

(86) Date de dépôt PCT/PCT Filing Date: 2007/02/01
(87) Date publication PCT/PCT Publication Date: 2007/08/16
(45) Date de délivrance/Issue Date: 2014/06/10
(85) Entrée phase nationale/National Entry: 2008/05/05
(86) N° demande PCT/PCT Application No.: US 2007/002811
(87) N° publication PCT/PCT Publication No.: 2007/092268
(30) Priorité/Priority: 2006/02/02 (US11/346,070)

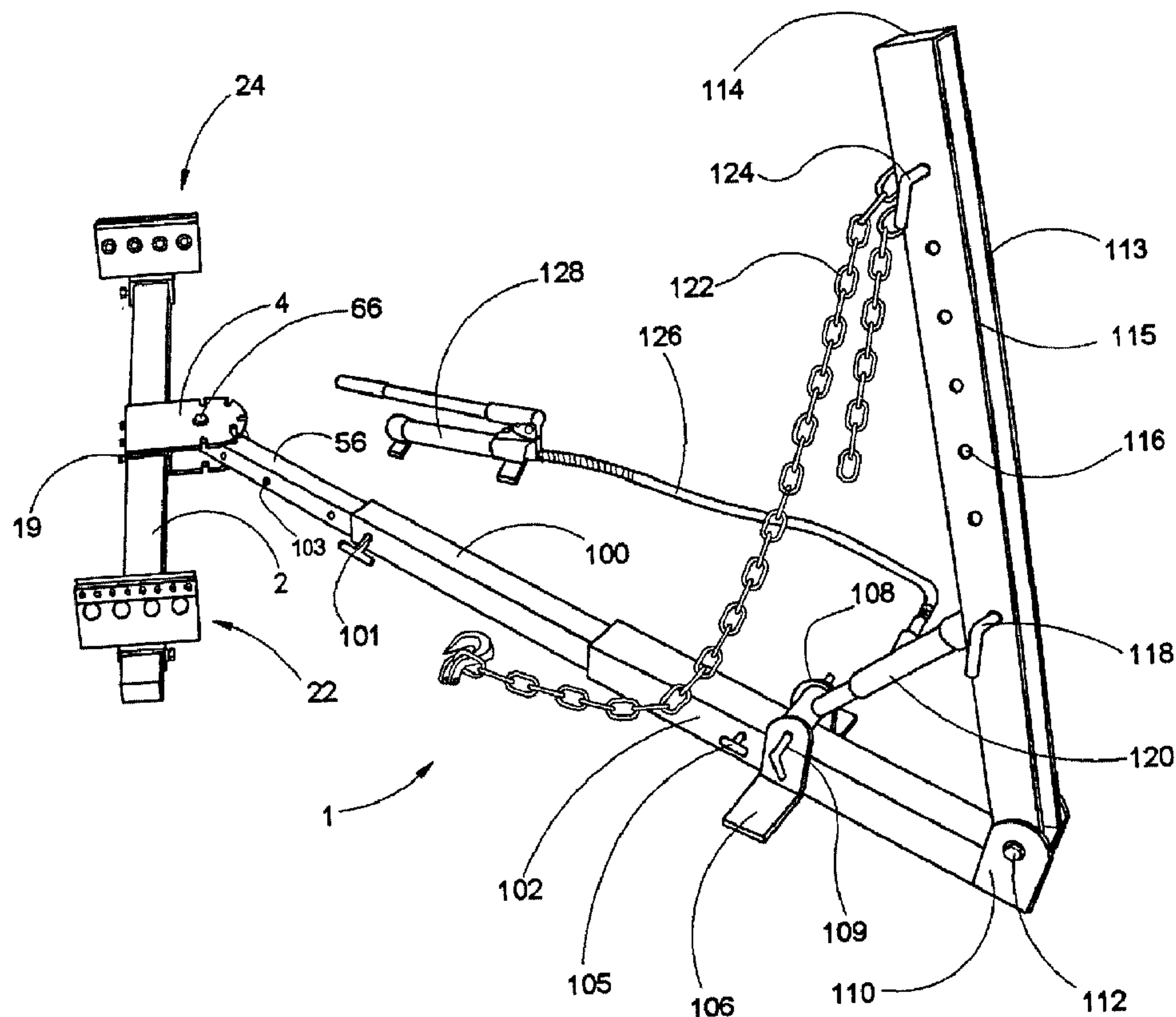
(51) Cl.Int./Int.Cl. *B21D 1/12* (2006.01),
B60S 5/00 (2006.01)

(72) Inventeur/Inventor:
KING, JERRY A., US

(73) Propriétaire/Owner:
KING, JERRY A., US

(74) Agent: CASSAN MACLEAN

(54) Titre : MACHINE DE REPARATION DE DOMMAGES AUTOMOBILES
(54) Title: AUTOMOBILE DAMAGE REPAIRING MACHINE



(57) Abrégé/Abstract:

An automobile body repair machine incorporating a quill and shaft load shouldering assembly whose quill includes lateral, medial, and oppositely lateral sections,- slide stopping set screws extending through the quill sections for impingement upon the quill and

(57) Abrégé(suite)/Abstract(continued):

shaft combination's shaft; weld seam grasping left and right anchor clamps fixedly attached to the lateral and oppositely lateral quill sections; a pull force transferring cantilevered stem,- a selectively lockable and. unlockable pivot joint interconnecting the stem and the medial quill section,- a pivoting cantilevered foot attached to a distal end of the stem,- and a foot extending hydraulic cylinder triangulating between the stem and the foot,- the automobile body repairing machine further incorporating a body damage pulling tie attached to a distal end of the cantilevered foot.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
16 August 2007 (16.08.2007)

PCT

(10) International Publication Number
WO 2007/092268 A2

(51) International Patent Classification: Not classified

(21) International Application Number:
PCT/US2007/002811

(22) International Filing Date: 1 February 2007 (01.02.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
11/346,070 2 February 2006 (02.02.2006) US

(71) Applicant and

(72) Inventor: **KING, Jerry, A.** [US/US]; 1712 N. Broadway,
Wichita, KS 67214 (US).

CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

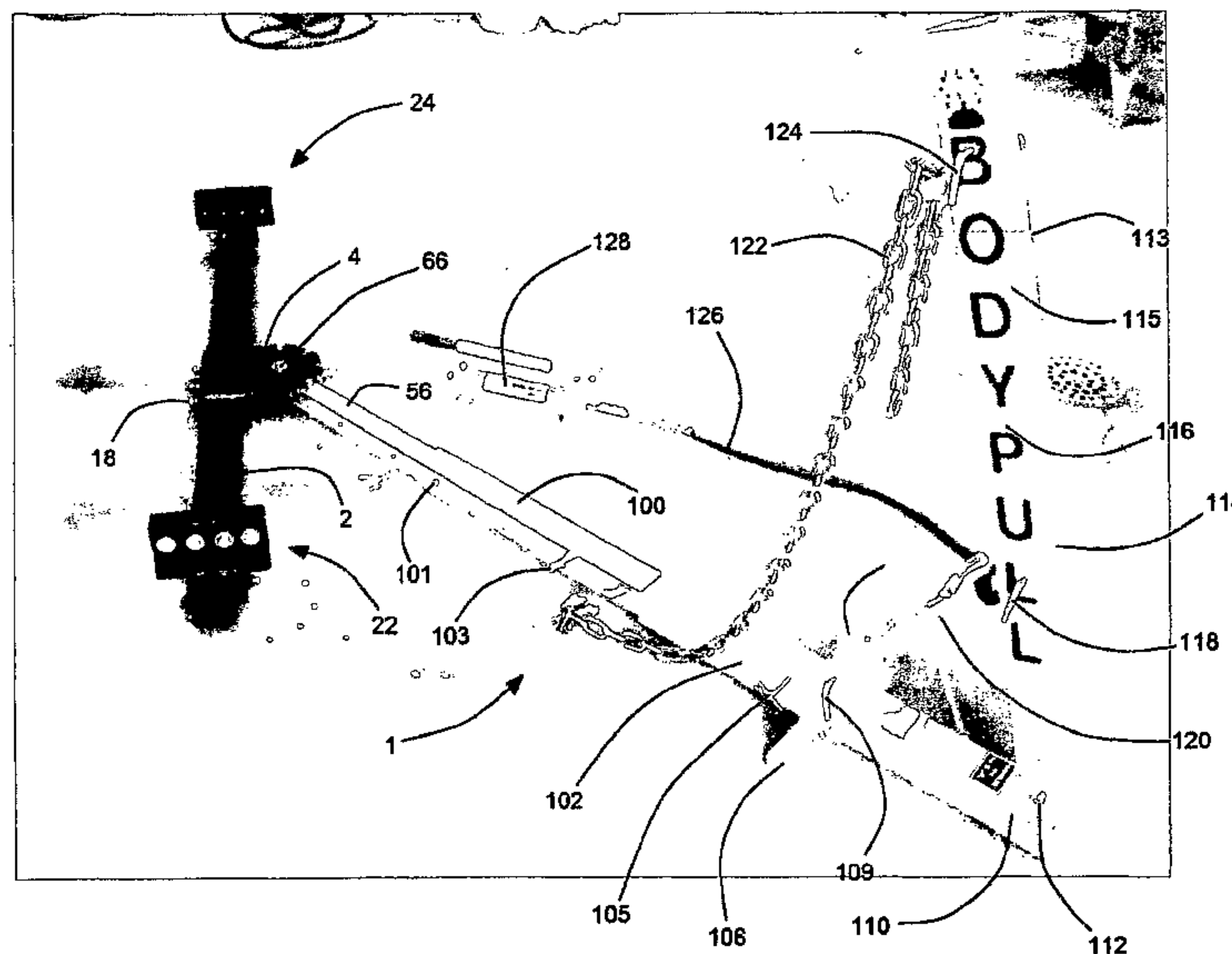
— *without international search report and to be republished upon receipt of that report*

(74) Agent: **JACK, Kenneth, H.**; Davis & Jack, L.L.C., 2121 W. Maple, Wichita, KS 67213 (US).

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: AUTOMOBILE DAMAGE REPAIRING MACHINE



(57) Abstract: An automobile body repair machine incorporating a quill and shaft load shouldering assembly whose quill includes lateral, medial, and oppositely lateral sections,- slide stopping set screws extending through the quill sections for impingement upon the quill and shaft combination's shaft; weld seam grasping left and right anchor clamps fixedly attached to the lateral and oppositely lateral quill sections; a pull force transferring cantilevered stem,- a selectively lockable and. unlockable pivot joint interconnecting the stem and the medial quill section,- a pivoting cantilevered foot attached to a distal end of the stem,- and a foot extending hydraulic cylinder triangulating between the stem and the foot,- the automobile body repairing machine further incorporating a body damage pulling tie attached to a distal end of the cantilevered foot.

WO 2007/092268 A2

1

AUTOMOBILE DAMAGE REPAIRING MACHINE

FIELD OF THE INVENTION

This invention relates to apparatus and machinery which
4 is specially configured and adapted for assisting auto body
repair persons in their performance of auto body work. More
particularly, this invention is related to such machinery
7 which is adapted for performing controlled body pulls for
reforming damaged or deformed automobile bodies to their
original undamaged configurations.

10

BACKGROUND OF THE INVENTION

Known machinery and apparatus for performing
13 progressive pulls for repairing and restoring automobile body
damage is typically mechanically complex, is bulky and
unwieldy, and is not economically fabricated and used.

16 The instant inventive automobile body damage repairing
machine overcomes such drawbacks and deficiencies of prior
art machines by providing a mechanically simple and compact
19 assembly, such assembly beneficially incorporating a pulling
force load shouldering structure which comprises a segmented
quill and shaft assembly.

22

BRIEF SUMMARY OF THE INVENTION

A major structural component of the instant inventive
25 automobile body damage repairing machine preferably comprises

1 a pulling force load shouldering quill and shaft assembly.
The shaft of the preferred quill and shaft assembly comprises
a single or unitary length of rectangular steel tubing.
4 Preferably, the cross-sectional dimensions of such length of
rectangular tubing are $1\frac{1}{2}$ " by $3\frac{1}{2}$ ", such tubing preferably
having a $\frac{1}{4}$ " wall thickness. Preferably, such rectangular
7 tubing shaft has a length sufficient to span between and
underlie the "hard point" weld seams of an automobile "uni-
body" frame, such seams commonly constituting the lowermost
10 structure of such frame.

The quill component of the quill and shaft assembly
preferably is segmented, comprising separately slidable
13 medial, lateral, and oppositely lateral sections. Each such
slide section or quill segment preferably forms a closely
fitted slide sleeve having inside cross-sectional dimensions
16 matching the outside cross-sectional dimensions of the shaft
element. Suitably, such slide sleeves may alternately
comprise an open frame defining a hollow lateral bore.

19 Lateral and oppositely lateral anchor clamps are
preferably provided, the lateral and oppositely lateral quill
sections constituting preferred means for movably mounting
22 such clamps upon the shaft element. Suitably, though less
desirably, the laterally opposite quill section may be
eliminated, and substitute sessile means for interconnecting
25 the laterally opposite anchor clamp and the shaft may be
provided. Suitably, means such as welding or fixed bolted
attachments may interconnect the shaft and the laterally

1 opposite anchor clamp in such alternate sessile
configuration.

The medial quill section is preferably similarly
4 slidably mounted over the shaft and is positioned between the
lateral and laterally opposite anchor clamps and between
their lateral and preferred laterally opposite quill section
7 attaching means. Such medial quill section preferably
supports and forms pivotal attaching means, such means
attaching a proximal end of a cantilevered pulling force
10 transmitting stem to the shaft of the preferred quill and
shaft assembly.

In operation, the medial, lateral, and preferred
13 laterally opposite quill sections may be slidably and
selectively positioned along the length of the shaft, such
selective positioning advantageously allowing an operator to
16 fit and attach the assembly to a particular vehicle's weld
seams and to establish a mechanically advantageous anchor
point for a desired body straightening progressive pull.

19 The lateral and oppositely lateral anchor clamps
preferably comprise jaw plate clamps which are specially
adapted for attachment to under surfaces of common automobile
22 uni-body frames. Such frames commonly present left and right
longitudinally and downwardly extending flange-like "hard
point" weld seams. The anchor clamps are preferably adapted
25 for compressively grasping such hard point weld seams. Where
the requisite anchor clamps must be engage a frame structure
of a vehicle having "C" channel chassis beams, the laterally

1 inward jaws of the anchor clamps are preferably adapted to
upwardly and outwardly span over the lower flanges of such
chassis beams to reach and to clamp against such beams'
4 vertically extending webs.

In order to releasably secure the lateral, preferred
oppositely lateral, and medial quill sections at desired
7 selected positions along the length of the shaft, slide
stopping means are preferably provided, such means being
operatively connected to such quill sections. In a preferred
10 embodiment, the slide stopping means comprises helically
threaded set screws which are threadedly mounted within
helically threaded apertures extending through the walls of
13 the quill sections. Pressurized impingement of inner ends of
such set screws upon the underlying shaft advantageously
releasably stops the quill sections in desired locations.
16 Suitably, though less desirably, the slide stopping means may
alternately comprise shear pin and aligned eyes combinations,
or may alternately comprise pressure clamping assemblies.

19 The stem element of the instant inventive automobile
body repair machine preferably comprises a telescoping square
tubing aluminum shaft, such shaft cantilevering distally from
22 the medial quill section's pivotal attaching means. Such
pivotal attaching means preferably comprises a pin, eye, and
clevis joint which extends distally from the medial quill
25 section. Where such preferred pin, eye, and clevis pivotal
attaching means is provided, upper and lower ear plates of
the clevis preferably present radially arrayed negative

1 detents for engaging positive detents or lugs extending from
the stem. Selective engagement of such lugs with detents
among such radial array of negative detents advantageously
4 secures the stem in a desired angular position with respect
to the load shouldering quill and shaft assembly. Suitably,
the orientation of the detents may be reversed, with positive
7 detents being radially arrayed and with a singular negative
detent supported upon the stem.

A pivoting and upwardly cantilevered foot is preferably
10 attached to the distal end of the preferred telescoping stem,
and foot extension means triangulating between the stem and
the foot are preferably provided. Preferably, the foot
13 extension mean comprises a hydraulic cylinder. In accordance
with a preferred embodiment of the instant invention, a body
damage pulling tie, such as a heavy chain and hook is fixedly
16 attached to a distal or upper end of the cantilevered foot.
Various body pulling attachment implements known in the body
work arts may be attached to such hook.

19 In operation of the inventive automobile body repair
machine, and assuming the provision of preferred structures
as described above, and also assuming utilization of the
22 machine for repair of damage to a four door sedan's center
door post, the load shouldering quill and shaft assembly of
the inventive assembly may initially be placed upon a garage
25 floor surface immediately underlying such sedan's left and
right "hard point" uni-body weld seams. Preferably, the
assembly is longitudinally oriented at a point immediately

1 rearward of the sedan's center door post. Also preferably,
upon such positioning, the machine's preferred telescoping
stem is pivotally moved to extend from beneath the sedan,
4 toward and distally beyond the sedan's damaged center door
post. Thereafter, the machine's lateral and oppositely
lateral anchor clamps are fixedly engaged with the sedan's
7 left and right weld seams. Thereafter, the lateral, medial,
and oppositely lateral quill sections' slide stopping set
screws are wrench turned to fixedly position each of those
10 quill sections at desired positions along the shaft. Upon
such mounting of the inventive machine's load shouldering
quill and shaft assembly upon such sedan's uni-body frame,
13 the machine's cantilevered body pulling foot, hydraulic
cylinder, and body pull tie combination may be engaged with
the damaged door post and may be manipulated for performing a
16 series of controlled pulls upon such post in a manner
conventionally known to those skilled in the art.

Accordingly, objects of the instant invention include
19 the provision of an automobile body repair machine including
and incorporating a load shouldering assembly comprising a
segmented quill and shaft assembly, the segmented quill
22 supporting a slidable positionable pivot joint and frame
engaging anchor clamps.

In one embodiment, an automobile body repair machine is provided. The automobile body repair machine comprising: a slide sleeve and shaft assembly, the slide sleeve comprising lateral and medial slide sleeve sections; slide stopping means fixedly attached to the lateral and medial slide sleeve sections; a lateral anchor clamp fixedly attached to the lateral slide sleeve section; an oppositely lateral anchor clamp; an oppositely lateral slide sleeve section interconnecting the oppositely lateral anchor clamp and the shaft; a stem having a distal end; a first joint cantilevering the stem from the medial slide sleeve section; a foot having a distal end; a second joint pivotally cantilevering the foot from the stem's distal end; extension means connected operatively to the foot; and a body damage pull tie fixedly attached to the distal end of the foot.

Other and further objects, benefits, and advantages of the instant invention have been discussed above and will become known to those skilled in the art upon review of the *Detailed Description* and appended drawings which follow.

1

BRIEF DESCRIPTION OF THE DRAWINGS

(Each of drawings Figs. 1-10 is submitted informally)

Fig. 1 is a perspective view of a preferred embodiment
4 of the instant inventive automobile body repair machine.

Fig. 2 depicts a disassembled proximal end of the
telescoping stem element of the machine depicted in Fig. 1.

7 Fig. 3 is a partial plan/perspective view of the
machine depicted in Fig. 1.

Fig. 4 is a view of disassembled medial quill section
10 and clevis joint element of the machine depicted in Fig. 1.

Fig. 5 redepicts the structure of Fig. 3, the view of
Fig. 5 showing an alternate configuration of such structure.

13 Fig. 6 depicts a disassembled lateral quill section and
anchor clamp element of the machine depicted in Fig. 1.

Fig. 7 is an end view of the structure depicted in
16 Fig. 6.

Fig. 8 depicts an alternate configuration of the
instant inventive machine, such configuration additionally
19 including lateral and oppositely lateral extension anchor
clamps.

Fig. 9 is an alternate perspective view of the
22 structure depicted in Fig. 8.

Fig. 10 shows disassembled lateral quill section,
anchor clamp, and extension anchor clamp structures.

25

1 DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to the drawings, and in particular to Fig. 1, a preferred embodiment of the instant inventive automobile body repair machine is referred to generally by Reference Arrow 1. The machine 1 preferably comprises a load or pull force shouldering quill and shaft assembly, the shaft of such assembly preferably comprising a laterally extending length of rectangular steel tubing 2. Referring further simultaneously to Figs. 4, 6, 7, and 10, the quill of such quill and shaft assembly preferably is partitioned or segmented to include a medial quill section 8, a lateral quill section 25, and a laterally opposite quill section 27. The medial quill section 8 preferably has a laterally extending bore 10 which is closely fitted for sliding receipt of the shaft 2. The lateral and laterally opposite quill sections 25 and 27 preferably include laterally extending bores configured substantially identically to the bore 10 of the medial quill section 8, such bores similarly slidably receiving the shaft 2.

Referring simultaneously to Figs. 1 and 4, releasable slide stopping means are preferably fixedly attached to the medial quill section 8, such means preferably comprising set screw receiving apertures 20 which extend through the proximal-most wall of quill section 8. Such slide stopping means preferably further comprises helically threaded nuts which are fixedly welded to the proximal-most outer surface of the quill section 8, such nuts 18 being positioned to

1 concentrically overlies the apertures 20. Such preferred
slide stopping means preferably further comprises helically
threaded bolts or set screws 19, such bolts being threadedly
4 received by and being mounted within threaded nuts 18, such
bolts thence extending distally through apertures 20. Upon
lateral extension of the shaft 2 through bore 10 of the
7 medial quill section 8, and upon right-handed tightening of
set screws 19, the distal ends 21 of the set screws 19
advantageously extend distally and compressively to
10 frictionally engage the proximal-most wall of shaft 2, such
engagement selectively and fixedly positioning the medial
quill section 8 at a desired mechanically advantageous
13 location upon shaft 2. Referring further simultaneously to
Fig. 6, such slide stopping means preferably further
comprises helically threaded nuts 28 and set screws 30 which
16 may similarly selectively secure the lateral quill section 25
at a desired location upon shaft 2. Referring further
simultaneously to Fig. 10, the slide stopping means
19 preferably further comprises helically threaded set screws
30A which may further similarly secure the laterally opposite
quill section 27 at a desired location upon shaft 2.

22 Referring simultaneously to Figs. 1, 6, and 7, a
lateral anchor clamp is referred to generally by Reference
Arrow 24. Such anchor clamp 24 preferably comprises an outer
25 jaw plate 26 which is fixedly welded to, and which extends
upwardly from the upper surface of the lateral quill
section 25. Such jaw plate 26 preferably includes a

1 quadruple of smooth walled bolt receiving apertures which
receive a quadruple of laterally extending helically threaded
bolt and washer combinations 40 and 42. The bolts 40
4 preferably extend laterally and axially through helical
springs 50, and thence extend through a quadruple of smooth
walled apertures which extend laterally through an inner jaw
7 plate 32. Helically threaded nuts 38 are preferably fixedly
welded in concentric alignment over such apertures, such nuts
38 threadedly receiving the bolts 40.

10 Referring further simultaneously to Figs. 1, 6, and 7,
the outer jaw plate 26 preferably further includes eight
laterally extending helically threaded apertures 46, each of
13 such apertures 46 threadedly receiving a helically threaded
tooth 44, each such tooth 44 presenting a weld seam engaging
point 48. Preferably, the outer end of each of the threaded
16 teeth 44 presents a hex key receiving depression. In the
event that tooth points 48 become dulled or rounded through
long use, such dulled teeth 44 may advantageously be
19 threadedly withdrawn, and new sharp pointed teeth may
advantageously be threadedly inserted in their place.

Referring further simultaneously to Figs. 1, 6, and 7,
22 the inner jaw plate 32 preferably presents an outwardly
extending weld seam engaging ridge 36 and an underlying
outwardly extending plate aligning ridge 34. Upon downward
25 extension of an automobile's longitudinally extending uni-
body weld seam (not within view) into the clamping space 37
defined by the inner ends of teeth 48 and the outer end of

1 ridge 36, and upon subsequent tightening of bolts 40, the
lateral anchor clamp 24 may effectively and securely hold
such weld seam.

4 Referring simultaneously to Figs. 1, 6, 7, 8, and 10, a
laterally opposite anchor clamp 22 is preferably provided,
such anchor clamp being attached to the laterally opposite
7 quill section 27. The laterally opposite anchor clamp 22 is
preferably substantially structurally identical to and
functions substantially identically with the lateral anchor
10 clamp 24.

Referring simultaneously to Figs. 1, 2, 3, and 4, the
medial quill section 8 preferably forms and supports means
13 for pivotally attaching a proximal end of a pull force
transmitting stem 56. Such means preferably comprises a pin,
eye, and clevis joint. The clevis of such joint preferably
16 comprises upper and lower apertured ear plates 4 and 6. The
pin of such joint preferably comprises a bolt, nut, and
washer combination 66, 70, and 72, wherein the bolt 66
19 extends through aperture 16 within plates 4 and 6. The eye
of such combination preferably comprises a proximally
oblongated slot 60 which extends vertically through the
22 proximal end of stem element 56. Referring further to
Fig. 3, the proximal end of the stem 56 is received between
plates 4 and 6 while the bolt 66 extends vertically through
25 the slot 60. The slot 60 preferably has distal and proximal
slide stopping surfaces 62 and 64, such surfaces mechanically

1 defining reciprocating longitudinal travel of the stem 56
with respect to the fixedly positioned bolt 66.

Referring to Fig. 3, the upper clevis plate 4
4 preferably presents a plurality of radially arrayed negative
detents 12 while the lower clevis plate 6 preferably
similarly presents a vertically aligned plurality of radially
7 arrayed negative detents 14. Referring further
simultaneously to Fig. 2, a singular positive detent is
preferably provided, such positive detent preferably
10 comprising vertically aligned upwardly and downwardly
extending lugs 58.

Referring simultaneously to Figs. 2 and 5, in operation
13 of the depicted preferred clevis joint assembly, proximally
directed body pulling load forces applied to stem 56 tend to
drive the lugs 58 into a desired aligned set of negative
16 detents 12 and 14. Such force simultaneously drives the
distal surface 62 of slot 60 into the side wall of the
bolt 66. The combination of such forces against such
19 surfaces advantageously securely holds the stem 56 in a
desired radially extended orientation. In order to change
the radial positioning of the stem 56, the stem 56 may be
22 slidably moved distally, causing the stem 56 to travel the
longitudinal length of slot 60 until slot surface 64 rests
against the side wall of bolt 66, such contact stopping such
25 distally directed travel. At their distally extended
positions, lugs 58 disengage from detents 12 and 14, allowing
the stem 56 to freely pivot radially about bolt 66 to a new

1 angular position wherein the lugs 58 may overlies a different
vertically aligned pair of negative detents 12 and 14.

Thereafter, the stem 56 may be slidably moved in the proximal
4 direction, causing the lugs 58 to re-engage detents 12 and 14
at the newly selected angular orientation.

Referring to Fig. 1, the stem 56 preferably comprises
7 square tube aluminum and is preferably telescoping,
comprising a medial sleeve section 100 and a distal sleeve
section 102. Sheer pin and alignable eye combinations 101
10 and 103 are preferably provided for selectively and fixedly
positioning the medial section 100 of the stem 56 with
respect to its proximal-most section. Similarly, the distal
13 section 102 of the stem 56 is preferably selectively
positionable with respect to the medial section 100 by means
of pin and alignable eye fastener combination 105.
16 Preferably, a stabilizing base 106 is fixedly welded to the
under surface of the distal section 102 of the stem 56. By
slidably positioning the medial and distal sections 100 and
19 102 of the stem 56 and by manipulating pins 103 and 105, the
cantilevered length of the stem 56 may be advantageously
tailored to suit a particular automobile and to a particular
22 needed automobile body repair.

Referring further to Fig. 1, a pulling foot 114
preferably cantilevers upwardly from the extreme distal end
25 of the stem 56. Preferably, the proximal end of the foot 114
is pivotally mounted to such distal end by means of a clevis
110 and a pivot pin 112 combination wherein the pivot pin 112

1 extends laterally through a laterally extending eye at the
proximal end of the foot 114 and through the lateral and
laterally opposite "ears" of the clevis 110.

4 Referring further to Fig. 1, foot extension means are
preferably provided, such means preferably being connected
operatively to and triangulating between the foot 114 and the
7 stem 56. Preferably, the foot extension means comprises a
one-way hydraulic cylinder 120 powered by a manually operated
hydraulic pump 128, such pump and such cylinder preferably
10 being interconnected by hydraulic line 126. As can be seen
in Fig. 1, the foot 114 preferably comprises lateral and
laterally opposite plates 113 and 115, such plates serving
13 functionally as a clevis plates which receive and secure the
upper end of hydraulic cylinder 120. A pin 118 which extends
laterally through eyes 116 within plates 113 and 115 and
16 through an eye (not depicted within view) at the upper end of
cylinder 120 effectively pivotally attaches the upper end of
such cylinder to the foot 114. A clevis and pin combination
19 108 and 109 similarly pivotally secures the lower end of the
hydraulic cylinder 120 to the stem 56. Preferably, a lateral
pair of the pin receiving apertures 116 which extend through
22 the plates 113 and 115 of the foot 114 will, upon removal of
the hydraulic cylinder 120 and upon complete flexion of
foot 114 with respect to the stem 56, align with the
25 apertures of the clevis 108, allowing either pin 109 or 118
to be reinserted to secure the foot 114 in a compact and
collapsed storage position.

1 Referring to further to Fig. 1, a body pulling tie 122
preferably in the form of a heavy chain, as depicted, is
preferably fixedly attached to a distal end of foot 114 by
4 means of a pin 124.

Referring to Fig. 1, anchor clamps 22 and 24 may be
secured to automobile's uni-body "hard point" weld seams
7 (not depicted) at any of several selectable desired points
along such seams. Referring further simultaneously to Figs.
6 and 10, sliding and selectively locking positioning of the
10 lateral and laterally opposite quill sections 25 and 27,
along with their anchor clamps 24 and 22, allows such clamps
to be securely engaged upon numerous makes of automobiles
13 having varyingly spaced weld seams. In addition to the
selective lateral and longitudinal positioning capability
provided by the anchor clamps and their quill sleeves, the
16 central sliding pivot joint provides further flexibility in
configuring mechanically advantageous progressive body
straightening pulls. The entire assembly depicted in Fig. 1
19 quickly and easily breaks down for compact storage or for
transportation.

Referring to Fig. 8, lateral and laterally opposite
22 extension anchor clamps 82 and 80 may be suitably provided,
such clamps preferably being configured similarly with anchor
clamps 22 and 24, with the exceptions that, referring further
25 to Figs. 9 and 10, quill sections or slide sleeves 83 and 86
extend in alignment with extension anchor clamps 82 and 80 as
opposed to a perpendicular orientation. Lateral and

1 laterally opposite extension arms 76 and 74 may also be
provided, the lateral and laterally opposite extension clamps
82 and 80 being securable upon the distal ends thereof by
4 helically threaded set screws 85 and 88.

Referring simultaneously to Figs. 6 and 10, attachment
pins or lugs 52 and 52A may be respectively fixedly welded to
7 the proximal-most surface of the lateral and laterally
opposite quill sections 24 and 22, each of such lugs
respectively presenting laterally extending attachment pin
10 receiving channels 54 and 54A. Preferably, the lateral and
laterally opposite extension arms 76 and 74 comprise hollow
bored rectangular tubing allowing the proximal ends of such
13 tubes to be extended over lugs 52 and 52A in a manner common
to pin and socket joints. Thereafter, lock pins 77 and 75
may be extended laterally therethrough for securely mounting
16 the extension clamp assemblies. In operation, the lateral
and laterally opposite extension clamps 82 and 80 mount to
and may securely engage the same "hard point" welding seams
19 that are engaged by anchor clamps 24 and 22.

While the principles of the invention have been made
clear in the above illustrative embodiment, those skilled in
22 the art may make modifications in the structure, arrangement,
portions and components of the invention without departing
from those principles. Accordingly, it is intended that the
25 description and drawings be interpreted as illustrative and
not in the limiting sense, and that the invention be given a
scope commensurate with the appended claims.

What is claimed is:

1. An automobile body repair machine comprising:
 - (a) a slide sleeve and shaft assembly, the slide sleeve comprising lateral and medial slide sleeve sections;
 - (b) slide stopping means fixedly attached to the lateral and medial slide sleeve sections;
 - (c) a lateral anchor clamp fixedly attached to the lateral slide sleeve section;
 - (d) an oppositely lateral anchor clamp;
 - (e) an oppositely lateral slide sleeve section interconnecting the oppositely lateral anchor clamp and the shaft;
 - (f) a stem having a distal end;
 - (g) a first joint cantilevering the stem from the medial slide sleeve section;
 - (h) a foot having a distal end;
 - (i) a second joint pivotally cantilevering the foot from the stem's distal end;
 - (j) extension means connected operatively to the foot;and
 - (k) a body damage pull tie fixedly attached to the distal end of the foot.
2. The automobile body repair machine of claim 1 wherein the slide stopping means is further fixedly attached to the oppositely lateral slide sleeve section.
3. The automobile body repair machine of claim 1 wherein the first joint is adapted for alternately permitting and resisting pivoting.

4. The automobile body repair machine of claim 3 wherein the first joint comprises a pin, eye, and clevis joint.

5. The automobile body repair machine of claim 4 wherein the pin, eye, and clevis joint comprises a positive detent and plurality of radially arrayed negative detents combination or a negative detent and plurality of radially arrayed positive detents combination.

6. The automobile body repair machine of claim 5 wherein the pin, eye, and clevis joint's eye is proximally oblongated for detents disengaging extension of the stem.

7. The automobile body repair machine of claim 2 further comprising lateral and oppositely lateral extension clamps, and extension clamp attaching means respectively removably attaching the lateral and oppositely lateral extension clamps to the lateral and oppositely lateral slide sleeve sections.

8. The automobile body repair machine of claim 7 wherein the extension clamp attaching means comprises lateral and oppositely lateral pin and socket joints.

9. The automobile body repair machine of claim 2 wherein the slide stopping means comprises helically threaded set screw and set screw receiving aperture combinations.

10. The automobile body repair machine of claim 1 wherein the shaft comprises a metal tube having a rectangular cross-sectional shape.

11. The automobile body repair machine of claim 1 wherein each clamp among the lateral and oppositely lateral anchor clamps comprises at least a first jaw plate, each at least first jaw plate comprising a plurality of teeth.

12. The automobile body repair machine of claim 11 wherein each at least first jaw plate has a plurality of helically threaded apertures extending therethrough, and wherein each tooth among the pluralities of teeth is helically threaded, each tooth being threadedly mounted within one of the apertures among the pluralities of helically threaded apertures.

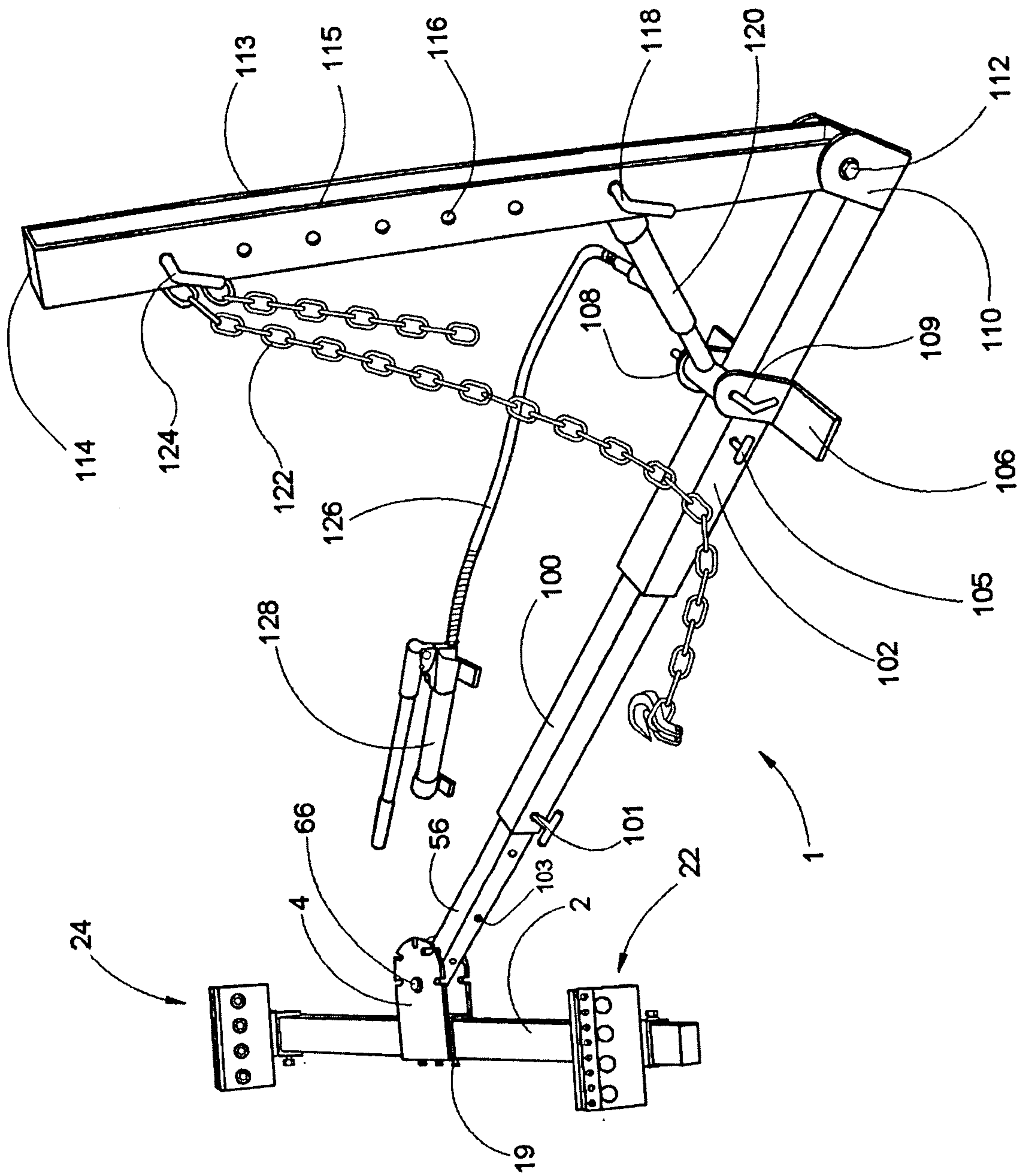


Fig. 1

Fig. 2

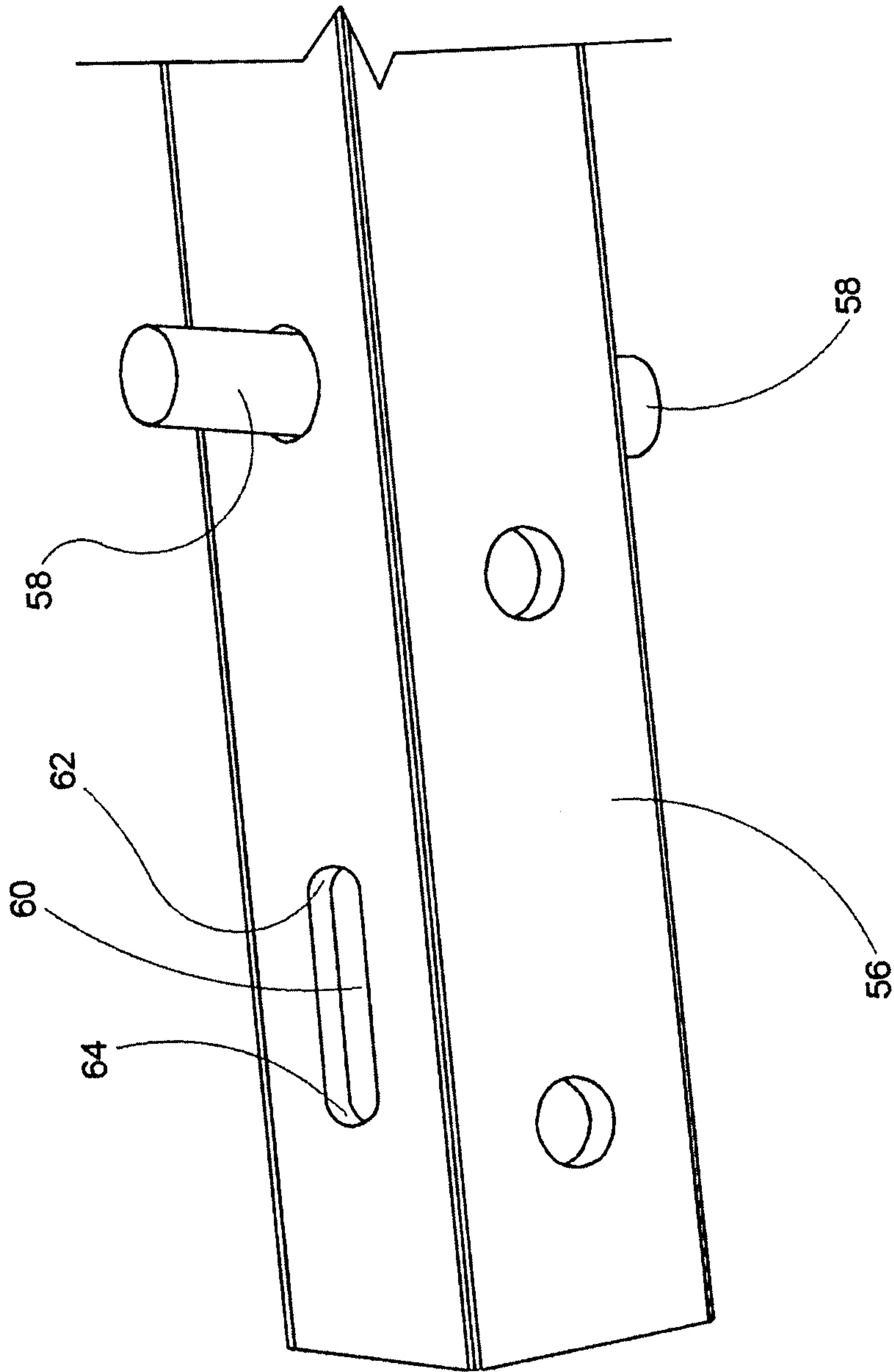


Fig. 3

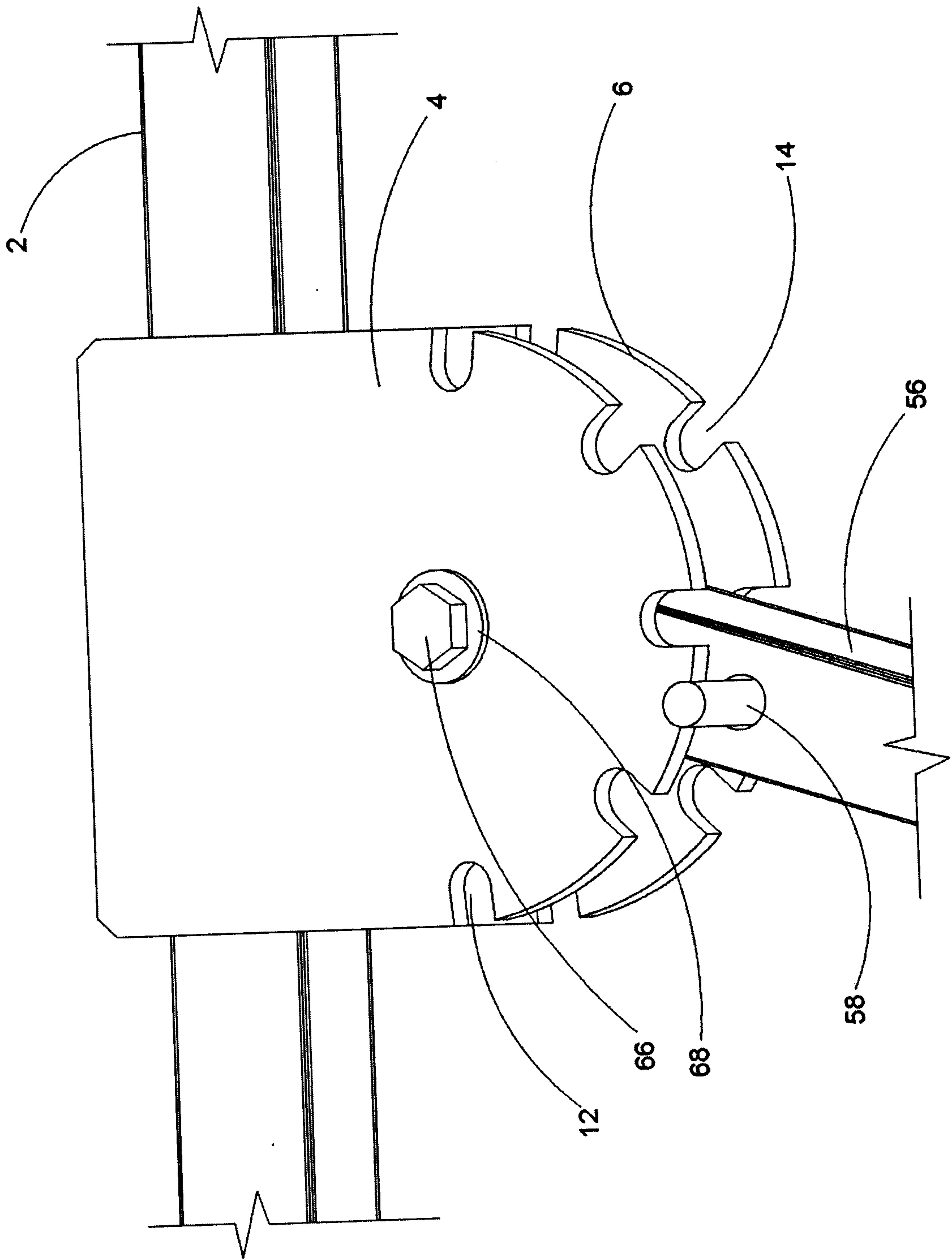


Fig. 4

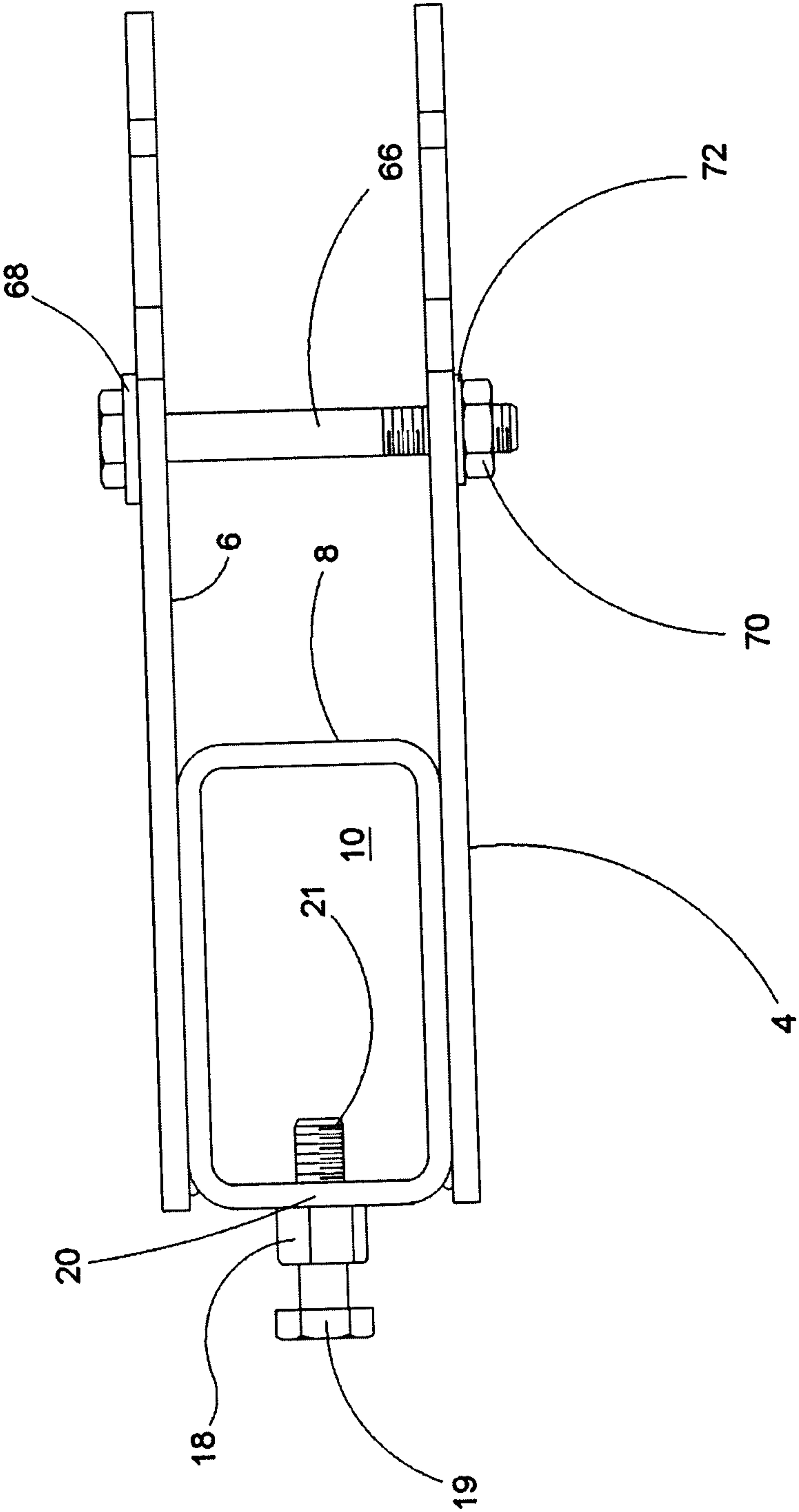
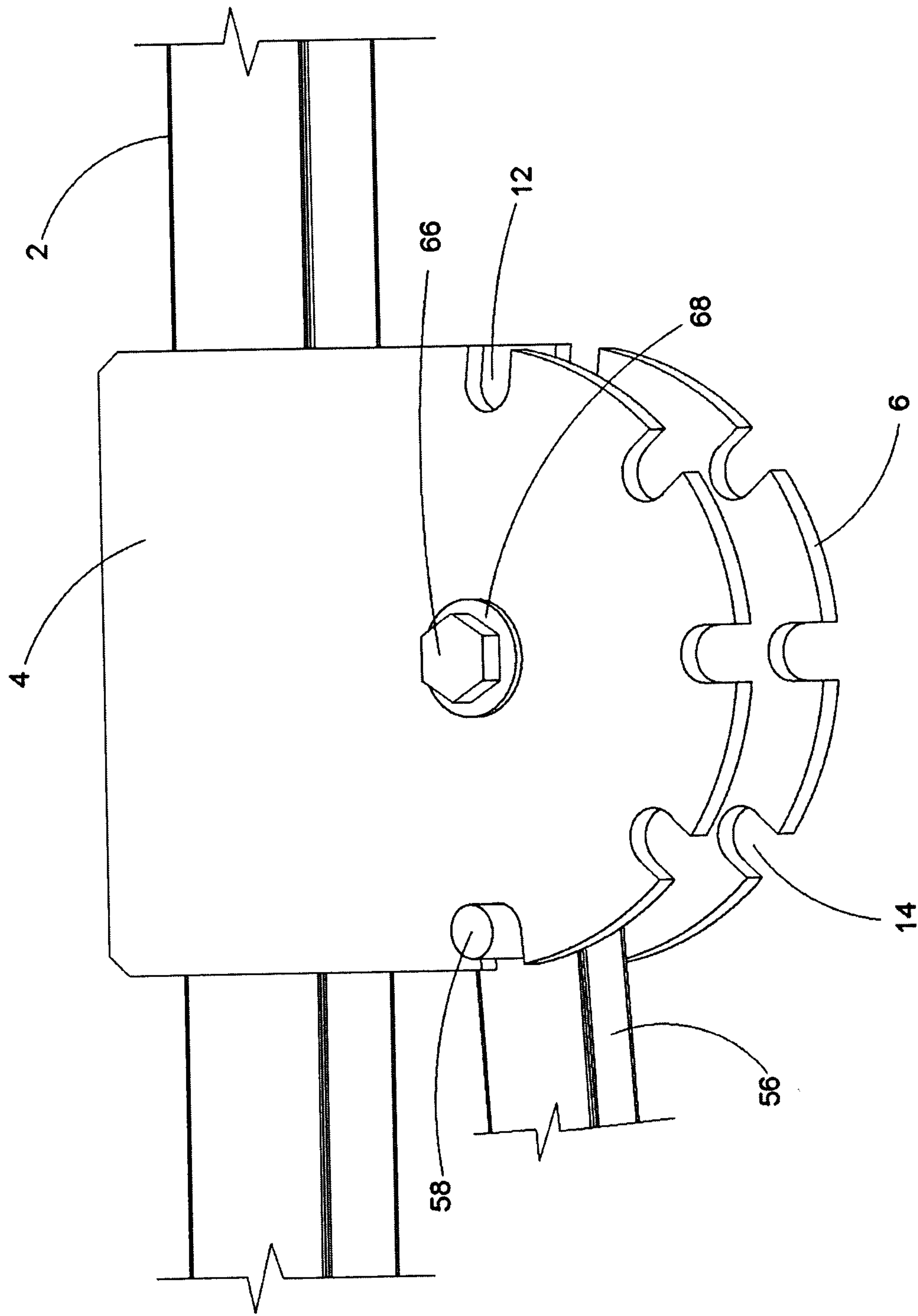
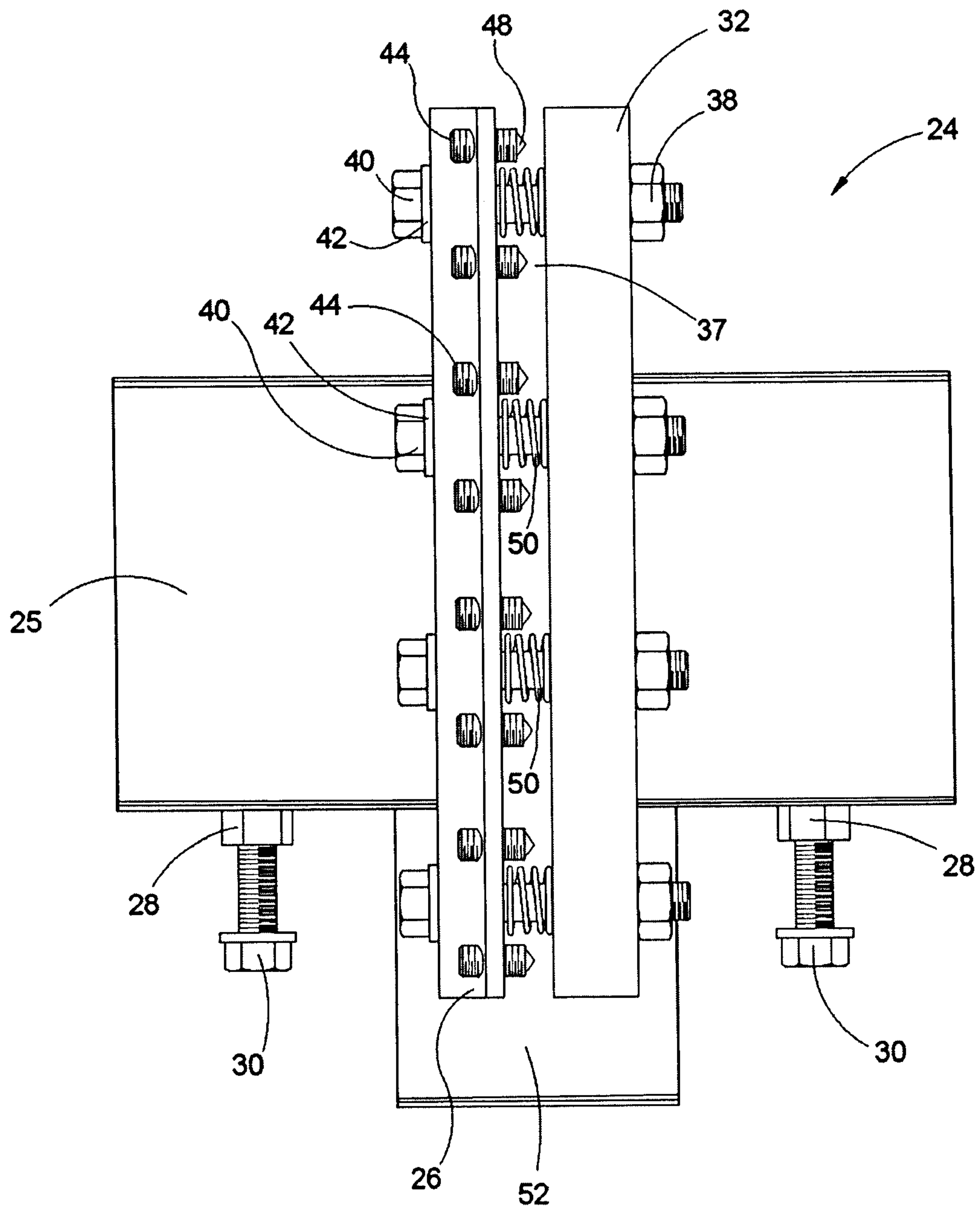


Fig. 5



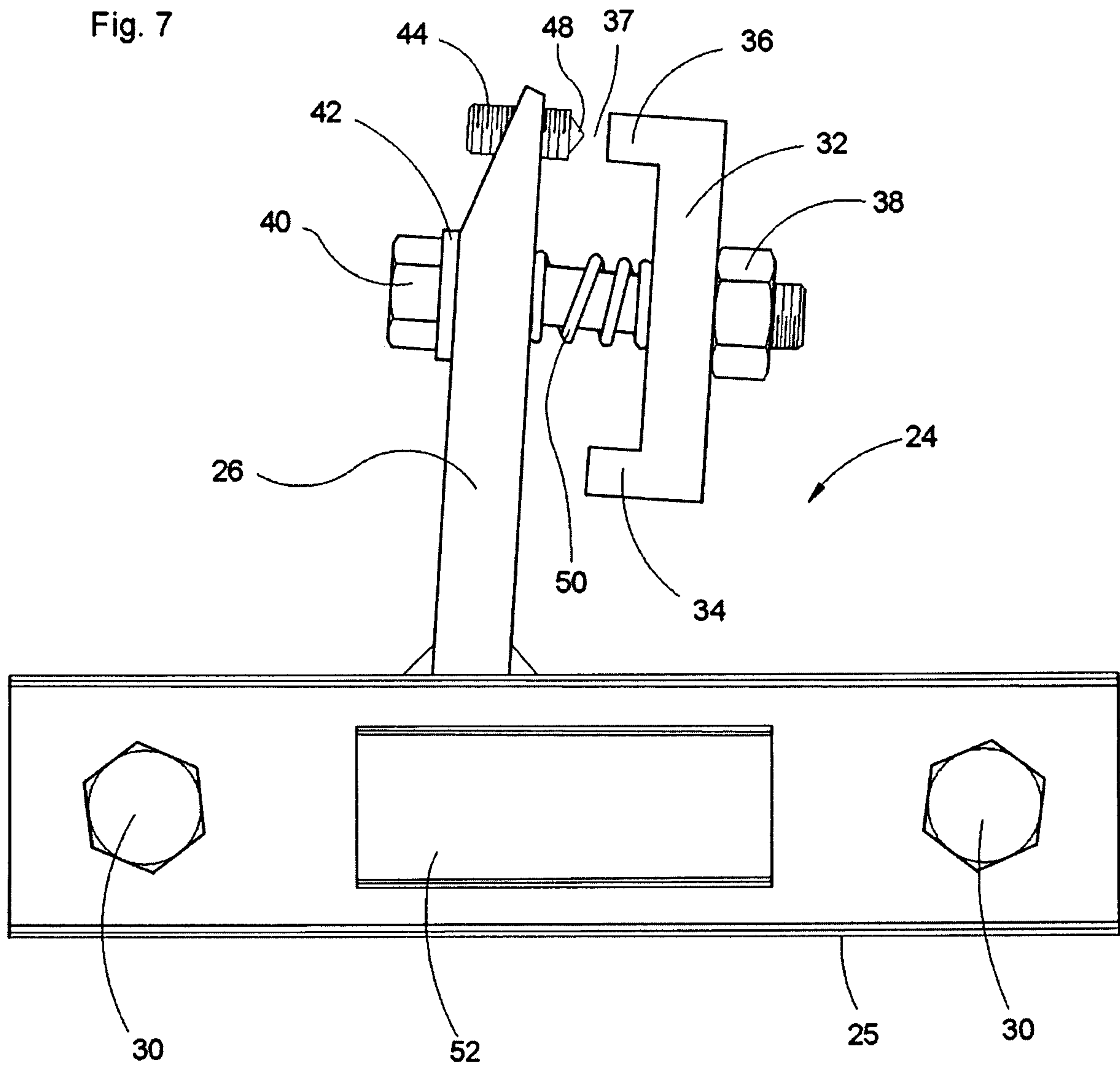
6/10

Fig. 6



7/10

Fig. 7



8/10

Fig. 8

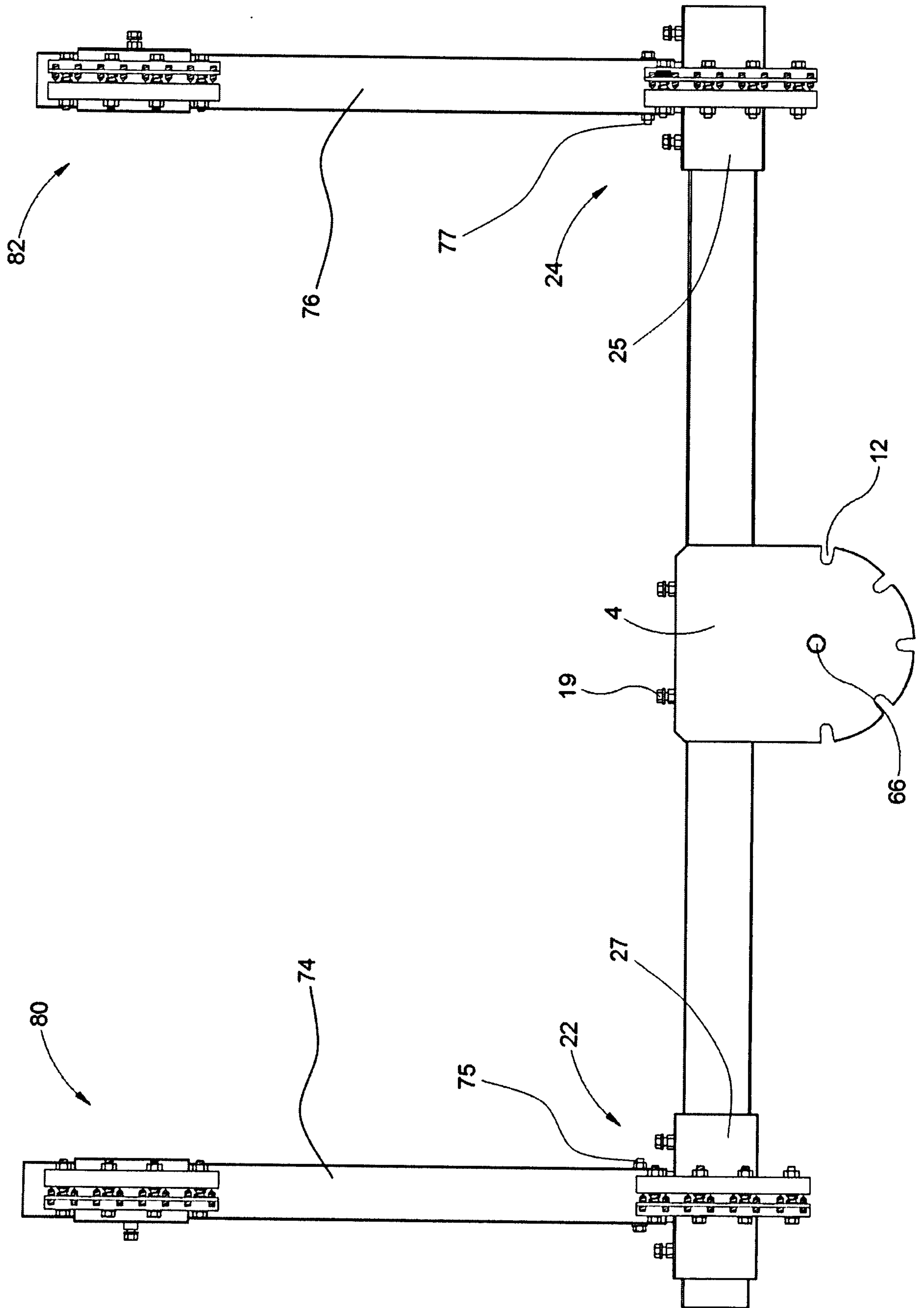


Fig. 9

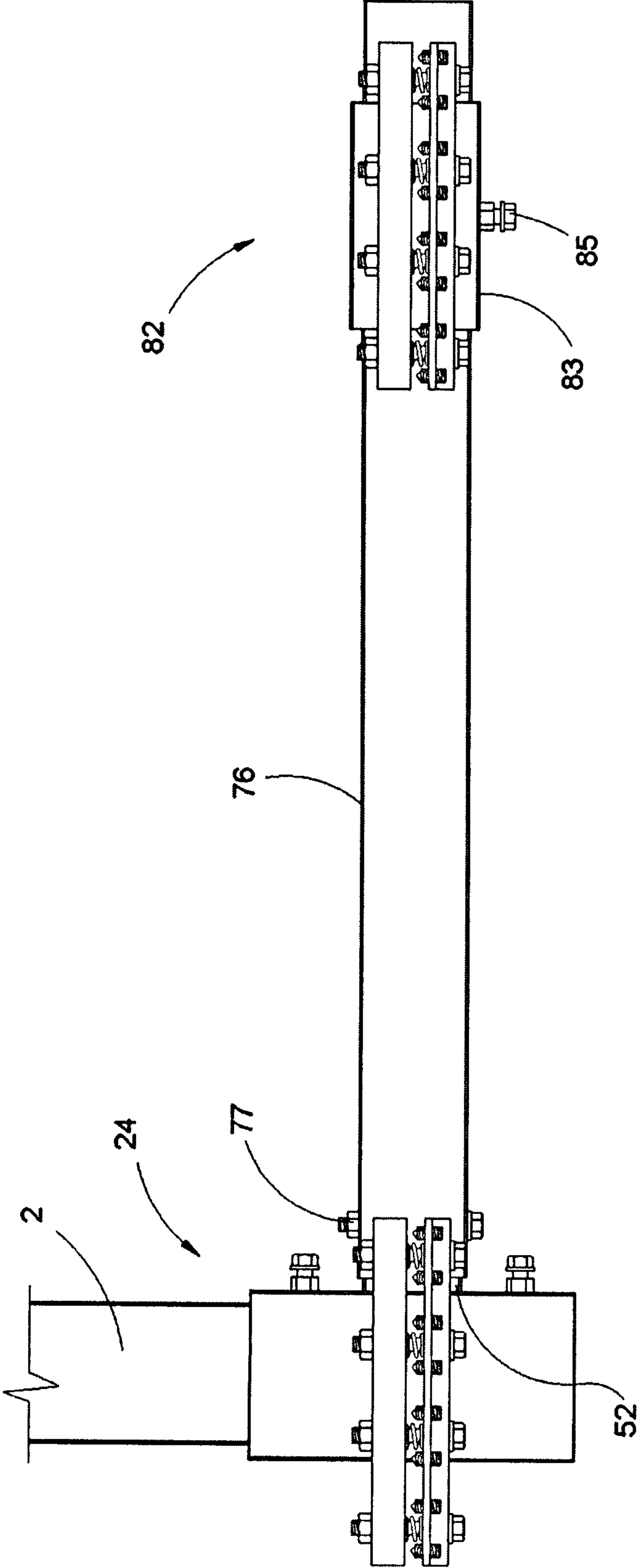


Fig. 10

