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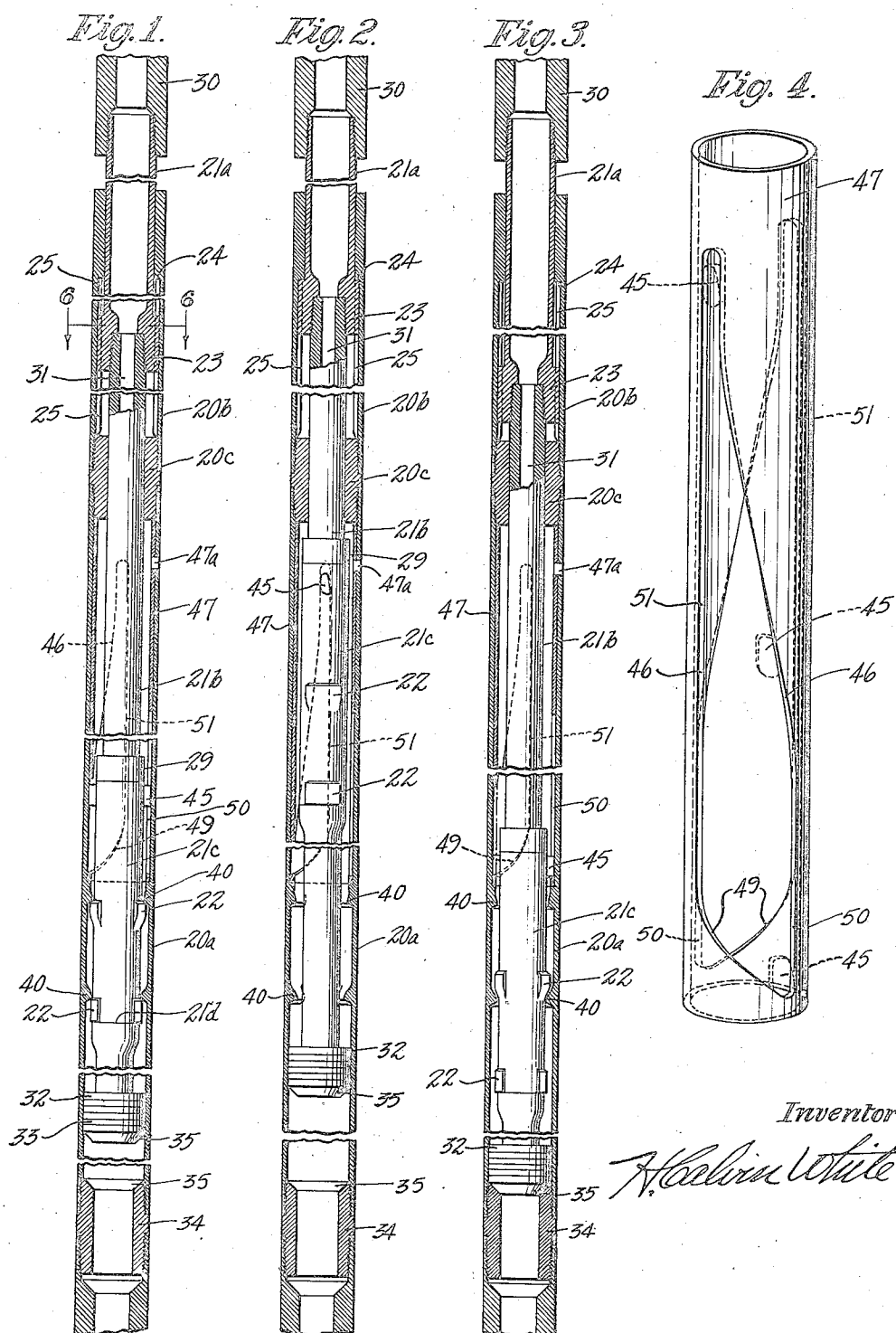
H. C. WHITE

2,056,496

JAR

Filed Jan. 16, 1934

4 Sheets-Sheet 1



Oct. 6, 1936.

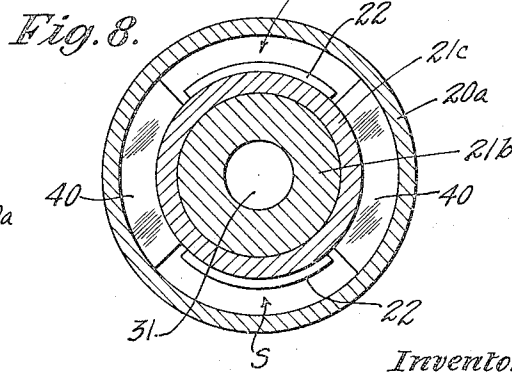
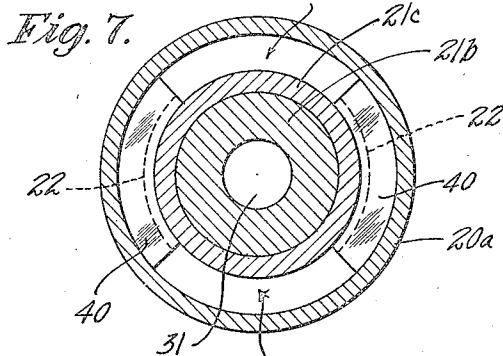
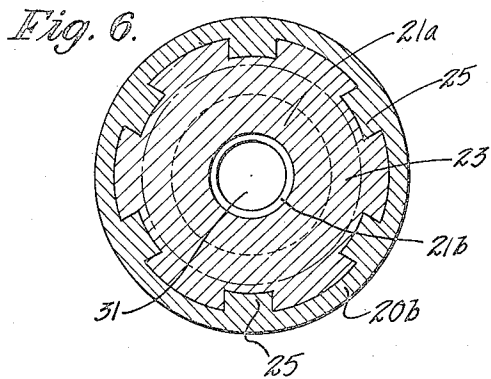
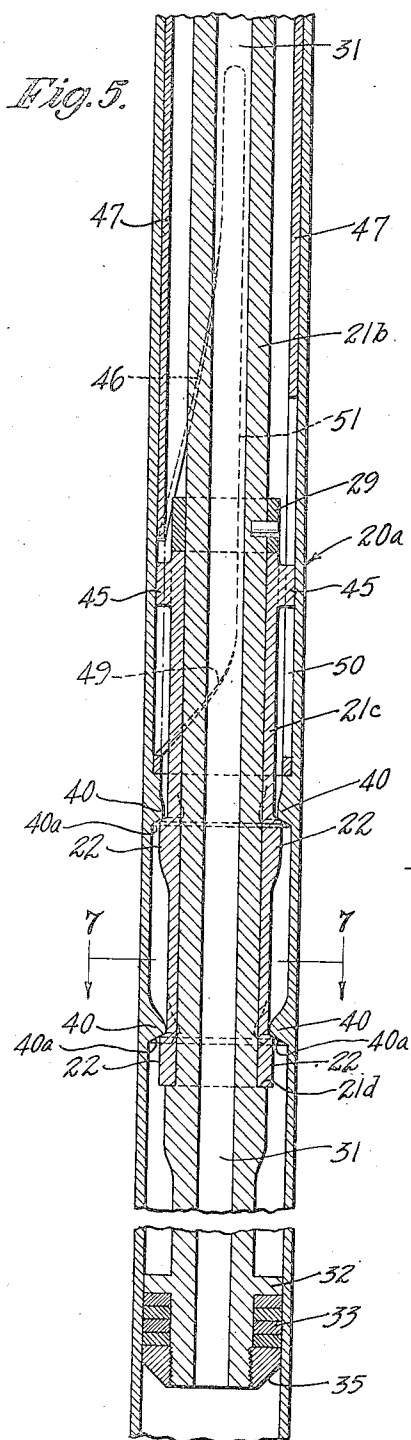
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JAR

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4 Sheets-Sheet 2



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H. Calvin White

Oct. 6, 1936.

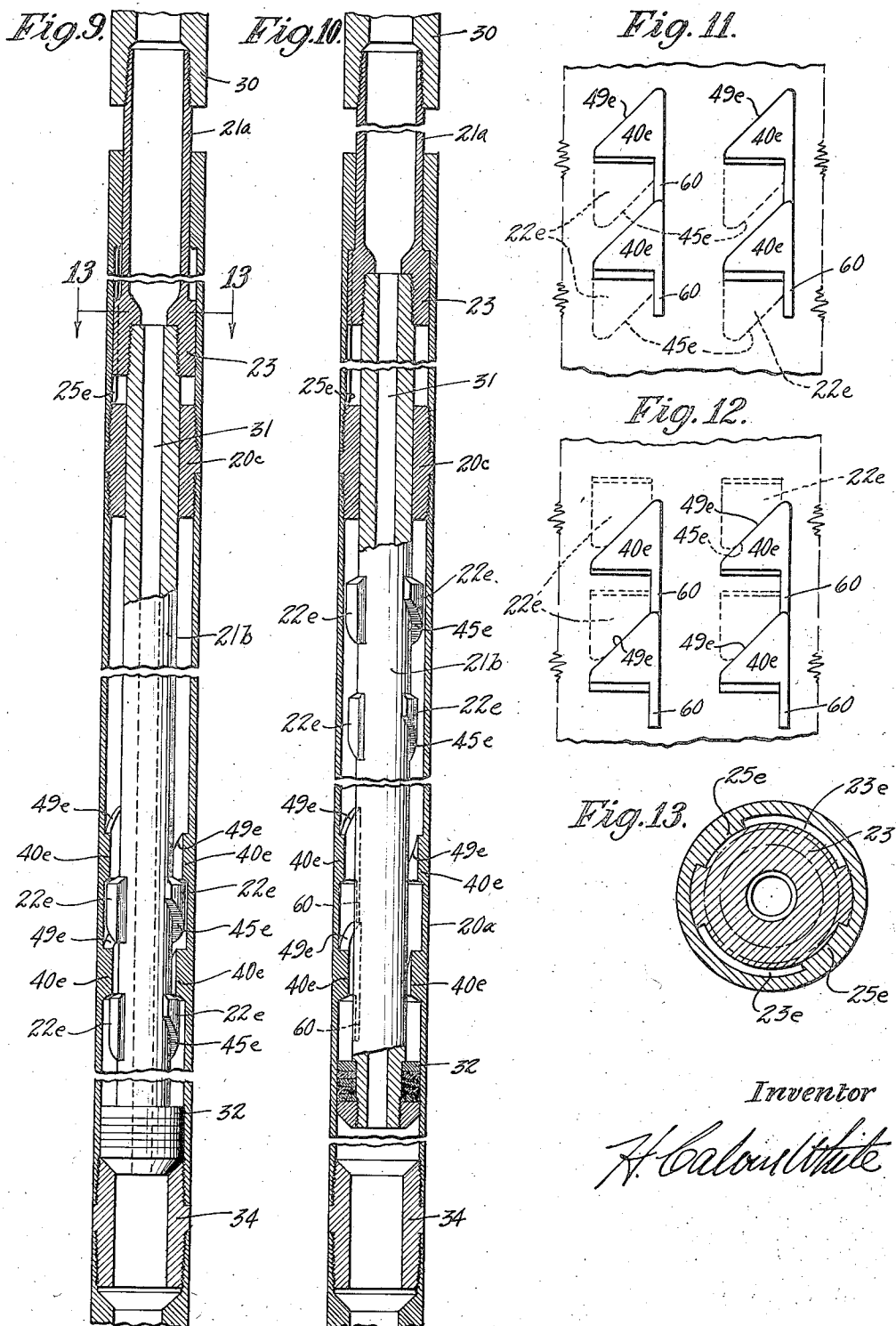
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Fig. 14.

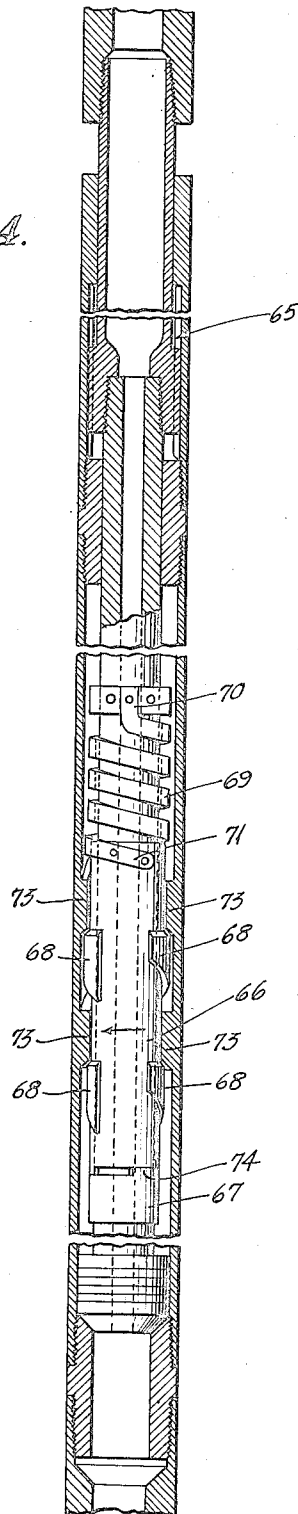
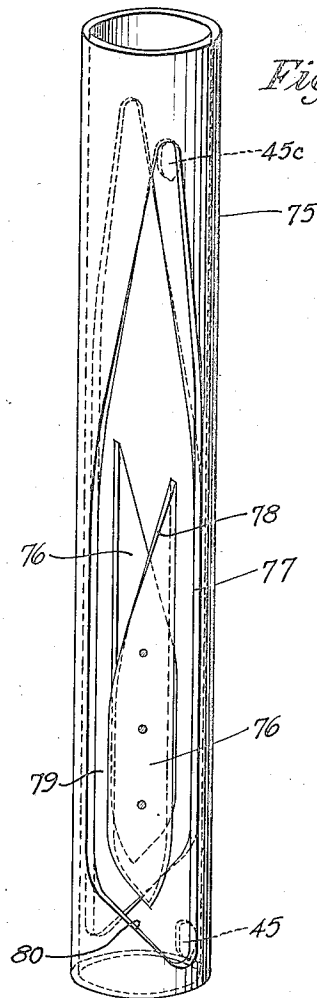


Fig. 15.



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UNITED STATES PATENT OFFICE

2,056,496

JAR

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Application January 16, 1934, Serial No. 706,845

24 Claims. (Cl. 255—27)

This invention has to do with jars, and, although it is broadly applicable to both the rotary and standard (percussion) drilling systems, in its present physical embodiment, and in some of its more specific aspects of invention, it has been designed as a rotary jar and will therefore be explained in that illustrative form. The jar here to be described is of the "straight pull" type—it releases and strikes as a result of straight pull on the drill pipe or other element connected with it. Such a pull can be exerted through a cable as well as through a rotary drill pipe. The only essentials necessary to a "rotary" jar over a "standard" one, are provisions for circulation passage through the jar, and for transmitting rotation. Those features in themselves are old in the art, and although they thus do not enter into certain broader aspects of the invention, in certain other and more limited aspects they do enter into the inventive combination. The invention is concerned primarily with improved mechanisms for obtaining jarring action by release of pipe or cable tension as a result of a straight pull; the general object of the invention being to provide a simple type of mechanism for action of the kind stated.

A mechanism typical of the invention involves interengaging lugs on the telescopically movable mandrel and body, so formed that the lugs are forced past each other when a predetermined longitudinal strain is reached. In so releasing, the lugs travel longitudinally. Means are then provided to insure that on the back stroke the lugs are relatively rotated so that they pass each other, and then rotate into engaging alignment. Typical embodiments are illustrated in the accompanying drawings, in which:

Figure 1 is a central longitudinal section of one form, in the position the mechanism assumes preparatory to tripping and striking;

Fig. 2 is a similar view showing the striking position;

Fig. 3 is a similar view showing the re-setting position;

Fig. 4 is a perspective showing the internal camming sleeve utilized in the form of the foregoing figures;

Fig. 5 is an enlarged fragmentary longitudinal central section showing the parts as shown in Fig. 1;

Figs. 6 and 7 are enlarged cross-sections on lines 6—6 and 7—7 of Figs. 1 and 5, respectively;

Fig. 8 is a section similar to that of Fig. 7, but showing the parts in the relative positions as-

sumed in reaching the re-setting position of Fig. 3;

Fig. 9 is a central longitudinal section of another form, in the position the mechanism assumes preparatory to tripping and striking;

Fig. 10 is a similar view showing the striking position;

Figs. 11 and 12 are developed diagrams illustrating the co-action of the body and mandrel lugs;

Fig. 13 is an enlarged cross-section on line 13—13 of Fig. 9;

Fig. 14 is a central longitudinal section of another form of the invention; and

Fig. 15 is a view similar to Fig. 4 illustrating a variational form of cam.

The form shown in Figs. 1 to 8 has an outer tubular body made up of two parts 20a and 20b, joined together at the bushing 20c. The purpose in making the body in two parts is mainly one of facilitating assembly. The internal and relatively movable mandrel is made up of an upper part 21a, a lower part 21b and a revoluble mandrel sleeve 21c carried by 21b. The mandrel lugs 22 are carried by the sleeve. The sleeve is held longitudinally fixed on the mandrel proper by confinement between a lower shoulder 21d and an upper collar 29.

Upper mandrel part 21a has at its lower end a striking head 23 that strikes upwardly against internal shoulder 24 at the upper end of the body; and the head and body are rotatively interlocked by splines 25. The length of upper body 20b, and the free vertical travel of head 23, are sufficient to allow the relative vertical movements hereinafter described and to give the jar the desired impact when it strikes.

The upper end of the mandrel is adapted for connection with a "string" of some kind; shown here as adaptation to a drill pipe 30 through which circulating fluid is passed. To permit the flow of circulating fluid through the jar, the mandrel is provided with a passage 31 from end to end. Head 32 on the lower end of the mandrel serves as a circulating fluid seal and may have packing 33, or the lower surface of the head may make sealing engagement with the upper end of bushing 34, or both means of sealing may be used. The sealing surfaces as shown at 35 may well be conical. Bushing 34 is an adapter for connection of the jar body to drill pipe, the drilling tools, fishing tools, etc. at the lower end of the string. It is desirable to seal the jar to prevent flow of the muddy circulation fluid through its working parts, thus to prevent abrasion. The sealing sur-

faces 35 and the packing 33 accomplish that purpose when the jar is in the position of Fig. 3, the normal position assumed when drilling etc. is going on. When the jar is in actual jarring use, the packing 33 will continue to prevent the flow of circulating fluid upwardly past the head 32.

The lower body section is shown to be formed with two sets of internally projecting lugs 40, the lugs of each set being circumferentially spaced and the sets longitudinally spaced. The reason for so multiplying and arranging the lugs is to obtain a sufficiently large aggregate lug surface to reduce the unit pressures to the point where wear will not be excessive and there will be no tendency to shear. The lower acting surface 40a of each body lug is sloped inwardly and upwardly; and the corresponding upper surface of each mandrel lug is also so sloped; the internal and external diameter of the respective lugs being such that the mandrel lugs will underlap the body lugs by a determined amount when in alignment and pulled up against them. The amount of that underlap determines the amount by which the mandrel has to be squeezed and the body expanded, and therefore determines the longitudinal force necessary, to force the mandrel lugs past the body lugs and release the mandrel for its upward stroke.

Starting with the normal position of Fig. 3, the action involves first pulling the mandrel up to position of Fig. 1, the mandrel lugs being then in alignment with those of the body. In the position of Fig. 1 a tension is then put upon the string above the tool and when the strain becomes sufficient the lugs squeeze by each other. Under the contractive force of the tensioned string the freed mandrel then moves up until its head 23 strikes shoulder 24; the position of Fig. 2. It will be noted that the upper and lower sets of body lugs 40 are relatively offset radially, the purpose of such offset being to enable, after simultaneous disengagement of the lugs, the lower mandrel lugs to pass up between and clear the upper body lugs sufficiently to avoid any substantial impact therewith.

In reaching the striking position, lugs 45 on the upper end of the mandrel sleeve have come into contact with camming surfaces 46, here shown as preferably formed in a sleeve 47 confined in the body between bushing 29c and the upper ends of the upper body lugs 40. The cam sleeve may be held against rotation by any suitable means, as for example a locking pin shown at 47a. By action of cam surfaces 46 on lugs 45, the mandrel sleeve is rotated so that its lugs 22 are then lined up with the spaces S between the body lugs, as in the position of Figs. 2 and 8. Subsequent downward movement of the mandrel moves the camming lugs 45 straight down the vertical surfaces 51 of the camming sleeve, moves the mandrel lugs straight down between the body lugs and then, on further movement toward the position of Fig. 3, sleeve lugs 45 engage cam surfaces 49 and the mandrel sleeve is rotated reversely to bring its lugs again into line with the body lugs. The parts are then again in the position of Fig. 3 ready for another striking operation.

Although sleeve 21c is relatively free to turn on the lower mandrel, there will always be sufficient friction between those parts to hold the sleeve in its set position on the mandrel unless it is forcibly cammed around. Thus on the downward re-setting movement the mandrel, splined to the body, travels straight down and carries the sleeve and lugs straight down with it; and likewise

on upward movement from the position of Fig. 3 the lugs travel straight up under the body lugs. And if rotary drilling is done with the mandrel in its lowermost position, no rotational forces will disturb the setting of the mandrel lugs for the camming lugs 45 are then confined between cam surfaces 49 and vertical surfaces 50 of the camming sleeve. And if for any reason rotary drilling is done with the mandrel in an upper position (e. g. to take off the tools the weight of the drill pipe above the jar) it is only necessary to pull the mandrel clear up in order to insure proper lug setting to re-set the tool on subsequent downward movement.

The body and mandrel lugs are caused to move past each other and to release, upon upward pull of the drill pipe from the position of Fig. 5, as a result of radial expansion of the body and compression of the lug carrying sleeve and mandrel. The lugs will, of course, be made of such hard metal as to withstand wear even under such severe conditions of usage. The parts will be so proportioned and made of such metals that at no time during the releasing operation will the body be expanded beyond its elastic limit or the sleeve 21c and mandrel compressed beyond their elastic or compressive limits. In order to prevent permanent binding between the sleeve and mandrel with resultant interference with subsequent rotation of the sleeve on the mandrel during the re-setting of the jar, the sleeve may be given a slight amount of clearance around the mandrel such that while, during movement of the lugs past each other, the sleeve may be radially pressed into engagement with the mandrel, the elastic limit of the sleeve will not be exceeded and, after release, the sleeve will return to its normal shape and will retain its normal clearance around the mandrel.

Due to the magnitude of impact of lugs 45 against cam surface 46 upon release of the lugs, and the severity of wear on the engaging lug and cam surfaces, it may be found preferable to so design the cam that its action in producing rotation of the mandrel sleeve, will take place for the most part during downward and comparatively slow movement of the mandrel. In Fig. 15 I have shown a tubular cam body 75 including sections 76 which may be welded or otherwise attached to the interior wall of the body. Lug 45, after release, follows cam surface 77 which first extends substantially straight and toward its upper end and then deflects toward the left at an angle just sufficient to bring the lug, in its uppermost position 45c, to the left of the upper end of cam surface 78. Upon downward movement of the mandrel, the lug engages surface 78 and is cammed into the way 79, which is so positioned as to bring the mandrel lugs down between the body lugs. The lug 45 then engages cam surface 80 to cause the mandrel sleeve to be turned in an opposite direction and the mandrel lugs to be rotated beneath the body lugs and into alignment with the latter.

Figs. 9 to 15 illustrate other typical forms, in which rotative movement of the lugs in one direction is accomplished by elastic action instead of by camming. In Figs. 9 to 13 the mandrel is shown as loosely splined to the body, the mandrel head 23 having enlarged grooves 23e to take the body splines 25e so that the mandrel may turn through the angle of 90° necessary to throw the mandrel lugs into and out of alignment with the body lugs, the necessary angle of rotation of course depends on the number and spacing 75

of the lugs in each set; two lugs each of approximately 90° and intervening spaces of the same extent have been preferably chosen in all the forms here shown.

5 In this form the mandrel lugs 22e are carried directly by the lower mandrel 21b, preferably integral therewith. Both the mandrel and body lugs 40e are formed as before, except that the upper faces of the body lugs and the lower faces of the mandrel lugs are formed into interengaging cam faces 45e and 49e, respectively, the interengagement of which cams the mandrel lugs around, on the downstroke, so that the mandrel lugs then pass downwardly between the body lugs.

15 Assuming the parts in the position of Figs. 9 and 11, with the mandrel lugs under the body lugs, upward pull then squeezes the mandrel lugs past the others and results in an upward strike as before. A small right-handed twist (right-handed looking down on the drill pipe or tool) will have been previously given the drill pipe from above, to be sure that the mandrel lugs are directly under the body lugs. Relative right-hand rotation of the mandrel in the body is limited by the splines 24e engaging the head 23 and also by the walls or ledges 60 which extend down from the body lugs in such position as to limit right-hand rotation.

30 Either of these limiting arrangements will serve to limit relative rotation, and either will serve as the rotary drive connection between mandrel and body; but it is preferred to locate the primary rotary drive connection near the top of the body where the rotary strain is transmitted directly to the torsionally stronger body, and to locate the lug-rotating arrangements close to the lugs. Thus, although that arrangement is preferred, these observations serve to show how the lug rotating and limiting means may be formed in the same elements as the rotation transmitting means.

40 In the form of Fig. 9 the mandrel lugs are in their limiting right-hand position under the body lugs when head 23 is in its limiting right-hand position relative to splines 25c. Consequently, when upward pull is exerted and the upward stroke made, the mandrel and its lugs travel straight up. On the subsequent down stroke, assuming the body to be fixed or relatively retarded against rotation by reason of the connection of the fishing tool with the fish, left-handed rotation of the mandrel and lugs by the camming action produces torsion in the drill pipe above the jar, and an opposite torsion in any drill pipe that may extend below the jar; with the result that the mandrel lugs spring under the body lugs as soon as they are passed. A slight torsion on the drill pipe is sufficient for this action. The parts are then back in substantially the position of Fig. 9 ready for the mandrel lugs to be pulled up against the body lugs and then squeezed through on the next upstroke.

60 In the variational form shown in Fig. 14, the mandrel head is splined to the body at 65, as in Fig. 1, and the mandrel carries a rotatable sleeve 66 confined against downward movement by collar 67 and carrying lugs 68 similar to those shown in Fig. 9. The body lugs 73 are also similar to those shown in Fig. 9, having the same upwardly facing cam surfaces adapted to be engaged by the lower cam surfaces of the mandrel lugs to cause the latter to be rotated, during downward movement of the mandrel, into the spaces between the body lugs. Rotation of the sleeve on

the mandrel in one direction (opposite that in which the mandrel lugs are rotated by engagement of the body lugs), is resisted by a coil spring 69 fixed to the mandrel at 70 and having its lower end attached at 71 to the sleeve. Spring 69 may be maintained under a slight longitudinal compression to maintain the sleeve in engagement with collar 67, and it may also be placed under slight torsional tension to cause sleeve 66 to be maintained in contact with a stop 74 integral with collar 67, and thereby to normally maintain the body and mandrel lugs in proper alinement.

Upon the exertion of sufficient upward pull on the mandrel, lugs 68 move up past the body lugs, as before, and after release during subsequent upward movement of the mandrel, sleeve 66 will remain rotatably stationary. Upon downward movement of the mandrel to the point at which the body and mandrel lugs again come into engagement, the cam action between the lugs causes the sleeve to rotate against the resistance of the spring and the mandrel lugs to pass down through the spaces between the body lugs. When the parts reach the relative longitudinal positions of Fig. 14, the mandrel lugs are released to move by "snap action" under the influence of spring 69 into positions of alinement with the body lugs.

I claim:

1. In a jar, a body and a relatively longitudinally movable mandrel, interengaging lugs carried by the mandrel and body, respectively, said lugs being circumferentially spaced and rotatable with respect to each other, and said lugs being maintained in alinement, longitudinally of the body so that when longitudinal tension is applied to the body and mandrel, the lugs are forced in tight engagement longitudinally past each other, with the mandrel lugs moving inside the body lugs, to free the body and mandrel for relative longitudinal movement in one direction, striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, and means acting by virtue of relative longitudinal movement of the body and mandrel to cause the mandrel lugs to pass the body lugs in circumferentially offset relation thereto, upon relative movement of the body and mandrel in a direction opposite the first mentioned direction.

2. In a jar, a body and a relatively longitudinally movable mandrel, interengaging lugs carried by the mandrel and body, respectively, said lugs being circumferentially spaced and rotatable with respect to each other, and said lugs being maintained in alinement, longitudinally of the body so that when longitudinal tension is applied to the body and mandrel, the lugs are forced in tight engagement longitudinally past each other, with the mandrel lugs moving inside the body lugs, to free the body and mandrel for relative longitudinal movement in one direction, striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, and means acting by virtue of relative longitudinal movement of the body and mandrel to cause the mandrel lugs to pass the body lugs in circumferentially offset relation thereto, and then to move into circumferential alinement with the latter.

3. In a jar, a body and a relatively longitudinally movable mandrel, means preventing substantial relative rotation between the body and mandrel, interengaging lugs carried by the mandrel and body, respectively, said lugs being circumferentially spaced and rotatable with respect

to each other, and said lugs being maintained in alinement, longitudinally of the body so that when longitudinal tension is applied to the body and mandrel, the lugs are forced in tight engagement longitudinally past each other, with the mandrel lugs moving inside the body lugs, to free the body and mandrel for relative longitudinal movement in one direction, striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, and means acting by virtue of relative longitudinal movement of the body and mandrel to cause the mandrel lugs to pass the body lugs in circumferentially offset relation thereto, and then to move into circumferential alinement with the latter.

4. In a jar, a body and a mandrel telescopically relatively movable, interengaging lugs carried by the mandrel and body, respectively, with angular interengaging faces so that longitudinal tension applied to the body and mandrel forces the lugs longitudinally past each other and frees the body and mandrel for relative longitudinal movement in one direction striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, the body and mandrel lugs being circumferentially spaced and the mandrel lugs being rotatable on the mandrel and with respect to the body by virtue of relative longitudinal movement between the mandrel and body.

5. In a jar, a body and a mandrel telescopically relatively movable, interengaging lugs carried by the mandrel and body, respectively, with angular interengaging faces so that longitudinal tension applied to the body and mandrel forces the lugs longitudinally past each other and frees the body and mandrel for relative longitudinal movement in one direction, striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, the body and mandrel lugs being circumferentially spaced and the mandrel lugs being rotatable on the mandrel and with respect to the body and means acting by virtue of relative longitudinal movement of the body and mandrel to turn and guide the mandrel lugs between the body lugs when the mandrel moves longitudinally oppositely to the direction stated and then to rotate the mandrel lugs into longitudinal alinement with the body lugs.

6. In a jar, a body and a mandrel telescopically relatively movable, interengaging lugs longitudinally fixed on the mandrel and body, respectively, said lugs being maintained in alinement, longitudinally of the body so that when longitudinal tension is applied to the body and mandrel, the lugs are forced longitudinally past each other, with the mandrel lugs moving inside the body lugs, to free the body and mandrel for relative longitudinal movement in one direction, striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, the body and mandrel lugs being circumferentially spaced and rotatable with respect to each other, and means acting by virtue of relative longitudinal movement of the body and mandrel to guide the mandrel lugs in longitudinal movement between the body lugs and then to rotate the lugs into longitudinal alinement.

7. In a jar, a body and a mandrel telescopically relatively movable, interengaging lugs longitudinally fixed on the mandrel and body, respectively, with angular interengaging faces so that longitudinal tension applied to the body and mandrel forces the lugs longitudinally past each other and

frees the body and mandrel for relative longitudinal movement in one direction, striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, the body and mandrel lugs being circumferentially spaced and the mandrel lugs being rotatable on the mandrel and with respect to the body, and means acting by virtue of relative longitudinal movement of the body and mandrel to turn and guide the mandrel lugs between the body lugs when the mandrel moves longitudinally oppositely to the direction stated and then to rotate the mandrel lugs into longitudinal alinement with the body lugs.

8. In a jar, a body and a mandrel telescopically relatively movable, interengaging lugs carried by the mandrel and body, respectively, with angular interengaging faces so that longitudinal tension applied to the body and mandrel forces the lugs longitudinally past each other, with the mandrel lugs moving inside the body lugs and radially expanding the body, to free the body and mandrel for relative longitudinal movement in one direction, striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, the body and mandrel lugs being circumferentially spaced and rotatable with respect to each other, and cam means acting by virtue of reverse relative longitudinal movement between the body and mandrel to relatively rotate the lugs to cause them to pass each other.

9. In a jar, a body and a mandrel telescopically relatively movable, interengaging lugs carried by the mandrel and body, respectively, with angular interengaging faces so that longitudinal tension applied to the body and mandrel forces the lugs longitudinally past each other, with the mandrel lugs moving inside the body lugs and radially expanding the body, to free the body and mandrel for relative longitudinal movement in one direction, striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, the body and mandrel lugs being circumferentially spaced and rotatable with respect to each other, and cam and spring means acting by virtue of reverse relative longitudinal movement between the body and mandrel to relatively rotate the lugs to cause them to pass each other and then to move into alinement.

10. In a jar, a body and a mandrel telescopically relatively movable, interengaging lugs carried by the mandrel and body, respectively, with angular interengaging faces so that longitudinal tension applied to the body and mandrel forces the lugs longitudinally past each other, with the mandrel lugs moving inside the body lugs and radially expanding the body, to free the body and mandrel for relative longitudinal movement in one direction, striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, the body and mandrel lugs being circumferentially spaced and rotatable with respect to each other, cam means acting by virtue of reverse relative longitudinal movement between the body and mandrel to relatively rotate the lugs in one direction, and spring means acting to rotate the lugs relatively in the opposite direction.

11. In a jar, a body and a mandrel telescopically relatively movable, a rotatable sleeve on the mandrel, interengaging lugs on the body and sleeve with longitudinally presented angular faces so that longitudinal tension applied to the body and mandrel forces the lugs longitudinally past each other and frees the mandrel for relative

longitudinal movement in one direction, and means whereby said sleeve is caused to rotate on the mandrel by virtue of relative longitudinal movement between the body and mandrel.

12. In a jar, a body and a mandrel telescopically relatively movable, a rotatable sleeve longitudinally fixed on the mandrel, interengaging lugs on the body and sleeve with longitudinally presented angular faces so that longitudinal tension applied to the body and mandrel forces the lugs longitudinally past each other and frees the mandrel for relative longitudinal movement in one direction, striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, the body and mandrel lugs being circumferentially spaced so that they may pass each other when in a given relative position, and means acting by virtue of longitudinal movement to rotate the mandrel sleeve to assume lug passing position when the mandrel moves reversely longitudinally and to again rotate the sleeve to lug alinement position after the lugs have passed.

13. In a jar, a body and a mandrel relatively longitudinally movable, means preventing relative rotation between the body and mandrel, a rotatable sleeve on the mandrel, interengaging lugs on the body and sleeve with longitudinally presented angular faces so that longitudinal tension applied to the body and mandrel forces the lugs longitudinally past each other and frees the mandrel for relative longitudinal movement in one direction, striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, the body and mandrel lugs being circumferentially spaced so that they may pass each other when in a given relative position, and means acting by virtue of longitudinal movement to rotate the mandrel sleeve to assume lug passing position when the mandrel moves reversely longitudinally and to again rotate the sleeve to lug alinement position after the lugs have passed.

14. In a jar, a body and a mandrel telescopically relatively movable, a rotatable sleeve longitudinally fixed on the mandrel, interengaging lugs on the body and sleeve with longitudinally presented angular faces so that longitudinal tension applied to the body and mandrel forces the lugs longitudinally past each other and frees the mandrel for relative longitudinal movement in one direction, striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, the body and mandrel lugs being circumferentially spaced so that they may pass each other when in a given relative position, and means acting by virtue of longitudinal movement to rotate the mandrel sleeve to assume lug passing position when the mandrel moves reversely longitudinally and to reversely rotate the sleeve to lug alinement position after the lugs have passed.

15. In a jar, a body and a mandrel telescopically relatively movable, a rotatable sleeve longitudinally fixed on the mandrel, interengaging lugs on the body and sleeve with longitudinally presented angular faces so that longitudinal tension applied to the body and mandrel forces the lugs longitudinally past each other and frees the mandrel for relative longitudinal movement in one direction, striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, the body and mandrel lugs being circumferentially spaced so that they may pass each other when in a given rela-

tive position, and means acting by virtue of longitudinal movement to rotate the mandrel sleeve to assume lug passing position when the mandrel moves reversely longitudinally and to again rotate the sleeve to lug alinement position after the lugs have passed, said means including camming surfaces within the body and a camming lug on the sleeve.

16. In a jar, a body and a mandrel telescopically relatively movable, a rotatable sleeve longitudinally fixed on the mandrel, interengaging lugs on the body and sleeve with longitudinally presented angular faces so that longitudinal tension applied to the body and mandrel forces the lugs longitudinally past each other and frees the mandrel for relative longitudinal movement in one direction, striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, the body and mandrel lugs being circumferentially spaced so that they may pass each other when in a given relative position, a cam engaging lug on the sleeve, and cam surfaces within the body one of which causes rotation of the sleeve to lug passing position and another causes rotation of the sleeve to lug alining position.

17. In a jar, a body and a mandrel telescopically relatively movable, a rotatable sleeve longitudinally fixed on the mandrel, interengaging lugs on the body and sleeve with longitudinally presented angular faces so that longitudinal tension applied to the body and mandrel forces the lugs longitudinally past each other and frees the mandrel for relative longitudinal movement in one direction, striking shoulders on the body and mandrel which are brought into engagement by such longitudinal movement, the body and mandrel lugs being circumferentially spaced so that they may pass each other when in a given relative position, cam means acting by virtue of longitudinal movement to rotate the mandrel sleeve in one direction, and spring means to rotate the sleeve in the opposite direction.

18. In a jar, a body and a mandrel telescopically relatively movable, a pair of interengaging members operating to hold the body and mandrel against relative longitudinal movement in one direction but releasable by tension applied to the body and mandrel to free the mandrel for relative longitudinal movement in that direction, one of said members being rotatably connected to the mandrel and being movable longitudinally of the body, and means whereby the last mentioned member is rotated relative to the mandrel by virtue of relative longitudinal movement between the body and mandrel.

19. In a jar, a body and a mandrel telescopically relatively movable, a pair of interengaging members operating to hold the body and mandrel against relative longitudinal movement in one direction but releasable by tension applied to the body and mandrel to free the mandrel for relative longitudinal movement in that direction, one of said members being connected to the mandrel for rotation about the mandrel longitudinal axis and being movable longitudinally of the body, means for rotating the last mentioned member about the mandrel axis by virtue of relative longitudinal movement between the body and mandrel, and yielding means resisting such rotation of said last mentioned member.

20. In a jar, a body and a mandrel telescopically relatively movable, a pair of interengaging members operating to hold the body and mandrel against relative longitudinal movement in

one direction but releasable by tension applied to the body and mandrel to free the mandrel for relative longitudinal movement in that direction, one of said members being rotatable relative to both the mandrel and body, and means whereby the last mentioned member is rotated relative to both the mandrel and body by virtue of relative longitudinal movement between the body and mandrel.

21. In a jar, a body and a mandrel telescopically relatively movable, and a pair of interengaging members operating to hold the body and mandrel against relative longitudinal movement in one direction but releasable by tension applied to the body and mandrel to free the mandrel for relative longitudinal movement in that direction, one of said members being rotatable relative about both the mandrel and body longitudinal axes, means for so rotating the last mentioned member by virtue of relative longitudinal movement between the body and mandrel, and yielding means resisting such rotation of said last mentioned member.

22. In a jar, a body and a mandrel telescopically relatively movable, two pairs of interengaging lugs operating to hold the body and mandrel against relative longitudinal movement in one direction but releasable by tension applied to the body and mandrel to free the mandrel for relative longitudinal movement in that direction, one pair of said lugs being rotatable relative to both

the mandrel and body, means rotatably connecting the last mentioned pair of lugs to the mandrel, and means whereby said last mentioned pair of lugs are rotated relative to the mandrel by virtue of relative longitudinal movement between the body and mandrel.

23. In a jar, a body and a mandrel telescopically relatively movable, a sleeve surrounding said mandrel and rotatable relative to both the body and mandrel, interengaging lugs carried by said sleeve and the body, means holding the mandrel and body against relative rotation, and means for rotating said sleeve on the mandrel by virtue of relative longitudinal movement between the body and mandrel while said body and mandrel are held by the first mentioned means against substantial relative rotation.

24. In a jar, a body and a mandrel telescopically relatively movable, a sleeve surrounding said mandrel and rotatable relative to both the body and mandrel, interengaging lugs carried by said sleeve and the body, means holding the mandrel and body against relative rotation, means for rotating said sleeve on the mandrel by virtue of relative longitudinal movement between the body and mandrel while said body and mandrel are held by the first mentioned means against substantial relative rotation, and yielding means resisting rotation of said sleeve.

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