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HYDRAULIC UNDERCARRIAGE FOR ELEVATORS AND THE LIKE

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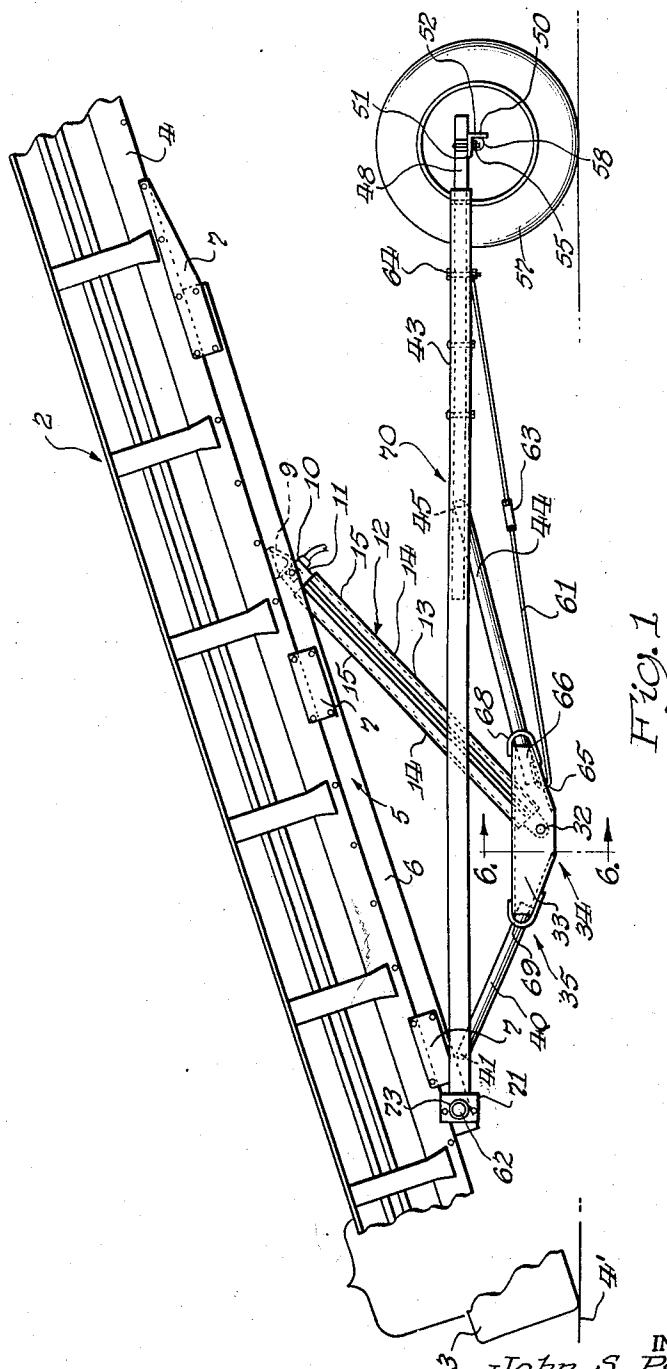


FIG. 1

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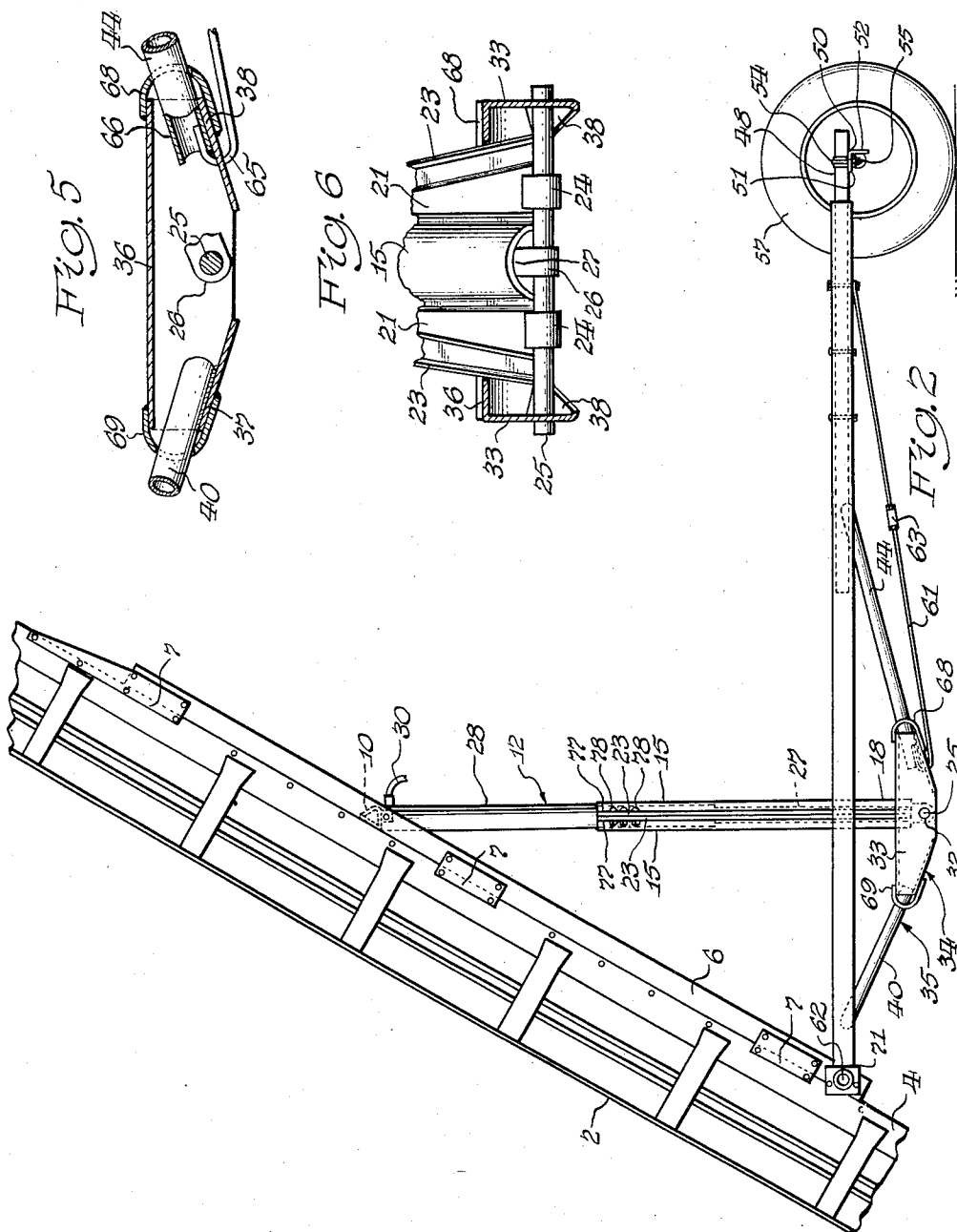
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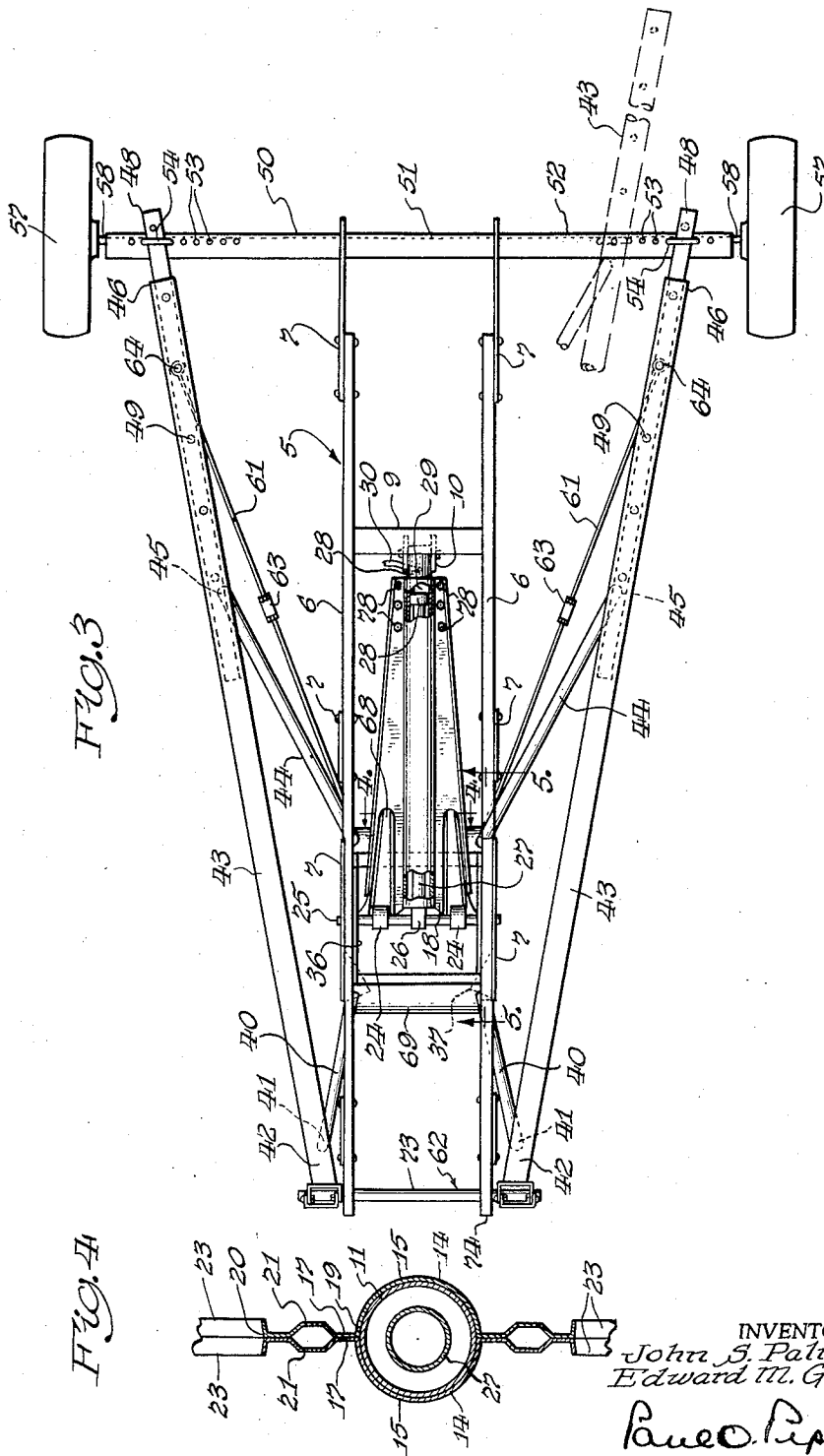
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HYDRAULIC UNDERCARRIAGE FOR ELEVATORS AND THE LIKE

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8 Claims. (Cl. 198—122)

This invention relates to an undercarriage structure for lifting and lowering a supported structure such as a portable elevator or the like.

A general object of the invention is to provide a novel and simple and efficient hydraulic undercarriage structure particularly adaptable for portable farm elevators which accommodates positioning the elevator close to a storage bin or other storing structure such as a barn.

A further object of the invention is to devise an undercarriage which includes a wheeled axle which is adjustable with respect to the carriage frame to position the same at substantially the center of gravity of the supported structure.

A still further object of the invention is to provide a novel and efficient undercarriage in which the principal frame work is wheel-supported at its outer end and pivoted to the supported structure at its other end and wherein a hydraulic ram unit is pivoted between the frame work and the supported structure, the supported structure having pivotal support at one end on the ground and the ram means functioning in extension and contraction to wheel the main frame work with attendant raising and lowering of the supported structure.

A still further object of the invention is to provide a novel stabilizing or reinforcing structure for the ram that serves in the nature of a support column for the elevator.

These and other objects of the invention will become more apparent from the specification and the drawings, wherein:

Figure 1 is a fragmentary side elevational view of an elevator illustrating the novel undercarriage applied thereto and disposed in the lowermost position thereof;

Figure 2 is a view comparable to Figure 1 illustrating the ram in extended position;

Figure 3 is a plan view of the undercarriage with the elevator removed and parts shown in section;

Figure 4 is a transverse sectional view taken substantially on the line 4—4 of Figure 3;

Figure 5 is an enlarged vertical sectional view taken substantially on the line 5—5 of Figure 4; and

Figure 6 is a sectional view taken substantially on the line 6—6 of Figure 1.

Describing the invention in detail and having particular reference to the drawing there is shown a portable farm elevator generally designated 2 of any conventional construction which has a lower receiving end 3 adapted to sit upon the ground as at 4' for pivotal movement. The elevator 2 has a frame work including the framing 4 on its underside which provides a means and a mounting for the cradle 5 which includes a pair of longitudinally extending laterally spaced side beams 6 provided at opposite ends and intermediate its ends with attachment plates 7 preferably bolted thereto and which as suitable bolting may be connected to the frame work 4. The side members 6 are interconnected intermediate their ends by a transverse anchor member

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9 which centrally thereof provides a pivotal mounting as at 10 for the cylinder 11 of the ram assembly 12.

The ram assembly 12 includes a stabilizing or reinforcing structure 13 which comprises a pair of complementary halves 14 each having a semi-cylindrical outwardly bowed central portion 15, the portions 15 being disposed in opposing relationships and defining a cylinder receiving bore within which the cylinder portion 11 of the ram telescopes in extension and contraction of the ram.

The stabilizer or structure 13 includes at diametrically opposite edges of the portions 15 outturned flange portions 17 which are sheared diagonally and widened out toward the lower extremity 18 of the ram assembly. The flanges are weld-connected to each other from a point about 6" to 8" below their upper extremities to their lower ends and adjacent to their lower extremities and between their inner and outer edges 19 and 20 have outwardly offset channel portions 21 to provide a strut reinforcement against transverse bending. The outer end portions 20 of these lateral flanges are provided with transversely out-turned edge flanges 23 which also serve as lateral as well as planter stiffeners. The lower end 18 of the reinforcing structure is provided with a pair of loops 24 which are transversely aligned and which receive a pin 25 therethrough on which the ram assembly pivots, the pin 25 being substantially horizontally disposed and substantially centrally thereof providing an anchor for the lower end 26 of the piston rod 27 which telescopes within the cylinder 11, the rod having a piston 28 mounted on the upper end thereof and defining a chamber 29 within the cylinder into which hydraulic fluid is adapted to be ported by a conduit 30 from any suitable power source which may either be mounted upon the undercarriage structure in the form of a manually operable hand pump as may be readily understood by those skilled in the art or which may have attachment to the hydraulic system of the tractor. The pin 25 is carried at opposite ends pivotally within openings 32 in the side members 33 of the saddle structure 34 of the tension frame 35.

The saddle is disposed intermediate the ends of the tension frame 35 and comprises the members 33 with vertically disposed plates each plate 33 having an upper edge inturned flange portion 36 and has lower edge with inturned corner flange portions 37 and 38 and it will be readily noted that plate portions 33 appear somewhat triangular shaped and are developed from a rectangular plate by turning in the lower edge corner portions, these lower edge corner portions 37 being secured as by welding to the lower ends of diagonally upwardly extending and outwardly diverging pipes or tubes 40 which at their upper ends are weld connected as at 41 to the adjacent end portions 42 of the compression members 43. Similarly the flanges 38 are weld-connected to the lower ends of tubular pipe members 44 which extend diagonally upwardly and diverge upwardly and at their upper ends are weld-connected as at 45 to the compression members 43 intermediate their ends.

The compression members 43 are tubular and have telescoped within their outer ends 46 extension members 48 which are secured to the members 43 by a plurality of bolts 49.

The frame members 43 diverge toward the wheel axle or bolster 50 which is preferably an angle member and comprises a top web 51 and a vertical web 52, the web 51 being provided adjacent each end with a plurality of vertical openings 53 for the reception of a U-clamp 54 which embraces an adjacent end of the member 43 and secures through suitable nuts 55 and members 48 to the axle 50. In view of the divergence of the members 43 in order to shorten the length or the extent of the main

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frame structure in order to accommodate elevators of different length and to position the wheels 57 which are mounted by axles 58 on the beam 50, so that the wheel will be substantially on the center of gravity of the supported structure, the openings 53 are plural and are arranged in a series along each end of the axle structure so that when the wheel and axle assembly is moved inwardly of the ends 46, the members 45 are adapted to be clamped as shown in phantom lines in Figure 3 on the members 43. Thus a simple longitudinally adjustable axle mounting for the main frame structure is provided in order to dispose the wheel and axle assembly approximately at the center of gravity of the supported structure.

In order to facilitate for such adjustment there are provided secondary braces 61 which are applied to the truss structure upon the axle assembly being disposed at its greatest extent from the pivotal axis generally designated 62 of the main frame. These braces 61 are in the form of rods with turn-buckle connections 63 intermediate their ends, the rod 61 being bolted as at 64 to the members 43 at a point adjacent to their ends 46 and the other ends of the rods being provided with hooks 65 which enter into the inner ends 66 of the tension members 44. Thus it will be seen when it is necessary to foreshorten the distance between pivot 62 and the wheels, said rods 61 are easily removed by loosening the turn buckles 63 and then removing the bolt 64 and withdrawing the hook end 65 from the tubes 44.

In order to strengthen the saddle structure there are provided transverse channel-shaped braces 68 and 69 which extend between corresponding ends of the members 33 and overlap the flanges 36, 38 and 36-37 respectively and are weld-connected thereto.

The inner end of the swinging frame or main frame structure 70 is provided with pivotal mounts or brackets 71 on the ends 42 of the compression members 43 and they are journaled to opposite ends of the shaft or pin 62 which pivots within a pipe 73, the pipe extending between adjacent ends 74 of the cradle members 6 and connected thereto as by welding.

Thus it will be readily seen that by extension of the ram from the position shown in Figure 1 the elevator pivots from the ground as at 4 and at the same time the wheels 58 move to the end 4 with attendant relative swinging movement between the supported structure and the supporting frame work about the pivot 62.

If it is desired to disconnect the hydraulic system and at the same time maintain the elevator on its supported structure in elevated position as shown in Figure 5, the cylinder is tightly clamped between the upper portions 77 of the side flanges 17 of the reinforcing structure, these upper portions of the flanges and the adjacent portion of the cylinder bracing parts 50 being so arranged that on the tightening of a plurality of bolts 78 through mating openings in the portions 77, the said portions 77 are drawn together with attending drawing and clamping of the adjacent portions 15 about the cylinder so that cylinder and the stabilizing structure are tightly clamped to each other. In order to release this interlock the bolts are, of course, loosened and the parts operated in normal condition with the cylinder sliding in the sections 15.

The piston head is located in transaxial alignment with the clamping area inasmuch as the cylinder is thin and thus the head prevents collapse of the cylinder wall because it is backed up by the piston head.

The adjustment of the main frame to the wheel and axle assembly changes the lever arm of the main frame so that the weight at opposite sides of pivot to the supported structure is readily balanced.

Thus it will be seen that a simple, novel and effective carriage structure is provided and it will be understood that the form of invention as illustrated is intended as a disclosure and not limitation as other forms will become

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readily apparent within the scope of the appended claims.

What is claimed is:

1. An undercarriage comprising a cradle having means for attachment to an associated supported structure, a generally horizontal main frame pivoted at one end to said cradle, a ground engaging wheel and axle assembly on the other end of the main frame, said main frame comprising a pair of compression members, tension members extending diagonally downwardly from the ends of said compression members to intermediate the end thereof, a saddle structure interconnecting adjacent ends of said tension members, and an hydraulic ram pivotally mounted at one end to said saddle and at its other end pivoted to said cradle, said saddle and pivotal mounting of the ram being disposed a substantial distance below said compression members and said ram diverging with respect to the portion of the frame between it and said one end of the frame.

2. An undercarriage for a portable elevator of the type comprising an elongated structure having one end rockably supported from the ground and its other end elevated and in which the elevation of said other end is determined by inclining said structure with respect to the ground, the improvement comprising: a first frame for attachment to said structure, a second frame having one end pivotally connected to one end of said first frame, a wheel and axle assembly connected to the other end of the second frame, and an hydraulic ram pivotally connected to said frames at points intermediate the ends thereof, and said wheel and axle assembly including a transverse beam, and said second frame having a pair of side elements diverging toward the beam, and releasable connections between each element and said beam positionable lengthwise on the beam and element whereby said wheel and axle assembly is adapted to be moved inwardly from the other end of the second frame for location at substantially the center of gravity of the elevator and changing the lever arm of said second frame in relation to the length and weight of the elevator at opposite sides of the point of pivot of said frames, each said connection comprising a U-bolt overlying a portion of the related element and extending through related pairs of openings disposed along the length of the axle of said assembly.

3. In an undercarriage for a portable elevator, a pair of frames pivotally connected at one of their ends, one of said frames having means for mounting and connection to an associated elevator structure, the other of said frames including a pair of side members diverging toward the other end of the frame, a wheel and axle assembly mounting said other end of said other frame, said other frame further having a tension member beneath each side member and connected thereto, a saddle interconnecting said tension members, a ram having a lower end portion between said side frames and pivotally mounted on the saddle and having an upper end pivoted to said first frame intermediate its ends, and secondary removable tension struts extending between said saddle and the said other end of said side members.

4. In a frame structure for an undercarriage, a pair of laterally spaced side frames comprising generally horizontally extending compression members, tension members beneath said compression members and each including a diagonal portion extending from adjacent each end of the compression member diagonally downwardly inwardly, each portion being tubular, a pair of side plate portions interconnecting adjacent ends of the portions of respective tension members, means interconnecting said tension members at said side plates, and supplementary tension braces having ends hooked to certain of said portions at said ends thereof and extending toward certain ends of the compression members, and means releasably connecting said braces with said compression members.

5. In a portable elevator having an elongated conveyor

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structure adapted to extend from a lower end upon the ground diagonally to an upper end, an undercarriage having a mounting frame connected to the structure and having a lower extremity proximate said lower end of the structure, a generally horizontal frame pivoted at one end to said extremity, and wheel means supporting the other end of the horizontal frame, a ram including a piston rod having a lower end pivotally connected to the horizontal frame intermediate its ends and having a cylinder pivoted to said mounting frame intermediate its ends, a piston head connected to the upper end of the rod and disposed in the cylinder, a stabilizer pivoted to said horizontal frame and having a central tubular portion sleeved about the piston rod and cylinder, said cylinder movable in said tubular portion, said stabilizer including a pair of opposed halves, and means for clamping said halves about the cylinder in any of its positions to hold the elevator in elevated position, said means disposed in radial alignment with the piston head whereby in clamping the cylinder said cylinder is backed up by the head.

6. In a device of the class described having a pair of pivotally interconnected frames and a ram therebetween comprising a piston stem connected to one of the frames and a cylinder to the other frame and a piston head connected to the stem and operative in the cylinder, reinforcing means for the ram comprising a pair of abutting complementary halves each having a semi-cylindrical center section and diametrically extending flanges, said means connected to said one frame, the flanges of opposing halves engaging each other whilst said center sections embrace said cylinder, and means for releasably interlocking said section about said cylinder in any posi-

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tion of the cylinder through clamping engagement therewith of portions of said center sections in radial alignment with the piston head.

7. In a device of the class described a piston rod and a piston, a cylinder telescoped thereon, means pivotally mounting said piston rod, a stabilizer pivoted on said means and comprising a center portion slidably embracing said cylinder and having lateral webs at opposite sides of said center portion, transverse edge flanges on said webs and with the edges of the webs diverging toward the connection of the stabilizer with said means, and beads on said webs intermediate said edges and center portion extending generally lengthwise of the stabilizer.

8. The combination of supporting and supported relatively movable structures, a piston rod with a piston head, a cylinder having a wall telescoped thereover, a stabilizer, means mounting said rod and stabilizer on one of the structures, means connecting said cylinder to the other of said structures, said stabilizer including means for clampingly engaging said cylinder to secure said cylinder against movement with respect to said stabilizer, said clamping means disposed in the vicinity of the piston head for reaction thereagainst through said cylinder wall.

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