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APPARATUS FOR DETERMINING THE TRIM OR INCLINATION OF THE KEEL OF VESSELS.

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1,114,480.

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Fig. 1.

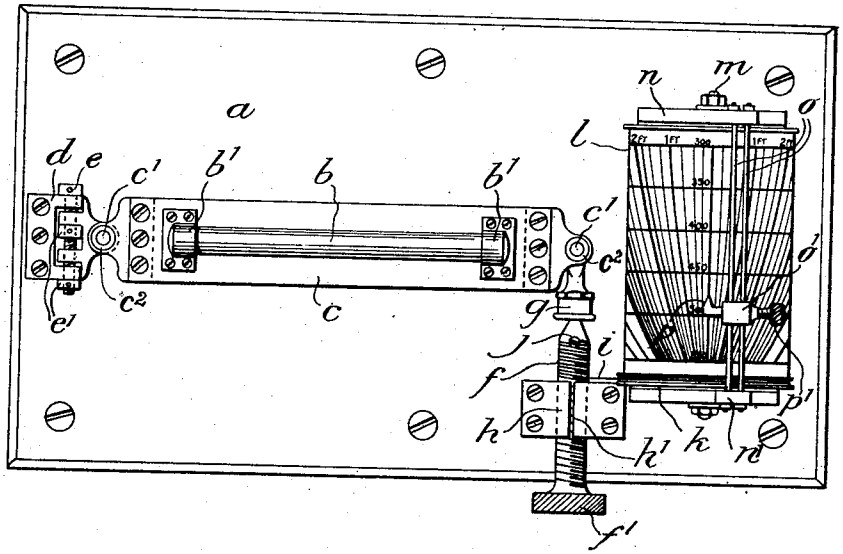


Fig. 2.

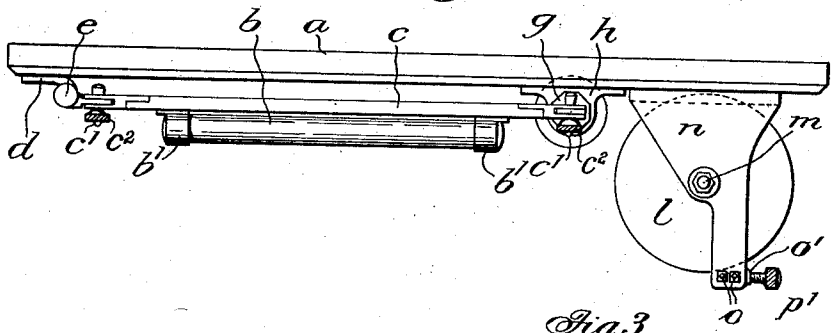


Fig. 3.

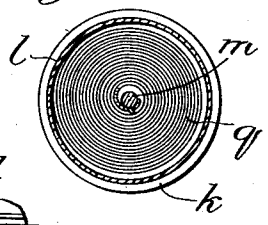
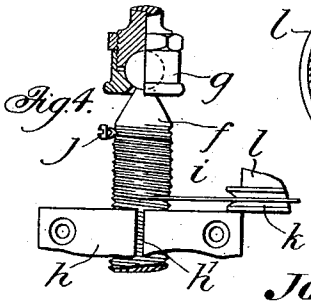


Fig. 4.



Witnesses

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APPARATUS FOR DETERMINING THE TRIM OR INCLINATION OF THE KEEL OF VESSELS.

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To all whom it may concern:

Be it known that I, JOHN JENSEN, of 5 Grosvenor street, Church Hill, Sydney, in the State of New South Wales, Commonwealth of Australia, master mariner, have invented certain new and useful Improvements in Apparatus for Determining the Trim or Inclination of the Keel of Vessels, of which the following is a specification.

It is of the utmost importance that cargo should be loaded into vessels in such a way that the latter may be made to ride on a horizontal keel or with a dip or inclination aft, according to the exigence of existing circumstances. Thus, it is well known that a vessel having an even keel will convey more cargo over a bar or through shallower water than one having an uneven keel and also that a vessel carrying a light load may require to be loaded heavier at the stern to obtain a maximum of efficiency from the propeller. Ordinarily, the cargo is passed into the holds of a vessel and then adjusted or "trimmed" so as to make the latter ride on an even or inclined keel which is ordinarily determined by noting the markings on both ends of the ship. These markings are read at night by lowering a lantern over the bow and stern of a ship, but even under the most favorable conditions an exact determination of the trim is difficult of accomplishment. The trimming of the cargo may be effected more or less rapidly in daylight when the vessel is being loaded in smooth or comparatively smooth water but it is oftentimes an extremely difficult task at night time when the markings on the ends of the vessel are more difficult to read or when the water is very rough.

Now the present invention provides an exceedingly simple and economically constructed apparatus which may be fitted in a convenient part of a ship and be employed to readily determine the "trim" or inclination of the keel of a vessel on all occasions, even on a dark night or in very rough water.

In order that the details of construction and action of my invention may be more clearly understood, reference is made to the accompanying drawings, in which:

Figure 1 is a view in front elevation of an apparatus constructed according to the present invention. Fig. 2 is a view in plan of the apparatus. Figs. 3 and 4 are views of constructional details hereinafter described.

In these drawings similar characters of reference have been employed to indicate like parts in the different views and the letter *a* designates a base of wood or other preferred material which is affixed by means of screws or the like to a wall of a cabin or other convenient part of a ship. Supported horizontally and adjustably on the said base *a* is a spirit level *b* which may be of the type shown or of any other suitable design. In the construction shown in the drawings the spirit level *b* is secured fixedly to a beam *c*, one end of which is pivotally mounted on an adjustable bracket *d* by means of a pin c^1. The said bracket *d* can be made in two interfitting parts held together by a screwed pin *e*, one of said parts being secured fixedly to the base *a* while the other is capable of vertical adjustment by means of said pin. The said pin *e* is provided with a head having means to effect rotation when required and nuts e^1 for locking the movable part of the bracket in a desired position. The spirit level *b* is a plain glass tube having its ends covered by metal caps b^1 or the like. The opposite end of the beam *c* is link-connected to the upper end of a vertically disposed screw *f* of preferred diameter and length. The upper end of the link is connected to the beam *c* by means of a pin c^1 and the lower end of the link forms a ball or swivel joint *g* with the upper end of the screw. Both pins c^1 preferably are tapered and their forward ends screwed to take thumb-screws c^2 which permit of these joints being tightened when they work loose or wear. The ball or swivel joint can also be constructed so that any loose movement or wear may be taken up to permit of the apparatus working with strict accuracy.

A detail view of a preferred form of ball joint is shown on a larger scale in Fig. 4 of the drawings.

The screw *f* is supported in a correspondingly screwed boss *h* or the like fitted to the base *a*. The said boss *h* can be formed with a saw cut or split h^1 to permit of it having a spring grip on the screw. The lower end of the screw *f* is provided with a knurled knob f^1 or any other preferred means to facilitate its operation.

One end of a piece of fine steel wire *i* is

secured to a small screw or pin *j* fitted to the upper end of the screw *f* and the said wire is wound in the thread of the latter and passes down to a point just above the boss *h*. The wire *i* passes from the screw *f* horizontally to a grooved flange *k* or wheel formed on or fitted to the bottom end of a drum or roller *l* or the like. The wire *i* is secured to the said grooved flange in any approved way and is wound thereon or unwound therefrom by rotating the screw *f*. The drum or roller *l* is rotatably mounted on a fixed vertical spindle *m* which is supported at each end in a bracket *n* secured to the base *a* in any approved way. The said bracket *n* is provided with two forwardly projecting extensions n^1 for supporting two parallel vertical rods *o*. These rods form a guide upon which is movably secured a block o^1 having a pointer *p* or the like. The said block o^1 is retained in any desired position on the guide rods *o* by a thumb screw p^1 or other approved contrivance. The drum or roller *l* is fitted internally with a clock spring *q* having its inner end fitted to a stud on the fixed spindle *m* and its outer end secured to the inner periphery of the drum in a preferred way. This said spring keeps a constant pull on the wire *i* and causes the drum or roller *l* to respond instantly to the slightest movement of the screw *f*. The periphery of the drum or roller *l* is fitted with or marked in the form of a scale having horizontal and oblique lines sloping oppositely on each side of a vertical line. The distances between the horizontal lines serve to indicate length and the distances between the oblique lines serve to indicate height, as and for the purpose hereinafter described.

Now in the practical working of my invention the base is secured in any desired position with the spirit level lying parallel with the longitudinal axis of and as nearly as possible parallel with the keel of the vessel. Should the spirit level be thrown out of plumb when the base is being secured in position, it can be set to a desired degree of nicety by adjusting the movable part of the bracket *d* by means of the screwed pin *e* and lock nuts e^1. The drum or roller *l* is then rotated to place a tension on the spring *q* and when the pointer *p* is directly over the vertical line the wire *i* is wound around the thread of the screw *f* and secured to the screw or pin *j*. The horizontal lines indicate various lengths of vessels, as indicated by the numbers placed immediately thereabove, and in Fig. 1 of the drawings the pointer is shown in a position for a vessel approximately 475 feet in length. The distances between the oblique lines represent feet and they may be subdivided into inches by intermediate markings, as indicated by the faint lines drawn in Fig. 1.

To facilitate a clear understanding of the operation it will be assumed that the base *a* is placed with the drum or roller *l* nearest the stern of the vessel. When the apparatus is placed in this position and the vessel is down at the bow, the exact amount of inclination can be determined by turning the screw *f* to bring the spirit level perfectly horizontal. The air bubble in the level will readily indicate when the level is horizontal and the location of the pointer will mark with the aid of the oblique lines on the left hand side of the vertical line the amount of inclination in feet and inches in the total length of the vessel. When the vessel is down at the stern, the rear end of the level will have to be raised by rotating the screw *f* in the opposite direction, which action will simultaneously rotate the drum and cause the pointer *p* to mark the inclination on the oblique lines on the opposite side of the vertical line. Each half of the periphery of the drum can be marked into any desired number of feet by employing a screw *f* and grooved flange or wheel *k* of different relative sizes. When the vessel inclines from the horizontal, the exact amount in feet and inches will be indicated on the scales by adjusting the screw *f* to place the spirit level perfectly horizontal. With this latter form of construction, scales of different sizes can be placed parallel with each other to permit of the apparatus being adapted to the requirements of vessels of different lengths.

While I have described in the foregoing specification the construction of parts and operations preferred, I am aware that numerous changes of construction and operation may be made without departing from the spirit and scope of the invention, and I, therefore, do not wish to be understood as limiting myself by the positive terms employed in connection with the description, excepting such as the state of the art may require.

What I do claim is:—

1. An apparatus of the class described comprising a pivotally supported spirit level, a revoluble indicator marked with scales denoting lengths and depths, and a screw connected to and simultaneously operating said level and indicator.

2. An apparatus of the class described comprising a pivotally supported spirit level, a screw swivelly connected to said spirit level, means for holding the screw with its axis in a fixed line, a revoluble indicator, and a flexible member connecting said screw to said indicator.

3. An apparatus of the class described comprising a pivotally mounted spirit level, a screw connected to said spirit level, means for holding the screw with its axis in a fixed line, a revolubly mounted drum,

a flexible member connecting said screw and drum, a spring arranged in said drum, said drum having oppositely disposed scales, and a pointer for indicating on the scales movement of said drum.

4. In an apparatus of the class described, a screw, a flexible member attached thereto and wound in the thread thereof, and a revolubly mounted indicator, the opposite end of said flexible member being connected to and arranged to impart movement to said indicator upon rotation of said screw.

5. In an apparatus of the class described, a pivotally mounted spirit level, a screw having a swivel connection with said spirit level, means for holding the screw with its axis in a fixed line, a flexible member wound around and having one end affixed to said screw, a drum, a wheel connected thereto, the opposite end of the flexible member being secured to said wheel, and a spring fitting within and connected to said drum for operating the latter in one direction, whereby to maintain a constant pull upon the flexible member.

6. In an apparatus of the class described, a pivotally supported spirit level, a link having pivotal connection with said level, a fixed bearing, and a screw operatively mounted in the bearing and having a swivel connection with said link.

7. In an apparatus of the class described, a spirit level capable of being moved to and from the horizontal, a screw for inducing such operation of the level, a revolubly mounted drum having a grooved flange and provided with oppositely disposed scales, a flexible connection between the screw and flange, a spring within and operatively connected to the drum for actuating the latter in one direction, a guide rod arranged in front of the drum, and a pointer adjustably fitted to the guide rod and coöperating with the scales.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN JENSEN.

Witnesses:
JAMES H. ANDERSON,
G. MCNAMARA.

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