder 41 also moves upwardly whereby the spring 22 draws the rod 17 and extension 19 upwardly, the dogs 18 being crowded inwardly by the sleeve 14. At the same time the heads of the screws 54 and 55, which extend into the slots 52 and 53 draw the tube 43 upwardly whereby the slips may be moved upwardly in the anchor tube or pipe, as illustrated in Figure 5. In the initial movement the dogs 18, being crowded inwardly by the sleeve 14 pass through the member 57, as shown in Figure 6.

The telescoping anchor pipe of this invention may be positioned at different elevations in a well and samples of oil, gas, or other fluid may be taken through the string. The perforations 40 provide communicating means between the interior of the anchor pipe 10 and the string or tube 11.

This device provides means whereby the slips 12 in an oil well telescoping anchor pipe may be reset at different positions in the outer casing or anchor pipe 10 by engagement of the lower end of a rod extended from the string with the plug or lower end of the outer casing. Furthermore engagement of the pins 48 and 49 or of the annular ring 38 with the lower end of the packing gland or collar in which the gland is mounted provides tripping means for releasing the elements whereby the anchor pipe may be drawn upwardly to a different elevation in a well.

The inner edges or threads 26 of the tubular casing 10 and the annular ring 38 of the string 11 provides gripping and tripping elements whereby the parts of the anchor are actuated through the string from the upper end of the well without pulling the well casing or parts thereof. By this means it is also possible to add sections in the two inch pipe or string between the anchor and upper end of the well.

It will be understood that although it has been suggested that the anchor pipe 10 is formed of three inch pipe and the string 11 of two inch pipe, pipe of any suitable size may be used.

In order to facilitate the action of the hooks or dogs 18 an inner annular ring 66 is provided in the bull plug 21 to hold back the ring 58 in the downward movement so that it will compress spring 23 and permit the hooks 18 to catch under the ring 58. This gives the slips 12 their tendency of an upward movement against the tapered spreader 13 causing the slips 12 to be positively engaged in the teeth 26 of the pipe 10.

The slips 12 which include a plurality of segments may also be described as forming parts of a split nut having a smooth or straight inner surface with the outer surface threaded for the purpose of retraction and expansion. The threads on the outer surface of the said split nut are positioned for mating with threads on the inner surface of the pipe 10. The parts generally referred to as conventional slips cling to a smooth surface wall whereas a split nut, regardless of the number of times it is split clings to the mating threads cut into the inner surface of the wall of a surrounding tube or pipe.

With the threads or annular rings formed with flat horizontally disposed upper surfaces on the inner surface of the well casing or pipe the resulting force from the weight of the parts is vertical providing a downward force whereas the conventional slips that are forced outwardly against the inner surface of a smooth wall grip with a lateral thrust and the downward force taken along the outer surfaces of the parts of the split nut transmitted to horizontal surfaces

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a load on the tube of one hundred thousand pounds of downward force can be released by an upward force of ten pounds whereas the lateral force required to hold slips against a smooth surface required a force many times as great to release the holding elements.

It will be understood that other modifications may be made in the design and arrangement of the parts without departing from the spirit of the invention.

What is claimed is:

1. In a telescoping anchor pipe, an outer tubular casing, an inner tubular string telescoping in the outer casing, slips positioned between the string and outer casing providing gripping means between the string and casing, and means resetting the slips by engagement of means on the end of the string with the lower end of the outer casing.

2. In a telescoping anchor pipe, an outer tubular casing, an inner tubular string telescoping in the outer casing, latching means between the string and outer casing for holding the string in relation to the casing, and means tripping the latching means upon engagement of an extension on the string with the upper end of the outer casing.

3. In a telescoping anchor pipe, the combination which comprises an outer tubular casing having gripping means on the inner surface, an inner tubular string telescoping in the outer casing, latching means carried by the inner tubular string and positioned to coact with the gripping means of the outer casing, means resetting the latching means by engagement of the lower end of the string with the lower end of the outer tubular casing, and means releasing the latching means by engagement of an extension on the tubular string with the upper end of the outer tubular casing.

4. A telescoping anchor for well casings comprising an anchor pipe, a well string telescoping in said anchor pipe, a sleeve extended from the lower end of the well string, a tube having a spreader on the lower end slidably mounted in the sleeve, slips having sloping inner surfaces mounted in the anchor pipe and positioned to be engaged by the spreader for urging the slips into gripping relation with the inner surface of the anchor pipe, means carried by the string for elevating the slips, and means whereby the slips are released from the anchor pipe from the upper end of the string.

5. In a telescoping anchor for well casings, the combination which comprises an anchor pipe having a threaded inner surface, a well string telescoping in the anchor pipe, slips positioned in the anchor pipe and having threaded outer surfaces to coact with the threaded inner surface of the anchor pipe, and means carried by the well string for actuating the slips.

6. In a telescoping anchor for well casings, the combination which comprises an anchor pipe having a threaded inner surface, a well string telescoping in the anchor pipe, slips positioned in the anchor pipe and having threaded outer surfaces to coact with the threaded inner surface of the anchor pipe, means carried by the well string for expanding the slips into gripping relation with the threads of the anchor pipe, and means extended from the lower end of the well string for releasing the expanding means of the slips, and means also carried by the lower end of the well string for resetting the slips.

7. In a telescoping anchor for well casings, the

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combination which comprises an anchor pipe having a threaded inner surface, a bull plug carried by the lower end of the anchor pipe, a well string telescoping in the anchor pipe, a tubular casing having elongated slots therein carried by the well string, a tube having a spreader on the lower end and also having elongated slots therein slidably mounted in the tubular casing, a rod slidably mounted in the tube, said rod having a washer on the upper end and elongated slots in the outer surface of the lower end, a spring positioned between the upper end of the tube and washer on the upper end of the rod for resiliently urging the rod upwardly, dogs nested in the elongated slots in the lower end of the rod, a sleeve encasing the dogs slidably mounted on the rod and having legs extended downwardly therefrom, pins carried by the upper end of the sleeve and extended through the elongated slots of the tube, screws extended from the upper end of the tubular casing carried by the well string, a plurality of slips having sloping inner surfaces positioned to receive the spreader of the tube, said slips positioned in the anchor pipe and having serrated outer surfaces positioned to coact with the threaded inner surface of the anchor pipe, means mounting the slips on the lower end of the said rod, said dogs in the slots of the rod positioned to engage the mounting means of the slips, and means on the lower end of the rod also positioned to engage the mounting means of the slips for resetting the slips.

8. In a telescoping anchor for well casings, the combination which comprises an anchor pipe having a threaded inner surface, a well string telescoping in the anchor pipe, a split nut including a plurality of segments positioned in the anchor pipe, said segments having straight inner surfaces and threaded outer surfaces and positioned to coact with the threaded inner surface of the anchor pipe, and means carried by the well string for actuating the segments of the split nut.

9. In a telescoping anchor for well casing, the

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combination which comprises an anchor pipe having a threaded inner surface, a bull plug carried by the lower end of the anchor pipe, a well string telescoping in the anchor pipe, a tubular casing having elongated slots therein carried by the well string, a tube having a spreader on the lower end and also having elongated slots therein slidably mounted in the tubular casing, a rod slidably mounted in the tube, said rod having a washer on the upper end and elongated slots in the outer surface, said elongated slots spaced from the lower end of the rod, a spring positioned between the upper end of the tube and the washer on the upper end of the rod for resiliently urging the rod upwardly, dogs nested in the elongated slots in the lower end of the rod, a sleeve encasing the dogs slidably mounted on the rod and having legs extended downwardly therefrom, pins carried by the upper end of the sleeve and extended through the elongated slots of the tube, screws extended from the upper end of the tube and positioned in the elongated slots of the tubular casing carried by the well string, a split nut including a plurality of segments having straight inner surfaces positioned to receive the spreader of the tube, said segments positioned in the anchor pipe and having serrated outer surfaces positioned to coact with the threaded inner surface of the anchor pipe, means mounting the split nut on lower end of said rod, said dogs positioned to engage the mounting means of the split nut for resetting the segments of the split nut.

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