No. 699,228. Patented May 6, 1902.

W. R. PARK.

REVOLUTION INDICATOR.

(Application filed Dec. 26, 1901.)

(No Model.) 2 Sheets—Sheet 1.

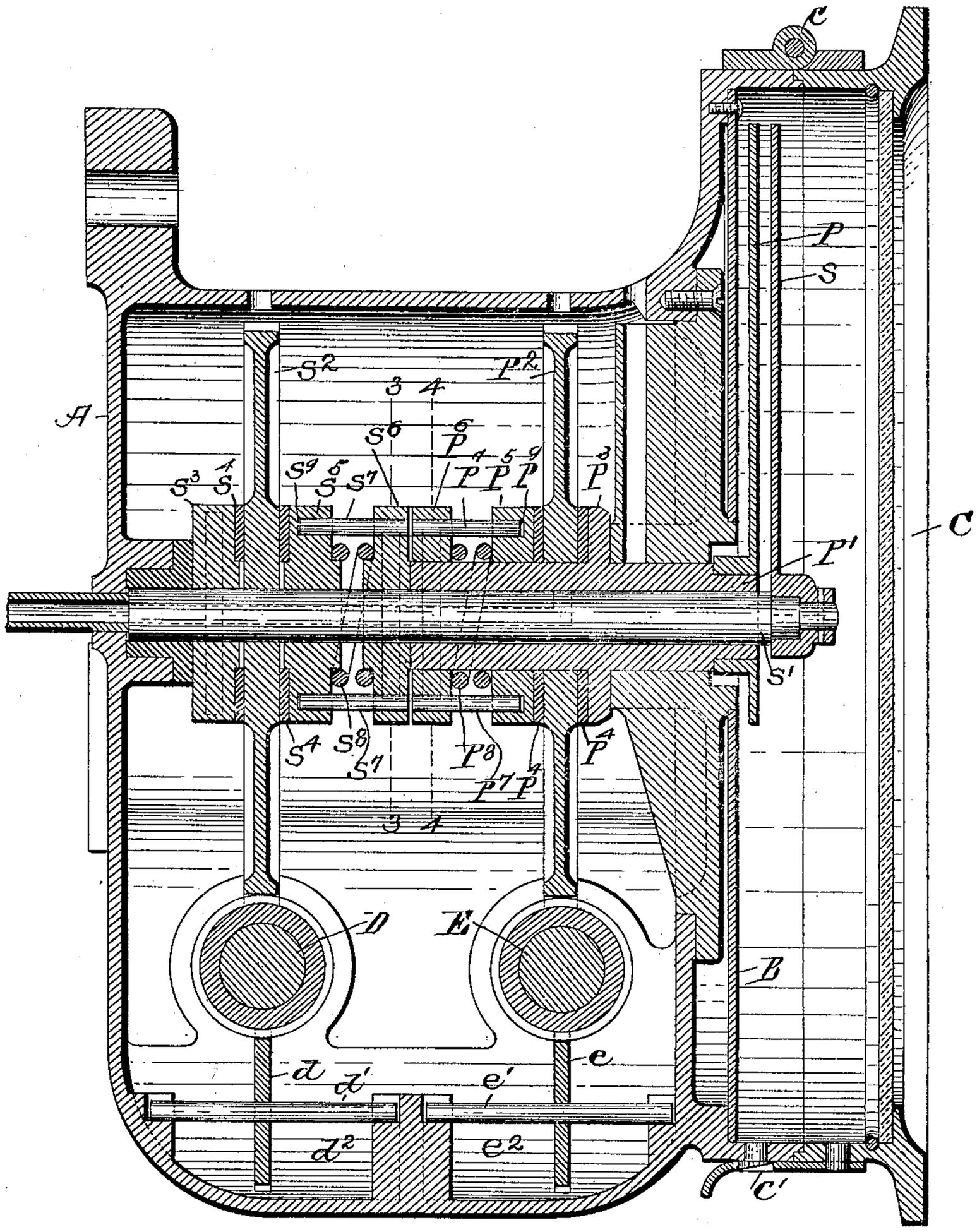

Fig. 1.

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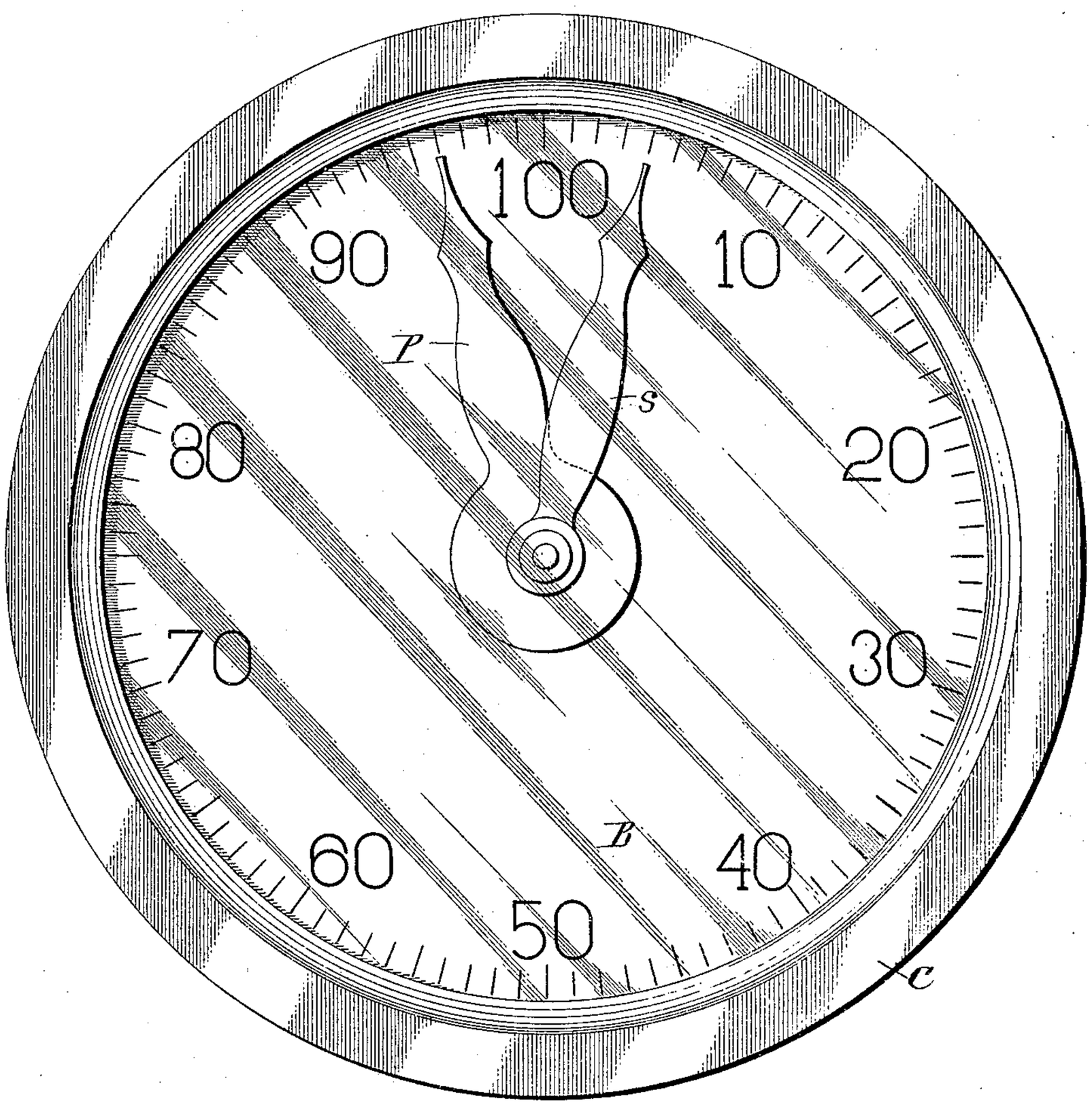

Fig. 2.

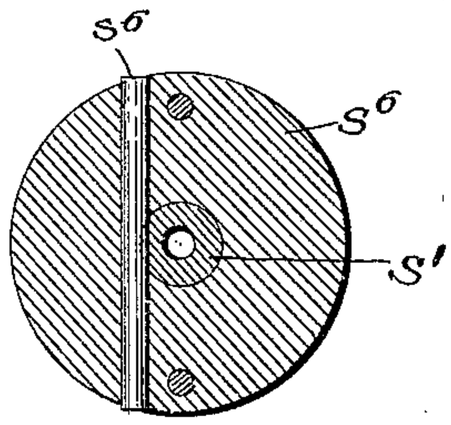

Fig. 3.

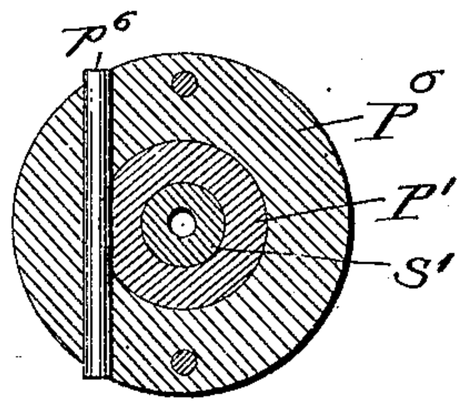

Fig. 4.

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WILLIAM R. PARK, OF TAUNTON, MASSACHUSETTS, ASSIGNOR TO HANCOCK INSPIRATOR COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

REVOLUTION-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 699,228, dated May 6, 1902.

Application filed December 26, 1901. Serial No. 87,214. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. PARK, a citizen of the United States, and a resident of Taunton, in the county of Bristol and State of Massachusetts, have invented new and useful Improvements in Revolution-Indicators, of which the following is a specification.

My invention consists in sundry improvements in the construction of revolution-indicators, such as are used on steam vessels to indicate the speed at which the engines are turning, and is especially adapted to twin or multiple screw vessels.

In the drawings hereto annexed, which illustrate my invention, Figure 1 is a vertical central section of an indicator, taken at right angles to its face. Fig. 2 is an elevation of the dial. Figs. 3 and 4 are detail sections taken at the dotted lines 3 3 and 4 4 in Fig. 1, respectively.

In steam vessels having more than one propeller-shaft it is of importance to maintain equal conditions in the engines of the respective shafts, so that a proper balance may be conserved between the propelling forces on the two sides of the vessel. In steamships of war especially the engineers in charge observe the comparative performance of port and starboard engines with constant scrutiny and require the assistance of speed-indicators in so doing.

Revolution-indicators for single shafts have long been used, and while just comparisons of the speed of two engines may be made with two such indicators separately mounted and driven each from its own engine-shaft such comparison is more or less troublesome according to the distance of one indicator from another or the pressure of duties upon the observers. With two such indicators accurate comparison can be made by no less than two persons, who count the revolutions of each engine separately and compare notes afterward.

With the revolution-indicators herein shown and presently to be described the comparative speed of two engines may be quickly and readily observed at any moment by a single person.

Referring to Fig. 1 of the drawings, A is the indicator-casing, made of cast-brass or other desired metal and provided with properly turned and fitted bearings for the shafting contained in the casing.

B is the face or dial, and C a glass-faced lid hinged at *c* and latched at *c'*.

The indicator-pointers S and P are of the same length, and should be contrasted in appearance—for instance, by coloring the starboard-engine pointer S green and the port-engine pointer P red. The pointer S is mounted on the shaft S', to which it is firmly secured. The pointer P is similarly secured to the tubular shaft P', which surrounds and is concentric with the shaft S'. Worm-wheels S^2 and P^2, of equal size and pitch, are mounted on the shafts S' and P', respectively, in the following manner: A flange or collar P^3 is formed on or secured to the shaft P'. The worm-wheel P^2 and loose collar P^5 are placed on the shaft P', the wheel P^2 being fitted so as to turn easily on the shaft. Friction-washers P^4, of leather-board, hard rubber, or other convenient material, are placed on the shaft, flanking the hub of the wheel P^2 on either side. The collar P^6 is keyed to the shaft P' by the key p^6, Fig. 4, and from this fixed collar P^6 the pins P^7 project and enter the holes P^9 in the loose collar P^5 and confine the latter to a sliding movement on the shaft P'. A spring P^8, coiled around the shaft between the fixed collar P^6 and the loose collar P^5, exerts pressure on the collar P^5 sufficient to bind the wheel P^2 and washers P^4 closely against each other and the flange P^3. The worm-wheel S^2 is similarly mounted on the shaft S' between the fixed collar S^3, the loose collar S^5, and friction-washers S^4. A collar S^6 is keyed to the shaft S' by the key s^6, Fig. 3, and its pins S^7, entering the holes S^9 in the loose collar S^5, permit the latter to slide on the shaft, but prevent it from turning. The spring S^8 crowds the collar S^5, washers S^4, and wheel S^2 closely against each other and the flange S^3. The frictional connections thus made between the shafts S' and P' and the worm-wheels S^2 and P^2, respectively, cause the pointers S and P to be driven positively, except when arrested by hand or otherwise, when the frictional connections permit

the wheels S^2 and P^2 to revolve on the shafts S′ and P′ without straining the arrested mechanism. Worm-shafts D and E mesh with the worm-wheels S^2 and P^2, respectively. The worm-shaft D is driven synchronously with the shaft of the starboard engine, and the worm-shaft E is similarly synchronized with the port engine.

In case more than two engines are to be speed-indicated the independently-driven indicator-pointers and their driving mechanisms may be correspondingly increased in number.

The lubrication of the worm-shafts and worm-wheels is accomplished by providing oil-wells d^2 and e^2 in the lower part of the casing A and mounting oiler-wheels d e on short shafts d' e', so that they will mesh with and be driven by the worm-shafts D and E. The oiler-wheels dipping in the oil-wells carry enough oil into the worms to keep them well lubricated.

The operation of the above-described engine-revolution indicators is as follows: Left to itself the train of gears driven by the inpendent worm-shafts causes the several pointers to travel on the dial at speeds which differ precisely as the engine speeds differ. The friction-washers which confine the worm-wheels cause the pointers to be driven for all practical purposes as positively as if the worm-wheels and their shafts were keyed together; but if it is desired to stop and set one or both pointers the worm-wheels may turn upon the friction-washers while the pointers are held by the person manipulating them. If it is desired, for instance, to see what differential of speed exists between the starboard and port engines, the observer lifts the cover C, grasps both the pointers S and P, brings them immediately over each other—say at the zero-mark—and lets go of both together. The friction-washers take hold instantly and the pointers travel forward. If the vessel is steaming straight ahead and the engines are working together perfectly, the pointers will travel around the dial as one; but if one engine is faster than the other—say by one revolution in a hundred—the differential will show when the pointers have traversed one hundred revolution divisions on the dial. At any time the observer may seize simultaneously both pointers and stop them, so as to read the differential more at leisure, though this will hardly be necessary. Speed differentials during turns of the vessel with helm to starboard or port may be quickly and accurately read from my improved differential-revolution indicator. If the worm-wheels and dial have each one hundred divisions, the differentials are mechanically given to the observer in decimal percentages. I believe it to be preferable to have both the pointers frictionally driven from their respective gears. The observation of differential speeds may, however, be made readily when one only of a pair of pointers is frictionally driven.

What I claim, and desire to secure by Letters Patent, is—

1. In a revolution-counter, the combination of a dial, a plurality of pointers, mounted on independently-driven shafts, the connection between one at least of the said shafts and its driving mechanism comprising a gear-wheel, loose on the shaft, a fixed collar on the shaft, a loose collar on the shaft between the fixed collar and the gear-wheel, a friction-washer between the loose collar and the gear-wheel, a second fixed collar on the other side of the gear-wheel, and a spring coiled around the shaft between the fixed and loose collars whereby the loose collar, friction-washer, and gear-wheel are cramped into close contact.

2. In a revolution-counter, the combination of a dial, a plurality of pointers, mounted on independently-driven shafts, the connection between one at least of the said shafts and its driving mechanism comprising a gear-wheel, loose on the shaft, a fixed collar on the shaft, a loose collar on the shaft between the fixed collar and the gear-wheel, a friction-washer between the loose collar and the gear-wheel, a second fixed collar on the other side of the gear-wheel, means for preventing the loose collar from turning on the shaft, and a spring coiled around the shaft between the fixed and loose collars, whereby the loose collar, friction-washer, and gear-wheel are cramped into close contact.

3. The combination, in a revolution-counter, of a dial, a pair of independent pointers, mounted respectively on concentric independently-rotating shafts, a worm-wheel on each shaft, frictional connection between the worm-wheels and their respective shafts, comprising shaft-collars, leather-board washers, clamping-rings, and clamping-springs; and driving-worms meshed with the worm-wheels, substantially as described.

Signed by me at Boston, Massachusetts, this 21st day of December, 1901.

WILLIAM R. PARK.

Witnesses:
E. T. v. GROLL,
FRANK S. HARTNETT.