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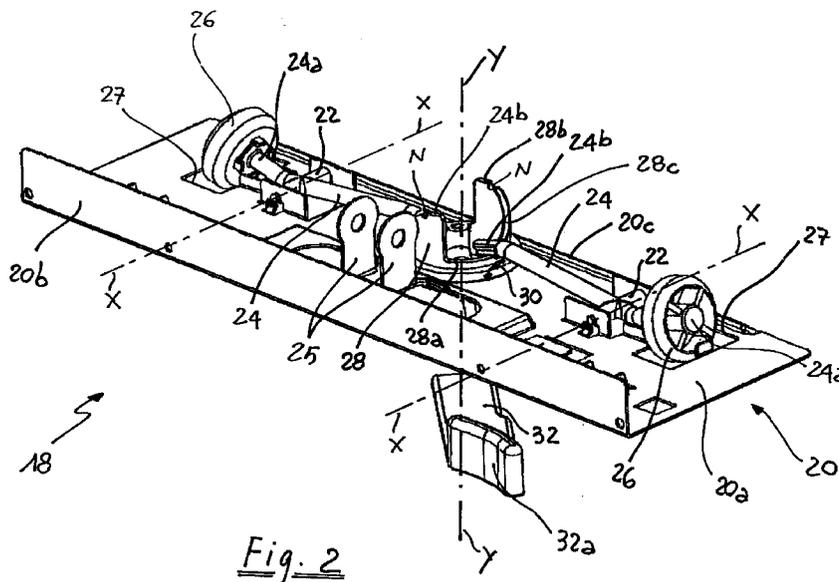
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(54) A lifting-roller device for domestic appliances

(57) A domestic appliance is provided with a trolley device (18) of the kind designed for fitting in to the lower part of the frame of the appliance to facilitate the moving of such an appliance when is required, by rolling. The trolley device comprises a crown-shaped cam (28) which is rotatable supported by the lower part of the frame (10,20) of the appliance and can be rotated by the

user with a lever (32) around a vertical axis. Two tilting shafts (24) are driven by the cam, each shaft having a first end (24b) adapted to cooperate with the crown shaped cam and a second end (24a) on which a wheel or roller (26) is mounted.



## Description

The present invention relates to a domestic appliance provided with a trolley device of the kind designed for fitting in to the lower part of the chassis of the appliance to facilitate the moving of such an appliance when this is required, by rolling.

Trolley devices for domestic appliances are known from DE-A-1585963 and DE-A-2127105, in which a movable auxiliary frame carrying the wheels or rollers is linked to the appliance. Such technical solutions are quite complicated and expensive.

GB-A-2082450 discloses a base for a domestic appliance comprising a rectangular-section bar having at its ends two retractable rollers. DE-A-2245967 discloses an appliance having a movable roller acted, through a cable, on closure of the lid of the appliance. The above two technical solutions have problems in term of reliability, cost and handling force.

The present invention has the object to provide a trolley device for domestic appliances having low cost, high reliability and a very low handling force.

The above object is obtained thanks to the features mentioned in the appended claims.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings, in which:

- Fig. 1 is a perspective exploded view of a chassis of a top-loading washing machine provided with the device according to the invention,
- Fig. 2 is an enlarged view of a detail of figure 1,
- Fig. 3 is a view similar to figure 2, on a smaller scale, showing the device in a working configuration (with the wheels resting on the floor),
- Fig. 4 is a back view of a figure 3, and
- Fig. 5 is a back view, on a smaller scale, of figure 2.

In Fig. 1 reference numeral 10 designates the chassis of a top-loading washing machine made of metal sheets bent and/or welded together. The chassis 10 is provided in its base front portion with two feet 12 and in its base rear portion with a roller 14 which is rotatably mounted in a seat 14a of the chassis 10.

A trolley device 18 is fixed by welding or by other well known techniques to an inside face (not shown) of the lower portion of the front panel of the chassis, designated with reference numeral 16. The trolley device 18 (figures 2 and 3) comprises a metal frame 20 with an horizontal plate 20a, a vertical front edge 20b for connecting the frame 20 to the chassis 10 of the washing machine and a rear raised portion 20c for stiffening purposes. The metal frame 20 comprises also two vertical fins 25 for the suspension of the washing machine (not shown). The horizontal plate 20a is provided on its upper face with two pivot pins 22 having parallel horizontal rotation axis X-X which are substantially perpendicular to the front panel of the chassis 10. Each pivot pin 22 is supporting and is integral with a Z-shaped

shaft 24 having a first free end 24a on which a wheel 26 is rotatably mounted, and a second free end 24b which has a triangular cross section. Each wheel 26 is positioned in an aperture 27 of the horizontal plate 20a. Each free end 24b of the shaft 24 is adapted to cooperate (like a feeler pin) with a crown-shaped cam 28 rotatably mounted in a central seat 30 of the horizontal plate 20a of the frame 20. The cam 28 has a vertical rotation axis Y-Y and is provided with an operating lever 32 having its free end 32a which, in a idle configuration of the device 18 (figures 1, 2 and 5), rests on the lower portion of the front panel of the washing machine. The profile of the cam 28 comprises two down areas 28a diametrically opposite and two up areas 28b, which are radiused by two ramp up areas 28c. In order to maintain securely the ends 24b of the shafts 24 in contact with the cam 28, between such ends 24b a tension spring (not shown) is preferably interposed.

The idle or retracted configuration of the device is shown in figures 1, 2 and 5. In such condition the chassis 10 rests on its front feet 12 and on its rear roller 14a, the wheels 26 being kept in a "up" position by the weight of the longer portions of shafts 34 adjacent the ends 24b, or preferably by a spring (not shown). In this retracted condition of the trolley device 18 the ends 24b of the two shafts 24 rest on the down areas 28a of the cam 28. When the user needs to move the washing machine on the floor, he rotates the operating lever 32 in a clockwise direction (from right to left); during this operation the ramp up areas 28c of the cam 28 slide against the ends 24b of the shafts 24, so that these latter rotate around the axis X-X of the pins 22 and the wheels 26 are lowered against the floor or ground, lifting the washing machine. When the ends 24b of the shafts 24 are in contact with the ramp up areas 28c of the cam 28, the movement of the lever 32 is reversible, i.e. if the user stops the rotation of the lever 32 the machine lowers itself on the feet 12 again. When the ends 24b reach the up areas 28b, the wheels 26 are maintained against the floor (and the machine lifted) in a stable condition, so that the user can easily move the washing machine on the front wheels 26 and on the rear roller 14 (configuration shown in figures 3 and 4).

The cam 28 is provided with positioning notches N at the ends of each ramp up areas 28c, in order to cooperate with the ends 24b of the shafts 24 for preventing the lever 32 from going beyond the positions shown in figures 2 and 4. In an alternative solution (not shown), between the cam 28 and the aperture 30 of the horizontal plate 20a stop means are provided in order to prevent the lever 32 from going beyond the desired positions.

According to another embodiment of the invention (not shown), the cam 28 can be provided with four substantially identical ramp up areas so that the retracted condition of the trolley device 18 can be obtained either with the end 32a of the operating lever 32 resting on the left side of the front panel or on the right side of such panel. In this embodiment the machine can be lifted on

the two wheels 26 by rotating the lever 32 in a counter-clockwise or in a clockwise direction.

The cam 28 is preferably made of antifriction material (nylon or similar). The trolley device according to the invention needs a very low handling force for lifting the appliance and it is very simple and economical. It does not need any modification of the chassis of the appliance; in other words it can be a cheap "optional" for high range more expensive machines, without requiring any specific feature on the low range less expensive machines.

In a further embodiment (not shown), the metal frame of the trolley device is integral with the chassis of the washing machine (i.e. the trolley is directly supported by the bottom plate of the washing machine).

### Claims

1. Domestic appliance provided with a trolley device (18) for enabling the appliance to be moved easily by means of wheels or rollers (26), characterised in that the trolley device (18) comprises two shaft elements (24) each articulated to the frame (10, 20) of the appliance around an horizontal axis (X-X), each shaft element (24) having a first end (24a) on which a retractable wheel (26) is rotatably mounted and a second end (24b) adapted to cooperate with a moving cam (28) supported by the frame (10, 20) of the appliance, the cam (28) being adapted to be moved between a first position in which the wheels carried by the shaft elements (24) are in a retracted position, and a second position in which the wheels (26) are in a lowered position, raising the appliance from the ground.
2. Appliance according to claim 1, characterised in that the cam is a rotating cam (28) which is rotatably supported by the frame (10,20) of the appliance around a vertical axis (Y-Y).
3. Appliance according to claim 2, characterised in that the cam (28) presents a crown-shaped upper edge having diametrically opposite down areas (28a) and up areas (28b) radiused by ramp areas (28c).
4. Appliance according to claim 1, characterised in that the horizontal axis (X-X) of rotation of the two shaft elements (24) are substantially parallel.
5. Appliance according to claim 1, characterised in that the shafts elements (24) are supported by an auxiliary frame (20) adapted to be fixed to the frame (16, 10) of the appliance.
6. Appliance according to claim 5, characterised in that the auxiliary frame (20) presents a plate (20a) on which two rotating pin elements (22) are pivoted, each pin element (22) supporting the shaft element (24).
7. Appliance according to claim 6, characterised in that the plate (20a) of the auxiliary frame (20) presents a vertical front edge (20b) adapted to be fixed to the frame (16, 10) of the appliance.
8. Appliance according to claim 3, characterised in that the cam (28) is made of antifriction material.
9. Appliance according to any of the previous claims, characterised in that the cam (28) is moved through an operating lever (32) whose free end (32a) may rest either on the left side or on the right side of the lower portion (16) of the front panel, in both such positions of the lever (32) the wheels (26) being retracted.

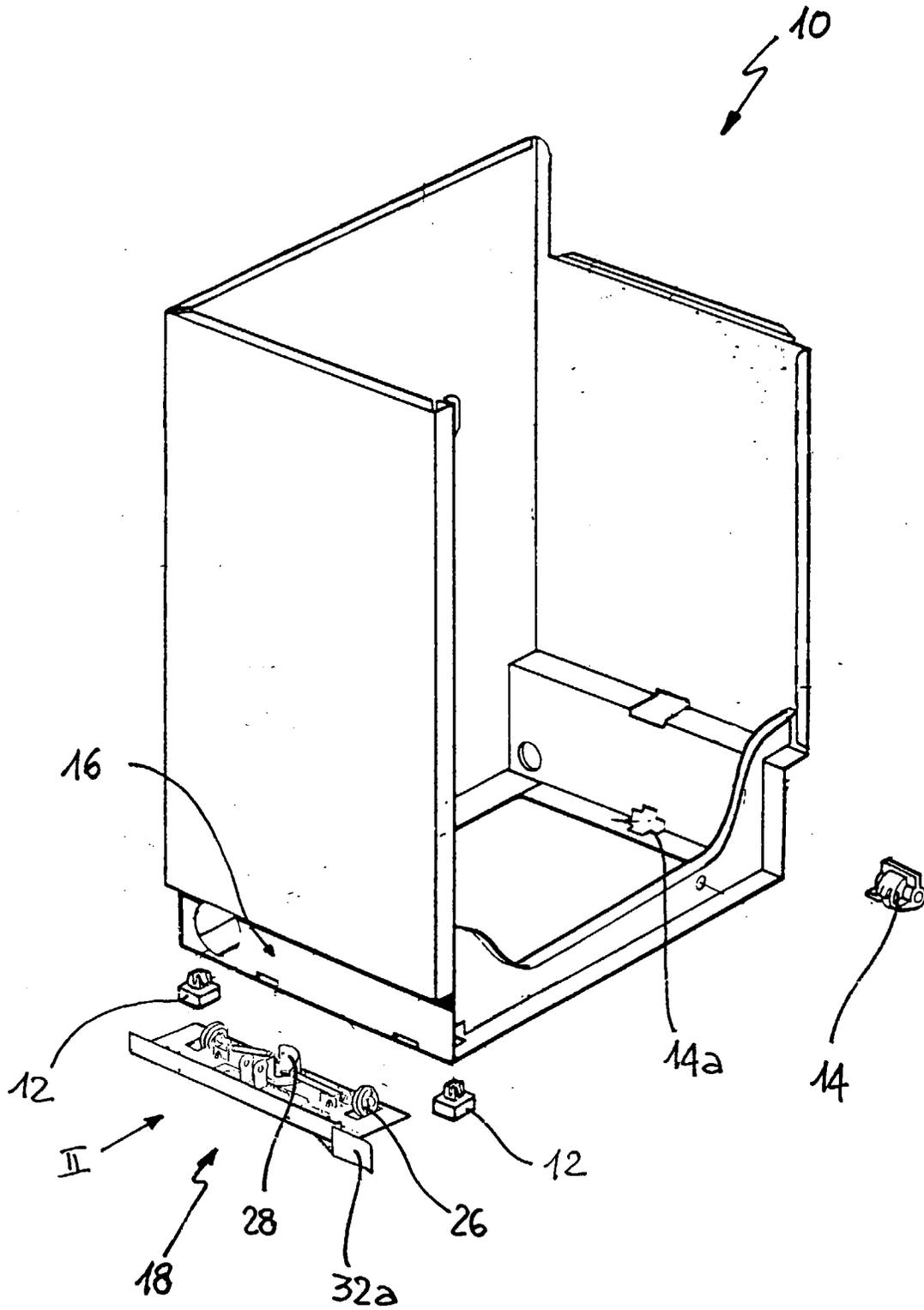


Fig. 1

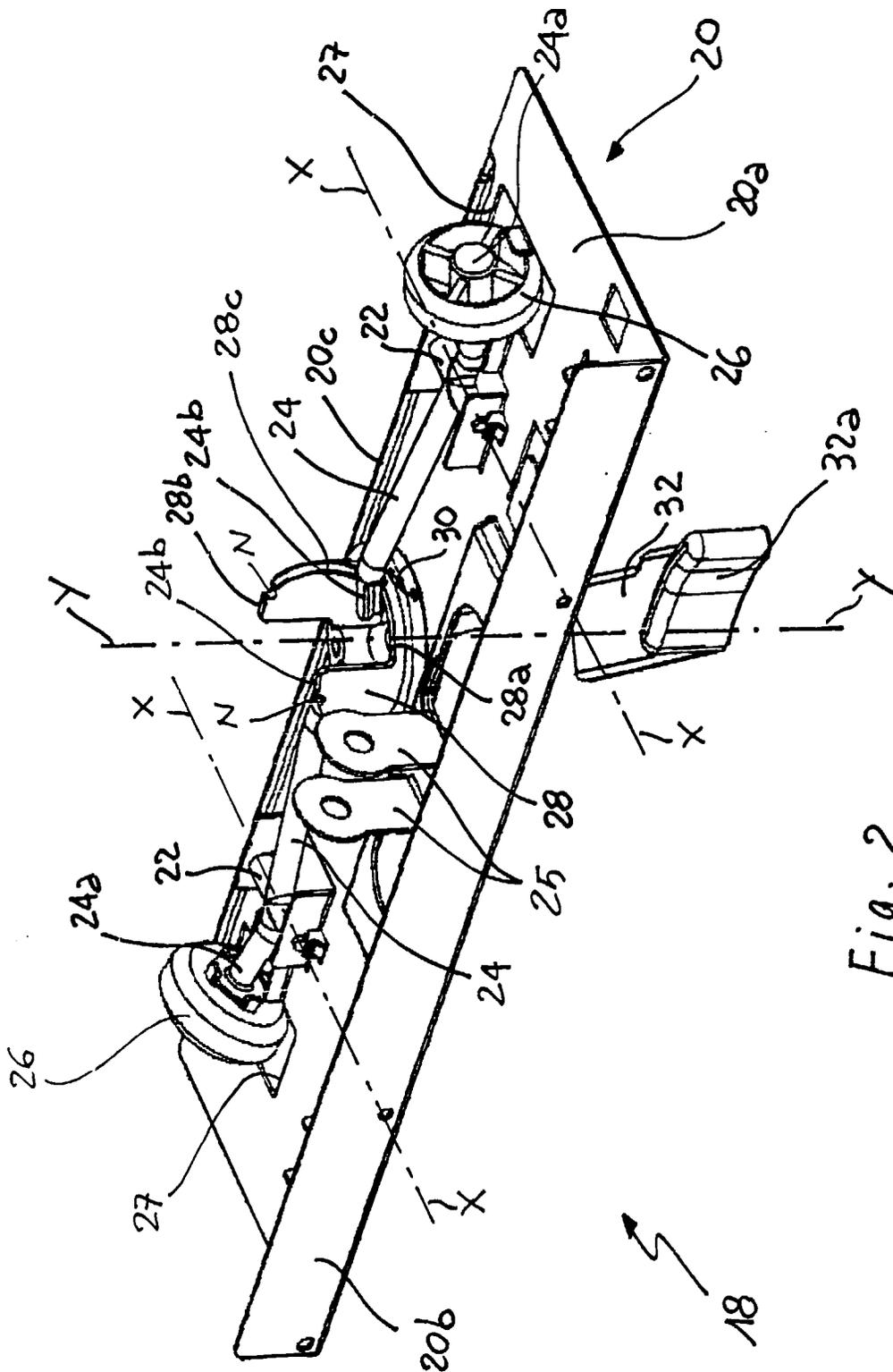
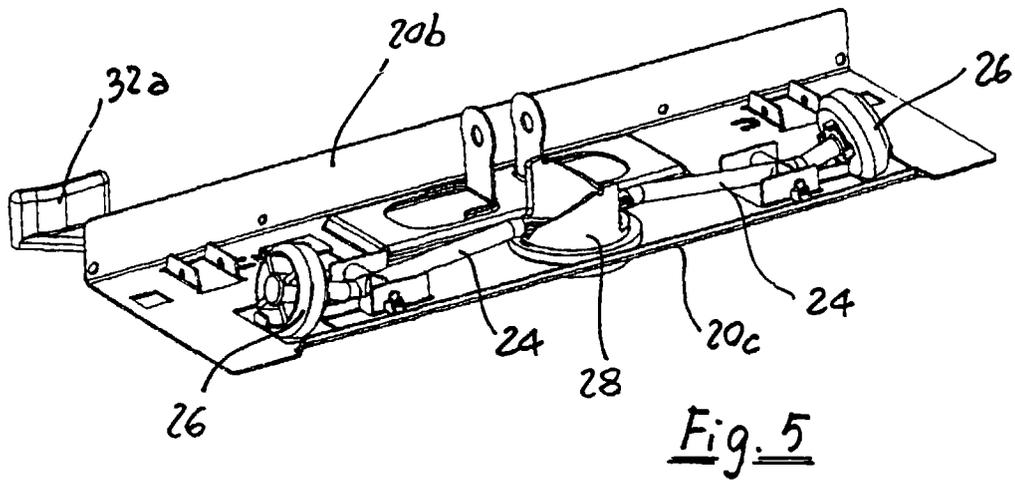
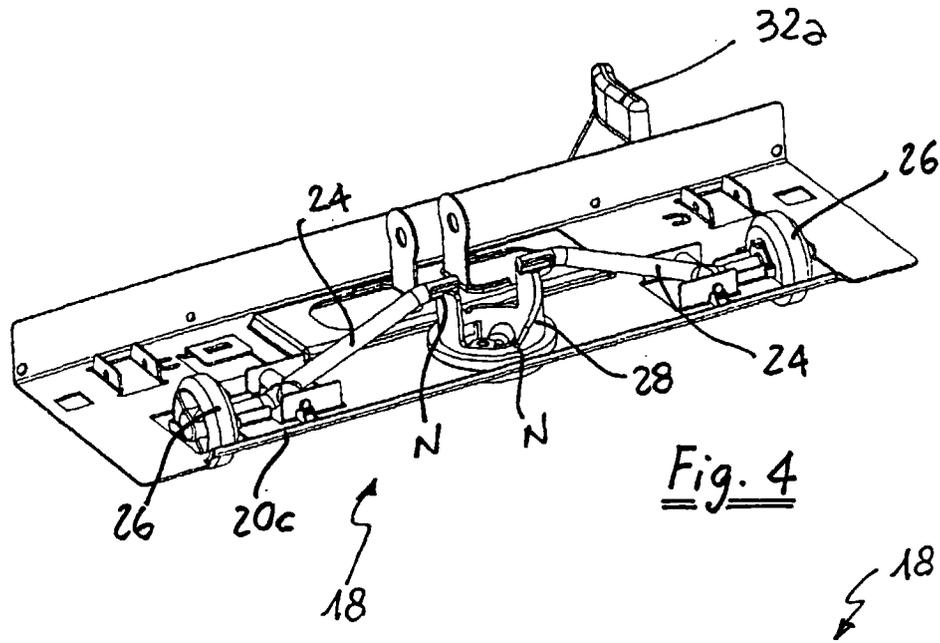
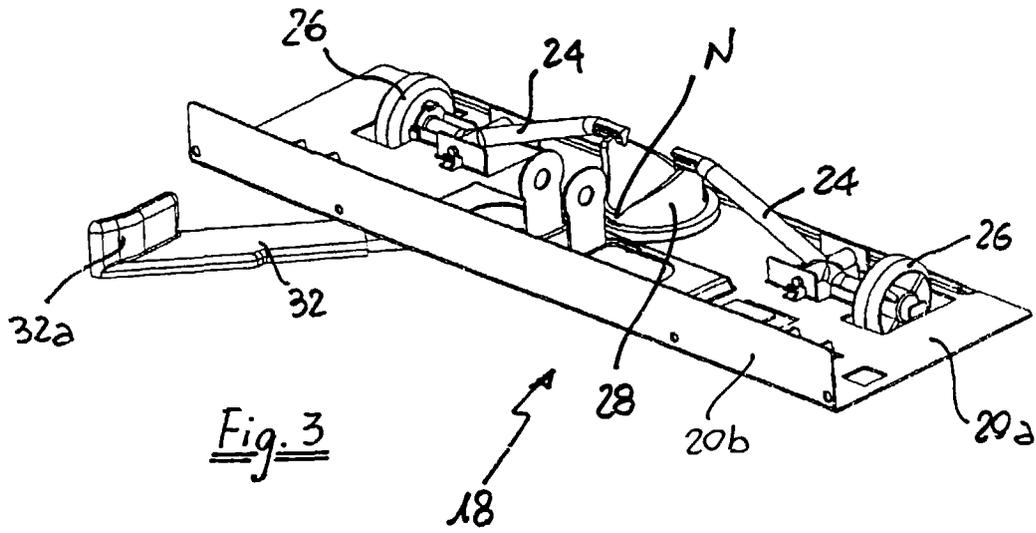


Fig. 2





European Patent  
Office

EUROPEAN SEARCH REPORT

Application Number  
EP 96 10 9378

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.6)
A	LU-A-44 223 (G. BORGHI) * page 31, line 5 - page 34, line 5; figures 40,41 *	1,5-7	D06F39/12
A	--- GB-A-1 136 591 (SEVERARD LIMITED) * page 4, line 43 - page 5, line 40; figures 4-9 *	1,2,9	
A,D	--- GB-A-2 082 450 (DOMAR SA) * abstract; figures *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			D06F
Place of search		Date of completion of the search	Examiner
THE HAGUE		8 November 1996	Courrier, G
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	

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