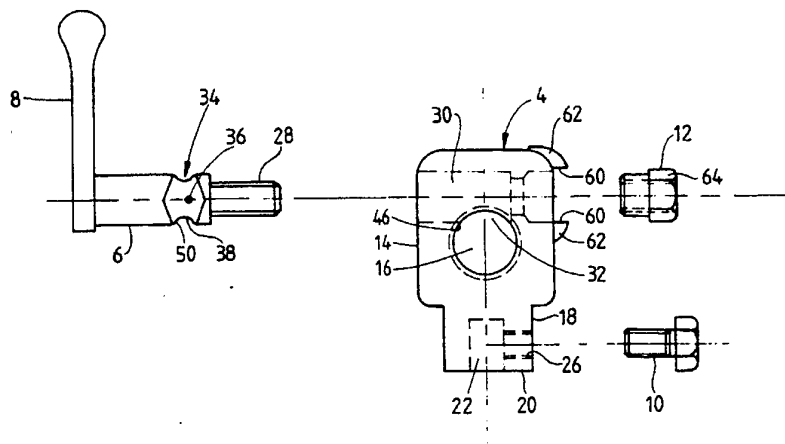




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H01R 4/50	A1	(11) International Publication Number: WO 95/05687 (43) International Publication Date: 23 February 1995 (23.02.95)
(21) International Application Number: PCT/AU94/00471 (22) International Filing Date: 12 August 1994 (12.08.94) (30) Priority Data: PM 0514 12 August 1993 (12.08.93) AU PM 2963 15 December 1993 (15.12.93) AU (71)(72) Applicants and Inventors: BOWATER, Barry, Thomson [AU/AU]; 15 Button Street, Strathdale, Bendigo, VIC 3550 (AU). OWEN, Garry, John [AU/AU]; 74-76 Hattam Street, Golden Square, Bendigo, VIC 3555 (AU). (74) Agents: WEBBER, David, Brian et al.; Davies Collison Cave, 1 Little Collins Street, Melbourne, VIC 3000 (AU).		(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LT, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD). Published <i>With international search report.</i>

(54) Title: A BATTERY TERMINAL CONNECTOR**(57) Abstract**

A battery terminal connector comprising a body having means for receiving a battery terminal, and a cam shaft rotatable within the body for engaging the terminal to lock the connector to the terminal. The cam shaft on rotation between an unlock and lock position pulls the body downwards onto the terminal and moves across the terminal to lock the connector to the terminal.

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A BATTERY TERMINAL CONNECTOR

The present invention relates to a battery terminal connector.

Battery leads for vehicle batteries are normally fixed to terminals of the battery
10 using clamps which have screws that act to open or close the clamps. Whilst the
terminal clamps provide a secure and good electrical contact with the battery terminals
for the leads, a tool is required to remove and attach the clamps and the connection and
disconnection process is cumbersome. This is disadvantageous for a number of reasons,
such as the following:

15

1. The clamps on vehicle batteries should be periodically removed to avoid
the accumulation of corrosive material which prevents the electrical
connection between the terminals and the leads being maintained, and can
also damage the terminals. This is discouraged by clamps which are
20 difficult to remove and reconnect.
2. Touring and camping equipment are now available which rely on power
from a vehicle battery. The battery needs to be removed from a vehicle
for use with the equipment, yet this becomes a significant annoyance
25 when the equipment is moved frequently. Also if the necessary tool is
misaid during a trip, then the battery can no longer be removed.
3. It may be necessary to disconnect the terminal clamps to either remove
the battery or perform maintenance in situations where the necessary tool
30 is not available or is difficult to use. For example, maintenance or
removal of a battery may need to be affected on the side of a road at
night without adequate lighting.

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Accordingly a battery terminal connector which can be removed and connected securely without a tool, and is simple both in use and in construction, is required.

In accordance with the present invention there is provided a battery terminal
5 connector comprising:

a body having means for receiving a battery terminal; and

a cam shaft rotatable within said body for engaging said terminal to lock the connector to said terminal.

10 Advantageously, in the preferred embodiment, the cam shaft on rotation between an unlock and lock position pulls said body downwards onto said terminal and moves across said terminal to lock said connector to said terminal.

A preferred embodiment of the present invention is hereinafter described, by way
15 of example only, with reference to the accompanying drawings, wherein:

Figure 1 is an exploded view of a preferred embodiment of a battery terminal clamp;

Figure 2 is a plan view of the battery terminal clamp;

Figure 3 is a side view of the battery terminal clamp; and

20 Figure 4 is an end view of the battery terminal clamp.

A battery terminal clamp 2, as shown in the Figures, includes a body 4, a cam shaft 6, lever 8, a screw 10 and a nut 12 with a left hand thread. The body 4 comprises a rectangular block 14 with a central hole 16, and a protruding part 18 which is bored
25 at its end face 20 so as to form a lead hole 22 for receiving the end of a battery lead 24 within the body 4. The end of the battery lead is clamped to the protruding part 18 of the body 4 by the screw 10 which can be screwed within a threaded bore 26 which extends between a side of the protruding part 18 and the lead hole 22. The screw 10 is an M6 hexagonal HD bolt screw. The central hole 16 extends between the top and
30 bottom of the body 4.

The projecting part 18 further includes a M8 threaded stud 19 mounted on top

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of the part 18, as shown in Figures 2 to 4, and a wing nut 21 can be screwed onto the stud 19 so as to clamp accessory leads to the body 4, as desired.

The cam shaft 6 has a lever arm 8 attached to one end and at the other end
5 includes an M8 left hand thread 28. Near the end of the body 4 opposite the protruding part 18, a stepped bore 30 extends between the sides of the body 4 and through a segment 32 of the hole 16. The bore 30 is cut so as to receive the cam shaft 6 from one side and the nut 12 from the other, with the thread 28 of the cam shaft 6 being received by the nut 12. The nut 12 is a hexagonal nut with an M8 left hand thread. The bore
10 30 allows the cam shaft 6 to be screwed into the nut 12 whilst the nut 12 remains in position. The shaft 6 includes a recessed cam part 34 which when inserted in the bore 30 is aligned with the centre of the hole 16. The cam part 34 includes an eccentric surface which has a major recess 36 and a minor recess 38, spaced approximately 45° apart. The surface of the cam part 34 tapers inwardly from the surface of the shaft 36,
15 as shown in Figures 1 and 2.

The lever 8 can be used to rotate the shaft 6 between a locked position, as shown in Figures 2 and 3, where the lever 8 is almost aligned with the plane of the body 4, and an unlocked position where the lever 8 is substantially perpendicular to the plane of a
20 body 4, as shown by the dotted lines 40 in Figure 3. The central hole 16 of the body 4 is provided so as to receive a battery terminal 42 of a vehicle battery 44. The battery terminal 42 has a tapered surface 43 which expands slightly from top to bottom of the terminal 42. With the cam lever 8 placed in the unlocked position, the major recess 36 of the cam part 34 faces into the hole 6 and its surface is aligned with the walls 46 of
25 the hole 16. The battery terminal 42 can therefore be received within the hole 16 and the body 4 placed on the terminal 42 when the cam lever 8 is placed in the unlocked position. On inserting the body 4 onto the terminal 42, the cam lever 8 can then be moved into the locked position so as to rotate the cam part 34 such that the minor recessed portion 38 thereof engages the battery terminal 42 and clamps the terminal 42
30 onto the walls 46 of the hole 16. In moving the lever 8 from the unlocked position to the locked position in a direction 45 rotates the cam shaft 6 in the same direction so that the engaging surface of the cam part 34 acts on the tapered surface 43 of the terminal

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42 to pull the body 4 in the downward direction 47. This action assists in enhancing the clamping engagement between the cam part 34, body 4, and the tapered surface 43 of the post 42 as the cam part 34 is pulled down onto an increased diameter portion of the tapered surface 43. Moving the lever 8 into the locked position also rotates the cam shaft 6 so as to screw the shaft 6 into the nut 12 and thereby move the cam shaft 6 in
5 towards the nut 12 in a direction 49, as shown in Figure 2. This causes the surface of the cam part 34 to move across the surface 43 of the battery terminal 42 so as to heighten the clamping engagement between the cam part 34, body 4, and the surface 43 by pulling an increased diameter part 50 of the cam part 34 onto the surface 43 of the
10 battery terminal 42. This assists in securing the cam shaft 6 in the locked position and maintaining the clamp connection between the terminal clamp 2 and the battery terminal 42. The heightened engagement between the nut 12 and the cam shaft 6 also prevents any sustained vehicle vibrations working the clamping engagement between the cam shaft 6 and the terminal 42 loose.

15

In the locked position the lever 8 is disposed behind the body 4 so as not to interfere with any adjacent clamps or terminals. The engagement between the nut 12 and the cam shaft 6 can also be adjusted to index or set the locked and unlocked positions of the lever 8 as desired. The nut 12 is held in an index position by the
20 abutting surfaces 60 of protrusions 62 on the body 4. The abutting surfaces 60 inhibit rotation of the hexagonal shaped head 64 of the nut 12. For every indexed position, a pair of opposing surfaces of the head 64 abut the abutting surfaces 60. Another index position is simply chosen by unscrewing the shaft 6 by an amount which allows the head 64 to be moved clear of the surfaces 60 so that it can be rotated and then moved
25 back within the bounds of the surfaces 60 so as to present a different pair of surfaces of the head 64 to face the abutting surfaces 60.

The body may be cast from rigid conductive material, such as alloy steel, or any other material, such as plastics, provided a conductive material portion is included to
30 electrically connect the lead 24 and the terminal 42.

The battery clamp 2 provides a simple and effective means of connecting battery

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leads to terminals of a vehicle battery. The number of parts employed in the clamp 2 is minimal, thereby providing a clamp which in addition to being simple to use is simple and inexpensive to construct. A secure connection can be made and disengaged by simple movement of a lever, and without requiring an additional tool. The battery

5 clamp 2 also provides a safety advantage in that in the event of an electrical short in a vehicle's electrical circuitry, which may cause a fire, the clamp 2 can be quickly removed to disconnect battery power.

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CLAIMS:

1. A battery terminal connector comprising:
a body having means for receiving a battery terminal; and
5 a cam shaft rotatable within said body for engaging said terminal to lock the
connector to said terminal.
2. A battery terminal as claimed in claim 1, wherein said receiving means is a hole
in said body.
10
3. A battery terminal as claimed in claim 1, wherein said cam shaft on rotation
between an unlock and lock position pulls said body downwards onto said terminal and
moves across said terminal to lock said connector to said terminal.
- 15 4. A battery terminal as claimed in claim 3, including means for moving said cam
shaft across said terminal during said rotation.
5. A battery terminal as claimed in claim 4, wherein said cam shaft has a tapered
surface for engaging said terminal.
20
6. A battery terminal as claimed in claim 5, wherein said moving means includes
nut means which receives a threaded portion of said cam shaft.
7. A battery terminal as claimed in claim 6, wherein said body inhibits rotation of
25 said nut means.
8. A battery terminal as claimed in claim 7, wherein said nut means has a plurality
of positions which can be selected to select said unlock and lock positions.
- 30 9. A battery terminal as claimed in claim 8, wherein said cam shaft includes a lever
arm to rotate said cam shaft between said unlock and lock positions.

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10. A battery terminal as claimed in claim 1, wherein the body includes means for connecting battery leads thereto.
11. A battery terminal as claimed in claim 2, wherein the body includes means for
5 receiving a battery lead, and clamp means for clamping the lead to said body.
12. A battery terminal as claimed in claim 11, wherein the clamp means includes a bolt which can be screwed into the body.
- 10 13. A battery terminal as claimed in claim 12, including nut means on the body for connecting accessory leads to the body.
14. A battery terminal as claimed in any one of the preceding claims, wherein said
body includes means for electrically connecting said terminal to a battery lead attached
15 to the body when said connector is locked on said terminal.

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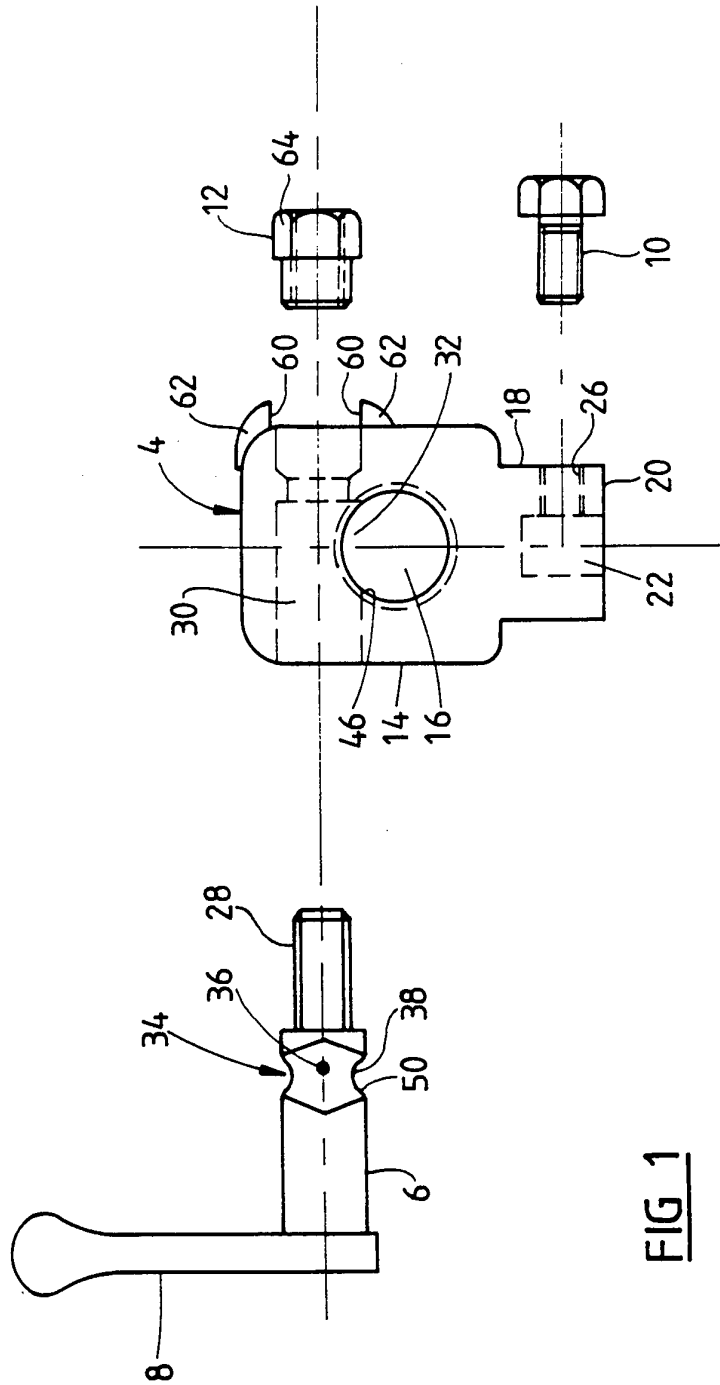


FIG 1

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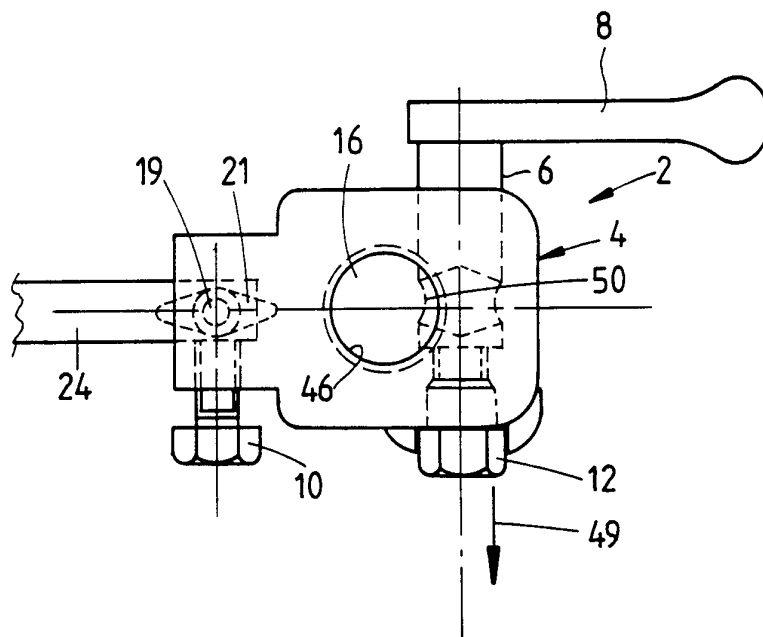
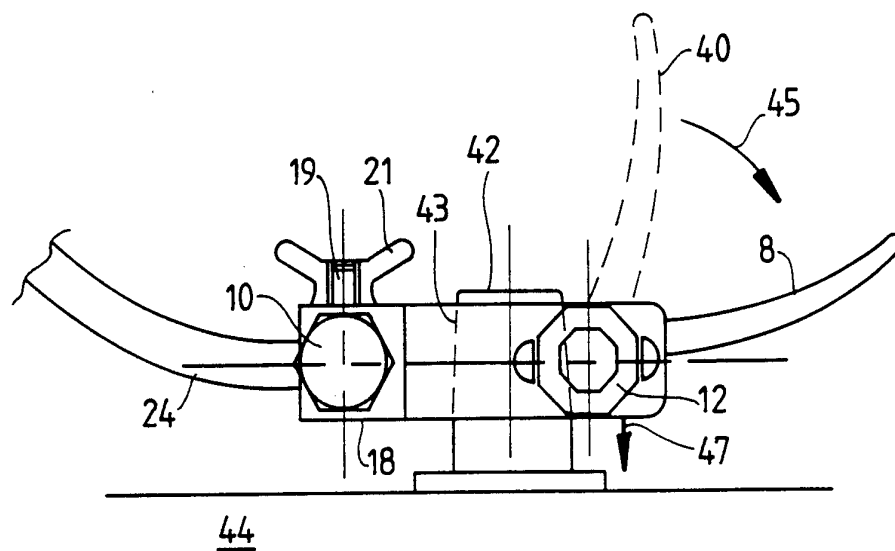
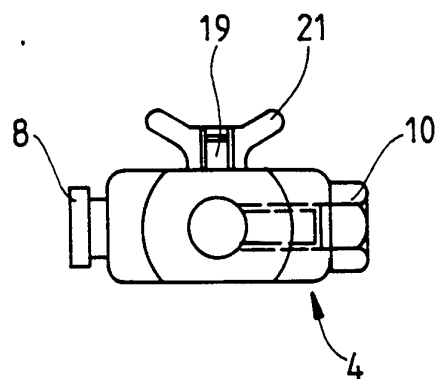


FIG 2

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FIG 3FIG 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 94/00471

A. CLASSIFICATION OF SUBJECT MATTER Int. Cl. ⁶ H01R 4/50 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) IPC : H01R 4/28, 4/50, 7/06 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU : IPC as above Electronic data base consulted during the international search (name of data base, and where practicable, search terms used) DERWENT JAPIO				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.		
X	FR,A, 534051 (MALLEVILLE) 17 March 1922 (17.03.22) page 1 lines 32-38, Fig 3	1,2,5,9-14		
X,P	US,A, 5256080 (BRIGHT) 26 October 1993 (26.10.93) abstract, column 1 lines 31-37, column 1 line 66 - column 2 line 5, Figs 5-8	1		
X	GB,A, 2166912 (BAker) 14 May 1986 (14.05.86) page 1 lines 47-57, page 2 lines 34-81, Fig 2	1		
Y	AU,A, 10161/47 (135207) 1 May 1947 (01.05.47) column 1 paragraph 2; column 2 paragraphs 1,3; column 5 paragraph 2; column 6 paragraph 6; column 8 paragraph 2; Figs 1,5,9,12	1,2,4-14		
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Name and mailing address of the ISA/AU AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No. 06 2853929		Authorized officer  GREG POWELL Telephone No. (06) 2832308		

INTERNATIONAL SEARCH REPORT

International application No.

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	GB,A, 2073305 (CORNELL) 14 October 1981 (14.10.81)	
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GB	2073305	CA	1159121	DE	3110298	FR	2480038
		JP	56141182	US	4357068	US	4479694
CA	1233209	EP	168612	IL	74916	JP	61045576
		US	4614393				
GB	2184900	DE	3643087	ES	2004506	FR	2592234
		IT	1184045				
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