Feb. 5, 1935. J. S. BECK 1,989,907

JAR AND SAFETY COUPLING

Original Filed April 15, 1933 2 Sheets-Sheet 1

Fig. 1

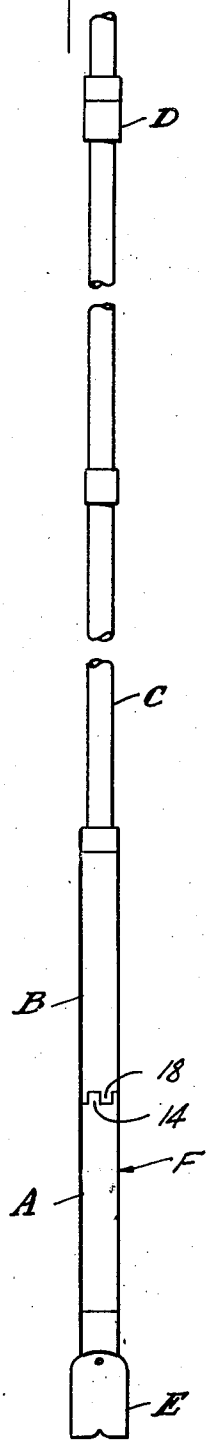


Fig. 2

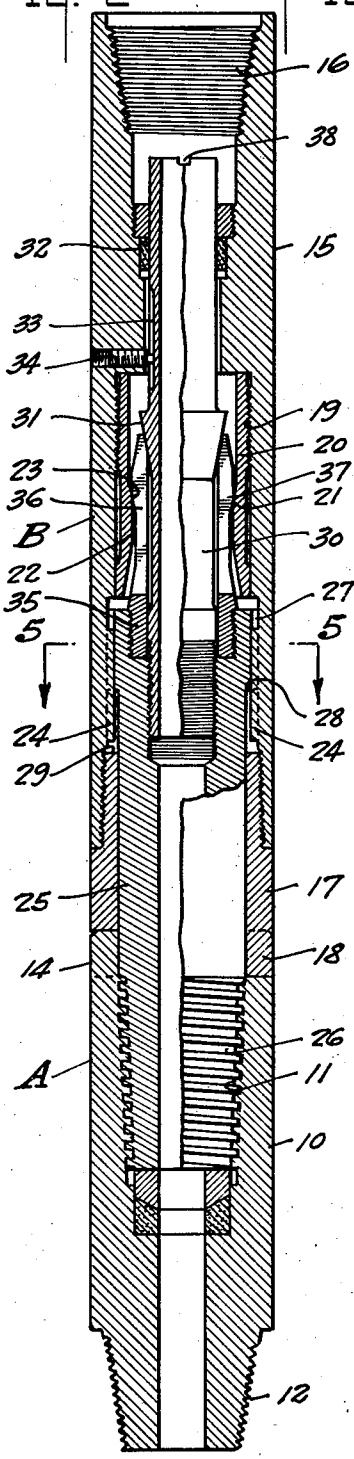
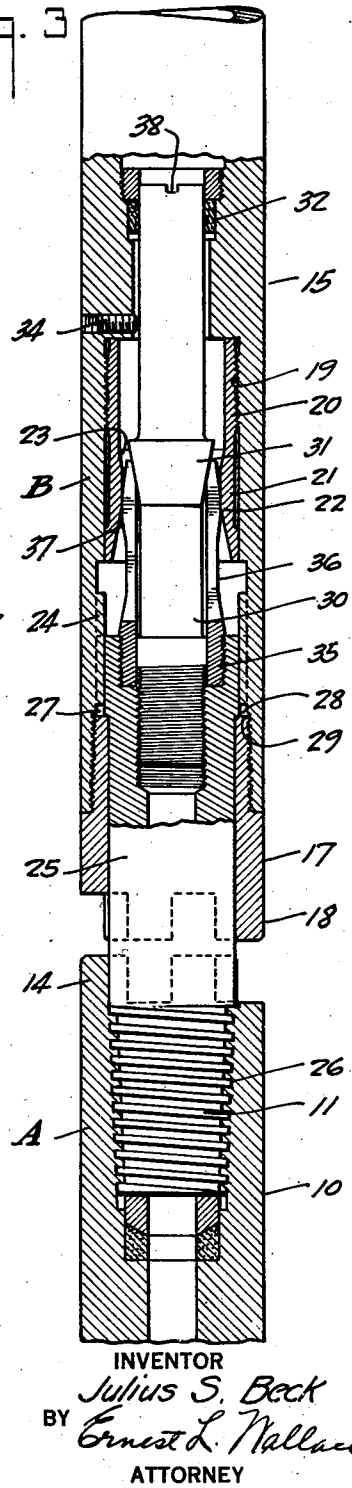


Fig. 3



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Fig. 5

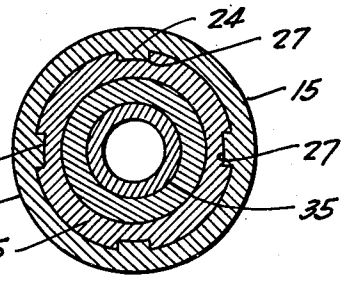


Fig. 4

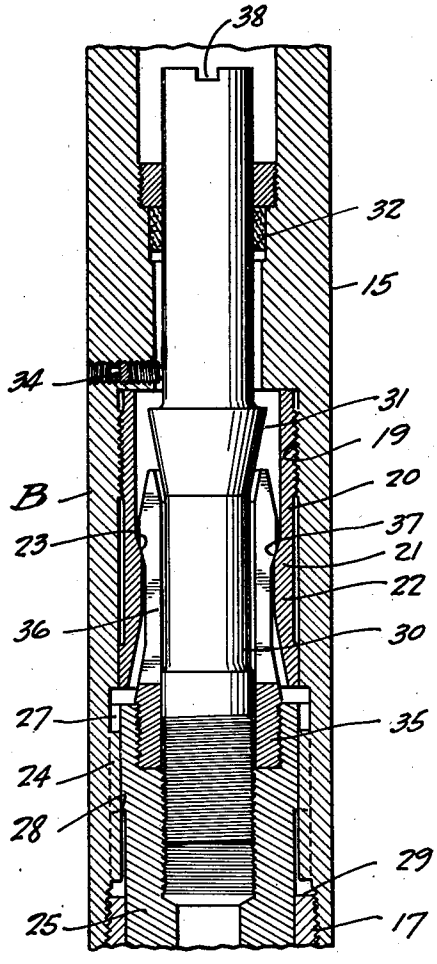
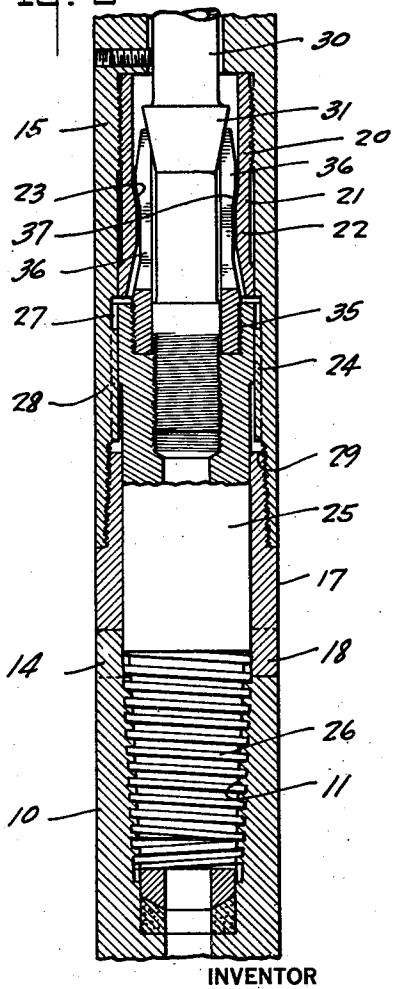


Fig. 6



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Patented Feb. 5, 1935 1,989,907

UNITED STATES PATENT OFFICE

1,989,907

JAR AND SAFETY COUPLING

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Application April 15, 1933, Serial No. 666,290
Renewed September 21, 1934

20 Claims. (Cl. 255—27)

This invention relates to a jar and is disclosed as embodied in a safety coupling for placing in a string of rods or a tubular string of pipe.

Jars in common use fundamentally comprise two slip members set in contracted position by a catch and having striking abutments which engage to impart a jarring blow on extension of the slip members effected by release of the catch. It is the common practice to pull upon the fishing string and cause the latter to stretch storing up energy therein which on release of the catch or tripping of the jar is converted into an impact due to the resiliency of the fishing string. Two types of such jars have been developed and are in common use. One of these types employs a catch releasable by relative rotational movement of the slip members accomplished by turning the fishing string and are herein referred to as "rotary jars". The other type employs a yieldable detention means releasable by a straight pull on the fishing string and are commonly called "straight pull jars". The present invention relates to a straight pull jar. In straight pull jars it is advantageous for reasons obvious in fishing jobs to be able to adjust the tension under which the jar must be placed to trip it. Rotary jars may be tripped at any time by turning the string so that the tension at tripping may be selected. Straight pull jars depend on the strain necessary to release the catch so that the catch should be adjustable. Although an upward pull jar and its uses have heretofore been referred to, it will be obvious from the subjoined specification, that the parts may be arranged to give a jarring blow on contraction and a down jar may thereby be obtained.

An object of the present invention is to provide a straight pull jar with a novel catch-mechanism having means to adjust the catch to enable predetermined pulls to be exerted for tripping. Another object of this invention is to provide a jar of the character described having means whereby the tripping pull may be adjusted without removing the jar from the well hole.

As illustrative of the jar, it is shown herein incorporated in a safety coupling adapted to be placed in a string of drill pipe capable of use to clutch the joint sections together or release them by longitudinally positioning of the members of the coupling. However, the invention is not limited to such embodiment.

The objects of this invention are accomplished by means of the embodiment of my invention illustrated in the accompanying drawings, in which:—

Fig. 1 is an elevation of a fragment of a drill string provided with a number of right hand threaded tool joints, a drill bit, and a coupling above the drill bit collar incorporating the jar embodying my invention; Fig. 2 is a longitudinal section through the jar coupling showing the jar in set position; Fig. 3 is a section similar to Fig. 2 showing the jar in tripped position; Fig. 4 is a longitudinal section through the jar in set position and showing the catch adjusted by means of the mandrel extension to trip at a less strain than with parts in the positions shown in Fig. 2; Fig. 5 is a section as seen on the plane indicated by 5—5 in Fig. 2; Fig. 6 is a longitudinal section showing the jar adjustment effected by the mandrel pin and box.

Referring more particularly to the drawings, A indicates the female member of the jar coupling and B the male member. The female member has a body 10 provided with a left hand threaded tapered bore 11 preferably having a fast thread, and at the bottom end is provided with a right hand threaded pin 12 whereby it may be mounted in a corresponding box as desired in a string of drill pipe. At the upper end are jaws 14 forming a portion of a jaw clutch. The male member comprises a tubular body 15 having a right hand thread tapered box 16 at the upper end for connection to a pin or like member in the string of drill pipe. At its lower end the body 15 is provided with an internal thread to receive a driving sub 17 also serving as a striking abutment. The driving sub 17 has jaws 18 for engagement between jaws 14 when the coupling is in contracted position as shown in Figs. 2 and 4. It is also provided with a mandrel having a left hand threaded pin portion to be engaged with the box 11 of member A.

The body 15 is provided with a bore forming continuation of the tapered box 16. This bore is threaded at 19 and receives therein a detention bushing 20. The bushing 20 is preferably formed of steel and is reduced in diameter externally intermediate its ends as indicated by 21 to provide for resilient flexure laterally. On the inner bore of the bushing is an annular mound 22 having a sloping surface to provide a detention shoulder 23. The bore of body 15 is enlarged below the position of bushing 20 and is provided with longitudinally extending keys 24.

Mounted within the bore of body 15 is a tubular mandrel body 25 having a threaded pin 26 so that it may be engaged with the threads of box 11. It is also provided with key-ways 27 within which are disposed keys 24 so that mandrel body 25 is held against rotation with respect to the

body 15 but is permitted sliding movement. The upper end of the mandrel body 25 is enlarged externally to provide a striking abutment 28 which may engage the upper face 29 of striking sub 17 when the coupling is expanded as shown in Fig. 3. The bore of mandrel body 25 is threaded to receive an extension 30. The extension 30 has a sloping seat 31 for limiting deflection of a wedging member later described. The upper end of extension 30 slidably extends through a packing 32 in body 15 to form a wash pipe and provide a closed water course in both extended and contracted positions of the jar. A key way 33 is provided in extension 30 and is engaged by a bolt pin 34 threaded in body 15. The bolt pin prevents turning of the extension 30 in mandrel body 25. The upper portion of the bore of mandrel body 25 is enlarged to receive a wedging barrel 35 which is threaded therein and is provided with cantilever strips 36. The strips 36 may rest against the wedge seat 31 at either outer ends and are provided with mounds having inclined detention surfaces 37 to coact with the inclined detention surface 23 of the bushing. The wedging barrel is preferably formed of steel or resilient material and strips 36 tend to maintain themselves with their tips out of contact with seat 31 as shown in Fig. 4. By screwing extension 30 in or out of the mandrel body 25 the longitudinal position of seat 31 with respect to the tips of strips 36 may be adjusted. Since seat 31 slopes, the seat may be adjusted to limit the inward flexure of strips 36. The wedging barrel 35 is a wedging member interposed between the mandrel and shell forming a member of detention catch. In contracted position of the jar as shown in Figs. 2 and 4, the detention surfaces 23 and 37 are engaged. A longitudinal strain placed upon the jar coupling tends to deflect strips 36 and deflection of the strips may take place from the position shown in Fig. 4 as the jar is extended. Finally the strips 36 engage seat 31 and are arrested as to further movement. If the strips 36 have not been flexed inwardly sufficiently for detention surfaces 23 and 37 to pass, then strips 36 act as beams and either or both the strips 36 and bushing 22 may give to permit passage of the detention surfaces and tripping of the catch. Obviously the amount of longitudinal strain necessary to trip is dependent on the position of seat 31. The seat position is made conveniently adjustable by spanner slots 38 in the upper end of extension 30 engageable by a suitable tool inserted in the upper end of the bore of body 15. Obviously various mechanical expedients may be resorted to for convenience of access to extension 30 for adjustment. The jar may be set to trip at a predetermined longitudinal pull by adjusting extension 30. This adjustment also provides for taking up wear. Upon release or tripping of the catch the striking face 28 of the mandrel engages striking face 29 of the driving sub with a jarring blow. As shown in Fig. 3, the mound 22 on the bushing does not pass below the mounds on strips 36. The mounds are frictionally in contact and the jar may easily be reset by lowering the drill string. Thus a series of successive blows may be struck by merely raising and lowering the drill string.

Referring to Fig. 1, the drill string is illustrated as composed of stands of pipe C connected by right hand threaded tool joints D. A drill bit E is mounted in the string and connected thereto by a jar coupling F. With the parts of jar coupling F in positions shown in Figs. 2 and 4 the jaw clutch is in clutching position, jaws 14 being disposed between jaws 18. The mandrel is in retracted position being releasably held in this position by the catch. If it is desired to break the joint in the jar coupling an axial pull is exerted on the drill string causing tripping of the jar. In this tripped position, the jaw clutch is released and the coupling may be broken by turning the drill string to the right unscrewing pin 26 from the box of member A, while the tool joint D and other couplings will tend to tighten but not unscrew.

Referring to Fig. 6, the mandrel is shown raised with respect to the female member A, thereby lifting the seat 31 and spacing the tips of strips 36 away from the seat. This accomplishes the same result as shown in Fig. 4. After the male member B and female member A have been declutched as shown in Fig. 3, the drill string may be rotated to partially unscrew pin 26 from box 10. This raises the mandrel and when the parts are clutched again the jaws 14 and 18 mesh and the jar is ready to be tripped, the adjustment having been made. It is obvious that this adjustment may be made while the string is in the hole.

What I claim is:—

1. A jar for well drilling comprising an outer slip member and an inner slip member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said slip members engageable at one of said positions to strike a blow, an interacting wedging member disposed between said slip members, said wedging member coacting with said slip members to form a catch with contacting surfaces when engaged setting the jar and restraining movement of said slip members from the other of said positions, one of the members of said catch being deflectable radially with respect to the longitudinal axis of said slip members to enable longitudinal movement of said contacting surfaces past one another, tripping of said catch and release of said slip members, whereby said catch may be tripped by a longitudinal strain exerted on said jar, and means to longitudinally adjust the contacting surface on the inner slip member whereby to tighten or loosen the wedging action and to vary the force required to trip said catch.

2. A jar for well drilling comprising an outer slip member and an inner slip member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said slip members engageable at extended poposition to strike a blow, an interacting wedging member disposed between said slip members, said wedging member coacting with said slip members to form a catch with contacting surfaces when engaged setting the jar and restraining movement of said slip members from the contracted position, one of the members of said catch having elasticity radially with respect to the longitudinal axis of said slip members to enable longitudinal movement of said contacting surfaces past one another, tripping of said catch and release of said slip members, whereby said catch may be tripped by a longitudinal strain exerted on said jar, and means to longitudinally adjust the surface on the inner slip member whereby to tighten or loosen the wedging action and to vary the force required to trip said catch.

3. A jar for well drilling comprising an outer slip member and an inner slip member telescopi-

cally assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said slip members engageable at one of said positions to strike a blow, an interacting wedging member mounted in normally fixed position on said inner member and disposed between said slip members, said outer slip member having a detention surface, said wedging member having a detention surface coacting with the detention surface of said outer slip member to form a catch with contacting detention surfaces when engaged setting the jar and restraining movement of said slip members from the other of said positions, one of the members of said catch being deflectable radially with respect to the longitudinal axis of said slip members to enable longitudinal movement of said detention surfaces past one another, tripping of said catch and release of said slip members, whereby said catch may be tripped by a longitudinal strain exerted on said jar, said inner slip member having a longitudinally adjustable part with a sloping surface for said wedging member to rest against to enable adjustment of the radial holding position of the detention surface of said wedging member whereby to tighten or loosen the wedging action and to vary the force required to trip said catch.

4. A jar for well drilling comprising an outer slip member and an inner slip member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said slip members engageable at extended position to strike a blow, an interacting wedging member mounted in normally fixed position on said inner member and disposed between said slip members, said outer slip member having a sloping detention surface, said wedging member having a sloping detention surface coacting with the detention surface of said outer slip member to form a catch with contacting detention surfaces when engaged setting the jar and restraining movement of said slip members from contracted position, one of the members of said catch having elasticity radially with respect to the longitudinal axis of said slip members to enable longitudinal movement of said detention surfaces past one another, tripping of said catch and release of said slip members, whereby said catch may be tripped by a longitudinal strain exerted on said jar, said inner slip member having a longitudinally adjustable part with a sloping surface for said wedging member to rest against to enable adjustment of the radial holding position of the detention surface of said wedging member whereby to tighten or loosen the wedging action and to vary the force required to trip said catch.

5. A jar for well drilling comprising an outer slip member and an inner slip member telescopically assembled one with the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said slip members engageable at one of said positions to strike a blow, an interacting wedging member mounted in normally fixed position on said inner member and disposed between said slip members, said outer slip member having a bushing provided with an internal detention surface and resiliently deflectable radially, said wedging member having a detention surface coacting with the detention surface of said outer slip member to form a catch with contacting detention surfaces when engaged setting the jar and restraining movement of said slip members from the other of said positions and enabling movement of said detention surfaces past one another, tripping of said catch and release of said slip members, whereby said catch may be tripped by a longitudinal strain exerted on said jar, said inner slip member having a longitudinally adjustable part with a sloping surface for said wedging member to rest against to enable adjustment of the radial holding position of the detention surface of said wedging member whereby to tighten or loosen the wedging action and to vary the force required to trip said catch.

6. A jar for rotary well drilling comprising a shell slip member and a hollow mandrel slip member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said slip members engageable at one of said positions to strike a blow, an interacting wedging member mounted in normally fixed position on said mandrel member and disposed between said slip members, said shell slip member having a detention surface, said wedging member having a detention surface coacting with the detention surface of said shell member to form a catch with contacting detention surfaces when engaged setting the jar and restraining movement of said slip members from the other of the said positions, one of the members of said catch being deflectable radially with respect to the longitudinal axis of said slip members to enable longitudinal movement of said detention surfaces past one another, tripping of said catch and release of said slip members, whereby said catch may be tripped by a longitudinal strain exerted on said jar, said mandrel member having a longitudinally adjustable tubular extension with a sloping surface for said wedging member to rest against to enable adjustment of the radial holding position of the detention surface of said wedging member whereby to tighten or loosen the wedging action and to vary the force required to trip said catch, said tubular extension forming a slip connection with said shell member to provide a longitudinally expansible circulation passage.

7. A jar for rotary well drilling comprising a shell slip member and a hollow mandrel slip member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said slip members engageable at one of said positions to strike a blow, an interacting wedging member mounted in normally fixed position on said mandrel member and disposed between said slip members, said shell slip member having a detention surface, said wedging member having a detention surface coacting with the detention surface of said shell member to form a catch with contacting detention surfaces engaged setting the jar and restraining movement of said slip members from the other of said positions, one of the members of said catch being deflectable radially with respect to the longitudinal axis of said slip members to enable longitudinal movement of said detention surfaces past one another, tripping of said catch and release of said slip members, whereby said catch may be tripped by a longitudinal strain exerted on said jar, said mandrel member including a body and a tubular extension threaded to said body and provided with a sloping surface for said wedging member to rest against to enable adjustment of the radial holding position of the detention sur-

face of said wedging member whereby to tighten or loosen the wedging action and to vary the force required to trip said catch, said tubular extension forming a slip connection with said shell member to provide a longitudinally expansible circulation passage.

8. A jar for rotary well drilling comprising a shell slip member and a hollow mandrel slip member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said slip members engageable at one of said positions to strike a blow, an interacting wedging member mounted in normally fixed position on said mandrel member and disposed between said slip members, said shell slip member having a bushing provided with an internal detention surface and resiliently deflectable radially, said wedging member having a detention surface coacting with the detention surface of said shell member to form a catch with contacting detention surfaces when engaged setting the jar and restraining movement of said slip members from the other of said positions and enabling movement of said detention surfaces past one another, tripping of said catch and release of said slip members, whereby said catch may be tripped by a longitudinal strain exerted on said jar, said mandrel member including a body and a longitudinally adjustable tubular extension threaded to said body and provided with a sloping surface for said wedging member to rest against to enable adjustment of the radial holding position of the detention surface of said wedging member whereby to tighten or loosen the wedging action and to vary the force required to trip said catch, said tubular extension forming a slip connection with said shell member to provide a longitudinally expansible circulation passage.

9. A jar for well drilling comprising a shell slip member and a hollow mandrel slip member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said slip members engageable at one of said positions to strike a blow, an interacting wedging barrel member mounted in normally fixed position on said mandrel member and disposed between said slip members, said shell slip member having a detention surface, said wedging barrel having cantilever strips with detention surfaces coacting with the detention surface of said shell member to form a catch with contacting detention surfaces when engaged setting the jar and restraining movement of said slip members from the other of said positions, the portion of said shell member carrying its detention surface being resiliently deflectable radially with respect to the longitudinal axis of said slip members to enable longitudinal movement of said detention surfaces past one another, tripping of said catch and release of said slip members, whereby said catch may be tripped by a longitudinal strain exerted on said jar, said mandrel member having a longitudinally adjustable tubular extension with a sloping surface for the tips of said wedging barrel to rest against to enable adjustment of the radial holding position of the detention surfaces of said wedging member whereby to tighten or loosen the wedging action and to vary the force required to trip said catch, said tubular extension forming a slip connection with said shell member to provide a longitudinally expansible circulation passage.

10. A jar for well drilling comprising a shell slip member and a hollow mandrel slip member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said slip members engageable at one of said positions to strike a blow, an interacting wedging barrel member mounted in normally fixed position on said mandrel member and disposed between said slip members, said shell slip member having a detention surface, said wedging barrel having cantilever strips with detention surfaces coacting with the detention surface of said shell member to form a catch with contacting detention surfaces when engaged setting the jar and restraining movement of said slip members from the other of said positions, the portion of said shell member carrying its detention surface being resiliently deflectable radially with respect to the longitudinal axis of said slip members to enable longitudinal movement of said detention surfaces past one another, tripping of said catch and release of said slip members, whereby said catch may be tripped by a longitudinal strain exerted on said jar, said mandrel member including a body and a tubular extension threaded to said body and provided with a sloping surface for the tips of said wedging barrel to rest against to enable adjustment of the radial holding position of the detention surfaces of said wedging member whereby to tighten or loosen the wedging action and to vary the force required to trip said catch, said tubular extension forming a slip connection with said shell member to provide a longitudinally expansible circulation passage.

11. A jar for well drilling comprising a shell slip member and a hollow mandrel slip member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said slip members engageable at one of said positions to strike a blow, an interacting wedging barrel member threaded to and in normally fixed position on said mandrel member and disposed between said slip members, said shell slip member having a detention surface, said wedging barrel having resilient cantilever strips with detention surfaces coacting with the detention surface of said shell member to form a catch with contacting detention surfaces when engaged setting the jar and restraining movement of said slip members from the other of said positions and being radially deflectable to enable longitudinal movement of said detention surfaces past one another, tripping of said catch and release of said slip members, whereby said catch may be tripped by a longitudinal strain exerted on said jar, said mandrel member including a body and a tubular extension threaded thereto and provided with a sloping surface for the tips of said wedging barrel to rest against to enable adjustment of the radial holding position of the detention surfaces of said wedging member whereby to tighten or loosen the wedging action and to vary the force required to trip said catch, said tubular extension forming a slip connection with said shell member to provide a longitudinally expansible circulation passage.

12. A jar for well drilling comprising a shell slip member and a hollow mandrel slip member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said slip members engageable at one of said positions to strike a blow, an interacting

wedging barrel member threaded to and in normally fixed position on said mandrel member and disposed between said slip members, said shell slip member having a resilient bushing slip longitudinally short of the ends with the intermediate portion bridging the shell member and having detention surfaces intermediate its ends; said wedging barrel having resilient cantilever strips with detention surfaces coacting with the detention surfaces of said bushing to form a catch with contacting detention surfaces when engaged setting the jar and restraining movement of said slip members from the other of said positions and enabling movement of said detention surfaces past one another, tripping of said catch and release of said slip members, whereby said catch may be tripped by a longitudinal strain exerted on said jar, said mandrel member including a body and a tubular extension threaded thereto and provided with a sloping surface for the tips of said wedging barrel to rest against to enable adjustment of the radial holding position of the detention surfaces of said wedging member whereby to tighten or loosen the wedging action and to vary the force required to trip said catch, said tubular extension forming a slip connection with said shell member to provide a longitudinally expansible circulation passage.

13. A jar for well drilling comprising an outer member and an inner member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said members engageable at one of said positions to strike a blow, means interconnecting said members releasable upon the exertion of a predetermined longitudinal stress between said members, said connecting means comprising shoulder means on one of said members and friction means on the other of said members engageable with said shoulder means, a wedge member engageable with said friction means, means mounting said wedge member for longitudinal movement relative to one of said members for radially adjusting said friction means relative to said shoulder means for varying the amount of longitudinal stress required to release said members.

14. A jar for well drilling comprising an outer member and an inner member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said members engageable at one of said positions to strike a blow, means inter-connecting said members releasable upon the exertion of a predetermined longitudinal stress between said members, said connecting means comprising shoulder means on one of said members and a sleeve on the other of said members engageable with said shoulder means, a wedge member engageable with said sleeve, means mounting said wedge member for longitudinal movement relative to said sleeve for radially adjusting said sleeve relative to said shoulder means for varying the amount of longitudinal stress required to release said members.

15. A jar for well drilling comprising an outer member and an inner member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said members engageable at one of said positions to strike a blow, means inter-connecting said members releasable upon the exertion of a predetermined longitudinal stress between said members, said connecting means comprising shoulder means on one of said members and a spring sleeve on the other of said members engageable with said shoulder means, a wedge member engageable with said spring sleeve, means mounting said wedge member for longitudinal movement relative to said spring sleeve for radially adjusting said spring sleeve relative to said shoulder means for varying the amount of longitudinal stress required to release said members.

16. A jar for well drilling comprising an outer member and an inner member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said members engageable at one of said positions to strike a blow, means inter-connecting said members releasable upon the exertion of a predetermined longitudinal stress between said members, said connecting means comprising shoulder means on one of said members and a spring sleeve on the other of said members engageable with said shoulder means, a tapered sleeve engageable with said spring sleeve, means mounting said tapered sleeve for longitudinal movement relative to said spring sleeve for radially adjusting said spring sleeve relative to said shoulder means for varying the amount of longitudinal stress required to release said members.

17. A jar for well drilling comprising an outer bowl member and an inner mandrel member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said members engageable at one of said positions to strike a blow, trip means interconnecting said members releasable upon the exertion of a predetermined longitudinal stress between said members, said trip means comprising shoulder means on said bowl member and friction means on said mandrel member engageable with said shoulder means, a wedge member engageable with said friction means, means mounting said wedge member for longitudinal movement relative to one of said members for radially adjusting said friction means relative to said shoulder means for varying the amount of longitudinal stress required to release said members.

18. A jar for well drilling comprising an outer bowl member and an inner mandrel member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said members engageable at one of said positions to strike a blow, trip means inter-connecting said members releasable upon the exertion of a predetermined longitudinal stress between said members, said trip means comprising shoulder means on said bowl member and sleeve means on said mandrel member engageable with said shoulder means, a tapered sleeve engageable with said sleeve means, means mounting said tapered sleeve for longitudinal movement relative to said bowl member for radially adjusting said sleeve means relative to said shoulder means for varying the amount of longitudinal stress required to release said members.

19. A jar for well drilling comprising an outer bowl member and an inner mandrel member telescopically assembled one within the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said members engageable at one of said positions to strike a blow, trip means inter-con-

necting said members releasable upon the exertion of a predetermined longitudinal stress between said members, said trip means comprising shoulder means on said bowl member and hollow spring sleeve means on said mandrel member engageable with said shoulder means, a tapered sleeve engageable with said hollow spring sleeve means, means mounting said tapered sleeve for longitudinal movement relative to one of said members for radially expanding said hollow spring sleeve means relative to said shoulder means for varying the amount of longitudinal stress required to release said members.

20. A jar for well drilling comprising an outer bowl member and an inner mandrel member telescopically assembled one with the other for relative longitudinal movement from a contracted position to an extended position, striking abutments on said members engageable at one of said positions to strike a blow, trip means interconnecting said members, releasable upon the exertion of a predetermined longitudinal stress between said members, said trip means comprising yieldable shoulder means on said bowl member and hollow spring sleeve means on said mandrel member engageable with said yieldable shoulder means, a hollow tapered sleeve engageable with said hollow spring sleeve means, means mounting said hollow tapered sleeve for longitudinal movement relative to said bowl member for radially expanding said hollow spring sleeve means relative to said yieldable shoulder means for varying the amount of longitudinal stress required to release said members.

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