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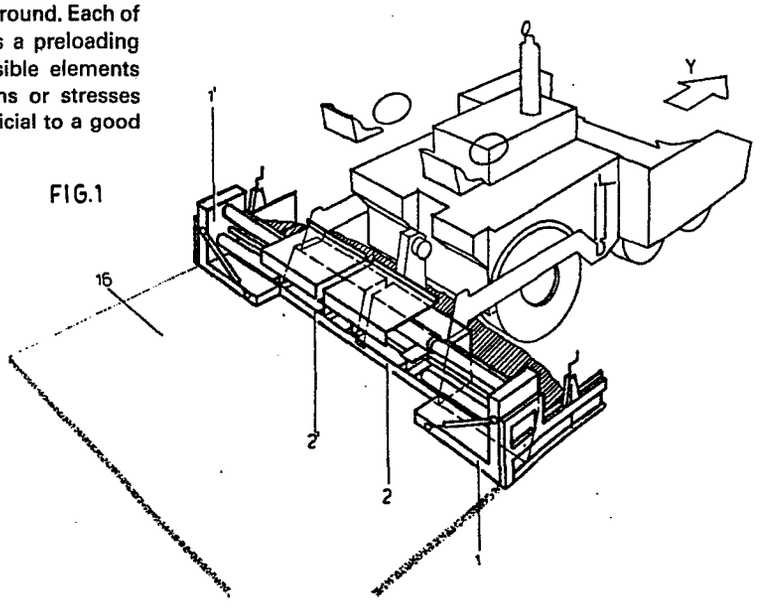
(54) **A road finisher with an improved smoother.**

(57) The roadfinisher is provided with at least a central element (2) and two extensible side elements, (1,1') for laying variable widths of material (16) on the ground. Each of the extensible side elements (1,1') comprisis a preloading device (18) imparting to each of the extensible elements (1,1') a load capable of opposing the strains or stresses which could give rise to deformations prejudicial to a good operation of the machine.

FIG.1



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"A ROAD FINISHER WITH AN IMPROVED SMOOTHER"

Finishers for laying bituminous mixes or conglomerates are generally distinghished by two important parts, namely a drawing part (tractor) and a part effecting the actual work of laying, levelling, thickening and the like for the mix or conglomerate on the roadway. This last unit, commonly referred to as "smoother", consists of an apparatus that by the time has become highly complex and articulated.

The most recent embodiments provide a smoother comprising four distinct elements; the two central ones are articulated to each other with adjusting means defining their inclination. Each of these central elements have mounted thereon an element nearly as long as the two central elements, which can slide outwardly and

horizontally driven by hydraulic pistons.

This smoother is generally referred to as "integrated smoother".

The extensibility advantage of the two outer elements allows a laying width variable without discontinuity. The sliding fastening means of the extensible elements to the central elements may widely vary depending on the models and brands of the finishers.

Highly accurate and strong cylindrical guides are generally provided to ensure that sliding will occur complying as far as possible with the geometrical design characteristics of the smoother.

The compliance with said characteristics is very important as the resulting surface of the laid bituminous mix or conglomerate is function of the shape of the smoother, and particularly of its lower face.

However, even when the sliding guides are very precise, the risk exists that the geometrical design shape could undergo changes due to elastic deformations of the various members comprising the smoother, when such members are subjected to considerable static and dynamic forces and reactions having values rapidly changing during the work.

One of the most serious elastic deformations is the torsional deformation which occurs particularly on the extensible elements. Thus, the latter should be constructed as light as possible, but

having a parallelepiped shape, they cannot have a sufficiently rigid structure to withstand torsional strains.

Practically, in all of the hitherto known machines, the torsional strains tend to deform the extensible elements, imparting a helical shape thereto which is also transferred to the lower face, which comes in contact with the bituminous mix to be laid on the road surface, thus negatively affecting accuracy.

This helical deformation occurs on the extensible elements in a very irregular manner depending on the laying width selected for carrying out the work. In other words, should the extensible elements pushed completely outward, that is to the end of stroke, each of the extensible elements would be completely involved by the heap of material to be laid, and accordingly all of the reactive forces would act upon such extensible elements.

On the other hand, when the extensible element operate partly closed, a portion of the extensible element would remain covered by the central element of the smoother, and no longer in contact with the material to be laid. As a result, the reactive forces acting upon the extensible elements are different or differently distributed.

Therefore, it can be stated that, depending on the width of the laying to be carried out, the extensible element is subjected to different and differently distributed reactive forces.

As a result, the extensible element will unavoidably change its

own elastic deformation.

As above pointed out, the most serious elastic deformation of the extensible elements is that tending to give a helical shape to the extensible element.

When assimilating said extensible element to a parallelepiped of elongated shape in horizontal and transverse direction, the most serious deformation is that tending to rotate towards each other the two vertical walls, which are parallel (to each other) and lie in the forwarding direction of the machine as the work is being carried out.

When this occurs, the horizontal face resting on the material to be laid out, will deform to a helical shape causing a considerable deviation at the surface of the laid out material.

Owing to the unavoidable elasticity of the materials of which these extensible elements can be made, and considering that for evident reasons these extensible elements should be made so as to reduce the weight thereof as far as possible, it was practically found that the above mentioned torsional deformations would unfortunately be substantial, whatever the care in the construction of said extensible elements and sliding guides.

Now, a convenient approach has been discovered for opposing and avoiding these deformations, the approach consisting of preloading the extensible element in a reverse direction, imparting thereto a torsion or twisting in opposite direction to the expected direction to be experienced as the work is being carried

out. However, this preloading cannot be introduced once for all at the time of manufacture for the extensible element since, for the above disclosed reasons, depending on the laying width and other varying work conditions, the reactive forces would act upon the extensible element to a larger or lesser degree and differently distributed.

The present invention solves this problem by introducing an adjusting element in the form of a tie rod-strut member of adjustable length, diagonally mounted on one of the parallelepiped faces of the extensible element, which faces are perpendicular to the operating direction of the finishing machine.

The accompanying drawings schematically show the main features of the improved finishing machine, and particularly:

Fig. 1 is a perspective rear view of a finisher having the inventive smoother allowing a continously variable width;

Fig. 2 is an enlarged partial rear perspective view of the right-hand end of the finisher at operating position and with the preloading device acting on the right-hand extensible element, while a further preloading device is similarly effective on the left-hand extensible element;

Fig. 3 is a view showing a specific exemplary construction for the preloading tie rod-strut member as applied to the left-hand extensible element; and

Fig. 3' is a view showing an enlarged detail for the cylinder securing system.

The running direction for the finishing machine during operation is shown by arrow Y.

Numeral 1 designates the extensible part of the smoother and numeral 2 designates the right-hand fixed central element, which in Fig. 2 has been shown as partially cut away so that the inner structure can be more clearly understood. This part of the smoother comprises a frame 3 carrying the bushes or sleeves 4 and 5 allowing the transverse sliding of the extensible element 1 in the cylindrical guides 6 and 7 laterally rightward and leftward projecting, when required, for varying the laying width.

The extensible element 1 is hydraulically controlled by means of a stem 8 and has the schematic shape of a parallelepiped defined by corners A, B, C, D, E, F, G and H. The above mentioned guides 6 and 7 are mounted integral with the inner surface of wall BC-FE. Said face has mounted thereon the end of said stem 8 of the hydraulic actuator causing the extensible element 1 to slide relative to the fixed central element 2. The rear (open) face A, B, C, D of the extensible element 1 is perpendicular to the feeding direction Y of the machine.

According to the present invention, this face of rectangular shape has mounted thereon at diagonal position relative to the face between the corners B and D a tie rod-strut member of adjustable length. Thus, it is shown in Fig. 2, that a tie rod-strut member 18 is mounted along the inclined diagonal B-D, this member 18 comprising a rugged screw 10, the lower end of

which is secured by an eyelet 11 and associated pin 11' (Fig. 3) adjacent to the corner D, and at the upper end from cylinder 9 terminating on the corner B, mounted through a spigot 12 welded onto a ring 13, rotatable about pin 13' adjacent to said corner D and near the upper wall of cylinder 9 has a nut screw thread 9' in which said rugged screw 10 rotatably engages. Thus, the hollow cylinder 9 provided with inner nut thread 9' can rotate about its own axis and through this rotation will move on the thread of the rugged screw 10. Rotation is practically controlled by the operation of an adjustable spanner engaged on the faceted zone 14 of cylinder 9, while the lock nut 15, idly rotatable on the thread of screw 10, is used to lock the desired length of the rodstrut assembly 18, upon adjustement, in order to prevent any deformation of the extensible element 1 during operation. Adjustement will be effected by the operator controlling the finishing machine operation, according to requirements due to quality and amount of material to be laid, that is according to thickness, mix or conglomerate temperature and ambient air.

Said assembly 18 (Fig. 3) comprising said rugged screw 10, along with its ring 11 and 11', and cylinder 9 provided with inner nut thread 9' for coupling with said screw 10, is mounted on the extensible element 1 at the corner B thereof by means of said spigot 12, (Fig. 3') ring 13 and pin 13'. This assembly makes up that adjustable torsional preloading tie rod-strut mechanism, performing the task of contrasting the thrust acting on the extensible element 1, due to the material to be laid on the ground as road blanket 16, thrust which would tend to deform the parallelepiped A, B, C, D, E, F, G and H of the extensible

element 1.

It is oubvious and intuitive that the application of the preloading tie rod-strut mechanism 18 described and shown in its simplest mechanical embodiment could be replaced by a hydraulic or oleostatic mechanism controlled by the operator, both at the start of work, and during machine operation, as well as by automatic control, depending on work conditions and values of parameters which may affect the laying operation.

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C L A I M S

1. A road finisher with smoother provided with at least a central element (2) and two extensible side elements, for laying variable widths of material (16) on the ground, characterized in that each of the extensible side elements (1) comprise a preloading device imparting to each of the extensible elements a load capable of opposing the strains or stresses which could give rise to deformations prejudicial to a good operation of the machine.

2. A road finisher according to Claim 1, characterized in that said preloading device acting upon the extensible element (1) comprises a parallelepiped A, B, C, D, E, F, G and H, in which the face opposite and parallel to that which during operation is subjected to the thrust of the material to be laid on the ground, is preloaded by a contrasting force preventing any possible deformation, the device consisting in a tie rod-strut assembly comprising a rugged screw (10) carrying at one end a ring (11) for securing onto a fixed pin (11') of the parallelepiped at the corner (D) and a tubular body (9) internally having a nut thread (9') for receiving and engaging said screw (10), and at the opposite end a spigot (12) and a ring (13) for movement on a pin (13') secured onto the extensible element (1) at the corner

(B), placed transversally to corner (D), said tubular body (9) being externally provided with a faceted zone (14) for convenient grip by an adjustable spanner and a lock nut (15), being provided on said screw (10), which can be tightened at the free end of the tubular body (9) to block the preloading of the tie rod-strut assembly at the correct condition of precalculated preloading, in accordance with the designed calculation.

3. A road finisher according to Claim 1, characterized in that the preloading device acting upon the extensible element (1) comprises hydraulic actuators resisting against the deformation strains from outside which could affect the good operation of the apparatus.

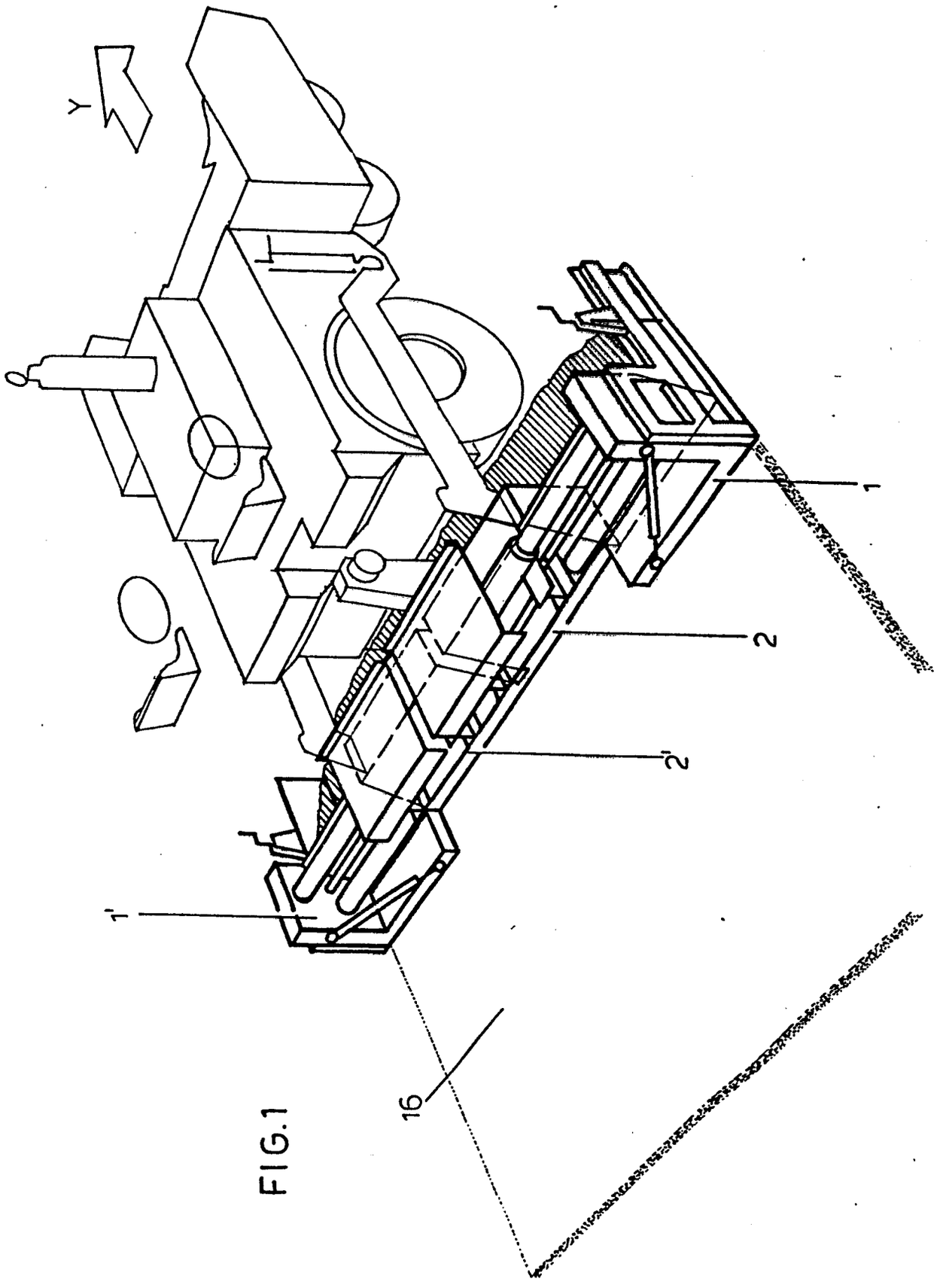

FIG.1

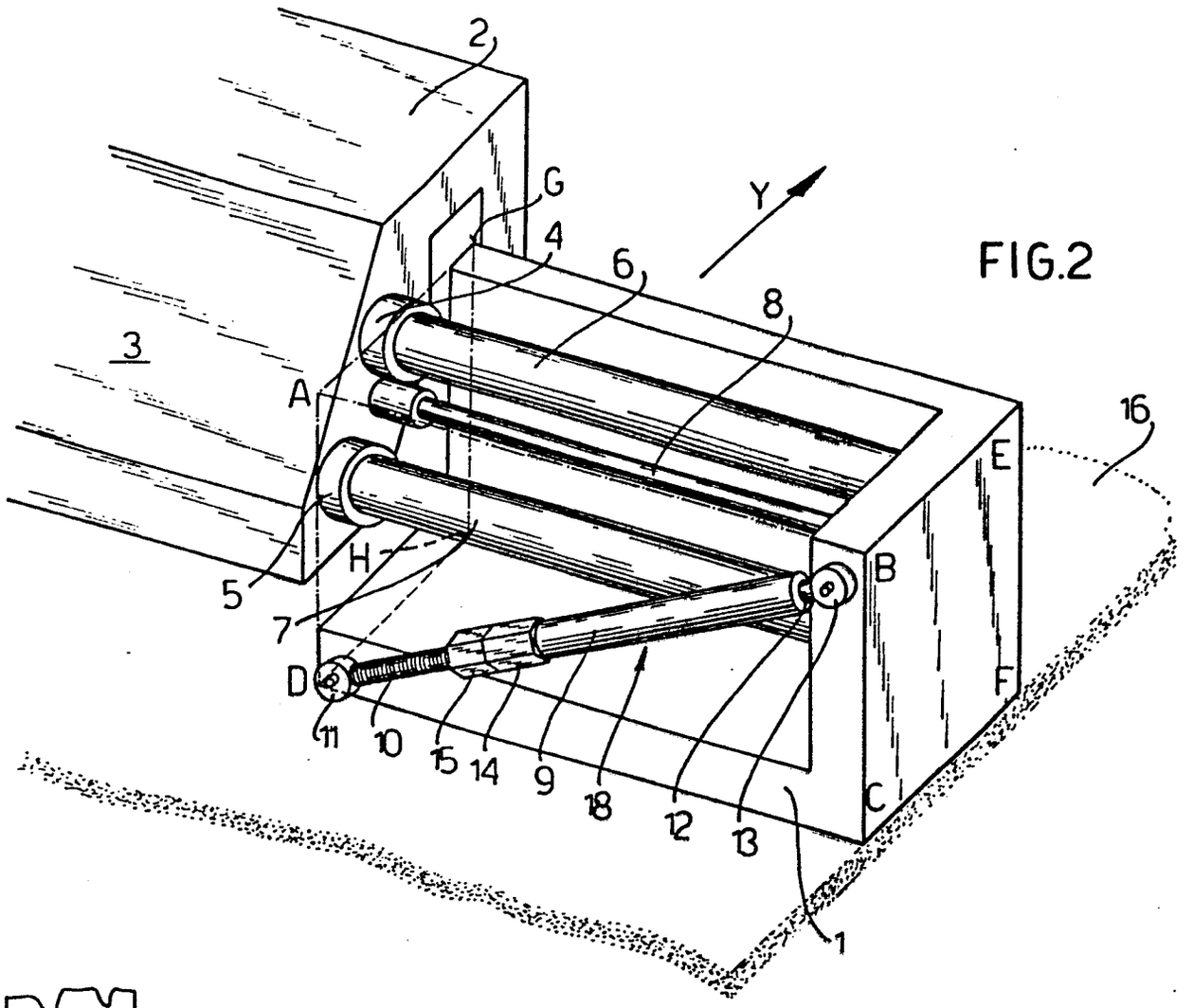

FIG.2

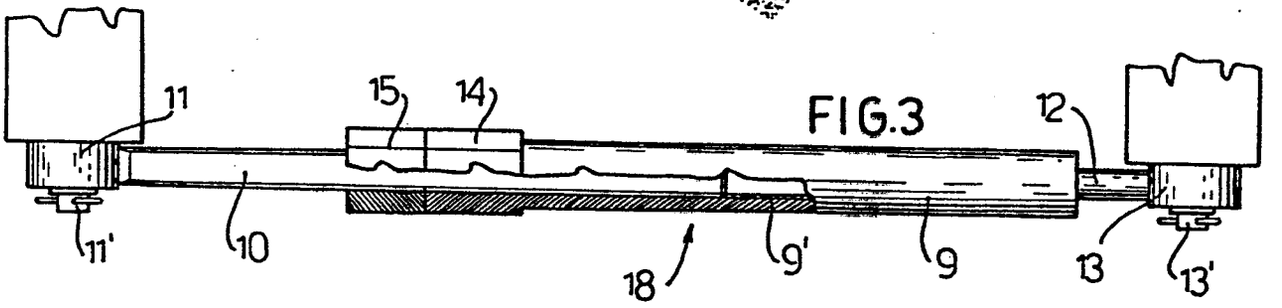

FIG.3

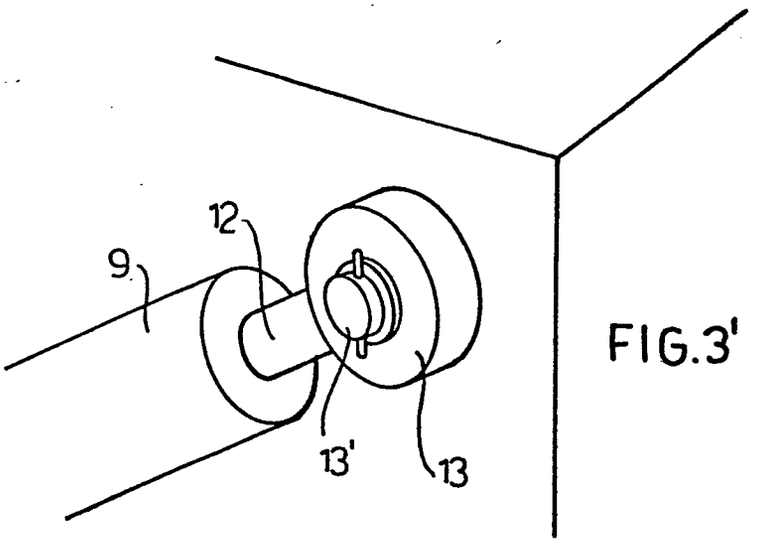

FIG.3'

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EUROPEAN SEARCH REPORT

Application number

EP 83 11 1356

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. ³)
A	US-A-3 907 451 (FISHER) * Column 2, line 66 - column 4, line 51; figures 1-5 *	1	E 01 C 19/48 E 01 C 19/42
A	GB-A- 886 853 (BLATCHFORD) * Whole document *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

E 01 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14-02-1984	DIJKSTRA G.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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