M. Wappich,

Steering.

No. 59,296. Patened Oct. 30, 1866.

Fig. 1.

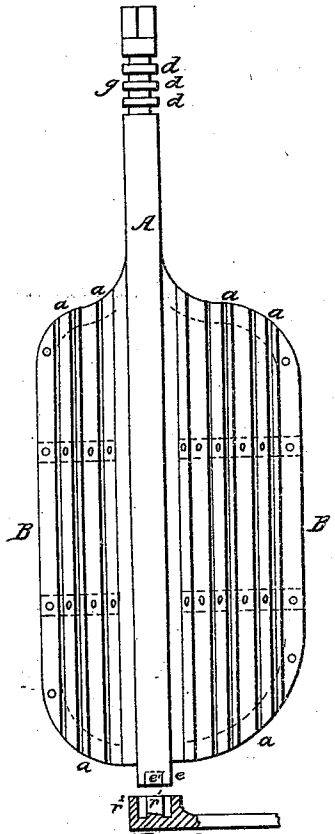


Fig. 2.

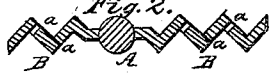


Fig. 3.

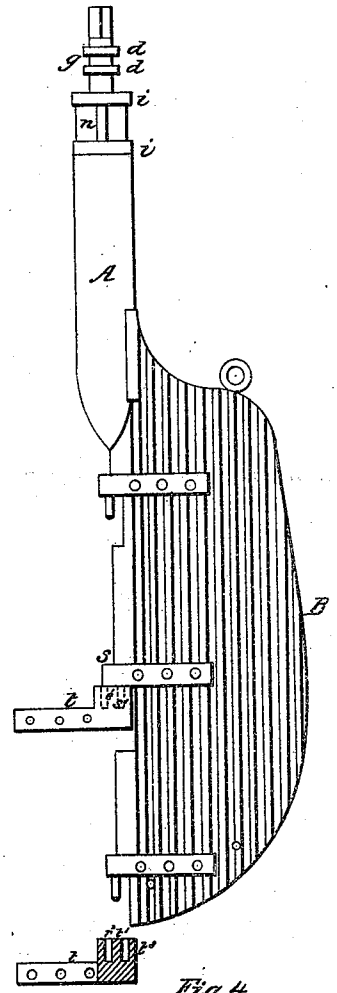


Fig. 4.

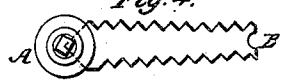


Fig. 5.

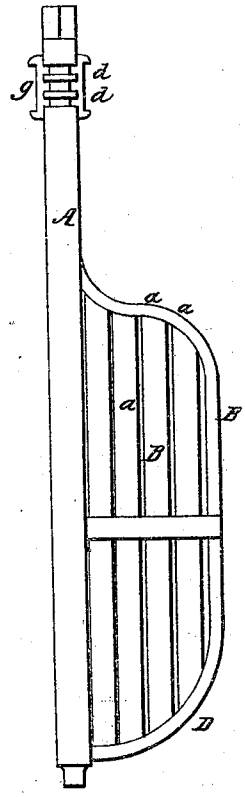


Fig. 6.



Fig. 7.



Fig. 8.

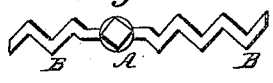


Fig. 9.



Fig. 10.

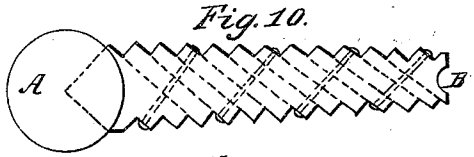


Fig. 11.

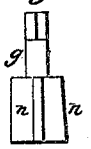
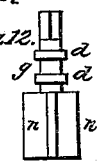


Fig. 12.



Witnesses.

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UNITED STATES PATENT OFFICE.

MAXIMILIAN WAPPICH, OF SACRAMENTO, CALIFORNIA.

IMPROVED RUDDER.

Specification forming part of Letters Patent No. **59,296**, dated October 30, 1866.

To all whom it may concern:

Be it known that I, MAXIMILIAN WAPPICH, of Sacramento city, in the county of Sacramento and State of California, have invented certain new and useful Improvements in Rudders for Steering Ships and other Vessels; and I do hereby declare the following to be a clear, full, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, and in which—

Figure 1 represents a side elevation of a balance-rudder constructed on my improved plan; Fig. 2, a horizontal section of the same; Fig. 3, a side elevation of a modified rudder embracing my invention; Fig. 4, a top view of the same; Fig. 5, a side elevation of a rudder made of round bars or tubes; Fig. 6, a section of the same; Fig. 7, a section of a rudder made of straight-sided beams or bars on my improved plan.

My invention consists in providing the body of the rudder-blade with lateral slits or openings to allow a partial efflux of the water through these openings, so as to prevent too much backing of the water, and to cause the comparative vacuum on the aft side of the rudder to fill with increased rapidity, whereby the pressure of the water on the forward and aft sides of the rudder-blade becomes more evenly balanced, so that the strain on the pintles is lessened, and the turning and handling of the rudder in steering a vessel greatly facilitated.

My invention further consists in forming a rudder of tubes or rounded bars, framed and braced together by top and bottom braces. Thus I obtain a most efficient rudder of a compact, strong, and durable construction, and which presents an effective resisting-surface to the course of the vessel, equal to that of common rudders of a much larger size and weight; and, lastly, my invention consists in providing the step and shoe and the pintles and braces of a rudder with concentric grooves and rings to obtain an increased lateral bearing-surface, in order to diminish in a measure the abrading of the bearing-surface of the step and pintles.

To enable others skilled in the art to make, construct, and use my invention, I will now proceed to describe it in detail.

In the accompanying drawings, Fig. 1 represents a metallic balance-rudder. A is the rudder-stem, and B the rudder-blade. *a* are slots through the rudder-blade; *g d* is the rudder-head journal, and *e* the improved step of the rudder.

In Figs. 5 and 6 the rudder is constructed of tubes *x*, or rounded bars *y*, which may be arranged either close together or a small space left open between them, as shown at *a*, to allow a partial efflux of the water therethrough. The tubes or rounded bars are to be properly braced and secured in a frame, D.

A rudder constructed on this plan combines the advantages of lightness, strength, and durability, while at the same time its steering efficiency is much superior not only over smooth-surface rudders, but also over corrugated rudders, as the tubes or round bars present much more efficient angles to the course of the vessel, and the curved surfaces insure also a more smooth and even action on the rudder being sharply and briskly turned in steering.

The tubes *x* and rounded bars *y*, when so arranged as to leave narrow openings between them, are not exposed to the backing of the water, as a partial efflux is allowed through such openings. Aside of this, the arrangement of the slits or openings *a* presents the further advantage, that the comparative vacuum on the aft side of the rudder-blade in steering is filled up with increased rapidity; and as thereby the pressure of the water on the forward and aft sides of the rudder-blade is more equally balanced, the step and pintles are considerably relieved of straining, and the turning and handling of the rudder are greatly facilitated. These slits or openings *a* may be made of any suitable shape, their number and arrangement depending of the size, form, and construction of the blade of the rudder. Figs. 1, 2, 5, 6, and 7 illustrate how this improvement of providing the rudder-blade with slots or openings may be successfully applied to various kinds of rudders.

In Fig. 1 the head of the rudder is provided with a series of grooves, *g*, and a series of rings, *d*, one above the other, by means of which the rudder is securely mounted in a journal-box having a series of corresponding rings and grooves, and which journal-box is to be secured to the deck of the vessel in any suitable manner. Thus a very simple and strong mounting of the rudder-head is obtained, which pivots

the rudder truly and steadily supports its weight.

In practice it has been found a very objectionable feature of all rudders having their main support in the step, the rapid abrading of the step and shoe. This might be obviated by increasing the bearing-surface of the stem; but such an increase of surface would render the turning of the rudder very unwieldy. In order that the rudder should turn readily, its stem, which rests on the shoe, ought not to present a too large bearing-surface. In my rudder the step is provided with a circular groove, *e*, on its bottom surface, for the reception of a pin-like projection, r^1, formed for this purpose in the center of the box r^2 of the shoe *r*. Instead of having but one concentric groove in the bottom of the step, a series of circular grooves may be formed, which are made to fit in corresponding projections in the box of the shoe. I also apply this improvement to the pintles, as shown in Fig. 3. The pintle *s* has a circular groove, s^1, turned out at its lower end, which is made to fit in a corresponding pin, t^1, formed for its reception in the box of the brace *t*. The ring s^2 of the pintle fits into the groove t^2 of the brace; and t^3 represents the outer ring, which surrounds the groove t^2.

In order to be fully and clearly understood, I would state that the gist of the last-described improvement consists in providing the step and shoe and the pintles and braces with corresponding circular grooves and rings to increase the lateral bearing-surface.

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

1. Providing the rudder-blade with slots forming openings through the entire body of the rudder, in such a manner as to allow a partial efflux through said openings, and thereby prevent the backing of the water, at the same time that the comparative vacuum on the aft side of the rudder-blade in steering is being filled with increased rapidity, for the purpose of more evenly balancing the pressure of the water on the forward and aft sides of the rudder, so as to reduce the strain on the pintles and facilitate the turning and handling of the rudder in steering a vessel.

2. Constructing a rudder of tubes or rounded bars, firmly braced and framed, substantially as specified, for the purpose of obtaining with a small rudder-blade a great effective steering action, and with a reduction of weight of material an increased strength of rudder.

3. Providing the rudder-step and shoe and the pintles and braces, or their equivalents, with concentric grooves and rings, substantially as and for the purpose set forth.

MAXIMILIAN WAPPICH.

Witnesses:

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A. POHLERS.