

Sept. 1, 1942.

R. S. BOHANNAN

2,294,770

HYDRAULIC FORCE TRANSMISSION MECHANISM

Filed Oct. 17, 1939

4 Sheets-Sheet 2

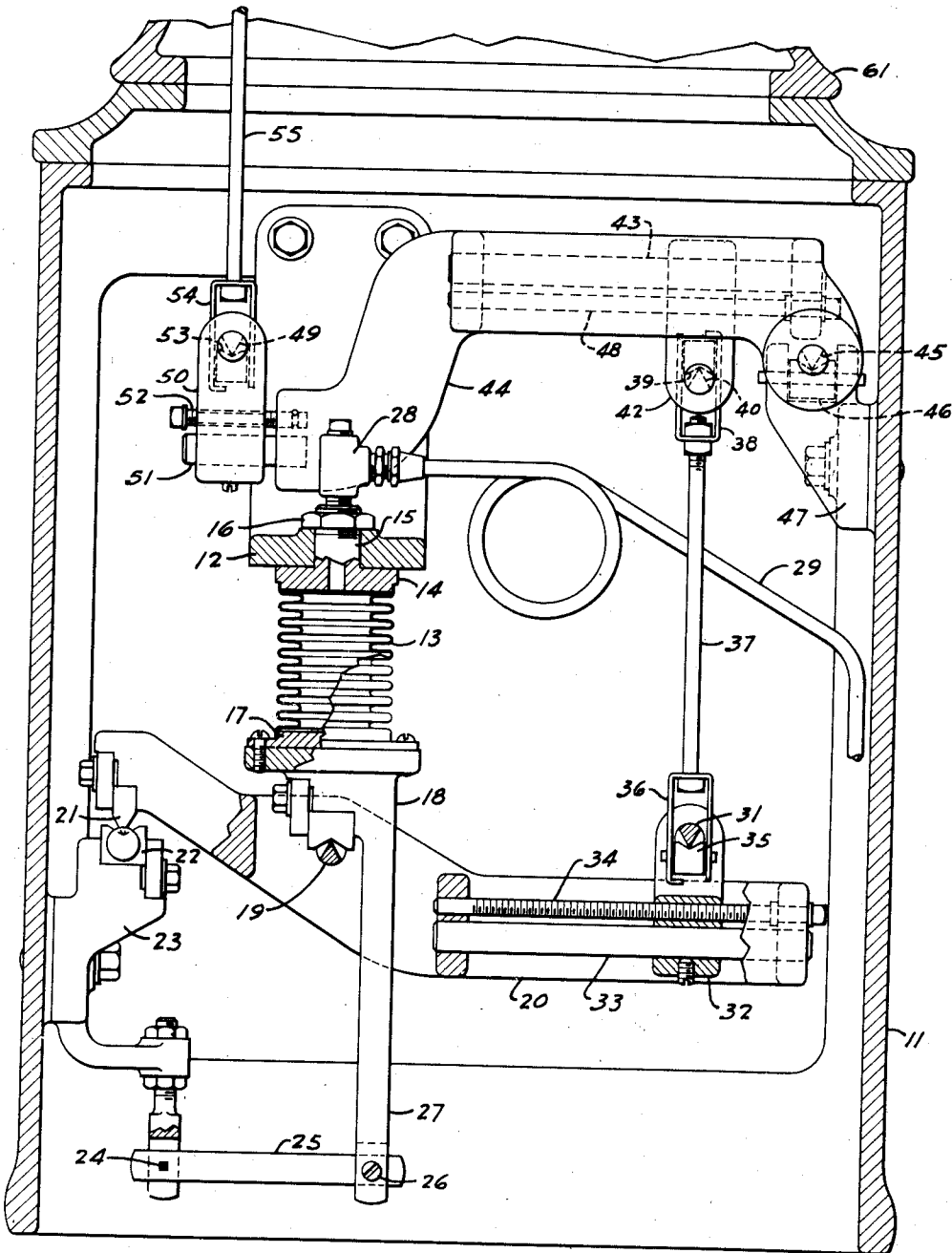


Fig. III

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4 Sheets-Sheet 3

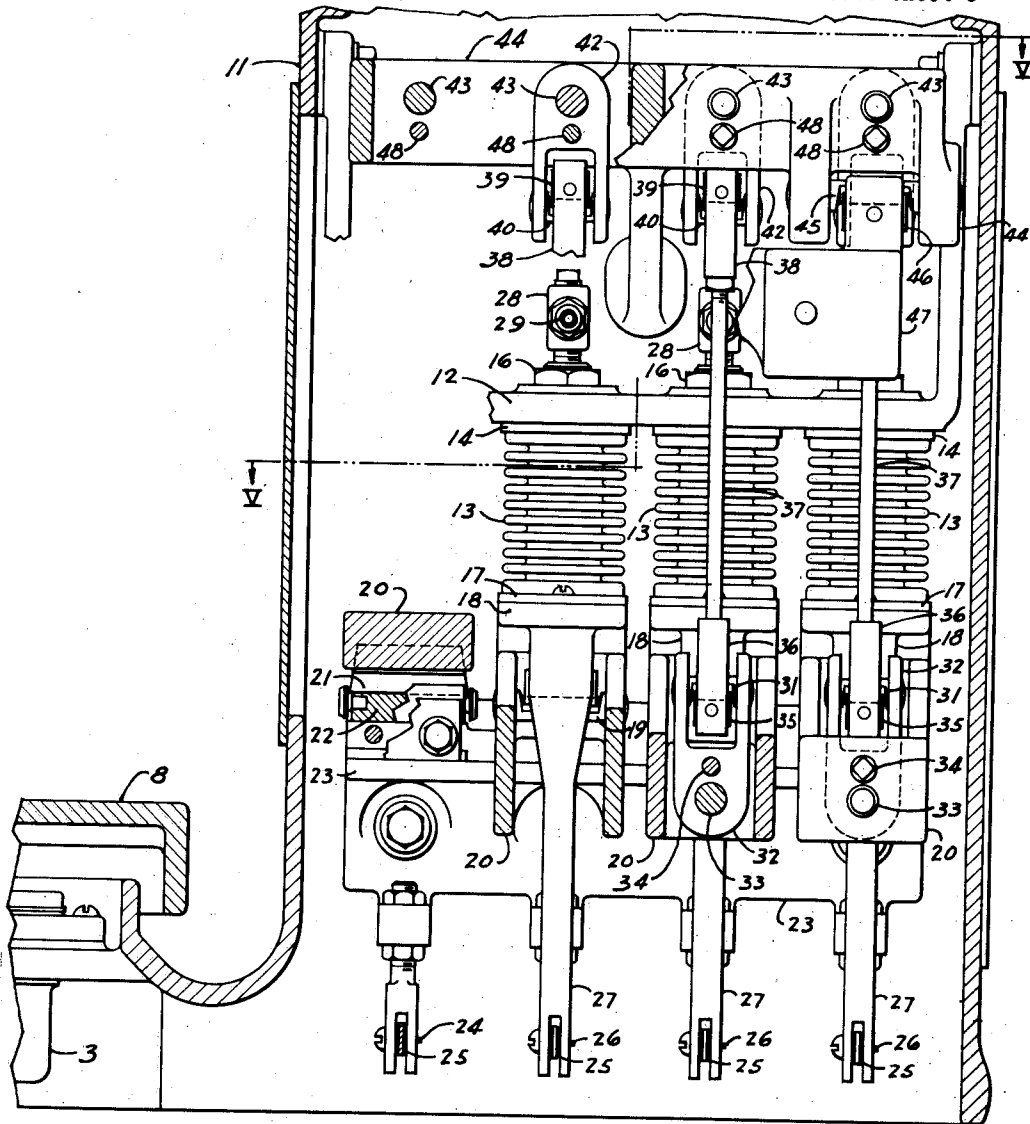


Fig. IV

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4 Sheets-Sheet 4

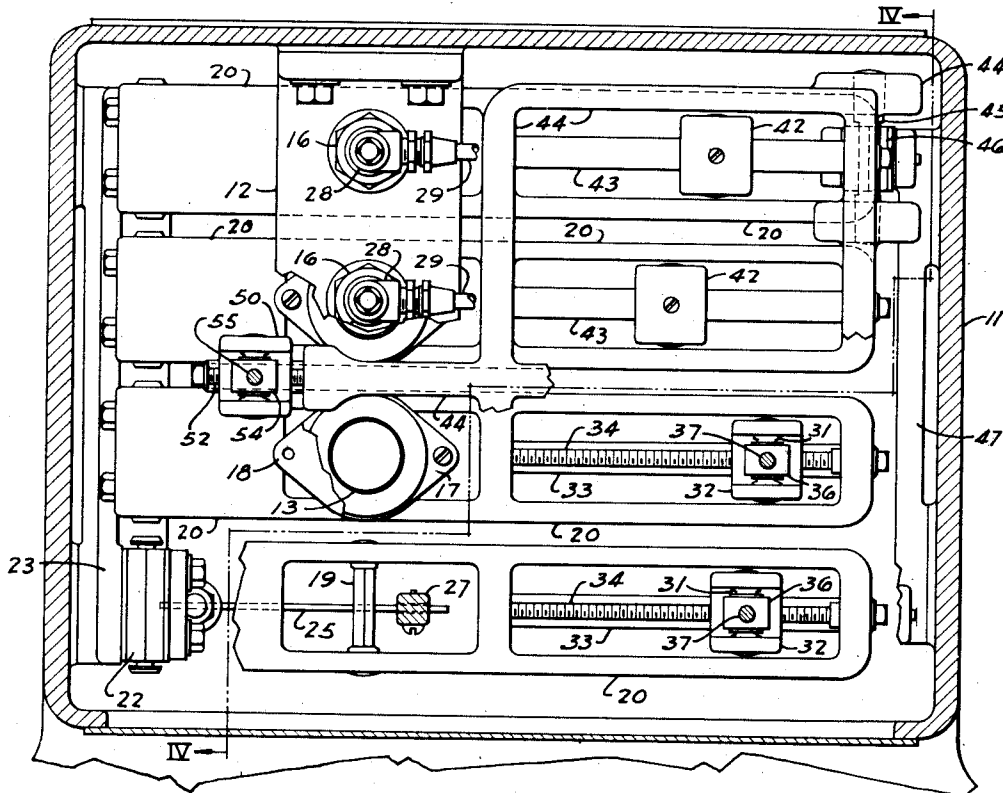


Fig. V

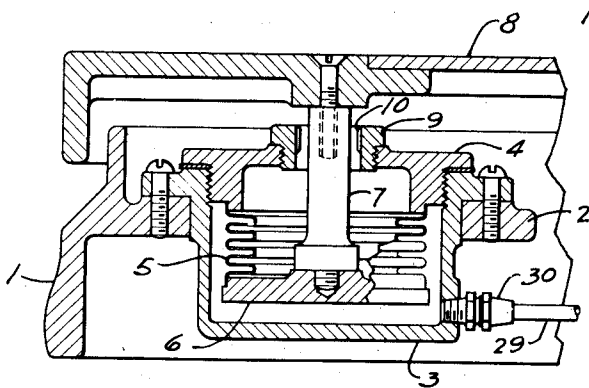


Fig. VI

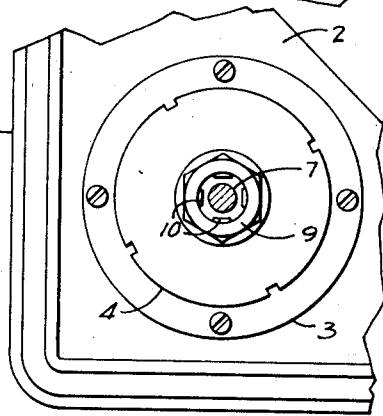


Fig. VII

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HYDRAULIC FORCE TRANSMISSION
MECHANISMRobert S. Bohannon, Toledo, Ohio, assignor to
Toledo Scale Company, Toledo, Ohio, a corporation of New Jersey

Application October 17, 1939, Serial No. 299,834

4 Claims. (Cl. 265—47)

This invention relates to hydraulic force transmission mechanism of the general type illustrated and described in copending application Serial No. 222,831, filed August 3, 1938.

It is an object of this invention to provide improved means whereby forces transmitted by metallic bellows are applied to the knife edges of lever load pivots.

It is a further object of the invention to provide means whereby forces transmitted by metallic bellows are applied to the knife edges of lever load pivots, while liability of such bellows to buckle is minimized.

Another object is to provide a hydraulic support for a load receiver capable of yielding under temporary horizontally acting forces.

And still another object is to provide such a hydraulic support which is acted upon by hydraulic forces to restore it to its initial condition after yielding.

Other objects and advantages will be apparent from the following description, in which reference is had to the accompanying drawings illustrating a preferred embodiment of my invention and wherein similar reference numerals designate similar parts throughout the several views.

In the drawings:

Fig. I is a front elevational view of a weighing scale embodying the invention, parts being broken away and parts being shown in section;

Fig. II is a reduced plan view thereof, part of the load receiver being broken away;

Fig. III is an enlarged front elevational view showing force transmitting mechanism incorporating features of the invention, parts being broken away and parts being shown in section;

Fig. IV is a similarly enlarged side elevational view of such force transmitting mechanism, parts being broken away and parts being in section as indicated by the line IV—IV of Fig. V;

Fig. V is a plan view with parts in section as indicated by the line V—V of Fig. IV;

Fig. VI is a vertical sectional view through a platform supporting capsule; and

Fig. VII is a plan view of such capsule.

The weighing scale illustrated has a base frame 1 adapted to rest upon a bench or counter. Rigidly secured to corner brackets 2, which in the device illustrated are rigid with the base frame, are four identical cups 3.

Fitted with leak-proof joints into the upper end of each of the cups 3 is an annulus 4, to which is brazed or otherwise sealed the upper end

of a metallic bellows 5, the lower end of the bellows being brazed or otherwise sealed to a disk 6.

Secured to the disks 6 and extending upwardly through the bellows 5 are four legs 7 which support a load receiving platform 8, and each leg 7 is surrounded by a collar 9 screwed into one of the annuli 4, the collars having internal bosses 10 which limit horizontal movements of the legs 7.

The spaces within the cups 3 surrounding the bellows 5 are filled with liquid that is under pressure. Horizontal movement of the disk 6 decreases the volume of the spaces surrounding the bellows 5. Hence, the pressure of the liquid resists such horizontal movement of the disks and the platform 8 and restores the platform to a position in which the legs 7 are out of engagement with the bosses 10 in the collars 9 whenever forces causing horizontal displacement of the platform cease to act.

Mounted upon the rear end of the base frame 1 is a cabinet 11, within which is a shelf 12. Mounted beneath the shelf 12 are four metallic bellows 13, the upper ends of which are brazed or otherwise sealed to disks 14 having nipples 15 that extend through holes in the shelf 12 and receive clamping nuts 16.

The lower ends of the bellows 13 are sealed to disks 17 which are fastened respectively to separate spiders 18, the spiders 18 being supported respectively upon knife edge load pivots 19 of levers 20.

The levers 20 are fulcrumed on fulcrum pivots 21 which rest upon bearings 22 supported by a bracket 23 that is secured within the cabinet 11 and that also supports an adjustably mounted pivot 24 for one end of a check link 25, the other end of the check link being pivotally connected, as at 26, to the lower end of a stem 27 depending from the spider 18.

The spider 18 with its stem 27 and the check link 25 act with the lever 20 to constitute a parallel motion means for transmitting forces from the bellows 13 to the load pivot 19.

Connected to each of the nipples 15 by means of a fitting 28 is one end of a tube 29, the other end of the tube 29 being connected by means of a fitting 30 to the interior of one of the cups 3. Thus each cup 3 with the tube 29 and bellows 13 connected thereto forms a closed hydraulic system that acts upon one of the levers 20.

Each lever 20 has a nose pivot 31 fixed in a pivotal retainer 32 which is slidably mounted on a bar 33 that forms a part of the lever 20. The length of the lever arm acting upon each nose

pivot 31 may be adjusted by means of an adjusting screw 34.

Engaging each of the nose pivots 31 is a bearing 35 mounted in a stirrup 36 which is connected to the lower end of a tension rod 37, the upper end of each of the tension rods being connected to a stirrup 38 in which is mounted a bearing 39 that engages a load pivot 40. Each of the load pivots 40 is fixed in a retainer 42 which is slidably mounted on a bar 43 that forms part of a gathering lever 44, the gathering lever 44 being fulcrumed upon fulcrum pivots 45 that rest in V-groove bearings 46 mounted in a bracket 47 that is secured within the cabinet 11.

The lever arms upon which the load pivots 40 of the gathering lever 44 act are individually adjustable by means of adjusting screws 48.

Should there be any variation in the relative effective areas of the disks 6 which support the corners of the platform 8 or any variation in the effective areas of the disks 17 which act upon the load pivots 19 of the levers 20, such variation can be compensated for by relative adjustment of the nose pivots 31 of the levers 20 and corresponding relative adjustment of the load pivots 40 of the gathering lever 44.

The nose pivot 49 of the gathering lever 44 is mounted in a retainer 50 which is slidable on a stud shaft 51, and the retainer 50 may be adjusted by means of an adjusting screw 52. The nose pivot 49 engages a bearing 53 mounted in a stirrup 54 at the lower end of a tension rod 55, the upper end of which is connected, by means of a stirrup 56 and bearing 57, to the load pivot 58 of a pendulum lever 59.

The pendulum lever 59 is fulcrumed, as at 60, within a dial housing 61 and its nose pivot 62 is connected, by means of a link 63 and flexible metallic ribbons 64, to a pair of load counterbalancing pendulums 65 which are supported by metallic ribbons 66 upon a frame 67 also mounted within the dial housing 61.

Connected, by means of a rack 68 and pinion 69, to the pendulum 65 is an indicating pointer 70 which swings over a chart 71 to indicate the weights of loads placed upon the platform 8.

The embodiment of my invention herein shown and described is to be regarded as illustrative only, and it is to be understood that the invention is susceptible to variation, modification

and change within the spirit and scope of the subjoined claims.

Having described my invention, I claim:

1. In a weighing scale, in combination, a bellows, means acted upon by the weights of loads to transmit hydraulic forces to said bellows, a lever having a load pivot, and link-controlled parallel motion means for transmitting forces from said bellows to said load pivot, one end of said bellows being mounted upon a fixed support, the other end of said bellows being mounted upon said parallel motion means and constrained thereby to move in a predetermined path.

2. In a weighing scale, in combination, a plurality of bellows, means acted upon by the weights of loads to transmit hydraulic forces to each of said bellows, a plurality of levers each having a load pivot, and link-controlled parallel motion means for transmitting forces from each of said bellows to one of said load pivots, one end of each of said bellows being mounted upon a fixed support, the other end of each of said bellows being mounted upon said link-controlled parallel motion means and constrained thereby to move in a predetermined path.

3. In a weighing scale, in combination, a bellows, means acted upon by the weights of loads to transmit hydraulic forces to said bellows, a lever having a load pivot, a spider supported upon said load pivot, means for transmitting forces from said bellows to said spider, and a check link for causing said spider to move with parallel motion, one end of said bellows being mounted upon a fixed support, said spider constraining the other end of said bellows to move in a predetermined path.

4. In a weighing scale, in combination, a plurality of chambers, a load receiver operatively associated with said chambers, a plurality of bellows, a conduit connecting each of said chambers to one of said bellows, a plurality of levers having load pivots, and link-controlled parallel motion means for transmitting forces from said bellows to said load pivots, one end of each of said bellows being mounted upon a fixed support, the other end of each of said bellows being so connected to said link-controlled parallel motion means as to move in a predetermined path.

ROBERT S. BOHANNAN.