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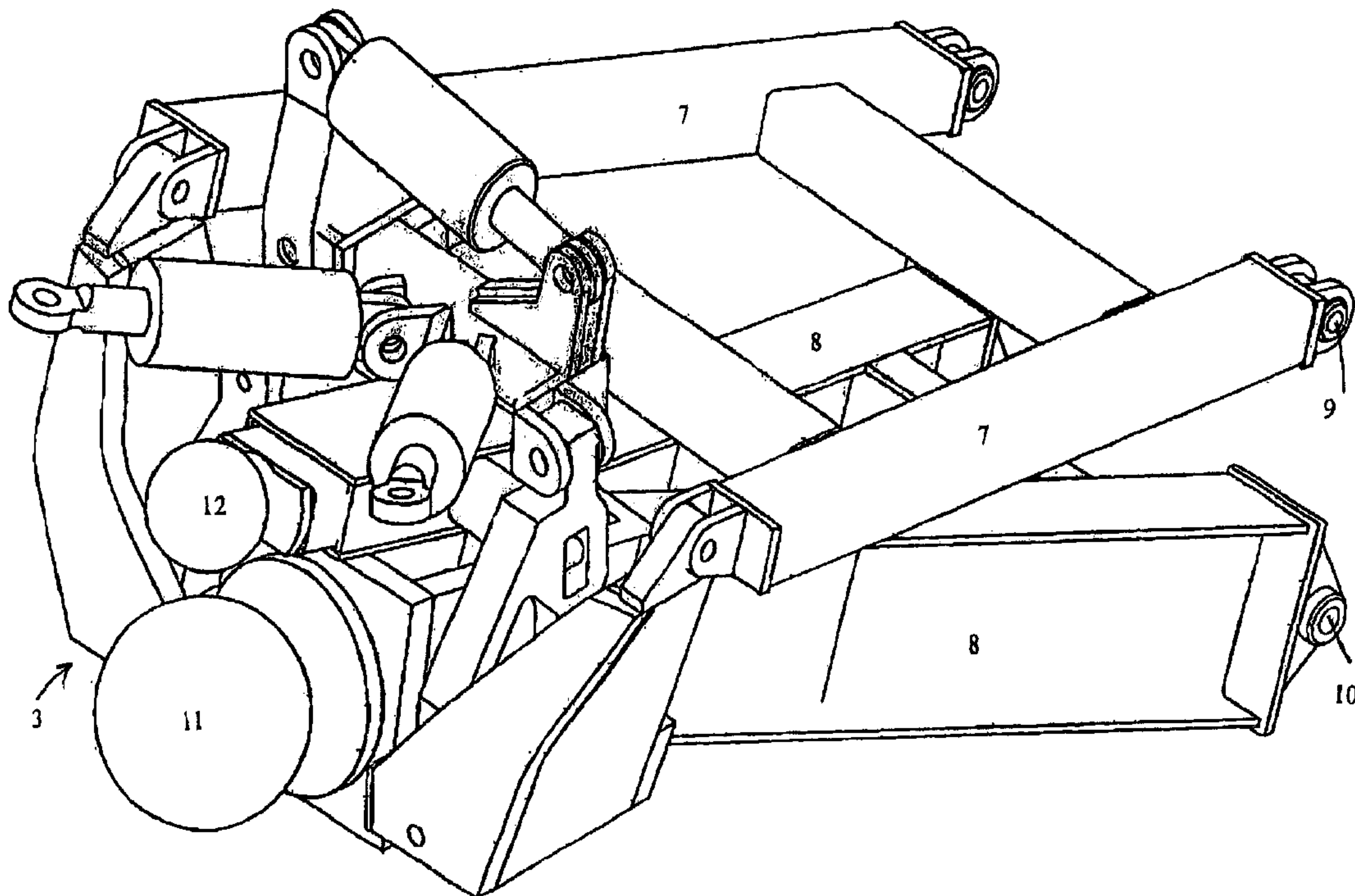
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(54) Titre : ASSEMBLAGE DE GABARIT
(54) Title: JIG ASSEMBLY



(57) Abrégé/Abstract:

A jig assembly (1) which includes a universal joint (3) to enable three-dimensional movement of a workpiece or handling device attached thereto. The assembly is particularly useful for enabling translation and rotational movement of heavy machinery and components for servicing and maintenance. The jig assembly (1) may comprise one or more ball joints (3) which may be moved by actuators such as hydraulic cylinder (7,8). The assembly (1) may be provided on its own movable frame (4), or it may be attached to a front end of a loader.



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ABSTRACT

A jig assembly (1) which includes a universal joint (3) to enable three-dimensional movement of a workpiece or handling device attached thereto. The assembly is particularly
5 useful for enabling translation and rotational movement of heavy machinery and components for servicing and maintenance. The jig assembly (1) may comprise one or more ball joints (3) which may be moved by actuators such as hydraulic cylinder (7,8). The assembly (1) may be provided on its own movable frame (4), or it may be attached to a front end of a loader.

10 (Fig. 1).

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JIG ASSEMBLY

BACKGROUND OF THE INVENTION

The present invention relates to a jig assembly, and in particular, to a jig assembly
5 which includes a universal joint to enable precise positioning to a work piece.

DESCRIPTION OF THE PRIOR ART

Various types of jig assemblies are currently known which are used to locate and hold
work pieces and/or to guide cutting tools in the manufacture of various devices the servicing
10 of machinery and other equipment, etc. In such applications, often the work to be held is of
cumbersome size and/or weight and/or the work piece or tool is required to be provided in
an awkward and/or fairly inaccessible location. Presently known jig assemblies usually
comprise a movable frame (i.e. supported on wheels) with hydraulic cylinders attached to
arms, wherein the ends of the arms may be located proximal to the work by activation of the
15 hydraulic cylinders. A number of sequential operations often have to be performed to locate
such a jig in the desired position. For example, when the jig needs to be moved to a different
angular disposition, it is has to be separately moved, up or down, sideways and also back
or forth. Often, in the process of moving it closer in one dimension further disalignment in
one or other of the other two dimensions occurs. Consequently, the separate movement in
20 each dimension often has to be performed a number of times prior to the jig being provided
in the desired location.

SUMMARY OF THE INVENTION

The present invention seeks to provide a jig assembly which overcomes the
25 disadvantages of prior art jig assemblies.

The present invention seeks to provide a jig assembly which incorporates a universal
joint in the head of the device such that alignment of the head to the desired work is enabled
more expeditiously.

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In one broad form, the present invention provides a jig assembly, including a frame supporting a head, characterised in that the head includes a universal joint for precise positioning to a work piece.

5 More specifically, the present invention provides an apparatus for handling heavy articles, including a mobile base frame for movement of the apparatus over a substrate surface, a support frame extending upwards from the base frame, first alignment means, to effect side-to-side alignment relative to the support frame, the first alignment means being formed of a plate member provided substantially parallel to and spaced apart from
10 the support frame by a pair of interconnecting members, side-to-side alignment being effected by pivotal connections provided between the support frame, the plate member and the interconnecting members, second alignment means, to effect vertical alignment relative to the first alignment means, the second alignment means being formed of a pair of outwardly extending arms pivotally connected to the plate member and also linked at
15 their remote ends to form a parallelogram configuration, and actuation means to effect pivotal rotation of the arms relative to the plate member, and a head supported by the second alignment means, the head including a universal joint or ball joint adapted to support the heavy article, the head able to be raised or lowered and be moved side-to-side
20 whilst being maintained in vertical and horizontal alignment, wherein the universal joint comprises a pair of ball joints, a first of the ball joints being a load bearing ball joint and a second of the ball joints being a guide ball joint.

25 Preferably, the universal joint comprises a ball joint.

Alternatively, but also preferably, the universal joint comprises a pair of ball joints, a first of the ball joints being a load bearing ball joint and a second of the ball joints being a guide ball joint.

30 Most preferably, the ball joints is/are movable by actuation of one or more hydraulic cylinder or the like.

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In a preferred form, the ball joints is/are supported by at least one arm extending from a main frame member.

5 Also preferably, movement of the universal joint and/or jig assembly is controlled from a remote position.

In a preferred embodiment the present invention further includes a handling device for attachment to the jig assembly to enable full 3 dimensional rotations and translational control and the ability to tip a wheel motor or final drive on end for servicing or maintenance.

10 In one form, the handling device is a device to handle a type of earthmoving, mining, or like equipment.

In a further form, the handling device is a fork lift device.

In yet a further form, the handling device is a device for handling a front wheel hub of a mining, earthmoving, or like equipment.

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In yet a further form, the handling device is a cylinder clamp.

In yet a further form, the handling device is a wheel motor handler for handling a wheel motor of a mining, earthmoving, or like equipment.

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BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from a following detailed description of a preferred by non-limiting embodiment thereof, described in connection with the accompanying drawings wherein :

10 Fig. 1 illustrates an isometric view of the jig assembly in accordance with the present invention;

Fig. 2 shows an alternative isometric view of the assembly shown in Fig. 1, to more clearly depict the arrangement of cylinders to effect movement of the head of the assembly;

Fig. 3 details the head of the assembly;

15 Fig. 4 shows, in schematic form, the "tilt" function of the head of the device;

Fig. 5 shows, in schematic form, the "turn" function of the head of the device;

Fig. 6 shows, the rotation mechanism of the head of the device;

Fig. 7 shows a tyre handling device attached to the jig assembly of the present invention;

20 Fig. 8 shows a fork lift device attached to the jig assembly;

Fig. 9 shows a front wheel hub handler attached to the jig assembly;

Fig. 10 shows a cylinder clamp device attached to the jig assembly; and,

Fig. 11 shows a wheel motor handler device attached to the jig assembly of the present invention.

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DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Throughout the drawings like numerals will be used to identify similar features, except where expressly otherwise indicated.

30 As shown in the drawings, and in particular, in Figs. 1 to 3, a jig assembly, generally

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designated by the numeral 1, comprises a support frame 2 and a head 3.

The frame may include a platform like member 4 which may for example be provided on wheels, on a vehicle, or the like, such that it is optionally movable. The device may
5 alternatively be attached to the front end of a loader. Supported on the platform 4 is an upward support 5, the upper end of which has one or more arms 6 extending therefrom. The arms 6, in this case upper arms 7 and lower arms 8, are pivotally connected to the upright frame portion 5 at pivot points 9 and 10 respectively. Movement of the arms 7 and 8 may be effected by operation of one or more hydraulic cylinder such that the head 3 may be
10 moved as desired and be precisely positioned in the transverse and longitudinal directions to be provided adjacent to a work piece, as required. The head comprises a main load bearing ball joint 11 and a guide ball joint 12 supporting the jig attachment 13. It will be understood that by movement of the ball joints 11 and 12, any desired positioning of the jig attachment 13 may be enabled three dimensionally by activation of appropriate cylinders. Details of the
15 operation of cylinders which may be attached to the ball and socket joints are shown in Figs. 4 to 6, with Fig. 4 illustrating a "tilt" function, Fig. 5 illustrates a turn function of the head components and Fig. 6 illustrating the rotation mechanism. Upwards, downwards, inwards, outwards and sideways movement may therefore be effected by activation of appropriate hydraulic cylinders or the like.

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In Fig. 4 is detailed, in schematic form, the "tilt" function. Fig. 4(a) shows a neutral position of the two cylinders 14 and 15, whilst Fig. 4(b) illustrates the cylinders 14 and 15 retracted such that a rearward tilt is achieved, and Fig. 4(c) shows how cylinders 14 and 15 are extended to achieve a forward tilt of head 17. Fig. 4(d) illustrates schematically the
25 double parallelogram configuration which enables for the head to be raised and lowered without any lift head tilt angle deviation in the neutral position.

In Fig. 5 is detailed, in schematic form, the "turn" function. Fig. 5(a) is shown the neutral position, wherein the right and left cylinders, 14 and 15, are both at mid stroke,
30 whilst Fig. 5(b) shows the right cylinder 14 retracted and the left cylinder extended to tilt the

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lift head 17 right, and, Fig. 5(c) shows the right cylinder extended and the left cylinder retracted to achieve a left turn of the head 17. Fig. 5(d) shows an isometric view of the schematic control mechanism, with the rotation mechanism omitted for clarity.

5 In Fig. 6 is detailed the rotation mechanism of the assembly of the present invention. The rotation mechanism undergoes movement illustrated schematically by the third parallelogram 19. This parallelogram constrains both the control cylinder mounts and the small ball to rotate about the centre of the main ball in the directions illustrated by arrow 20. For rotational movement only, the control cylinders 14 and 15 remain at a fixed extension
10 to maintain both the "tilt" and "turn" constant. The third parallelogram is hence rotated by extension or retraction of rotation cylinder 16. This third parallelogram 16 exerts a transverse load through the small ball 12 to produce a torque about the main ball 11 to effect rotation shown by arrows 20.

15 Figs. 7 to 11 show various devices attached to the jig assembly 1 of the present invention.

In Fig. 7, a tyre handler device is connected to the head of the jig assembly, with Fig. 7(a) showing an isometric view, Fig. 7(b) showing a front view, Fig. 7(c) showing a top view
20 and Fig. 7(d) showing a side view. As will be appreciated, the jig assembly is particularly useful for changing such tyres of large dimensions of earthmoving, mining and other equipment.

In Fig. 8, a fork lift device is shown attached to the head of the jig assembly. Fig.
25 8(a) illustrates an isometric view of the fork lift apparatus, Fig. 8(b) illustrates a front view, Fig. 8(c) shows a top view and Fig. 8(d) shows a side view with the fork lift in both an elevated and lowered position. Such a fork lift has advantages over conventional fork lift devices in that fine adjustment of the positioning of the fork lift attachment is more readily made without the necessity to relocate the entire assembly.

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In Fig. 9, a front wheel hub handling, typically useful in servicing earthmoving and mining equipment is illustrated, with Fig. 9(a) showing an isometric view, Fig. 9(b) showing a front view, Fig. 9(c) showing a top view and Fig. 9(d) showing a side view.

5 In Fig. 10, a cylinder clamp attachment is shown attached to the jig assembly of the present invention, Fig. 10(a) showing an isometric view, Fig. 10(b) showing a front view, Fig. 10(c) showing a top view and Fig. 10(d) showing a side view. It will be appreciated that the cylinder can be grasped and moved as desired for servicing and the like.

10 Fig. 11 illustrates a wheel motor handler shown attached to the jig assembly of the present invention. Firstly, in Figs. 11(a) to 11(d) is illustrated various views of the wheel motor attached to a handler base which can be used as a transportation pallet, with Fig. 11(a) showing an isometric view, Fig. 11(b) showing an end view, Fig. 11(c) showing a side view, and Fig. 11(d) showing another side view with the base tipped onto one end - useful for
15 servicing or maintenance. Figs 11(e) to 11(g) then show the wheel motor and its associated handler base attached to the jig assembly, with Fig. 11(e) showing an isometric view of the assembly with the wheel motor rotated forward, Fig. 11(f) showing a side view of the assembly with the wheel motor rotated forward and Fig. 11(g) showing a side view with the wheelmotor rotated backwards. Figs. 11(h) to 11(k) then show further views of the wheel
20 motor handler device connected to the jig assembly, but with the wheel assembly and its handler base rotated in an orthogonal direction to that shown in Figs. 11(e) to 11(g). That is, Fig. 11(h) shows an isometric view, Fig. 11(i) shows a front view, Fig. 11(j) shows a top view and Fig. 11(k) shows a side view.

25 The advantage of the present invention is primarily achieved by use of one or more ball joints, as illustrated. Two joints are utilised in the present embodiment, one as the load bearing joint, and one as a guide. It will however be appreciated by persons skilled in the art, that these may be embodied in one universal joint. Other types of universal joint may be used, however, it is anticipated that a ball and socket type joint whereby a ball is embraced
30 by spherical cup like device is the preferred type of universal joint to permit the required

relative angular movement in any plane.

It will be appreciated that the present invention is particularly useful for holding tools,
or for holding heavy and awkwardly positioned work pieces during repair/
5 maintenance/installation.

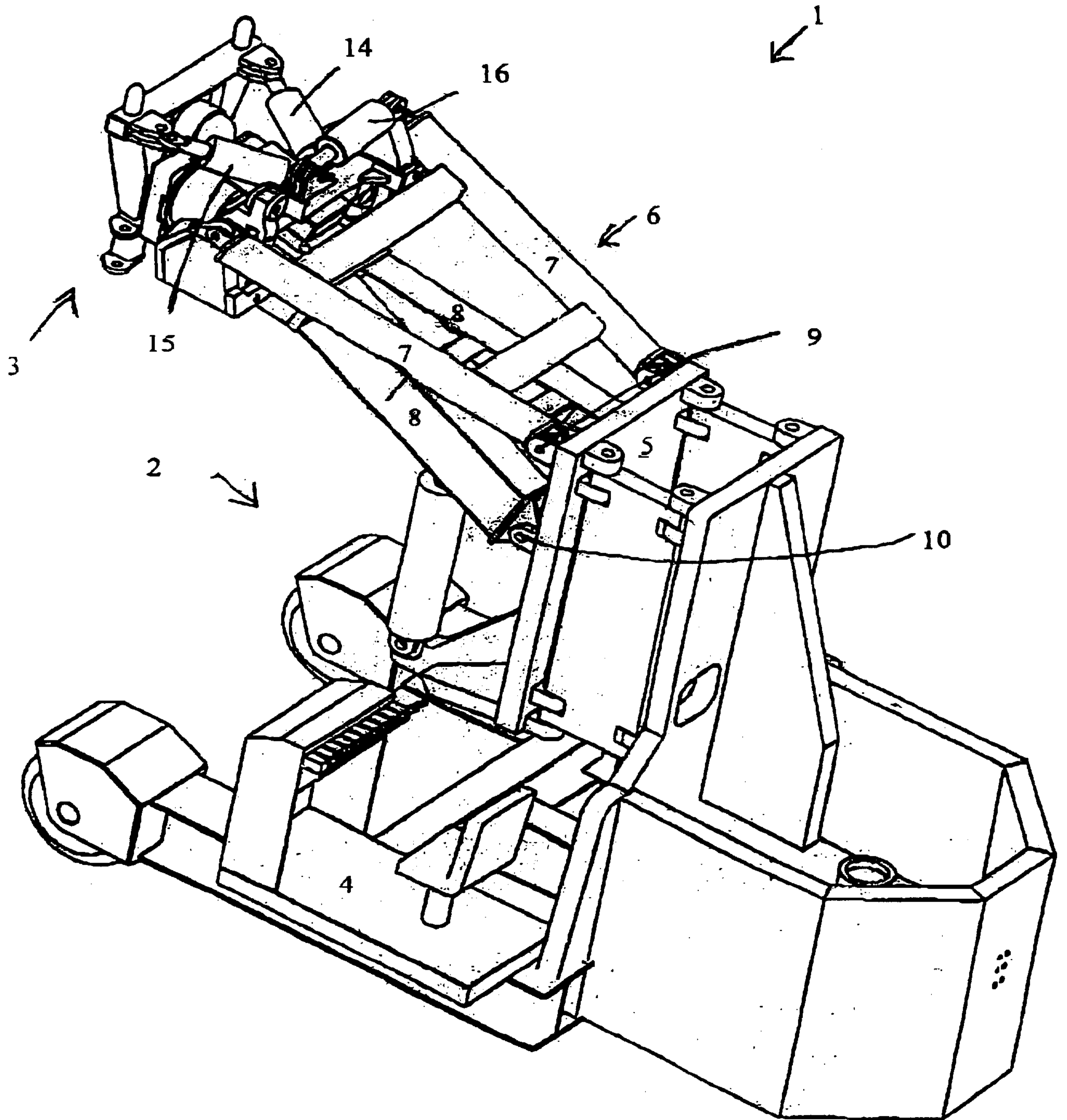
Whilst the present invention has been hereinbefore described with reference to a
particular embodiment, it will be understood that numerous variations and modifications will
be envisaged by persons skilled in art. All such variations and modifications should be
10 considered to fall within the scope of the invention as broadly hereinbefore described and as
hereinafter claimed.

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The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An apparatus for handling heavy articles, including:
 - a mobile base frame for movement of said apparatus over a substrate surface;
 - a support frame extending upwards from said base frame;
 - first alignment means, to effect side-to-side alignment relative to said support frame, said first alignment means being formed of a plate member provided substantially parallel to and spaced apart from said support frame by a pair of interconnecting members, side-to-side alignment being effected by pivotal connections provided between said support frame, said plate member and said interconnecting members;
 - second alignment means, to effect vertical alignment relative to said first alignment means, said second alignment means being formed of a pair of outwardly extending arms pivotally connected to said plate member and also linked at their remote ends to form a parallelogram configuration; and
 - actuation means to effect pivotal rotation of said arms relative to said plate member; and
 - a head supported by said second alignment means, the head including a universal joint or ball joint adapted to support said heavy article, the head able to be raised or lowered and be moved side-to-side whilst being maintained in vertical and horizontal alignment;
 - wherein said universal joint comprises a pair of ball joints, a first of the ball joints being a load bearing ball joint and a second of the ball joints being a guide ball joint.
2. An apparatus as claimed in claim 1, wherein said plate member of said first alignment means is moved relative to said support frame by one or more hydraulic cylinders.
3. An apparatus as claimed in claim 1 or 2, wherein:
 - vertical rotation of said head is effected by operation of a vertical rotation cylinder to cause rotation about the horizontal axis of said universal joint; and
 - horizontal rotation of said head is effected by operation of a horizontal rotation cylinder to cause rotation about the vertical axis of said universal joint.
4. The apparatus of claim 1, 2 or 3, wherein movement of at least one of said universal joint and jig assembly is controlled from a remote position.

FIG. 2



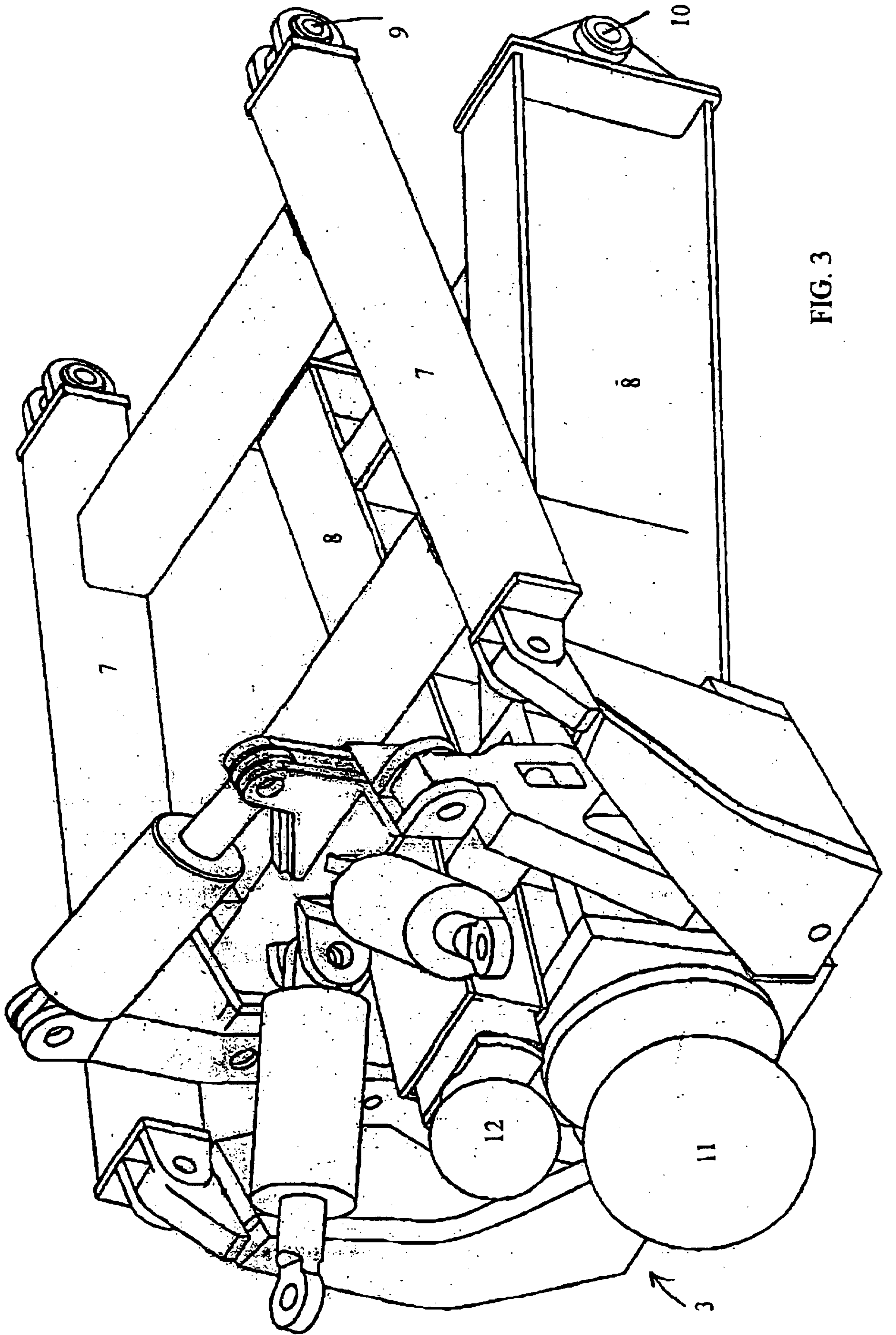
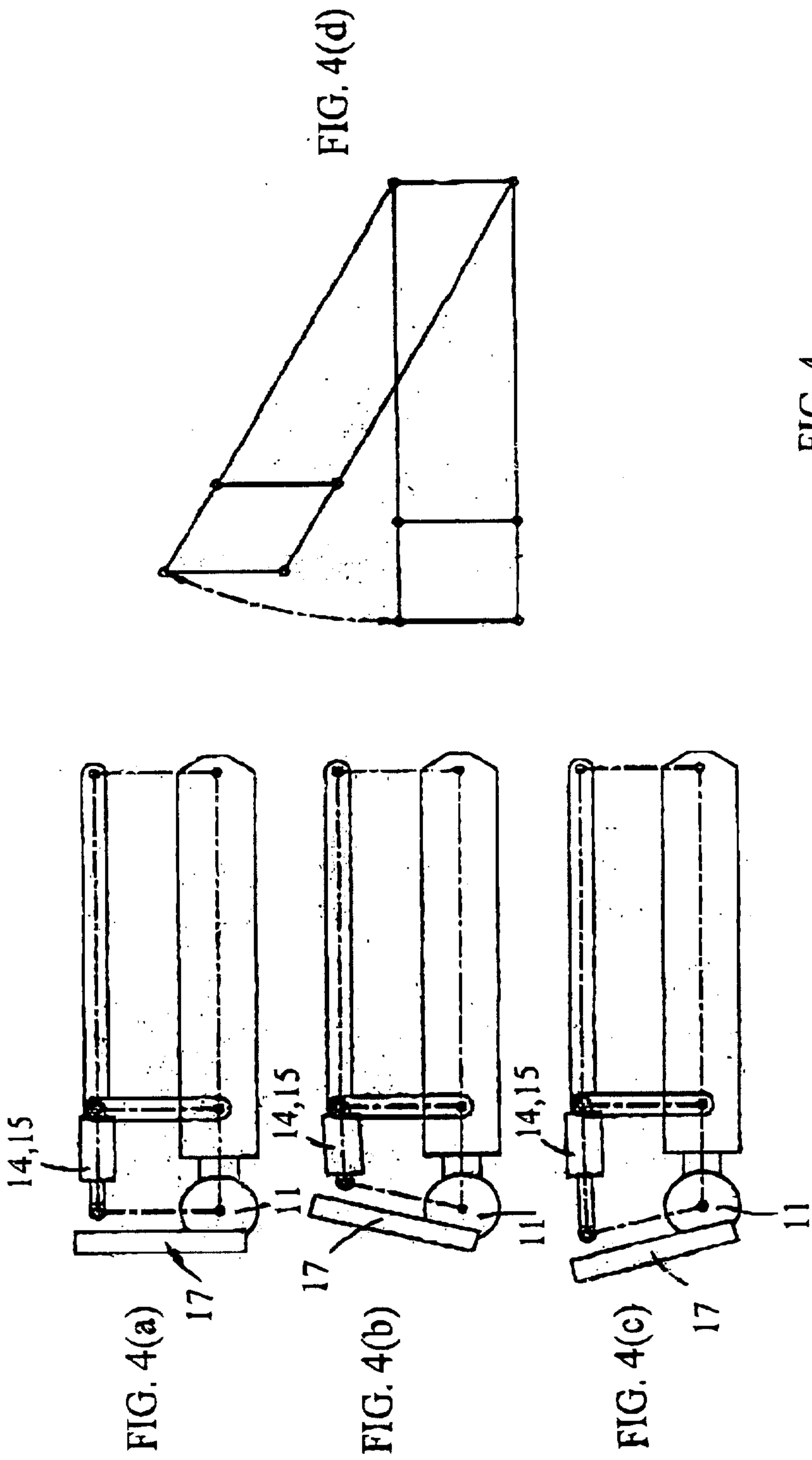


FIG. 3



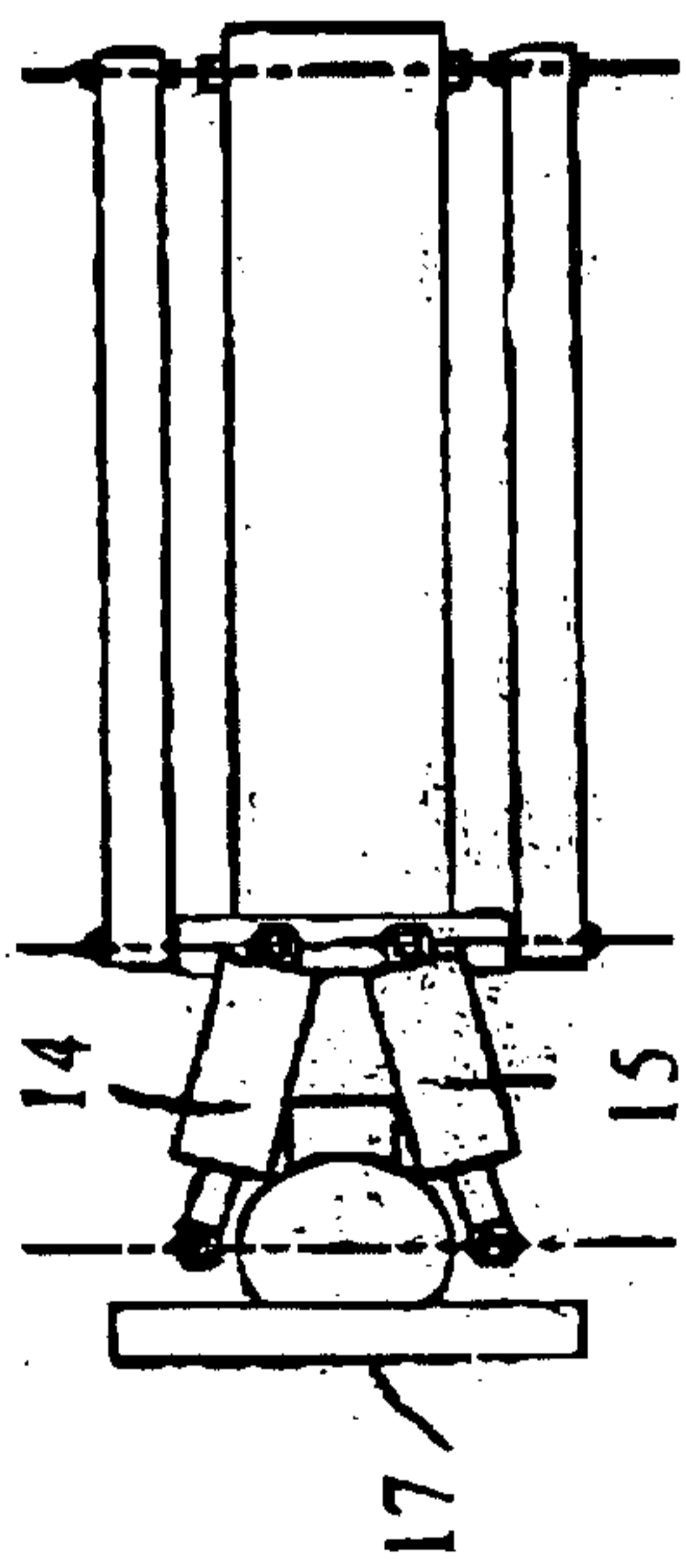


FIG. 5(a)

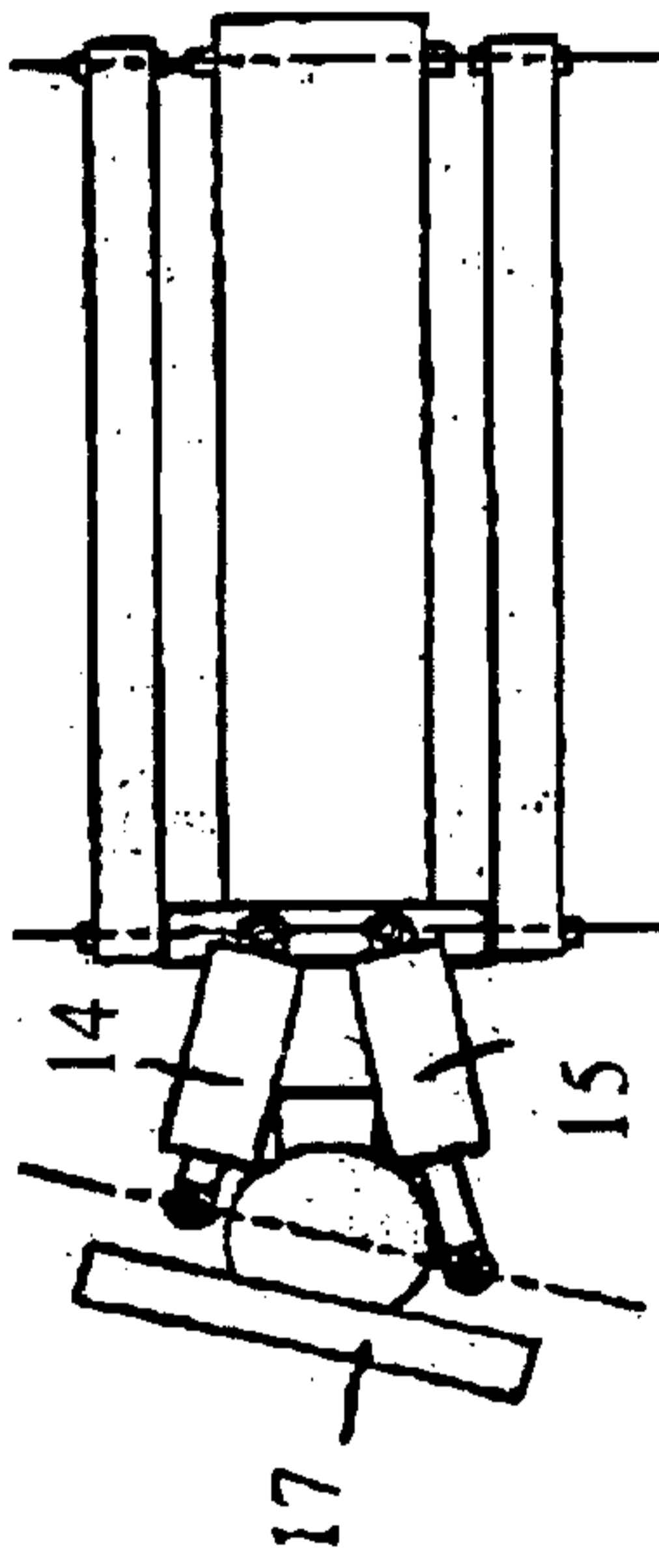


FIG. 5(b)

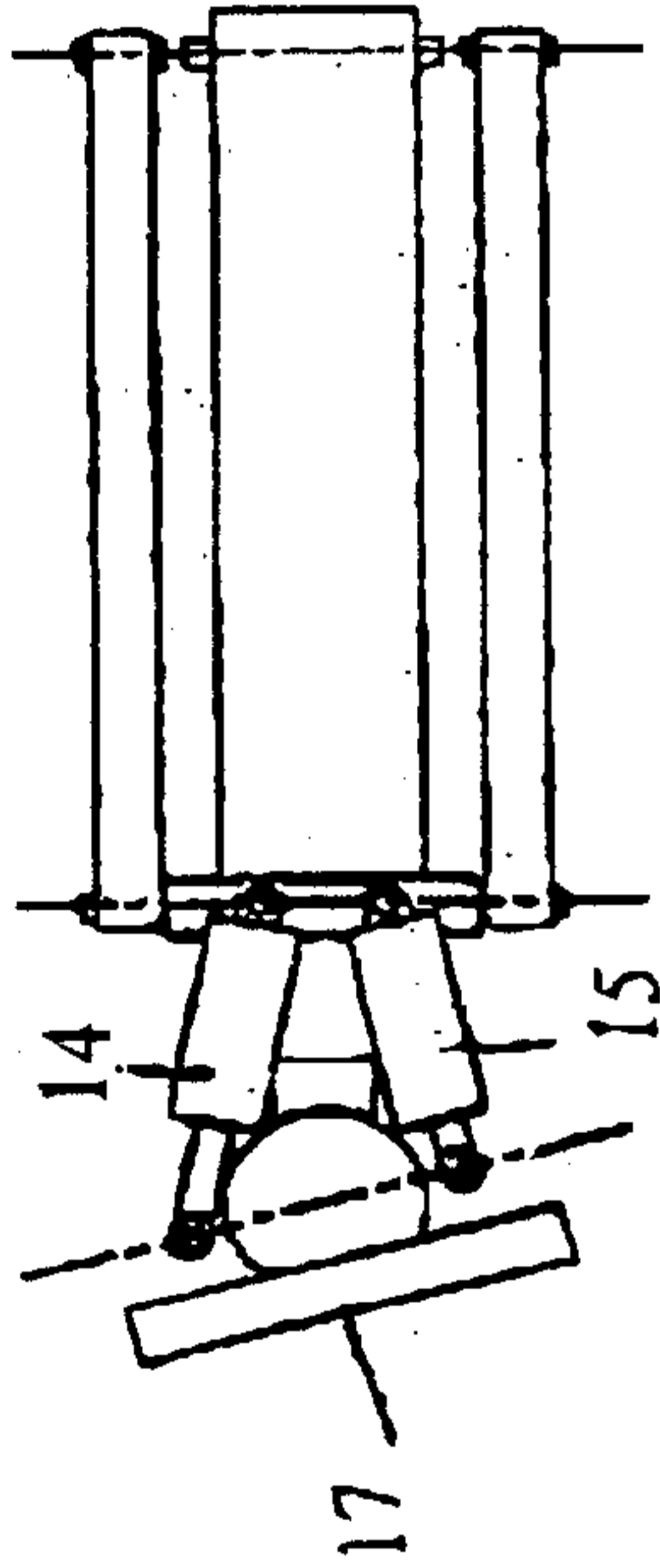


FIG. 5(c)

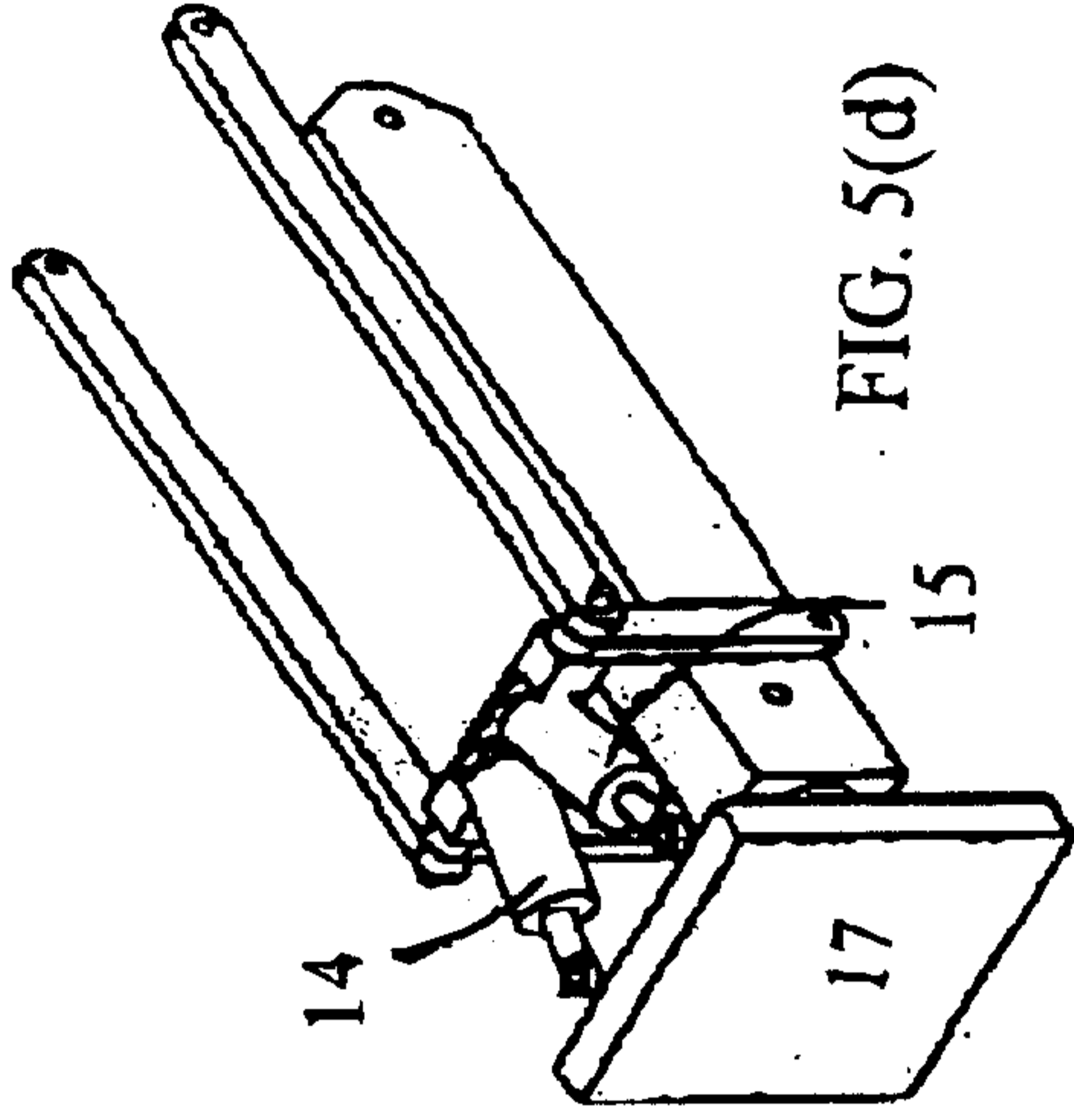
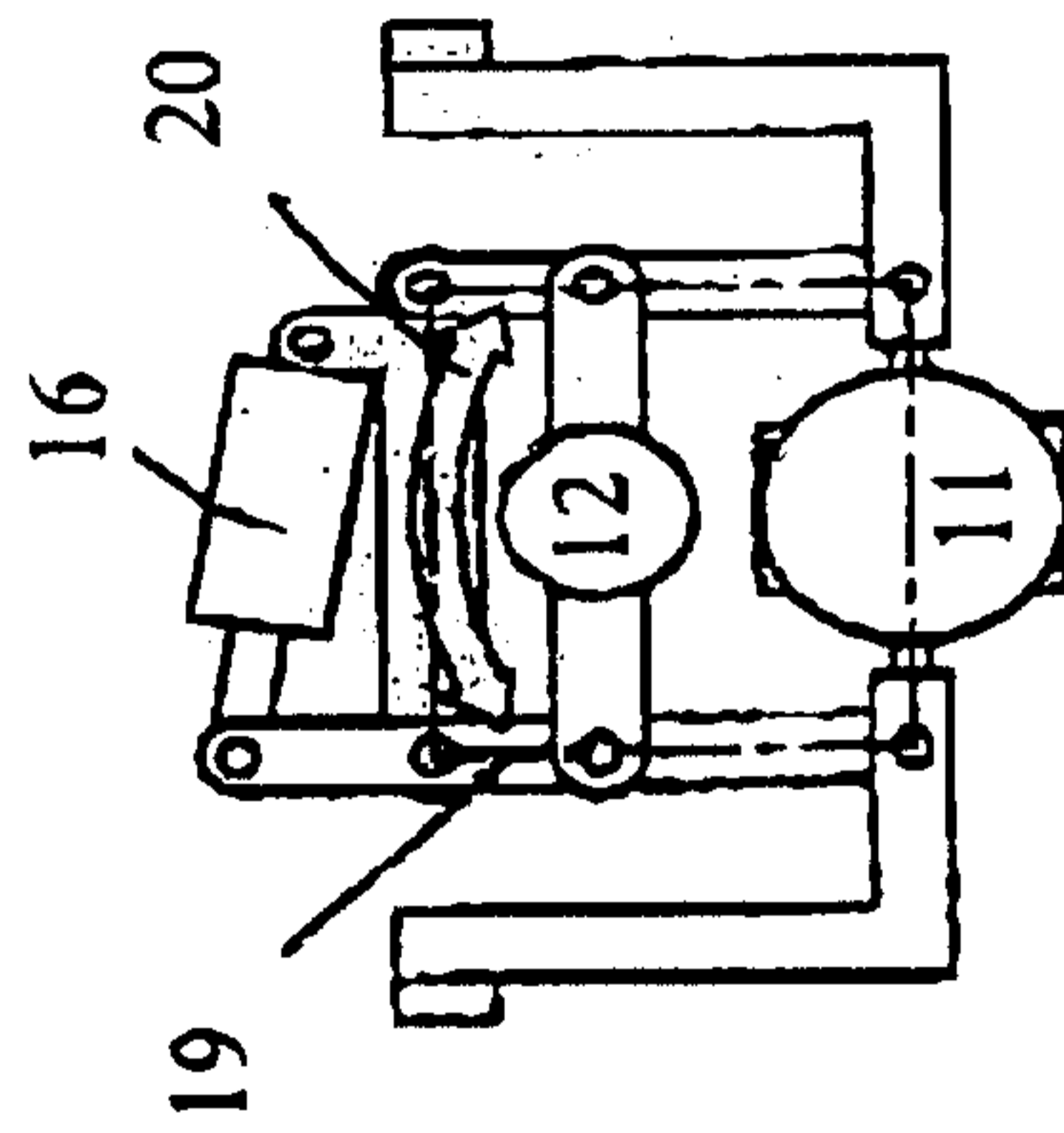
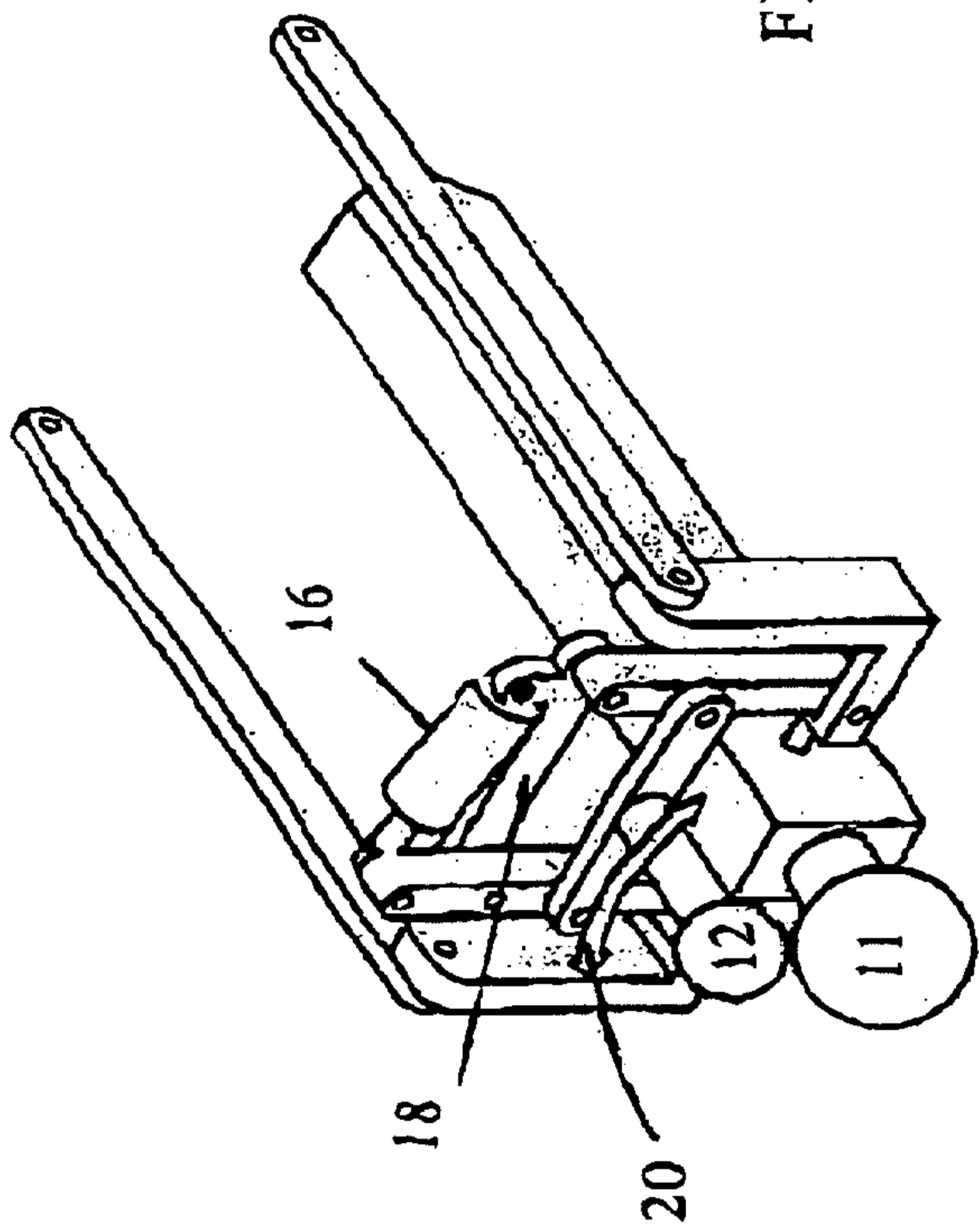


FIG. 5(d)

FIG. 5



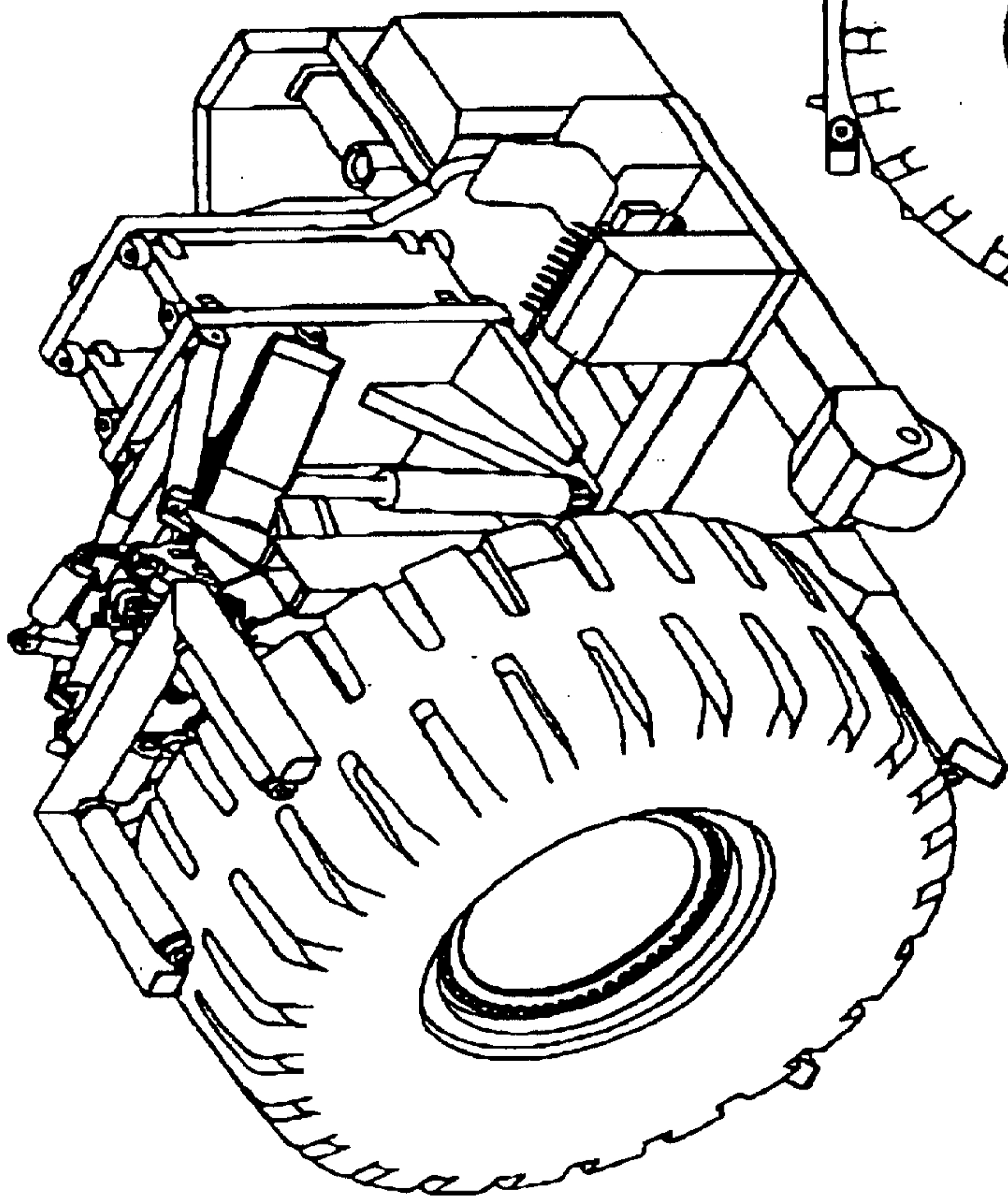


FIG. 7(a)

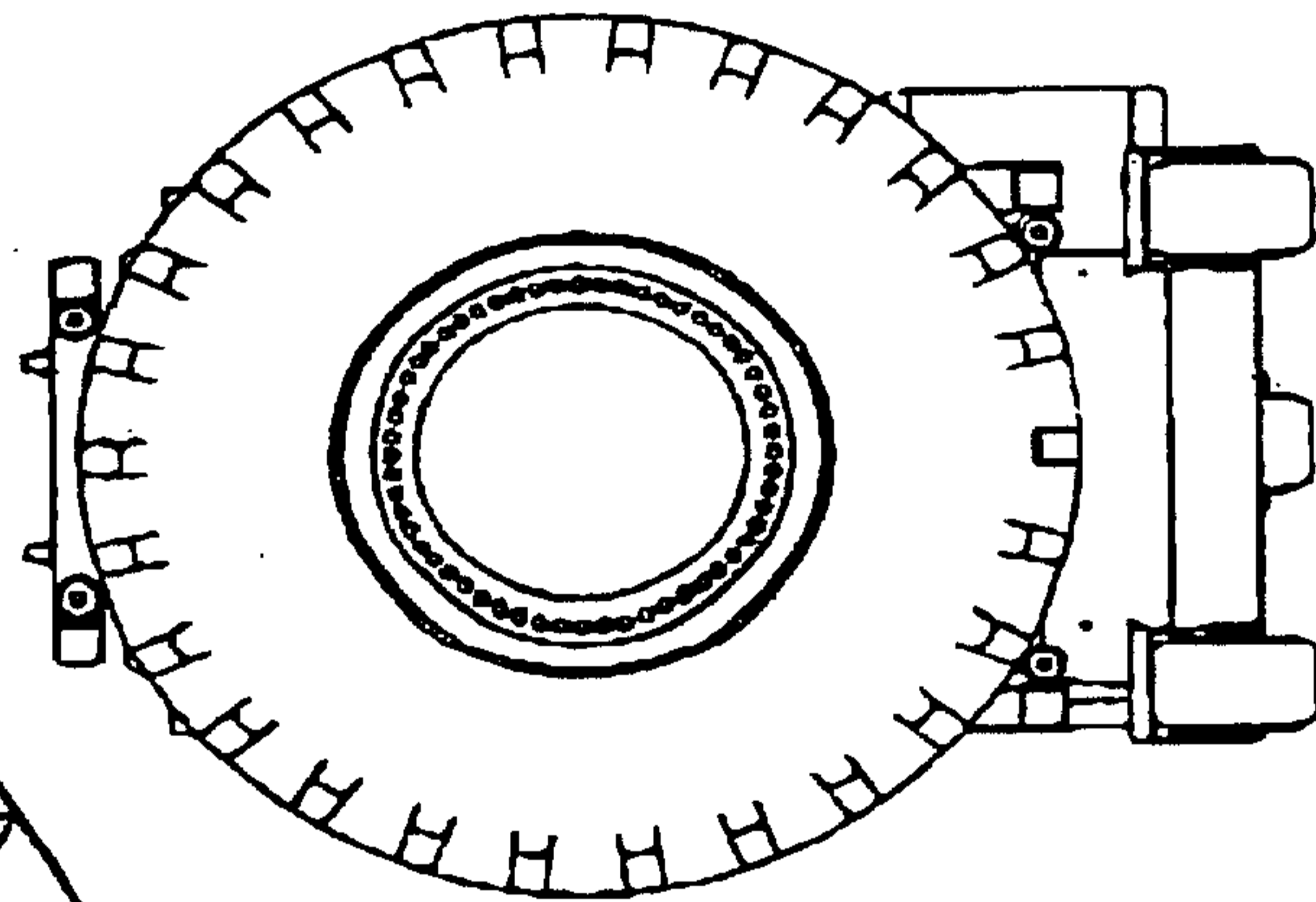


FIG. 7(b)

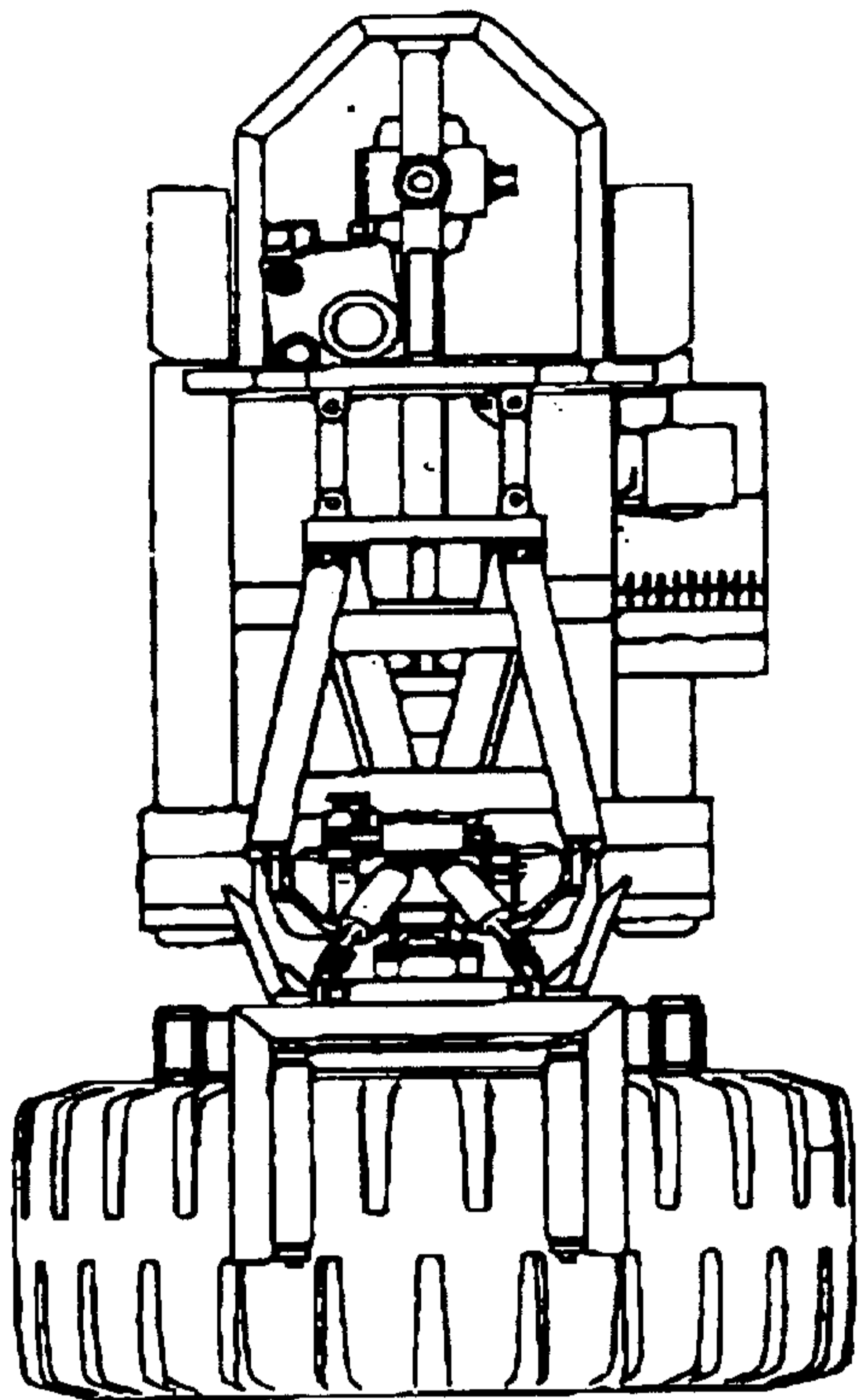


FIG. 7(c)

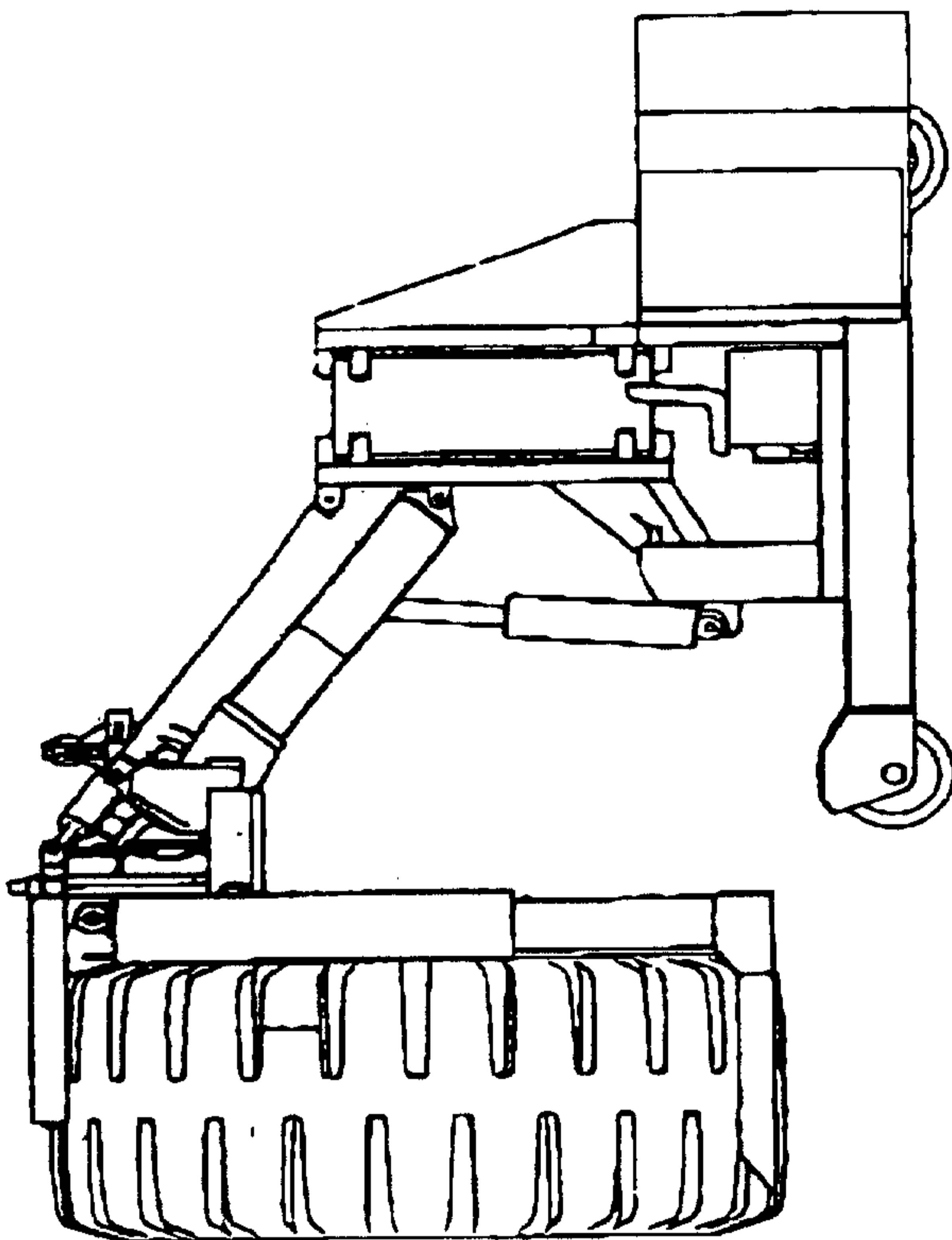


FIG. 7(d)

FIG. 7

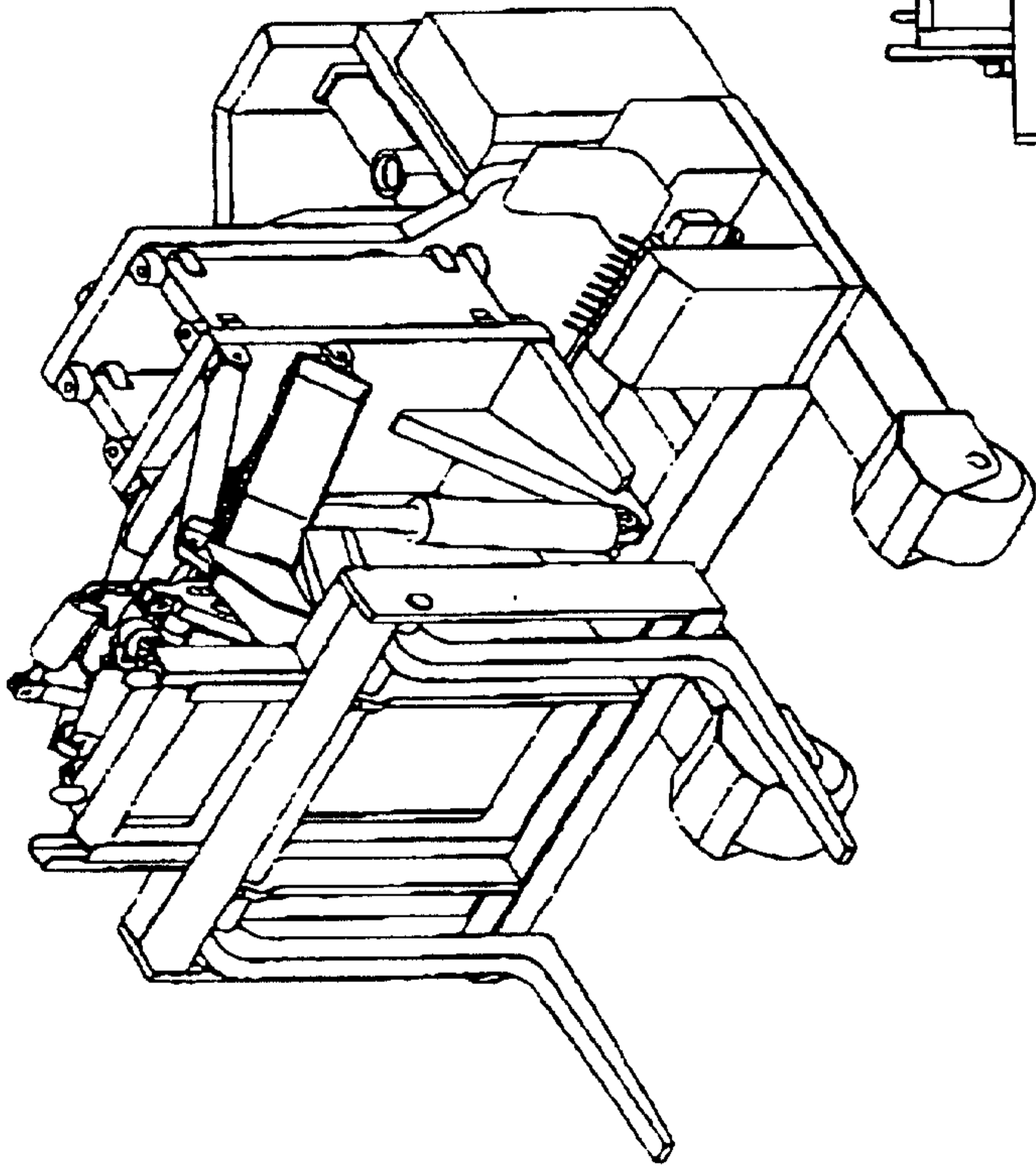


FIG. 8(a)

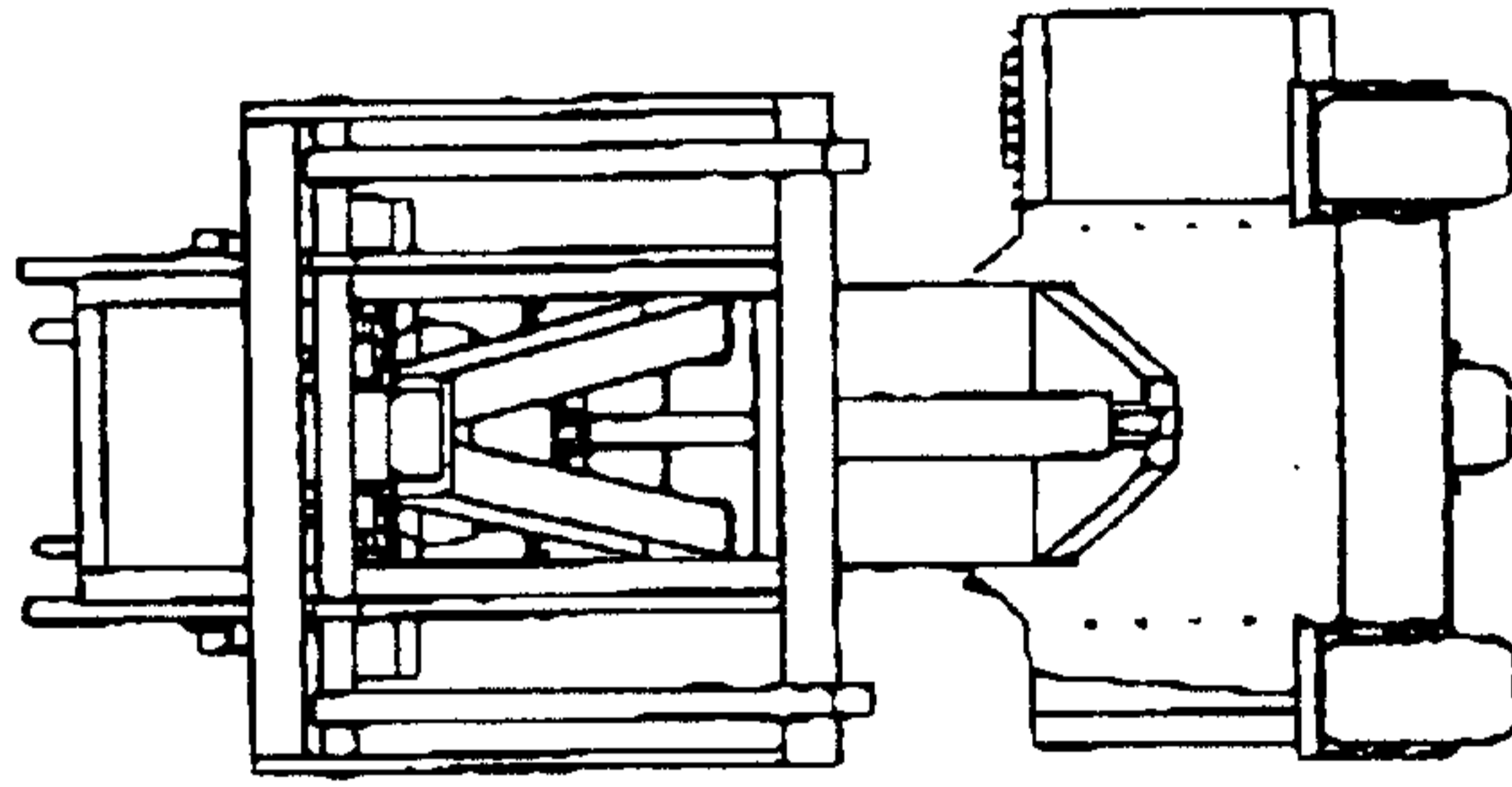


FIG. 8

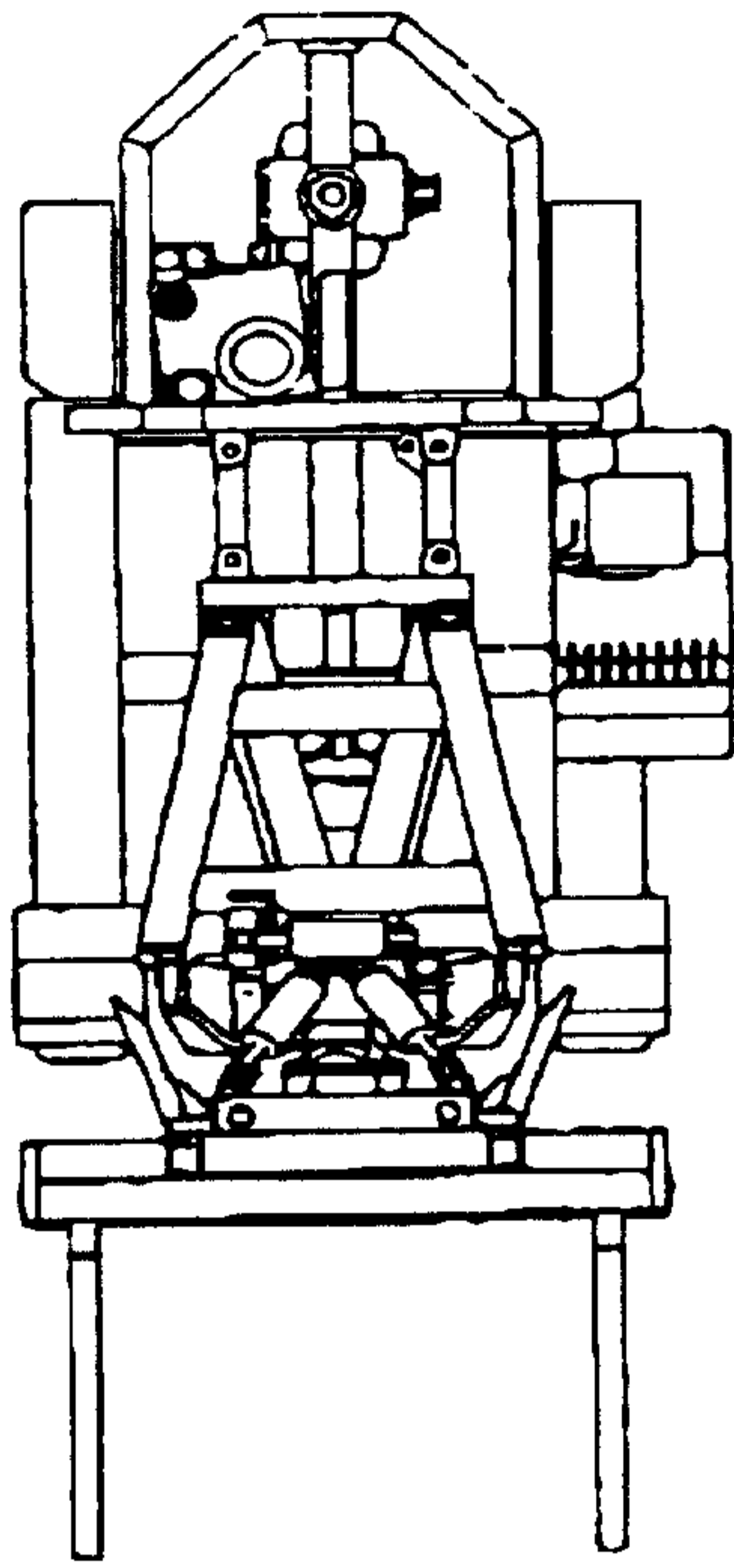


FIG. 8(c)

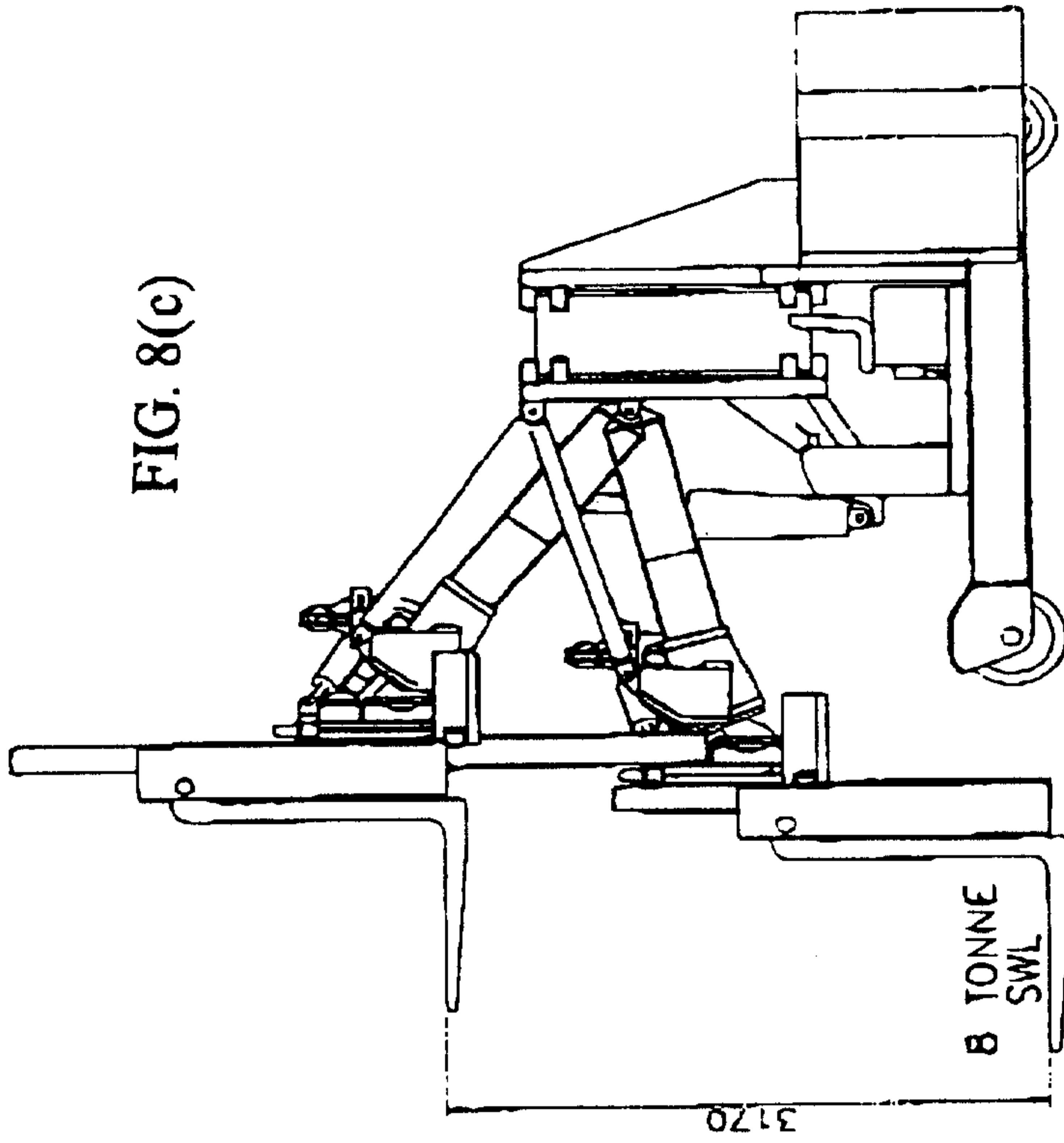


FIG. 8(d)

FIG. 8(b)

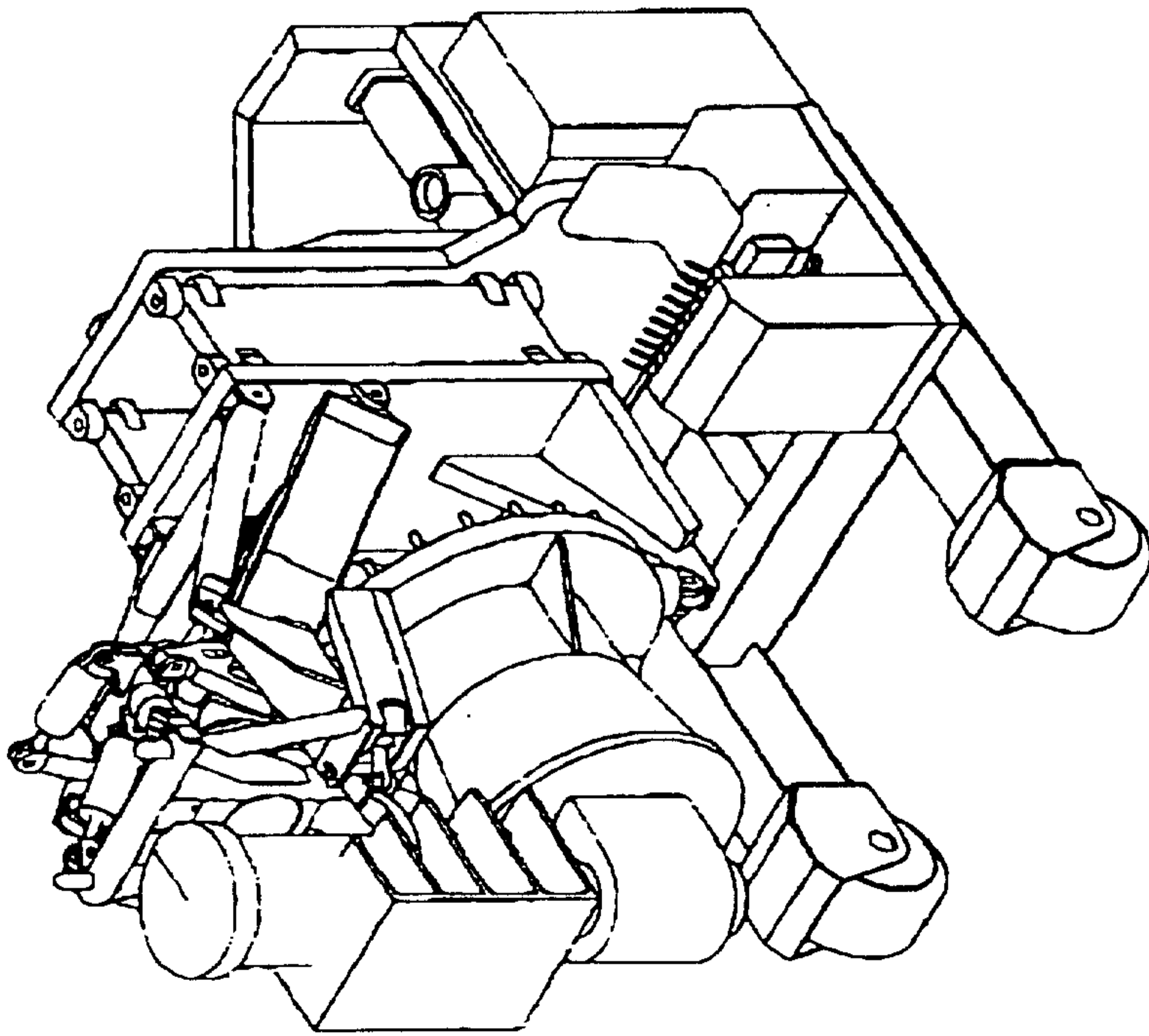


FIG. 9(a)

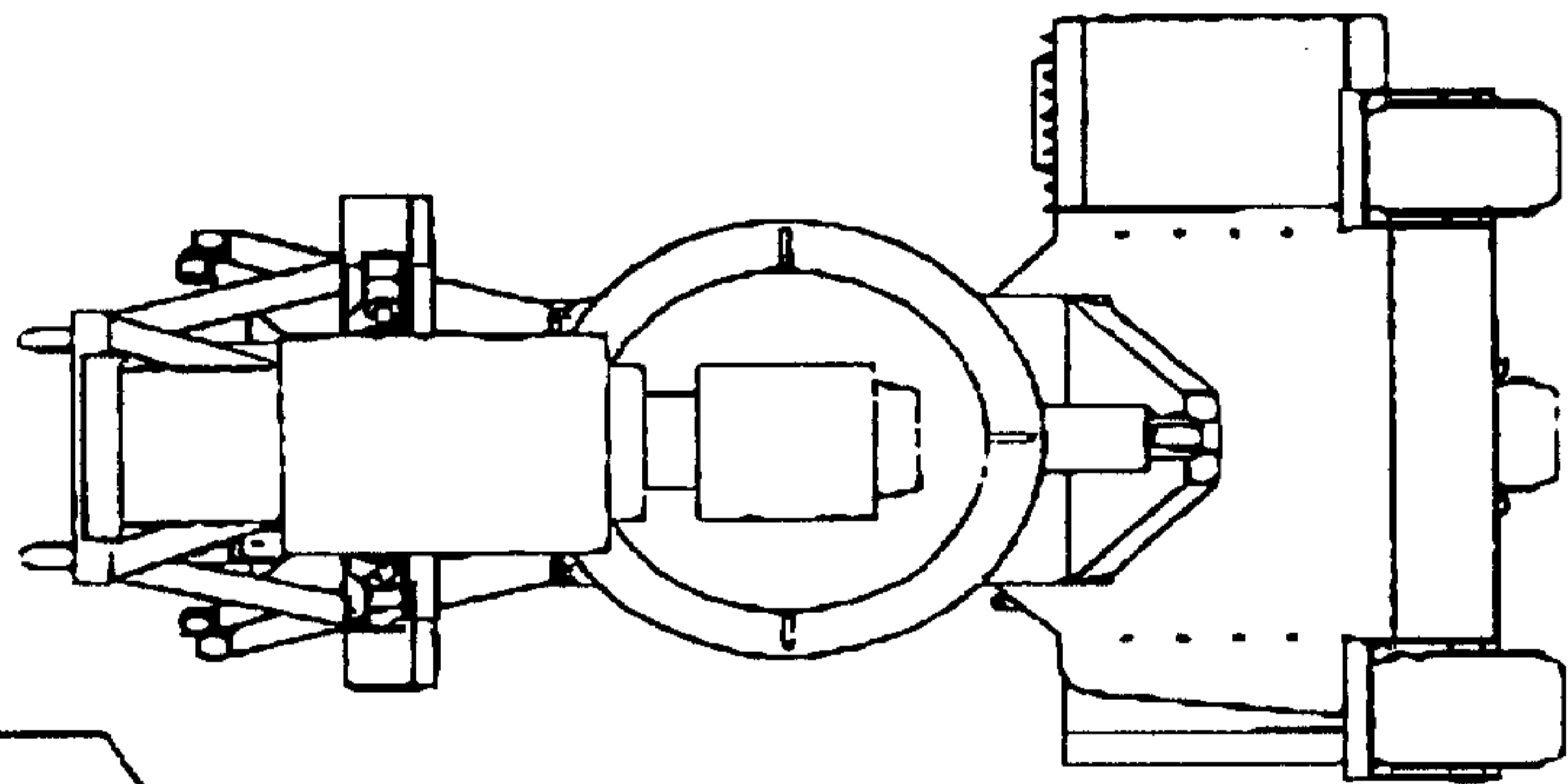


FIG. 9(b)

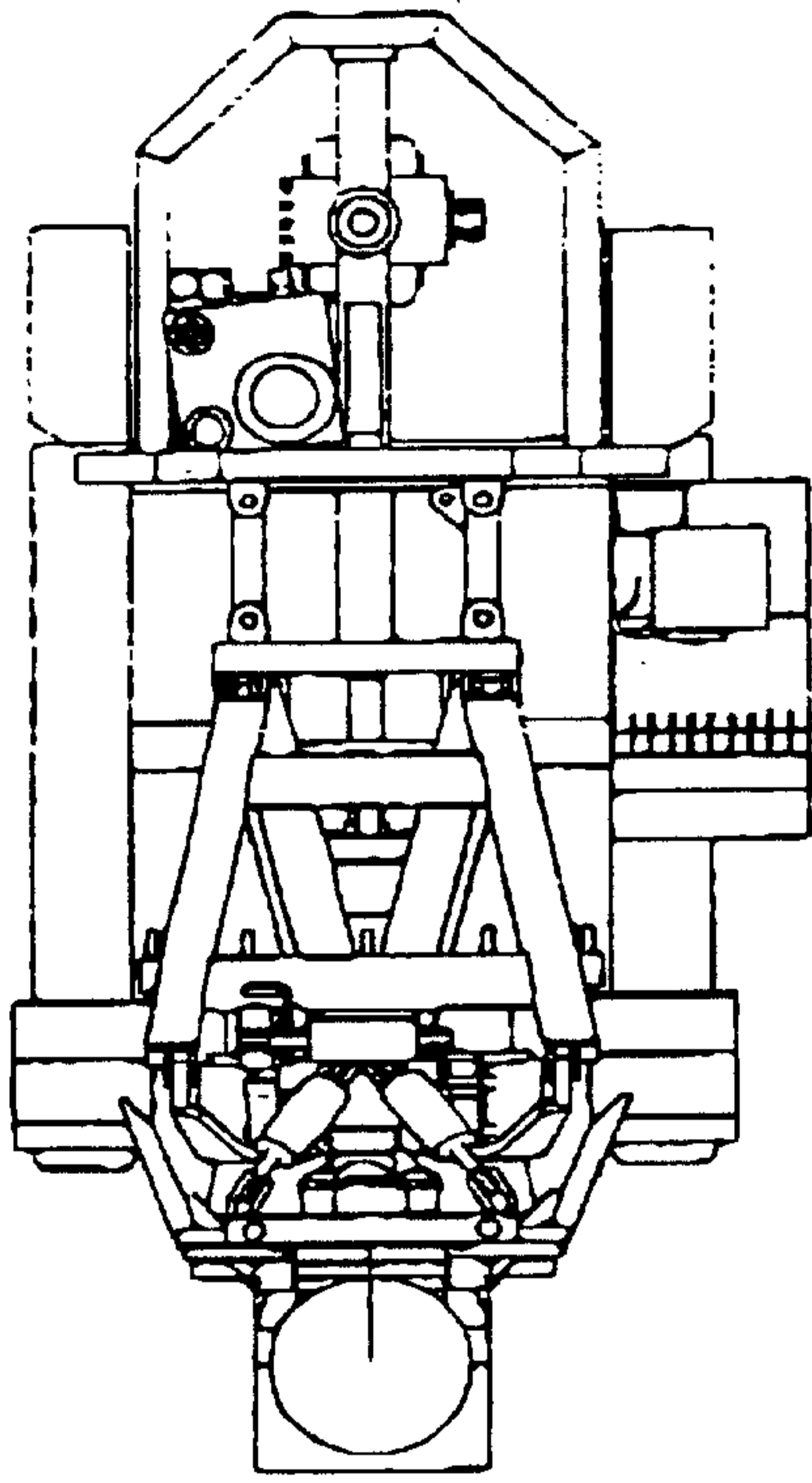


FIG. 9(c)

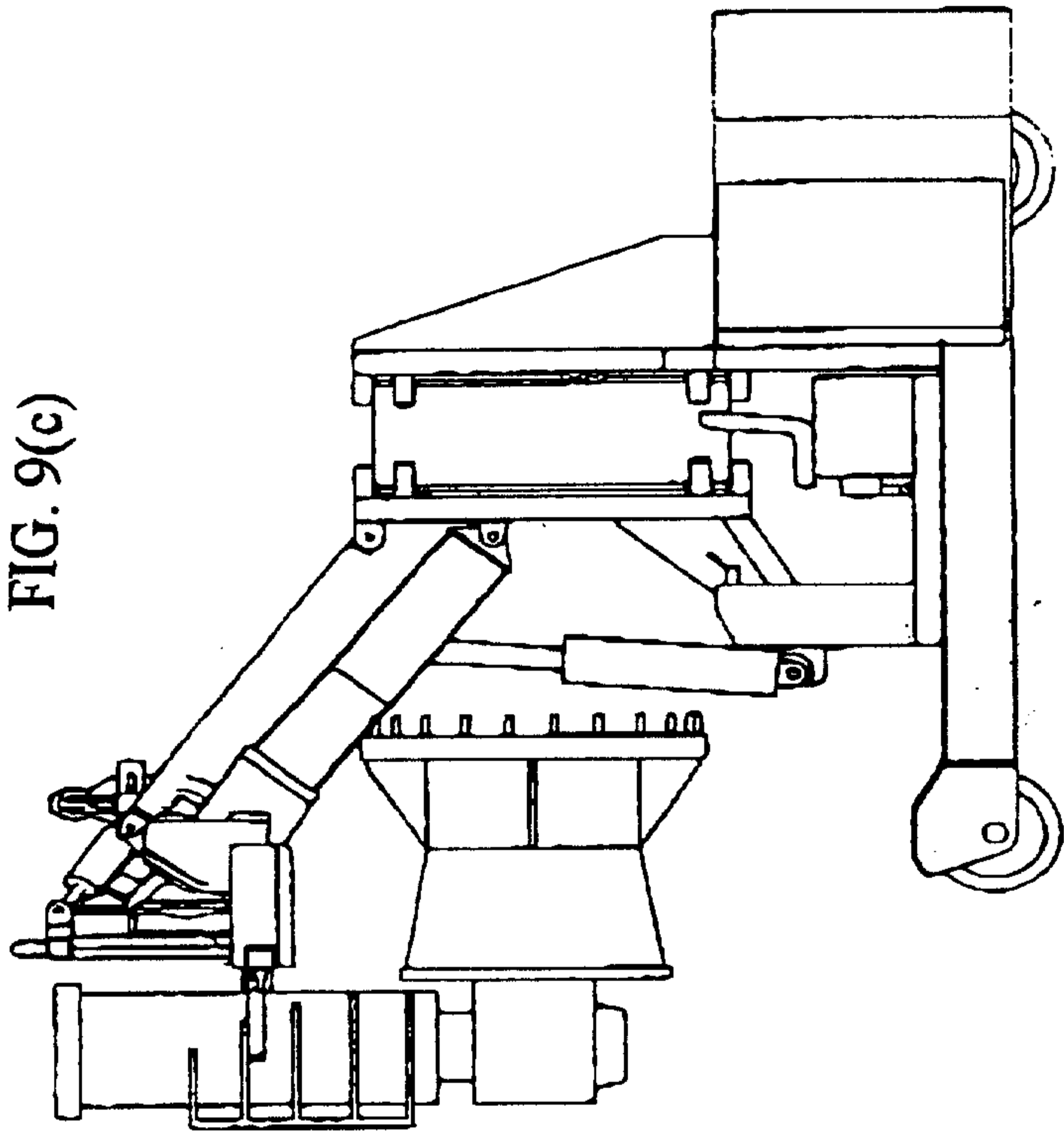


FIG. 9(d)

FIG. 9

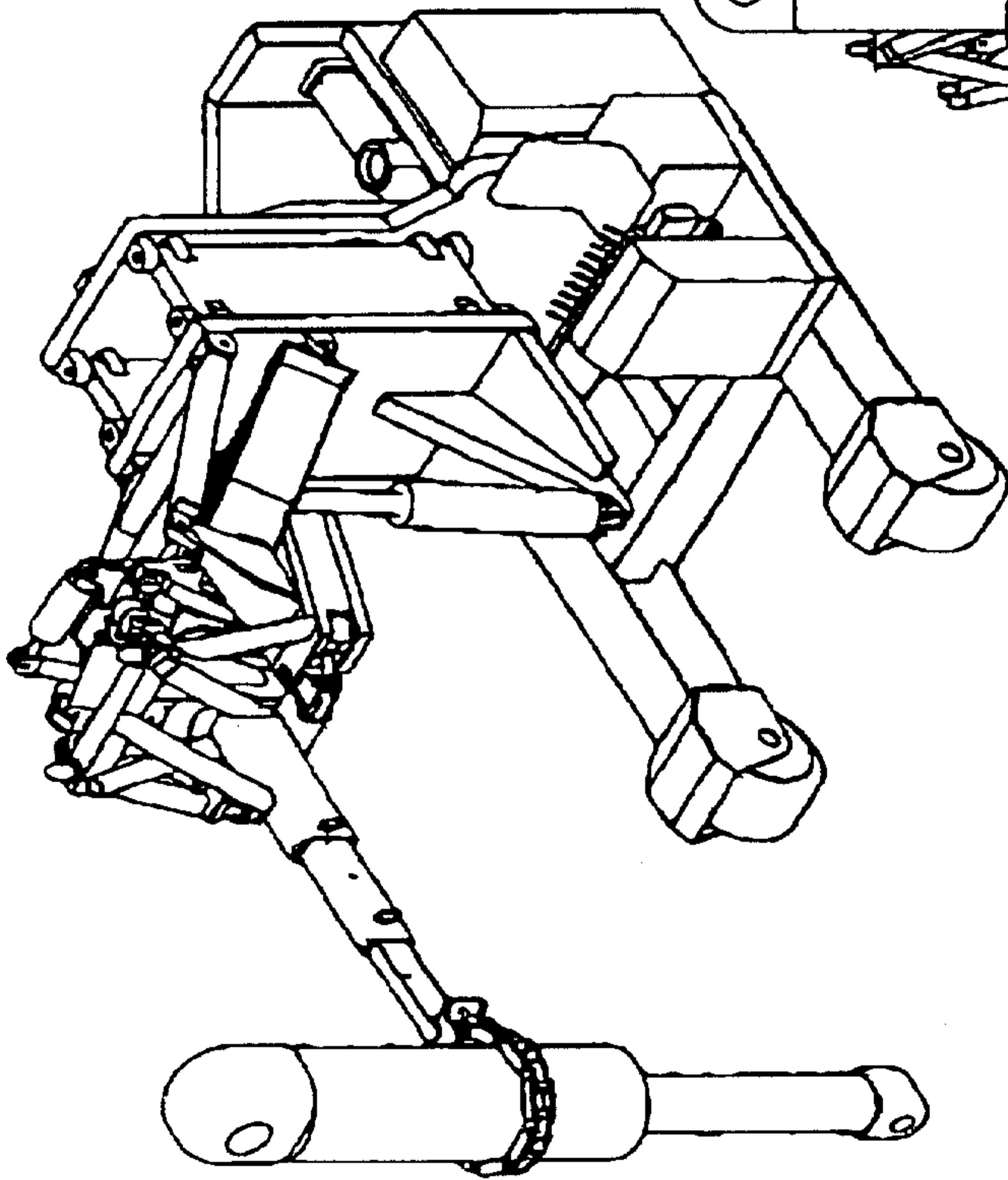


FIG. 10(a)

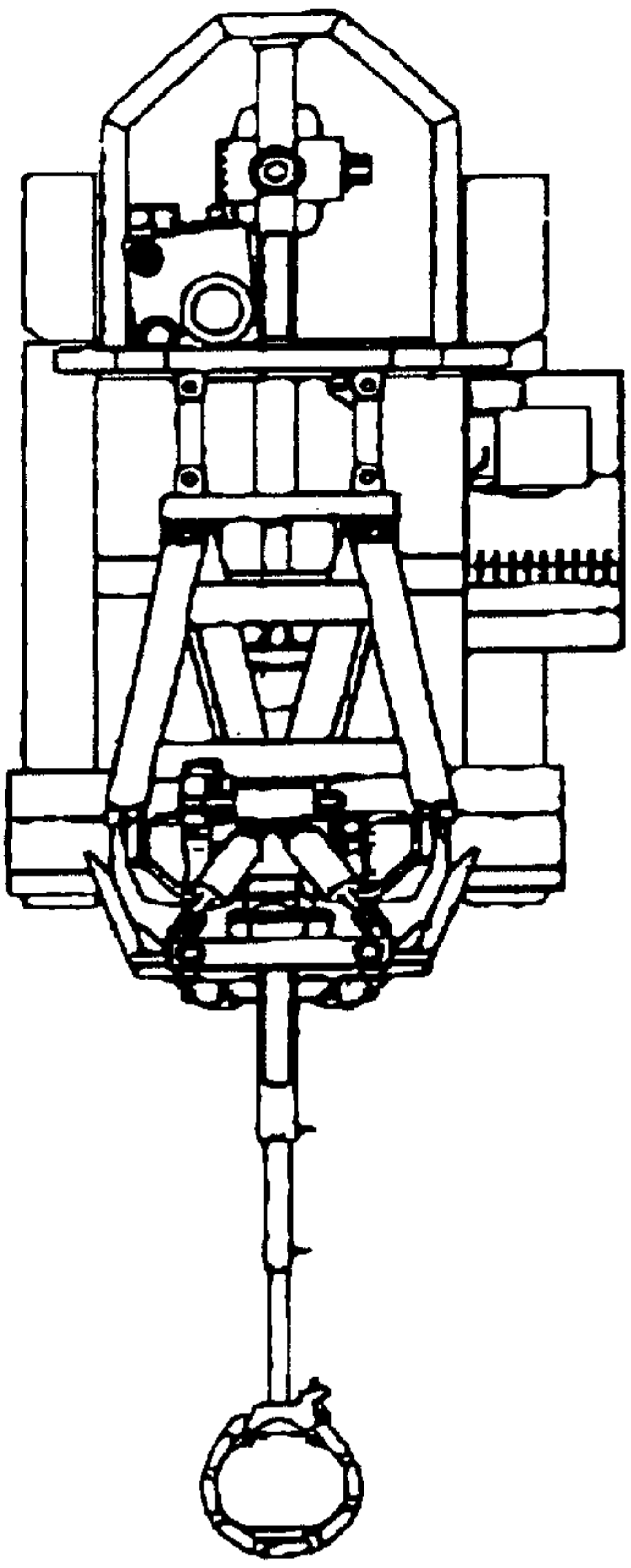


FIG. 10(c)

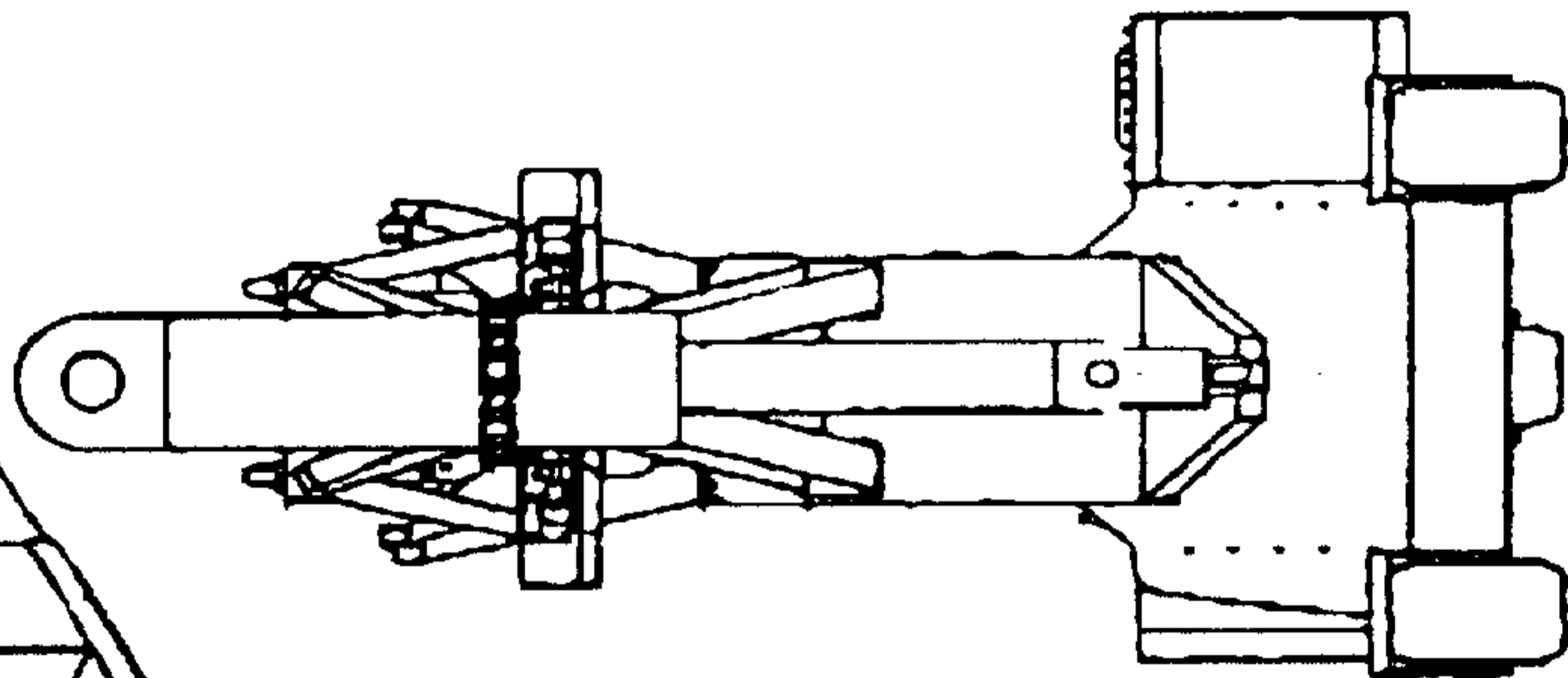
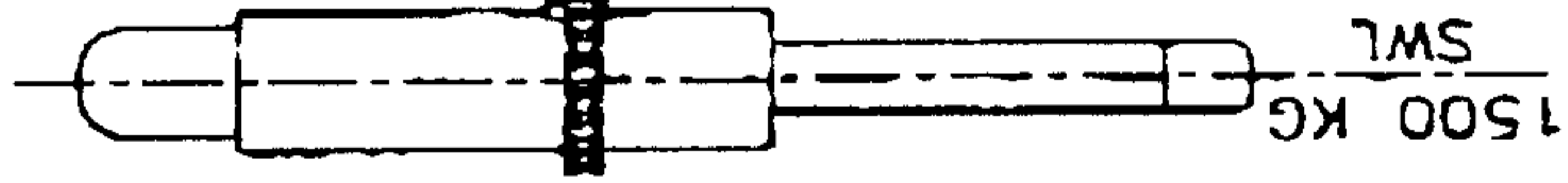


FIG. 10(b)

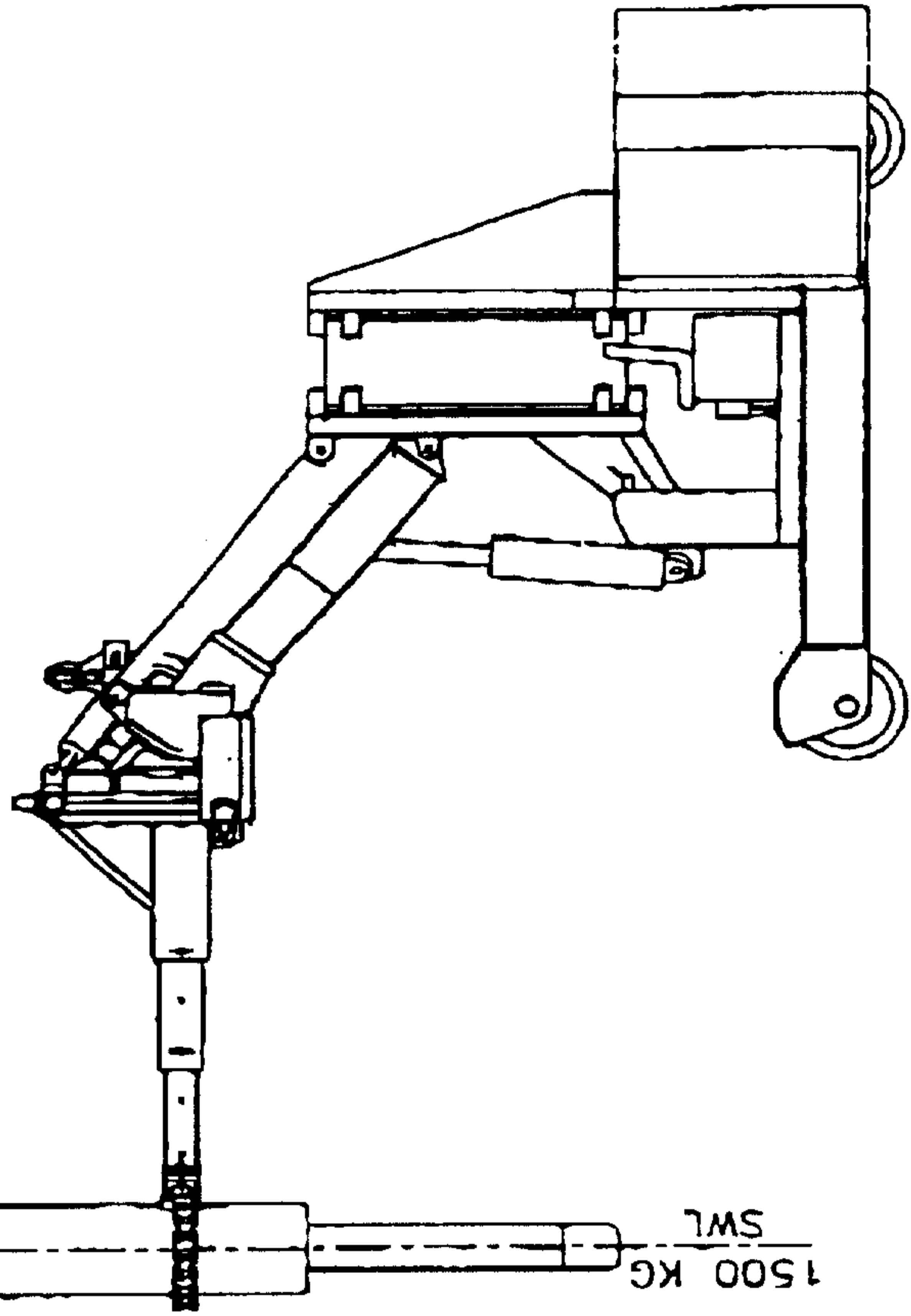


FIG. 10(d)

FIG. 10

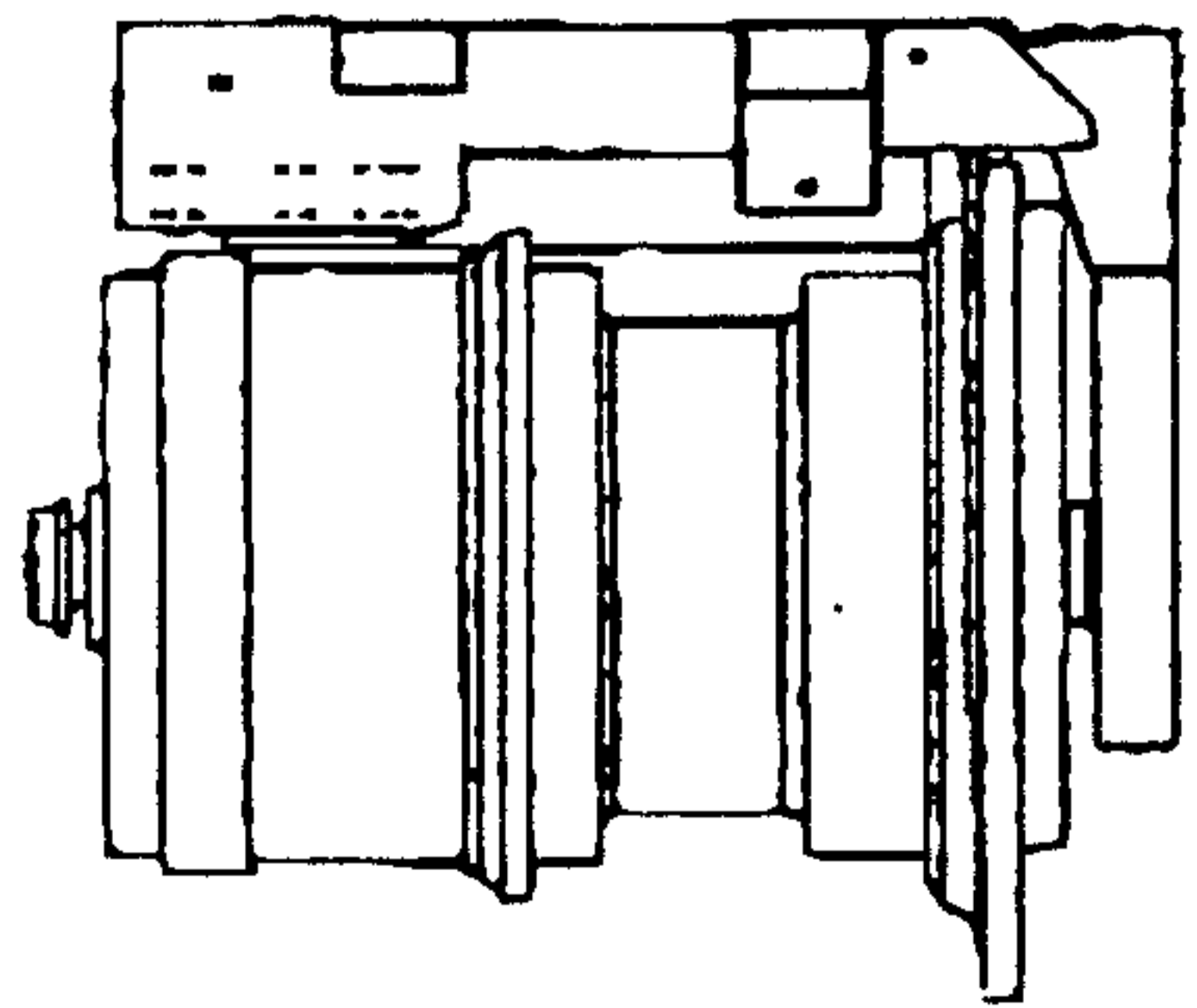


FIG. 11(d)

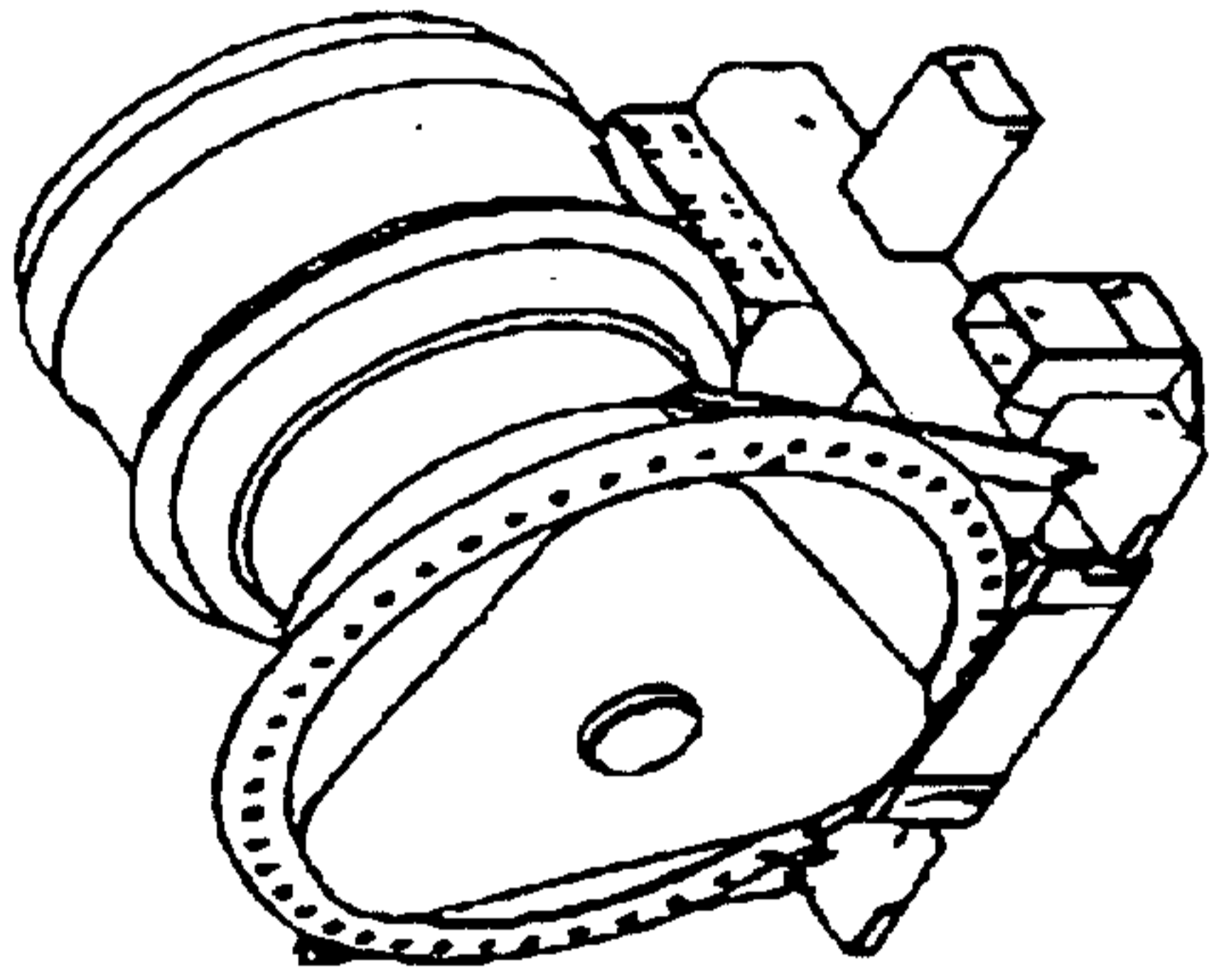


FIG. 11(a)

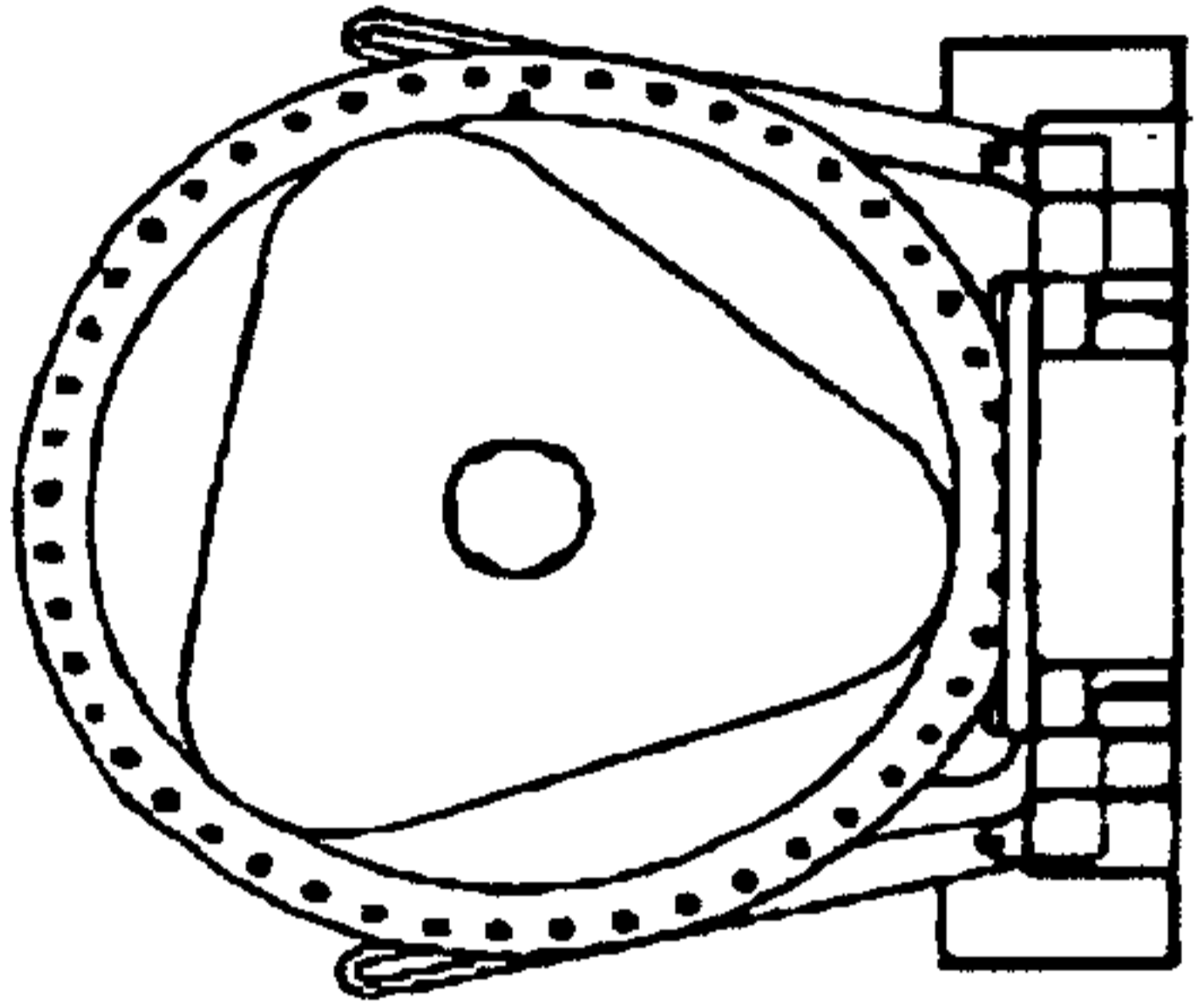


FIG. 11(b)

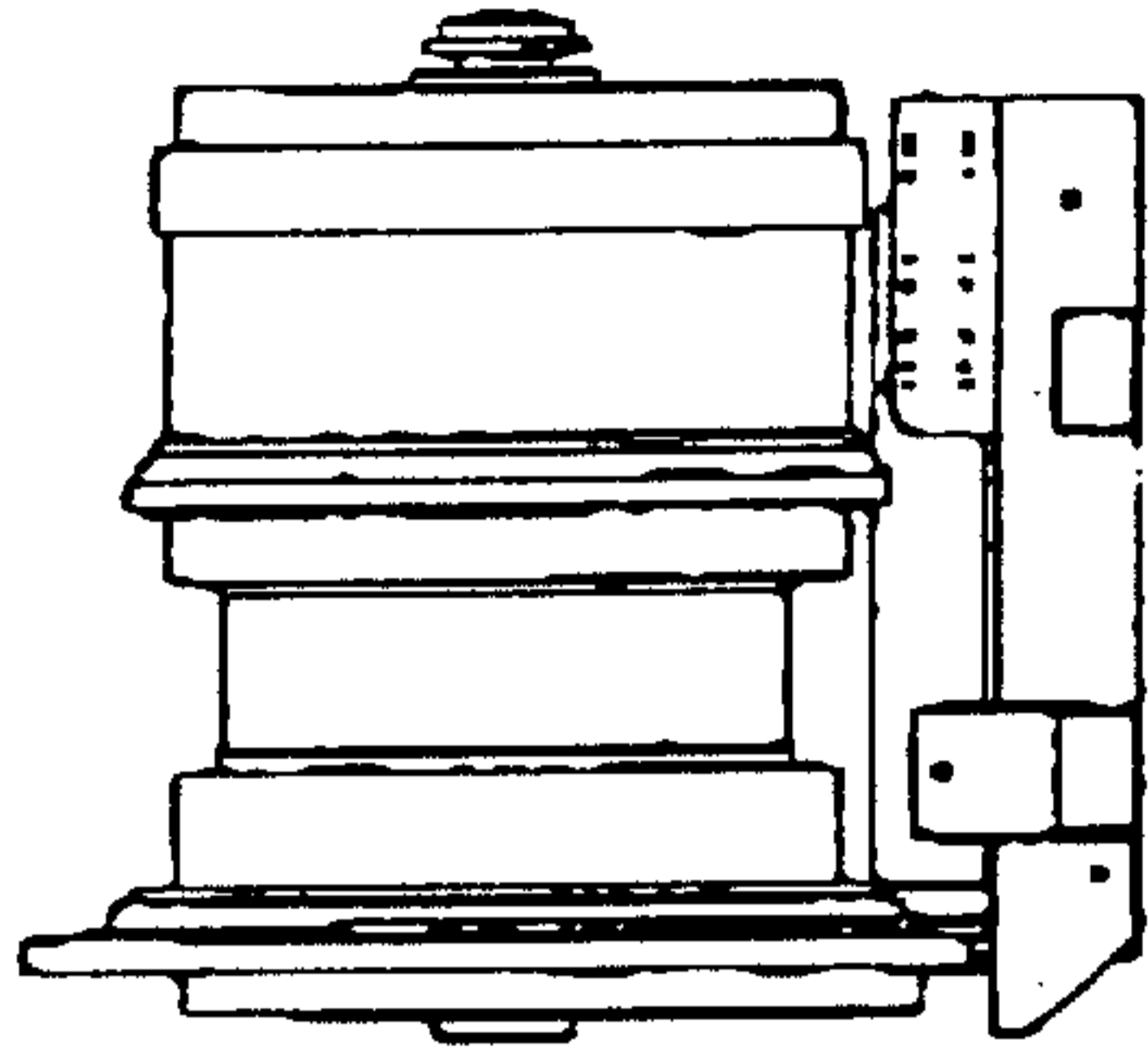


FIG. 11(c)

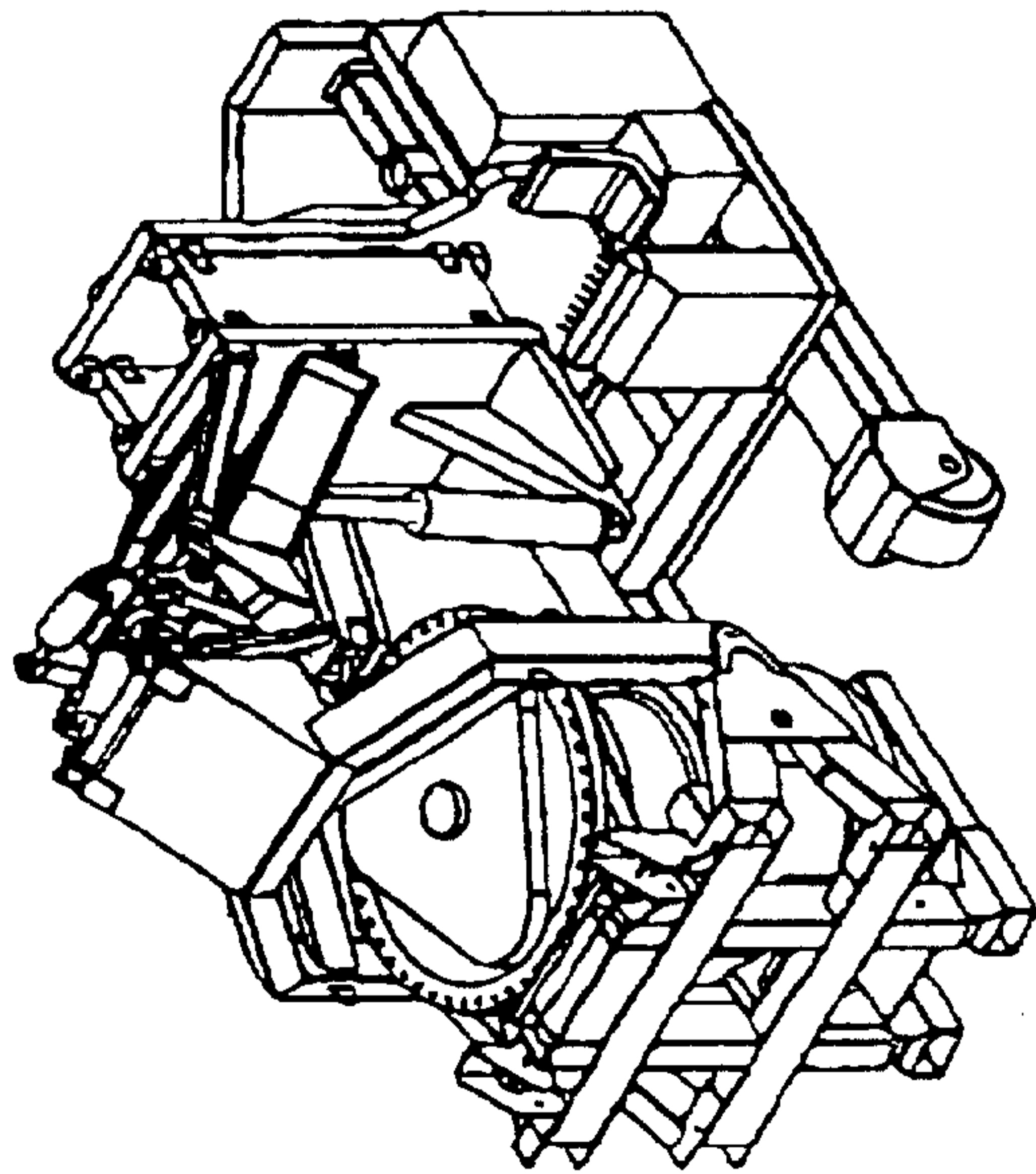


FIG. 11(e)

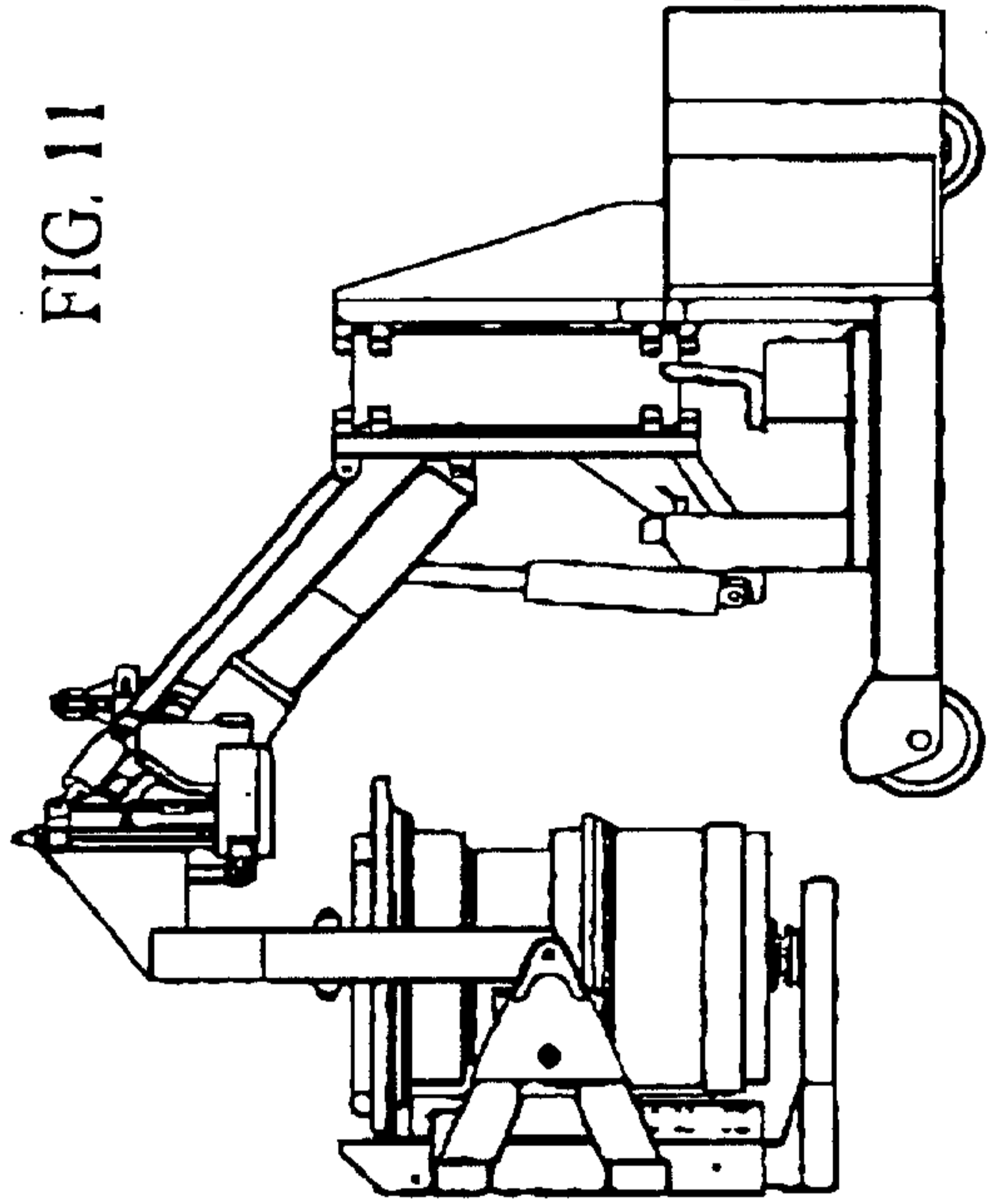


FIG. 11(f)

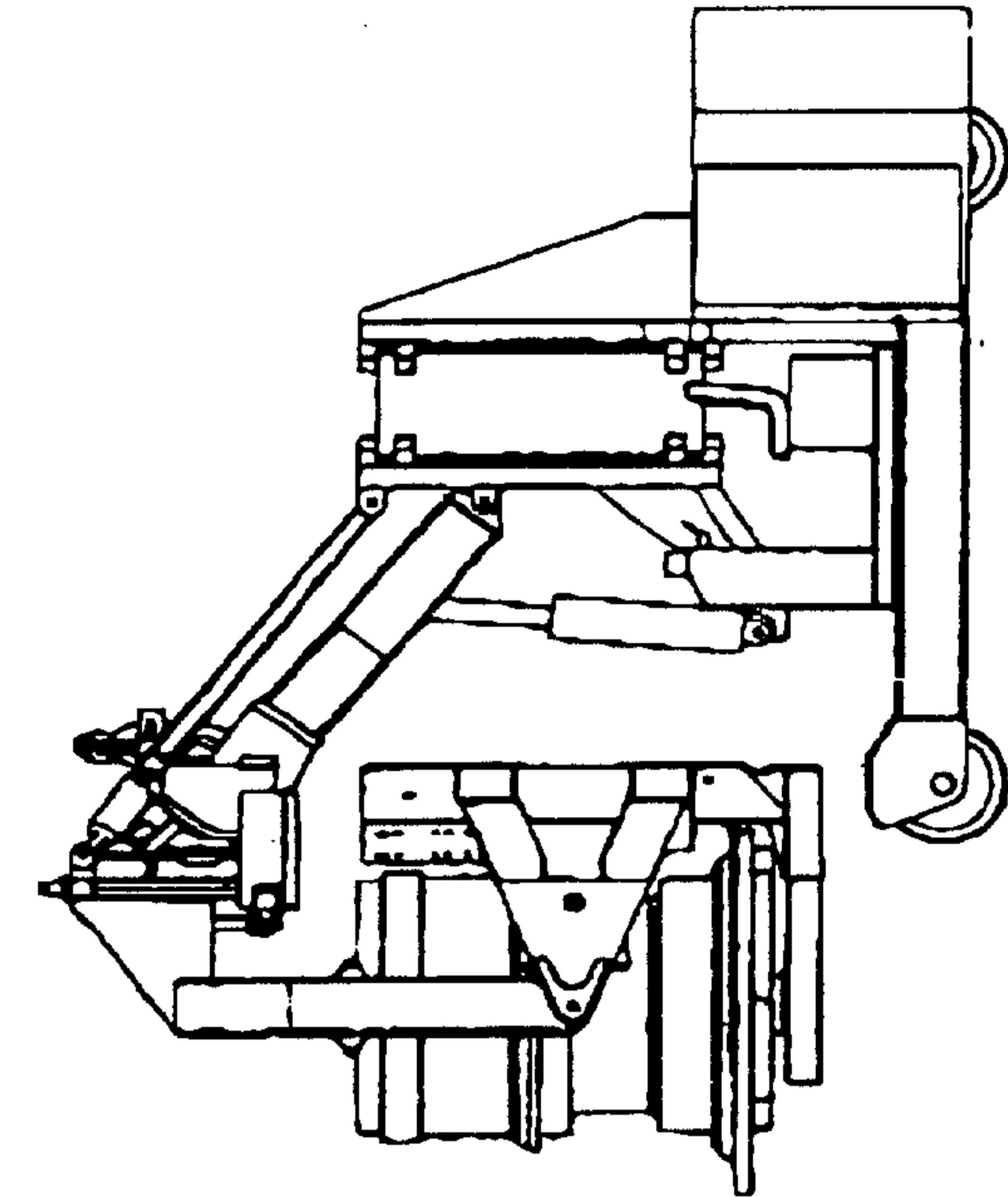


FIG. 11(g)

FIG. 11

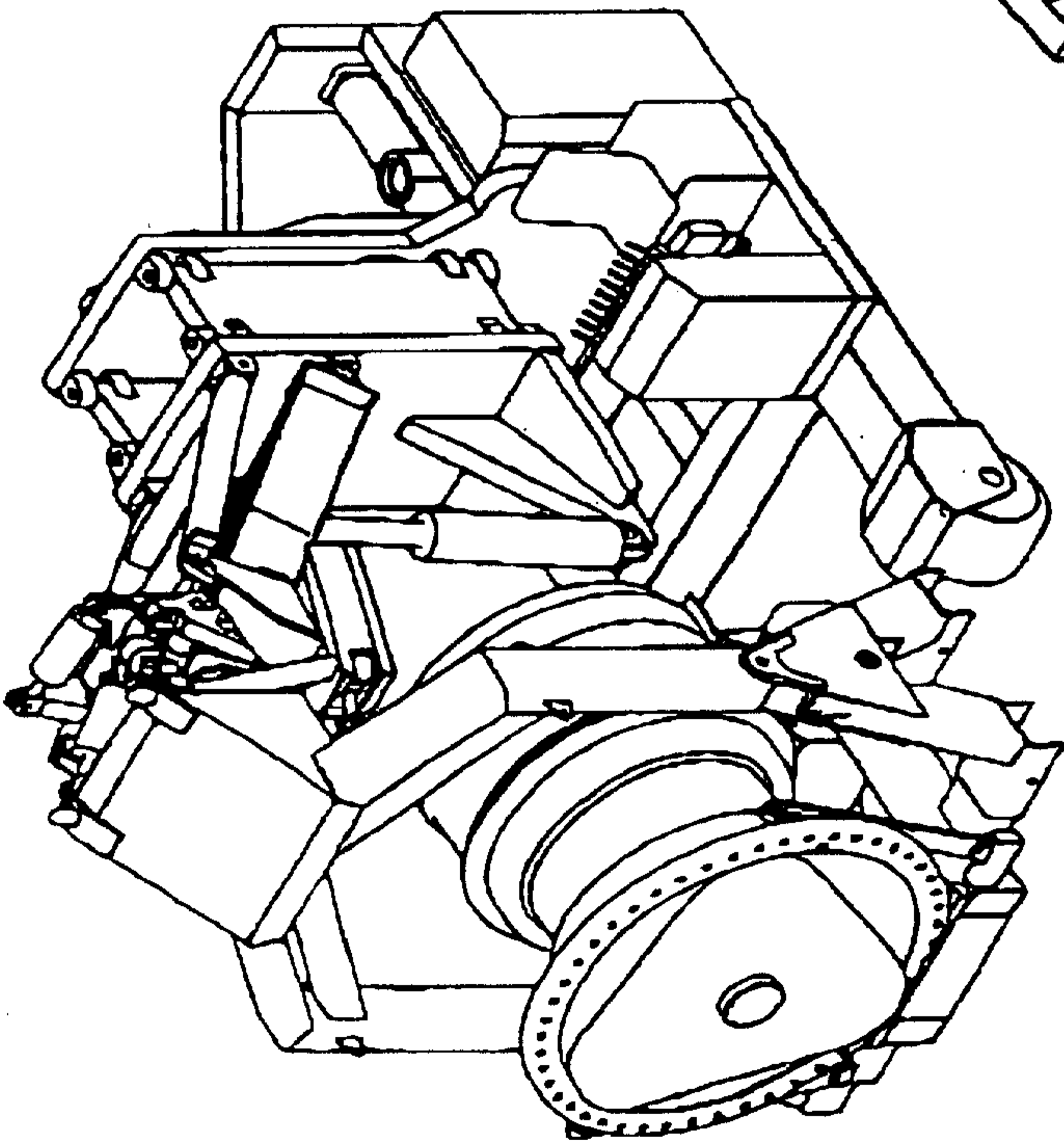


FIG. 11(h)

FIG. 11 cont.

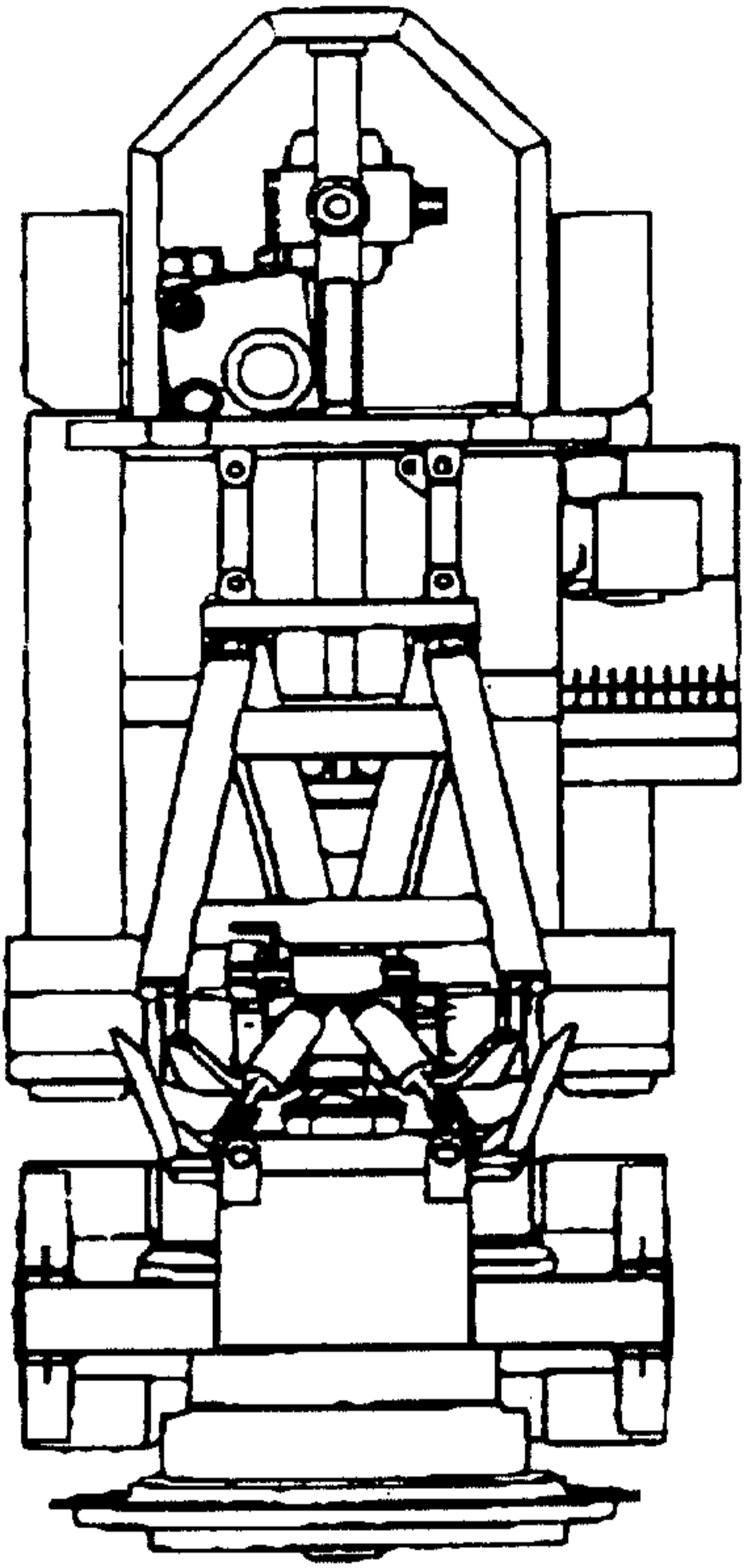


FIG. 11(j)

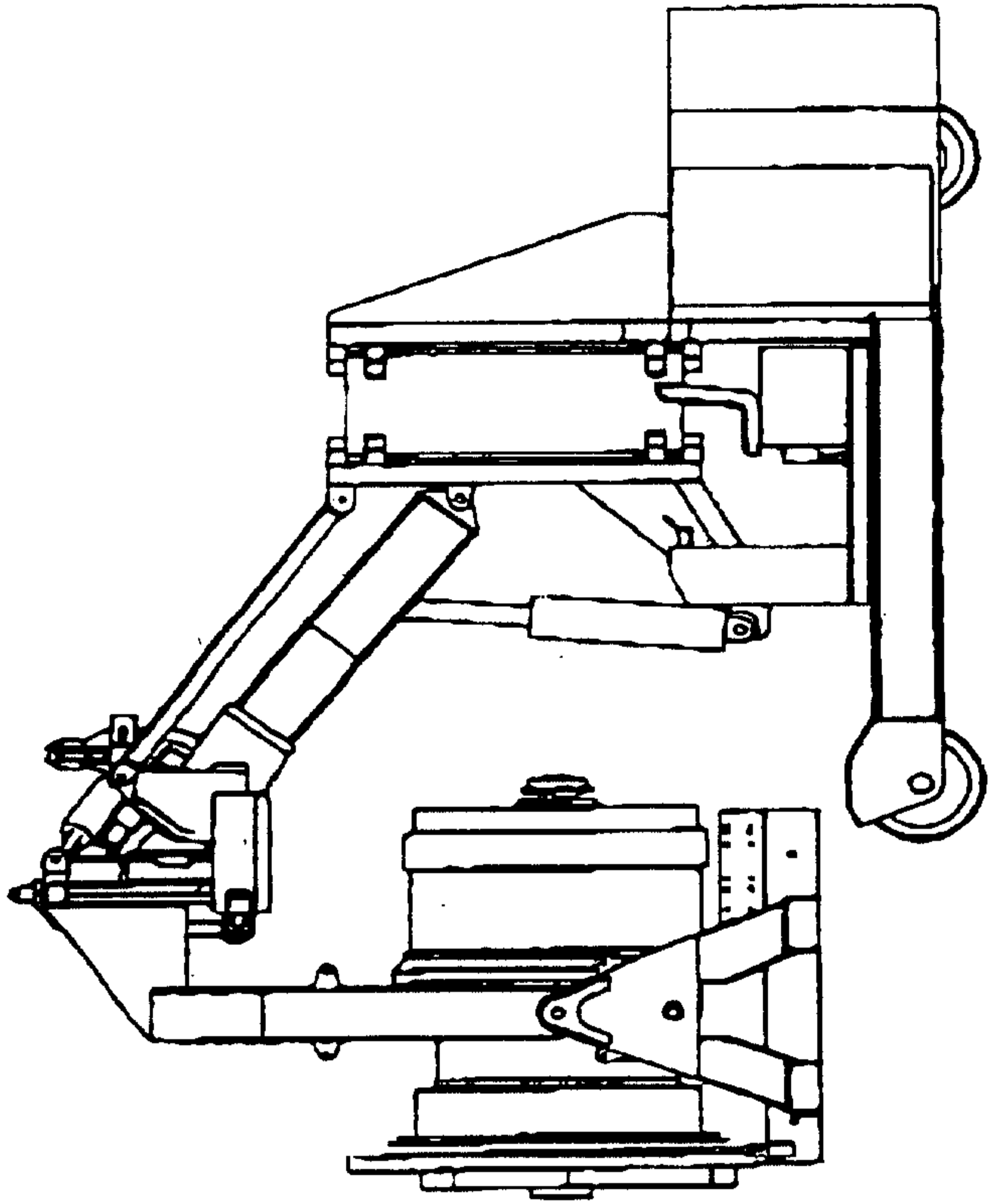


FIG. 11(k)

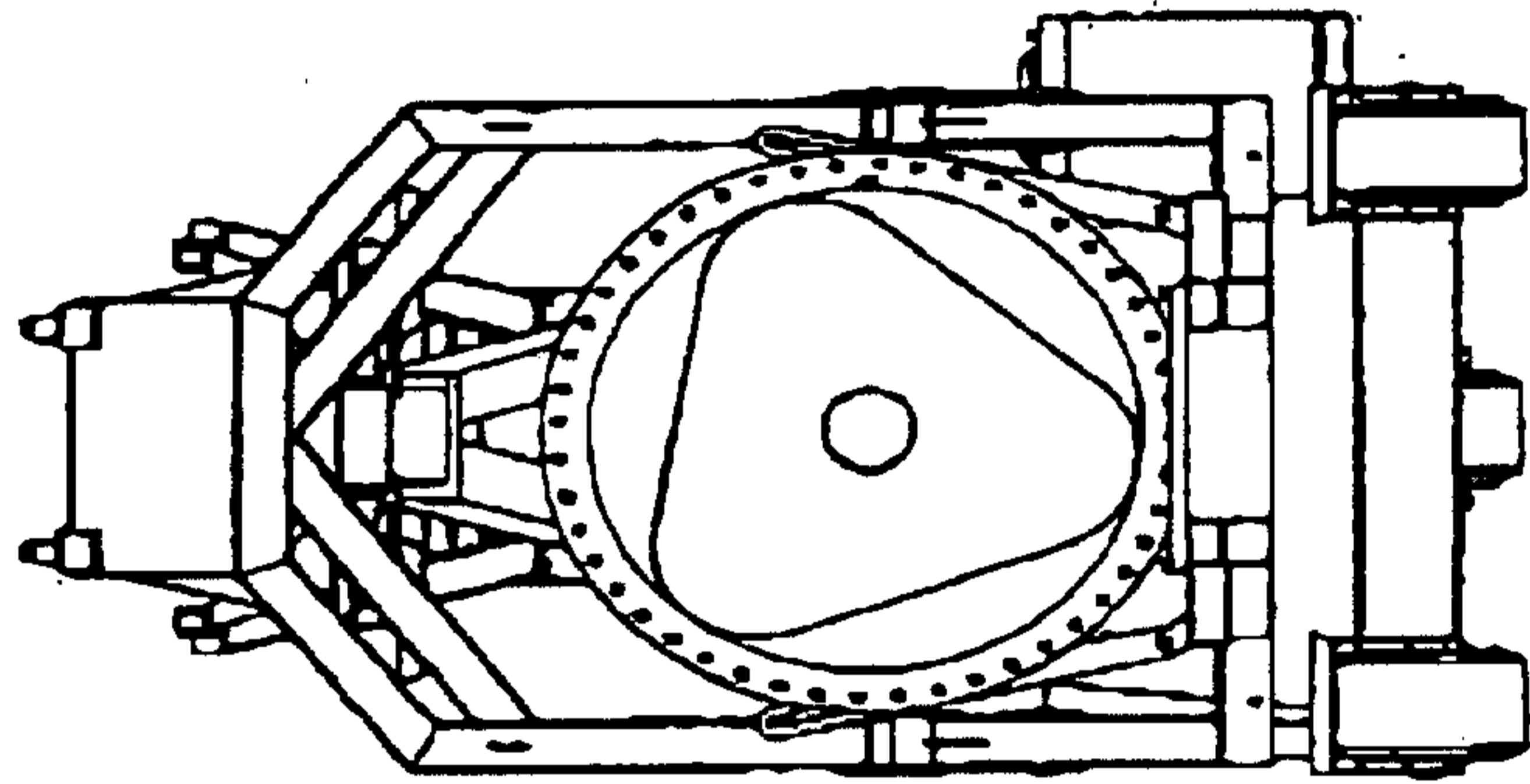


FIG. 11(i)

