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54 Device for cleaning products.

57 Frame (1-4), having coupling members (5,6) for attaching it to a lifting mechanism of a vehicle and a drum (10) journaled in said frame and adapted to rotate about an at least substantially horizontal rotary axis, the wall of said drum having holes and comprising two parts of curved section which are relatively pivotable between a first position in which the drum is open for picking up products and a second position in which the drum is closed whereby a first part (22) of the drum has a prolongation adjoining the curved part and being at least substantially tangential to the curved part, whereas the second part (33) being at least substantially concentric with the rotary axis of the drum is pivotable with respect to the first part about the rotary axis between the open position in which the second part extends along the first part and the closed position in which the second part extends between the ends of the first part.

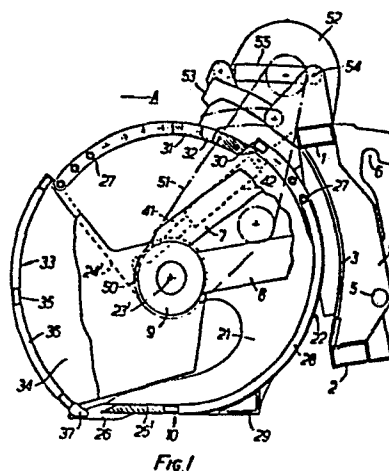


Fig. 1

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DEVICE FOR CLEANING PRODUCTS

The invention relates to a device for cleaning products such as, for example, paving stones or the like comprising a frame with coupling members for attaching to a lift mechanism of a vehicle and a drum journalled in said frame and adapted to rotate about an at least substantially horizontal rotary axis, the wall of said drum having holes and the drum wall comprising two parts of curved section which are relatively pivotable between a first position in which the drum is open for receiving stones and a second position in which the drum is closed.

Such a device is known from Dutch Patent Application 8004941. In this known device the two drum parts are relatively pivotable about a pivotal shaft journalled in the drum wall, whilst in the closed state the drum has a circular section. Owing to the strongly curved shape of the drum part by means of which the products to be worked have to be picked up from the ground picking up the products requires comparatively much effort, whilst in addition the capacity of picking up is adversely affected. Since furthermore the two drum parts are relatively pivotable about a horizontal pivotal shaft journalled in the drum wall, the centre of gravity of the drum in the open state lies, during operation, at a fairly large distance from the vehicle supporting the device, for example, a wheeled loader or the like, which also has an adverse effect on the capacity of the device.

The invention has for its object to provide a device of the kind set forth by which the above-mentioned disadvantages of the known device can be mitigated.

According to the invention this can be achieved in that a first part of

the drum is provided with a prolongation adjoining the curved part, which prolongation adjoins the curved part in an at least substantially tangential direction, whereas the second part being at least substantially concentric with the rotary axis of the drum is pivotable with respect to the
5 first part about the pivotal axis between the open position in which the second part extends along the first part and the closed position in which the second part extends between the ends of the first part.

When the construction embodying the invention is used the material to be picked up during operation can be shifted effectively along the prolon-
10 gation into the drum so that the energy required for picking up is reduced and the loading capacity is raised. Apart therefrom the device can be constructed in a compact manner with an advantageous location of the centre of gravity both in the open and the closed position of the drum.

The drum is preferably adjustable with respect to the coupling members
15 in two positions turned about a vertical axis through at least substantially 180° . By using this construction, in dependence on the operational conditions, the device can be pushed or pulled by the vehicle carrying the device during operation when picking up the products so that at any time optimum use of the device can be ensured.

20 The invention will be described more fully hereinafter with reference to an embodiment of a device in accordance with the invention shown schematically in the accompanying Figures.

Fig. 1 schematically shows partly in a side view and partly in a sectional view an embodiment of the device in accordance with the invention,
25 the drum being in the closed position.

Fig. 2 schematically shows partly in a side view and partly in a sectional view the drum in the open position.

Fig. 3 is an enlarged sectional view of a drum support located near one end of the drum.

30 Fig. 4 is a sectional view taken on the line IV-IV in Fig. 3, some parts being omitted for the sake of clarity.

The frame of the device comprises a few horizontal frame beams 1 and 2 lying one above the other, between which curved plates 3 are arranged. To the plates 3 are secured at right angles plates 4 having holes 5 and re-

cesses 6 for coupling the device with, for example, the lifting device of a vehicle, for example, a wheeled loader or the like.

On both sides of the device struts 7 and 8 are fastened to the above-mentioned frame parts. To the ends of the struts 7 and 8 remote from the first-mentioned frame parts are fastened bearing bushes 9 serving to support a drum 10 arranged between the struts 7 and 8 on both sides of the device and adapted to rotate about a horizontal rotary axis. For supporting the drum the bearing bushes 9 comprise short shafts 12 supported by ball bearings 11 and having blind bores 13.

At the proximal ends the shafts 12 are provided with collars 14 subtending an angle of about 180° and being provided at their ends with projecting noses 15. From Fig. 4 it will be apparent that boundary faces 16 of the protruding collar are in contact with similar boundary faces of a collar 17 subtending an angle of 180° and being integral with a hub 18. The hub 18 is fastened to a plate 19, which is secured by bolts (not shown) to an annular plate 20, which is fastened to a sidewall 21 of a first drum part 22. A shaft 23 is located in the hub 18 and the blind bore 13 of the shaft 12 are screwed with the aid of a screwthreaded part 24 into the bore of the hub 18 also having screwthread in part of the length. In order to facilitate screwing of the shaft 23 a bolt 25 is welded to the accessible end of the shaft 23.

Fig. 2 shows the drum 10 in the position which the drum will occupy when picking up material, for example, stones lying on the ground. From this Figure it will be apparent that the foremost boundary line 24' of each sidewall 21 of the drum part 22 located for the major part above the rotary axis 23' formed by the registering centre lines of the shafts 12 is upwardly inclined at an angle of about 50° . The adjoining outermost boundary edges of the side plates are at least substantially concentric with the rotary axis 23' up to a plane going horizontally through the rotary axis 23', after which the distance between the rotary axis 23' and the outermost boundary of the drum part 22 gradually decreases, said part finally terminating in an at least substantially tangential part at the level of the ends of the sidewalls 21 terminating in a tip and being interconnected by a broad strip 25' converging the entire width of the drum and being

bevelled at the front. The front edge of the strip 25' is provided with projecting tines 26. The curved wall of the drum part 22 is formed by a plurality of horizontal bars 27, which form the upper part of the drum wall in the position of said part shown in Fig. 2 and by a plurality of bars 5 28 extending parallel to a plane normal to the rotary axis 23 and forming the hindmost and lowermost part of the wall of the drum part 22 in the position shown in Fig. 2.

From Fig. 2 it is furthermore apparent that a beam 29 of at least substantially triangular section is arranged parallel to the strip 25', said 10 beam interconnecting the bars 28 and having its underside located in a plane going through the underside of the plate 25.

It is furthermore apparent from Fig. 2 that the wall part of the drum part 22 adjoining the front edge 24' and being concentric with the rotary axis 23' and formed by the bars 27 is nearer the rotary axis than an adjoining part beginning at the level of the square-section beam 30 extending 15 between the sidewalls 21. At this part of the wall portion of the drum part 22 concentric with the rotary axis, which part is at a shorter distance from the rotary axis 23' and subtends an angle of about 90° , there are arranged near the sides of the drum plates 31 having holes 32 of frustoc- 20 nical shape for a purpose to be described hereinbelow. Apart from the first drum part 22 the drum comprises a second drum part 33 provided with two side plates 34, whose outer edges being concentric with the rotary axis 23' are interconnected with the aid of beams 35 extending parallel to the rotary axis. Between these beams 35 bars 36 are extending concentrically with 25 the rotary axis 23'. In the position shown in Fig. 2 the second drum part 33 is concentric with and subtends at least substantially the same angle as that part of the second drum part 22 which is slightly nearer the rotary axis 23' than the adjoining curved wall portion of the drum part 22. A beam 35 forming one end of the curved wall portion of the drum part 33 is in con- 30 tact with the beam 30 of the first drum part 22. The beam 35 forming the other end of the curved wall portion of the drum part 33 is provided with projecting tines 37.

It will be apparent from Fig. 3 that the two side plates 34 of the second drum part 33 have fastened to them sleeves 38, which are rotatably

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arranged on the outer periphery of the hubs 18 with the interposition of bearing shells 39.

With each side wall or plate 34 of the second drum part 33 is coupled by means of a pivot pin 40 the end of a piston rod 41 of a setting cylinder 5 42, which is pivoted to a sidewall 21 of the drum part 22 by means of a pivot pin 43 extending parallel to the pivot pin 40.

It will be obvious that with the aid of the setting cylinders 42 the second drum part 33 can be turned with respect to the first drum part 22 from the open position of the drum shown in Fig. 2 to the closed position 10 of the drum shown in Fig. 1, in which the tines 37 pass between the tines 26, the portion of the drum part 33 curved around the rotary axis closes the opening between the ends of the wall portion of the drum part 22 extending around the rotary axis and the plates 34 together with the plates 21 close at least substantially completely the sides of the drum.

15 For the supply and drainage of pressurized fluid, for example, oil to and from the setting cylinders 42 one shaft 12 has a screw threaded bore 44 concentric with the center line of the shaft, into which a first part 45 of a coupling member is screwed. This part 45 is rotatable with respect to the coupling part 46 about an axis coinciding with the rotary axis of the 20 drum, whereby with part 46 communicate an inlet duct and an outlet duct 47 for the supply and drainage of fluid respectively. The bore 44 is in open communication with a channel 44' in the shaft 12 opening out in a tapped bore 44'' in the projecting collar 14, into which a connecting nipple 48 is screwed. The connecting nipple 48 communicates with a duct 49 to be connected 25 with the setting cylinders 42. For the supply and drainage of oil towards and from the setting cylinder disposed near the stub shaft 12 not shown in Fig. 3 a duct can be passed through one of the hollow pipes 27 of the first drum part 22 extending parallel to the rotary axis.

The shaft 12 located on the other side of the drum than the shaft 12 : 30 shown in Fig. 3 is provided with a prolongation protruding from the sleeve 9 on the side remote from the collar 14 concerned. This prolongation has fastened to it a sprocket or pulley 50 (Fig. 1), which is connected by means of a chain or belt 51 with a driving motor, for example, a hydraulic motor 52.

Lock bolts 53 are furthermore coupled with the frame so that these lock bolts are pivotable about pivotal axes 54 extending parallel to the rotary axis 23' with respect to the frame with the aid of setting cylinders 55, that is to say, between the position indicated in Fig. 1 by solid lines and 5 the position indicated in Fig. 1 by broken lines. In the position indicated by broken lines the ends of the lock bolts 53 are located in the aforesaid holes 32 in plates 31 forming part of the first drum part 22. It will be obvious that in this position the first drum part 22 is locked against a turn about the rotary axis 23'.

10 The device described above operates as follows.

With the aid of the holes 5 and recesses 6 in the frame the frame can be fastened to the lifting mechanism of a vehicle, for example, the lifting arms of the hydraulic lifting device of a wheeled loader or the like. When the drum is in the opened position shown in Fig. 2, the device can be pro- 15 pelled by the vehicle in the direction of the arrow A, whilst the plate 25' and the beam 10 are slipped along the ground by their undersides. Material lying on the ground can then be advanced along the plate 25' and the adjoining bars 28 into the opened drum. Owing to the initially horizontal and gradually ascending inner wall of the drum part 22 formed by the plate 25' 20 and the bars 28 this introduction of the material is progressively performed. It is also possible to pick up material from a large heap since the inlet opening between the free ends of the drum part 22 has a large height and the interior of the drum is completely free of parts hindering or disturbing the introduction of the material.

25 When sufficient material is picked up in the drum, the drum can be closed by turning the second drum part 33 from the open position of the drum shown in Fig. 2 into the closed position shown in Fig. 1. Moreover, the drum can be moved upwards by means of the lifting device of the vehicle and after the lock bolts 53 are turned from the position indicated by broken 30 lines into the position indicated by solid lines the drum can be caused to rotate. By this rotation of the drum the stones or a similar material picked up are agitated so that earth or the like adhering to said material is disengaged from the products and will fall out through the openings in the wall of the drum, as a result of which the products are effectively cleaned.

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Since the inner wall of the drum has a relatively uniform shape undesirable dropping and tumbling movements of the products are avoided, which is particularly important in cleaning stones in order to avoid damage of the stones. Preferably the drum is adapted to rotate in two directions.

5 After the products are sufficiently cleaned, the drum can be opened by turning the second drum part 33 from the position shown in Fig. 1 into the position shown in Fig. 2 and the products can be removed from the drum by setting the first drum part 22 in such a position that the prolongation formed at least essentially by the strip 25' and tangentially adjoining the
10 curved wall portion of the second drum part is inclined upwards so that the products can easily slide along said part out of the drum.

It will be obvious that when the drum is arranged in the position shown in the Figures in the frame, the drum, when picking up the products and then being displaced in the direction of the arrow A, is pushed on in front
15 of the vehicle carrying the device. The drum can, however, be arranged in the frame in a simple manner in a position in which with respect to the position shown in the Figures the drum is turned through 180° about a vertical axis. For this purpose the shafts 23 can be screwed out of the shafts 18 and the shafts 12. Subsequently with the aid of the lifting device of
20 the vehicle carrying the device the frame can be moved upwards, whilst the drum remains standing on the ground. The vehicle can then be driven to the other side of the device and be turned through 180° , after which the frame is lowered until the faces 16 of the protruding collars come again into contact with the corresponding faces of the protruding collars 17. This de-
25 position of collars 14 on the collars 17 is facilitated by the projecting noses 15. When the collars 14 are bearing again on the collars 17 the shafts 23 can be screwed in.

The collars 14 and 17 not only facilitate the disposition of the frame on the drum in different positions, but also ensure the transfer of the
30 torque required for driving the drum.

In the resultant, new position of the drum in the frame the drum can be drawn on behind the moving vehicle for picking up products. This is advantageous, for example, in picking up paving stones from a road surface, since the vehicle can drive along the still intact part of the road surface.
35 The further operation of the device remains the same. It should be noted

that though in the foregoing reference is particularly made to be cleaning paving stones, the device may also be used for cleaning other products such as beet or the like.

The figures used in the claims are only meant to explain more clearly
5 the intention of the invention and are not supposed to be any restriction concerning the interpretation of the invention.

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CLAIMS

1. A device for cleaning products such as paving stones or the like comprising a frame having coupling members for attaching it to a lifting mechanism of a vehicle and a drum journaled in said frame and adapted to rotate about an at least substantially horizontal rotary axis, the wall of said drum having holes and comprising two parts of curved section which are relatively pivotable between a first position in which the drum is open for picking up products and a second position in which the drum is closed characterized in that a first part of the drum has a prolongation adjoining the curved part and being at least substantially tangential to the curved part, whereas the second part being at least substantially concentric with the rotary axis of the drum is pivotable with respect to the first part about the rotary axis between the open position in which the second part extends along the first part and the closed position in which the second part extends between the ends of the first part.
2. A device as claimed in Claim 1 characterized in that the device is constructed so that with respect to a vehicle propelling the device the drum can be set in two positions turned about a vertical axis through at least substantially 180° .
3. A device as claimed in Claim 1 or 2 characterized in that the distance between the free ends of the first drum part exceeds the radius of curvature of the second drum part.
4. A device as claimed in anyone of the preceding Claims characterized in that the second drum part subtends an angle of about 90° .

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5. A device as claimed in anyone of the preceding Claims characterized in that in the open position of the drum the second drum part extends along the outer side of part of the first drum part, said part being off-set in the direction of the rotary axis of the drum with respect to an adjoining
5 part of the first drum part.

6. A device as claimed in anyone of the preceding Claims characterized in that the boundary edges of the two drum parts located near one another in the closed position of the drum are provided with projecting tines.

7. A device as claimed in Claim 5 characterized in that in the closed
10 position of the drum the tines of the two drum parts pass in between one another.

8. A device as claimed in anyone of the preceding Claims characterized in that the second drum part is provided with side plates which are adapted to turn about hubs fastened to side plates of the first drum part.

15 9. A device as claimed in anyone of the preceding Claims characterized in that the two drum parts are relatively pivotable with the aid of setting cylinders arranged between the first drum part and the second drum part.

10. A device as claimed in anyone of the preceding Claims characterized in that the first drum part is provided with hubs holding releasable
20 shafts and ends of the shafts protruding from the hubs are located in bores in shafts journalled in the frame.

11. A device as claimed in Claim 10 characterized in that the hubs fastened to the first drum part are provided with collars subtending an angle of about 180° and co-operating with protruding collars of the shafts jour-
25 nalled in the frame also subtending an angle of about 180° .

12. A device as claimed in anyone of Claims 10 or 11 characterized in that a shaft journalled in the frame has a blind bore for receiving the shaft passed through the hub of the first drum part, whilst the end of the shaft is provided with a coupling piece consisting of two parts relatively ro-
30 tatable about the centre line of the shaft for the supply of pressurized fluid to a bore in the shaft, which communicates with setting cylinders moving with the drum.

13. A device as claimed in anyone of the preceding Claims characterized in that locking members are provided for fixing the first drum part in a

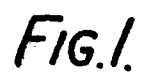
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position in which the prolongation is at least substantially horizontal.

14. A device as claimed in Claim 13 characterized in that the locking members are formed by arms pivotally coupled with the frame, bent-over ends of which arms can grip in recesses provided for this purpose in the
5 first drum part.

15. A device as claimed in anyone of the preceding Claims characterized in that the radius of curvature of the wall of the first drum part initially becomes gradually larger in a direction away from the prolongation and subsequently remains the same to form a first part concentric with
10 the rotary axis, which terminates in a part nearer the rotary axis and concentric with the rotary axis.

16. A device substantially as described in the foregoing and as illustrated in the accompanying drawings.



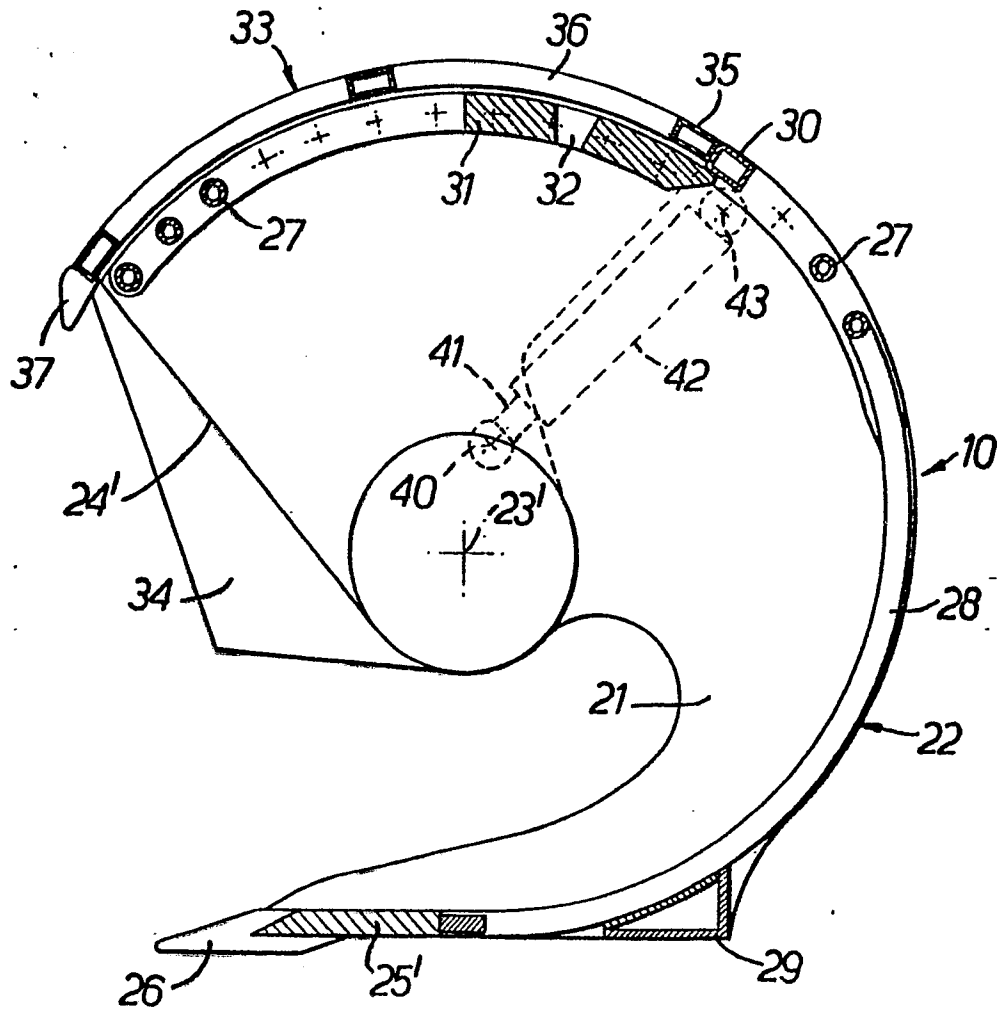


FIG. 2.

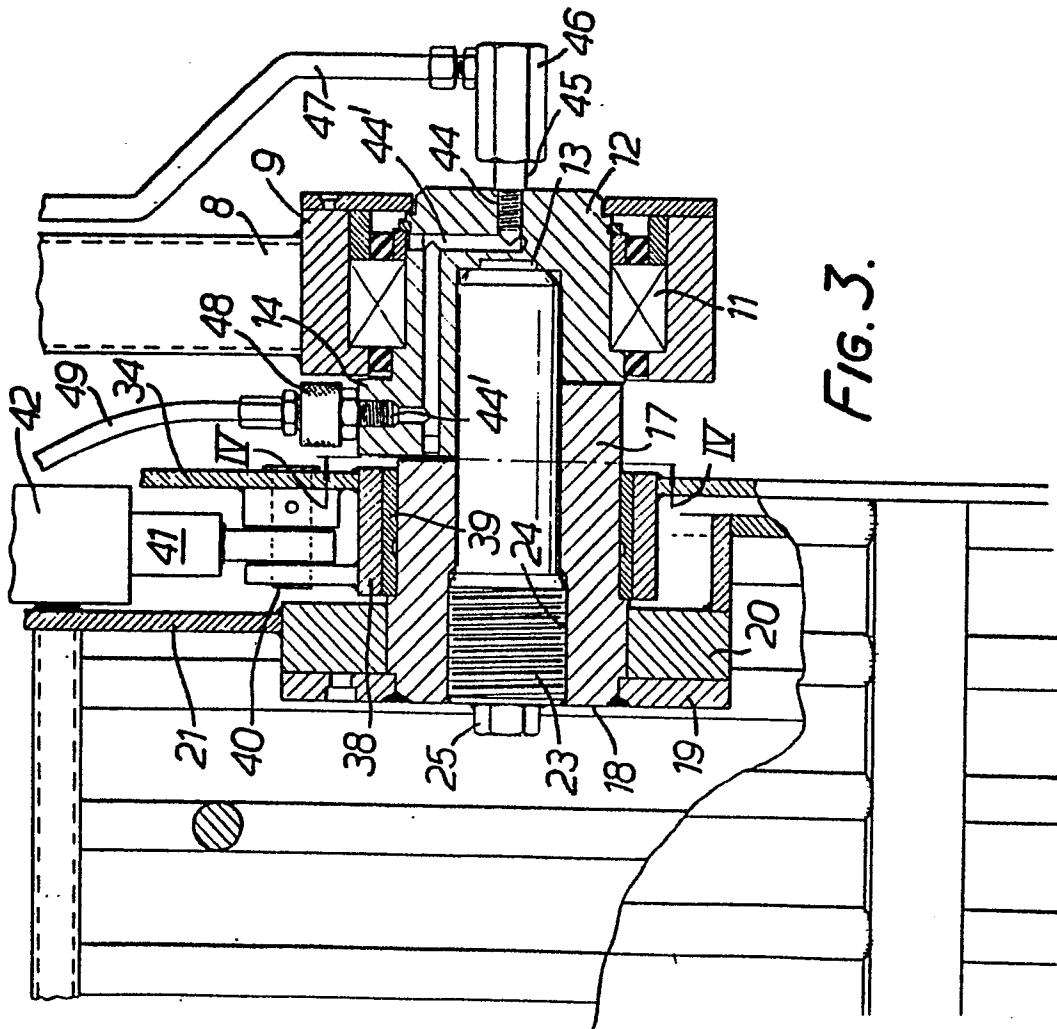


FIG. 3.

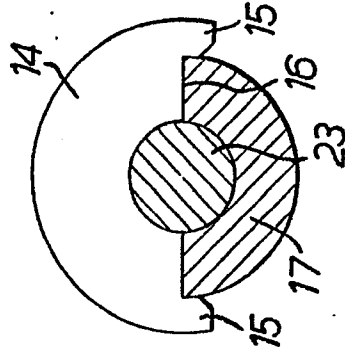


FIG. 4.



European Patent
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EUROPEAN SEARCH REPORT

0106412

Application number

EP 83 20 1459

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)
Y	EP-A-0 047 041 (VAN DALFSEN) * Whole document *	1, 3, 5, 8-10, 12-14, 16	E 02 F 7/06 E 02 F 3/81 E 01 C 23/12 B 07 B 1/22
Y	US-A-3 765 490 (LOGUE) * Figures *	1, 3, 5, 8-10, 12-14, 16	
Y	US-A-1 974 717 (LE BLEU) * Page 2, lines 18-35; figures 1, 3-5, 7 *	5, 13, 14	
A	US-A-2 422 985 (RECKLER)		TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
A	GB-A-1 512 206 (FOULGER)		E 02 F E 01 C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 06-01-1984	Examiner RAMPELMANN J.
CATEGORY OF CITED DOCUMENTS		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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