May 5, 1931. W. D. SHAFFER 1,803,732

JAR MECHANISM FOR WELL DRILLING

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Fig. 1.

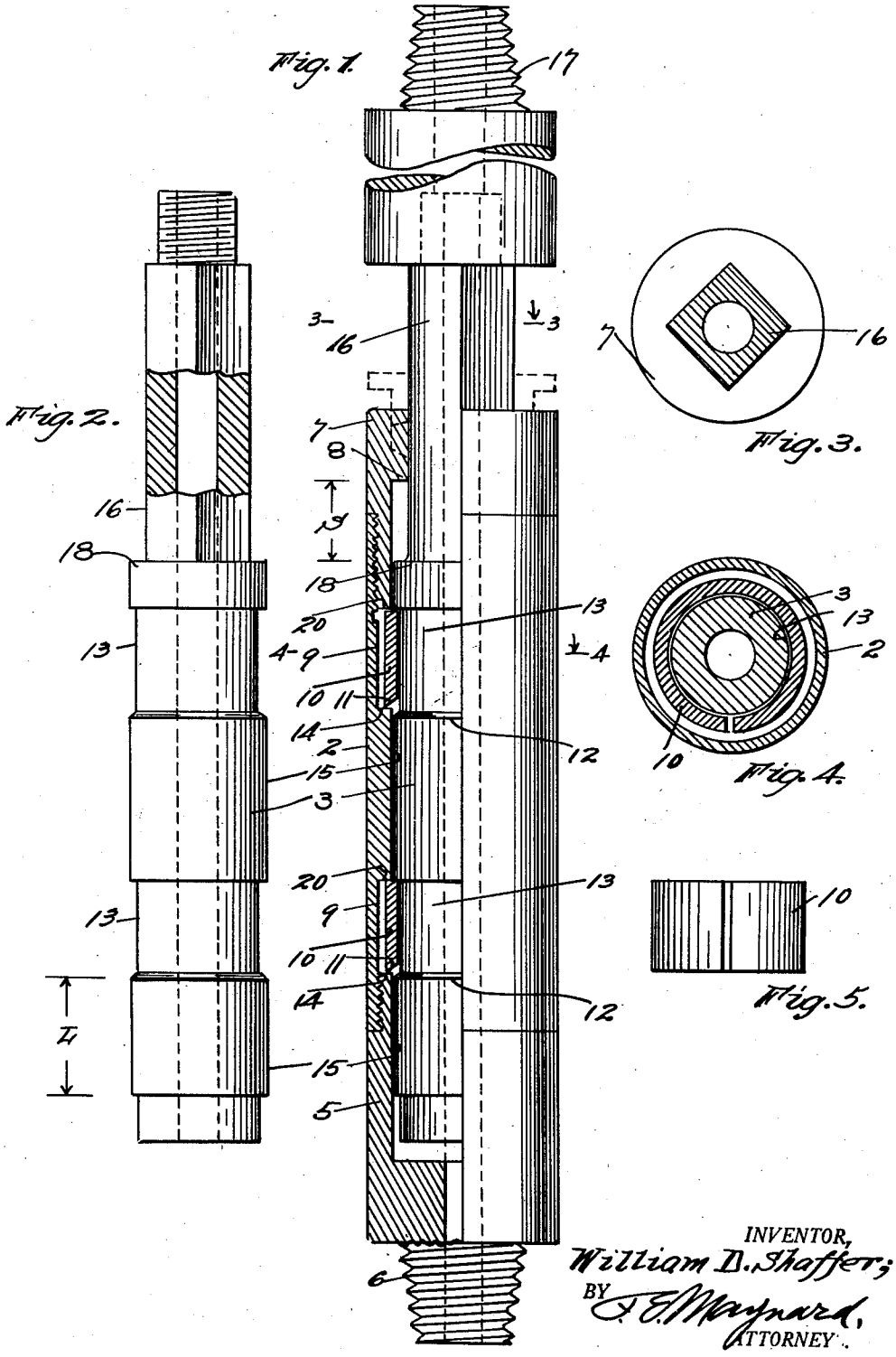



Fig. 2.




Fig. 3.




Fig. 4.




Fig. 5.

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## JAR MECHANISM FOR WELL DRILLING

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This invention relates to well drilling apparatus and more especially to jar mechanism.

In well drilling practice it is frequently necessary to exert a strong pull in certain processes and use of equipment, as for instance, when fishing jobs develop. It is known that a jaw percussion is often more effective in starting loose the fish, or other engaged object, than a mere powerful steady pull.

Therefore, it is an object of my invention to provide means to accomplish the desired percussion blow as well as to exert all the desired direct pull and lift action needed in the job.

A further object is to provide a simple and practicable jar mechanism which may be incorporated in rotary rig and string apparatus.

Another object is to provide a jar mechanism which enables the use of one or more yieldable resistances which act to check movement of the grappling part until a material tension is set up in the pulling string and which, after accumulation, is sufficient to overcome the resistance and suddenly snaps into action with the result that the rapidly moving, released part of the mechanism acquires high kinetic energy and when striking an interposed abutment or "anvil" of the grappling part will have a percussive effect on the fish or object to the pulled.

An additional object is to provide a jar of such structure that the resistive, yieldable elements may act cumulatively so that it is possible to employ elements each of less stiffness and of easier release action than is permissible where only one of such yieldable resistances is employed. The advantage of this is that a more easily flexed resistor, or spring collar, may be employed thus obtaining longer life of action because of reduced rigidity under flexure stresses. Where a very stiff spring is used to obtain the necessary resistance it will be seen that the greater is the liability of fracture and total breaking at each use; whereas if a number of more flexible springs are employed the less the risk and the greater the flexing life of each spring.

A still further object is to provide a jar mechanism or unit in which relatively telescopic sections are combined for rotation as a unit to enable a screwing-up action of associated and connected parts of the apparatus.

The invention consists in certain advancements in this art as set forth in the ensuing disclosure and having, with the above, additional objects and advantages, and whose construction, combination and details of means, and the manner of operation will be made manifest in the description of the herewith illustrative embodiment; it being understood that modifications, variations and adaptations may be resorted to within the scope, principle and spirit of the invention as it is more directly claimed hereinafter.

Figure 1 is an elevational and longitudinal sectional view of the jar unit.

Figure 2 is an elevation of the dismounted mandrel.

Figure 3 is a cross-section on line 3—3, of Fig. 1.

Figure 4 is a cross-section on line 4—4, Fig. 1.

Figure 5 is an elevation of a resistor or spring collar.

The present jar may be considered as a unit adapted to be connected in a drill-string or other apparatus and includes a cylindrical shell 2 and inner slidable mandrel 3.

The shell 2 has an attached bottom cup 5 provided with a screw-pin 6 for a subjacent string part (not shown) and has an attached crown 7 presenting an internal transverse shoulder 8 hereinafter called the "anvil."

The shell is counterbored at one or more places to form pockets 9 for yieldable resistors here shown as split, spring collars 10 which have beveled lower ends 11 complementary to opposing shoulders 12 of the mandrel 3.

The shoulders 12 are provided at reduced necks 13 of the mandrel and into which the springs 10 close in normal position and while supported on relative ledge 14 of the sleeve shell parts.

The mandrel 3 has cylindrical lands 15 of greater diameter than the normal internal diameter of the spring collars and has a stem 16 non-rotatively sliding in the crown 7 and provided with a head pin 17 for attachment to superjacent apparatus (not shown). The upper end 18 of the mandrel 3 constitutes a hammer to engage the overhanging anvil 8.

The operation of this jar is as follows: When lowered the shell hangs on the closed springs 10 and these hang on the shoulders 12 of the mandrel; the springs being stiff enough not to open under the load of the shell and its attached parts.

When the shell has been connected, by its subjacent parts, to the fish or other object sought, the stem and its mandrel are pulled upward and the springs pulled hard against top shoulders 20 of the shell with the result that the resistance to the pull sets a tension in the fishing line. This tension gradually increases until it overcomes the cumulative resistance of the spring collars 10, thus suddenly releasing the mandrel and permitting this to fly against the anvil 8. The percussion shock is thus transmitted from the shell to the caught fish and this ultimately loosened and pulled.

It will be understood that the control spring collars and opposed springing shoulders could be designed to contract into the mandrel with the same releasing results as the expanding action here shown.

The lands 13 are of greater length indicated at L Fig. 2 than the jar stroke indicated at S Fig. 1 so that the collars can not close in under the lands and lock the unit parts in extended position. It is desired that circulation be possible through the jar unit when desired and the sections thereof are shown as provided with a central circulation passage.

What is claimed is:

1. A drill mechanism jar comprising coupled telescopic parts forming a unit adapted to be introduced in a fishing string, and yieldable resistor means interposed between said parts to restrain their sliding motion until a predetermined strain is acquired and constituting solid drive means on down stroke, one part having an anvil to be struck by the released moving part.

2. A drill mechanism jar comprising coupled relatively non-rotatable telescopic parts forming a unit adapted to be introduced in a fishing string, and yieldable resistor means forming rigid drive down connections interposed between said parts to restrain their sliding motion until a predetermined strain is acquired, one part having an anvil to be struck by the released moving part.

3. A drill mechanism jar comprising a pair of sections having telescopic action of limited degree each way, and a yieldable means to release one part, under accumulated strain, to strike against the other part with percussive effect; said means comprising rigid pressure transmitters in one direction of force.

4. A drill mechanism jar comprising a pair of sections having telescopic action of limited degree each way, and a yieldable means to release one part, under accumulated pulling strain, to strike against the other part with percussive effect; said means being non-yieldable under drive stroke of the parts.

5. A drill mechanism jar comprising coupled, telescopic sections, one part having a hammer element and the other an anvil element, and yieldable means to automatically release one part as to the other under relative pull so that the hammer will fly against the anvil with percussive effect and being non-yieldable under compression force along the parts.

6. A drill mechanism jar for a drill stem line including a shell part provided with internal pockets, a stem mandrel part sliding in the shell and having reduced necks, and split spring collars nested in opposed neck and pocket portions and resisting relative sliding action of the parts and adapted to yield and release one of said parts for a snap movement as to the other.

7. A drill mechanism jar including a shell part provided with internal pockets, a stem mandrel part sliding in the shell and having reduced necks, and spring means nested in opposed neck and pocket portions and resisting relative sliding action of the parts and adapted to release one of said parts for a snap movement as to the other; one part having an anvil element and the other a hammer element to impinge thereon when the snap action occurs.

8. A jar, for drilling mechanism, including relatively sliding parts provided with means for requiring an accumulated force on one part to effect such sliding action and then automatically releasing the restrained part for a sudden percussive jar against the other part; said means forming a solid drive connection during application of compressive force on the parts.

9. A drill mechanism jar including a shell part provided with internal pockets, a stem mandrel part sliding in the shell and having reduced necks, and spring means nested in opposed neck and pocket portions and resisting relative sliding action of the parts and adapted to release one of said parts for a snap movement as to the other; one part having an anvil element to impinge thereon when the snap action occurs; and said springs comprising rigid compression elements between said shell and mandrel parts during their downward drive operation on a subjacent part.

10. A jar, for well drilling stems, including telescopic shell and mandrel parts having opposed rigid up-jar hammer and anvil shoul-

ders, and down-drive couplers for rigidly connecting the parts under compression force and yieldable under tension of one part when drawing from the other.

11. A jar, for well drilling stems, including telescopic shell and mandrel parts having rigid hammer and anvil shoulders, and a spring coupler frictionally locking said parts until a predetermined degree of tension has accumulated between the parts, and comprising a drive collar for the parts.

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