Sept. 20, 1955 J. R. BERRY ET AL 2,718,266

STOP DEVICES FOR WELL CONDUITS

Filed Dec. 14, 1951

Fig. 1.

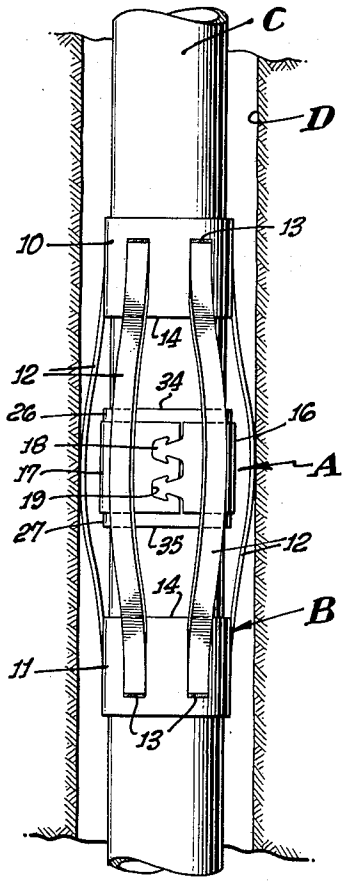


Fig. 2.

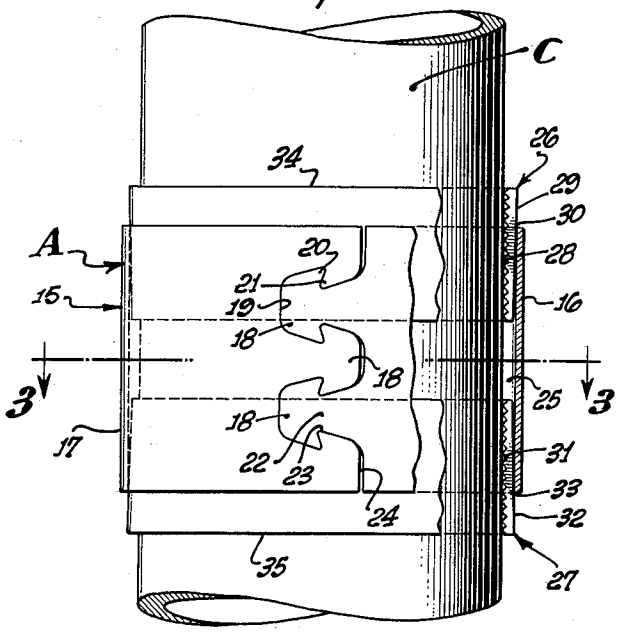


Fig. 3.

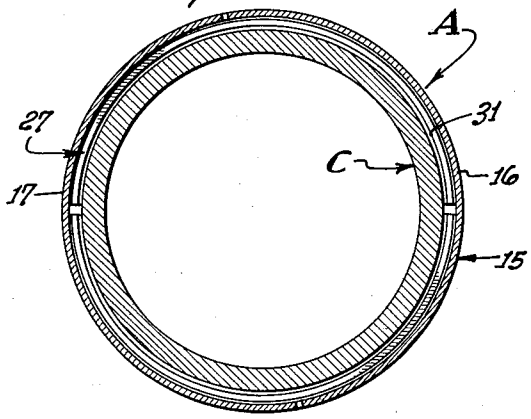
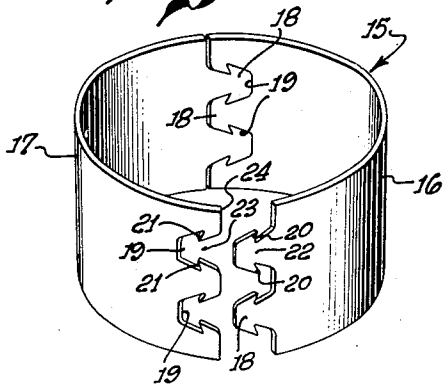


Fig. 4.



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United States Patent Office 2,718,266
Patented Sept. 20, 1955

2,718,266

STOP DEVICES FOR WELL CONDUITS

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Application December 14, 1951, Serial No. 261,656

13 Claims. (Cl. 166—243)

The present invention relates to subsurface well equipment, and more particularly to devices capable of being mounted on well casing, liner, tubing, and similar conduit strings, for moving apparatus on said strings longitudinally through the well bore.

Apparatus, such as centralizers, wall scratchers and cement baskets are mounted on casing or similar conduit strings, being moved longitudinally through the well bore with the casing string because of their engagement with one or more stop devices secured to the casing string.

An object of the present invention is to provide a comparatively simple stop device of the character indicated which is easily mounted upon and secured to the conduit string.

Another object of the invention is to provide a stop device that is readily and securely mountable on the conduit string without the necessity for welding it to the latter.

A further object of the invention is to provide a stop device that can be securely assembled to the conduit string and which tends to more firmly tighten itself on the conduit string as a result of its engagement with other apparatus disposed on the conduit string.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of a form in which it may be embodied. This form is shown in the drawings accompanying and forming part of the present specification. It will now be described in detail, for the purpose of illustrating the general principles of the invention; but it is to be understood that such detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is a side elevation of the apparatus as mounted on a casing section disposed in a well bore;

Fig. 2 is a side elevation, partly in longitudinal section, of the stop device illustrated in Fig. 1, disclosed in position on a casing section;

Fig. 3 is a cross-section taken along the line 3—3 on Fig. 2;

Fig. 4 is an isometric projection of the outer sectional lock ring or sleeve, with one portion thereof in open position.

The device A illustrative of the invention is shown in the drawings in connection with a casing centralizer B mounted on a string of well casing C, or running-in string, positionable in a well bore D. It is to be understood, however, that the device is also useful in other relationships, being adapted for engagement with wall scratchers, cementing baskets, and other apparatus, mounted on a casing, or similar conduit, string, and to be moved longitudinally through the well bore with such conduit string, as well as being supported on the latter.

As shown in the drawings, a casing centralizer B is mounted on a casing secton C disposed in a well bore

D. The centralizer includes upper and lower longitudinally spaced collars 10, 11 slidable on the casing section C, which are interconnected by circumferentially spaced outwardly bowed leaf spring members 12 attached to the upper and lower collars in any suitable manner, as by use of welding material 13. The springs 12 engage the wall of the well bore D, and tend to center the well casing C therewithin.

The centralizer or centering apparatus B is movable longitudinally through the well bore D upon longitudinal movement of the casing C. Thus, a stop device A is secured to the casing section between the upper and lower casing collars 10, 11, this stop device being engageable with the inner edges 14 of the collars to pull the centralizer apparatus B through the well bore. Thus, the stop device A will engage the upper edge 14 of the lower collar 11 when the casing C is moving downwardly in the well bore, to pull the apparatus B and its outwardly bowed springs 12 through the well bore and past any restrictions that might be encountered therein. If the casing string is moved in an upward direction, the stop device A will engage the lower edge 14 of the upper collar 10 and pull the centering device B in an upward direction with the casing string.

The stop device A is easily mounted upon the casing section C between the centralizer collars 10, 11. Thus, the device includes an outer sectional or split lock ring or sleeve 15, which, as disclosed in the drawings, consists of two parts 16, 17 that can be moved transversely of the casing C toward each other. One end or section 16 of the ring 15 has one or more tongues or dovetails 18 adapted to be received in one or more companion sockets 19 in the adjoining end of the other sleeve section 17. As illustrated, a pair of longitudinally separated tongues 18 on one section 16 are receivable within a pair of longitudinally separated companion sockets 19 in an adjacent section 17, the tongues and sockets forming a dovetailed type of of joint in which the oppositely directed wing portions 20, 20 of each tongue 18 provide hooks engageable with companion hooks 21, 21 defining the outer portion of each socket 19. The shank 22 of each tongue is receivable within a slot or groove 23 in the adjoining section extending from the socket 19 to the longitudinal edge 24 of the section.

The segmental ring 15, which is illustrated as being formed of two like sections 16, 17, is disposed transversely of the casing section C between the centralizer collars 10, 11, and the tongues 18 on one section 16 or 17 disposed in the adjoining slots 23 and sockets 19 of the other section 17 or 16, thus latching or locking the sections 16, 17 together to form a circumferentially continuous sleeve or ring 15. This sleeve or ring has an inside diameter that is greater than the outside diameter of the casing section C, to provide an annular clearance space 25 therebetween in which a pair of opposed segmental gripping elements 26, 27 may be disposed. An upper segmental annular gripping element 26 is composed of a pair or a plurality of slips having inwardly directed wickers or teeth 28 adapted to dig into or grip the casing section. The periphery 29 of the slips 26 is tapered in a downward and inward direction, this tapered surface cooperating with the upper edge 30 of the lock ring 15, to be wedged inwardly by the latter into firm gripping engagement with the casing section C. Similarly, the lower pair or plurality of segmental slips 27 have inner wickers or teeth 31 adapted to grip the casing section and also a tapered peripheral surface 32 which is inclined in an upward and inward direction for cooperation with the lower edge 33 of the lock ring or sleeve 15, being urged inwardly by the latter to place

its wickers **31** in firm gripping engagement with the casing section.

After the latch or lock ring sections **16**, **17** have been disposed around the casing C between the centralizer collars **10**, **11**, with the tongues **18** of one section **16** or **17** disposed in the companion sockets **19** and slots **23** of the other section **17** or **16**, one set of slips, as the upper slips **26**, may be disposed around the casing and inserted within the lock ring **15**, being driven downwardly within the latter so that the slip segments are wedged against the casing section. The other set of slips, such as the lower slips **27**, is then disposed upon the casing section and moved upwardly into the annular space **25** between the lock ring **15** and the casing C, being driven upwardly within the ring so that its tapered surface **32** wedges the slip segments into firm gripping engagement with the casing. The segments **26** of the upper slips have their upper edges **34** in alignment with each other, forming a substantially circumferentially continuous edge engageable with the lower end **14** of the upper collar **10**. Similarly, the segments **27** of the lower slips have their lower edge **35** in transverse alignment with each other, to provide a substantially circumferentially continuous lower end engageable with the upper edge **14** of the lower collar **11**. The wedging of the slips **26**, **27** within the ring **15** holds the latter outwardly of the casing section and substantially coaxial thereof, the dovetailed joints **18**, **19** being pulled laterally outward but being prevented from inadvertent disconnection because of the interengagement between the interlocking wings or hooks **20**, **21** on the ring sections **16**, **17**.

Assuming that the casing string C is being moved downwardly in the well bore, the lower slips **27** engage the lower collar **11**, to force the centralizer device through the well bore. The force necessary to perform this function is imposed upon the lower slips **27** and tends to shift them relatively upward into the lock ring or sleeve **15** to a further extent, causing the lower slips **27** to be wedged still more firmly between the lock ring **15** and the casing section C, because of the tapered external surface **32** on the slips. Similarly, in the event that the casing section C is moved upwardly, the upper slips **26** will engage the upper collar **10** of the centralizer, the force of such engagement necessary to move the centralizer in an upward direction within the well bore tending to move the upper slips **26** relatively downward within the lock ring **15**, wedging the slips **26** more firmly in the latter and against the casing section C, because of the direction of taper of the outer surface **29** of the slips. It is, accordingly, apparent that the force transmitted between the casing C and a centering device B tends to secure the stop device A more firmly to the casing section, offering assurance that the stop device will be maintained in appropriate assembled relation and permanently fixed to the casing section C.

From a consideration of the structure of the stop device, it is evident that it is comparatively simple, and readily mountable on the casing section C between the upper and lower centralizer collars **10**, **11**. Once mounted on the casing section, it is permanently secured to the latter, since the force transmitted to the stop device A tends to tighten it more securely against the casing.

The inventors claim:

1. In a stop device adapted to be mounted on a running-in string to be lowered in a well bore: a split annular member adapted to be moved transversely into position around the running-in string; means for latching the adjoining end portions of the member together; and oppositely directed segmental slips extending partly into said member to be wedged by said member into gripping engagement with the running-in string.

2. In a stop device adapted to be mounted on a running-in string to be lowered in a well bore: a split annular member adapted to be moved transversely into position around the running-in string; means for latching the adjoining end portions of the member together; and oppositely directed upper and lower segmental slips extending partly into said member and having internal teeth to grip the running-in string, said upper slips having an external surface engageable with said member and tapering downwardly and inwardly, said lower slips having an external surface engageable with said member and tapering upwardly and inwardly.

3. In a stop device adapted to be mounted on a running-in string to be lowered in a well bore: an annular member composed of separate sections to be placed around the running-in string; means for latching the adjoining end portions of said sections to each other to form a composite, substantially circumferentially continuous annular member; and oppositely directed upper and lower segmental slips extending partly into said sections and having internal teeth to grip the running-in string, said upper slips having an external surface engageable with said sections and tapering downwardly and inwardly, said lower slips having an external surface engageable with said sections and tapering upwardly and inwardly.

4. In a stop device adapted to be mounted on a running-in string to be lowered in a well bore: an annular member composed of separate sections to be placed around the running-in string; interlocking tongues and grooves at the adjoining end portions of said sections for securing said sections to each other to provide a composite, substantially circumferentially continuous annular member; and oppositely directed upper and lower annular slips extending partly into said sections and having internal teeth to grip the running-in string, said upper slips having an external surface engageable with said sections and tapering downwardly and inwardly, said lower slips having an external surface engageable with said sections and tapering upwardly and inwardly.

5. In a stop device adapted to be mounted on a running-in string to be lowered in a well bore: an annular member composed of separate sections to be placed around the running-in string; means for latching the adjoining end portions of said sections to each other, comprising a dovetailed tongue on one section disposed within a companion dovetailed socket in the adjoining section; and oppositely directed upper and lower annular slips extending partly into said sections and having internal teeth to grip the running-in string, said upper slips having an external surface engageable with said sections and tapering downwardly and inwardly, said lower slips having an external surface engageable with said sections and tapering upwardly and inwardly.

6. In combination: a running-in string to be lowered in a well bore; an apparatus on said running-in string and movable longitudinally with respect thereto; a split annular member adapted to be moved transversely into position around the running-in string; means for latching the adjoining end portions of the member together around the running-in string; and gripping means engaging the member and running-in string to secure the member to the running-in string, said gripping means extending longitudinally beyond the member and engageable by the apparatus, whereby to be urged by the apparatus longitudinally of the member and inwardly by the member to be more firmly engaged between and with the running-in string and member.

7. In combination: a running-in string to be lowered in a well bore; an apparatus on said running-in string and movable longitudinally with respect thereto; an annular member composed of separate sections to be placed around the running-in string; means for latching the adjoining end portions of said sections to each other to form a composite, substantially circumferentially continuous annular member; and gripping means engaging the sections of the member and the running-in string to secure the member to the running-in string, said gripping means extending longitudinally beyond the sections and engageable by the apparatus, whereby to be urged by the ap-

paratus longitudinally of the sections and inwardly by the sections to be more firmly engaged between and with the running-in string and sections.

8. In combination: a running-in string to be lowered in a well bore; an apparatus on said running-in string and movable longitudinally with respect thereto; a split annular member adapted to be moved transversely into position around the running-in string; interlocking tongues and grooves in the adjoining end portions of the member for securing such end portions to each other; and gripping means engaging the member and running-in string to secure the member to the running-in string, said gripping means extending longitudinally beyond the member and engageable by the apparatus, whereby to be urged by the apparatus longitudinally of the member and inwardly by the member to be more firmly engaged between and with the running-in string and member.

9. In combination: a running-in string to be lowered in a well bore; an apparatus on said running-in string and movable longitudinally with respect thereto; an annular member composed of separate sections to be moved transversely into position around the running-in string; interlocking tongues and grooves in the adjoining end portions of the sections for securing such end portions to each other to provide a composite, substantially circumferentially continuous annular member; and gripping means engaging the sections of the member and running-in string to secure the member to the running-in string, said gripping means extending longitudinally beyond the member and engageable by the apparatus, whereby to be urged by the apparatus longitudinally of the sections and inwardly by the sections to be more firmly engaged between and with the running-in string and sections.

10. In combination: a running-in string to be lowered in a well bore; an apparatus on said running-in string and movable longitudinally with respect thereto; a split annular member adapted to be moved transversely into position around the running-in string; means for latching the adjoining end portions of the member together around the running-in string; and slip means disposed within and engaging the member and having internal teeth engaging the running-in string to secure the member to the running-in string, said slip means extending longitudinally beyond the member and adapted to engage the apparatus to be moved by the apparatus longitudinally of the member and inwardly by the member into gripping engagement with the running-in string.

11. In combination: a running-in string to be lowered in a well bore; an apparatus on said running-in string and movable longitudinally with respect thereto; a split annular member adapted to be moved transversely into position around the running-in string; interlocking tongues and grooves in the adjoining end portions of the member for securing such end portions to each other; and slip means disposed within and engaging the member and having teeth engaging the running-in string to secure the member to the running-in string, said slip means extending longitudinally beyond the member and adapted to engage the apparatus to be urged by the apparatus longitudinally of the member and inwardly by the member into gripping engagement with the running-in string.

12. In combination: a running-in string to be lowered in a well bore; an apparatus on said running-in string and movable longitudinally with respect thereto; a split annular member adapted to be moved transversely into position around the running-in string; means for latching the adjoining end portions of the member together around the running-in string; and a coupling member engaging said annular member and running-in string to secure said annular member to said running-in string; one of said members being engageable by the apparatus, whereby to be urged by the apparatus longitudinally of said other member to be more firmly engaged between and with the running-in string and annular member.

13. In combination: a running-in string to be lowered in a well bore; an apparatus on said running-in string and movable logitudinally with respect thereto; a split annular member adapted to be moved transversely into position around the running-in string; means for latching the adjoining end portions of the member together around the running-in string; a slip member disposed within and engaging said annular member and having teeth engaging said running-in string to secure said annular-member to said running-in string, one of said members being engageable with the apparatus to be moved by the apparatus longitudinally of said other member to urge said slip member inwardly into gripping engagement with the running-in string.

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