Feb. 4, 1930. W. SCHOLZ 1,745,916

BALANCED RUDDER

Filed March 26, 1928

Fig. 1.

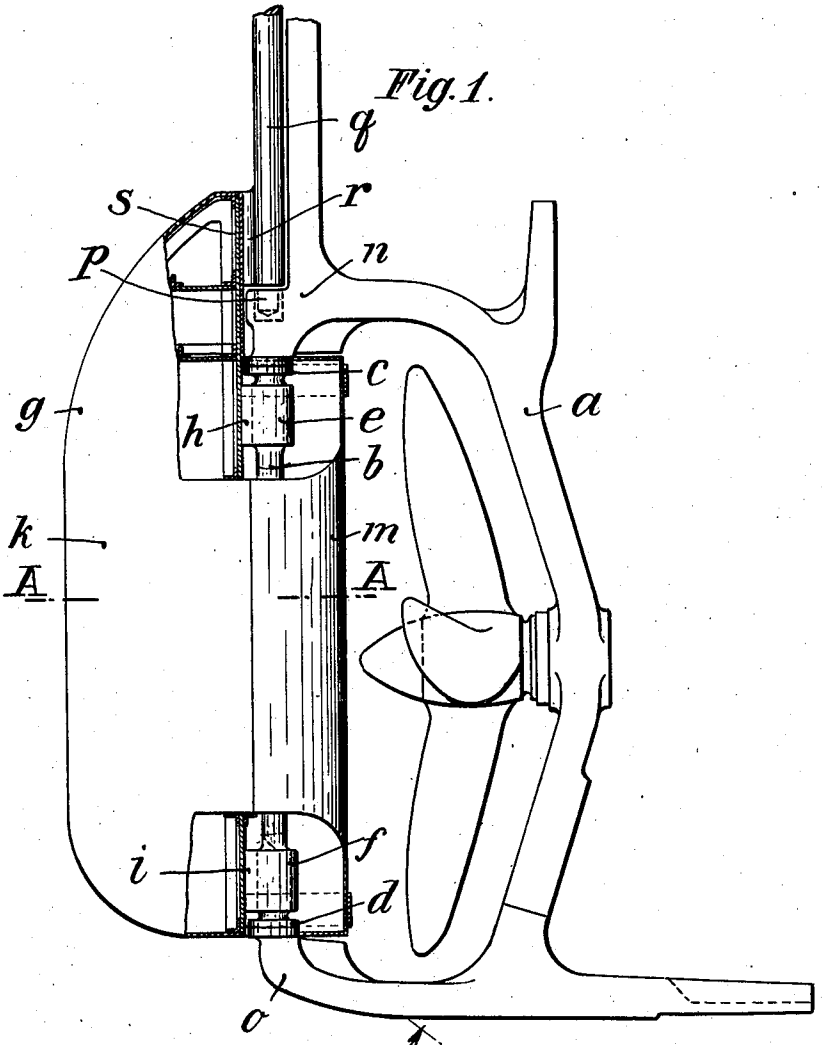
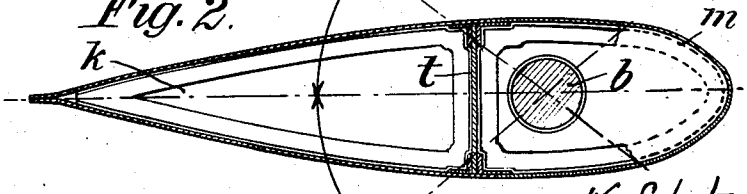



Fig. 2.




W. Scholz INVENTOR

By: Marks & Clark Attys.

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# UNITED STATES PATENT OFFICE

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## BALANCED RUDDER

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Theoretical investigations and practical experiments on actual rudders show that the complete balanced rudder of the known forms exhibits the most advantageous rudder action with the minimum expenditure of power.

The present invention solves the problem of employing a balanced rudder even with a closed rudder frame by constructing the rudder post removably in the region of the screw race. This removable part of the rudder frame receives bearings which serve for guiding the balanced rudder. The divisibility of the rudder frame thus provided enables the rudder, together with the releasable rudder post, to be completely assembled in the workshop, whereby accurate shop work is ensured, which has hitherto not been possible in the case of rudders which have had to be fitted and adjusted on the slipway.

In the case of damage to the rudder or of a balanced rudder requiring to be overhauled, the present invention further permits of rudder and rudder post being dismounted in a minimum time in dock or on the slipway and replaced by a spare rudder and rudder post kept in stock. Since the rear part of the cut-water shaped rudder is constructed as a displacement rudder, only a small residual weight is taken by a footstep bearing arranged on that part of the rudder post rigidly connected with the ship's hull, and this footstep bearing can be arranged above the water line, thereby making it accessible for inspection and overhauling at any time. The bearings provided on the rudder post are purely guide bearings.

The invention extends to the characteristic production of the rudder from rolled material.

The invention is illustrated by way of example in its preferable constructional form in the accompanying drawings wherein,

Figure 1 shows the balanced rudder with the associated rudder post for a single-screw ship, and

Figure 2 shows upon a larger scale a horizontal section through the rudder on the line A—A in Figure 1.

In these drawings *a* denotes the propeller post, *b* the rudder post which is releasably arranged by means of flanges *c* and *d* in the region of the screw race. The flanges *c* and *d* of the rudder post *b* are secured to corresponding flanges provided on the extensions *n* and *o* of the propeller post *a*. Screw bolts preferably serve as securing means. The releasable rudder post *b* is provided with bearings *e* and *f*, to which the balanced rudder *g* is pivoted. Bearing bodies *h* and *i* are fixedly connected with the displacing part *k* of the balanced rudder. Their releasable covers enable the bearings to be adjusted.

The part *m* of the balanced rudder surrounding the front part of the rudder post forms, with the displacing part *k* located behind the rudder axis, a cut-water shaped body, and is releasably connected with the latter preferably by welding.

The propeller post head *n* and the propeller post shoe *o* are extended by cut-water shaped projections as far as the front edge of the balanced rudder, for the purpose of obviating eddies by the interstices between the screw frame and the balanced rudder and in order to diminish the form resistance of the propeller frame to a minimum.

A footstep bearing *p* for the rudder spindle *q* is provided in the propeller post head *n*. The axis of the rudder spindle *q* coincides with the axis of the rudder post *b*. The lower end of the rudder spindle *q* is in the form of a perpendicular flange *r*, opposite which is a corresponding flange *s* of the rudder body. The flanges *r* and *s* are preferably united by screw bolts. The footstep bearing *p* supports the weight of the rudder spindle *q* and the rudder body in so far as it is not counter-balanced by the displacing action of the rudder. If the screw connections on the flanges *c*, *d* and *s* are released it is possible to remove, without lifting, the rudder body together with the rudder post *b*.

Now the invention presents a rudder construction which in comparison with known plate rudders, attains smaller weight for the same strength, an almost completely smooth surface and a very simple construction. The smallness of the weight simplifies operating and the smooth surface, together with the cut water shape formation ensures satisfactory

stream-line flow along the rudder, thereby diminishing resistance.

These results are obtained by constructing the rudder merely as rolled material and avoiding castings and forgings, the connecting of the individual structural members being effected by butt welding or lap welding. The method of construction renders it possible, with minimum constructional weight, for the rudder body to consist of a completely shaped shell of welded iron plates. The top and bottom are also covered by welded iron plates, so that the rudder has, to a considerable extent, a water-displacing action.

The requisite strength of the rudder to resist torsion and the impact of the waves is obtained by means of a supporting structure welded into the hollow interior of the rudder. In the constructional form shown by way of example, the said supporting structure is a double T-girder *t*. It may however also consist of a tube, one or two U-irons or the like.

The invention is primarily adapted to large sea-going ships in which it is important to take up considerable rudder stresses and rudder weights by means of a light and yet reliable construction.

What I claim is:

1. A balanced rudder for ships, adapted to exert a displacing action and comprising a rudder spindle, a rudder post coinciding with said rudder spindle, means for releasably mounting said rudder post in the region of the propeller post of the ship, so that it may be removed horizontally therefrom and bearings on said rudder post, the rudder being pivoted to said bearings.

2. A balanced rudder for ships, adapted to exert a displacing action and comprising a rudder spindle, a rudder post coinciding with said rudder spindle, means for releasably mounting said rudder post in the region of the propeller post of the ship, (so that it may be removed horizontally therefrom) bearings on said rudder post, the rudder being pivoted to said bearings, a non-releasable rudder carrier, and a footstep bearing on said non-releasable rudder carrier, the weight of the rudder, in so far as it is not counterbalanced by the displacing of said rudder, being supported by said footstep bearing.

3. A balanced rudder for ships, adapted to exert a displacing action, and consisting entirely of rolled material such as plates, section iron and tubes, welded together, to the exclusion of castings and forgings.

4. A hollow balanced rudder for ships, adapted to exert a displacing action, and consisting entirely of rolled material welded together, to the exclusion of castings and forgings, and comprising a welded reinforcing structure, such as a tube, in the interior of the rudder, said structure being adapted to increase the torsional strength of the rudder and its ability to resist the impact of the waves.

In testimony whereof I have signed my name to this specification.

DR. WILLIAM SCHOLZ.