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(54) **A compactor**

(57) A compactor (1) comprises a support member (2, 6). A base plate (3) is mounted for vibration on the support member (2, 6) and a motor (4) mounted on the support member (2, 6). The output of the motor (4) is coupled to the base plate (3) to cause vibration of the base plate (3), in use. A mounting device (10) mounts a handle (9) on the support member (2, 6). The mounting

device (10) comprises an elastomeric member (12) with the support member (2, 6) coupled to one side of the elastomeric member (12) and the handle (9) pivotally coupled to the other side of the elastomeric member (12). A mass (11) is mounted on the mounting device (10) and the centre of weight of the mass (11) substantially coincides with the pivoting axis of the handle (9).

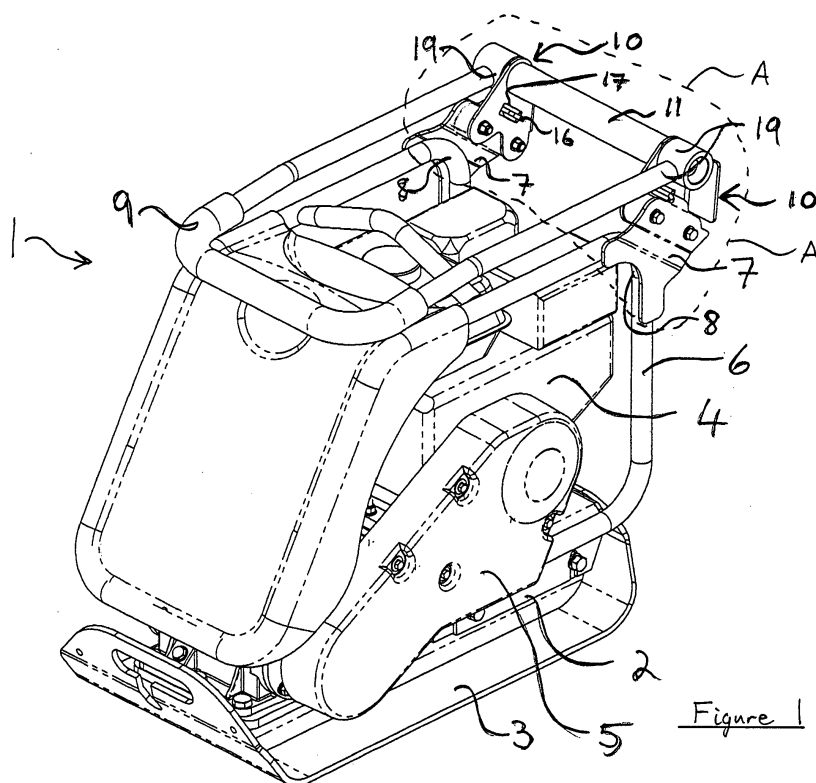


Figure 1

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Description

[0001] The invention relates to a compactor and especially, a ground compactor for compaction of granular materials, such as gravel, soil, sand, hardcore materials and other aggregates, and/or paving materials such as paving block, paving slabs, flagstones and asphalt.

[0002] Conventional plate compactors use a motor, such as a petrol or diesel engine to vibrate a base plate below the motor. The base plate is generally weighted to increase the compaction of the material to be compacted. The compactor includes a handle which is held by an operator to control the movement of the compactor across the material being compacted. Hence, the handle is also subject to the vibration generated by the compactor.

[0003] This vibration can cause a medical condition known as vibration induced white finger (VWF) which can result in loss of ability to grip properly. Therefore, the vibration of compactors limits the safe working time that an operator can continually use the compactor.

[0004] In accordance with a first aspect of the invention, there is provided a compactor comprising a support member, a base plate mounted for vibration on the support member, a motor mounted on the support member, the output of the motor being coupled to the base plate to cause vibration of the base plate, in use, a handle and a mounting device to mount the handle on the support member, the mounting device comprising an elastomeric member with the support member coupled to one side of the elastomeric member and the handle pivotally coupled to the other side of the elastomeric member, and a mass mounted on the mounting device, the centre of weight of the mass substantially coinciding with the pivoting axis of the handle.

[0005] An advantage of the invention is that vibration of the handle of a compactor can be reduced by coupling the handle to the support member via an elastomeric member and by providing a mass centred on the pivoting axis of the handle.

[0006] Preferably, the mass is located on the handle side of the elastomeric member.

[0007] Typically, the pivotal axis of the handle is offset from the central axis of the elastomeric member.

[0008] Preferably, the mounting device comprises a first mounting plate and a second mounting plate, the elastomeric member being located between the mounting plates and the first mounting plate having the support member coupled thereto and the second mounting plate having the handle coupled thereto.

[0009] Typically, the support member is fixedly attached to the first mounting plate.

[0010] Typically, the handle is pivotally coupled to the second mounting plate.

[0011] The mounting device may comprise a stop to limit pivoting movement of the handle in one direction. In one example of the invention the mounting device comprises two stops to limit pivoting movement of the

handle in both directions. Typically, where the mounting device includes first and second plates, the stop (or stops) are formed on the second mounting plate.

[0012] Preferably, the mounting device comprises two elastomeric members, and the support member is coupled to a side of each elastomeric member and the handle is coupled to the opposite sides of the elastomeric members. Where the mounting device includes first and second mounting plates, the elastomeric members are located between the mounting plates in side-by-side arrangement. It is also possible that more than two elastomeric members could be used.

[0013] Typically, the handle may be coupled to the support member at two separate locations, each location having a separate mounting device. The handle may comprise two leg sections, each leg section being coupled to the support member by a mounting device. For example, the handle could be generally U-shaped, with each leg of the U being coupled to the support member by a separate coupling device, and the central portion of the U forming a grip section to be held by an operator.

[0014] Preferably, where the handle has two legs, both legs being coupled to the support member, the mass is located between the legs of the handle and is coincident with the pivoting axis of the handle. For example, the mass may be in the form of a cross bar between the pivot points of the handle. This has the additional advantage of helping to increase the rigidity of the handle.

[0015] Preferably, the mass has weight of at least 2kg, and preferably at least 5kg.

[0016] Typically, the elastomeric member may be cylindrical with an end of the cylinder coupled to the support member and the other end of the cylinder coupled to the handle. The elastomeric member may be manufactured from an elastomeric material, such as rubber or another material having rubber-like mechanical properties.

[0017] Examples of a compactor in accordance with the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a perspective view from the front and side of a first example of a plate compactor with a handle in a folded position;

Figure 2 is a rear view of the compactor shown in Figure 1;

Figure 3 is an enlarged side view of the section A in Figure 1;

Figure 4 is a perspective view from the side and rear of section A;

Figure 5 is an exploded view of the handle and mounting assembly of the compactor shown in Figure 1;

Figure 6 is an exploded view showing the connection of the handle and mounting assembly to the compactor;

Figure 7 is a cross-sectional view along the line BB of Figure 3;

Figure 8 is a perspective view from the front and side of a second example of a plate compactor with a handle in a folded position;

Figure 9 is a perspective view from the side and rear of the compactor shown in Figure 8;

Figure 10 is an enlarged view of section C in Figure 9;

Figure 11 is an enlarged view of section C from a different angle;

Figure 12 is an exploded view of a mounting assembly for the compactor of

Figures 8 and 9 with the handle omitted for clarity.

Figure 13 is a side of a part of the compactor of Figures 8 and 9 with the handle in an operating position; and

Figure 14 is a perspective view of the part of the compactor shown in Figure 13;

[0018] Figures 1 and 2 show a first example of a plate compactor 1. The compactor 1 is of the type conventionally known as a plate compactor. The compactor 1 includes a main body 2 on which is mounted a base plate 3. Mounted on the main body 2 is a motor 4. The output from the motor 4 drives a conventional vibration generating mechanism via a drive belt contained in a drive belt housing 5. Also attached to the main body 2 is a frame 6, which has two mounting assemblies 10 attached at the rear, upper corners 8 of the frame 6.

[0019] The mounting assemblies 10 are used to mount a handle 9 on the frame 6. Interconnecting the mounting assemblies 10 is a weighted cross bar 11. The bar 11 typically has a weight of 5kg.

[0020] Figures 3 and 4 are enlarged side and perspective views respectively of section A of Figure 1. These figures show the mounting assemblies 10 in more detail. The mounting assemblies 10 each include two rubber bushes 12, a frame plate 7 and a handle mounting plate 13. The plates 7 are attached to the upper corners 8 of the frame 6, for example, by welding of the plates 7 to the upper corners of the frame 6. The plates 7, 13 are attached to opposite sides of the rubber bushes 12 by bolts 14 and nuts 15. In addition, the plate 7 has a flange 16 that engages in a slot 17 in the plate 13. This limits movement of the plate 13 relative to the plate 7 and so limits shear and twisting stresses on the bushes 12.

[0021] Pivotaly mounted on the plates 13 are respective ends 19 of the handle 9. The handle is generally U-shaped with the central section of the handle 9 forming a grip section 30. The ends 19 of the handle 9 are attached to the opposite ends of the bar 11 by bolts 20 that pass through bushings 21 located in the handle ends 19 and holes 22 in the plates 13 and engage with threaded bores 23 in the ends of the bar 11, as shown in Figure 5. Figure 5 also shows that the bushes 12 each include a threaded stud 27 that enables the bushes 12

to be attached to the plates 13 by means of a nut 15. Figure 6 shows how the bushes 12 attach to the plates 7 by means of bolts 14 that engage with threaded bores 25 in the bushes 12. Figure 7 is a cross-section that shows the bushes attached to the plates 7, 13 and the bar 11 and handle ends 19 pivotally coupled to the plates 13.

[0022] In use, the handle 9 is pivoted back about the pivot connection with the plates 13 until the grip section 30 of the handle is behind the mounting assemblies 10. Backward pivoting of the handle 9 is limited by stop 18 on the plates 13. When the motor 4 is started the compactor 1 can be used by an operator, who holds the grip section 30 of the handle 9.

[0023] During operation the presence of the rubber bushes 12 helps to mechanically isolate vibration of the compactor main body 2 from the handle 9. In addition the vibration is further reduced by the weight in the form of the cross-bar 11 that interconnects ends 19 of the handle 9. In addition, the bar 11 helps to increase the rigidity of the handle 9. As the bar 11 is concentric with the pivoting point of the handle 9, an operator is not fatigued by having to lift the weight of the bar 11 on the handle as the weight of the bar 11 is balanced on the handle 9.

[0024] Figures 8 and 9 show a second example of a plate compactor 41. The compactor 41 is also of the type conventionally known as a plate compactor and is generally similar in basic construction and operation to the compactor 1 described above. The compactor 41 includes a main body 42 on which is mounted a base plate 43. Mounted on the main body 42 is a motor 44. The output from the motor 44 drives a conventional vibration generating mechanism via a drive belt contained in a drive belt housing 45. Mounted on the rear of the main body 42 are two mounting assemblies 410.

[0025] The mounting assemblies 410 are used to mount a handle 49 on the main body 42. Interconnecting the mounting assemblies 410 is a weighted cross bar 411. The bar 411 typically has a weight of 5kg.

[0026] Figures 10 and 11 show the mounting assemblies 410 in more detail and Figure 12 shows an exploded view of the mounting assemblies 410 and the cross bar 411. The mounting assemblies 410 each include two rubber bushes 412, a main body plate 47 and a handle mounting plate 413. The plates 47, 413 are attached to opposite sides of the rubber bushes 412 by bolts 414 and nuts 415. In addition, the plate 47 has an aperture 416 through which the bar 411 extends. The aperture 416 is of a size such that flexing of the rubber bushes 412 is permitted but limits movement of the bar 411 and therefore, plate 413 relative to the plate 47 so that excessive shear and twisting stresses are not applied to the rubber bushes 412.

[0027] Pivotaly mounted on the plates 413 are respective ends 419 of the handle 49. The ends 419 of the handle 49 are attached to the opposite ends of the bar 411 by bolts 420 that pass through bushings 421 located

in the handle ends 419 and holes 422 in the plates 413 and engage with threaded bores 423 in the ends of the bar 411, as shown in Figure 12. Figure 12 also shows that the bushes 412 each include a threaded stud 427 that enables the bushes 412 to be attached to the plates 47 by means of a nut 415. The bushes 412 attach to the plates 413 by means of bolts 414 that engage with threaded bores (not shown) in the bushes 412.

[0028] In use, the handle 49 is stored in the position shown in Figure 8 where the handle rests against forward stop 435 on the plates 413. To operate the compactor 41 the handle 49 is pivoted back about the pivot connection with the plates 413 until grip section 430 of the handle is behind the mounting assemblies 410, as shown in Figures 13 and 14. Backward pivoting of the handle 49 is limited by stop 418 on the plates 413. When the motor 44 is started the compactor 41 can be used by an operator, who holds the grip section 430 of the handle 49.

[0029] During operation the presence of the rubber bushes 412 helps to mechanically isolate vibration of the compactor main body 42 from the handle 49. In addition the vibration is further reduced by the weight in the form of the cross-bar 411 that interconnects ends 419 of the handle 49. In addition, the bar 411 helps to increase the rigidity of the handle 49. As the bar 411 is concentric with the pivoting point of the handle 49, an operator is not fatigued by having to lift the weight of the bar 411 on the handle, as the weight of the bar 411 is balanced on the handle 49.

[0030] The plate compactors 1, 41 are particularly useful for compaction of ground material, especially where the ground material is: (i) a granular material, such as gravel, soil, sand, hardcore or other aggregates; and/or (ii) a paving material, such as paving block, paving slab flagstones or asphalt. In addition, the compactors can also be used for other applications that require a downward force to be exerted on a surface, such as during the installation of waterproof membranes on a surface.

[0031] An advantage of the invention is that by reducing vibration of the handles of the compactor, the vibration experienced by an operator is also reduced and this helps to prolong the period that an operator can safely use the compactors 1, 41 without suffering from VWF without affecting the efficiency of the compactors 1, 41.

Claims

1. A compactor (1) comprising a support member (2, 6), a base plate (3) mounted for vibration on the support member (2, 6), a motor (4) mounted on the support member (2, 6), the output of the motor (4) being coupled to the base plate (3) to cause vibration of the base plate (3), in use, a handle (9) and a mounting device (10) to mount the handle (9) on the support member (2, 6), the mounting device (10) comprising

an elastomeric member (12) with the support member (2, 6) coupled to one side of the elastomeric member (12) and the handle (9) pivotally coupled to the other side of the elastomeric member (12), and a mass (11) mounted on the mounting device (10), the centre of weight of the mass (11) substantially coinciding with the pivoting axis of the handle (9).

2. A compactor according to claim 1, wherein the mass (11) is located on the handle side of the elastomeric member (12).

3. A compactor according to claim 1 or claim 2, wherein the pivotal axis of the handle (9) is offset from the central axis of the elastomeric member (12).

4. A compactor according to any of the preceding claims, wherein the mounting device (10) comprises a first mounting plate (7) and a second mounting plate (13), the elastomeric member (12) being located between the mounting plates (7, 13) and the first mounting plate (7) having the support member (2, 6) coupled thereto and the second mounting plate (13) having the handle (9) coupled thereto.

5. A compactor according to claim 4, wherein the support member (2, 6) is fixedly attached to the first mounting plate (7).

6. A compactor according to claim 4 or claim 5, wherein the handle (9) is pivotally coupled to the second mounting plate (13).

7. A compactor according to any of the preceding claims, wherein the mounting device (10) may comprise a stop (18) to limit pivoting movement of the handle (9) in one direction.

8. A compactor according to claim 7, wherein the mounting device (10) comprises two stops (418, 435) to limit pivoting movement of the handle (9) in both directions.

9. A compactor according to claim 7 or claim 8 when dependent on any of claims 4 to 6, wherein the stop (18) (or stops (435, 418)) are formed on the second mounting plate (13, 413).

10. A compactor according to any of the preceding claims, wherein the mounting device (10) comprises two elastomeric members (12), and the support member (2, 6) is coupled to a side of each elastomeric member (12) and the handle (9) is coupled to the opposite sides of the elastomeric members (12).

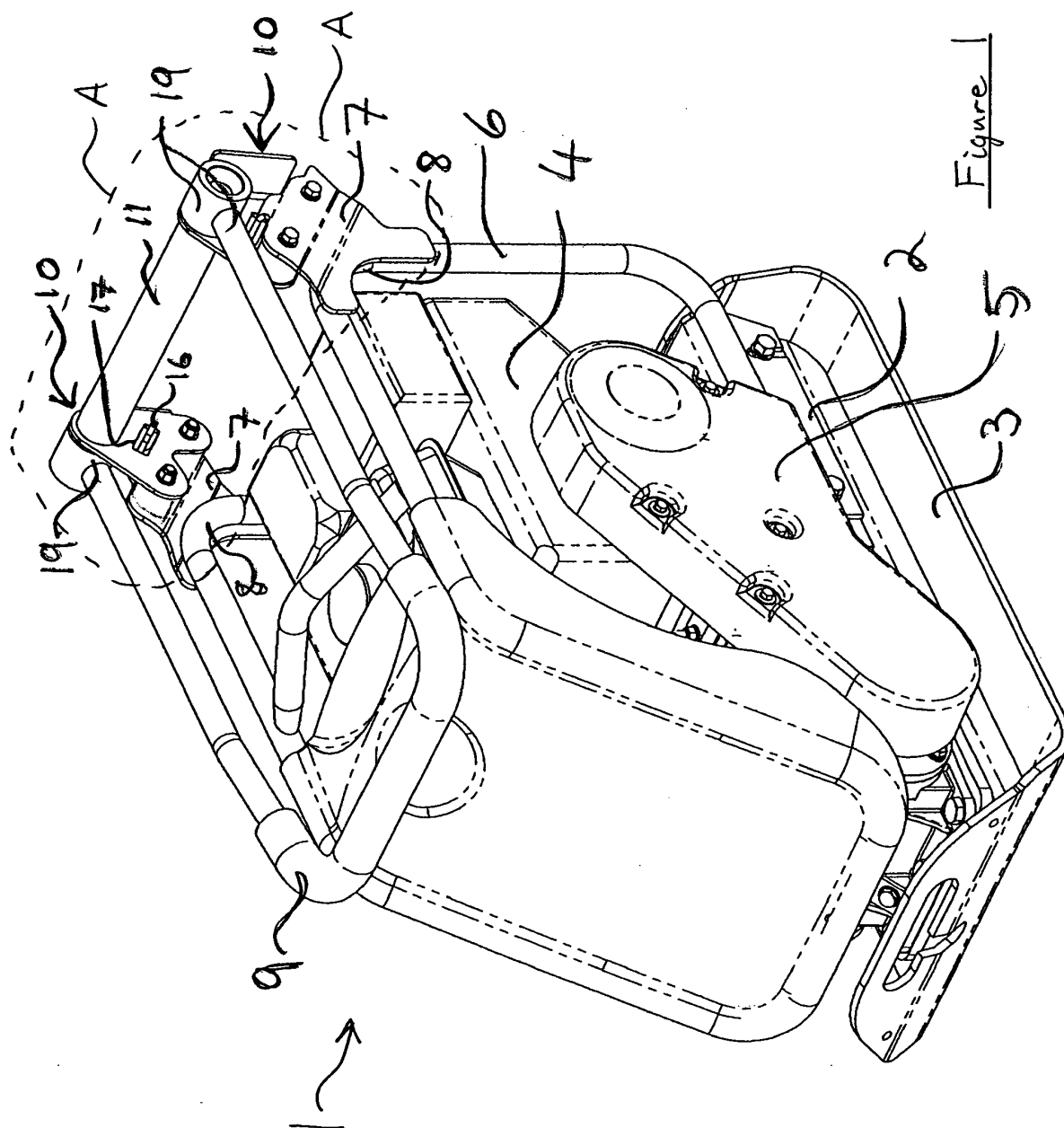
11. A compactor according to claim 10 when dependent on any of claims 4 to 6, wherein the elastomeric

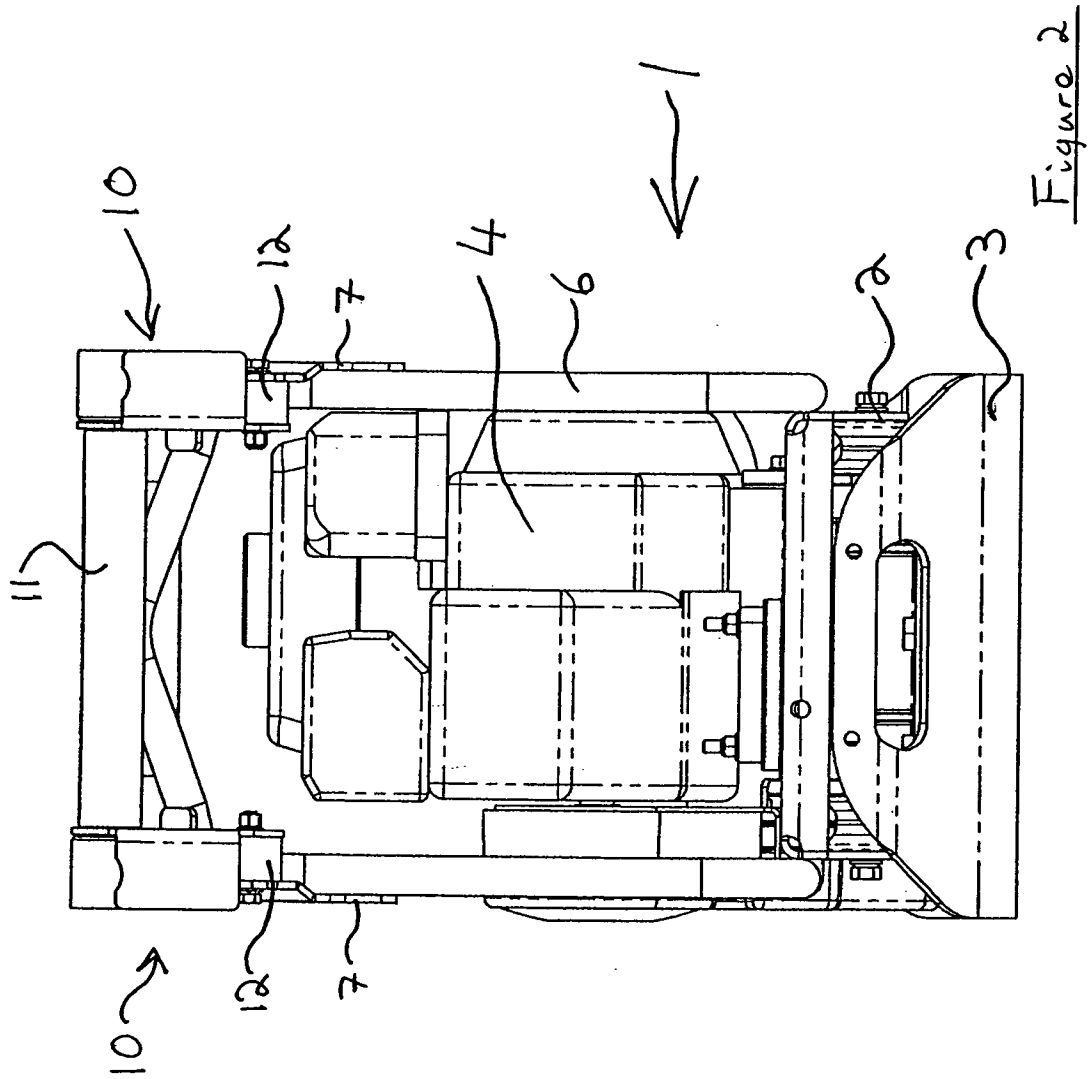
members (12) are located between the mounting plates (7, 13) in side-by-side arrangement.

12. A compactor according to any of the preceding claims, wherein the handle (9) is coupled to the support member (2, 6) at two separate locations, each location having a separate mounting device (10). 5
13. A compactor according to any of the preceding claims, wherein the handle (9) comprises two leg sections, each leg section being coupled to the support member (2, 6) by a mounting device (10). 10
14. A compactor according to claim 13, wherein the handle (9) is generally U-shaped, with each leg of the U being coupled to the support member (2, 6) by a separate coupling device (10), and the central portion of the U forming a grip section. 15
15. A compactor according to claim 13 or claim 14, wherein the mass (11) is located between the legs of the handle (9) and is coincident with the pivoting axis of the handle (9). 20
16. A compactor according to claim 15, wherein the mass (11) is in the form of a cross bar between the pivot points of the handle (9). 25
17. A compactor according to any of the preceding claims, wherein the mass (11) has a weight of at least 2kg. 30
18. A compactor according to any claim 17, wherein the mass (11) has a weight of at least 5kg. 35
19. A compactor according to any of the preceding claims, wherein the elastomeric member (12) is cylindrical with an end of the cylinder coupled to the support member (2, 6) and the other end of the cylinder coupled to the handle (9). 40
20. A compactor according to any of the preceding claims, wherein the elastomeric member (12) is manufactured from an elastomeric material. 45

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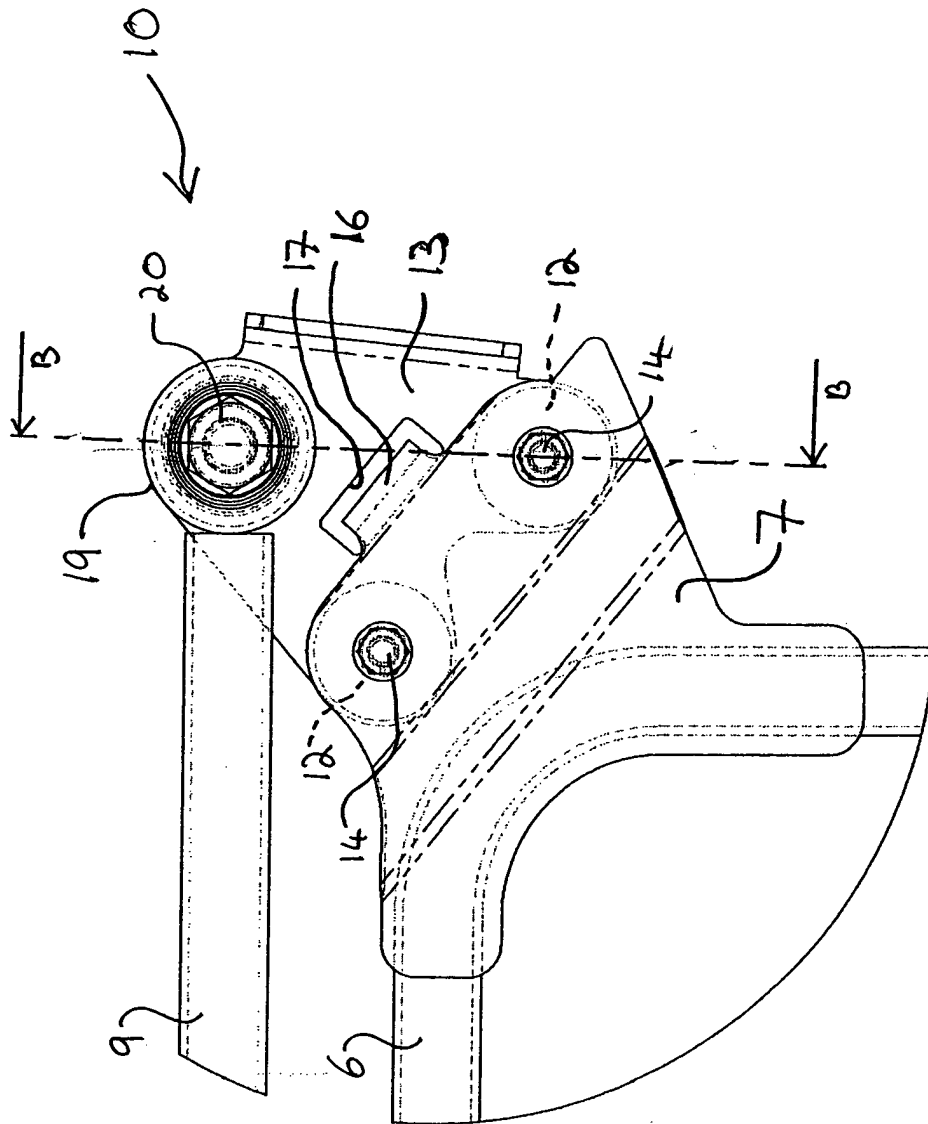
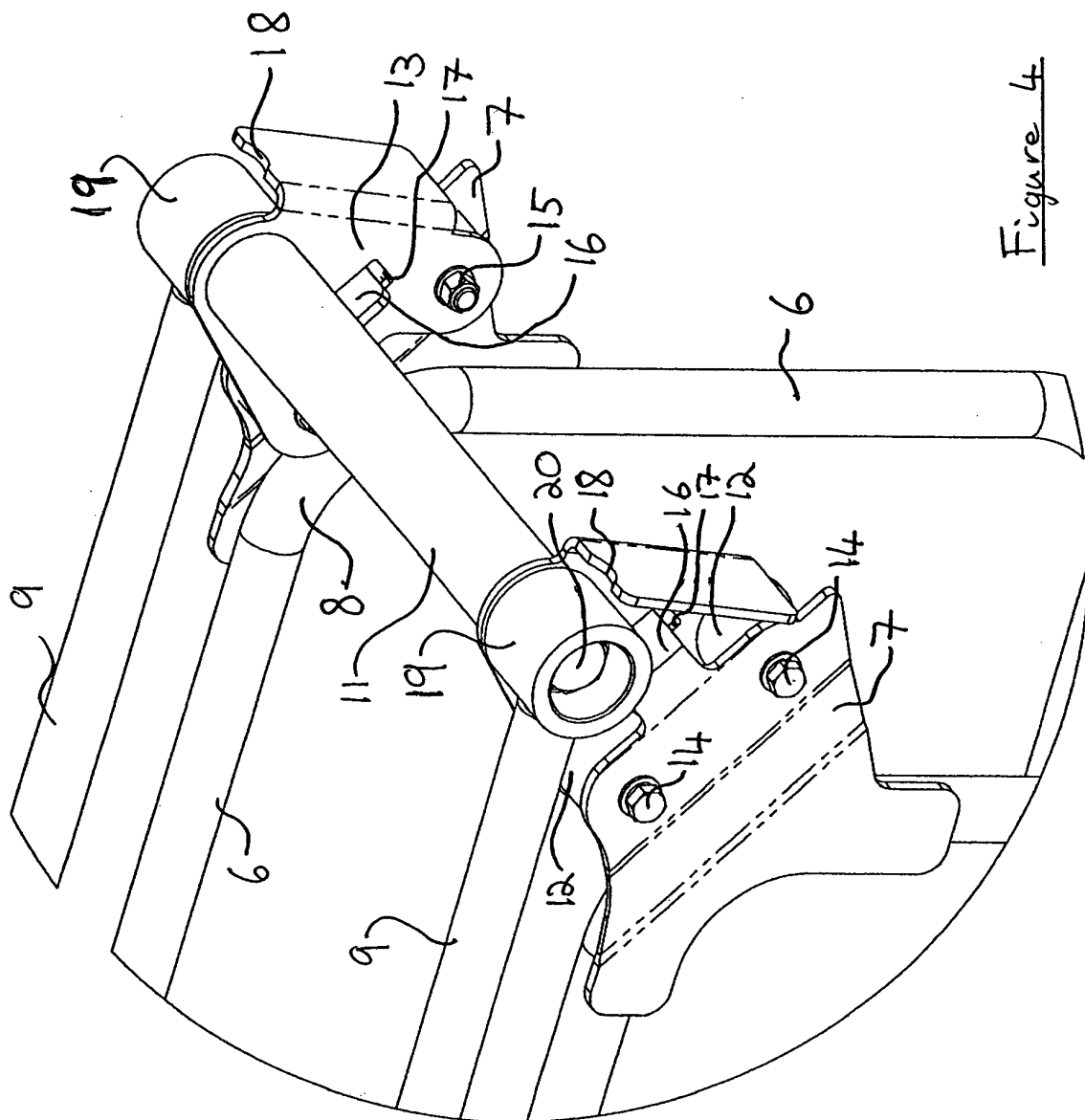


Figure 3



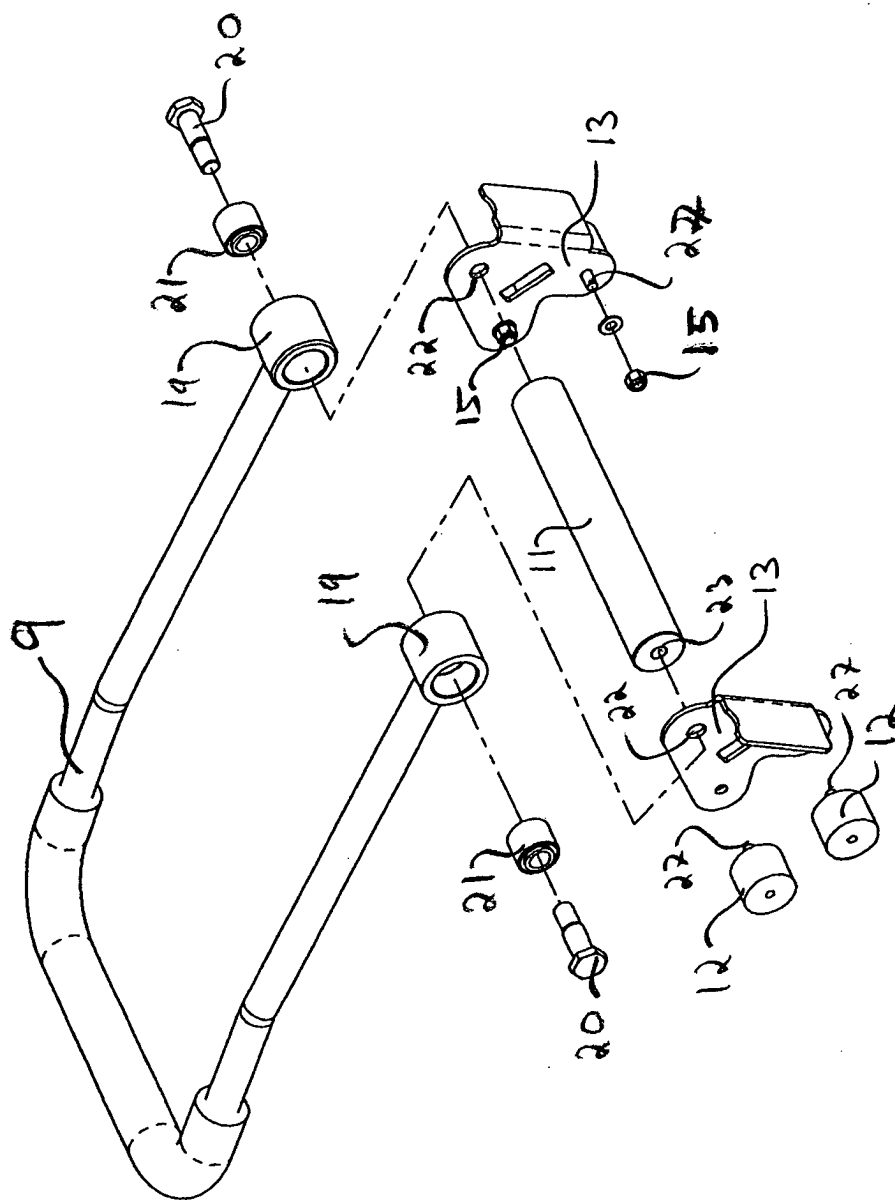
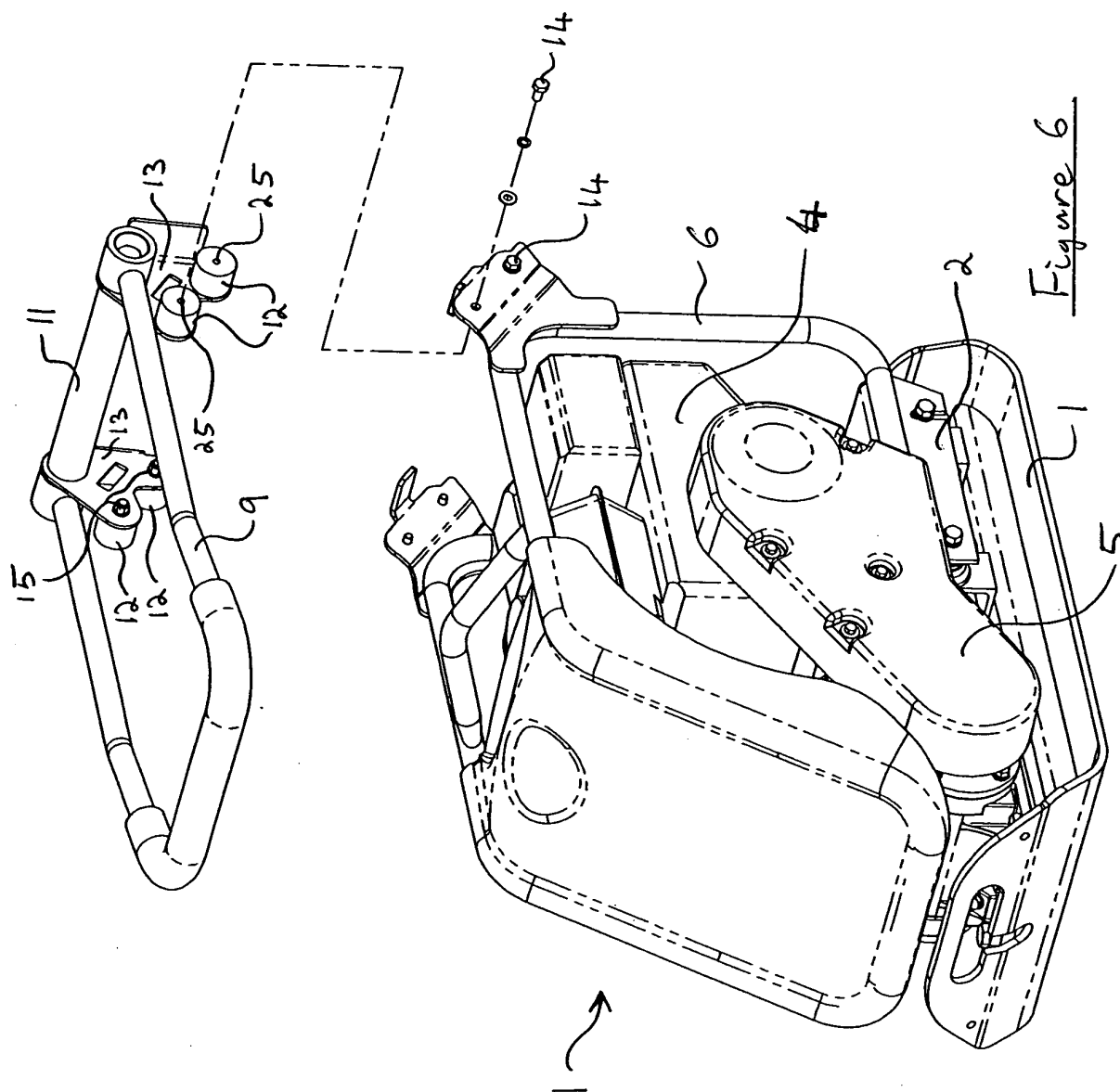


Figure 5



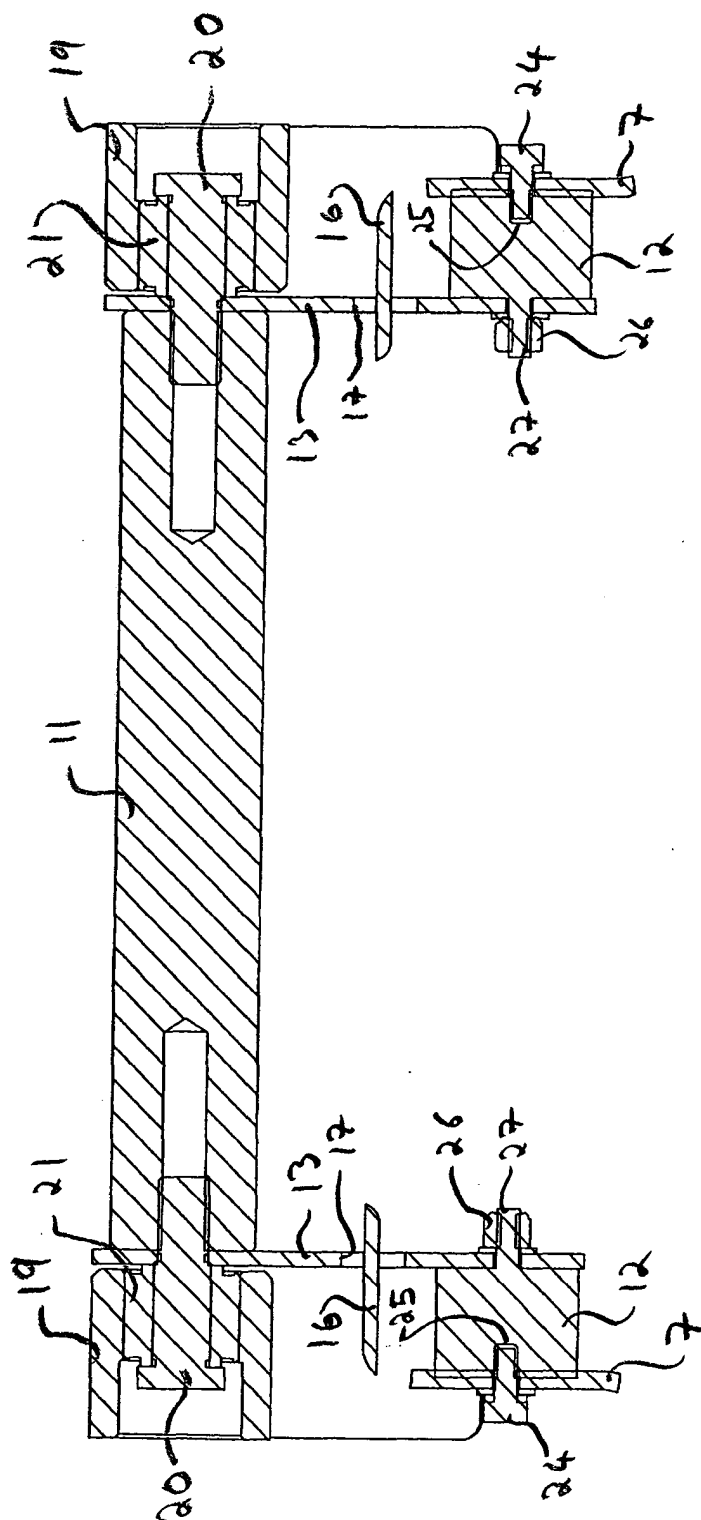


Figure 7

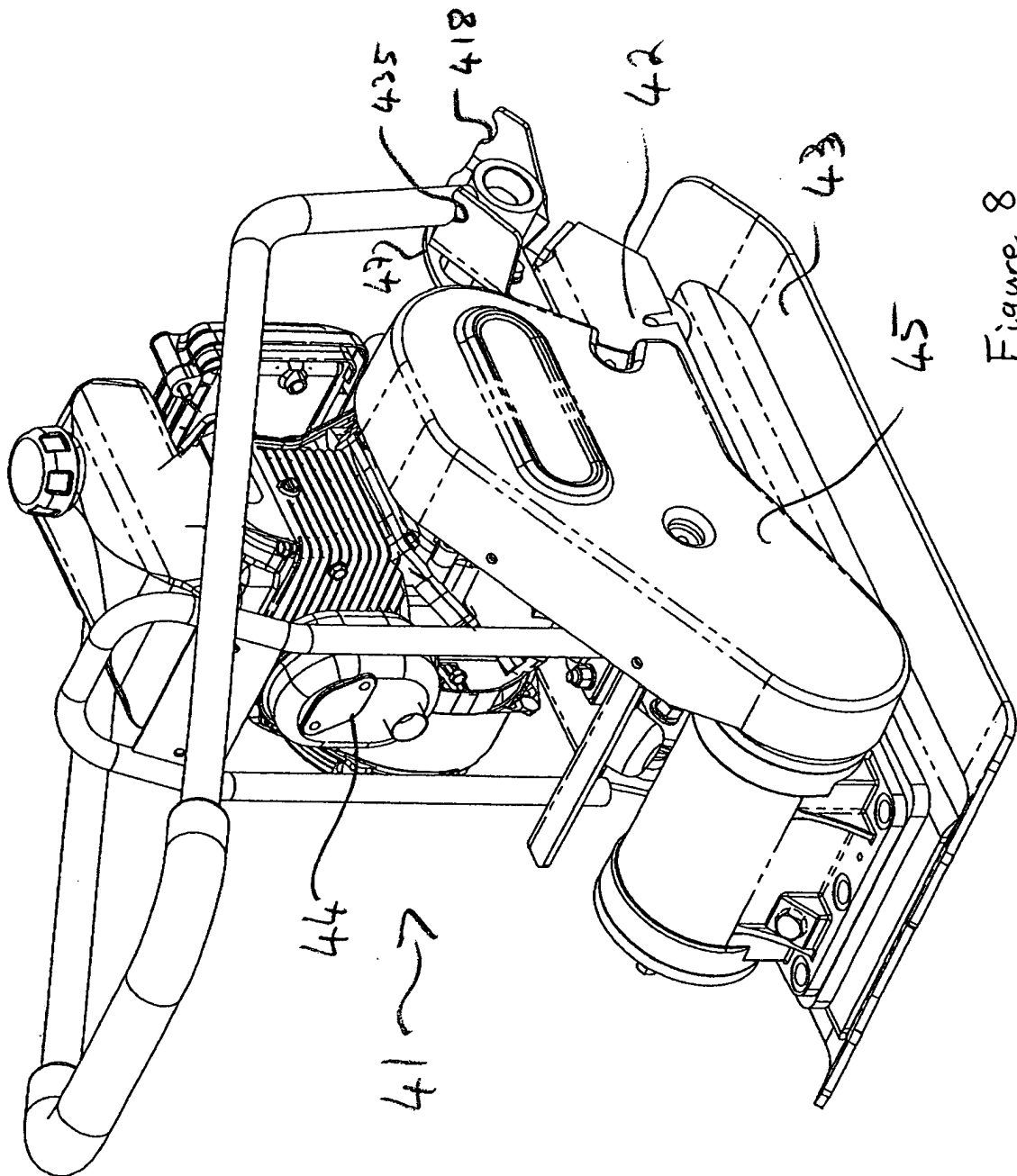


Figure 8

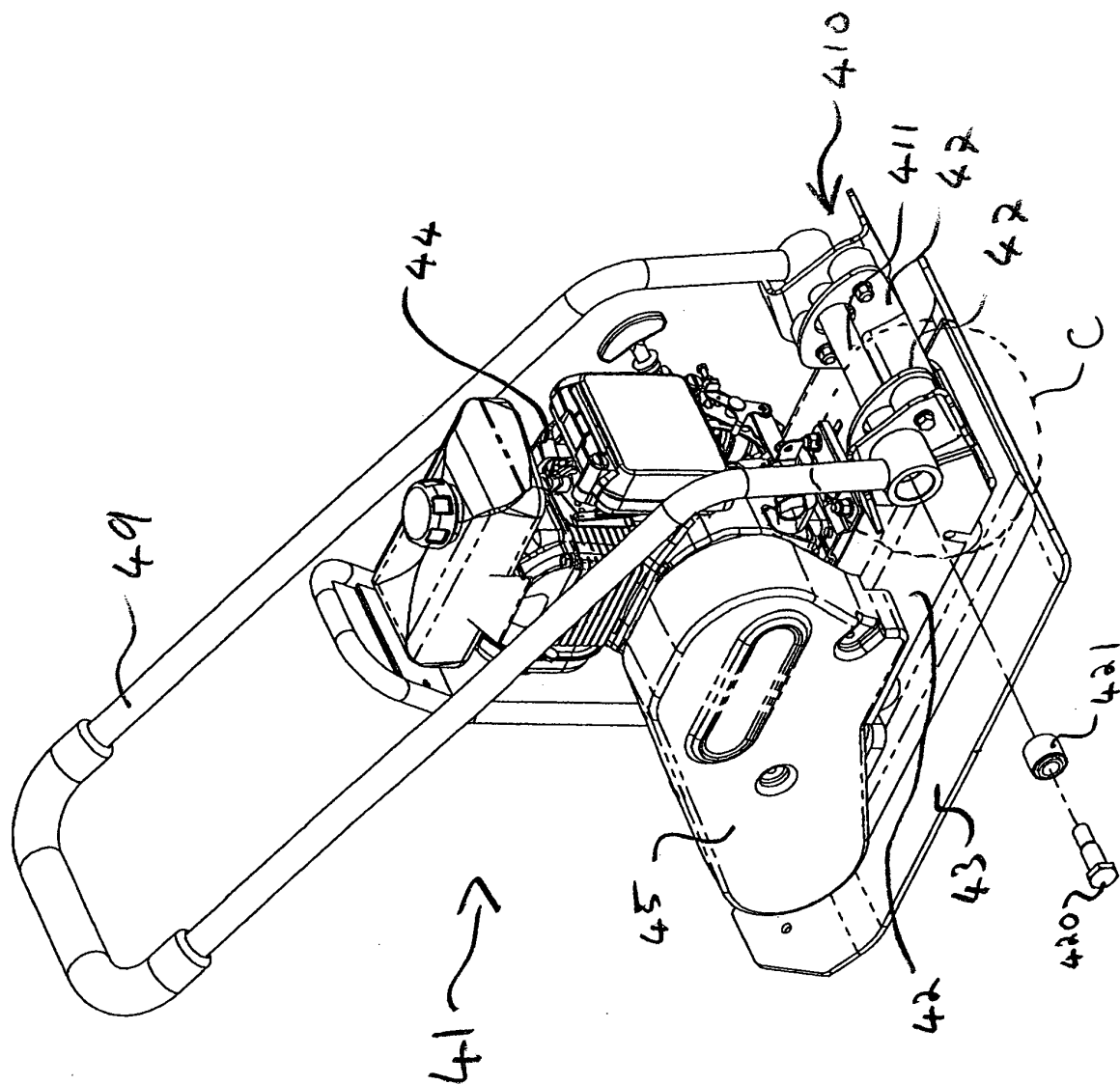


Figure 9

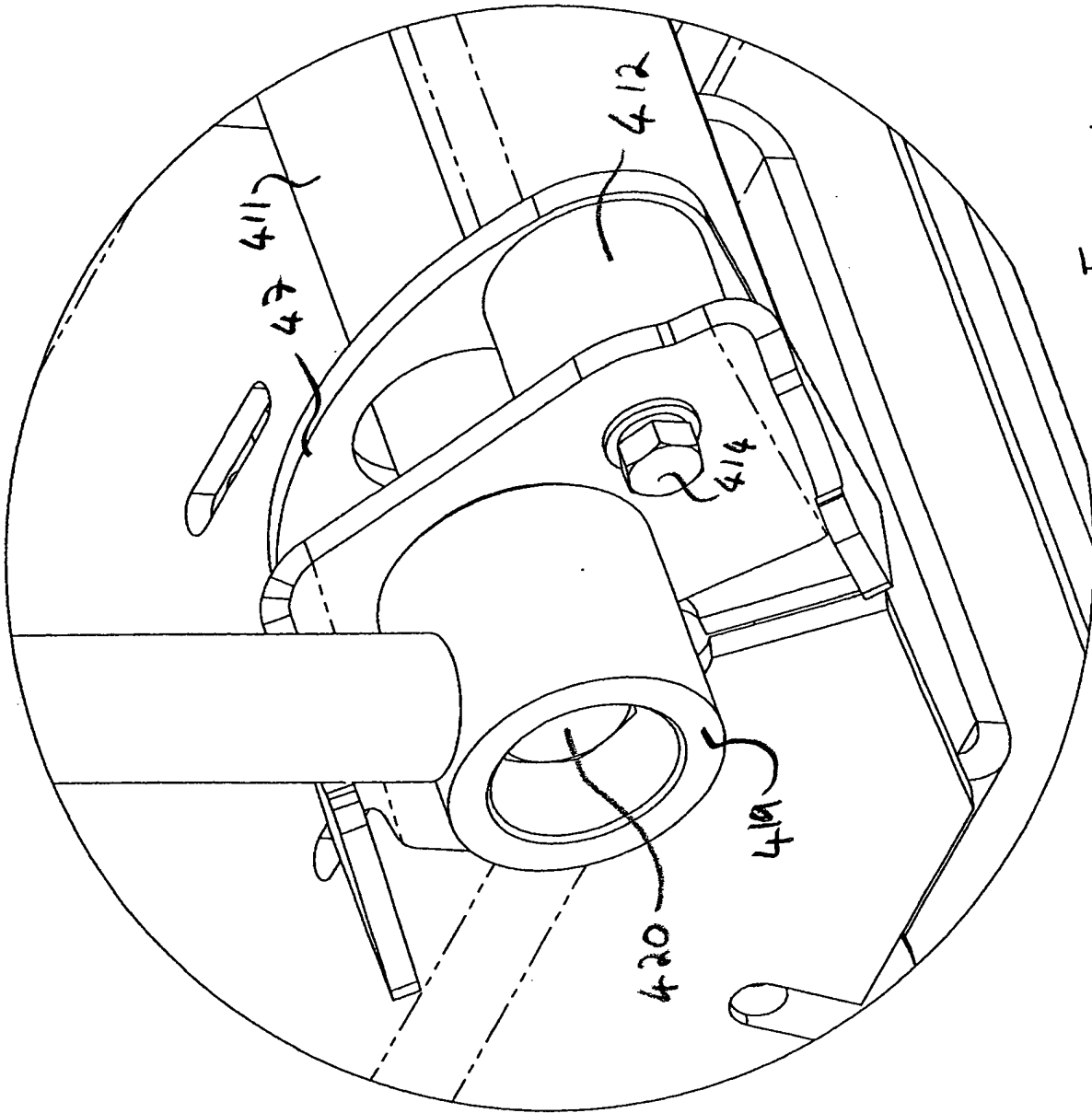


Figure 10

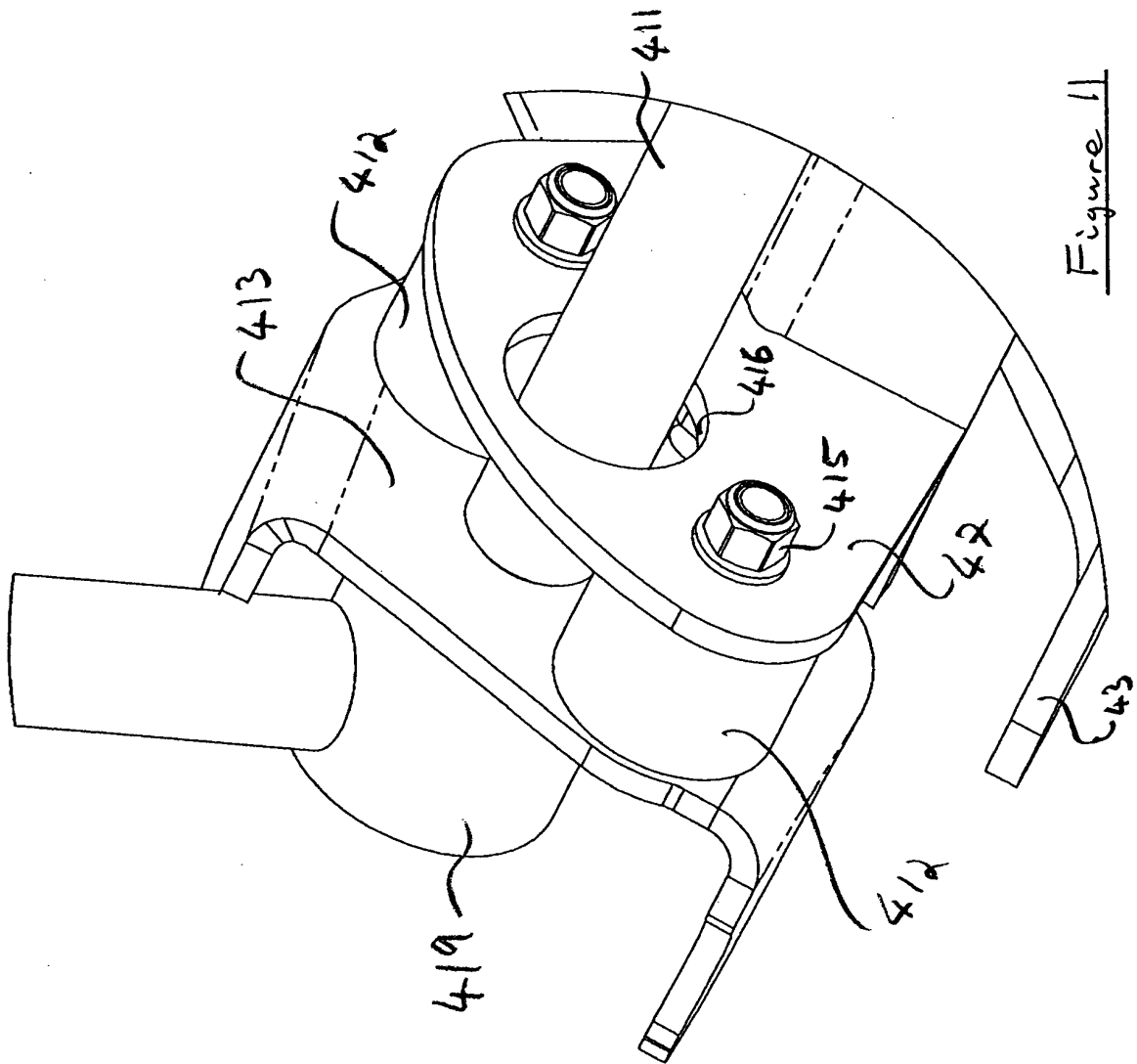


Figure 1

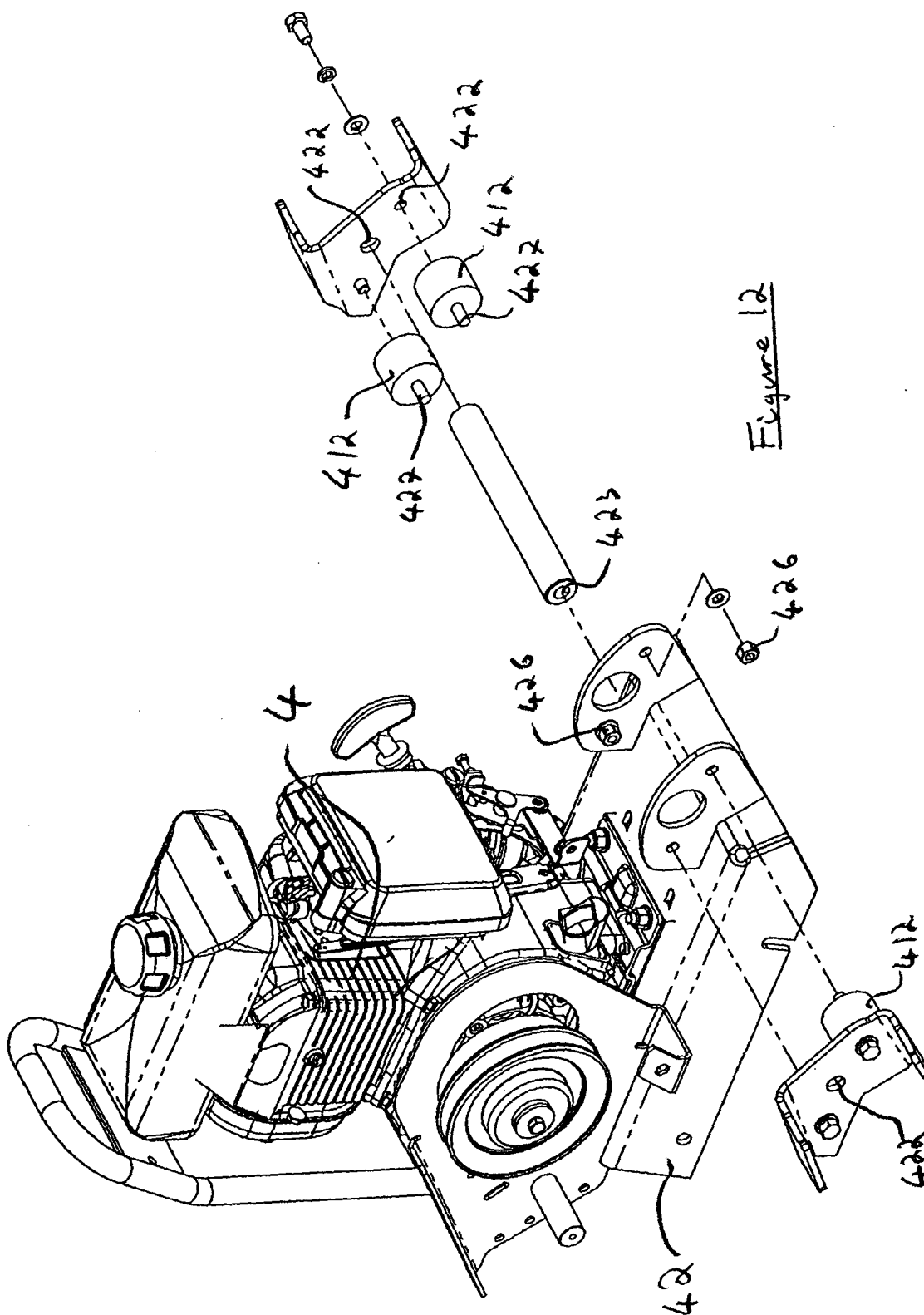


Figure 12

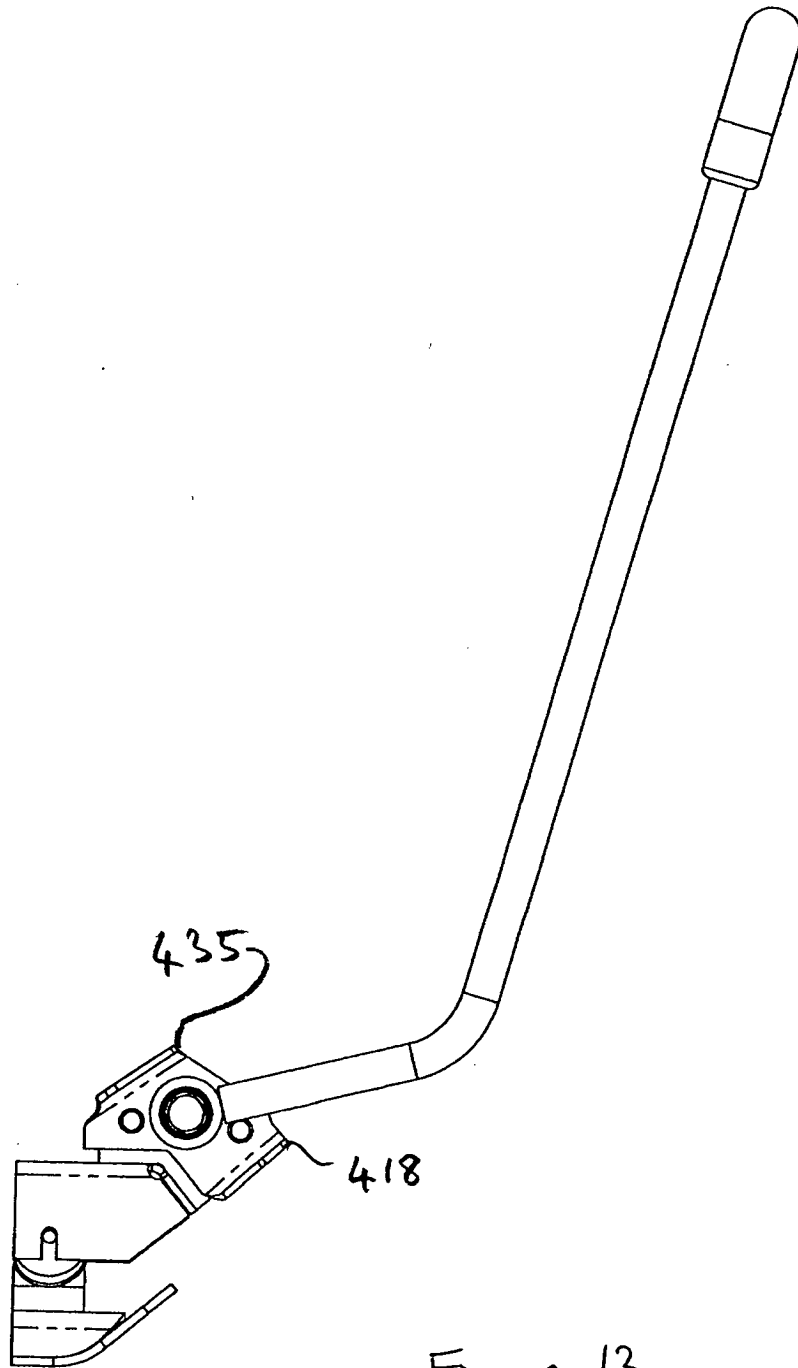


Figure 13

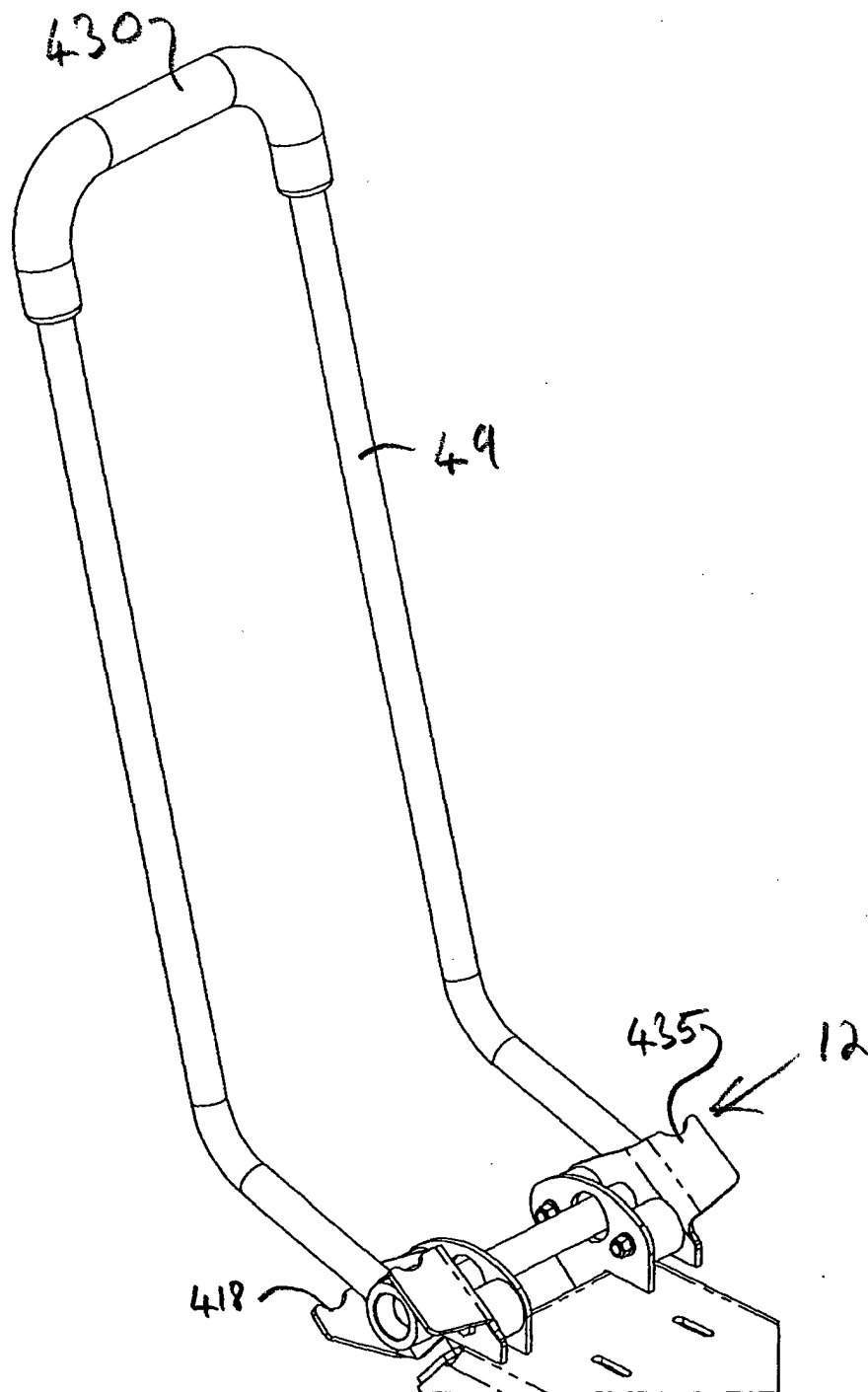


Figure 14