R. CHANDLER,

Roll and Pitch Indicator for Vessels.

No. 204,133. Patented May 28, 1878.

Fig. 2.

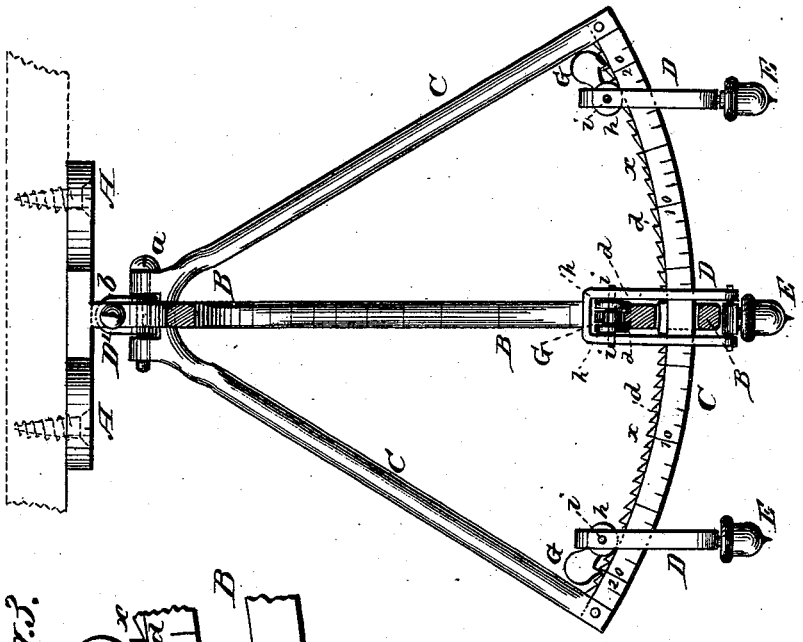


Fig. 3.

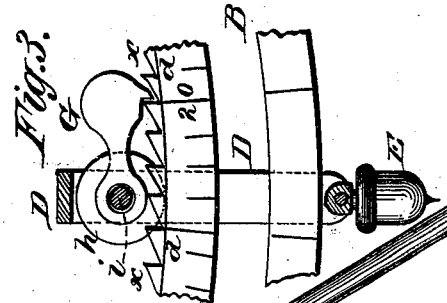
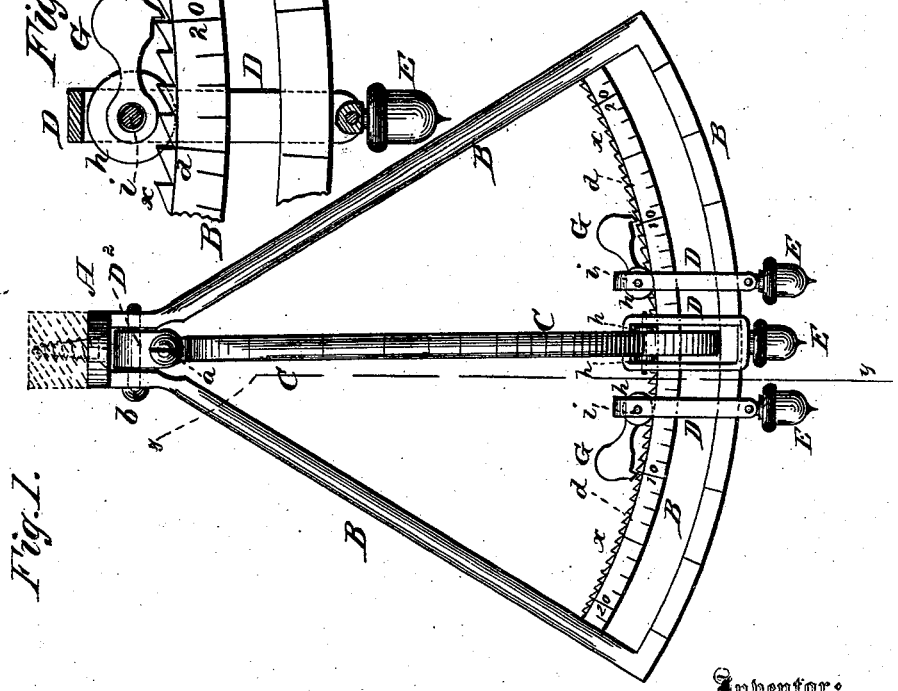


Fig. 1.



Witnesses:

P. C. Dieterich.

F. H. Duffy.

Inventor:

Ralph Chandler

Per: C. H. Watson & Co. Attorneys.

UNITED STATES PATENT OFFICE.

RALPH CHANDLER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO HIMSELF AND WALTON BROTHERS, OF NEW YORK CITY.

IMPROVEMENT IN ROLL AND PITCH INDICATORS FOR VESSELS.

Specification forming part of Letters Patent No. **204,133**, dated May 28, 1878; application filed May 13, 1878.

To all whom it may concern:

Be it known that I, RALPH CHANDLER, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Roll and Pitch Indicators for Vessels; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The nature of my invention consists in the construction and arrangement of a device for indicating the roll and pitch of vessels, as will be hereinafter more fully set forth.

In the annexed drawing, Figure 1 is a side elevation. Fig. 2 is a vertical section on line *y y*, Fig. 1, and Fig. 3 is an enlarged detail view of my invention.

A represents a metal bar, of suitable dimensions, which is to be securely fastened to a beam or the ceiling of the cabin, or the captain's or the navigator's office, or any other desired part of a vessel. From this bar depends a quadrant, B, which is firmly secured to the bar, and stands in its plane at right angles with the plane of said bar. The arc of the quadrant B is slotted, and through the same is passed the arc of another quadrant, C, the arms of which are pivoted to a block, D′, by means of a pin or bolt, *a;* and this block is pivoted by a pin or bolt, *b*, between the arms of the quadrant B, the two pivot-bolts running at right angles with each other, so that the quadrant C can swing in any direction. In other words, the quadrant C is connected to the stationary quadrant B by a universal joint.

The arcs of the two quadrants are graduated from the center toward both ends, and the upper edge or surface of each arc is formed with two series of teeth, *x x*, running on each arc from the center in opposite directions toward both ends. On each side of these rows of teeth is formed a shoulder or way, *d*, as shown.

On each arc are hung two stirrups, D D, one on each side of the center, and in the lower end of each stirrup is pivoted a weight, E. Through the upper end of each stirrup D is passed a pin, *i*, upon which, within the stirrup, is pivoted a hook, G, which projects outward from the center of the arc and over the teeth *x*, so as to catch thereon. On each side of the hook G on the pin *i* is a small wheel or roller, *h*, which runs on the shoulder or way *d* of the arc.

The indicator, thus constructed, being secured in the desired place, the arcs of the two quadrants should cross each other in the center, and the stirrups D are all moved close to the center.

The quadrant B, being stationary, will follow the motions of the vessel, both rolling and pitching, while the quadrant C, being suspended by a universal joint, will hang in a perpendicular position, and hence the stirrups D will be moved outward upon their respective arcs, more or less, according to the amount of the roll and pitch of the vessel. As the stirrups are being thus moved, their hooks engage with the teeth *x*, and hold them so that they will not move back toward the center, but remain at the farthest points on the arcs to which they have been moved. Hence the navigator can at any time see the greatest extent of the roll and pitch of the vessel.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a graduated stationary quadrant, B, a graduated quadrant, C, united thereto by a universal joint, and stirrups D, placed loosely upon the arcs of the quadrants, for the purposes herein set forth.

2. The stirrup D, provided with hinged weight E, pin *i*, rollers *h h*, and hook G, in combination with the arc of a quadrant having teeth *x* and ways *d*, substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

RALPH CHANDLER.

Witnesses:
A. H. VAIL,
EDWD. CRONIN.