Sept. 10, 1946. J. A. McCULLOCH ET AL 2,407,435

WEIGH BEAM ASSEMBLY

Filed Feb. 10, 1941 2 Sheets-Sheet 1

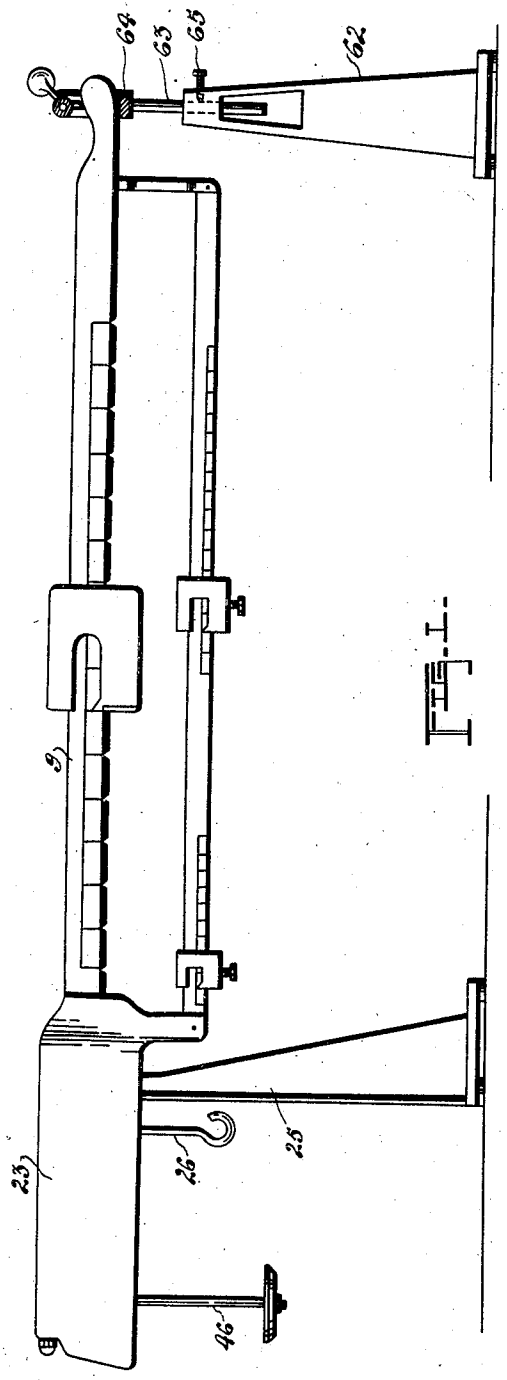


FIG. 1.

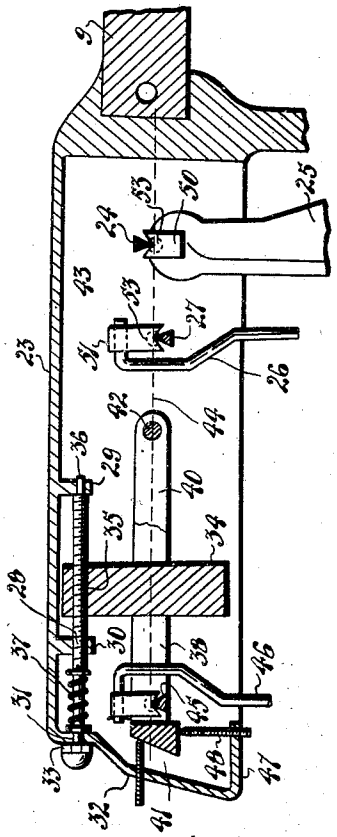


FIG. 2.

Applicants:-
J.A. McCulloch,
N. R. Slasor.

Sutherstonhaugh & Co
Atty's.

Sept. 10, 1946. J. A. McCULLOCH ET AL 2,407,435

WEIGH BEAM ASSEMBLY

Filed Feb. 10, 1941 2 Sheets-Sheet 2

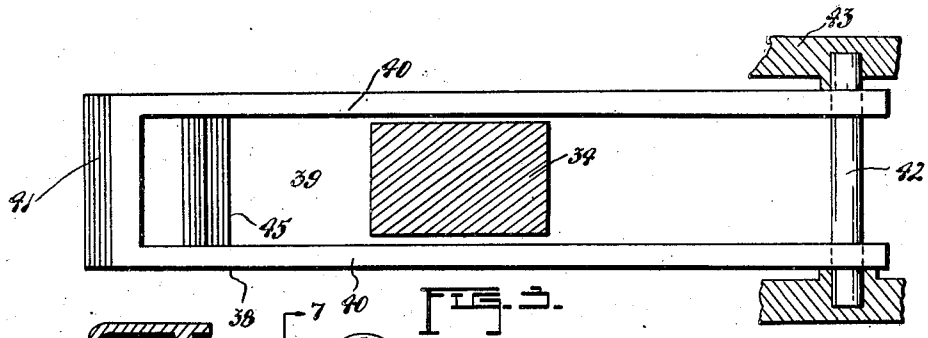


FIG. 3.

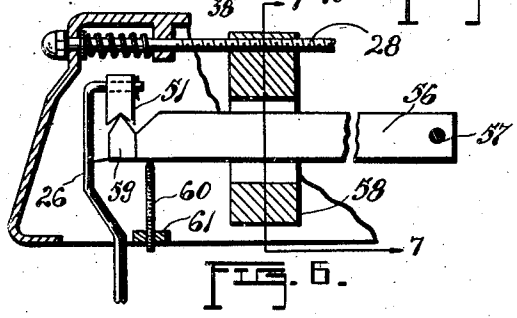


FIG. 6.

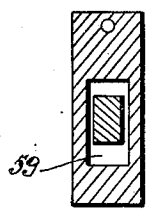


FIG. 7.

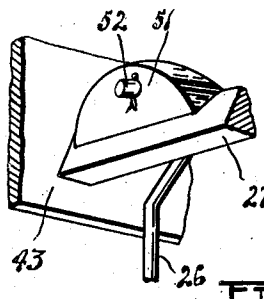


FIG. 4.

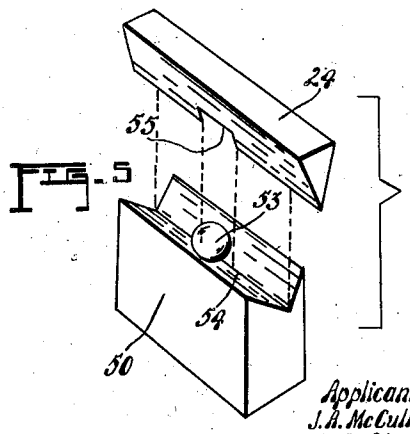


FIG. 5.

Applicants:-
J. A. McCulloch,
N. R. Slaser.

Butterston Haugh & Co
Atty's.

Patented Sept. 10, 1946

2,407,435

UNITED STATES PATENT OFFICE

2,407,435

WEIGH BEAM ASSEMBLY

John A. McCulloch and Nicholas R. Slasor, Winnipeg, Manitoba, Canada, assignors to Manitoba Bridge & Iron Works Limited, Winnipeg, Manitoba, Canada

Application February 10, 1941, Serial No. 378,224
In Canada February 10, 1940

3 Claims. (Cl. 265—49)

1

Our invention relates to improvements in weigh beam assemblies, an object of our invention being to provide in a weigh beam assembly an improved rear balance hanger knife edge adjustment by means of which the beam may be quickly adjusted by the mechanically controlled upward or downward movement of the knife edge.

A further object of our invention is to provide in a rear balance weight adjusting assembly, a balance weight of novel design and replacing the usual balance ball, such design permitting the convenient and compact arranging of the balance weight assembly in a dust excluding housing and in compact combination with said rear balance hanger knife edge adjustment assembly.

A further object of our invention is to provide in weigh beam assembly, a dust excluding housing of elongated configuration, having therein knife edge fulcra spanning the walls of the housing towards the forward end thereof together with a rear balance hanger knife edge capable of being adjusted upwardly or downwardly upon manual operation of mechanism associated therewith.

With the above more important objects in view and such other minor objects as may appear as the specification proceeds, this invention consists essentially in the arrangement and construction of parts all as hereinafter more particularly described, reference being had to the accompanying drawings, in which:

Figure 1 is a side elevation of our weigh beam assembly.

Figure 2 is a sectional elevation of the structure within our weigh beam housing.

Figure 3 is an enlarged plan view of the balance weight employed in association with our invention.

Figure 4 is a perspective illustration of our improved load pivot resting upon its knife edge fulcrum and showing the hanger depending therefrom.

Figure 5 is a perspective illustration of our ball bearing check arrangement used in association with this invention to prevent longitudinal movement as between seatings and their associated knife edge fulcra.

Figure 6 is a section illustrating an alternate embodiment of a rear balance knife edge supporting bracket and associated parts.

Figure 7 is a section on the line 7—7 of Figure 6.

Our novel balance weight assembly consists of the accompanying Figure 2, it will be seen that the same is located in a housing 23 which is mounted by means of the knife edge fulcrum 24

2

upon a stand or pedestal 25, the load pivot hanger 26 being suspended upon the knife edge fulcrum 27.

The balance weight assembly comprises a horizontally disposed screw-threaded shaft 28 journalled at the forward end thereof and a point medially of its length in the brackets 29 and 30 respectively while at the rear end this member is journalled in an aperture 31 in the rearwall 32 of the housing 23, terminating upon the external surface of the wall in a hexagon head 33 to facilitate rotation.

Depending from the rod 28 is a vertically disposed rectangular balance weight 34 provided near the top with a horizontal screw-threaded aperture 35, through which the rod 28 extends and from the foregoing description it will be apparent that upon rotation of the rod clockwise or anticlockwise, the weight will be moved to the right or left or in other words, forwardly or rearwardly with respect to the accompanying Figure 2, between the brackets 29 and 30.

Finally in this context it should be noted that the forward end 36 of the rod which is journalled in the bracket 29, is preferably reduced thereby providing a flange to prevent endwise movement in a forward direction while a coil spring and washer assembly 37 is positioned between the bracket 30 and the wall 32 to prevent end-shifting of the rod in the opposite direction.

We do not claim as part of our invention the idea of, or the structure for adjusting a weigh beam balance weight horizontally. Previously, however, the balance weight has assumed the form of a ball and not a vertically disposed rectangular mass depending from a rod as herein set forth. We therefore claim as novel this particular design of balance weight in combination with the rear balance hanger knife edge adjustment assembly about to be described.

This knife edge adjusting assembly best illustrated in the accompanying Figures 2 and 3, will be seen to comprise in combination a holder in the form of a horizontal bracket or yoke 38, having an open centre 39, a pair of parallel guide arms 40 and a cross head 41 at the rear end thereof serving to unit the arms. The bracket 38 is pivoted within the housing 23 by means of a transverse shaft 42 which is journalled in the side walls 43 of the housing 23 in the plane of the range line 44.

A rear balance hanger knife edge 45 spans the open centre of the yoke between the cross head and the transverse shaft at a point in close proximity to the former as clearly illustrated in

the accompanying Figures 2 and 3 and upon this knife edge is mounted the conventional rear balance hanger 46.

Extending vertically through a screw-threaded aperture in the underturned portion 47 of the housing 23, is a set screw 48, the upper end of which engages with the under surface of the cross head 41 and from the foregoing description it will be apparent that should the knife edges 24, 27 and 45 become misaligned for any reason, the necessary adjustment may readily be made by rotation of the set-screw 48 to raise or lower the bracket 38. It will be noted in this context that the balance weight 34 extends downwardly through the open centre 39 of the yoke 38, being free to move forwardly or rearwardly therein to provide a peculiarly compact and efficient combination of balance weight assembly and rear balance hanger knife edge adjusting assembly.

The foregoing arrangement will obviously be seen to comprise a means for effecting quick adjustment or balancing of a weigh beam through the mechanically controlled upward or downward movement of the knife edge 45, such adjustment being necessary from time to time when an associated scale is being used continuously since the knife edges and seat are subject to wear and this applies to those in the scale as well as those in the weigh beam. Wear in the scale pivots (knife edges and seatings) particularly, causes a sluggish transmission of movement to the weigh beam.

The present method employed to readjust the range of a scale beam is by raising or lowering the balance ball when necessary while often a heavier balance ball has to be machined at the time of such readjustment. Furthermore, it is necessary under prevailing practice to relocate to a new permanent position the conventional fixed rear balance hanger knife edge with all the necessary shop work which this entails.

The knife edges 24 and 27 best illustrated in the accompanying Figure 2, span the side walls 43 of the housing 23, these being located as will clearly be seen, towards the forward end of the housing and to the right of a transverse plane drawn through the mid-point of the housing with respect to the accompanying Figure 2. The knife edge 24 rests on the seating 50, the ends of which are spaced somewhat from the inner surface of the walls 49.

The knife edge 27 supports the load pivot 51, the configuration of which is most clearly illustrated in the accompanying Figure 4, from which it will be seen that the upper end 52 of the hanger 26 is free to rotate therein so that even though the seating surface of the load pivot may deviate from the horizontal to some extent, the hanger will still remain vertical.

The seating lengths of the load pivot 51 is equal to that of the seating 50 and by reference now to the accompanying Figure 5, it will be seen that at the midpoint of the seating 50 is embedded a ball bearing 53, this ball bearing being preferably rigidly, embedded below the range line 44 to a depth slightly in excess of its greatest radius. The knife edge fulcrum 24 is machined or ground out transversely as at 55 to receive the ball.

The foregoing instructions with reference to the seating 50 and the knife edge fulcrum 24 apply with respect to the load pivot 51 and its knife edge 27 in association with which we also employ an embedded ball bearing and complementary recess as indicated by reference to the accompanying Figure 2 and from the foregoing arrangement, it will clearly be seen that by means of the bearing arrangement described, friction is reduced to a minimum and that deviation of the stand 25 from the true vertical unless excessive, will permit satisfactory operation of the weigh beam within the limits of inaccuracy allowed under the weights and measures regulations, according to the amount of deviation since the checking action of the ball bearings will prevent (as applied to the knife edge 24) the weigh beam from sliding sideways on the seating 50 and (with respect to the knife edge 27) prevent the load pivot 51 from sliding sideways against one of the walls 49 or the other.

In the accompanying Figures 6 and 7 it will be seen that we have provided an alternative embodiment of a bracket 38 the equivalent thereof in this embodiment taking the form of an elongated rod 56 pivoted on a transverse bearing 57 in the side walls of our housing. In this instance it will be seen that the balance weight 58 is provided with a central rectangular aperture 59 through which the member 56 extends, the aperture being sufficiently large to allow limited vertical movement and limited side movement in the event that foundation subsidence should cause the unit to incline slightly from the vertical.

The balance weight of this embodiment moves in an identical manner to the balance weight 34 for which reason further description is deemed unnecessary.

Reverting to the member 56, however, it will be seen that the rear balance hanger knife edge 59 is secured transversely to the extreme end thereof so that in plan the member 56 and the member 59 will assume the appearance of a T.

The load pivot 51 and the load pivot hanger 26 in this embodiment are mounted oppositely to their manner of mounting in our first embodiment and it will be seen that our means for effecting limited rotation of the member 56 (or on the other hand, substantially vertical adjustment thereof) is accomplished by a set-screw 60 identical with the set screw 48, the upper end thereof bearing against the underside of the member 56 the set-screw being secured in a transverse piece of metal 61 spanning the side walls of our housing.

Proceeding finally to describe the novel trig-loop adjustment best illustrated in the accompanying Figure 1, it will be seen that this comprises in combination with a trig-loop stand 62, a vertical rod 63 extending through a vertical aperture in the apex of the stand, the conventional trig-loop assembly 64 being secured to the apex of the rod. Extending horizontally through the stand adjacent the apex thereof is a set screw 65, the end of which may be screwed into binding relationship with the rod 63 whereby the same may be adjusted and fixed at any desired height.

The peculiar virtue of the last inventive feature resides in the fact that by its use a proper adjustment of the trig-loop may be effected after the trig-loop stand has been erected and its position fixed. The arrangement obviously prevents the necessity for shimming-up the stand to the required height and furthermore, if through settlement after erection, the stand should settle or if on the other hand, it should be heaved upwardly, the necessary compensating adjustment of the trig-loop can be made with the greatest ease.

Since many modifications can be made in the invention herein described and since the accom-

panying drawings have been prepared only to illustrate the relative arrangement and interaction of parts and not with regard to accuracy of dimensions for manufacturing purposes which in view of this disclosure is submitted to entail merely mechanical skill together with the skill of the mechanical draftsman, and since many apparently widely different embodiments of this invention may be made within the scope of the accompanying claims without departing from the spirit and scope of the same, it is intended that all matter contained in the accompanying specification shall be interpreted as illustrative only and not in a limiting sense and it is desired only such limitations be placed thereon as justice dictates.

What we claim as our invention is:

1. In a weigh beam balance weight assembly, and in combination a balance weight and knife edge supporting structure, a rear balance knife edge adjusting assembly comprising a substantially horizontal bracket in the form of a yoke having an open centre, pivotally attached to said supporting structure, a knife edge spanning said bracket, a horizontally adjustable balance weight and a screw-threaded rod horizontally journalled on said supporting structure, said balance weight depending from said rod, downwardly between the open centre of said bracket.

2. In a weigh beam balance weight assembly and in combination a balance weight and knife edge supporting structure, a rear balance hanger knife edge adjusting assembly comprising in combination, a horizontal elongated yoke having an open centre and consisting of a pair of parallel arms and a cross head uniting the arms at or adjacent one end thereof, said yoke being pivotally attached to said supporting structure by means of a transverse shaft extending through said arms at a point remote from said cross head, a rear balance hanger knife edge spanning the open centre of said yoke between said cross head and said transverse shaft, means for effecting limited rotation of said yoke to raise or lower said knife edge with respect to the other parts of said balance weight assembly, a rod positioned centrally above said yoke and horizontally journalled in said supporting structure, a balance weight depending from said rod and through the open centre of said yoke, said balance weight being provided with a horizontal aperture, said rod extending through said aperture, said balance weight being movable horizontally in one direction or the other.

3. In a weigh beam and in combination a balance weight and knife edge supporting structure, a rear balance knife edge adjusting assembly comprising an elongated and normally horizontal member pivotally attached to said supporting structure, a rear balance hanger knife edge secured to said member, a horizontally adjustable balance weight suspended above said member and from said supporting structure, said balance weight depending downwardly to intersect said member, sufficient clearance being provided at the intersection to permit adjusting movements of the balance weight and horizontal member, means for effecting limited rotation of said member from the horizontal about the point at which it is pivoted to raise or lower said knife edge and means for effecting horizontal adjustment of said balance weight.

JOHN A. McCULLOCH.
NICHOLAS R. SLASOR.