

Nov. 3, 1936.

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2,059,540

OIL WELL JAR

Filed Dec. 5, 1930

Fig. 1.

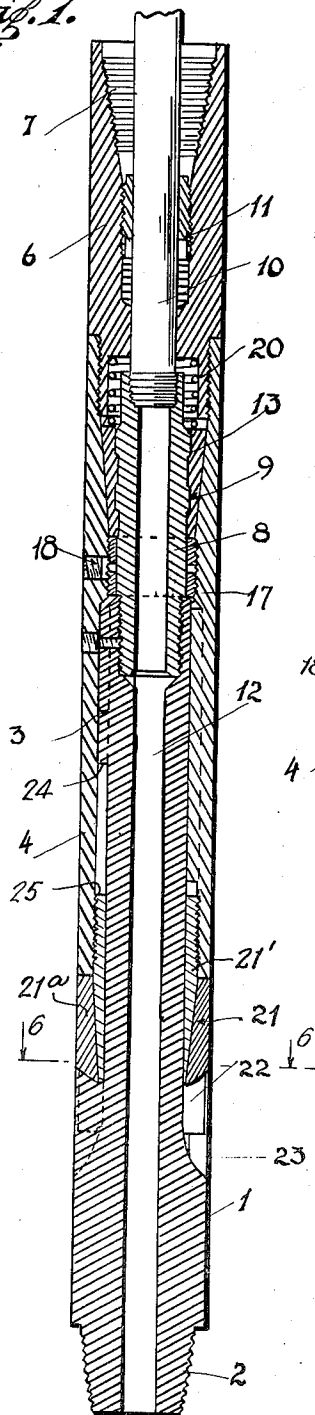


Fig. 2.

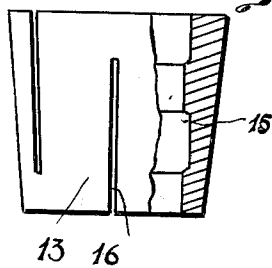


Fig. 4.

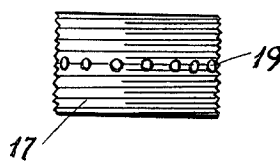


Fig. 3.

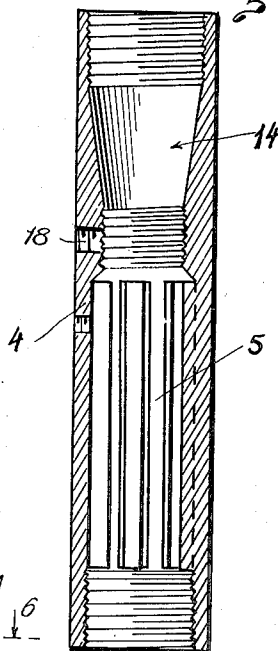


Fig. 5.

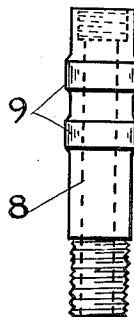
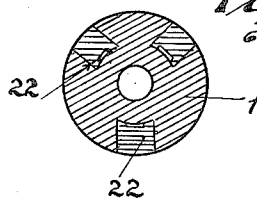


Fig. 6.



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2,059,540

OIL WELL JAR

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Application December 5, 1930, Serial No. 500,271

26 Claims. (Cl. 255—27)

This invention relates to an oil well jarring tool by means of which a bit, a string of pipe, or the like, can be loosened when it becomes stuck in the hole, and is an improvement on my co-pending application, Serial Number 384,736, filed August 9, 1929, Patent No. 1,794,991.

An object of my invention is to provide a novel jarring tool, the wearing parts of which are so constructed and arranged that they may be readily replaced when worn.

Another object is to provide a jarring tool, the engaging slip of which may be adjusted so as to vary the force of the blow imparted to the bit, pipe, or the like.

A further object is to provide a tool of the character stated which has a novel releasable connection between the coupling member and the outer sleeve whereby the tool may be used during the drilling operation, and is available for use as a jar at all times.

Other objects, advantages, and features of invention may appear from the accompanying drawing, the subjoined detailed description, and the appended claims.

In the drawing:

Figure 1 is a longitudinal, sectional view of my tool.

Figure 2 is a side elevation of the slip with parts broken away to show interior construction.

Figure 3 is a longitudinal, sectional view of the bowl.

Figure 4 is a side elevation of the adjusting ring.

Figure 5 is a side elevation of the friction head.

Figure 6 is a sectional view taken on line 6—6 of Figure 1.

Referring more particularly to the drawing, the numeral 1 indicates the mandrel, the lower end of which is threaded, as at 2 so that the tool may be coupled to the bit, the tool joint, the pipe, or a similar structure. At the upper end of the mandrel, a plurality of longitudinally extending splines 3 is provided. A bowl 4 extends partly over the mandrel 1 and the bowl is provided with internal splines 5 in which the splines 3 fit. Thus the bowl is guided in its longitudinal movement, as will be further described.

A top sub 6 screws into the upper end of the bowl 4 and the sub is threaded as at 7 to receive the drill pipe, or the like. A friction head 8 screws into the top of the mandrel 1 and this mounting is a feature of my invention in that the friction head may be readily replaced if it becomes worn or broken. If worn or broken, the friction head may be readily removed and an-

other one inserted in the place thereof. A plurality of friction rings or shoulders 9 are integrally formed on the head 8, said rings being adjacent the upper end of the head. A wash pipe 10 screws into the top of the head 8 and extends upwardly through a packing gland 11, the purpose of the wash pipe being to conduct circulating fluid into the central longitudinal passage 12 of the tool.

A slip or sleeve 13 is mounted in the bowl 4 adjacent the upper end thereof. The slip fits or rests in a tapered seat 14 in the bowl and the outer surface of the slip is tapered to conform to the shape of the seat. A plurality of inwardly extending annular rings or shoulders 15 is integrally formed on the slips 13 and the purpose of these rings is to engage the friction rings 9 on the head 8 for the purpose of impeding the upward movement of the bowl to cause a jar or shock to be imparted to the mandrel, as will be further described.

In operation the mandrel is attached to the bit or the like which is to be loosened, and the bowl is attached to the drill pipe. The tool is in the position shown in Figure 1 with the slip 13 engaging the friction head 8. Now by pulling upwardly on the drill pipe the slip is caused to slide off of the friction head after a considerable pull is exerted, and the friction head will be released suddenly, thus causing the bowl to strike against the splines in the top of the mandrel to impart a severe jar to the mandrel. The striking abutments are shown at 24 and 25, wherein 24 constitutes the anvil and 25 the hammer. The tapered surface 14 tends to force the slip 13 inwardly, but the necessary expansion of the slip is provided by a plurality of slots 16 which are cut in the slip. The grip of the slip on the friction head can be adjusted by means of an adjusting ring 17 which screws into the bowl 4. The slip rests on the top of the adjusting ring and by screwing the ring up or down, the slip is adjusted on its tapered seat 14 and is moved either towards or away from the friction head. When a pull is being exerted on the bowl, the slip bears tightly against the adjusting ring, but when the bowl is lowered for another stroke, the slip slides upwardly on the tapered surface 14, thus allowing the friction head to pass readily through it. The ring 17 can be rotated from the outside by means of a tool which is inserted into the plugged opening 18, which tool enters one of the holes 19 in the adjusting ring. The slip 13 is urged downwardly in its seat by a coil

spring 20 which bears against the top of the slip.

The engaging splines 3—5 might not be sufficient to drive the mandrel 1 during the drilling operation, so I have provided a split nut 21 which screws into the bottom of the bowl 4. The split nut is provided with a plurality of depending lugs or fingers 22 which enter notches 23 in the mandrel 1. Thus a sturdy connection is provided between the bowl and the mandrel, and this connection releases readily when the bowl is pulled upwardly during the jarring operation.

The split nut consists of two parts, a sleeve 21' which is threaded at the top and screws into the bowl 4, and a ring 21a which encircles the sleeve and is welded to it after the nut is assembled around the mandrel. The sleeve 21' is made in two halves as is also the ring 21a. After assembling the halves of the ring they are welded together and the ring is also welded to the sleeve. The lugs 22 depend from, and are integrally formed with the ring 21a.

Having described my invention, I claim:

1. A jarring tool comprising a mandrel, a bowl extending over the mandrel, coupling means on the bowl to which the drill pipe is adapted to be secured, coupling means on the lower end of the mandrel, a friction head on the mandrel, a slip seated in the bowl and adapted to releasably engage the friction head, and manual means to adjust said slip whereby the grip of the slip on the friction head is varied.

2. A jarring tool comprising a mandrel, a bowl extending over the mandrel, coupling means on the bowl to which the drill pipe is adapted to be secured, coupling means on the lower end of the mandrel, a friction head on the mandrel, a slip seated in the bowl and adapted to releasably engage the friction head, a ring screwed into the bowl, said ring engaging the slip whereby it may be longitudinally adjusted to vary the grip of the slip on the friction head.

3. A jarring tool comprising a mandrel, a bowl extending over the mandrel, coupling means on the bowl to which the drill pipe is adapted to be secured, coupling means on the lower end of the mandrel, a friction head detachably secured to the mandrel, a slip seated in the bowl, said slip being adapted to engage the friction head, engaging splines on the mandrel and in the bowl, driving means on the lower end of the bowl, said driving means engaging the mandrel whereby said bowl and mandrel are rotated in unison.

4. A jarring tool comprising a mandrel, a bowl extending over the mandrel, coupling means on the bowl to which the drill pipe is adapted to be secured, coupling means on the lower end of the mandrel, a friction head detachably secured to the mandrel, a slip seated in the bowl, said slip being adapted to engage the friction head, adjustment means engaging said slip whereby the grip of the slip on the friction head is adjusted, engaging splines on the mandrel and in the bowl, driving means on the lower end of the bowl, said driving means engaging the mandrel whereby said bowl and mandrel are rotated in unison.

5. A jarring tool comprising a mandrel, a bowl extending over the mandrel, coupling means on the bowl to which the drill pipe is adapted to be secured, coupling means on the lower end of the mandrel, a friction head detachably secured to the mandrel, a slip seated in the bowl, said slip being adapted to engage the friction head, an adjusting ring screwed into the bowl, said slip resting on the ring whereby said slip may be longitudi-

nally adjusted to vary the grip of the slip on the friction head, engaging splines on the mandrel and in the bowl, driving means on the lower end of the bowl, said driving means engaging the mandrel whereby said bowl and mandrel are rotated in unison.

6. A jarring tool comprising a mandrel, a bowl extending over the mandrel, coupling means on the bowl to which the drill pipe is adapted to be secured, coupling means on the bottom of the mandrel, a friction head screwed into the top of the mandrel, a plurality of friction rings on the friction head, a slip, a tapered seat in the bowl on which the slip rests, a plurality of annular rings on the slip, said rings engaging the friction head, means in the bowl whereby the slip may be longitudinally adjusted on its seat, and engaging splines in the bowl and on the mandrel.

7. A jarring tool comprising a mandrel, a bowl extending over the mandrel, coupling means on the bowl to which the drill pipe is adapted to be secured, coupling means on the bottom of the mandrel, a friction head screwed into the top of the mandrel, a plurality of friction rings on the friction head, a slip, a tapered seat in the bowl on which the slip rests, a plurality of annular rings on the slip, said rings engaging the friction head, means in the bowl whereby the slip may be longitudinally adjusted on its seat, and engaging splines in the bowl and on the mandrel, a split sub screwed into the bottom of the bowl, depending fingers on the sub, said mandrel having recesses therein to receive the fingers whereby the bowl and the mandrel are driven in unison.

8. A jarring tool comprising a mandrel, a bowl extending over the mandrel, coupling means on the bowl to which the drill pipe is adapted to be secured, coupling means on the bottom of the mandrel, a friction head screwed into the top of the mandrel, a plurality of friction rings on the friction head, a slip, a tapered seat in the bowl on which the slip rests, a plurality of annular rings on the slip, said rings engaging the friction head, a ring screwed into the bowl, said slip resting on the top of the ring whereby the slip may be longitudinally adjusted, and engaging splines in the bowl and on the mandrel to simultaneously rotate the bowl and the mandrel.

9. A jar for use in rotary drilling comprising two members telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments formed on said members inter-engageable when said members are in extended position, a shoulder formed on one of said members, a sleeve carried by the other of said members and having means thereon for releasably engaging said shoulder to hold said members in contracted position but releasable by the exertion of a predetermined longitudinal strain between said members, and means for adjusting said shoulder engaging means relative to said shoulder to vary the force required to release it.

10. A jar for use in rotary drilling comprising two members telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments formed on said members inter-engageable when said members are in extended position, a radially extending shoulder formed on one of said members, a sleeve carried by the other of said members and having radially extending means thereon for releasably engaging said radial shoulder to hold said members in contracted position but releasable by the exertion of

a predetermined longitudinal strain between said members, and means for radially adjusting said shoulder-engaging means to vary the force required to release it.

11. A jar for use in rotary drilling comprising an outer member, an inner member telescopically assembled within said outer member for longitudinal movement relative thereto from a contracted position to an extended position, striking abutments formed on said inner and outer members inter-engageable when said members are in extended position, means formed on said two members preventing relative rotation of said members, said outer member having a longitudinally tapered surface thereon facing said inner member, a tapered surface sleeve interposed between said inner and outer members, means on said outer member for adjustably limiting the movement of said sleeve relative to said outer member, a shoulder formed on said inner member, inwardly extending means on said sleeve normally engaging said shoulder, said shoulder and said engaging means constituting a yielding engagement releasable by the exertion of a predetermined longitudinal strain between said inner and outer members.

12. A jar for use in rotary drilling comprising an outer member, an inner member telescopically assembled within said outer member for longitudinal movement relative thereto from a contracted position to an extended position, striking abutments formed on said inner and outer members inter-engageable when said members are in extended position, means formed on said two members preventing relative rotation of said members, a sleeve interposed between said inner and outer members, a shoulder formed on said inner member, inwardly extending means on said sleeve normally engaging said shoulder, said shoulder and said engaging means constituting a yielding engagement releasable by the exertion of a predetermined longitudinal strain between said inner and outer members, and means for adjusting said sleeve relative to said shoulder to vary the engagement of said shoulder and said engaging means to vary the force required to release said members.

13. A jar for use in rotary drilling, comprising two members telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments formed on said members inter-engageable when said members are in extended position, a shoulder formed on one of said members, a sleeve movable relative to the other of said members having means thereon for releasably engaging said shoulder, means for limiting the movement of said sleeve relative to said other member to thereby hold said members in contracted position but releasing said shoulder means upon exerting of a predetermined longitudinal strain between said members in the direction of limited movement of said sleeve.

14. A jar comprising two members mounted to rotate synchronously and slide one on the other, a means to move one of the members longitudinally and rotate it, the other member adapted for connection with a tool to be jarred, a shoulder on one of said members, a sleeve carried by the other of said members and having means thereon for releasably engaging said shoulder, to hold said members in contracted position but releasable by the exertion of a predetermined longitudinal strain between said members, means operable from the outside of the jar for adjusting

said shoulder engaging means relative to the other of said members to vary the force required to release said members.

15. A jar for use in rotary drilling, comprising two members telescopically assembled one within the other, said inner member provided with an annular shoulder, and a sleeve provided with a shoulder adapted for engagement with the annular shoulder of the inner member, and means within the said jar for engagement with said sleeve and adjustable from the outside of said jar for regulating the degree of frictional engagement between said annular shoulders.

16. A jar for use in rotary drilling comprising two members telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, one of said members being adapted to be connected to a "fish", and the other of said members being adapted for connection with a string of pipe, striking abutments formed on said members, a shoulder formed on one of said members, a sleeve carried by the other of said members and having means thereon for releasably engaging said shoulder to hold said members in contracted position but releasable by the exertion of a predetermined longitudinal strain between said members when a selected tension is taken in the string of pipe to permit said striking abutments to co-engage, and means adjustable from the outside of said jar for regulating the release of tension between said two members.

17. A jar comprising two members mounted to rotate synchronously and slide one on the other, a means to move one of the members longitudinally and rotate it, the other member adapted for connection with a tool that is to be jarred, a shoulder on one of the members, a sleeve provided with a shoulder, a conical seat on the member not provided with said shoulder engageable with the said sleeve, said sleeve having its shoulder engageable with the other of said shoulders; said shoulders being releasably engaged on relative longitudinal movement between said members, the releasability depending upon the position of said sleeve within said conical seat.

18. In a jar, a member having coupling means for connection with the drill pipe, a member having coupling means for connection with the tool to be jarred, said members being adapted for longitudinal movement with respect to one another between contracted and extended positions, opposed striking abutments on said members for impact when said members are moved with respect to one another, engaging means carried by one of said members, an expansible sleeve carried by the other of said members, cooperating engaging means carried by said sleeve to hold said members in one position but to release said members upon the exerting of a predetermined longitudinal strain between the members, and means for adjusting said sleeve longitudinally with respect to said members to expand or contract said sleeve to regulate the grip of said engaging means.

19. In a jar, a member having coupling means for connection with the drill pipe, a member having coupling means for connection with the tool to be jarred, said members being adapted for longitudinal movement with respect to one another between contracted and extended positions, opposed striking abutments on said members for impact when said members are moved with respect to one another, engaging means carried by one of said members, an expansible sleeve

carried by the other of said members, cooperating engaging means carried by said sleeve to hold said members in one position but to release said members upon the exerting of a predetermined longitudinal strain between the members, and means operable from the outside of the jar for adjusting said sleeve longitudinally with respect to said members to expand or contract said sleeve to regulate the grip of said engaging means.

20. In a jar, a member having coupling means for connection with the drill pipe, a member having coupling means for connection with the tool to be jarred, said members being adapted for longitudinal movement with respect to one another between contracted and extended positions, opposed striking abutments on said members for impact when said members are moved with respect to one another, engaging means carried by one of said members, an expansible sleeve carried by the other of said members, cooperating engaging means carried by said sleeve to hold said members in one position but to release said members upon the exerting of a predetermined longitudinal strain between the members, a ring threaded to one of said members for adjusting said sleeve longitudinally with respect to said member to expand or contract said sleeve to regulate the grip of said engaging means, and means included in one of said members whereby said adjusting ring may be operated from outside of the jar.

21. In a jar, a member having coupling means for connection with the drill pipe, a member having coupling means for connection with the tool to be jarred, said members being adapted for longitudinal movement with respect to one another between contracted and extended positions, opposed striking abutments on said members for impact when said members are moved with respect to one another, engaging means carried by one of said members, an expansible sleeve carried by the other of said members, cooperating engaging means carried by said sleeve to hold said members in one position but to release said members upon the exerting of a predetermined longitudinal strain between the members, and means for adjusting said sleeve longitudinally with respect to said members to expand or contract said sleeve to regulate the grip of said engaging means, one of said members having an opening whereby said adjustment may be effected from outside of the jar.

22. In a jar, a member having coupling means for connection with the drill pipe, a member having coupling means for connection with the tool to be jarred, said members being adapted for longitudinal movement with respect to one another between contracted and extended positions, opposed striking abutments on said members for impact when said members are moved with respect to one another, a bendable slip carried by one of said members, and a plurality of alternating longitudinally spaced projections and recesses on said slip and the other of said members which engage to hold said members in one position but release said members by bending said slip upon the exerting of a predetermined longitudinal strain between the members.

23. In a jar, a member having coupling means

for connection with the drill pipe, a member having coupling means for connection with the tool to be jarred, said members being adapted for longitudinal movement with respect to one another between contracted and extended positions, opposed striking abutments on said members for impact when said members are moved with respect to one another, a bendable slip carried by one of said members, a plurality of longitudinally spaced projections on the other of said members, and a plurality of opposed projections on said slip which engage the projections on said member to hold said members in one position but release said members by bending said slip upon the exerting of a predetermined longitudinal strain between the members.

24. In a jar, a member having coupling means for connection with the drill pipe, a member having coupling means for connection with the tool to be jarred, said members being adapted for longitudinal movement with respect to one another between contracted and extended positions, opposed striking abutments on said members for impact when said members are moved with respect to one another, a bendable slip carried by one of said members, a plurality of longitudinally spaced annular projections on the other of said members, and a plurality of opposed annular projections on said slip which engage the projections on said member to hold said members in one position but release said members by bending said slip upon the exerting of a predetermined longitudinal strain between the members.

25. In a jar, a member having coupling means for connection with the drill pipe, a member having coupling means for connection with the tool to be jarred, said members being adapted for longitudinal movement with respect to one another between contracted and extended positions, opposed striking abutments on said members for impact when said members are moved with respect to one another, a bendable slip carried by one of said members, and a plurality of opposed alternating annular projections and recesses on the other of said members and said slip which engage to hold said members in one position but release said members by bending said slip upon the exerting of a predetermined longitudinal strain between the members.

26. In a jar, a member having coupling means for connection with the drill pipe, a member having coupling means for connection with the tool to be jarred, said members being adapted for longitudinal movement with respect to one another between contracted and extended positions, opposed striking abutments on said members for impact when said members are moved with respect to one another, a bendable slip carried by one of said members, a plurality of alternating annular projections and recesses on a wall of said slip, a head carried by the other of said members, a plurality of alternating annular projections and recesses on an opposed wall of said head for engagement with said projections and recesses on said slip for holding said members in one position but releasing said members by bending said slip upon the exerting of a predetermined longitudinal strain between the members.

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