E. G. HEDMAN.

KNIFE EDGE BEARING FOR WEIGHING APPARATUS.

APPLICATION FILED MAY 2, 1913.

1,109,838. Patented Sept. 8, 1914.

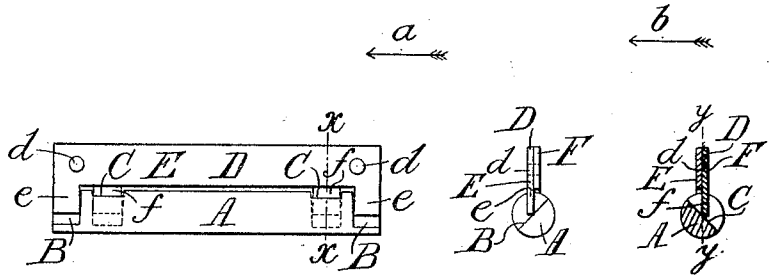


Fig. 1. Fig. 2. Fig. 3.

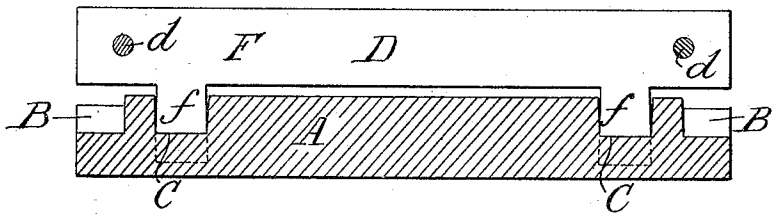


Fig. 4.

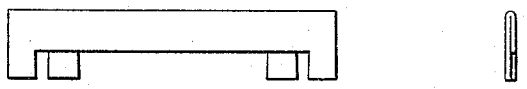


Fig. 5. Fig. 6.

Witnesses

Mary Y. Brooks

Harry King

Inventor

Erik Gustaf Hedman

By F. C. Jones

attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ERIK GUSTAF HEDMAN, OF STOCKHOLM, SWEDEN.

KNIFE-EDGE BEARING FOR WEIGHING APPARATUS.

1,109,838. Specification of Letters Patent. Patented Sept. 8, 1914.

Application filed May 2, 1913. Serial No. 765,028.

To all whom it may concern:

Be it known that I, ERIK GUSTAF HEDMAN, a subject of the King of Sweden, and residing at 46 Kungsholmsgatan, Stockholm, Sweden, have invented certain new and useful Improvements in Knife-Edge Bearings for Weighing Apparatus, of which the following is a specification.

In knife edge bearings as heretofore, or usually constructed, the knife edge is arranged to bear upon a flat or curved surface or against the bottom of a V-groove; but in all these forms there is the disadvantage that the knife-edge is liable to lateral displacement which, in the case of machines in which the load is transmitted through a system of leverages, may interfere with the accuracy of the machine to an appreciable extent. In the case of a V-groove lateral displacement is liable to occur owing to the fact that a perfectly sharp corner cannot be formed at the bottom of the groove. A further disadvantage of the usual form of knife-edge is that, unless the bearing surface is flat or of a curve having a relatively large radius or is in the form of a V-groove in which the faces of the V are set at a very open angle, the knife edge needs to be of a very acute angle, and therefore is very liable to wear.

The object of the invention is to provide a bearing of the knife-edge type in which some or all of the above disadvantages are eliminated and which is nevertheless very easy to manufacture.

The invention will be clearly described with reference to the drawings herewith which illustrate convenient embodiments thereof.

Of these drawings: Figure 1 is a side elevation of a practical form of my invention. Fig. 2 is a right hand end view. Fig. 3 is a vertical section taken on the line *x x* of Fig. 1 looking in the direction of the arrow *a;* Fig. 4 is a longitudinal sectional view to an enlarged scale the section being taken in the plane indicated by the line *y y* of Fig. 3 and looking in the direction of the arrow *b* (Fig. 3); and Figs. 5 and 6 illustrate a modified form of knife edge.

The bearing member A is formed from a plain cylindrical bar, the surfaces B B and C C being formed thereon by filing, milling, grinding or in other convenient manner. The surfaces B B lie in the same plane, while the surfaces C C lie in another plane which is conveniently at right angles to the first. As clearly shown in the figures all the surfaces pass through the axis of the bar A.

D is the knife-edge member formed of two plates E F of which the plate E has the middle part of its lower edge cut away as shown in Fig. 1, so as to be clear of the bearing portion A except for downwardly extending portions *e e* which bear upon the surfaces B B. The plate F has portions of its lower edge cut away as shown in Fig. 4 so as to leave downwardly projecting portions *f f* which bear upon the surfaces C C. The plates E F are fastened together face to face by rivets *d*.

It will be seen by reference to Figs. 2 and 3 that the plate E bears on the surfaces B B only at its right hand bottom edge and that the angle of the edge approximates to a right angle. It is therefore easy to grind the edge very accurately to a straight line after the two parts have been brought and secured together, and owing to the angle of the edge being a right angle it will have considerable strength and will therefore be much less liable to damage than the knife-edges of ordinary knife-edge bearings. The plate F in like manner needs only to have its left-hand bottom edge ground to a straight line. It will be seen that so long as the plates have plane surfaces at the faces which come together, their bearing edges will come accurately into the same straight line. The fact that the surfaces B B and C C intersect in the same straight line, namely the axis of the bar A in the embodiment illustrated and that the inner bottom edges of the plates E and F are also in one straight line insures that the knife edge portion as a whole turns very accurately about a single axis, namely that of the bar A in the example shown, and thus the bearing is extremely sensitive and can be employed in connection with weighing apparatus of a class which is designed for very great sensitiveness. The construction also allows of a very great angular movement of the knife-edge portion in relation to the bearing portion.

In lieu of securing the plates E and F together by riveting, it will be understood that these two superposed plates may be integral with each other, being formed from a single

sheet open along its length and folded over as illustrated in Figs. 5 and 6. In this construction the knife edges are ground after the folding operation. The claims are designed to cover this construction as well as the construction where the two plates are made from separate sheets.

It will be seen by reference to Fig. 4 that the portions *f* taper inward in an upward direction and that the grooves cut in the bar A in forming the surfaces C C taper outward in an upward direction, so that the portions *f f* touch the bar A only at the bearing edges. In a similar manner the portions *e e* are prevented from touching the bar A except at the bearing edges.

Endwise movement of the knife-edge portion relative to the portion A can be prevented by insuring that both a right hand and left hand bottom corner of the various bottom corners of the portion *e e*, *f f* touch the walls of their respective grooves.

It will be seen by reference to Fig. 1 that forming a wall between adjacent bearing surfaces adds considerably to the strength of the bearing portion; because, if the bearing faces touched each other the bearing portion would have a very small cross sectional area at the point of contact. If in such case the faces were at right angles to each other the cross sectional area would be only one quarter of the full cross-sectional area of the original cylinder.

It will, of course, be understood that four surfaces are not essential but in ordinary cases it will be necessary to provide the equivalent of at least three surfaces, one or more surfaces lying between and at an angle to two or more other surfaces which should be parallel to each other or approximately so, as otherwise the knife-edge could not be steadied upon the bearing.

Having fully described my invention what I claim and desire to secure by Letters Patent is:—

1. In a knife edge bearing for a weighing apparatus, a bearing member comprising two or more bearing faces set at an angle one to another and all containing a common straight line, and a knife edge member composed of two plates whereof the adjacent faces come together and are formed substantially as planes, one or more of the knife edges being formed in one of said plates and another or others in the other plate and all said knife edges being disposed in a single straight line and adapted to contact with the bearing along said line.

2. In a knife edge bearing for weighing apparatus, a bearing member comprising two or more bearing faces set at an angle one to another and all containing a common straight line, walls or partitions each of which separates one bearing face from another, and a knife edge member adapted to bear on said bearing faces, and having gaps therein to bridge over said walls or partitions.

3. In a knife edge bearing for weighing apparatus, a bearing member comprising two or more bearing faces set at an angle one to another, and all containing a common straight line, walls or partitions each of which separates one bearing face from another, and a knife edge member having gaps therein to bridge over said walls or partitions, said gaps leaving projections of the knife edge member, each projection being adapted to bear on one of the bearing faces and one or more of the ends of said projections adapted to touch a wall or walls aforesaid only at the plane of the respective bearing surface whereby endwise movement of the knife edge portion relative to the bearing portion is prevented without introduction of friction.

4. In a knife edge bearing for a weighing apparatus, a bearing member comprising two or more bearing faces set at an angle one to another and all containing a common straight line, walls or partitions each of which separates one bearing face from another, and a knife edge member having gaps therein to bridge over said walls or partitions, said gaps leaving projections forming the knife edges, each projection being adapted to bear on one of said bearing faces, adjacent ends of a wall and gap touching at the plane of said bearing surfaces and being thence divergent whereby endwise movement is prevented and radial contact and friction avoided.

5. In a knife edge bearing for a weighing apparatus, a bearing member comprising two or more bearing faces set at an angle one to another and all containing a common straight line, walls or partitions each of which separates one bearing face from another, and a knife edge member having gaps therein to bridge over said walls or partitions, said gaps leaving projections of the knife edge member, each projection being adapted to bear on one of the bearing faces, adjacent ends of a wall and gap touching at the plane of said bearing surfaces, the ends of the wall being thence sloped away from the ends of the gap, whereby endwise movement is prevented and radial contact and friction avoided.

6. In a knife edge bearing for a weighing apparatus, a bearing member comprising two or more bearing faces set at an angle one to another and all containing a common straight line, walls or partitions each of which separates one bearing face from another, and a knife edge member having gaps therein to bridge over said walls or partitions, said gaps leaving projections of the knife edge member, each projection being adapted to bear on one of the bearing faces,

adjacent ends of a wall and gap touching at the plane of said bearing surfaces and being thence sloped in opposite directions one away from the other, whereby endwise movement is prevented and radial contact and friction avoided.

In witness whereof I have hereunto signed my name this 19 day of April 1913 in the presence of two subscribing witnesses.

ERIK GUSTAF HEDMAN.

Witnesses:

CARL ALBIN WIKLUND,

JOHN ALBERT ELDMAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."