

COMMONWEALTH OF AUSTRALIA
THE PATENTS ACT, 1952

DECLARATION IN SUPPORT OF AN
APPLICATION FOR A PATENT

In support of the Application made for a patent for an invention
entitled:

PIPE CRIMPING APPARATUS

I, WILLIAM JAMES IRWIN

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NORTHERN IRELAND, UNITED KINGDOM

do solemnly and sincerely declare as follows:-

1. I am the Applicant for the patent -
2. I am the actual inventor of the invention referred to in the basic application.
3. The basic application as defined by Section 141 of the Act was/were made inUNITED.KINGDOM.....on...01.07.88..... by.....WILLIAM.JAMES.IRWIN.....
4. The basic application referred to in paragraph 3 of this Declaration was/were the first application made in a Convention country in respect of the invention the subject of the application.

Declared at BELFAST this 12th day of March . 1990.

To: The Commissioner of Patents

.....*Wm J. Irwin*.....

Signature of Declarant

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PIPE CRIMPING APPARATUS

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(56) Prior Art Documents
US 3948451
US 3771343
US 3726122

(57) Claim

1. A pipe crimping apparatus comprising holding means to externally engage and hold a joint to be formed by swaging one end of a pipe connector onto a pipe end, the holding means being elongate and formed by two jaw members, each having an inner concavity together defining a substantially cylindrical clamping zone, a crimping tool movable relative to the clamping zone and means to cause movement of the tool relative to the clamping zone, the jaw members being pivotally related with a gripping zone provided at one end of the holding means, and the tool being substantially cylindrical and extending axially into the clamping zone to be urged towards the gripping zone on axial actuation of the movement means.

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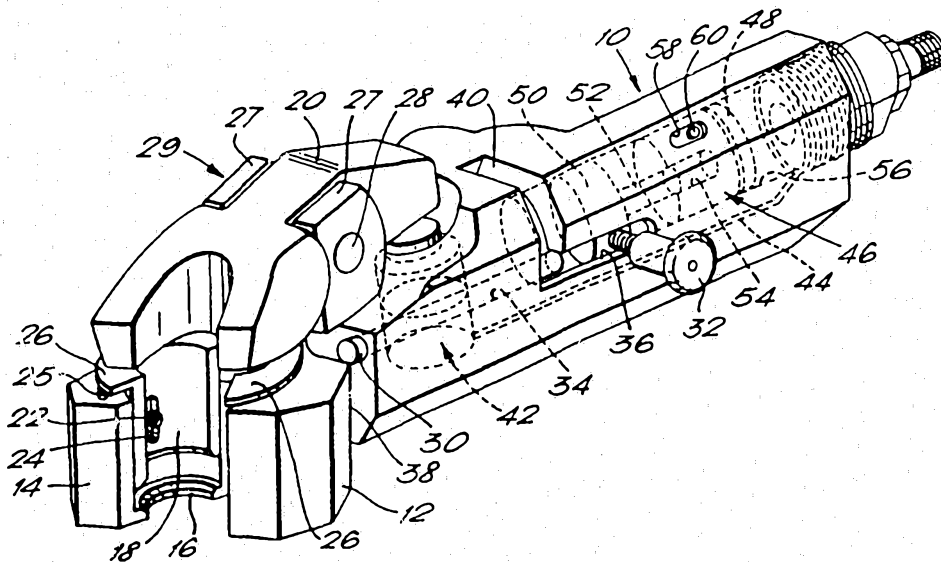
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PCT

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<p>(51) International Patent Classification⁴ : B21D 39/04</p>	<p>A1</p>	<p>(11) International Publication Number: WO 90/00097 (43) International Publication Date: 11 January 1990 (11.01.90)</p>
<p>(21) International Application Number: PCT/GB89/00746 (22) International Filing Date: 3 July 1989 (03.07.89) (30) Priority data: 8815643.5 1 July 1988 (01.07.88) GB (71)(72) Applicant and Inventor: IRWIN, William, James [GB/GB]; 799 Feeny Road, Dungiven, Londonderry BT47 4TA (GB). (74) Agent: IRWIN, William, James; 244 Upper Newtownards Road, Belfast BT4 3EU (GB). (81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB, GB (European patent), IT (European patent), LU (European patent), NL (European patent), SE (European patent), US.</p>		<p>Published With international search report.</p> <p style="font-size: 2em; text-align: center;">628367</p>

(54) Title: PIPE CRIMPING APPARATUS



(57) Abstract

A pipe crimping apparatus comprises holding means to externally engage and hold a joint formed by locating one end of a pipe connector onto a pipe end, the holding means having a crimping tool (18, 106, 124) movable relative to the swaged end to cause the swaged end to be deformed and crimped onto the pipe end. In a preferred embodiment, the holding means (12, 14) is elongate and at one end thereof has a gripping zone (16) to engage behind the inner side of a swaged end of the pipe connector, and at the other end thereof the crimping tool (18) is movable longitudinally and internally of the holding means. Means (20) are provided to cause axial movement of the tool (18) towards the gripping zone (16) so to engage the outer side of the swaged end and crimp it to the pipe end.

PIPE CRIMPING APPARATUS.

5 This invention relates to pipe crimping apparatus for crimping the joints of pipe connections of the type having non-flux, non-solder joints such as those described in my co-pending UK patent application No. GB2 219 644 in which pipe ends are provided adjacent to their ends with a collar of increased diameter over which an end of a pipe connector is fitted, said pipe connector end having been swaged to a complimentary dimensioned diameter to fit over the pipe end, the outer end of said swaged end then being crimped over the side of the collar remote from the end of the pipe.

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15 Alternatively, the pipe ends are straight, and pipe connectors are provided in which a collar is pre-fitted into the or each swaged end of each pipe connector, and the swaged end partially crimped around said collar to

20 retain it in position, the swaged end being fully crimped after the swaged end is fitted over one end of a pipe.

The term 'swaged' is used herein to include the increasing in diameter at or adjacent to one or each end of a pipe or pipe connector by mechanical means or by the increase in diameter being formed as part of a casting of the or each end of a pipe or pipe connector.



In accordance with the present invention, a pipe crimping apparatus comprises holding means to externally engage and hold a joint to be formed by swaging one end of a pipe connector onto a pipe end, the holding means being elongate and formed by two jaw members, each having an inner concavity together defining a substantially cylindrical clamping zone, a crimping tool movable relative to the clamping zone and means to cause movement of the tool relative to the clamping zone wherein the jaw members are pivotally related with a gripping zone provided at one end of the holding means, and the tool is substantially cylindrical and extends axially into the clamping zone to be urged towards the gripping zone on axial actuation of the movement means.

Preferably, the gripping zone is formed by an internal peripheral element. The crimping tool is preferably in two parts corresponding to the jaw members and each part is secured to its respective jaw member for restricted lengthwise movement relative thereto. Each part of the tool is desirably an arcuate wall which projects beyond the other end of the holding means. The projecting end of the walls are each preferably provided with an outward flange to overlie their respective jaw members, the distance of the flanges from their respective jaw members determining the extent of lengthwise movement. The walls are beneficially spring-biased to an outer position.



5 Preferably also, the movement means includes a lever mounted at the outer end of the walls with one end of the lever adapted to engage the projecting ends of the walls to cause movement of the walls towards the element. One end of the lever is desirably bifurcated. The means to move the lever is desirably a ram and piston arrangement operated hydraulically, pneumatically or hydro-pneumatically.

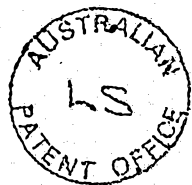
10 Preferably further, the apparatus is a hand held implement having an elongate handle at one end of which the holding means are provided. One jaw member is preferably stationary with the handle and the other member is hinged thereto. A bolt arrangement is desirably provided to urge the hinged member into a closed position with the other member against the biasing. The bolt is preferably securable in said urged position.

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20 Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view of a pipe crimping apparatus according to a first embodiment of the present invention;

25 Fig. 2 is a perspective view of the apparatus according to a second embodiment; and

Fig. 3 is a perspective view of a cable operating



device for use with the apparatus of the second embodiment.

Referring to Figs. 1 and 2 of the drawings, a pipe crimping apparatus according to first and second
5 embodiments generally comprises a hand held implement having an elongate handle 10, at one end of which elongate holding means, in the form of a pair of jaw members 12, 14 are provided with its axis at right angles to the axis of the handle 10. The jaws of both
10 members 12, 14 are similar and concave, and together the concavities of the members form a cylindrical clamping zone with a gripping zone formed by an internal peripheral element 16 at one end thereof. Jaw member 14 is stationary with the handle 10 and jaw member 12 is hinged thereto to allow the jaw members 12, 14 of the
15 implement to be opened and located around a pipe connection (not shown) and then closed to hold same. The jaw members 12, 14 are spring biased apart to the open position. A crimping tool is provided at the other end of the jaw members 12, 14 and comprises an inner arcuate wall 18 for each jaw member. The walls 18 extend beyond
20 the end remote from the



elements 16 and are movable relative to its member 12, 14 in a direction longitudinal of the clamping zone and adapted for movement towards or away from the gripping elements 16. The walls 18 are each provided with a slot 24 and are mounted onto their respective members 12, 14 by a fastener 22 whose head marginally overlaps the sides of the respective slot 24 to allow for their restricted lengthwise movement. The marginal sides of the respective slot 24 are recessed so that the head of the fastener 22 does not project out beyond the wall's inner face. The projecting end of the walls 18 are each provided with an outward flange 26 to overlie their respective member. Spring biasing, such as in the form of helical springs 25, is provided between the top of the members 12, 14 and their respective flanges 26 and is provided to bias the walls 18 to their outer extent of movement.

As shown in Fig. 1, the gripping elements 16 are contoured to complement the curved shape of the inner side of a swaged end of a pipe connector, and the inner ends of walls 18 are cut away from the inside to outside wall to a thickness the same as, or approximately the same as, the thickness of the swaged end of the pipe connector. The inner walls may be recessed over most of their length to allow the crimping tool to be used with closely adjacent swaged ends, the recessing of the walls allowing a second swaged end to be positioned within the



tool but not being acted on by the tool.

Means to cause axial movement of the tool is a lever 20 mounted, to act as a simple lever about fulcrum pivot pin 28, at the end of the jaw members 12, 14 remote from the gripping elements 16 with one end adapted to engage the flanges 26 of the projecting ends of the walls 18. The pin 28 is provided between two opposed cheeks 27 provided upstanding on a mounting 29 pivotally connected to the handle 10. The said one end of the lever 20 is bifurcated as shown with both arms overhanging said flanges 26. The lever 20 is pivotal to allow it to swivel to fit around a pipe located projecting from the clamping zone.

A bolt arrangement is provided comprising a bolt 30 movable in a bore 34 as shown. The movement of the bolt 30 is controlled by a knob 32 slidable along a slot 36 to urge the bolt 30 against the hinged member into a closed position with the other member. The axes of the slot 36 and bore 34 are parallel to the longitudinal axis of the handle 10. The longitudinal movement of the bolt 30 towards the members 12, 14 causes the outer end of the bolt 30 to abut a cheek 38 on the hinged member 12. The slot 36 has a right-angled extension 40, and the bolt 30 is securable against major axial movement in the handle 10 in said urged position by the knob 32 being moved along said extension 40.



Movement means is provided to cause the lever 20 to urge the walls 18 towards the elements 16 so to crimp an inner side, or an outer side, or both inner and outer sides of a swaged end of a pipe connector to a pipe end when such is located therein.

In the first embodiment, the movement means to move the lever 20 is a first piston and cylinder arrangement 42 operated hydraulically, pneumatically or hydro-pneumatically. The cylinder is a bore provided in the handle 10 adjacent to the members 12, 14 and having an axis at right angles to the handle 10. The piston floats in the cylinder and is movable in response to fluid being fed therein through a narrow bore 44 from a supply of fluid fed to the end of the handle 10 remote from the jaw members 12, 14. A second piston and cylinder arrangement 46 is provided as shown and serves, when extended, to urge the bolt 30 into tight abutment with the cheek 38 of member 12 so to retain it in tight abutment with member 12. The cylinder of the arrangement 46 is a bore 56 lengthwise of the handle 10 and the piston of the arrangement 46 is formed in two parts, a first part 48 adjacent to the supply end of the fluid and a second part 50 to which the knob 32 is secured as shown. The first part 48 is secured against rotational movement by a slot 58 being provided in the wall of the bore 56 and a grub screw 60, whose outer end slides in the slot 58, is secured into a tapped bore in part 48.



5 The knob 32 prevents rotational movement of part 50. The two parts are closable together when the knob 32 is in the slot 36. In this position, a spindle 52 projecting towards the first part 48 and provided on an inside face of the second part 50 is in registry with a complementary bore 54 in the first part 48. By moving the knob 32 into the extension 40, the spindle 52, which will have fully emerged from the bore 54, will be out of registry and in front of the inside face of the first part 48. Entry of fluid from the supply, will cause the first part 48 to abut the spindle 52 to cause the second part 50 to urge the bolt 30 tightly against the cheek 38. After the fluid so acts it then flows through bore 44 to the first piston and cylinder arrangement 42. Both pistons of arrangements 42, 46 are spring biased to retracted position by helical spring (not shown) being provided between the end of each cylinder and the leading face of its respective piston.

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20 In use, the implement is hand held and after a pipe connector is located on a pipe end, is used to crimp it, by axial compression against its outer end and behind the inner side of the swaged end, in position in the manner hereinbefore described.

25 In a modification, the bolt arrangement may be mechanically operated without assistance from the lever movement means.



In the second embodiment as shown in Figs. 2 and 3, the lever 20 may be operated by a Bowden cable 62, the other end of which is connected to a cable operating device as shown in Fig. 3. In this embodiment, like parts are denoted by like numerals. The slot 36 does not have an extension 40. The handle 10 is of a different construction and appearance. The bolt 30 has a corresponding shaped bar 64 spaced therefrom and parallel thereto as shown and between which at the member remote end, has a transom 66 to which the cable 62 is secured, the core cable 68 passing through a bore in the transom to be secured to a wedge 70 movable along a surface 72, provided in a housing 76, to engage under the end of lever 20 to pivot it about pin 28 to abut the bifurcated end against the flanges 26. The bolt 30 is secured by knob 32 being in the form of a clamping nut in screw threaded engagement with a screw-threaded element secured to bolt 30, the clamping nut being clamped against bolt housing 74. The housing 76 provides spring-biasing to return the lever 20 to its original position and also wedge 70 when the cable 68 is released. The cable operating device (Fig. 3) is a stand 80 having a rod 82 along which a key 84 is provided. A cylinder 86 is low-friction movable lengthwise along said rod 82, the cylinder 86 having a groove 88 to engage said key 84 whereby to prevent the cylinder 86 from rotational movement. The cylinder 86



5 on its outside surface as shown mounts a plate 90 to which the cable 56 is secured with core cable 68 passing through a hole 92. The core cable 68 is secured to cranked handle 94 pivotally mounted to anchorage 96 secured to cylinder 86 as shown. With the handle 94 in an upward position the wedge 70 is in the position as shown in Fig. 2 and with the handle 94 in the position as shown in Fig. 3 the wedge 70 is pulled to move the lever 20.

10 In both of the above embodiments, the crimping to the swaged end may alternatively be by spot or dot crimping rather than as above described with the full annular inner, outer or both inner and outer sides of the swaged end being crimped.

15 Variations and modifications of the means for causing the crimping tool to move relative to the gripping zone of the elongate holding means can be made without departing from the scope of the invention as described above and claimed hereinafter.

20



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

5 1. A pipe crimping apparatus comprising holding means to externally engage and hold a joint to be formed by swaging one end of a pipe connector onto a pipe end, the holding means being elongate and formed by two jaw members, each having an inner concavity together defining a substantially cylindrical clamping zone, a crimping tool movable relative to the clamping zone and means to cause movement of the tool relative to the clamping zone, the jaw members being pivotally related with a gripping zone provided at one end of the holding means, and the tool being substantially cylindrical and extending axially into the clamping zone to be urged towards the gripping zone on axial actuation of the movement means.

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15 2. Apparatus as claimed in Claim 1, wherein the gripping zone is formed by an internal peripheral element.

20 3. Apparatus as claimed in Claims 1 or 2, wherein the crimping tool is in two parts corresponding to the jaw members and each part is secured to its respective jaw member for restricted lengthwise movement relative



thereto.

5 4. Apparatus as claimed in Claim 3, wherein each part of the tool is an arcuate wall which projects beyond the other end of the holding means.

10 5. Apparatus as claimed in Claim 4, wherein the projecting ends of the walls are each provided with an outward flange to overlie their respective jaw members the distance of the flanges from their respective jaw members determining the extent of lengthwise movement.

15 6. Apparatus as claimed in Claim 5, wherein the walls are spring-biased to an outer position.

20 7. Apparatus as claimed in Claim 4, 5 or 6, wherein the movement means includes a lever mounted at the outer end of the walls with one end of the lever adapted to engage the projecting ends of the walls to cause movement of the walls towards the element.

25 8. Apparatus as claimed in Claim 7, wherein the said one end of the lever is bifurcated.

9. Apparatus as claimed in Claims 7 or 8, wherein the lever is pivotal for swivel movement.



10. Apparatus as claimed in Claims 7, 8 or 9, wherein the means to move the lever is a ram and piston arrangement operated hydraulically, pneumatically or hydro-pneumatically.

11. Apparatus as claimed in any one of Claims 1 to 10, wherein the apparatus is a hand held implement having an elongate handle at one end of which the holding means are provided.

12. Apparatus as claimed in Claim 11, wherein one jaw member is stationary with the handle and the other member is hinged thereto.

13. Apparatus as claimed in Claim 12, wherein the jaw members are spring-biased apart.

14. Apparatus as claimed in Claim 13, wherein a bolt arrangement is provided to urge the hinged member into a closed position with the other member against the biasing.

15. Apparatus as claimed in Claim 14, wherein the bolt is securable in said urged position.

16. Apparatus as claimed in Claim 7, 8 or 9, wherein



the means to move the lever is a Bowden Cable.

5 17. Apparatus as claimed in any one of the preceding Claims, wherein the inward axial movement of the tool causes the inner side of the swaged end to be crimped to the pipe end.

10 18. Apparatus as claimed in any one of Claims 1 to 16, wherein the inward axial movement of the tool causes the outer side of the swaged end to be crimped to the pipe end.

15 19. Apparatus as claimed in any one of Claims 1 to 16, wherein the inward axial movement of the tool causes the outer and the inner sides of the swaged end to be crimped to the pipe end.

20 20. Apparatus substantially as hereinbefore described with reference to Fig. 1 of the accompanying drawings.

21. Apparatus substantially as hereinbefore described with reference to Fig. 2 and 3 of the accompanying drawings.

DATED this 8th day of July 1992

WILLIAM JAMES IRWIN

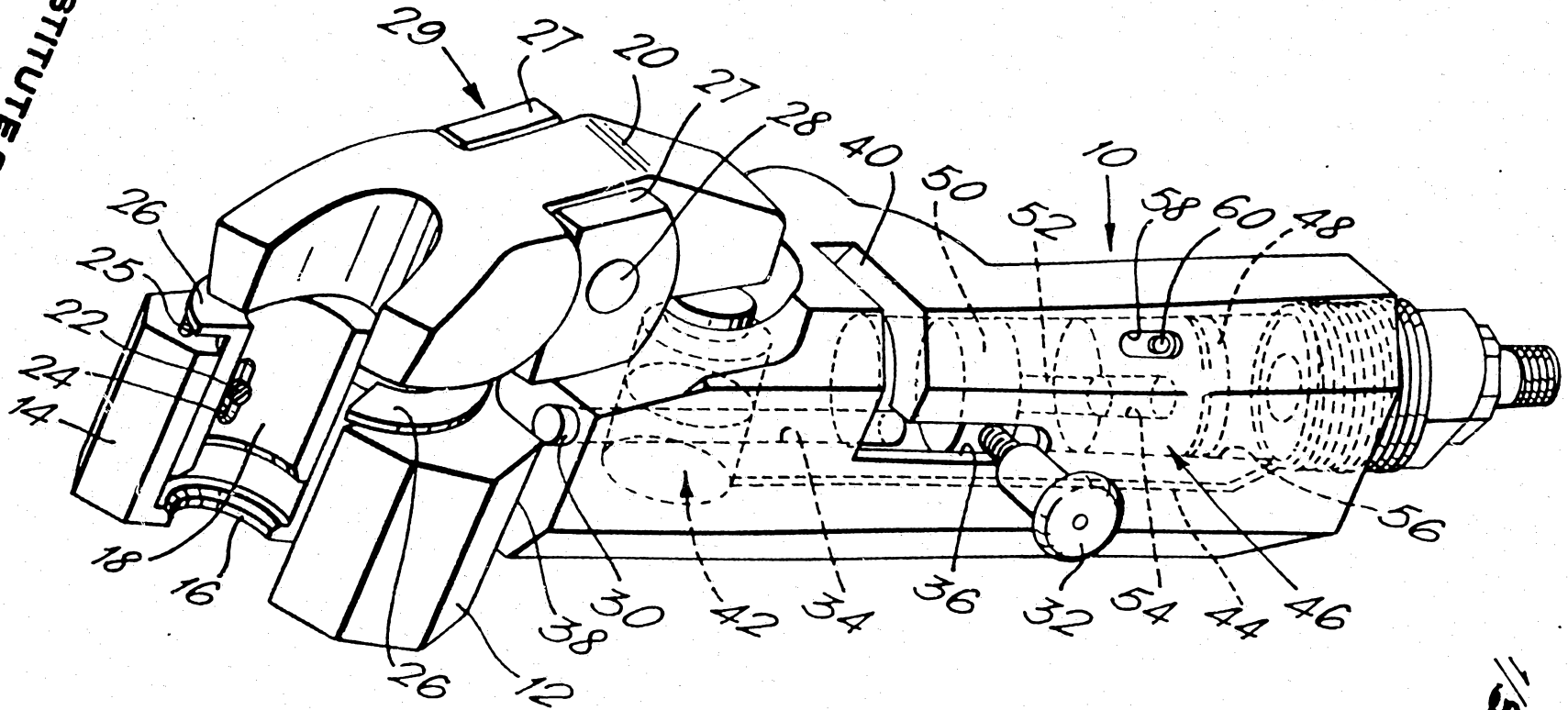
By his Patent Attorneys

CULLEN & CO.



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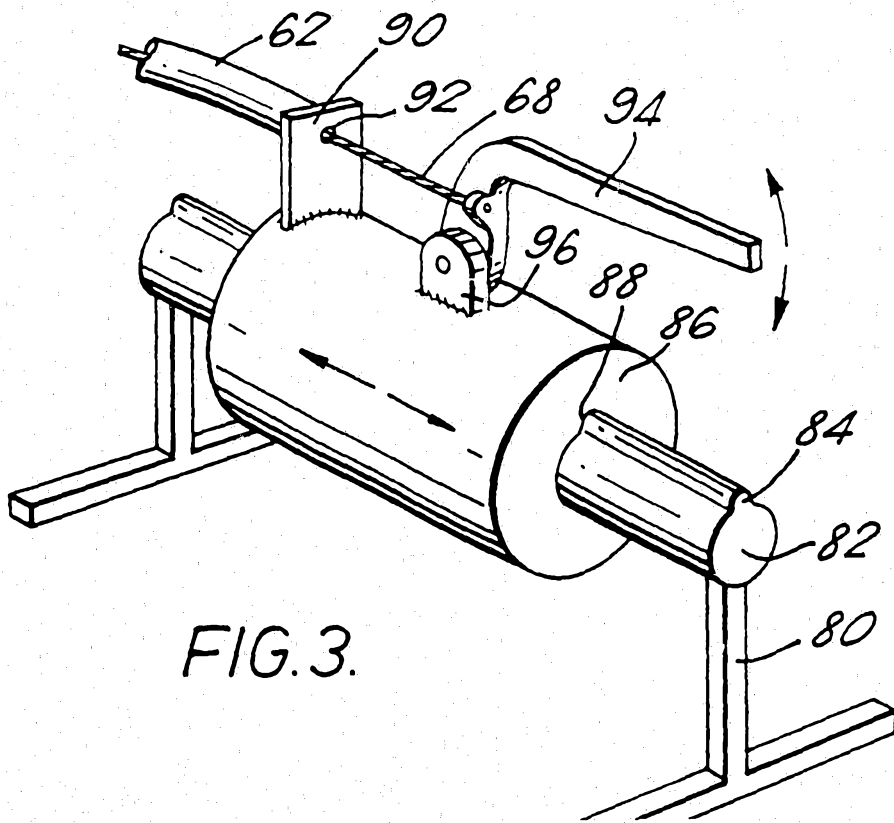
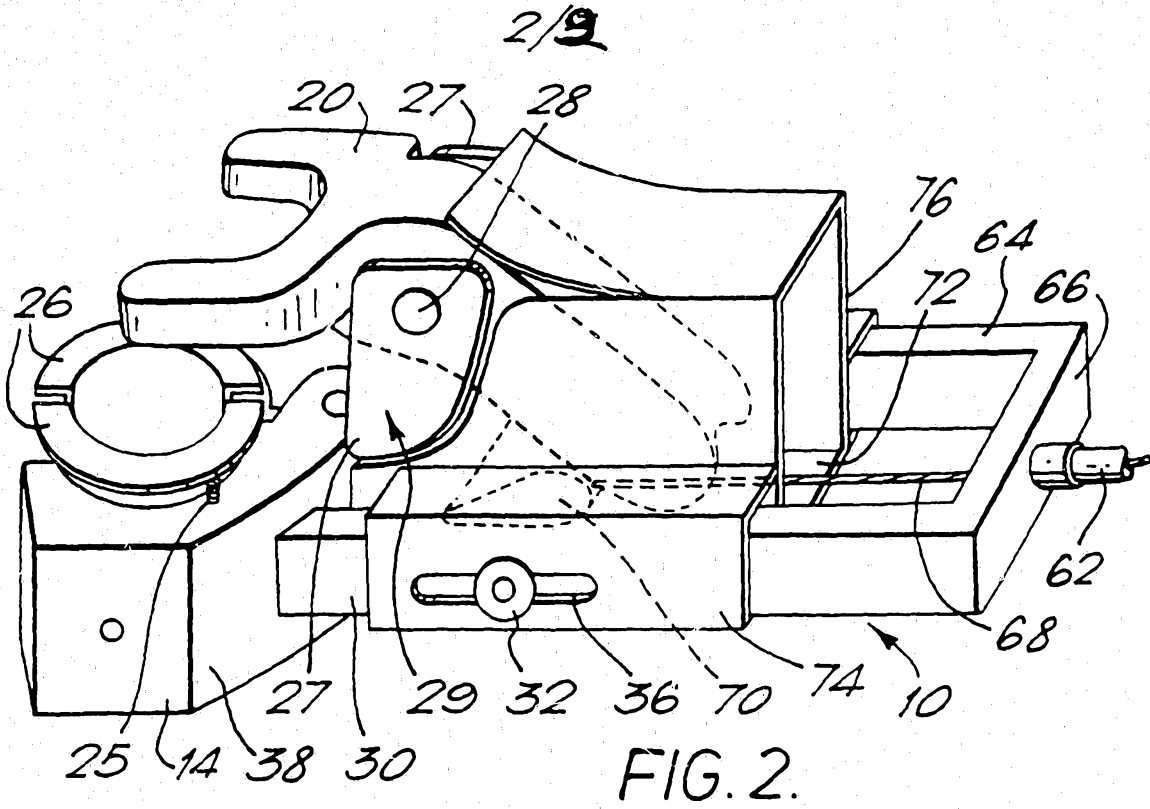
FIG. 1.



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SUBSTITUTE SHEET

INTERNATIONAL SEARCH REPORT

International Application No. PCT/GB 89/00746

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC4: B 21 D 39/04		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC4	B 21 D; F 16 L	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	US, A, 3626450 (FREDERICK S. BROWNE) 7 December 1971, see the whole document --	1-2,4
X	US, A, 3726122 (DAWSON) 10 April 1973, see the whole document --	1-2,4,6-10
X	US, A, 3771343 (DAWSON) 13 November 1973, see column 4, line 16 - line 53; figures 5-7 --	1
X	US, A, 3848451 (ALLIN) 19 November 1974, see the whole document --	1
<p>⁹ Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"Δ" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
4th October 1989		17 OCT 1989
International Searching Authority		Signature of Authorized Officer
EUROPEAN PATENT OFFICE		T.K. WILLIS

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	US, A, 1782219 (WALLACE ARCHIBALD) 18 November 1930, see figures 1-4 --	1
A	US, A, 3691604 (SPONTELLI) 19 September 1972, see the whole document -- -----	1

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/GB 89/00746**

SA 30098

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on 03/03/89
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 3626450	07/12/71	NONE	
US-A- 3726122	10/04/73	NONE	
US-A- 3771343	13/11/73	NONE	
US-A- 3848451	19/11/74	NONE	
US-A- 1782219	18/11/30	NONE	
US-A- 3691604	19/09/72	CA-A- 974041	09/09/75

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82