(No Model.)

# R. M. SKILES & C. LEDERER.

## BALL BEARING FOR SCALES.

No. 594,492. Patented Nov. 30, 1897.

Fig. 1.

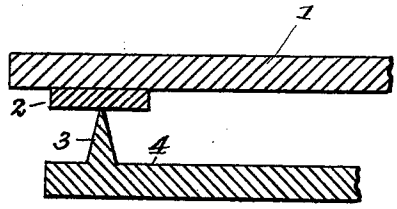



Fig. 2.

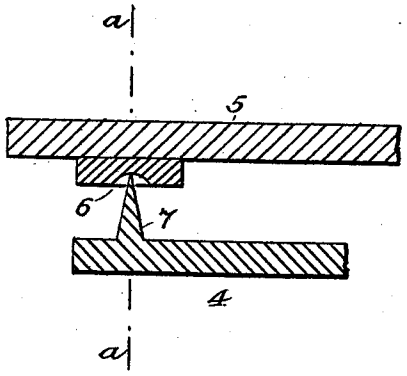



Fig. 3.

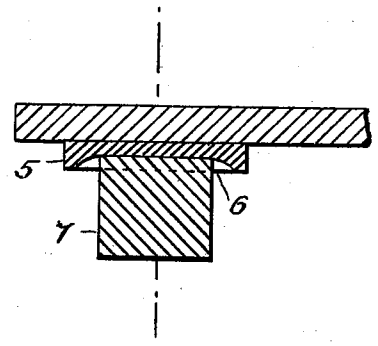
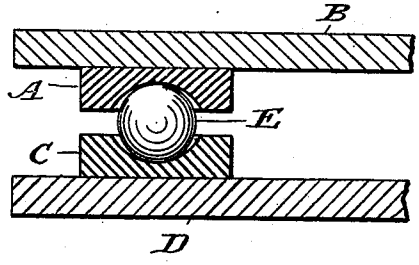



Fig. 4.




Witnesses:
E. B. Bolton
H. S. Williams

Inventors:
Robert M. Skiles
Charles Lederer
By James R. Rogers
their Attorney.

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

# UNITED STATES PATENT OFFICE.

ROBERT M. SKILES, OF ATLANTIC, IOWA, AND CHARLES LEDERER, OF NEW YORK, N. Y.

## BALL-BEARING FOR SCALES.

SPECIFICATION forming part of Letters Patent No. 594,492, dated November 30, 1897.

Application filed October 14, 1896. Serial No. 608,822. (No model.)

*To all whom it may concern:*

Be it known that we, ROBERT M. SKILES, residing at Atlantic, in the county of Cass and State of Iowa, and CHARLES LEDERER, residing at New York, in the county of New York and State of New York, citizens of the United States, have invented certain new and useful Improvements in Ball-Bearings for Scales; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to improvements in scales used in stores as well as those upon farms—in fact, scales of all kinds and for all purposes, from the most delicate scales in use by chemists and druggists to scales used by farmers, stock-raisers, and railroads; and the objects of our invention and improvement are, first, to provide an automatic self-adjusting bearing affording facilities for the proper adjustment of the oscillating platform and lever, and, second, to obviate the objections heretofore made to the knife-edge bearings, which, when blunted by wear and friction thereon, render scales inaccurate for the purposes for which they were intended—namely, accurate weighing. We attain these objects by the construction illustrated in the accompanying drawings, in which—

Figure 1 is a view showing the platform in longitudinal section, the bearing secured thereto, the knife, and the tilting lever. Fig. 2 is a view illustrating the platform in section, with an oblong cup secured thereto, the knife, and the tilting lever. Fig. 3 is a view in cross-section on the line *a a* of Fig. 2; and Fig. 4 is a view showing the platform with our improved bearings, the platform and tilting lever in section, the semispherical or nearly semispherical concave cups, and the sphere or ball located within the cups.

In all scales used for store, farm, and stock purposes the platform rests on knife-edge bearings, as shown in Figs. 1 and 2 of the drawings, and check-rods are used to prevent the bearings from slipping, except in small counter-scales and one single manufacture of scales, where an oblong cup is employed, which fits over the knife, as illustrated in Fig. 2 of the drawings. The knife in all cases is a part of the tilting lever that secures the registration of the weight. After comparatively little use all the knives cut into the bearings secured to the platforms and add to the friction, causing considerable deflection in weighing. These knives are made of very fine steel and are highly tempered and hardened after adjustment to the lever-bearing. Except in some cases the scales are made with adjustable knives.

Check-rods are used in all scales, except in small scales and in scales in which the oblong cup is employed to keep the knife in place. Knives in ordinary use—for example, in four-ton scales—are about three inches long, one inch wide, and three-quarters of an inch thick.

If the upper bearings are not carefully adjusted in the under side thereof, there will be a cut diagonal of the bearing, and so important is this adjustment and so desirable is it that this diagonal cut be not made that some manufacturers send out with their scales illustrations and diagrams showing these diagonal cuts as they appear upon the oblong cup-shaped bearings after the scales have been used for a time.

This invention, our improvement, obviates all these defects and decreases the expense of manufacturing scales and does away with the necessity of experts in farming and rural districts by the use of a ball-bearing such as we have shown in Fig. 4 of the drawings.

The ball-bearing consists of one sphere or ball located between two concave cups semispherical or nearly semispherical on their inner surfaces. These concave cups are attached to the platforms and levers in any ordinary manner, so as to be removable therefrom, as by means of screws, bolts, or they may be made integral with the platforms and levers.

The result of our improvement is that the bearings are self-adjusting, invariably find their center, and there is the least possible friction developed by the oscillation of the platforms and levers.

The ball-bearings are designed to take the place of the knife and its bearing and at the same time obviate the necessity of using the check-rods above described.

The numeral 1 in Fig. 1 of the drawings represents the platform, 2 the bearing secured to the platform on the under side thereof, upon which the knife 3 bears, and 4 refers to the tilting lever, to which the knife is secured in the ordinary manner, as hereinbefore described.

The numeral 5 of the drawings represents the platform, and 6 the oblong concave cup or bearing secured to the platform in which the knife rests and upon the edge of which the inner surface of the cup impinges. This form of scale-bearing is old, and it is objectionable for the reason that the sharp cutting edge of the knife cuts, wears, and indents the inner surface of the cup 6, thereby rendering the scales inaccurate for the purposes of weighing. Furthermore, the edge of the knife 7 becomes blunted by friction upon the inner surface of the oblong concave cup 6 from the constant oscillation of the platform and lever, whereby the scales become inaccurate, the platform and lever ceasing to delicately turn or oscillate upon the knife-edge as once they did when first brought into use. This blunting of the knife-edge causes inaccuracy in weighing and necessitates the removal of the knife from the oblong concave cup, and often its removal from the lever in which the knife is rigidly secured, in order that its edge may again be retempered and rehardened. Moreover, the oblong concave cup 6, too, often requires to be removed and a new cup put in its place because of the cut or indentation made therein by the cutting edge of the knife 7.

Our principal object is to overcome these objections, inconveniences, and annoyances, as well as the expense of using costly steel bearings and parts, and the expense, too, attending the retempering the blunted knife-edge, also the removal of the oblong concave cup and substituting a new one in its place.

We do away entirely with the knife and with the oblong concave cup, and in its place and in lieu of the knife we place the semispherical or nearly semispherical concave cup A upon the under side of the platform B and a similar semispherical or nearly semispherical concave cup C upon the upper side of the tilting lever D, which are screwed, bolted, or otherwise attached thereto in order that they (the said concave cups) may be separable or removable from the said platform and lever, sufficient room or space being left between the cups to permit the platform and lever to oscillate.

The cups A and C may be made integral with the platform B and tilting lever D, respectively. The letter E represents the sphere or ball, of iron or of any suitable metal or material, but preferably it is made of steel, and it is somewhat smaller than the concave cups A and C on their interior surfaces and runs or moves about loosely within the concavity of the two cups and when placed in position in the cups form the self-adjusting automatic bearings upon which the platform and tilting lever always accurately turn or oscillate.

Such a bearing is not open to the objections incident to the cutting of the knife-edge into the inner surface of the oblong concave cup, as shown in Fig. 2 of the drawings. Neither are purchasers of our scales subjected to the expense, annoyances, and inconveniences in having the blunted friction-worn edges of knives such as above described retempered, rehardened, and resharpened.

Having fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In scales or weighing apparatus, a platform, a lever and removable ball-bearing connections between the former and the latter, whereby no knife-edge connections or bearings are required, substantially as herein shown and described.

2. In scales or weighing apparatus, a combination of a principal platform, and a main lever both of which are provided with removable or separable conical cup-bearings, of a spherical body mounted in said bearings and forming connections at point of suspension for said platform and lever, instead of knife-edge connections for said parts, substantially as described.

3. In scales, the combination of the main or principal platforms, and main or principal levers, having the removable semispherical concave cups or bearings, upon the lower and upper surfaces secured to the said platform and lever, respectively, the ball or sphere inclosed within said cups, whereby the use of the knife-edge bearings is unnecessary, substantially as herein shown and described.

4. In scales the combination of the chief or principal platform and chief or principal lever, provided with semispherical concave cups or bearings or nearly semispherical, upon the inner concave surfaces thereof, and secured to the platform and lever, upon the lower and upper surfaces, respectively, and the ball or sphere, smaller than the circle, described by the inner surfaces of the combined concave cups, whereby the knife-edge bearings are rendered unnecessary, substantially as herein shown and described.

In testimony whereof we affix our signatures in presence of two witnesses.

ROBERT M. SKILES.
CHARLES LEDERER.

Witnesses to the signature of Robert M. Skiles:

E. S. HILL,
C. W. SAVERY.

Witnesses to the signature of Charles Lederer:

MICHAEL SCHAAP,
EDWARD A. MCCUE.