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A contrivance for moving snow, gravel and soil.

The contrivance is composed of a central buffer element (3) whose curving surface maintains constant contact with two blades (1 & 2) whilst upper and lower extremities of a pivot (6) passing vertically through the body thereof pair with and lodge between two sets of horizontal overlapping lugs (4 & 5 and 49 & 50) protruding from the rear of said blades; there being a horizontal yoke (8) hinged to said pivot (6) and embracing upper lugs (4 & 5), a pair of oil-hydraulic cylinders (26 & 27) hinged to a sub-chassis (12) engaging side-irons (10) made fast to vehicle (11) carrying the contrivance, rods (28 & 29) of which being hinged to the rear of yoke (8); also a horizontal pivot (22) mounted to the rear of buffer (3) by way of a bushing (21) affixed at a tangent to a further vertical bushing (20) having prismatic inside section and counter-sunk ends and pairing with vertical prismatic pivot (19') whose cylindrical extremities (19) form turning pairs with two bushings (18) furnished at rear with further horizontal bushings (17) accommodating hinge-pivots (16) for a double articulating parallelogram (15) anchored hindmost to said sub-chassis (12) and worked by an upwardly-inclined cylinder (23); provision being made for a pair of oil-hydraulic cylinders (32 & 33) inclined upward and forward from hinge-pins at a rear-extension (14) of sub-chassis (12) whose rods (34 & 35) each hinge with a bushing (38 & 39) turning about a horizontal pivot (40 & 41) attached to the rear of each blade (1 & 2). Not only does the contrivance allow for raising

the blades, but also for their being spread, and orientated laterally, as well as for movement forward and or to the rear of the blade top-edges for the respective purposes of moving blades through a single central path of snow or other loose material in general, and through two lateral strips. A pair of quick-release couplings (13) completes the contrivance.

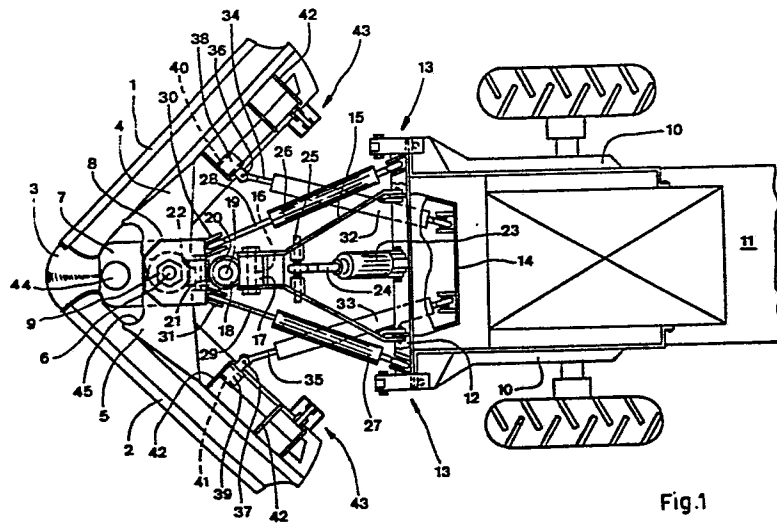


Fig.1

A contrivance for moving snow, gravel and soil.

The invention relates to a contrivance for the removal of snow, gravel, soil, and the like - that is, a snowplough viz. an appliance fitted to the front end of a tractor and
5 designed to clear roads, streets and open spaces when driven forward by the tractor, capable of shifting gravel, soil and other such loose material in general.

The prior art is able to show snowploughs of a type having a pair of blades arranged in an adjustable wedge-formation
10 which will open out into complete alignment one with the other, though without offering an unbroken surface at the join, and with a buffer element isolated from the blades themselves; the prior art further comprises single blade ploughs, which are in fact alone in providing for forward
15 inclination of the blade top-edge in order to allow for scraping and sideways dispersal of accumulated ice and snow; the forward angling of this upper edge -and indeed its backward inclination, to avoid unwanted removal of gravel down the central path of the blade- being obtained by way of a
20 horizontal pivot allowing rotation of the blade with respect to the same pivot's centre support, the turning motion imparted direct by the rod of an oil-hydraulic actuator cylinder. The prior art offers a side-on angle of no more than 45° for the wedge plough; connections between plough and tractor
25 hitherto lack in terms of speed and precision; lastly, the degree of lift possible to the single blade or wedge for the purposes of passing over obstructions remains somewhat limited.

The technology provided by the prior art, such as it is, stands
30 in need of further improvements -and in particular with regard to the need for forward and rear angling of the blade top-edge, whether this be a single entity, or a pair of blades in wedge-formation opening out by adjustable degrees to full alignment one with the other; also the need for a
35 side-on angle of greater degree, increased lift from ground level, and more speedy coupling to the prime mover.

The foregoing represents a need for resolving the technical problem posed by a snow-clearing contrivance having a pair

of blades joined in wedge-formation and capable -when operated- of being inclined rearward from the vertical for the purpose of removing a more shallow layer of material from its centre path, and forward from the vertical so as to
5 scrape material from the ground lying along the said centre path. Furthermore, the contrivance ought to offer an unbroken surface area at the join of the blades, regardless of the angular posture assumed thereby, in order to prevent snow or other material from passing therebetween; there
10 should also be increased ground clearance, a wider side-on angle, and more rapid means of attachment.

The invention resolves the problem thus stated by providing for the blade top-edge inclination utilising an arrangement of two vertical pivots and single horizontal pivot; a first
15 vertical pivot passing through the central buffer element held in position by two pairs of overlapping rear blade-lugs, the upper pair of said lugs embraced by a horizontally-disposed yoke paired to this same first vertical pivot and provided rearwardly and at either side with horizontal pivots converging toward the rear which provide anchor points for hinging the rod extremities of a pair of actuator cylinders hinged at their rearmost part to the main plough-to-vehicle chassis and converging to the fore. A second vertical pivot is
25 tilulating parallelogram converging thereon and carrying a pair of horizontal pivots disposed within a relative pair of horizontal bushings affixed at a tangent to respective vertical bushings forming part of a turning pair by means of which the cylindrical pivoting extremities of a vertical
30 prismatic pivot are supported in rotation; the said prismatic pivot is accommodated -with a degree of play- within a vertical bushing having prismatic inner surface and offering countersunk upper and lower extremities, the forward wall of this same vertical bushing affording support to a horizontal
35 bushing paired with the aforementioned horizontal pivot about which the blade assembly is caused to rotate.

With regard to the increased degree of lift achieved by the pair of blades, this is brought about by the inclusion of

a pair of actuator cylinders converging rearwards, whose hinge-pins are located upon a rear-extending portion of the plough-to-vehicle chassis and whose rod-extremities hinge with respective bushings which in turn mate with a pair of
5 horizontal pivots attached to the blade-rears; the said pair of rearwardly-converging cylinders being inclined upward toward the blades, the distance between the anchor points of each cylinder and relative rod being greater than that between those of the aforesaid articulating parallelo-
10 gram.

With regard to the central buffer element, this shows a forward surface area curving away in two directions in such a way as to maintain unbroken contact with the two blade-end inner surfaces. Speedier fitting-up to the prime mover is
15 obtained by two double-articulated couplings which make use of a safety mechanism preventing their becoming unhitched. Advantages offered by the invention are these: the use of a single adjustable wedge-formation snowplough capable of inclining forward or to the rear regardless of the blade aspect,
20 instead of two separate ploughs -one fixed-angle wedge and the other, an inclining single blade: this signifies a marked saving in capital outlay, time, garaging space and maintenance; the possibility of obtaining side-on angle of more than 45°; speedy and exact hitching even though the plough may
25 be out of horizontal and not perfectly lined up with the tractor linkage -for instance separated by ten centimetres or so; perfect union between the central element and the blades regardless of the latter's position whether angled or aligned at 180°; greater lift from ground level for passing
30 over obstacles.

An embodiment of the invention will now be described in detail, by way of example, with the aid of the seven sheets of drawings attached, in which:

35 fig 1 is a plan of the contrivance in part-section, hitched to the front of a motorised vehicle and having blades disposed perpendicular to the ground in symmetrical wedge-formation;

fig 2 is the same part-section plan of the contrivance in

fig 1, in this instance with blades fully extended and aligned, and disposed perpendicular to the plough's longitudinal axis of forward motion;

fig 3 is a plan of the contrivance as in fig 2, with blades
5 angled away from the said longitudinal axis into a side-on aspect;

fig 4 shows a longitudinal section through IV-IV of fig 2, in vertical elevation -showing the invention's actuator mechanisms;

10 fig 4' shows a horizontal section through IV'-IV' of fig 4, demonstrating the central buffer element in its aligned-blade position;

fig 4'' shows a similar section to that of fig 4' in which the blades are shown in wedge-formation;

15 fig 5 is a frontal view of the extended and aligned pair of blades showing a pair of tractor wheels in their background;

fig 6 is the same frontal view as fig 5 though with blades in wedge-formation;

fig 7 shows the vertical section through VII-VII of fig 2,
20 on larger scale, illustrating the shoe, or skid, affording support to each blade;

fig 8 shows a detail of fig 4 seen in cross-section demonstrating the coupling which allows the blades to oscillate transversely;

25 fig 9 shows the side view of a part of fig 4 drawn in part-section so as to reveal the method of quick hitching between plough and prime mover;

fig 10 is a horizontal section through X-X, fig 9.

With reference to the drawings, 1 and 2 denote the pair of
30 plough blades; 3 denotes the central buffer element set at the join of the actual blades, 4 and 5 denote a pair of upper central horizontal lugs protruding from the blades, offset in terms of height and paired with a vertical pivot 6, this in turn pairing in its upper region with a horizontal plate
35 7 which forms the upper rearwardly-disposed component of central buffer element 3; 8 denotes a horizontal yoke, disposed to the fore and hinging with the uppermost portion of pivot 6, operation of said yoke 8 bringing about the inclin-

ation forward or to the rear of blades 1 and 2 with respect to the vertical; the lower branch of yoke 8 makes slip-contact with the topside of plate 7, whilst the upper branch of same is offered to a nut 9 securing the uppermost extremity of pivot 6, the interspace between said branches serving to accommodate the rearmost overlapping portions of lugs 4 and 5; 10 denotes a pair of side-irons made fast to the flanks of prime mover 11 and interconnected at the fore-ends by a vertical transverse sub-chassis 12; 13 denotes pairs of quick-release couplings -upper and lower- between sub-chassis 12 and side-irons 10; a chassis-extension denoted by 14 and occupying space to the rear of sub-chassis 12 offers anchor-points for actuator mechanisms; 15 denotes two pairs of arms, each pair lying parallel within a vertical plane, hinged hindmost to sub-chassis 12 and at the fore to two pivots 16 paired with respective horizontal bushings 17, each of the latter being affixed at a tangent to a relative vertical bushing 18 set forward therefrom, said bushings 18 interconnected by a vertical pivot whose extremities form part of turning pairs capable of transverse oscillation; 20 denotes a bushing ensheathing the intermediate portion of last-mentioned vertical pivot 19-19', and furnished at the fore with a transverse bushing 21 pairing with and bearing up a horizontal pivot 22 affixed to a centrally-located pair of vertical lugs protruding rearward from central buffer element 3; more exactly - the end portions of pivot 19 are in fact cylindrical, whilst the intermediate stretch 19' (see figs 4 & 8) is prismatic in section and pairs with bushing 20 allowing a certain degree of play, the latter's internal surface section being likewise prismatic, the resulting pair allowing oscillation of blades 1 and 2 occasioned by unevenness in the ground surface; bushing 20 also offers countersunk upper and lower extremities; furthermore, and for the sake of exactitude, that composite whole formed by arms 15 plus the portion of sub-chassis 12 lying between rear anchor-pivots of said arms themselves, also said horizontal pivots 16 with their relative bushings 17 interconnected by way of respective bushings 18 pairing with extremities

19 of aforesaid vertical pivot 19' all combine in forming an articulating parallelogram; 23 denotes a centrally-located oil-hydraulic actuator cylinder hinged at the rear to sub-chassis 12 and with its rod 24 extremity hinged about
5 a transverse pivot 25 lodged between the upper pair of arms 15 to the end of raising and lowering the plough; 26 and 27 denote a pair of oil-hydraulic actuator cylinders hinge likewise to sub-chassis 12 and converging to the fore, where respective rods 28 and 29 have their extremities hinged about
10 respective pivots 30 and 31 which converge rearward from their mountings at the hindmost part of yoke 8 providing for control of the angle of inclination assumed by blades 1 and 2 with respect to the vertical when turned about horizontal pivot 22 forward or to the rear; 32 and 33 denote
15 a further pair of oil-hydraulic actuator cylinders converging toward the rear and hinged at points upon chassis-extension 14, the respective rods thereof 34 and 35 hinging by way of pivots 36 and 37 to the rear faces of blades 1 and 2 respectively thus providing for overall transverse
20 orientation of the latter about vertical pivot 19 and for angular positioning thereof with respect to pivot 6; pivots 36 and 37 are located vertically within the lugs of respective bushings 38 and 39 pairing with further, relative horizontal pivots 40 and 41 carried by appendages 42 projecting
25 forth from the rear surfaces of blades 1 and 2; 43 denotes skids for guidance of blades 1 and 2 and for provision of ground support thereto; the upper plate 7 of central buffer element 3 affords a cylindrical protrusion 44 establishing the limit stop for blades 1 and 2 in their aligned position,
30 this reached upon closing thereabout of the two arc recesses 45 of aforesaid upper horizontal lug plates 4 and 5.
With reference to fig 3, A represents the angle formed between the centre axis C of blades 1 and 2 and the longitudinal axis L of the contrivance proper, produced by rotation
35 of blades 1 and 2 through a horizontal plane with respect to pivot 19; 46 denotes the lower plate appendage of central buffer element 3 which combines with upper plate 7 in supporting vertical pivot 6; 47 denotes a plate form-

ing an upper appendage of lower plate 46 and creating a pocket 48 therewith in which to accommodate that lower pair of lugs 49 and 50 protruding from blades 1 and 2 which correspond to upper lugs 4 and 5, each said lug 49 and 50 being paired with vertical pivot 6; forward-facing flanks denoted by 49' and 50' relative to the side- and rear-extending portions 49" and 50" of each respective lug, perform the function of checking flanks offered thereto by buffer element 3 (see figs 4' and 4").

10 With reference to fig 7, 51 denotes a pair of lugs relative to each of pivots 40 and 41 and engaging -height adjustably- with uprights 53 whose lower regions bear pivots 54 paired with the lugs of skids 56 aforementioned, these in turn connecting by way of struts 59 with the pivots 57 of further lugs 58 protruding from each of blades 1 and 2; 60 and 61 (in figs 9 and 10) denote two pairs of vertical pins, lower and upper respectively, each provided with an undercut 62 and fitted in pairs to the fore-ends of side-irons 10; 63 denotes two pairs of brackets, both capable of vertical oscillation and provided with a hole 64 at the rear extremity of the single bracket arm 63 by means of which to engage the undercut portion 62 of each of pins 60 and 61, the hole diameter 64 being greater than that of the latter; the inner fore-end of each bracket arm 63 is furnished with a pair of vertical lugs 65 paired about a single horizontal pivot 66 whose bearer bushing 67 incorporates a radially-disposed appendage 68 directed toward the rear and hinged in turn to a further horizontal pivot 69 lodged between a pair of vertical lugs 70 protruding forward from sub-chassis 12; 71 denotes a handgrip affixed to each bushing 67 and held thus by safety rings 72 in the correct position assumed upon fitting of sub-chassis 12 to the pair of vehicle side-irons 10. R denotes the straight line passing through the centre points R1 and R2 of pivot 66 and the undercut portion 62 of either pin 60 and 61, respectively. When in fitted position, the centre point R3 of pivot 69 lies outside the path of straight line R and toward its relative bracket arm 63 thus ensuring a secure and stable fit; 73 denotes a vertical

transverse plate attached to side-irons 10 and offering a centre aperture 74 through which -to the end of obtaining a properly-centred hitch- the extension 14 of sub-chassis 12 is directed.

5 Function of the contrivance is as follow: beginning from the snowplough position in fig 1, with blades 1 and 2 disposed vertically and in wedge-formation -i.e. parallel with and resting on the ground- retraction of the rods 28 and 29 of cylinders 26 and 27 brings the plough into that position
10 wherein blade fore-ends incline rearward and skids 43 are caused to slide along the ground -thus lessening the volume of snow shifted in order to proceed more easily over heavily-covered ground- extension of said rods bringing about the corresponding tilt forward of blade fore-ends toward the
15 ground and the raising of skids 43 - this for the purpose of scraping a centre path - both such movements produced by a turn upon pivot 22 and furnishing the possibility of inclining the wedge apex forward or to the rear by virtue of blades' 1 and 2 being turned as one with buffer element 3,
20 since locked thereto by flanks 49' and 50' around the axis of aforesaid horizontal pivot 22; the passage from wedge-formation in fig 1 to full alignment of blades 1 and 2 as illustrated in fig 2 is brought about by extension of the rods 34 and 35 of cylinders 32 and 33; it will be seen that
25 forward and rear angling of the top-edge of aligned blades 1 and 2 is rendered possible by the presence of horizontal pivots 40 and 41, which in fig 2 lie parallel with that pivot 22 offering rotation to central buffer element 3; in gaining the side-on angle defined by A in fig 3, the aligned
30 blades 1 and 2 move by means of retraction of rods 34 and 28 into respective cylinders 32 and 26, and extension from cylinders 33 and 27 of respective rods 35 and 29; in the position thus achieved, the centre point of cylindrical protrusion 44 issuing from buffer element 3 coincides with
35 the centre axis C of blades 1 and 2 and aligns thus with pivots 6 and 19, the latter pivot constituting vertical axis of rotation proper for the plough when in aligned-blade position; it will be observed that in this position, by

working cylinders 26 and 27 so as to retract rods 28 and 29 relative thereto, the blades' top-edge will be tilted to the rear whilst skids 43 remain planted and, conversely, extension of the same rods will tilt the blade forward whilst raising the skids.

With reference to fig 4, working of cylinder 23 causes the plough to be raised for the purpose of transit, or lowered to the point of its resting upon the ground -at which juncture, by allowing the cylinder further stroke such as will separate the lower extremity of bushing 20 from bushing 18 therebeneath, the plough is made capable of vertical oscillation by means of which to override small obstacles within its path; thanks to the nature of bushing 20 (see fig 8) the snow-plough may also oscillate transversely with respect to axis C.

Raising of the plough is achieved by extending the rod 24 of cylinder 23 in order to lift arms 15 of the articulating parallelogram -viz. 12, 15 and 19', during the course of which the vertical angle described between arms 15 and cylinder pair 32 and 33 disappears giving way to an angle of opposed apex, by dint of the distance between hinge-pins of each arm being less than that between those of each of the pair of cylinders 32 and 34 with their respective rods, thus giving an automatically clean and completely even lift by means of which to close the gap existing between the uppermost face of bushing 20 and the lower face of bushing 18 lying thereabove -a greater degree of lift being achieved thus than offered by the prior art.

It will be observed further that central buffer element 3 offers a vertical concave face to the fore and a transverse concave profile to the rear in order to maintain unbroken contact with blades 1 and 2 in whatever position; moreover the centre body portion of the element is hollow, the cross-section thereof showing a rounded forward profile and a rectilinear profile to the rear, the lower region of which offering a pair of stop-flanks to blades 1 and 2 during closure of the latter; supporting lugs for horizontal pivot 22 issue forth from the vertical transverse rear buffer wall whilst resting upon aforesaid lower plate 47 protruding

rearward from the said buffer element.

When carrying the invention into effect, materials employed, dimensions, and constructional details may differ from those described herein whilst retaining equivalent technical validity, and by no means straying from within the
5 bounds of protection afforded to the invention as claimed below.

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CLAIMS

1. A contrivance for moving snow, gravel and soil comprising a pair of blades (1 & 2) with central buffer element, a double vertical articulating parallelogram (15) carrying
5 said blades (1&2) from anchor points upon a sub-chassis (12) forming transverse member to a pair of irons (10) made fast onto the sides of a tractor (11), an actuator cylinder for working said parallelogram, a pair of actuator cylinders converging rearward for varying the mutual angle of said
10 blades when in wedge-formation and for lateral orientation of the single blade formed by said blades (1 & 2) when aligned, a pair of skids (43); and characterised by the fact that the blades (1 & 2) are matched without break to a central buffer element (3) offering a concave vertical face
15 transversely and to the fore and are borne up by way of three pivots: a first vertical pivot (6) passing through said central buffer (3), a second vertical pivot (19) whose extremities are carried in rotation thus at converging fore-ends of the two pairs of arms (15) contributing to said articulating
20 parallelogram and hinged hindmost to that vertical transverse sub-chassis (12) interconnecting the pair of sideirons (10) affixed to the prime mover (11) for the purpose of carrying the contrivance, and a horizontal pivot (22) mounted to a pair of rearwardly-disposed vertical lugs whilst intercon-
25 necting the fore-section of a bushing (20) ensheathing the intermediate portion (19') of said pivot (19) with the rear of central buffer element (3) whence protrudes the said pair of vertical lugs.

2. Contrivance according to claim 1, characterised by the
30 fact that the first said vertical pivot (6) offers threaded extremities pairing with relative nuts, the overlapping extremities of two pairs of lugs -upper (4 & 5) and lower (49 & 50)- protruding from the rear of said blades (1 & 2) and pairing with said vertical pivot (6); the extremities
35 of upper said pair of lugs (4 & 5) accommodated within a horizontal yoke (8) serving to control the angle of inclination assumed by central buffer (3) with respect to the vertical and retained uppermost by that nut (9) secured to the

upper threaded extremity of aforesaid pivot (6); the extremities of lower said pair of lugs (49 & 50) accommodated within a pocket (48) created between a pair of horizontal plates (46 & 47) incorporated into the body of said central buffer (3); the lower (46) of said horizontal plates offering one face to the nut securing that lower extremity of pivot (6), remaining plate (47) extending toward the rear in like manner to upper plate (7) of the central buffer (3) so as to combine therewith in providing support for aforesaid vertical rear lugs thereof.

3. Contrivance according to claim 2 characterise by the fact that said horizontal control yoke (8) is provided at the rear with a pair of lateral pivots (30 & 31) converging rearward and offering hinge-pins to the rod-extremities from a pair of oil-hydraulic actuator cylinders hinged hindmost to the vertical transverse sub-chassis (12) interconnecting the side-irons (10) afore-mentioned made fast to prime mover (11).

4. Contrivance according to claim 1 characterised by the fact that upper and lower extremities (19) of the second said vertical pivot pair in rotation with a pair of bushings (18) whilst secured thereto by relative axially-disposed nuts; a further bushing (17) being affixed at a tangent to the rear of each of bushings (18) and pairing with a horizontal pivot (16) serving as anchorage for either of the two said pairs of arms (15) articulated through raising or lowering by means of actuator cylinder (23), the latter being hinged to said vertical transverse chassis (12) and directed forward and upward therefrom.

5. Contrivance according to claims 1 and 2 characterised by the fact that end-portions of aforesaid lower pair of lugs (49 & 59) are provided with appendages (49' & 50') beyond the level of said first pivot (6) whose forward flanks (49' & 50') perform the function of checking the spread of blades (1 & 2) by abuttal with the flanks of the lower region of central buffer element (3), this signifying the forward limit of the said pocket (48) in which the said lugs are duly accommodated.

6. Contrivance according to claim 5 characterised by the fact that the upper face of upper plate (7) surmounting central buffer (3) exhibits a cylindrical protrusion (44) at its fore-end about whose flanks the semi-circular recesses formed at the forward extremities of upper lugs (4 & 5) are caused to enclose when blades (1 & 2) are in the aligned position.

7. Contrivance according to claims 1 and 4 characterised by the fact that the intermediate portion (19') of the said second vertical pivot lying between the two extremities thereof (19) is prismatic, and mates with the prismatic internal surface of a vertical bushing (20) allowing a degree of play thereto and showing countersunk upper and lower extremities.

8. Contrivance according to claim 1 characterised by the fact that the blades (1 & 2) are provided with a pair of horizontal pivots (40 & 41) to the rear about which a pair of horizontal bushings (38 & 39) may hinge, these in turn hinging with rod-extremities (34 & 35) of a pair of oil-hydraulic actuator cylinders (32 & 33) hinged hindmost onto a rear-extension (14) of vertical transverse sub-chassis (12); the distance between hinge-pins of single cylinders (32 & 33) and respective rods (34 & 35) being greater than that between hinge-pins afforded to the arms (15) of the said articulating parallelogram.

9. Contrivance according to claim 1 characterised by the fact that the vertical and transverse sub-chassis (12) is furnished with upper and lower pairs of quick-release couplings (13), each comprising: a pin (60 or 61) affixed to respective side-iron (10) -protruding downward and upward respectively- and provided with an undercut portion (62); a horizontal bracket arm (63) provided at rear with a hole (64) of greater diameter than that of said pin (60 or 61) by means of which to engage undercut (62) allowing a degree of play to said pin, and at the fore with a pair of vertical lugs (65) provided with holes for lodging of a horizontal pivot (66) whose bushing (67) is furnished not only with a hadgrip (71) directed inward and made secure to sub-chassis (12) by way of safety-link (72) upon hitching of

the contrivance, but also with a radially-disposed appendage (68) set to the rear and provided with aperture for insertion of a pivot (69) lodged between a pair of vertical lugs (70) issuing forth from said sub-chassis (12); the hitch
5 being secure when straight line (R) passing through the centre-axis (R2) of undercut (62) and the centre-axis (R1) of pivot (66) lying within bushing (67) carrying hadgrip (71) is found to be displaced inward with respect to the axis (R3) of that pivot (69) carried by the pair of vertical
10 lugs (70) protruding forward from vertical transverse sub-chassis (12).

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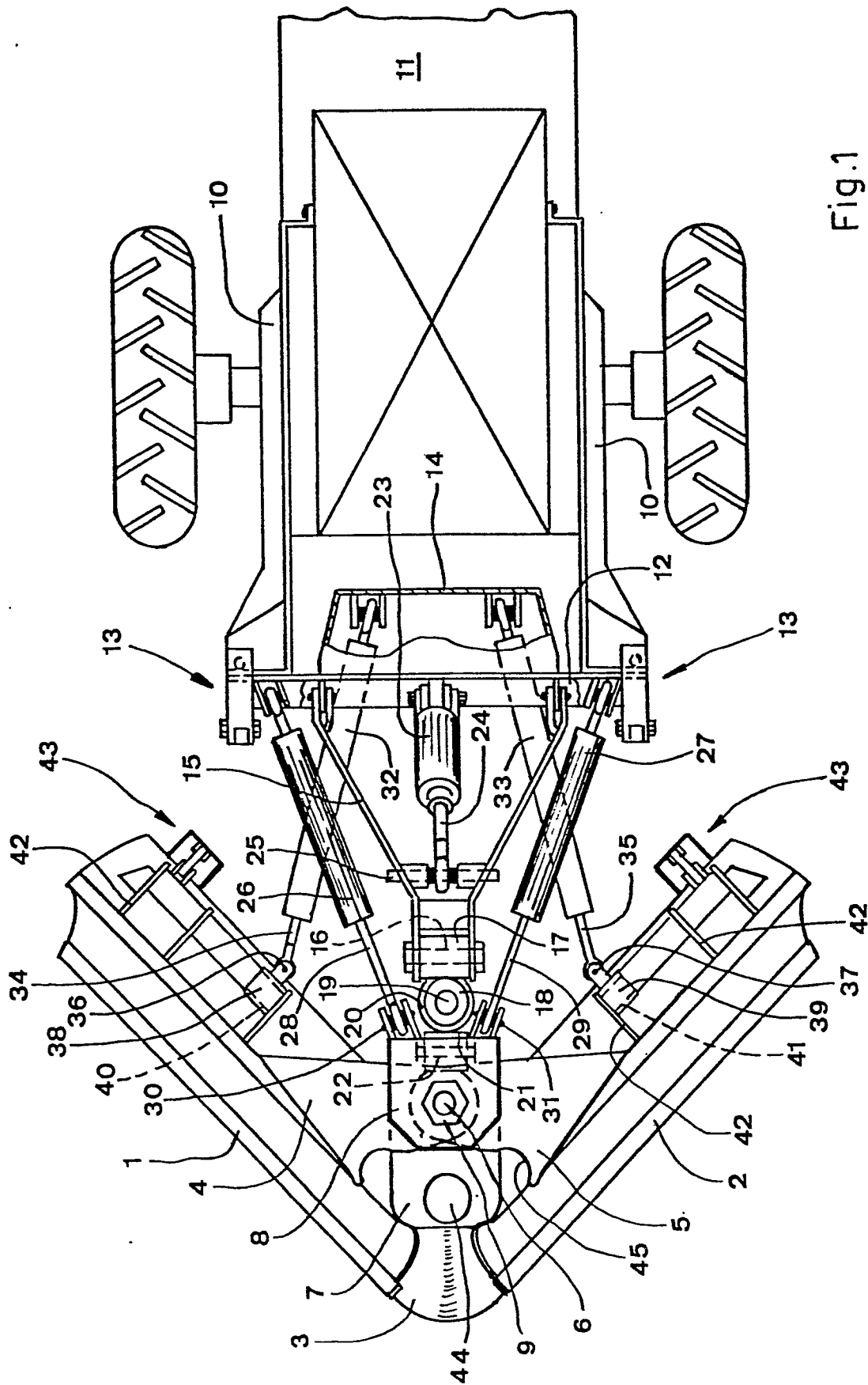


Fig.1

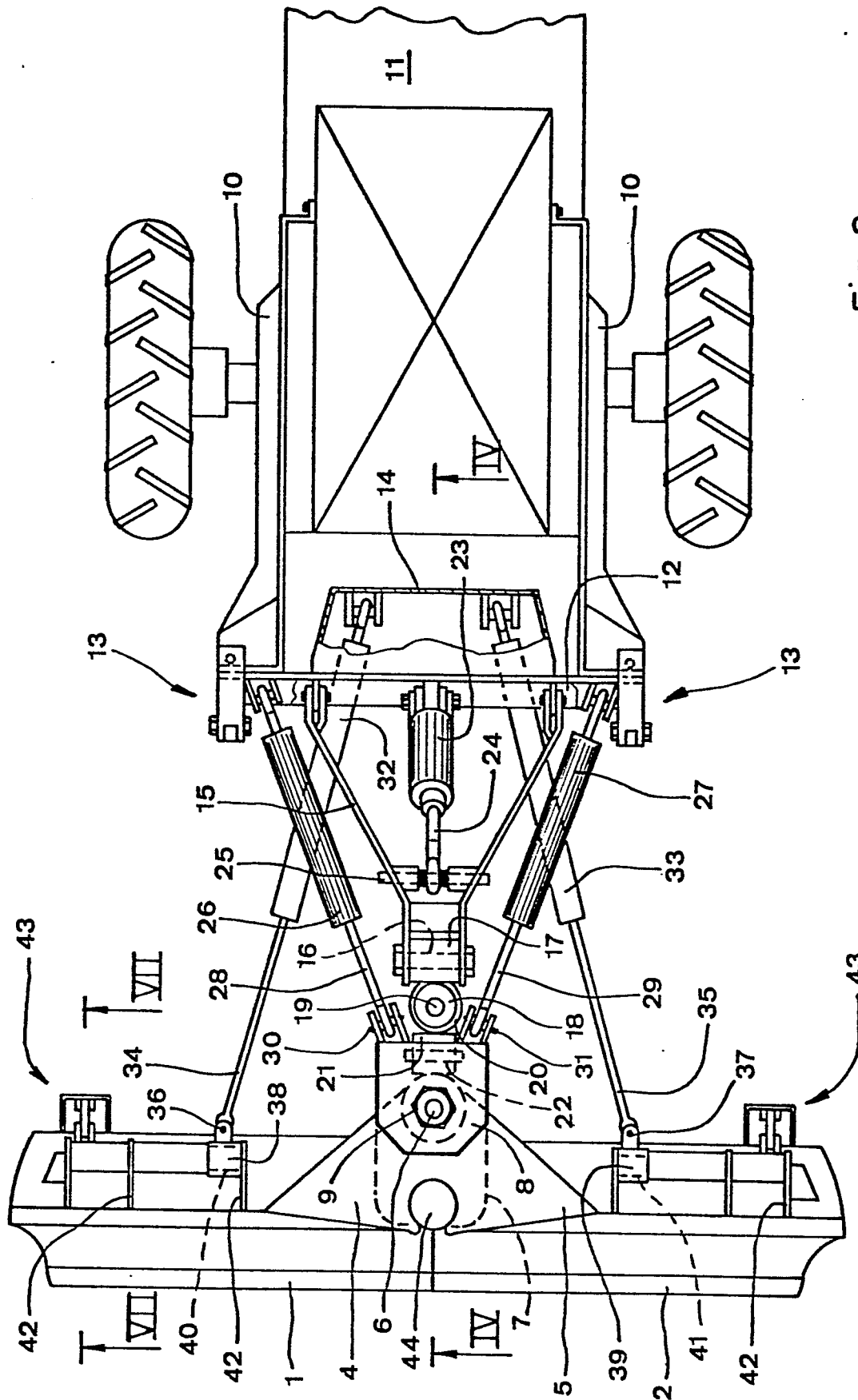


Fig. 2

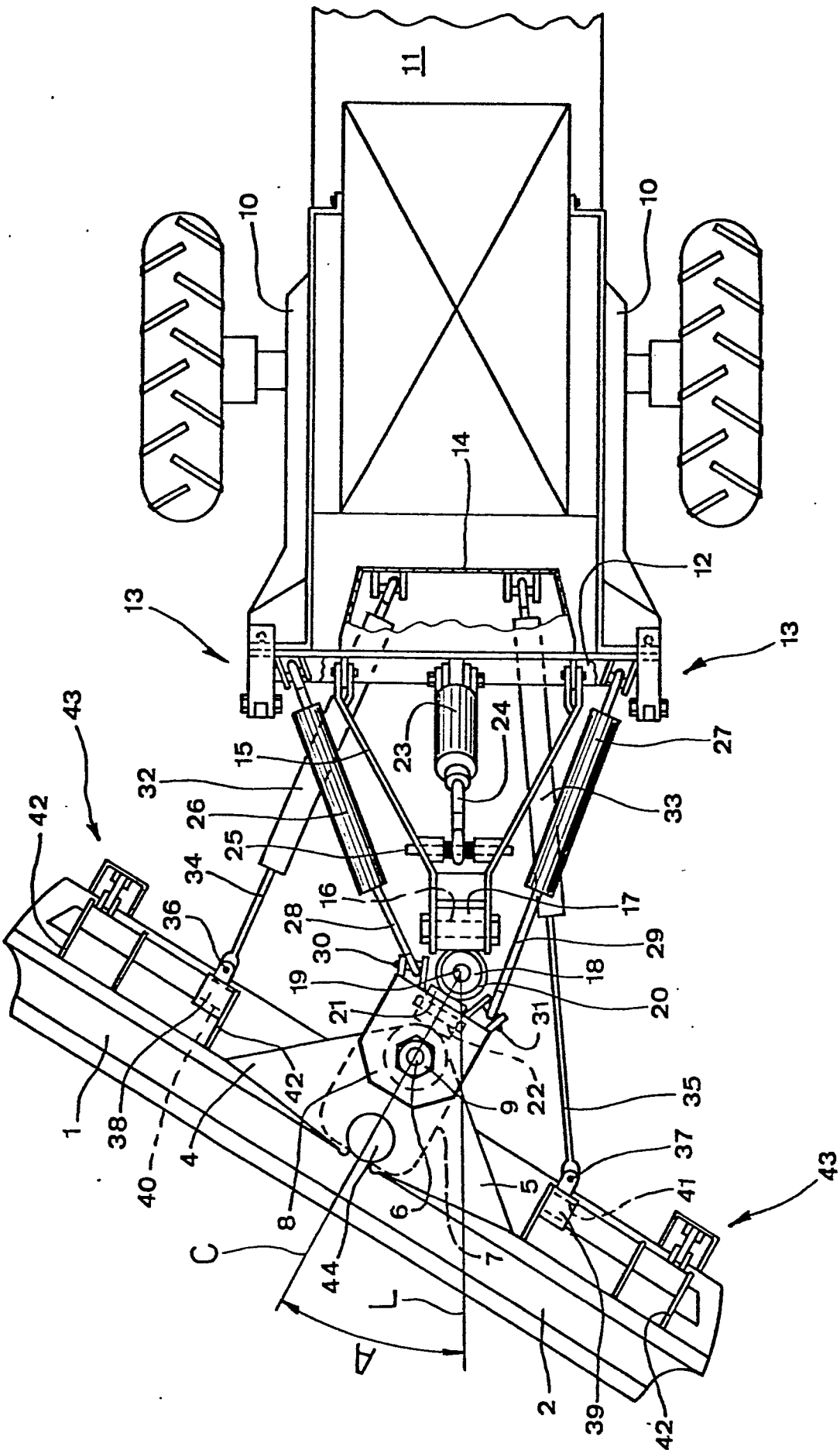


Fig.3

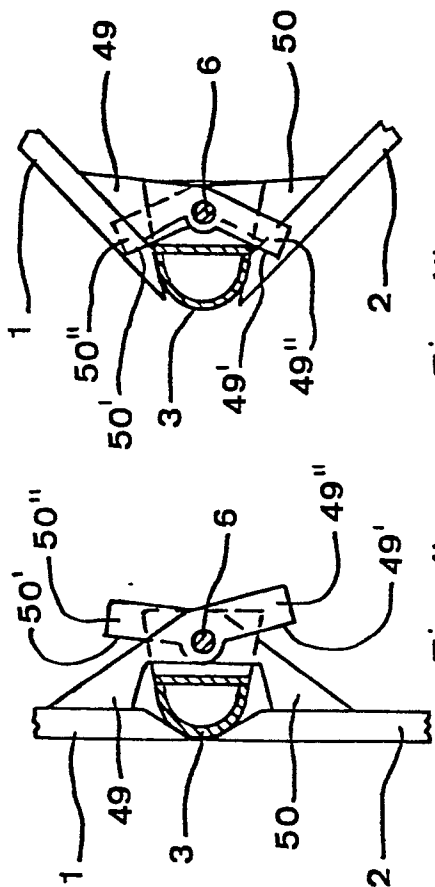


Fig. 4'

Fig. 4''

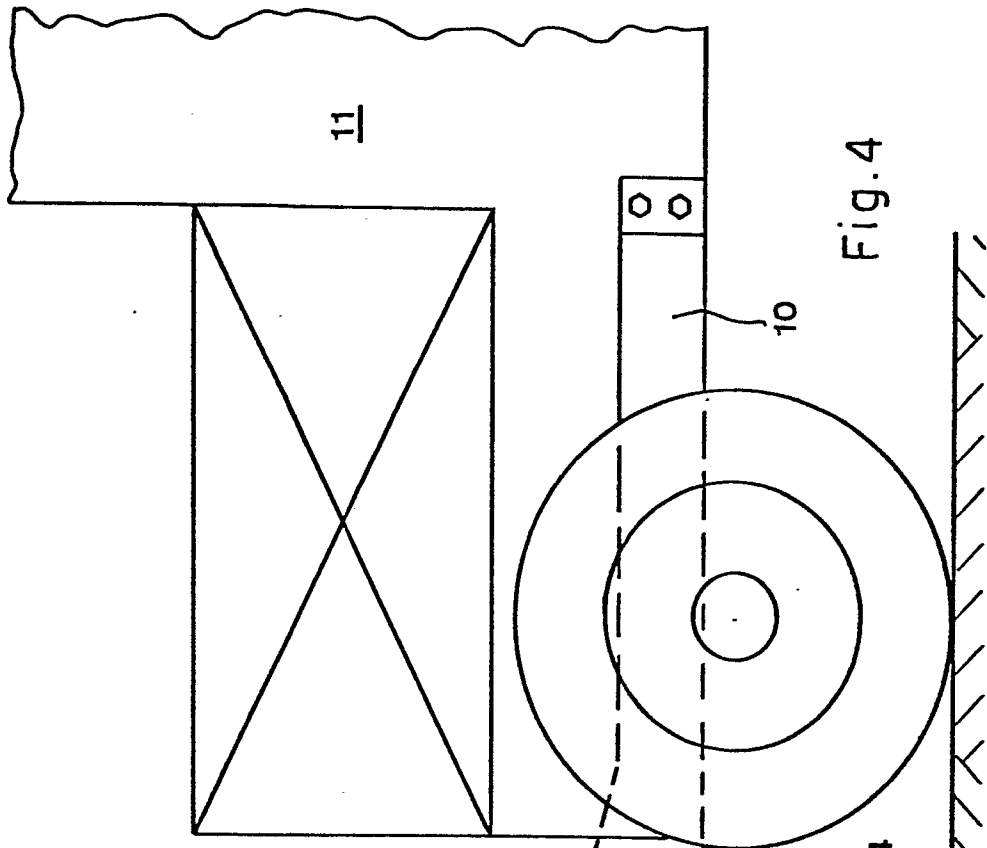
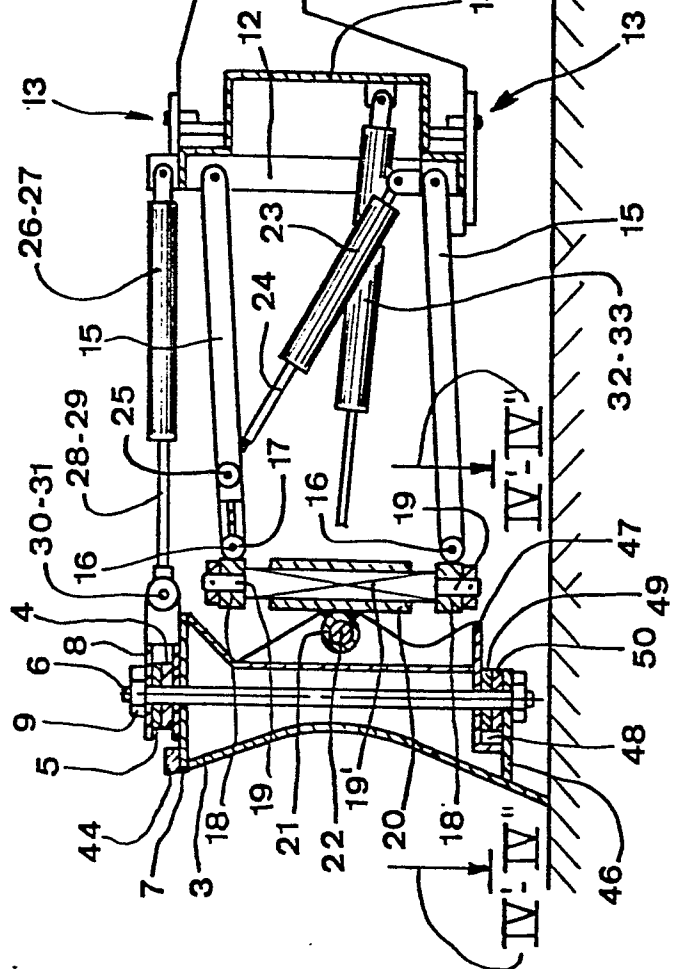


Fig. 4



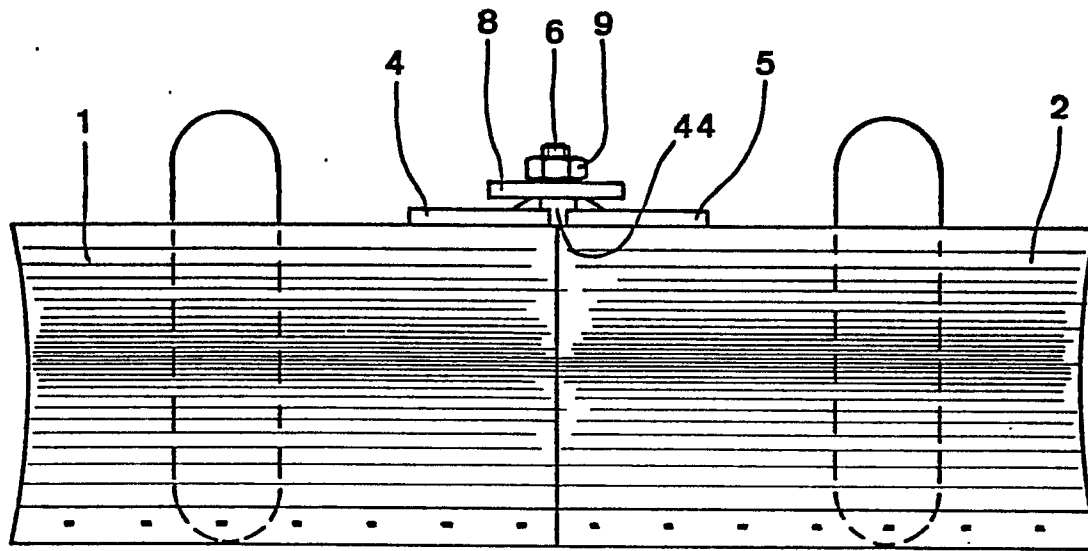


Fig. 5

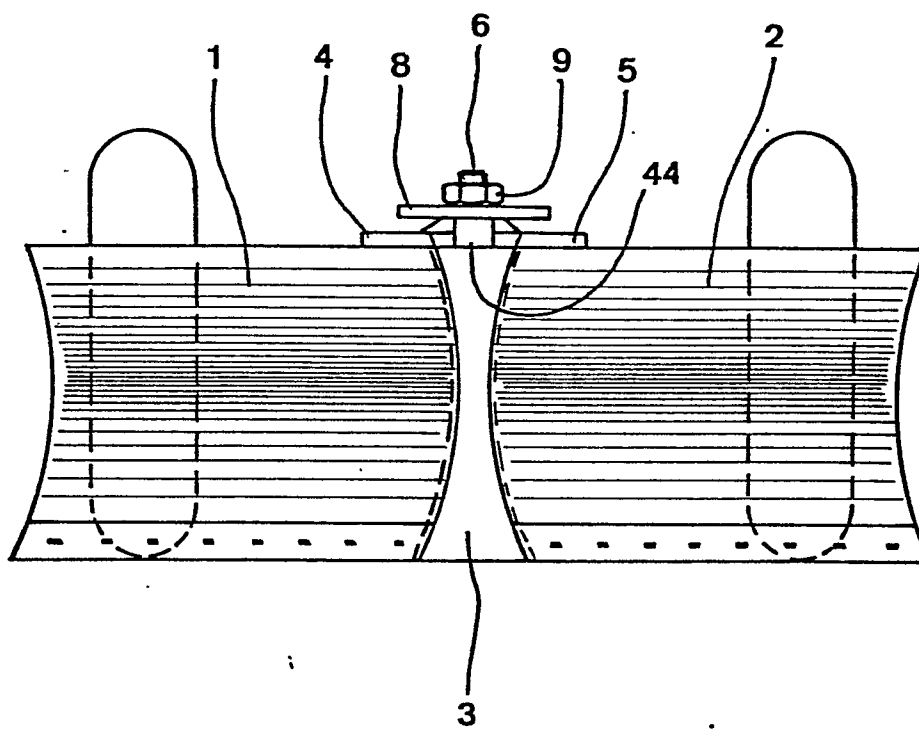


Fig. 6

