

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 1 447 522 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
18.08.2004 Bulletin 2004/34

(51) Int Cl. 7: E21B 19/16

(21) Application number: 03003379.9

(22) Date of filing: 14.02.2003

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT SE SI SK TR

Designated Extension States:

AL LT LV MK RO

(71) Applicant: C.B.C. S.p.A.
I-42016 Guastalla (Reggio Emilia) (IT)

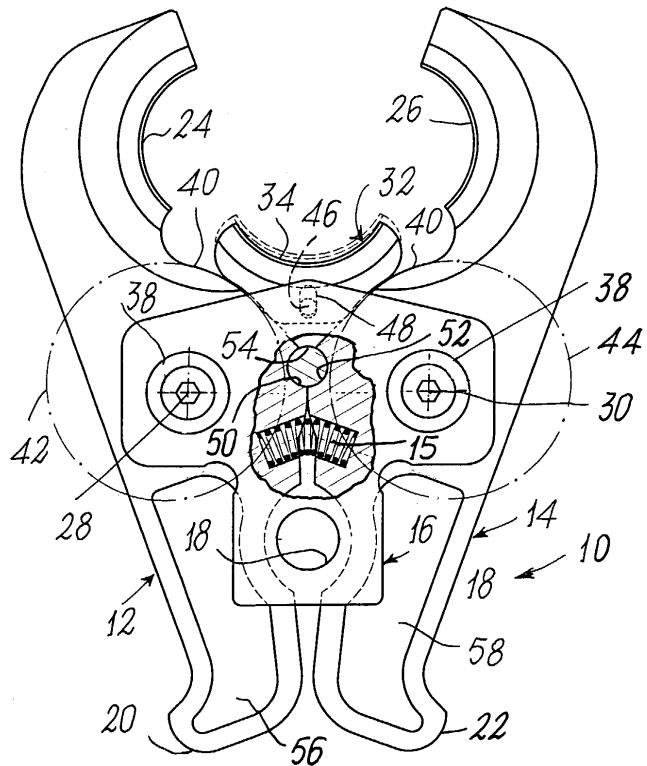
(72) Inventor: Vezzani, Giorgio
42016 Gustalla (Reggio Emilia) (IT)

(74) Representative:
Giambrocono, Alfonso, Dr. Ing. et al
Ing. A. Giambrocono & C. S.r.l.
Via Rosolino Pilo 19/B
20129 Milano (IT)

(54) Pipe pressing tongs

(57) The pipe pressing tongs (10) comprise two symmetrical hinged arms (12, 14), each having one end shaped as a jaw (24, 26) extending through an angle of about 120 degrees, the two jaws (24, 26) being closed by widening-apart the other ends (20, 22) of the two arms (12, 14), a third jaw (32) with an angular extension such as to complete the round angle being interposed

between the first two jaws (24, 26). The third jaw (32) is closer to the hinging axes (28, 30) of the two arms (12, 14) of the tongs (10) than the first two jaws (12, 14) and is disposed coaxially to the tongs (10). Means (36, 40) are provided to forcibly advance the third jaw (32) from a retracted position to a position in which the third jaw (32) blends with the first two jaws (24, 26) following closure of the tongs (10).



Description

[0001] The present invention relates to pipe pressing tongs, i.e. those tongs which, usually operated by a suitable operating device (normally of hydraulic type), enable two pipe pieces to be joined together by a tubular connector with interposed O-rings, the connector then being suitably pressed with the tongs to form the joint.

[0002] As is well known to the expert of the art, conventional pipe pressing tongs present two coplanar, symmetrical hinged arms, one end of which is shaped as a jaw. Each jaw has an angular extension of 180 degrees, so as to embrace one half of the tube. Each of the two arms can rotate about its own hinging axis, the two axes being perpendicular to the plane of the two arms and spaced apart. The hinge pins of the two arms are carried by a pair of equal and symmetrical parallel plates, each disposed on one side of the two arms. The two jaws are maintained open by a return spring. To effect the pressfitting operation on a connector, the two jaws are forced together, against the action of the return spring, by widening apart those ends of said arms distant from their jaw-shaped end. This widening is achieved by the aforesaid operating device.

[0003] The joints obtained in the aforescribed manner are increasingly used in hydraulic heating and sanitary installations because of their quickness of execution and low cost.

[0004] The aforesaid conventional two-jaw tongs have however the drawback that the joints obtained present an ovalization along their pressed part, with the result that the said O-ring is not subjected to circumferentially uniform radial pressure, so that it does not operate correctly. It can therefore happen that leakages occur at the joint when higher pressures arise in the installation pipes.

[0005] To prevent this drawback, pipe pressing tongs have been provided comprising three equal jaws, each extending through an angle of 120 degrees. The three jaws are disposed one following the other and connected together by cylindrical hinges. The ends of the three-jaw combination are drawn together (to effect the pressing operation) by two hinged arms similar to the arms of the two-jaw tongs. Consequently, in three-jaw tongs of this type, when in their working position the third jaw (or intermediate jaw) is further from the arm hinge pins than the other two jaws.

[0006] These three-jaw tongs do not solve the sealing problem. In this respect, the intermediate or third jaw does not exert on the connector a force comparable to that exerted by the other two jaws, so that the O-ring of the obtained joint is again not subjected to a radial pressure circumferentially distributed in a sufficiently uniform manner.

[0007] An object of the present invention is to provide pipe pressing tongs which enable joints to be obtained in the pipes of an installation such that the joint O-ring is subjected to a radial pressure which is circumferen-

tially substantially uniform, so ensuing a perfect joint seal.

[0008] Another drawback of the aforescribed three-jaw tongs is due to the fact that the presence of the third jaw makes it more difficult to apply these tongs to the pipe, with increased time loss. In fact the third jaw has to be located behind the pipe, which is not always easy, especially for chased pipes (it may be necessary for this purpose to force them out of the wall).

[0009] Another object of the invention is therefore to provide tongs of the aforesaid type which are as simple to use as the known two-jaw tongs. These objects are attained by the pipe pressing tongs of the present invention, comprising two symmetrical hinged arms each having one end shaped as a jaw extending through an angle of about 120 degrees, the two jaws being closed by widening-apart the other ends of the hinged arms, a third jaw with an angular extension such as to complete the round angle being interposed between the first two jaws, characterised in that the third jaw is closer to the hinge pins of the two arms of the tongs than the first two jaws, means being provided to forcibly advance the third jaw from a retracted position to a position in which it blends with the first two jaws following closure of the tongs.

[0010] By virtue of the forced advancement of the third jaw, the pipe pressing tongs of the present invention are not only as easy to use as the known two-jaw pipe pressing tongs, but also enable a joint to be obtained in which the O-ring operates circumferentially in a substantially uniform manner, so ensuring the seal.

[0011] The said means for forcibly advancing the third jaw preferably comprise: a cam surface provided on each of the two hinged arms of the tongs, the two cam surfaces being disposed symmetrically about the tongs axis; and two symmetrical cam follower surfaces provided on the third jaw, each cam follower surface cooperating with one of the cam surfaces to effect the forced advancement of the third jaw. Guide and limit stop means are provided for the third jaw.

[0012] Conveniently, means are provided to ensure the symmetrical synchronous movement of the two first jaws relative to the third jaw, without involving the operator.

[0013] The invention will be more easily understood from the following description of one embodiment thereof by way of example. In this description reference is made to the accompanying drawings, in which:

Figure 1 is a partly sectional side view of pipe pressing tongs according to the invention, shown open; Figure 2 shows the same tongs as Figure 1, but closed; Figure 3 is a partly sectional side view thereof; Figure 4 is an enlarged view of the third jaw alone; Figure 5 is a side view thereof.

[0014] As can be seen from Figures 1-3, the pipe pressing tongs 10 comprise two symmetrical hinged

arms 12 and 14 which when at rest are maintained in the position shown in Figure 2 by the action of a helical spring 15. The two arms 12 and 14 are hinged to a pair of symmetrically disposed, parallel equal plates 16 of roughly T-shape. The two arms 12 and 14 are hinged by relative pins 41 fixed to the plates 16 by threaded bushes 38. The axes of the pins 42 are indicated by 28 and 30. The pins 42 are inserted into corresponding through holes (not visible) provided in the plates 16. Both the plates 16 also present a through hole 18 which enables the pressing tongs 10 to be applied to a suitable conventional operating device (not shown), for example of the hydraulic transmission type such as that described in EP 1121997 or EP 0908657. As known to the expert of the art, said operating device enables the ends 20 and 22 of the hinged arms 12 and 14 to be widened apart by rotating them about the relative hinge axes 28 and 30, so that the other ends, shaped as jaws 24 and 26 respectively, of said arms move towards each other to embrace and press a tubular connector (not shown) to be pressed. It should be noted that the two arms 12 and 14 are similar to the hinged arms of known two-jaw pipe pressing tongs, the only difference being that the angular width of the two jaws 24 and 26 is 120 degrees instead of 180 degrees. The two jaws 24 and 26 (each of angular width 120 degrees, as stated) have a total angular extension of 240 degrees. The round angle (necessary to completely embrace the connector) is completed by the third jaw 32. The feature of this latter is that in addition to a jaw surface 34, it also presents two symmetrical surface portions, 36 and 38 respectively, which act as cam followers arranged to cooperate with a corresponding arcuate surface portion 40 (in Figure 1 the relative circles 42 and 44 are shown by dashed and dotted lines) acting as a cam, provided on each of the two arms 12 and 14. To enable the arcuate surfaces 40 to operate as cams the respective circles 42 and 44 must be eccentric to the hinging axes 28, 30 of the respective arms 12 and 14. Because of this eccentricity, when the ends 20 and 22 of the arms 12 and 14 are widened apart to move the first two jaws 24 and 26 towards each other, the third jaw 32 is forced to advance so that it passes from its position shown by full lines in Figure 1 to the position shown by dashed lines in the same figure and by full lines in Figure 2. The combined action of the three jaws 24, 26 and 32 enables a radial compression or pressing action to be exerted on the tubular connector which is much more uniformly distributed than by pipe pressing tongs having only two jaws or known three-jaw pressing tongs. By virtue of the pipe pressing tongs of the invention, not only is joint ovalization prevented, but the O-ring present in the joint is subjected to a radial compression which is essentially uniformly distributed circumferentially, to hence obtain maximum sealing assurance.

[0015] As can be seen from the figures, the third jaw 32 is traversed by a pin 46 parallel to the axes 28, 30, its two projecting ends being received in relative recess-

es 48 provided in the inner face of the plates 16. The two recesses 48 are slotted in the direction of the axis of the tongs 10. The pin 46 and the slotted recesses 48 in practice constitute the initially stated guide and limit stop means for the third jaw 32.

[0016] To be certain that the two jaws 24 and 26 move symmetrically and in a synchronized manner relative to the third jaw 32, the two arms 12 and 14 are shaped in such a manner that there is a region of permanent contact, in which spherical cup-shaped cavities 50 and 52 are provided to receive one and the same ball 54. The ball 54 and the spherical cup-shaped cavities 50 and 52 constitute the initially stated means for ensuring the symmetrical synchronous movement of the two arms 12 and 14 relative to the third jaw 32.

[0017] It should be noted that those portions of the hinged arms 12 and 14 close to their ends 20 and 22 present usual cut-away parts for the purpose of lightening the tongs 10.

[0018] If desired, a return spring (not shown for simplicity) can be provided for the third jaw 32, enabling the third jaw 32 to automatically return to its most retracted position (that of Figure 1) when the first two jaws 24 and 26 are widened apart. It should however be noted that the return spring for the third jaw 32 is not indispensable, because when the operator opens the tongs manually to position them about the connector to be pressed, the operator tends to exert a forward thrust which automatically causes the third jaw to retract.

30

Claims

1. Pipe pressing tongs (10) comprising two symmetrical hinged arms (12, 14), each having one end shaped as a jaw (24, 26) extending through an angle of about 120 degrees, the two jaws (24, 26) being closed by widening-apart the other ends (20, 22) of the two hinged arms (12, 14), a third jaw (32) with an angular extension such as to complete the round angle being interposed between the first two jaws (24, 26), **characterised in that** the third jaw (32) is closer to the hinging axes (28, 30) of the two arms (12, 14) of the tongs (10) than the first two jaws (12, 14), means (36, 40) being provided to forcibly advance the third jaw (32) from a retracted position to a position in which the third jaw (32) blends with the first two jaws (24, 26) following closure of the tongs (10).
2. Pipe pressing tongs (10) as claimed in claim 1, wherein the means for forcibly advancing the third jaw (32) comprise: a cam surface (40) provided on each of the two hinged arms (12, 14) of the tongs (10), the two cam surfaces (40) being disposed symmetrically about the axis of the tongs (10); and two symmetrical cam follower surfaces (36) provided on the third jaw (32), each cam follower surface

(36) cooperating with one of the cam surfaces (40) to effect the forced advancement of the third jaw (32).

3. Pipe pressing tongs (10) as claimed in claim 1, 5
wherein guide and limit stop means (46, 48) are provided for the third jaw (32).

4. Pipe pressing tongs (10) as claimed in claim 1, 10
wherein means (50, 52, 54) are provided to ensure the symmetrical synchronous movement of the two first jaws (24, 26) relative to the third jaw (32).

5. Pipe pressing tongs (10) as claimed in claim 4, 15
wherein the means for rendering automatic the symmetrical synchronous movement of the two first jaws (24, 26) comprise in each hinged arm (12, 14) a region which is permanently in contact with an equal symmetrical region of the other hinged arm, 20
in each contact region there being provided an equal but symmetrical spherical cup-shaped cavity (50, 52), the two cavities (50, 52) being arranged to receive one and the same ball (54).

6. Pipe pressing tongs (10) as claimed in claim 3, 25
wherein the guide and limit stop means for the third jaw (32) comprise a pin (46) which passes through the third jaw (32) and is parallel to the hinging axes (28, 30) of the arms (12, 14), the two ends of the pin (46) projecting laterally from the third jaw (32) and being received in relative recesses (48) provided in the inner face of each of the two equal and symmetrical plates (16) which carry the hinge pins (20) of the arms (12, 14), the two recesses (48) being slotted in the direction of the axis of the tongs 30
(10). 35

7. Pipe pressing tongs (10) as claimed in claim 1, 40
wherein a return spring (15) is provided to maintain the tongs (10) closed when their hinged arms (12, 14) are at rest.

8. Pipe pressing tongs (10) as claimed in claim 1, 45
wherein a return spring is provided to return the third jaw (32) to its retracted position when the two first jaws (24, 26) are widened apart.

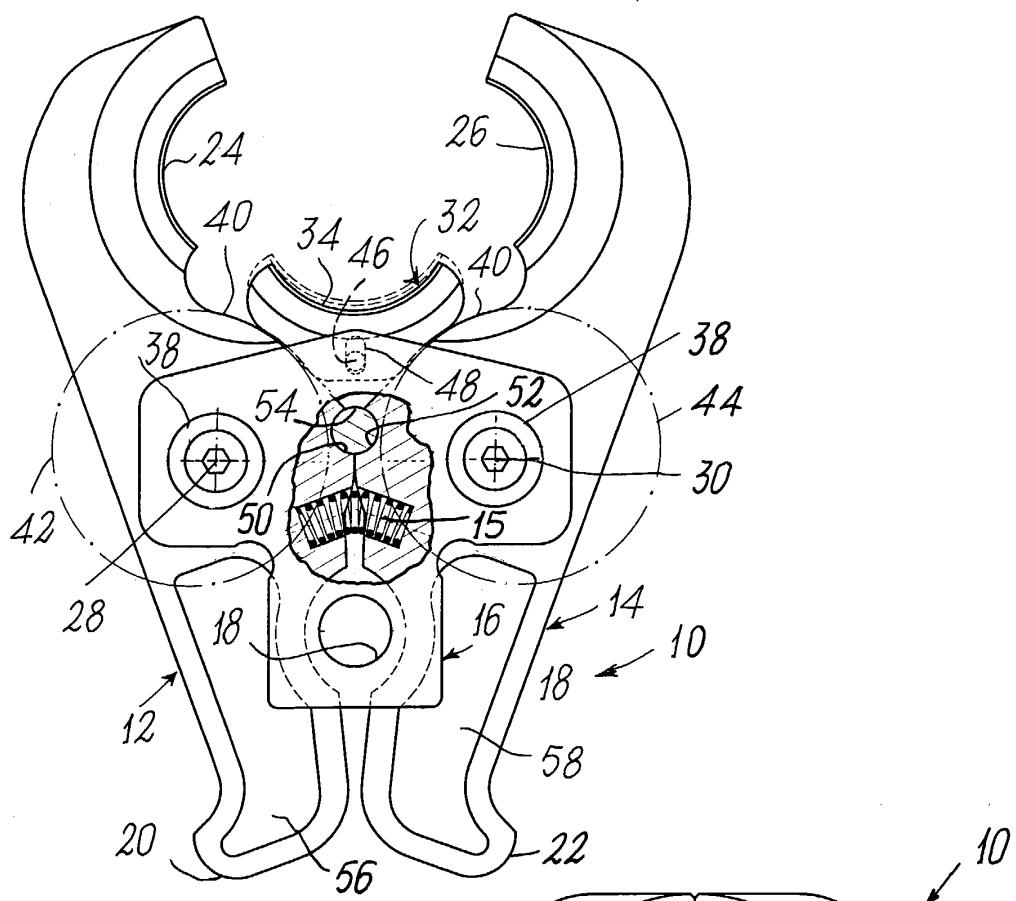


FIG. 1

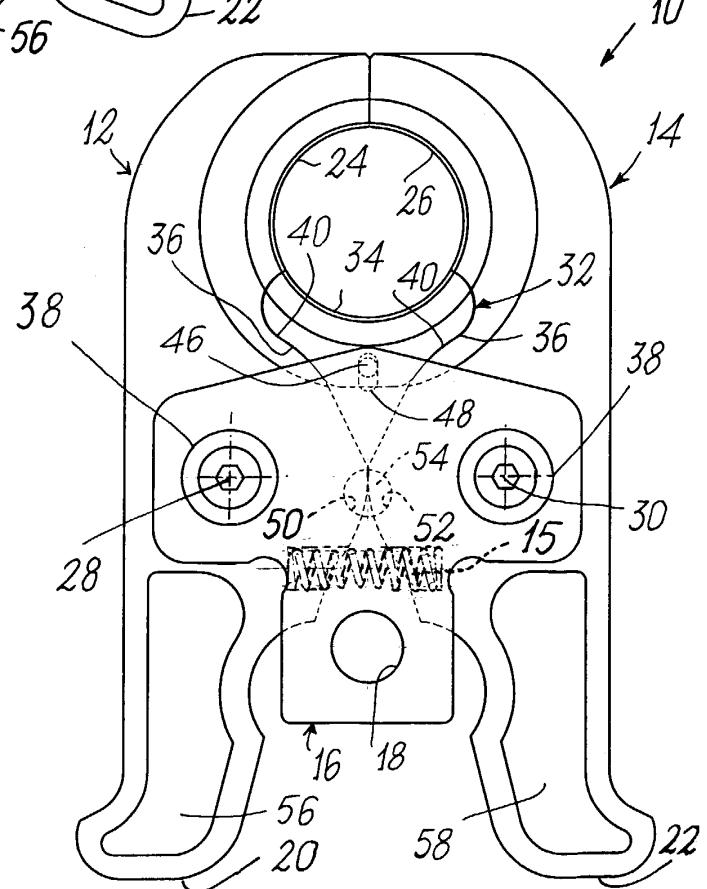


FIG. 2

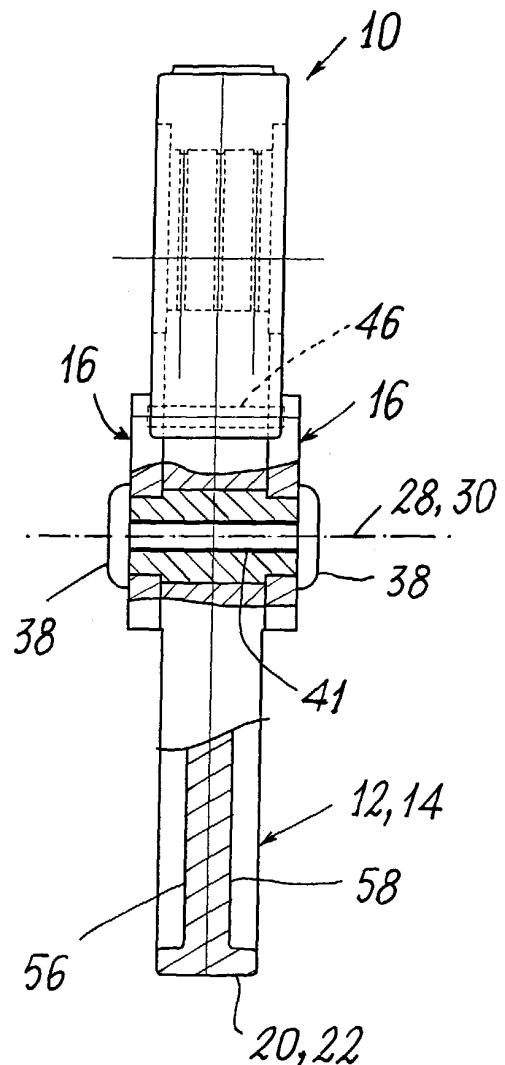


FIG. 3

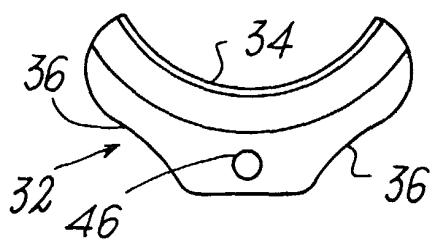


FIG. 4

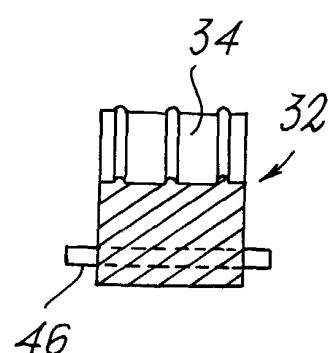


FIG. 5



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.7)		
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim			
X	US 5 702 139 A (BUCK DAVID A) 30 December 1997 (1997-12-30) * column 3, line 51 - column 4, line 49; figures 1-3 *	1-4	E21B19/16		
Y	US 6 116 118 A (WESCH JR WILLIAM E) 12 September 2000 (2000-09-12) * column 5, line 56 - line 60; figure 1 *	7			
Y	US 5 669 653 A (PENISSON DENNIS J) 23 September 1997 (1997-09-23) * abstract *	7			
A	-----	1			
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)		
			E21B		
The present search report has been drawn up for all claims					
Place of search	Date of completion of the search	Examiner			
MUNICH	28 July 2003	Ott, S			
CATEGORY OF CITED DOCUMENTS					
X : particularly relevant if taken alone	T : theory or principle underlying the invention				
Y : particularly relevant if combined with another document of the same category	E : earlier patent document, but published on, or after the filing date				
A : technological background	D : document cited in the application				
O : non-written disclosure	L : document cited for other reasons				
P : intermediate document	& : member of the same patent family, corresponding document				

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 03 00 3379

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-07-2003

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 5702139	A	30-12-1997	US	5671961 A	30-09-1997
			CA	2232447 A1	17-04-1997
			EP	0862509 A1	09-09-1998
			WO	9713618 A1	17-04-1997

US 6116118	A	12-09-2000	US	6237445 B1	29-05-2001

US 5669653	A	23-09-1997	CA	2186827 A1	06-04-1997
			DE	19641083 A1	15-05-1997
			GB	2305878 A ,B	23-04-1997
