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(54) Load-lifting jack.

(57) A load-lifting jack for a light goods vehicle comprises a frame (10, 12, 18, 20, 22) links (24) mounted by pivots (26) on brackets (28) of a base (10) of the frame the links (24) being connected to a load-bearing arm (54) by a pivot (68) intermediate a top step (56) and pivot pins (62) by which the arm (54) is pivotted on a nut (64) which is in threaded engagement with a lead screw (46). The lead screw is rotatably mounted in a load-carrying bearing (40, 42, 44) carried by a support (34) of the base (10) at a position intermediate the nut (64) and the pivots (26). An efficient jack construction is thereby produced.

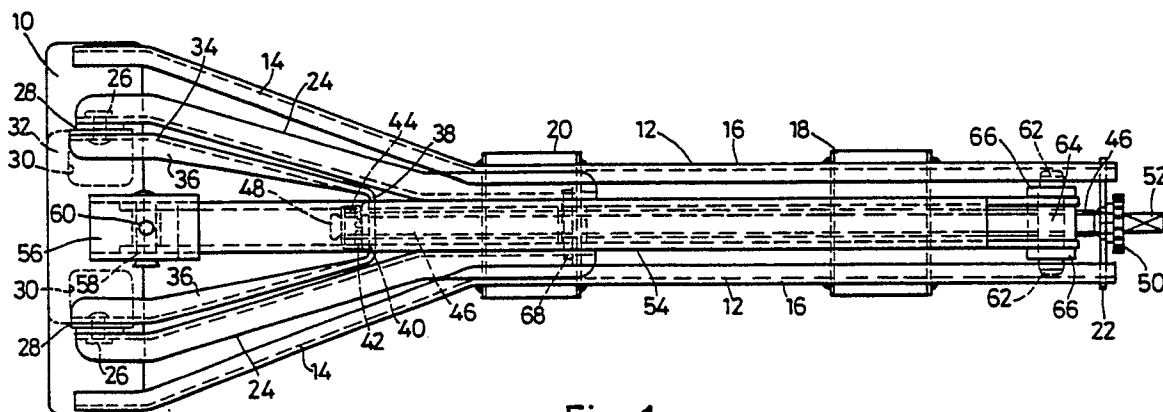


Fig. 1

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LOAD-LIFTING JACK

This invention is concerned with improvements in or relating to load-lifting jacks and especially to such jacks for use in jacking vehicles e.g. for changing wheels.

Load-lifting jacks of various constructions have been proposed in the past. Amongst the types of jack which have been proposed are jacks made by the applicant company which are sometimes referred to as cantilever-type jacks. In our U.K. Patent Specifications Nos. 903079 and 1082067, jacks of this general type are shown: both of these specifications describe a jack in which a load-bearing arm is moved by a lead screw through a nut (to which the arm is pivotally connected) which itself is moved lengthwise of the lead screw by rotation of the screw. In each case a link is pivotally connected to the load-bearing arm at a position intermediate the point at which the arm is pivotally connected to the nut and a load-engaging portion of the arm, the link also being pivotally connected to a ground-engaging member. The lead screw, in both instances, is rotatably mounted on the ground-engaging member by means of a thrust bearing carried by the member at a position remote from the position at which the link is pivotted, the nut being disposed between the thrust bearing and the pivot for the link. Jacks somewhat similar to those described in the above mentioned patent specifications have been supplied by the applicants and it has been found that the thrust bearing exhibits a tendency to distort the part of the ground-engaging member by which it is supported unless this part is heavily reinforced. Furthermore, in order to manufacture one of these commercially produced jacks it has been necessary to carry out a substantial amount of CO₂ welding during manufacture a relatively expensive welding operation.

One of the various objects of the present invention is to provide an improved load-lifting jack.

In one aspect the invention may be considered to provide a load-lifting jack comprising a ground-engaging frame, link means mounted on the ground-engaging frame by first pivot means and connected to a load-bearing arm by second pivot means positioned intermediate a load-engaging portion of the arm and third pivot means by which the arm is connected to a nut which is in threaded engagement with a lead screw the lead screw being mounted for rotation in a load-carrying bearing mounted on the ground-engaging frame so that the bearing is closer to said first pivot means than is the nut.

Preferably the ground-engaging frame of a jack in accordance with the invention comprises a base on which the link means is pivotted and the load-

carrying bearing is carried by a bearing support suitably carried by one or more brackets projecting upwardly from the base. The bearing is preferably carried by the support at a position intermediate the nut and said first pivot means.

In a preferred jack in accordance with the invention the link means comprises two links symmetrically positioned at either side of the arm and the first pivot means comprises coaxial pivots, conveniently carried by spaced brackets upwardly projecting from the base. The preferred bearing support is of a generally U-shaped configuration, and comprises two limbs mounted on the base and a transverse connecting portion by which the limbs are connected remote from the base, the bearing being carried by the connecting portion. The limbs suitably are encompassed by the links of the link means and are mounted on the pivots for the links. Each of the brackets of the preferred jack has an associated link carried by its pivot, the link being disposed outwardly of the bracket and the limb of the bearing support inwardly thereof.

Preferably the lead screw is also supported at a position remote from the load-carrying bearing by a part of the ground-engaging member to stabilise it. The support provided is sufficient to permit rotation of the lead screw and to provide sufficient restraint against movement transversely to the axis of the lead screw but no, or substantially no load is transferred to the part in a direction axially of the screw. Means is provided for rotating the lead screw to operate the jack and this suitably comprises a portion of the lead screw projecting beyond said part adapted to be engaged by an operating member, for example a ratchet spanner, whereby to rotate the lead screw.

There now follows a detailed description, to be read with reference to the accompanying drawings, of a load-lifting jack embodying the invention. It will be realised that this jack has been selected for description to illustrate the invention by way of example.

In the accompanying drawings:-

Figure 1 is a plan view of a vehicle jack embodying the invention; and

Figure 2 is a view in front elevation of the jack.

The illustrative load-lifting jack is suitable for use in jacking up vehicles for example for changing wheels and is especially intended for use with light goods vehicles. The illustrative jack comprises a ground-engaging frame comprising a base 10, channel section main frame members 12 each having a first end portion secured to the base 10, the members 12 each having two portions 14 converg-

ing from the base to parallel portions 16. The ground-engaging frame further comprises a foot 18 interconnecting the parallel portions 16, a tie member 20 disposed between the foot 18 and the base 10 also interconnecting the parallel portions 16 and a transverse support portion provided by an end plate 22 inter-connecting the parallel end portions 16 at the end portion remote from the base 10. Two channel section links 24 are mounted for pivotal movement about first pivot means, namely coaxial pivots 26 carried by brackets 28 projecting upwardly from the base 10.

The base 10 comprises a body part pressed from a metal sheet and has two spaced portions cut from the metal sheet and bent upwardly to provide part of the bracket 28 leaving openings 30 in the body part. A cover plate 32 is spot welded beneath the body part of the base 10 and has two ears upstanding through the openings 30 adjacent the upwardly bent portions of the body part of the base plate the ears and the upwardly bent portions together providing the brackets 28.

The illustrative jack further comprises a generally U-shaped bearing support 34 comprising two limbs 36 end portions of which are mounted on the pivots 26 inwardly of the brackets 28, the links 24 being mounted on the pivots 26 outwardly of the brackets 28. The limbs 36 are connected remote from the pivots 26 by a transverse connecting portion 38 and the whole of the bearing support 34 is pressed from a single metal sheet. Transverse connecting portion 38 mounts a load-carrying bearing of the illustrative jack, the bearing comprising a thrust washer 40, a ball race 42, and a thrust collar 44. A lead screw 46 is mounted for rotation in the load-carrying bearing and comprises a headed end portion 48 adapted to engage the thrust collar 44 of the bearing whereby to transmit load applied by the lead screw 46 through the bearing to the bearing support 34. The lead screw 46 is supported at a position remote from the bearing by the end plate 22 of the ground-engaging frame to stabilise the screw 46. A knurled disc 50 is secured to the lead screw outwardly of the end plate 22 so that the lead screw 46 can be readily rotated by hand using the knurled disc 50 when there is little or no load on the jack. The lead screw 46 may also be rotated by an operating member (not shown), for example a suitable ratchet spanner or handle: the end portion of the lead screw outwardly of the knurled disc 50 is provided with drive means 52 with which such an operating member may be brought into engagement and used to rotate the lead screw.

The illustrative jack further comprises a load-carrying arm 54 comprising a load-engaging portion, namely a top step 56 at one end portion of the arm. The top step is connected to an end portion

of the arm 54 by a pivot pin 58 and includes a peg 60 adapted to engage a vehicle body whereby to position the top step in suitable location relative to a jacking point of the vehicle body. The links 24 are connected by second pivot means, namely a pivot 68, at end portions remote from the pivots 26, to the load-bearing arm 54. The pivot 68 is positioned intermediate the top step 56 and third pivot means, namely pivot pins 62 by which an end portion of the load-bearing arm 54 opposite the top step 56 is connected to a nut 64 which is in threaded engagement with the lead screw 46. Collars 66 retain the load-bearing arm 54 in engagement with the pivot pins 62 carried by the nut 64.

In the operation of the illustrative jack the base 10 and foot 18 of the ground-engaging member are placed on the ground G and the lead screw 46 rotated by means of the knurled disc 50 to raise the load-bearing arm 54 from a retracted position (in which it is shown in full line in Figure 2) to a suitable extended position in engagement with a jacking point of a vehicle which is to be raised by the jack. When the top step 56 has been brought into engagement with the jacking point of the vehicle the load-bearing arm 54 is further raised using a suitable operating member applied to the portion 52. The weight of the vehicle is transferred to the illustrative jack through the arm 54, the nut 64 and lead screw 46, as well as through the links 24 back to the ground-engaging frame. The nut 64 transfers a load to the lead screw 46 which exerts a tensile force through the bearing to the bearing support 34 and thence to the pivots 26 and brackets 28. The links 24 also place a load on the brackets 28 via the pivots 26. No, or substantially no load is transmitted to the end plate 22. In Figure 2 the load-bearing arm 54 is shown in dash line in a fully raised position.

As compared with the aforementioned jacks supplied by the applicant company and those shown in the aforementioned Patent Specifications of the applicants, the load is distributed over a substantially greater area than is the case where the load is transferred through a thrust bearing to an end plate remote from the region at which the links are pivotted. The change in construction not only reduces the possibility that distortion of the jack (especially the end plate) will occur under load but also enables the use of a lighter construction as less reinforcement is required. Furthermore, there is a considerable reduction in the amount of welding required, especially in the amount of CO₂ welding which can be replaced by spot welding, for example of the reinforcing plate 32 to the remainder of the base. Thus, the illustrative jack is believed to be not only of more efficient construction and less liable to damage than the previously known jacks referred to above but also to be rela-

tively cheap to manufacture.

Claims

1. A load-lifting jack comprising a ground-engaging frame (10, 12, 18, 20, 22), link means (24) mounted on the ground-engaging frame by first pivot means (26) and connected to a load-bearing arm (54) by pivot means (68) positioned intermediate a load-engaging portion (56) of the arm (54) and third pivot means (62) by which the arm is connected to a nut (64) which is in threaded engagement with a lead screw (46) characterised in that the lead screw (46) is mounted for rotation in a load-carrying bearing (40, 42, 44) mounted on the ground-engaging frame at such a position that the bearing is closer to the first pivot means (26) than is the nut (46).

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2. A jack according to Claim 1 characterised in that the link means (24) is pivotted on a base (10) of the ground-engaging frame (10, 12, 18, 20, 22) and the load-carrying bearing (40, 42, 44) is carried by a bearing support (34) attached to the base (10), the bearing (40, 42, 44) being carried at a position intermediate the nut (46) and the first pivot means (26).

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3. A jack according to Claim 2 characterised in that the link means (24) comprises two links (24) symmetrically positioned at either side of the arm (54) and the first pivot means (26) means comprises spaced coaxial pivots (26) carried by the base (10).

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4. A jack according to Claim 3 characterised in that the bearing support (34) comprises two limbs (36) mounted on the base (10) and a transverse connecting portion (38) by which the limbs (36) are connected remote from the base (10), the bearing (40, 42, 44) being carried by said connecting portion (38).

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5. A jack according to Claim 4 characterised in that the limbs (36) are encompassed by the links (24) of the link means (24), and are mounted on the pivots (26) for the links (24).

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6. A jack according to Claim 5 characterised in that the coaxial pivots (26) are carried by spaced upwardly projecting brackets (28) of the base (10), each bracket having, carried by its pivot (26), a link (24) disposed outwardly of the bracket and a limb (36) disposed inwardly thereof.

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7. A jack according to any one of the preceding claims characterised in that the screw (46) is supported remote from the load-carrying bearing (40, 42, 44) by a portion (22) of the ground-engaging frame.

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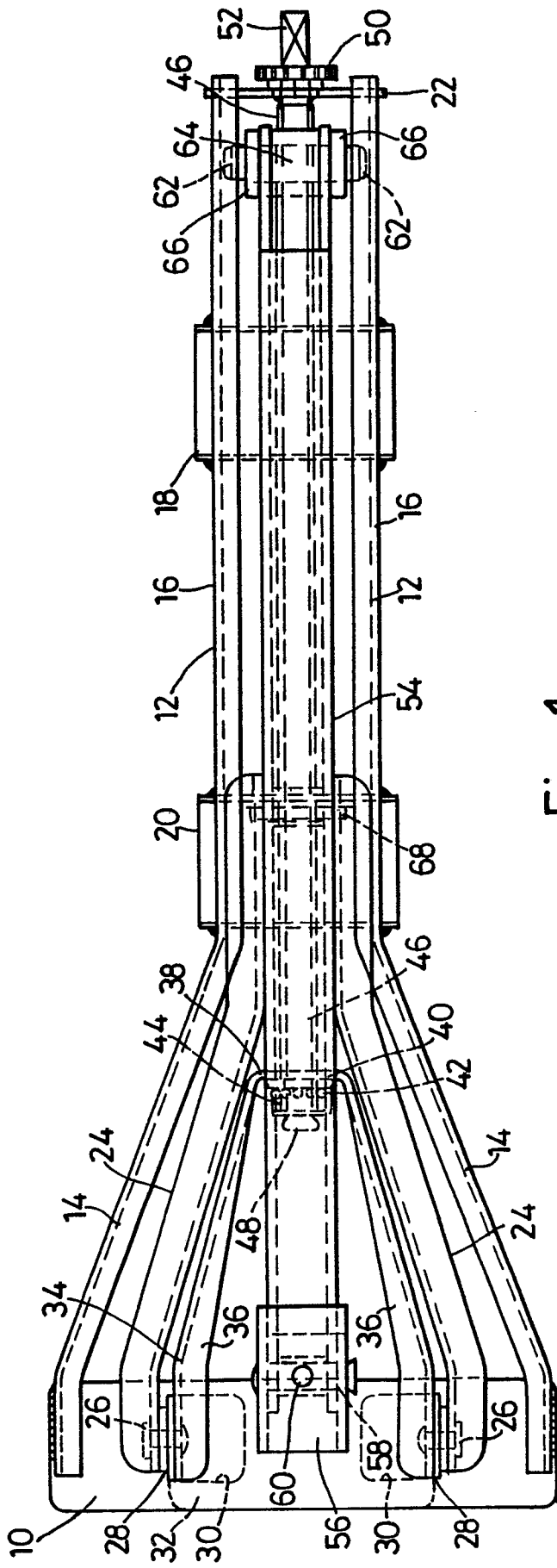


Fig. 1

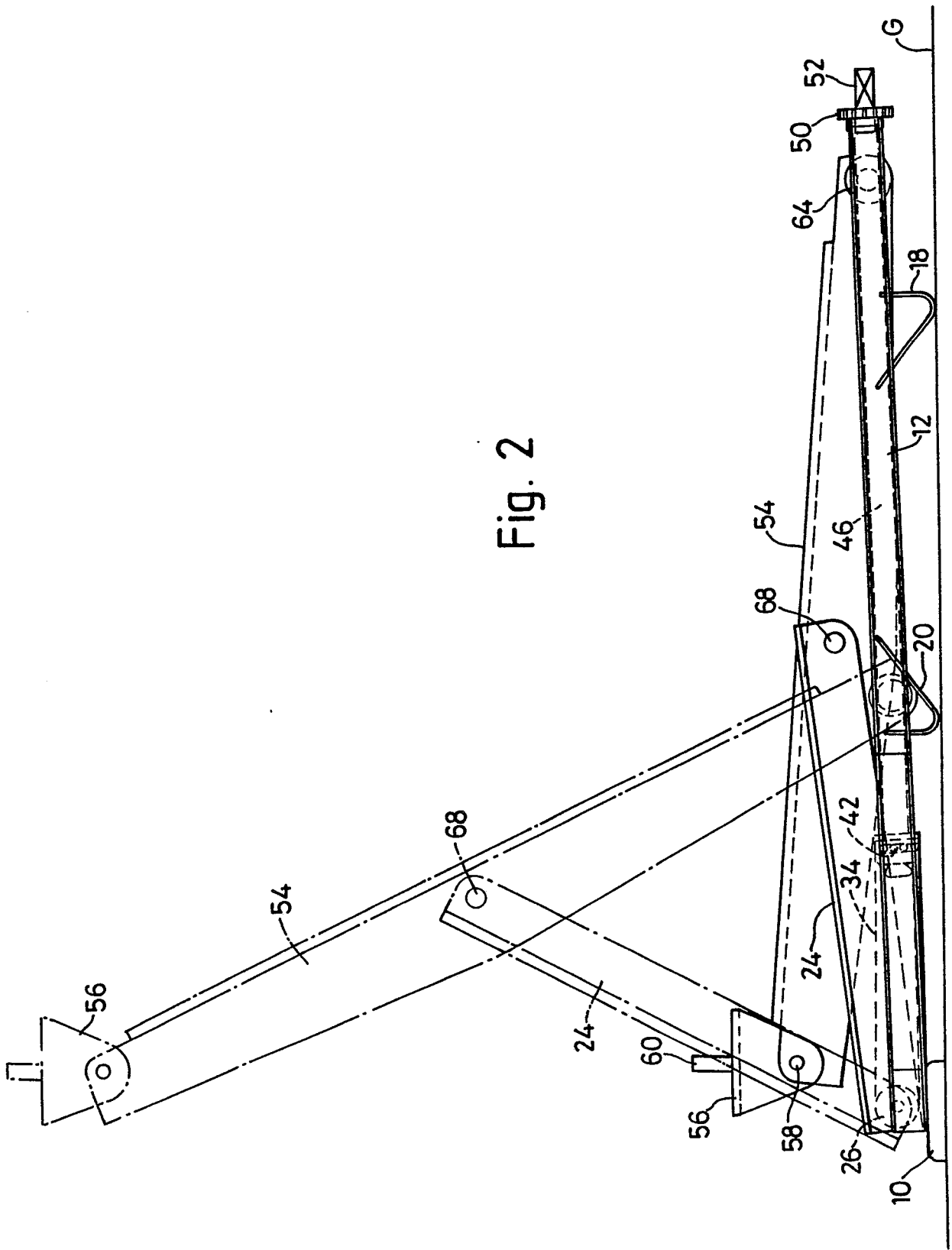


Fig. 2



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	GB-A-1 322 426 (AISIN SEIKI K.K.) * Page 1, lines 88-94; page 2, lines 1-111 *	1,2,3,4,7	B 66 F 3/12
A	---	5,6	
X	EP-A-0 226 695 (FORD-WERKE) * Column 2, lines 22-53; column 3, lines 1-4 *	1,2	
X	US-A-2 469 048 (MANKE) * Column 2, lines 22-55; column 3, lines 1-62 *	1,2,3,7	
X	GB-A-1 227 715 (AISIN SEIKI K.K.) * Page 1, lines 61-94; column 2, lines 1-50 *	1,2,3	
A	GB-A- 980 024 (METALLIFACTURE) ---		
A	CH-A- 483 360 (TANGYES) ---		
A,D	GB-A-1 082 067 (METALLIFACTURE) ---		TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A,D	GB-A- 903 079 (METALLIFACTURE) -----		B 66 F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 23-05-1990	Examiner VAN DEN BERGHE E.J.J.
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			