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Declarations under Rule 4.17:

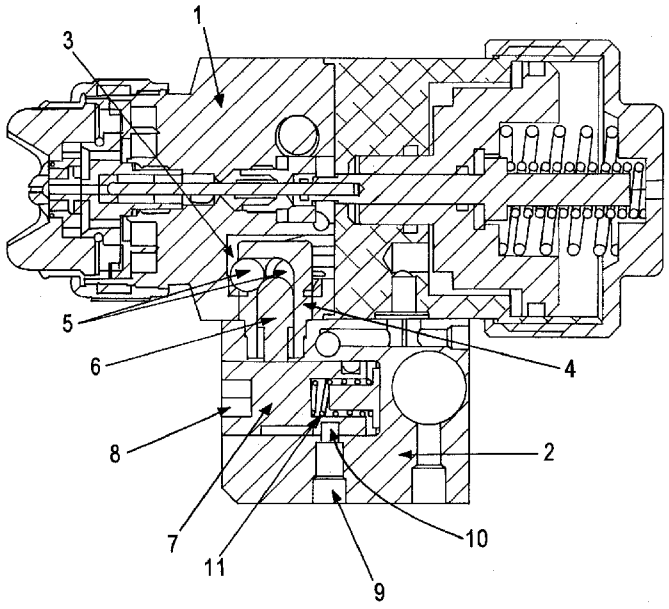
— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

[Continued on next page]

(54) Title: BALL LOCK MOUNTING ARRANGEMENT

FIGURE 1



(57) Abstract: A paint gun assembly comprises two connected body parts, the spray head 1 and the connecting manifold 2. The spray head is provided with a bore which terminates in a radially extending space 3 of gradually increasing radius. Received in the bore is a shaft 4. The shaft has an axially extending bore which connects with radially extending bores in which balls 5 are contained. Received in the shaft is a plunger 6 which has a rounded end and which engages with the balls 5. When forced into the axial bore, the plunger 6 forces the balls 5 into the radially extending bores and out into the tapered, radially extending space 3. Engaging with the plunger 6 in the manifold body 2 is a cam 7. The cam body 7 is exposed at a surface of the manifold body 2 and includes a hexagon drive 8 by means of which the angular rotation of the cam can be adjusted using a suitable key. The manifold body further includes a recess 9 for receiving a retaining pin (not shown). The end of the retaining pin is received in the cam guide profile 10. Axial movement of the cam 7 in its housing is further resisted by compression spring 11.

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BALL LOCK MOUNTING ARRANGEMENT

The present invention relates to a ball lock mounting arrangement and in particular to a novel arrangement for locking body parts together which utilises a ball lock. The arrangement has particular application in the assembly of body parts of apparatus to be subjected to high pressure, for example, spray guns.

Ball locks are well known, such arrangements are, for example, widely used in the detachable connection of machine tools. An example of such an arrangement is described in US 3498653.

Generally, a ball lock comprises a body having a shank with a centrally, axially extending bore into which is slideably received a ball. At one end, the shank further includes a plurality of radially extending bores which pass through the shank wall. The radially extending bores are no longer in length than the diameter of the balls they receive. The relative proportions of the balls and bores are such that, if the ball of the central bore is driven against the balls in the radial bores, the balls in the radial bores are caused to travel and protrude from the radial bores beyond the outer surface of the shank. Conventionally, axial movement and fixing of the centrally located ball is facilitated by an adjustment screw which is received through a tapped bore in the ball lock body. Appropriate adjustment of the screw forces the centrally located ball against the radially located balls, forcing the radially located balls radially outwards. The screw locks the balls in position. Reversal of the screw allows the balls to travel in the bores, retracting back inside the shank.

It will be appreciated the arrangement facilitates that the body may be received into the proximal end of a bore in a second body; the bore of the second body having a radially larger space at its distal end. Appropriate adjustment of the screw after insertion of the ball lock body causes the radially located balls to travel into the radially larger space and locks them in position thereby resisting axial withdrawal of the shank.

The present invention provides a novel adaptation of this arrangement which is particularly useful in connecting parts of a paint spray gun body. Other uses for the novel arrangement will no doubt occur to the skilled addressee.

In accordance with the present invention there is provided a connecting body for securing to a main body, the main body including a bore, the bore having a distal end which terminates in a radially larger space; the connecting body comprising a shank portion configured to be received in the bore in the main body and having a centrally, axially extending bore and a plurality of radially extending bores passing through the shank wall, a plurality of balls receivable in the radially extending bores and a round headed plunger received in the centrally axially extending bore such that when the plunger engages the balls, the balls are caused to travel through the radially extending bore and protrude into the radially larger space, rise and fall of the plunger being effected by a cam portion which is drivable from a position on the exposed surface of the connecting body when the connecting body is aligned for attachment to the main body.

In one useful application, the main body is the spray head of a spray gun and the connecting body a base manifold of a spray gun.

The cam is conveniently driven by a hexagon drive accessible at the exposed surface of the connecting body. An appropriate key can be provided to drive the cam into the desired position.

Preferably there are three balls, one in each of three radially extending bores and the radially extending bores are equally angularly spaced.

The radially larger space may be bounded by a tapered wall, the radius of the space increasing towards the distal end of the space. In such an arrangement, the balls can be forced outwards as the plunger is driven further into the shank. This eventually provides a tight clamping force between the two bodies.

A retaining pin engages with the guide profile of the cam to retain the position of the cam with respect to the plunger. Optionally, there is further included a cam spring which resists axial motion of the cam.

Desirably the cam guide profile is configured to provide three distinct phases; fully engaged, partial engaged and fully disengaged.

An embodiment of the invention will now be further described with reference to the following Figures in which:

Figure 1 shows in cross section an embodiment of a connecting body and a main body secured together in accordance with the invention;

Figure 2 shows the embodiment of Figure 1 in a three dimensional view;

Figure 3 shows a cam guide profile suitable for inclusion in the cam of the embodiment of Figure 1 or 2.

As can be seen from Figures 1 and 2 a paint gun assembly comprises two connected body parts, the spray head 1 and the connecting manifold 2. The spray head is provided with a bore which terminates in a radially extending space 3 of gradually increasing radius. Received in the bore is a shaft 4. The shaft has an axially extending bore which connects with radially extending bores in which balls 5 are contained. Received in the shaft is a plunger 6 which has a rounded end and which engages with the balls 5. When forced into the axial bore, the plunger 6 forces the balls 5 into the radially extending bores and out into the tapered, radially extending space 3.

Engaging with the plunger 6 in the manifold body 2 is a cam 7. The cam body 7 is exposed at a surface of the manifold body 2 and includes a hexagon drive 8 by means of which the angular rotation of the cam can be adjusted using a suitable key. The manifold body further includes a recess 9 for receiving a retaining pin (not shown). The end of the retaining pin is received in the cam guide profile 10. Axial movement of the cam 7 in its housing is further resisted by compression spring 11.

Figure 3 shows the guide profile of the cam 7. There are three distinct positions of the plunger which correspond with the positions

A, B and C of the cam 7. In the Figure, the arrow represents a load on the cam 7 provided by spring 11.

When the cam engages with the plunger at position A, the spray head 1 and manifold 2 are tightly clamped together. At position B, the clamping force is partially released, the spray head and manifold are still secured together but there sufficient space between them to allow release of any pressure build up within the cavity of the gun. The balls 5 are held more loosely in the radially extending bores and can travel up the taper of the radially larger space allowing a small gap between the still secured manifold body 2 and spray head 1. The position is maintained by the spring force and a retaining pin which together create a stop position. At position C, the balls 5 are no longer forced through the radially extending bores and the spray head and manifold body can be separated. To arrive at position C from position B, the cam 7 must be pushed in an axial direction against the spring force and rotated.

It will of course be understood that many variations may be made to the above-described embodiment without departing from the scope of the present invention.

CLAIMS

1. A connecting body for securing to a main body, the main body including a bore, the bore having a distal end which terminates in a radially larger space; the connecting body comprising a shank portion configured to be received in the bore in the main body and having a centrally, axially extending bore and a plurality of radially extending bores passing through the shank wall, a plurality of balls receivable in the radially extending bores and a round headed plunger received in the centrally axially extending bore such that when the plunger engages the balls, the balls are caused to travel through the radially extending bore and protrude into the radially larger space, rise and fall of the plunger being effected by a cam portion which is drivable from a position on the exposed surface of the connecting body when the connecting body is aligned for attachment to the main body.

2. A connecting body for securing to a main body as claimed in claim 1 wherein the main body is the spray head of a spray gun and the connecting body a base manifold of a spray gun.

3. A connecting body for securing to a main body as claimed in claim 1 or claim 2 wherein the cam is driveable by means of a hexagon drive accessible at the exposed surface of the connecting body.

4. A connecting body for securing to a main body as claimed in any preceding claim wherein there are three balls, one in each

of three radially extending bores and the radially extending bores are equally angularly spaced.

5. A connecting body for securing to a main body as claimed in any preceding claim wherein the radially larger space may be bounded by a tapered wall, the radius of the space increasing towards the distal end of the space.

6. A connecting body for securing to a main body as claimed in any preceding claim further including a retaining pin which engages with the guide profile of the cam to retain the position of the cam with respect to the plunger.

7. A connecting body for securing to a main body as claimed in any preceding claim wherein there is further included a cam spring which resists axial motion of the cam.

8. A connecting body for securing to a main body as claimed in any preceding claim wherein the cam guide profile is configured to provide three distinct phases; fully engaged, partially engaged and fully disengaged.

9. A connecting body for securing to a main body substantially as described herein and with reference to the accompanying Figures.

FIGURE 1

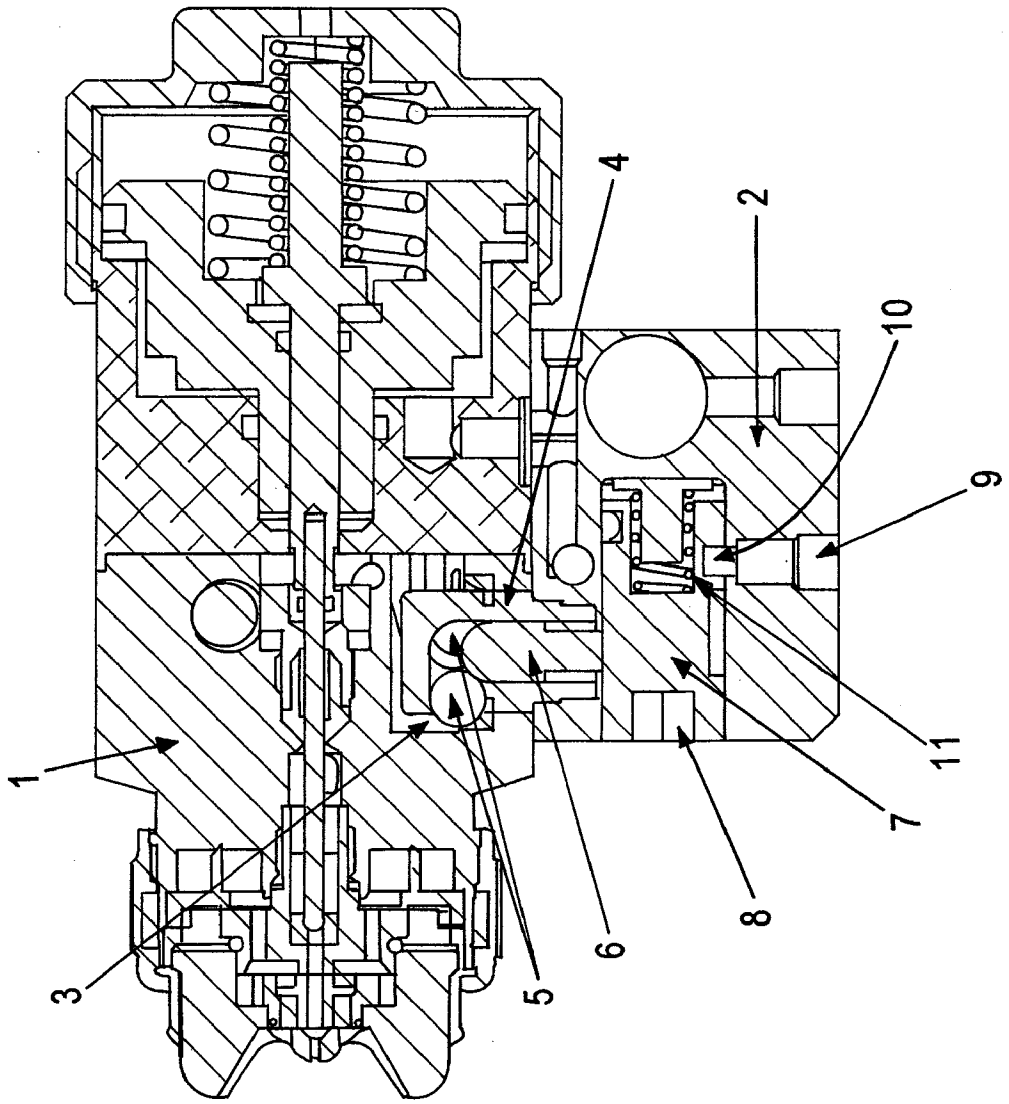


FIGURE 2

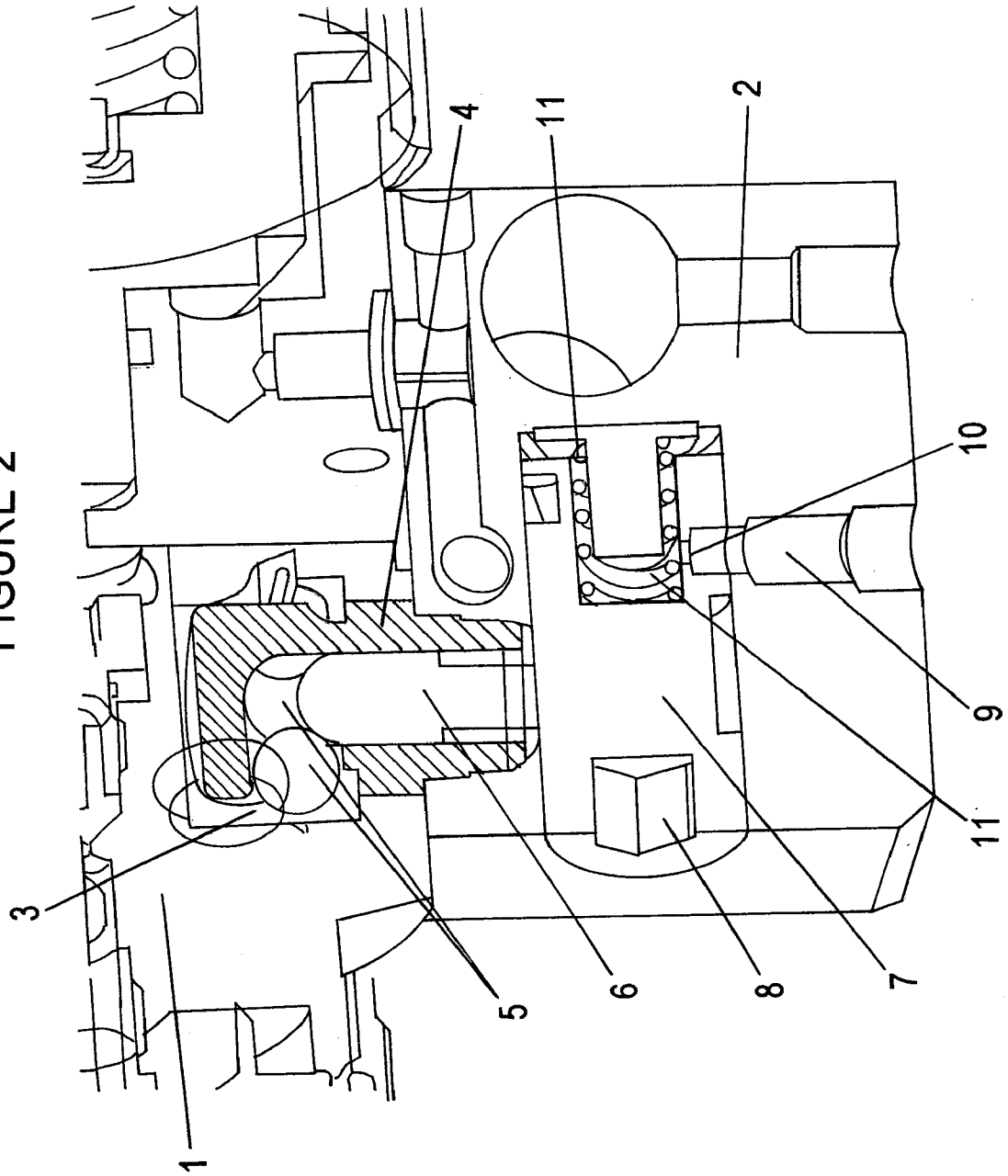
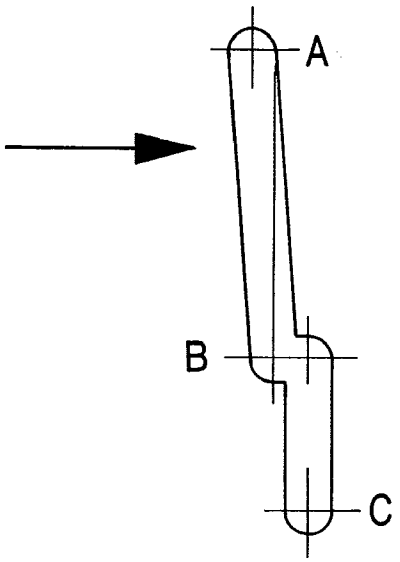


FIGURE 3



INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. B05B15/06 F16B2/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B05B F16B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 200 04 718 U1 (LUDWIG DEMMELER GMBH & CO [DE]) 10 August 2000 (2000-08-10) page 8, paragraph 4 page 10, paragraph 2 page 11, paragraph 2 page 11, paragraph 4 figures 2,4,8	1-9
A	WO 2006/108245 A1 (BRIAN INVEST PTY LTD [AU]; DAVIES BRIAN [AU]) 19 October 2006 (2006-10-19) figures 1,2	1,3
A	GB 843 859 A (WILLIAM MCGEOCH & COMPANY LTD) 10 August 1960 (1960-08-10) figures	1

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
4 June 2009	15/06/2009

Name and mailing address of the ISA/	Authorized officer
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 795 462 A1 (KIRCHDOERFFER REMY [FR]) 29 December 2000 (2000-12-29) figures 1-4	1
A	US 2007/210184 A1 (VACHER ERIC [FR]) 13 September 2007 (2007-09-13) figures 1-3	2

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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