J. H. CUNNINGHAM.

OARSMEN'S APPARATUS.

APPLICATION FILED MAR. 31, 1909.

927,833.

Patented July 13, 1909.

2 SHEETS—SHEET 1.

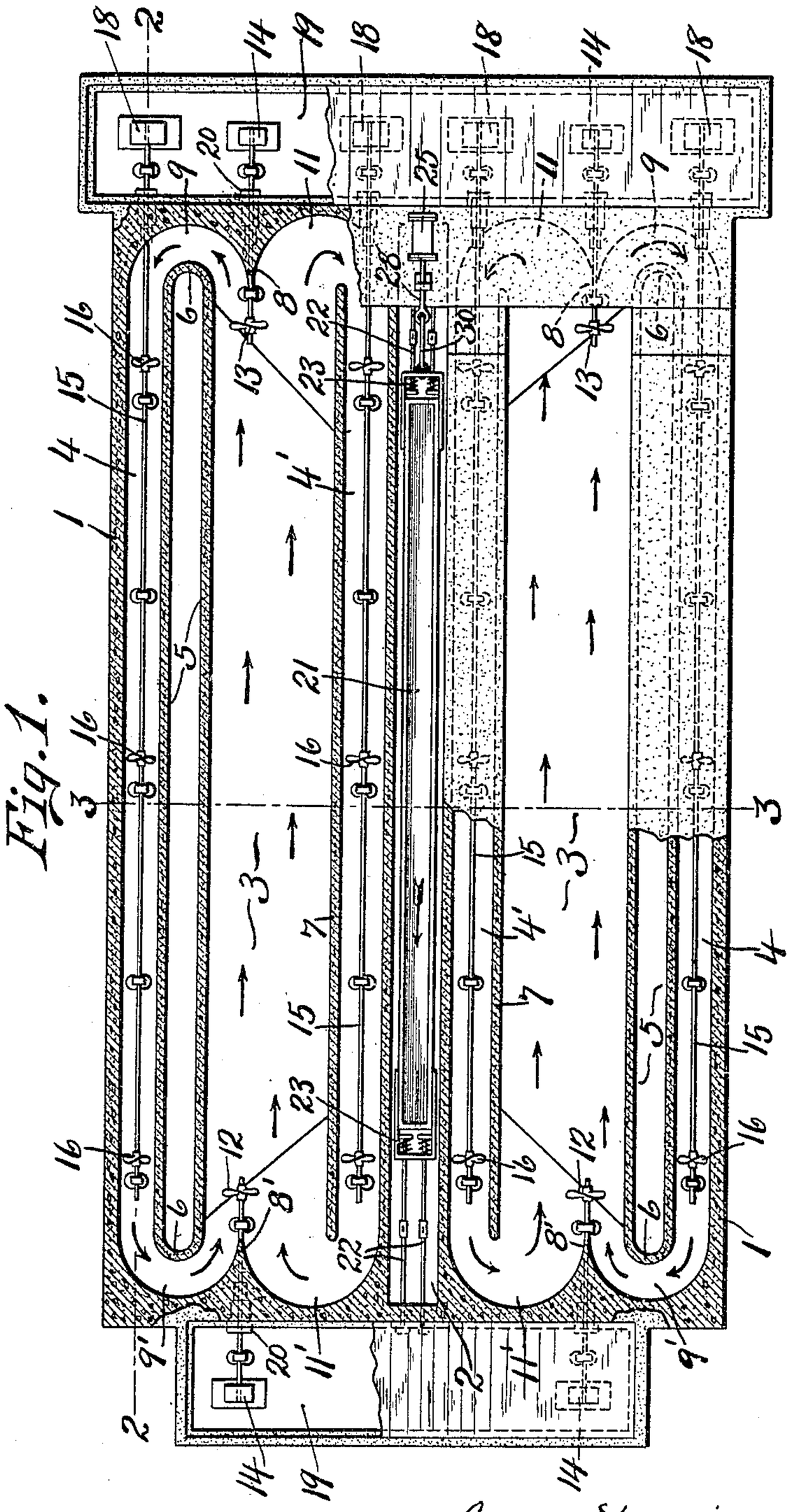

Fig. 1.

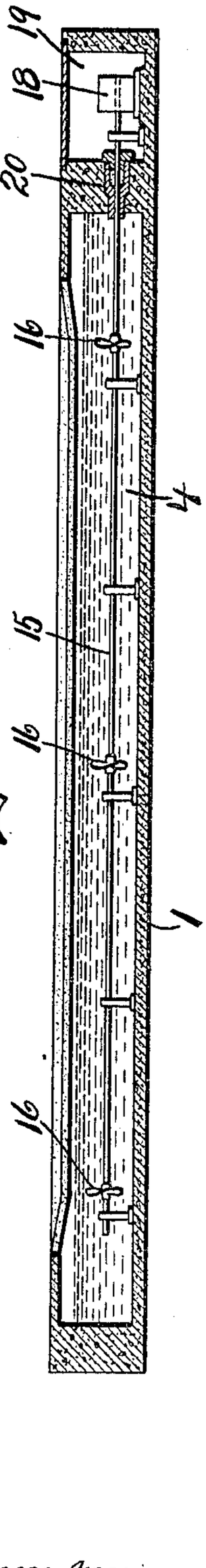

Fig. 2.

Witnesses.

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2 SHEETS—SHEET 2.

Fig. 3.

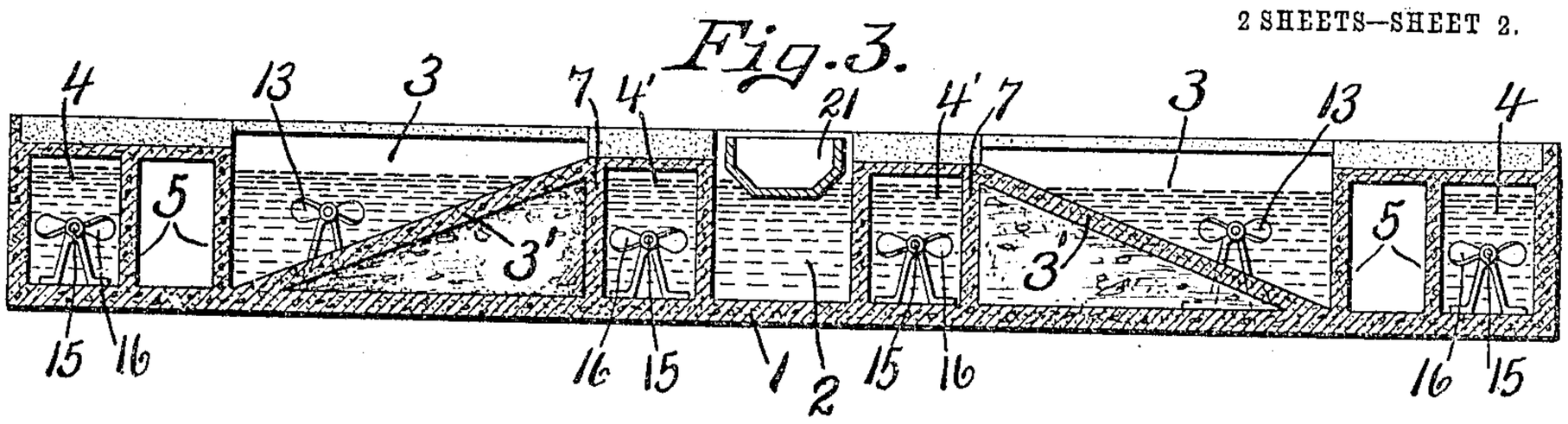


Fig. 4.

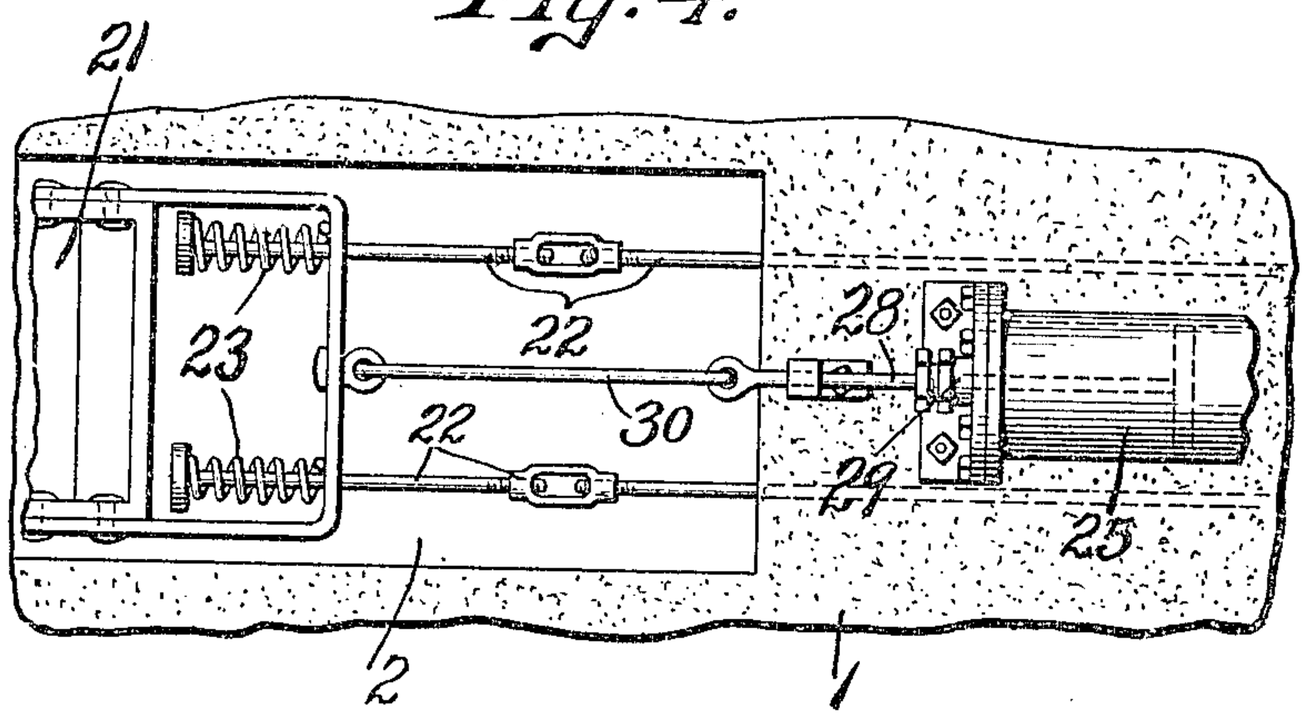
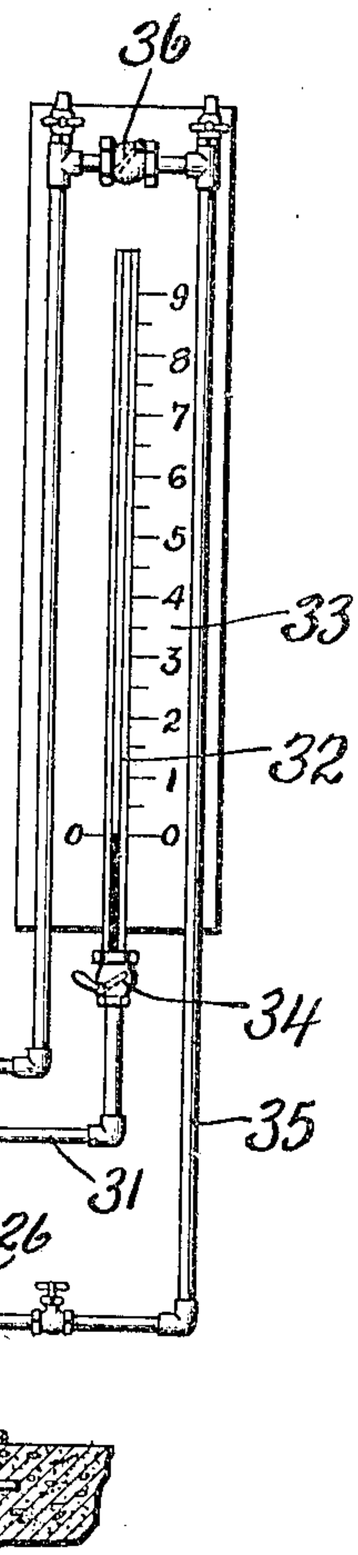


Fig. 5.



Witnesses.

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UNITED STATES PATENT OFFICE.

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OARSMEN'S APPARATUS.

No. 927,833. Specification of Letters Patent. Patented July 13, 1909.

Application filed March 31, 1909. Serial No. 487,071.

To all whom it may concern:

Be it known that I, JOHN HARTE CUNNINGHAM, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Oarsmen's Apparatus, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in oarsmen's apparatus of the water-tank type, adapted to be installed as part of the physical training equipment of colleges, athletic clubs and allied associations for the more convenient and perfect development and training of individuals and crews in the science of rowing.

My main object is to render the effect of rowing in the training tank substantially the same as that in the open water by providing such tank with central lengthwise water compartments in which the boat or shell is actually floated, and with opposite lengthwise sweep-ways or oar compartments through which water is circulated or impelled in one direction from end to end, thereby giving the same effect as if the boat was actually moving in open water.

Another object is to provide means at the end of each sweep-way toward which the body of water is moving for diverting and returning substantially equal quantities of such water to the opposite end of said sweep-way so as to avoid eddying and counter-currents such as would occur if the entire body of water passing through the sweep-way were returned through a single flume.

A further object is to provide means for registering the stroke or propelling power of the oarsmen, whereby comparative and competitive tests may be made by the seam or different oarsmen or crews.

Other objects and uses relating to specific parts of the apparatus will be brought out in the following description:

In the drawings—Figure 1 is a top plan partly in section of my improved rowing tank showing the shell or boat in operative position. Figs. 2 and 3 are longitudinal and transverse sectional views taken respectively on lines 2—2 and 3—3, Fig. 1, Fig. 3 being somewhat enlarged. Fig. 4 is an enlarged top plan of the stern of the boat showing the anchorages and the cylinder of the registering device. Fig. 5 is a side elevation partly in section of the registering device shown as operatively connected to the stern of the boat.

In carrying out the objects stated I provide a tank —1— of concrete or other suitable material, having a central lengthwise boat compartment —2— and opposite parallel oar or sweep compartments —3—, each sweep compartment —3— communicating at its ends with opposite return flumes —4— and —4′—, the outer channels or flumes —4— being separated from the sweep-way —3— throughout the greater portion of its length by a hollow partition —5— having rounding ends —6—, while the inner channels —4′— are similarly separated throughout the greater portion of their lengths from the corresponding sweep ways —3— by partitions —7—.

The opposite extremities of each sweep-way —3— are divided by apexes —8— and —8′— preferably forming a part of the concrete structure, the portions of the sweep-ways —3— at the outer ends of the apexes communicating with the outer channels —4— through outwardly arched or curved passage-ways —9— and —9′—, which in this instance are concentric with the rounded ends) —6— of the hollow partitions —5—.

The opposite ends of the sweep-ways —3— at the inner sides of the apexes —8— and —8′— communicate through outwardly curved or arched passages —11— and —11′— with the corresponding ends of the inner channels —4′—, the cross-sectional areas of the ends of the sweep-ways at opposite sides of the apexes being substantially equal to each other and to the combined cross-sectional areas of the return channels —4— and —4′—, so that practically the same quantity of water passes through each of the return channels from one end of the sweep-way to the other.

As best seen in Fig. 3, the bottoms, as —3′— of the sweep-ways are inclined downwardly and outwardly from the upper edges of the partitions —7— to the lower edges of the corresponding hollow partitions —5—, thereby forming water-ways which are substantially triangular in cross-section with

their greatest depth at their extreme outer sides where the dip of the oars is necessarily greatest.

By inclining the bottoms of the sweep-ways —3— in the manner described, I am enabled to obtain a maximum effective dip for the oars with a minimum quantity of water, and by the use of this small quantity of water, I am also enabled to circulate it through the sweep-ways and return flumes under the desired uniform speed with a comparatively small power, thereby producing an effective circulation which may be economically maintained for long periods of time.

In view of the triangular cross-sectional form of each sweep-way, the water-dividing apexes —8— and —8′— are necessarily located nearer to the partitions —5— than to the partitions —7— so as to divide the cross-sectional area of each end of the sweep-way equally, the return passages —9— and —9′— and lengthwise channels —4— and —4′— being of substantially the same cross-sectional area as that of either side of the dividing apexes —8— and —8′— of the sweep-way. The apexes —8— at the end of the sweep-ways toward which the water is moving, therefore, serve to divide the volume of water passing through such sweep-ways equally, one half of the water returning through the channel —4— and the other half through the channel —4′—, the return curved ends of the water channels —4— and —4′— serving to bring the water from both race-ways or channels together again into the main sweep-way without producing excessive agitation, eddying or countercurrents. In like manner the equal speed or division of the water by the apexes —8— at the ends of the sweep toward which the water is flowing, serves to prevent excessive friction or agitation of the water, thereby avoiding eddying or countercurrents which would result from attempting to return the entire body of water from each sweep-way through a single flume or return passage.

The dividing partitions or apexes —8— taken in connection with the duplicate return passages or flumes —4— and —4′— of each sweep-way, constitute one of the main features of my invention owing to the fact that by the use of these elements I am enabled to obtain a direct-flowing straight-away water course for the oars substantially the same in effect as in open water.

The means for circulating the water through the sweep-ways and return channels preferably comprises rotary propellers —12— and —13—, which, in this instance, are located at the ends of the sweep-ways —3— and preferably at the apexes —8— and —8′— with their axes substantially parallel with their respective sweep-ways, said propellers being preferably operated by separate electric motors —14— indicated diagrammatically in Figs. 1 and 2, the propeller shafts being, in this instance, direct-connected to their respective motors.

When two propellers —12— and —13—, one at each end of the sweep-way, are employed, the one at the return end of the sweep-way propels the water forwardly toward the opposite end, while the propeller —13— at the end toward which the water is flowing, operates to draw the water in the same direction, although in some instances a single propeller at the return end of the sweep-way is sufficient. It is preferable, however, to provide some means for propelling the water through the return channels —4— and —4′—, and for this purpose each channel —4— and —4′— is equipped with a lengthwise shaft —15— having thereon a series of, in this instance, three propellers —16—, each shaft extending practically the whole length of the channel and is driven by a separate electric motor —18— direct-connected thereto in order to transmit a maximum power to the propellers.

The ends of the inner high sides of the sweep-ways —3— are preferably inclined downwardly to the plane of the bottom of the channels —4′— which are at the same level as the channels —4—, such incline being comparatively short but of a gentle grade to permit the easy passage of the water to and from the ends of the sweep-way.

The motors for operating the propeller shafts are inclosed in suitable housings or pits —19— at one or both ends and separate from the main water tank, where they are kept dry or free from moisture from the tanks, the propeller shafts extending through suitable glands or stuffing boxes —20— in the ends of the tank or in the partition walls between the tank and housings —19— so as to prevent any back-flow of water into the motor pits.

The boatway or channel —2— is entirely separate from the other waterways of the tank, but is filled with water to the same level as that in the sweep-ways and return channels for receiving and floating a boat or shell —21—, the float channel being of sufficient dimensions, as compared with those of the boat or shell, to permit the latter to float freely without friction with the sides or ends of the waterways, and at the same time is sufficiently long to allow a limited lengthwise movement of the boat. It is now apparent that while the water in the float chamber or channel —2— is still, as compared with the moving water in the sweep-ways and return channels, the boat is nevertheless susceptible to practically all the movements to which it may be subjected in the open water, and, therefore, the oarsman in training practice

experiences the same sensations and must exert the same caution as he would in any natural water-course, thereby obtaining an indoor training which is fully as effective as any that might be obtained in natural streams or larger water-courses.

The means for limiting the endwise movement of the boat or shell —21— consists, in this instance, of one or more rods —22— located at each end of the boat and having their outer ends suitably anchored to the end walls of the chamber —2— and their inner ends yieldingly connected to the boat by springs —23— which normally hold the boat in one position when at rest but allow such boat or shell to move a sufficient distance endwise to operate the indicating or registering device presently described. This registering device is preferably of the hydraulic type consisting of a cylinder —25— containing a piston body —26— of oil or colored fluid and a piston —27—, said piston having a piston rod —28— extending through a suitable gland —29— in one end of the cylinder and connected by a link —30— to the stern of the boat, as best seen in Figs. 4 and 5. The cylinder —25— is preferably mounted upon the rear end of the tank at the rear or stern and lengthwise of the boat or shell —21—, the front end of the cylinder —25— being connected by a pipe —31— to an upright transparent tube —32— which is mounted upon an indicator plate —33— having vertical graduations printed thereon along the tube —32—, said pipe —31— being provided with a check valve —34— to prevent back-flow of the fluid from the upright indicator tube —32— into the cylinder, although such check valve is provided with a hand piece by which it may be opened to allow such back-flow when desired.

An external fluid circulating pipe —35— is connected to both ends of the cylinder, the intermediate portion of said pipe —35— being extended upwardly along the graduated plate —33— at opposite sides of the indicator tube —32— for the purpose of allowing the fluid at both ends of the piston to follow the movements of such piston, the upper portion of the pipe —35— being provided with a check valve —36— to prevent back-flow of the liquid from the rear end of the cylinder, although this check valve may also be opened by hand when necessary to permit such back-flow.

The entire indicating apparatus, as previously stated, is located at the end of the tank facing the oarsmen, the graduations and other parts of the indicator being of large size so that the stroke may readily ascertain from a glance at the indicator the pulling strength of the oarsmen or speed of the boat, the check valve —34— serving to retain the indicating fluid at the level in the indicator tube —32— to which it has been elevated by the action of the piston —27— during the forward movement of the boat connected thereto. By this arrangement of indicator I am enabled to readily indicate the results of comparative or competitive tests of the same or different crews, which enables the coach to readily select and train the crew showing the greatest degree of efficiency.

What I claim is:—

1. In an oarsmen's training apparatus, a water tank having parallel but separate sweep-ways for the oars and water and provided with separate pairs of return water channels, those of each pair being located at opposite sides of its corresponding sweep-way and communicating at their ends with the ends of the sweep-way, and means for propelling the water from one end of the sweep-way toward the opposite end and through the return channels.

2. In an oarsmen's training apparatus, a water tank having parallel but separate sweep-ways for the oars and water and provided with separate pairs of return water channels, those of each pair being located at opposite sides of its corresponding sweep-way and communicating at their ends with the ends of the sweep-way, and means for propelling the water from one end of the sweep-way toward the opposite end and through the return channels, the end of each sweep-way toward which the water is propelled being provided with partitions having diverging sides for dividing the water and diverting substantially equal portions thereof through the return channels.

3. In an oarsmen's training apparatus, a water tank having opposite parallel sweep-ways for the oars and at least two return channels for each sweep-way located at opposite sides thereof, said tank being also provided with a water channel between but separate from the sweep-ways, and a floating row boat in said channel.

4. In an oarsmen's training apparatus, a water containing tank having a central lengthwise boat compartment, and separate sweep-ways for the oars at opposite sides of the boat compartment, each sweep-way having return channels at opposite sides thereof and parallel therewith.

5. An oarsmen's training apparatus comprising a water containing tank having a central lengthwise waterway for the boat and sweep-ways for the oars located at opposite sides of the boatway, said tank being also provided with separate return channels for each sweep-way located at opposite sides thereof and communicating therewith at the ends, means for moving the water through the sweep-ways and return channels, and means at the end of each sweep-way toward

which the water is moving for dividing such water and diverting portions thereof through the return channels.

6. An oarsmen's training apparatus comprising a water containing tank having a central boat chamber and opposite sweepways for the oars, a boat in said chamber, and an indicating device connected to and actuated by the boat for indicating the power or speed with which the boat is propelled.

In witness whereof I hereunto set my hand this 22nd day of March 1909.

JOHN HARTE CUNNINGHAM.

Witnesses:

H. E. CHASE,

J. M. HOES.