Nov. 22, 1927. 1,650,204

W. N. GILBERT

SCALE

Filed June 13, 1921 4 Sheets-Sheet 1

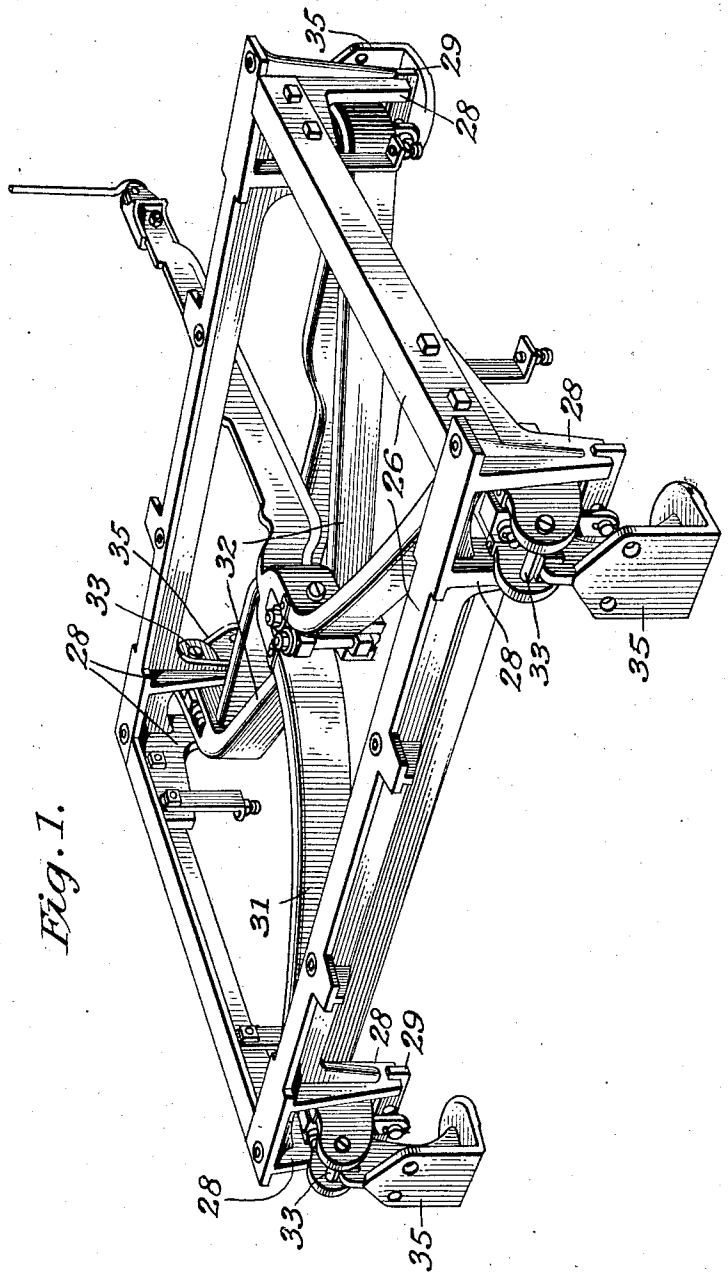


Fig. 1.

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By his Attorneys
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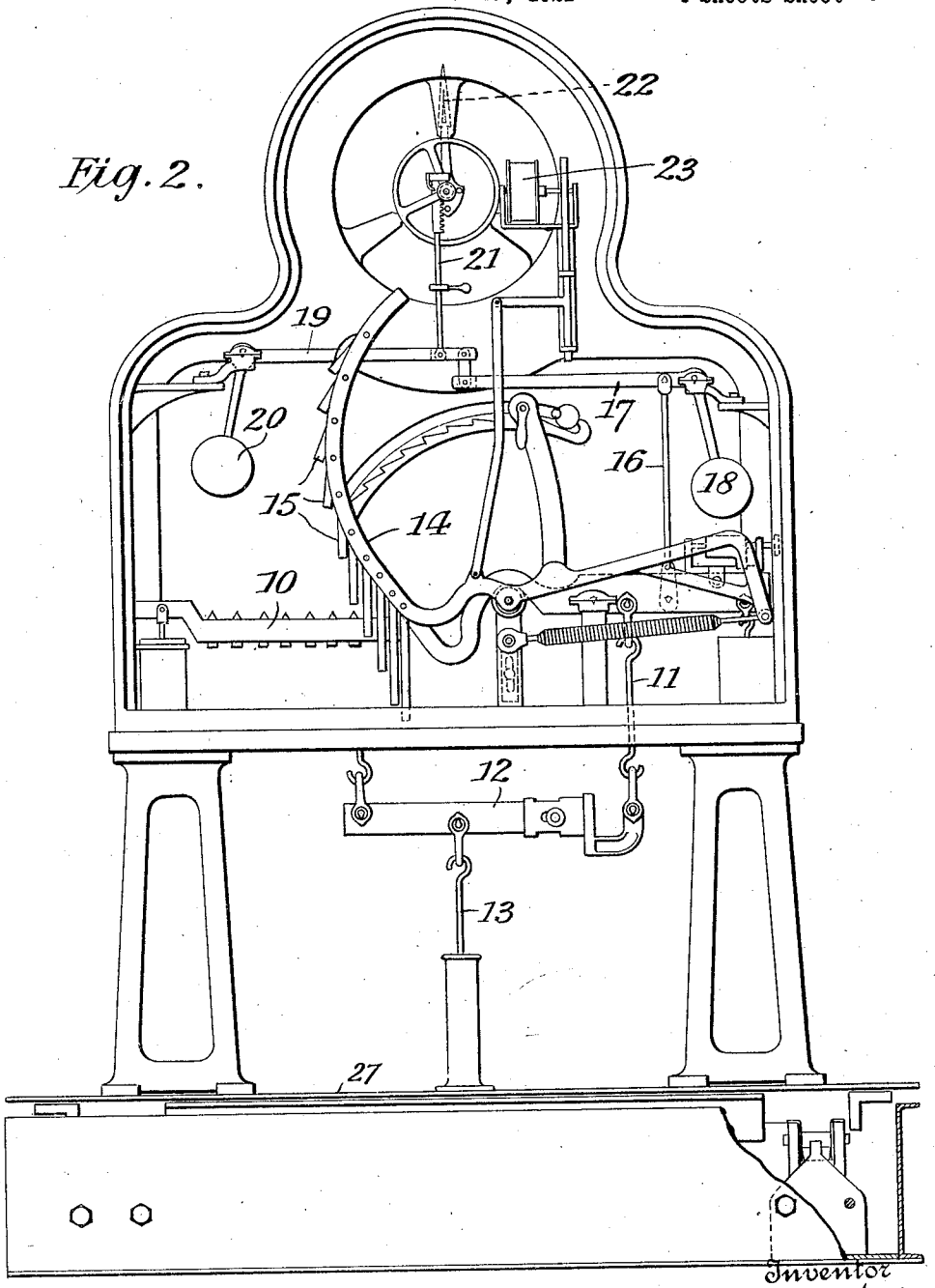
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Fig. 2.



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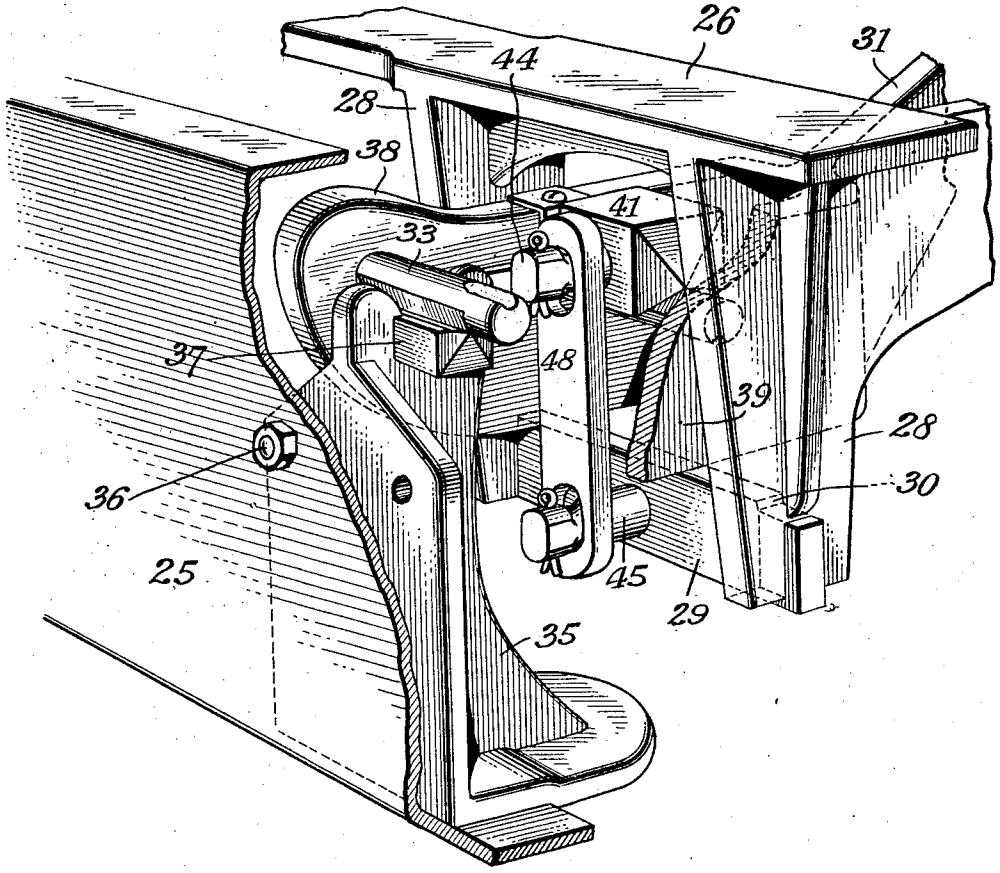
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Fig. 3.



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Nov. 22, 1927. 1,650,204

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Filed June 13, 1921 4 Sheets-Sheet 4

Fig. 4.

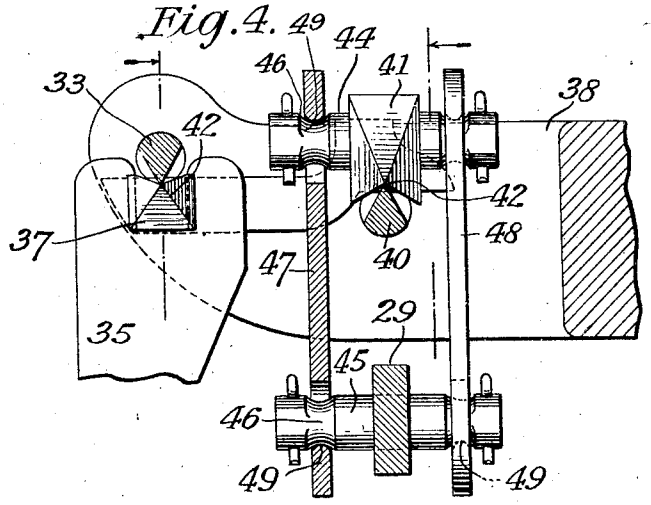


Fig. 5.

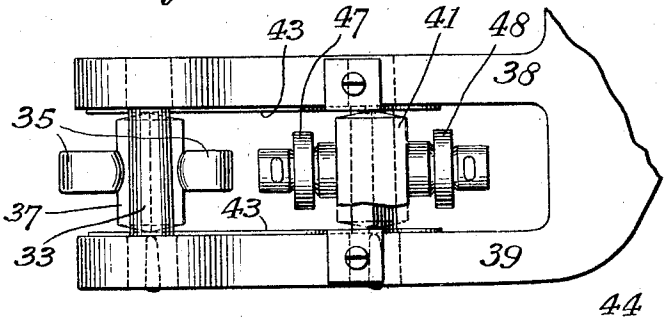


Fig. 7.

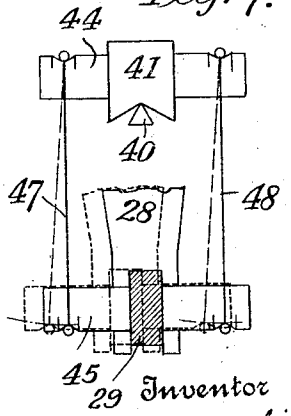


Fig. 6.

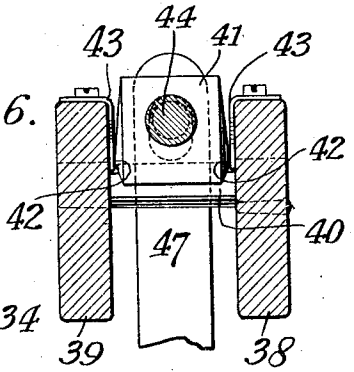
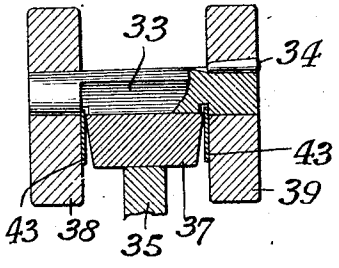


Fig. 8.



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Patented Nov. 22, 1927. 1,650,204

UNITED STATES PATENT OFFICE.

WILLIAM NATHAN GILBERT, OF DAYTON, OHIO, ASSIGNOR TO INTERNATIONAL SCALE COMPANY, OF DAYTON, OHIO, A CORPORATION OF ILLINOIS.

SCALE.

Application filed June 13, 1921. Serial No. 477,071.

The present invention relates to improvements in weighing scales and more particularly to improvements in the platform suspension system which transmits the load to the base levers from the platform.

Heretofore in the art it has been the general practice to transmit the load from the platform to the base levers by either of two methods. In one system a so-called superposed system of linkage is used. Such superposed systems while holding the bearing block rigidly, thereby preventing rocking upon the cooperating pivot, are subject to objection in that the tendency of the linkage is to collapse. Previous so-called suspended systems of linkage, while free from the foregoing disadvantage, have not heretofore prevented a slight rocking of the bearing block upon the pivot.

The present invention has for its object the provision of a suspension type of linkage which, while retaining the desirable floating and non-collapsing characteristics of former suspension linkage, will also secure the desired rigid and nonrocking action of the bearing block.

Other objects of the invention reside in the provision of a linkage of such character that friction may be reduced to a minimum.

In other devices provision is made for preventing rocking of the bearing blocks by means of link-like anchoring devices which, while preventing the rocking action, introduce additional friction and are otherwise objectionable.

Still other objects of the invention reside in the provision of a construction which will be simple, easy to manufacture and assemble, and one which will maintain proper action for long periods without attention.

Another object of the present invention resides in the provision of a novel form of weighing scale which may be used in connection with base lever systems embodying my improved suspension linkage.

Other objects of the invention will be pointed out in the accompanying specification and shown in the drawings which show by way of exemplification a preferred embodiment of the invention.

In the drawings:

Figure 1 shows a perspective view of a typical base lever system which embodies my new suspension linkage for the platform.

Fig. 2 is a rear view of a scale which may be used in connection with the base lever system shown in Fig. 1.

Fig. 3 is an enlarged perspective view of one of the suspension linkages.

Fig. 4 is a side elevation of the linkage adjacent one of the fulcrum pivots of one of the levers.

Fig. 5 is a top plan view of the parts shown in Fig. 4. In this figure the cross member which is carried by the feet depending from the bearing frame is omitted.

Fig. 6 shows a sectional view taken on line 6—6 of Fig. 4.,

Fig. 7 is a diagrammatic view showing the action of the parts when the bearing frame is displaced in a direction perpendicular to the knife edges.

Fig. 8 is a sectional view showing a pivot and its cooperating bearing taken on line 8—8, Fig. 4.

The scale to which the base lever system is adapted to be connected is of a type which in its general arrangement is well known in the art. It comprises the usual fulcrumed main scale beam 10 having a steelyard 11 connected to an intermediate lever 12 from which the usual draft rod 13 extends to the nose iron of the base lever system. Associated with the scale beam is a counterbalanced weight carrier 14 which may be manually adjusted to apply one or more capacity weights 15 upon the scale beam. In order to automatically counterbalance the load and indicate the amount of load thus offset, I provide a steelyard 16 which connects the main beam 10 with a laterally extending arm 17 of a pivoted pendulum 18. The end of the arm 17 is preferably connected by means of a link with a similar arm 19 extending from a pendulum 20. One of the arms 17—19, preferably the latter, has connected to it a rack rod 21 which, through the usual pinion, actuates the pivotal indicator 22. Upon the application of a load to the beam the pendulums swing upwardly, thereby counterbalancing the applied load and displacing the pointer 22 to indicate the amount thereof upon the usual dial.

Loads in excess of the capacity of the

automatic counterbalancing are offset by the capacity weights—and the amount of load thus offset is indicated by a suitable capacity weight indicator 23.

Referring now to Figs. 1, 2 and 3: The dormant portion of the scale comprises an outer supporting frame 25, preferably formed of channels which are supported upon a suitable foundation not shown. Within the supporting frame is the bearing frame for the scale platform. This bearing frame 26 is rectangular in shape and is built up of side and end members which support the platform 27 (see Fig. 2). At each corner the bearing frame is provided with a pair of depending feet 28 which are notched at the bottom to receive a cross bar 29. The cross bar fits the notches snugly so as to prevent any rocking of the bar relatively to the bearing frame support and endwise movement of the bar is prevented by providing shoulders 30 thereon which abut against the inside edges of the feet 28.

The base lever system of the scale comprises a main lever 31 of Y-shape and a supplementary V-shaped lever 32. Both the forked ends of these levers are bifurcated as shown at 38—39, adjacent their fulcrum ends and carry knife edge fulcrum pivots 33 which are preferably tapered to fit tapered holes in the bifurcated ends of the levers. The pivots are driven into place and thereafter locked in position in the levers by suitable taper pins 34 (see Fig. 8). In order to support the levers, chairs 35 are provided. These chairs are bolted to the main frame by suitable bolts 36 and are notched to receive self-aligning bearings 37. The cooperating surfaces of the chairs are arcuate in shape to permit the bearing to properly align with the knife edge 33 (see Fig. 5). The location of the bearing blocks 37 is such that a vertical line from the pivot 33 falls entirely within the base of the chair 35. Therefore the applied load does not tend to impart a strain to the frame 26 but is transmitted directly to the foundation. The bifurcated ends 38—39 of each lever are also provided with upwardly facing knife edge pivots 40 which are similarly mounted and retained in position upon the levers. These pivots, which will hereafter be called load pivots, support bearing blocks 41 which are preferably freely tiltable upon the pivots. The suppression of the tilting is preferably effected by means of the suspension linkage hereafter described and not by any direct fixed anchor devices directly connected to the bearing block. To prevent friction between the sides of the levers and the bearing blocks 41 and 37, the blocks are preferably pointed as shown at 42, and these pointed portions are adapted to abut against hardened friction steel pieces 43 (see Figs. 5, 6 and 8). To prevent friction between the friction steel parts and the pivots, the latter are notched to clear the friction steel.

To transmit the load from the bearing frame to the load pivots, I provide a suspension linkage which is so arranged that movement of the bearing blocks will be prevented irrespective of any shake that may be imparted to the bearing frame.

Each bearing block 41 has fixedly mounted therein a stud 44 extending perpendicularly to the pivot line of the block (see Figs. 3 and 4). Parallel to and below the stud 44 is a similar stud 45, which is fixedly mounted in cross bar 29 and connected to stud 44 by a pair of links 47—48. The applied load is transmitted to the load pivots through feet 28, cross member 29, stud 45, links 47—48, stud 44, and bearing block 41. To permit a free rocking movement between the studs and links I groove the former as shown at 46 and provide curved bearing surfaces 49 at the apertured ends of the links.

The linkage and studs in effect form a parallel motion which is adapted to be swung freely in two planes at right angles to each other. Links 48 and 47 may be swung back and forth in a plane parallel to the pivot 40 (see Fig. 6). Likewise the links may swing to the right and left as shown in Fig. 7. In neither of these swinging movements is rocking imparted to the bearing block 41. The greatest tendency to rock block 41 occurs when the bearing frame moves as shown by the full and dotted line positions in Fig. 7. Here, however, no rocking of block 41 about pivot 40 occurs since stud 45 is at all times maintained in horizontal position by cross bar 29. As previously explained, the cross bar 29 snugly fits in the notches in the depending feet 28, and therefore does not in itself rock when shake is imparted to the bearing frame.

So long as stud 45 is maintained horizontal, the parallel links may assume varying positions and maintain stud 44 constantly horizontal and parallel to stud 45. Therefore no rocking of bearing block 41 will occur irrespective of the position of displacement of links 47 and 48. To attain the foregoing result it is essential that the bearing blocks 41 have freedom of movement relatively to the links. If either the block 41 or the stud 45 be in any way rigidly fastened to the linkage 47—48, or if the movement be cramped, the bearing block will have movement imparted to it.

The suspension linkage just described is adapted to prevent the transmission to the bearing block 41 of platform movement. All platform movements are exhausted before reaching this block and in addition the parts forming the linkage form a true suspension and are not superimposed upon the pivots in such a way that the parts tend to collapse under loading shocks.

I claim:

1. A suspension linkage for a weighing scale, comprising, in combination with a load pivot and cooperating superimposed bearing block mounted for free tipping movement upon said pivot, a suspension linkage depending from said bearing block and extending below said load pivot, said linkage having limitless freedom of relative movement with respect to said bearing block in a plane parallel to said load pivot, and means for transmitting the applied load to said linkage, said means being adapted to prevent said bearing block from being rocked upon its pivot upon a lateral swinging of said linkage.

2. A suspension linkage for a weighing scale comprising, in combination with a load pivot and cooperating bearing block, a bearing frame having portions depending below the said pivot, a cross member carried by said depending portions, a stud carried thereby, a stud carried by the bearing block, and a pair of links connecting said studs, said studs and links having provisions for permitting free swinging of the links in a plurality of planes.

3. In a weighing scale, in combination with a load pivot and cooperating bearing block, a bearing frame having notched depending feet extending below said pivot, a cross bar carried by the said notched feet, a stud carried by the cross bar, a stud carried by the bearing block parallel with the aforesaid stud, parallel links connecting said studs, said studs and links having provisions for permitting a free rocking of the links relatively to the studs, and said notched feet being adapted to prevent the rocking of the cross bar and thereby maintain the stud carried thereby horizontal whereby the bearing block is prevented from rocking upon its pivot upon "shake" of the bearing frame.

4. In a weighing scale, in combination with a bearing frame, a scale lever, a load pivot thereon, a suspension linkage adapted to transmit the applied load from the bearing frame to the said load pivot, said linkage comprising a bearing block supported by the load pivot, a pair of links each independently suspended from the said block at opposite sides of the line of contact with the load pivot and adapted to freely rock thereon in a plurality of directions, a member having circular grooves engaging said links for permitting lateral swinging of said links and unlimited parallel displacement of said member, and means for transmitting the load from the bearing frame to said member, said means being adapted to maintain said member horizontal irrespective of a displacement of said bearing frame.

5. In a weighing scale, a scale lever, a load pivot thereon, a bearing frame having depending portions extending below the said load pivot, and means comprising a bearing block and a suspension linkage for transmitting the load from said depending portions to the load pivot, said linkage having links and connecting members for permitting unlimited swinging movement of said links with respect to said bearing frame and to said bearing block in a plane parallel to said load pivot whereby rocking of said bearing block upon said load pivot is prevented.

6. In a weighing scale, a compound base lever system, load pivots carried thereby, a bearing frame, a pair of feet depending from said frame adjacent each load pivot and extending below the same, a cross bar carried by said feet extending under the lever and parallel to the load pivot, a bearing block superimposed upon said load pivots, and means comprising a linkage connecting the bearing block and cross bar, said linkage being free to rock relatively to the cross bar and bearing block whereby the latter is adapted to remain stationary upon lateral movements of the bearing frame.

7. In a weighing scale, a scale lever, a load pivot thereon, a bearing frame, means comprising a bearing block and a suspension linkage for transmitting the load from the bearing frame to said load pivot, said linkage including links and connecting members for permitting unlimited swinging movement of said links in respect to said bearing frame and to said bearing block in a plane parallel to said load pivot, and depending portions extending from said bearing frame and below said load pivot engaging and maintaining one of said connecting members horizontally.

8. A weighing scale including, in combination, a fulcrumed lever, a load pivot carried thereby, a bearing block superposed on said load pivot, a member extending from said bearing block and having circular grooves therein, a link disposed at each end of said member and having means for engaging said grooves, a second member sustained by said links and having circular grooves for engaging said links, a bearing frame, and means to rigidly connect said second member with said bearing frame, whereby said first named member and bearing block are maintained substantially horizontal irrespective of a horizontal displacement of said bearing frame.

9. A weighing scale including in combination, a fulcrumed lever, a load pivot carried thereby, a bearing block carried by said load pivot, a suspension linkage adapted to transmit applied loads to said load pivot, said linkage including a plurality of separate members disposed in parallel relation to each other and comprising vertical members disposed at each side of the vertical plane of the load pivot line and substantially horizontally disposed members above and

below said load pivot and means for preventing a rocking movement of said load pivot upon lateral movement of the aforesaid linkage, said means having provisions cooperating with the lower horizontal member of said linkage for maintaining the same in horizontal position to thereby maintain parallel relations of the suspension linkage upon the swinging thereof.

In testimony whereof I hereto affix my signature.

WILLIAM NATHAN GILBERT.