

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



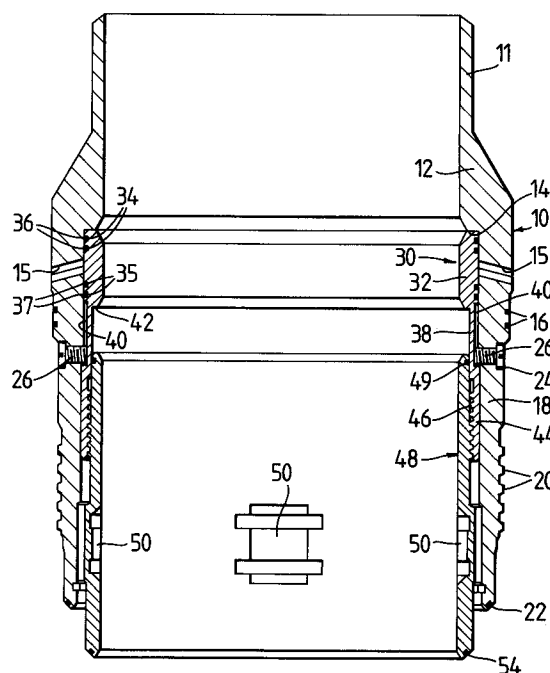
(11) Publication number:

0 520 107 A1

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **91305899.6**(51) Int. Cl.⁵: **E21B 33/04, E21B 34/02,
E21B 34/12**(22) Date of filing: **28.06.91**(43) Date of publication of application:
30.12.92 Bulletin 92/53(84) Designated Contracting States:
DE FR GB NL(71) Applicant: **COOPER INDUSTRIES INC.**
1001 Fannin Street, Suite 4000
Houston Texas 77002(US)(72) Inventor: **Kellett, Rodney c/o Cameron Iron**
Works Limited
Queen Street Stourton, Leeds
West Yorkshire LS10 1SB(GB)(74) Representative: **Jackson, Peter Arthur et al**
Gill Jennings & Every, 53-64 Chancery Lane
London WC2A 1HN(GB)(54) **Running tool for casing hangers.**

(57) A running tool has a tubular body (10) which can support a casing hanger. The body carries a first sleeve (30) which is movable axially to open or close washout ports (15) on the body. The first sleeve is movable axially in response to rotation of a second sleeve (48) which is disposed coaxially within and threadably engages the first sleeve. Rotation of the second sleeve can be achieved by means of the tool lowered into the central bore of the running tool. The arrangement has the advantage that seals (36, 37) on the first sleeve only undergo relative sliding movement relative to the surface against which they seal.

FIG. 1.

This invention relates to running tools which are used to locate items such as casing hangers in drilling wells.

A running tool which is used to lower a casing hanger into a drilling well usually comprises a generally tubular body to which the casing hanger can be attached. The body usually has a thread which is engageable with a thread on the casing so that the two items can be coupled together by relative rotation. Once the casing hanger has been landed in for example a wellhead it is secured in position by cement which is pumped down into the well. It is known to provide running tools with what are known as washout ports which are used to enable fluid to pass through it to wash away excess cement which has been used to cement the casing hanger into position. During location of the casing hanger the washout ports are commonly isolated by means of seals either carried on the running tool itself or on the tubular sleeve associated with the running tool. In known arrangements the washout ports are opened either by rotation of the running tool itself or by rotation of a sleeve associated with the running tool. A problem with this kind of arrangement is that the seals used to isolate the washout ports can become damaged.

The present invention is concerned with a running tool which is designed to alleviate this type of problem.

According to the present invention there is provided a running tool which comprises a generally tubular body, a first sleeve carried within the body for axial movement between positions in which it can open or close a port or ports in the body, and a second sleeve operatively coupled to the first sleeve such that rotation of the second sleeve causes the first sleeve to undergo said axial movement. The second sleeve may be rotatable by means of a tool lowered into the well equipment. The second sleeve may threadably engage the first sleeve.

The first sleeve may have external seals which seal against the inner wall of the body and isolate said ports in the closed position of the sleeve. The first sleeve may be mounted such that it cannot undergo any significant rotational movement. The body may carry one or more pins which engage in slots formed in the first sleeve to resist rotation of the first sleeve.

The body of the running tool may have external threads for engaging corresponding threads on a casing hanger.

The invention will be described now by way of example only with particular reference to the accompanying drawings. In the drawings:

Figure 1 is an axial sectional view of a running tool in accordance with the present invention, and

Figure 2 is a view similar to Figure 1, but showing the running tool coupled to a casing hanger with a torque tool located internally of the running tool.

Referring to Figure 1 of the drawings a running tool has a generally tubular body shown at (10). The body (10) has an upper tubular part (11) of relatively narrow wall thickness which extends axially downwardly to an integrally formed part (12) of greater wall thickness. The part (12) is formed with an internal shoulder (14) and a plurality of angularly spaced through ports (15) which are disposed below the shoulder (14). Towards the lower end of the part (12) the outer periphery of the running tool body has two circumferential grooves in which are located extension seals (16). The body part (12) extends axially downwardly to a lower part (18) which has a slightly tapering wall thickness and the external periphery of which is formed with threads (20) which can engage correspondingly shaped threads on the interior wall of a casing hanger. At its lower end the body part (20) has a circumferential groove which accommodates a crud seal (22). At the junction of the body parts (12) and (18) the body has a plurality of angularly spaced through bores (24) which accommodate screws or pins (26). Typically there are four such bores and screws spaced around the running tool body.

The body (12) carries within it a first sleeve (30). The first sleeve has three integrally formed sections. A first upper section (32) has a relatively large wall thickness and its upper end is shown located against the shoulder (14). The outer periphery of the section (32) has first and second pairs of grooves (34) and (35) which are located so that one pair (34) is above and one pair (35) is below the ports (15). The grooves (34) and (35) each accommodate annular elastomeric seals (36, 37). The section (32) extends downwardly to an intermediate section (38) of lesser wall thickness. The outer surface of the section (38) has four angularly spaced axially extending grooves (40) which are located at positions corresponding to the screws (26) so that the inner end of each screw can project into a corresponding groove (40). At the upper end of the section (38) at its junction with the section (32) there is formed an internal shoulder (42). The section (38) extends downwardly to a lower section (44) which has on its inner surface a thread (46).

A second sleeve (48) is located coaxially within the first sleeve (30). The second sleeve carries on its upper end an annular crud seal (49) which contacts the inner wall of the intermediate section (38) of the first sleeve. The second sleeve (48) has on its outer upper cylindrical surface a thread which engages with the thread (46) on the lower end of the first sleeve (30). On the interior of the

sleeve (48) towards its lower end there are formed four angularly spaced profiled recesses (50) which as will be described below can receive correspondingly shaped projections on a tool so that the sleeve (48) can be engaged by that tool and caused to rotate. The lower periphery of the sleeve (48) is formed with a circumferential groove which carries a crud seal (54).

It will be seen that rotation of the inner sleeve (48) will cause the outer sleeve (30) to move axially within the running tool body (10). The outer sleeve (30) is constrained against rotational movement by means of the screws (26) engaging in the axial slots (40). The extent of the axial movement which the sleeve (30) can undergo is determined by the length of each slot (40). As shown in Figure 1 the washout ports (15) are isolated by the seals (34) and (36) disposed on either side thereof. When the sleeve (48) is rotated to cause the sleeve (30) to move downwardly from the position shown in Figure 1 the upper seals (34) move past the washout ports so that those ports are opened and can allow fluid to pass therethrough.

Figure 2 shows the running tool engaged with a casing hanger (60) by virtue of the threads (20). The seals (16) seal against the inner upper circumferential wall of the hanger. A torque tool (62) is disposed within the interior of the running tool body and is carried on the lower end of a drill string (64). The torque tool has actuating members (66) which have been extended radially to engage with the recessed formations (50) formed in the interior surface of the sleeve (48). When the torque tool (62) is rotated, the sleeve (48) is rotated to cause the outer sleeve (30) to move axially and either open or close the ports (15) depending upon the sense of rotation of the torque tool. In Figure 2 the right-hand side shows the outer sleeve in a position in which the washout ports (15) are isolated by the seals (34) and (36). In this position the screws (26) project into the lower end of their respective grooves (40) and the upper end of the inner sleeve (48) is spaced from the shoulder (42). The left-hand side of Figure 2 shows the sleeve (30) lowered to a position in which the washout ports are open. In this position the screws (20) project into the upper end of their respective grooves (40) and the upper end of the inner sleeve (48) is disposed against the shoulder (42).

It will be appreciated that the only movement which the sleeve (30) has to undergo is an axial movement within the running tool body (10). Thus, the seals (36 and 37) carried on that sleeve do not have to undergo any rotational movement, but undergo sliding movement relative to the surface against which they seal. It will thus be seen that the problem of rotation of the seals which occurred in prior art arrangements is avoided in the present

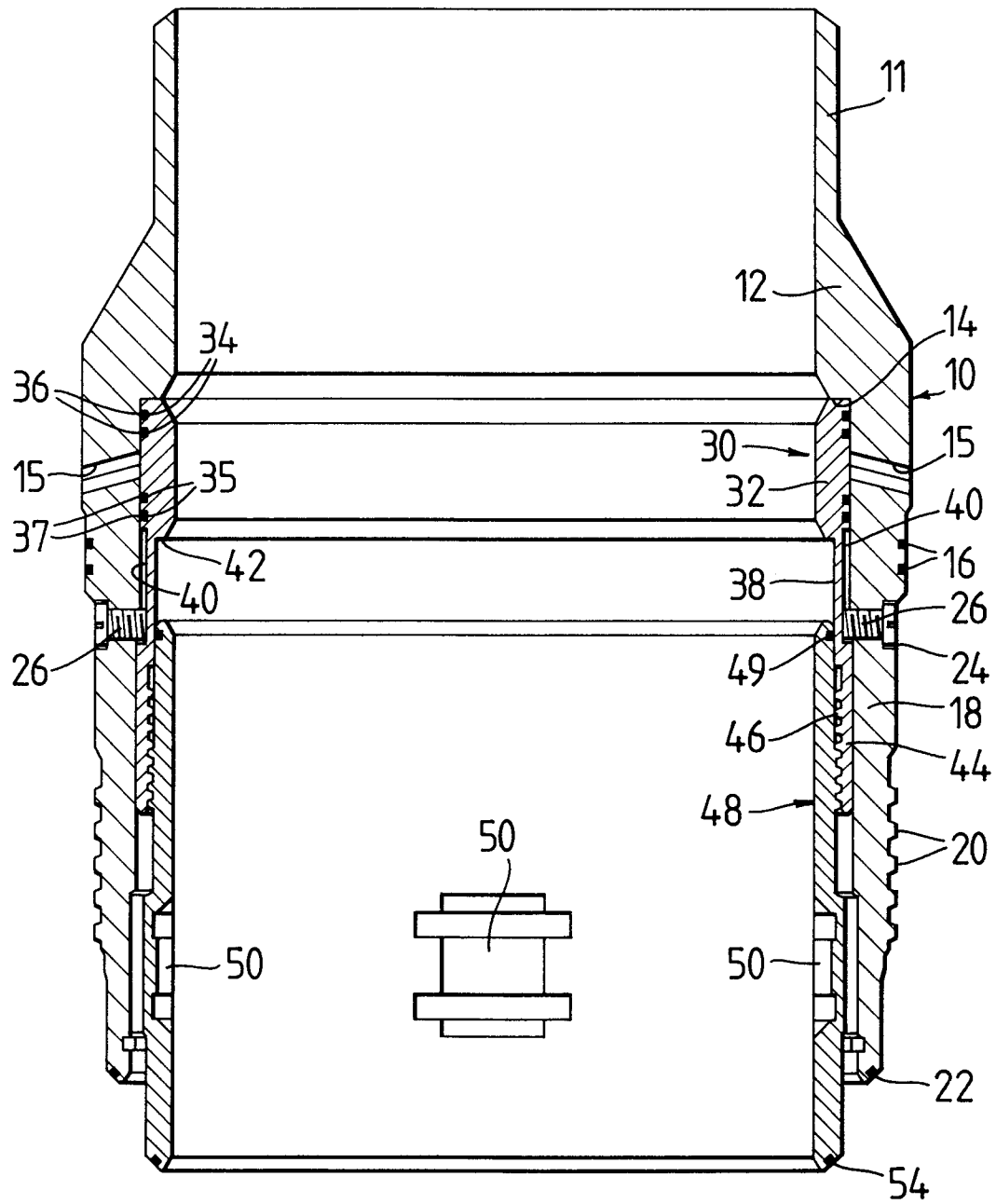
tool.

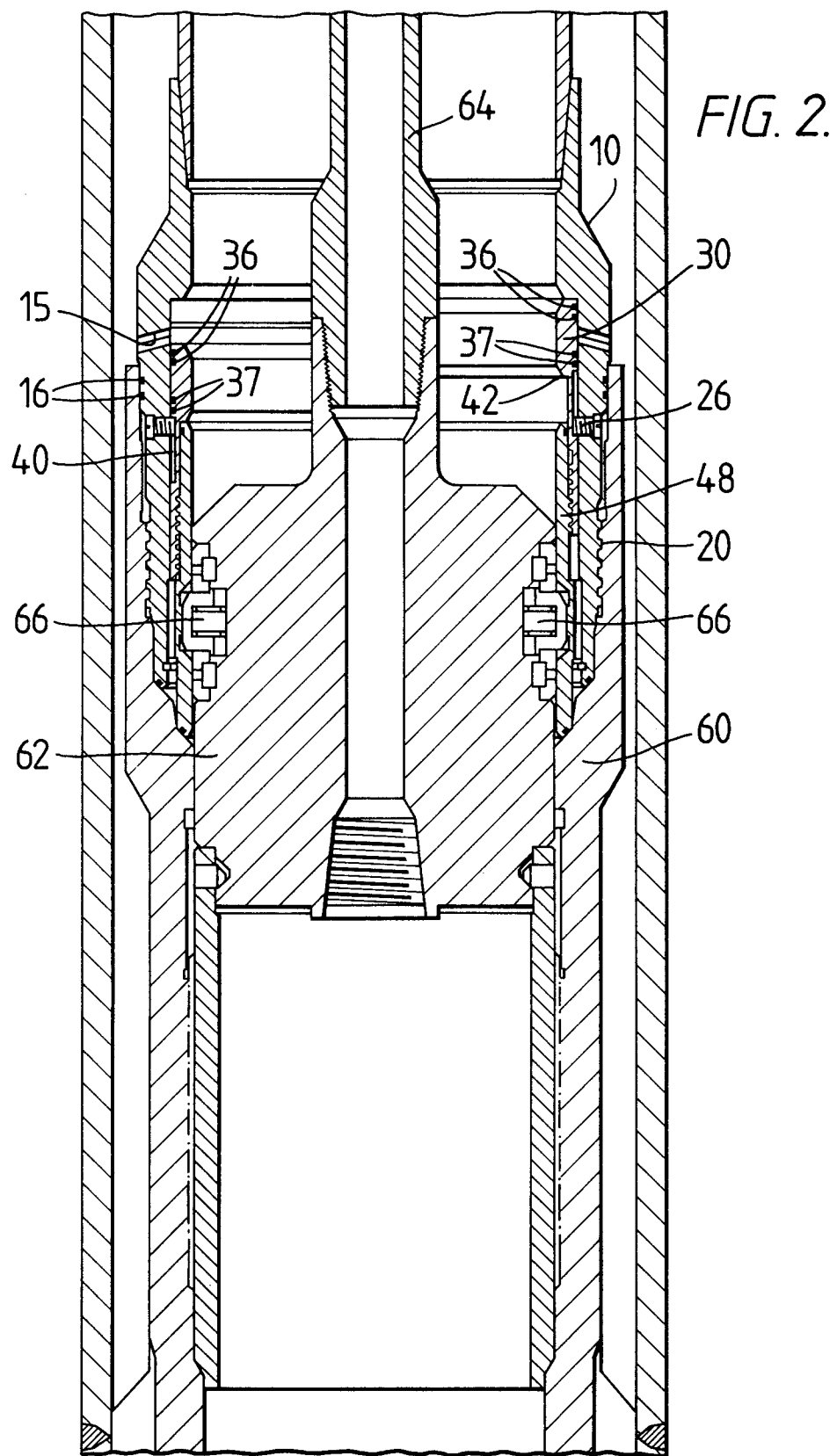
It should be noted that the seals (22), (49) and (54) are crud seals which are not fluid-type seals, but are intended to keep out debris and similar material. The seals (36, 37) are annular elastomeric seals.

Claims

1. A running tool which comprises a generally tubular body, a first sleeve carried within the body for axial movement between positions in which it can open or close a port or ports in the body, and a second sleeve operatively coupled to the first sleeve such that rotation of the second sleeve causes the first sleeve to undergo said axial movement.
2. A running tool according to claim 1 wherein the second sleeve is rotatable by means of a tool lowered into the well equipment.
3. A running tool according to claim 1 or claim 2, wherein the second sleeve threadably engages the first sleeve.
4. A running tool according to any preceding claim, wherein the first sleeve has external seals which seal against the inner wall of the body and isolate said ports in the closed position of the sleeve.
5. A running tool according to any preceding claim, wherein the first sleeve is mounted such that it cannot undergo any significant rotational movement.
6. A running tool according to claim 5, wherein said body carries one or more pins which engage in slots formed in the first sleeve to resist rotation of said first sleeve.
7. A running tool according to any preceding claim, wherein the body has external threads for engaging corresponding threads on a casing hanger.

FIG. 1.







European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 30 5899

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-4 979 566 (S. HOSIE ET AL.) * the whole document *	1-5	E21B33/04 E21B34/02 E21B34/12
A	GB-A-2 235 229 (DRIL-QUIP INC.) * abstract *	6	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E21B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 12 FEBRUARY 1992	Examiner RAMPOLMANN K.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			