(No Model.) 2 Sheets—Sheet 1.

T. J. BIGGER.

ROWING MACHINE.

No. 413,015. Patented Oct. 15, 1889.

FIG. 1.

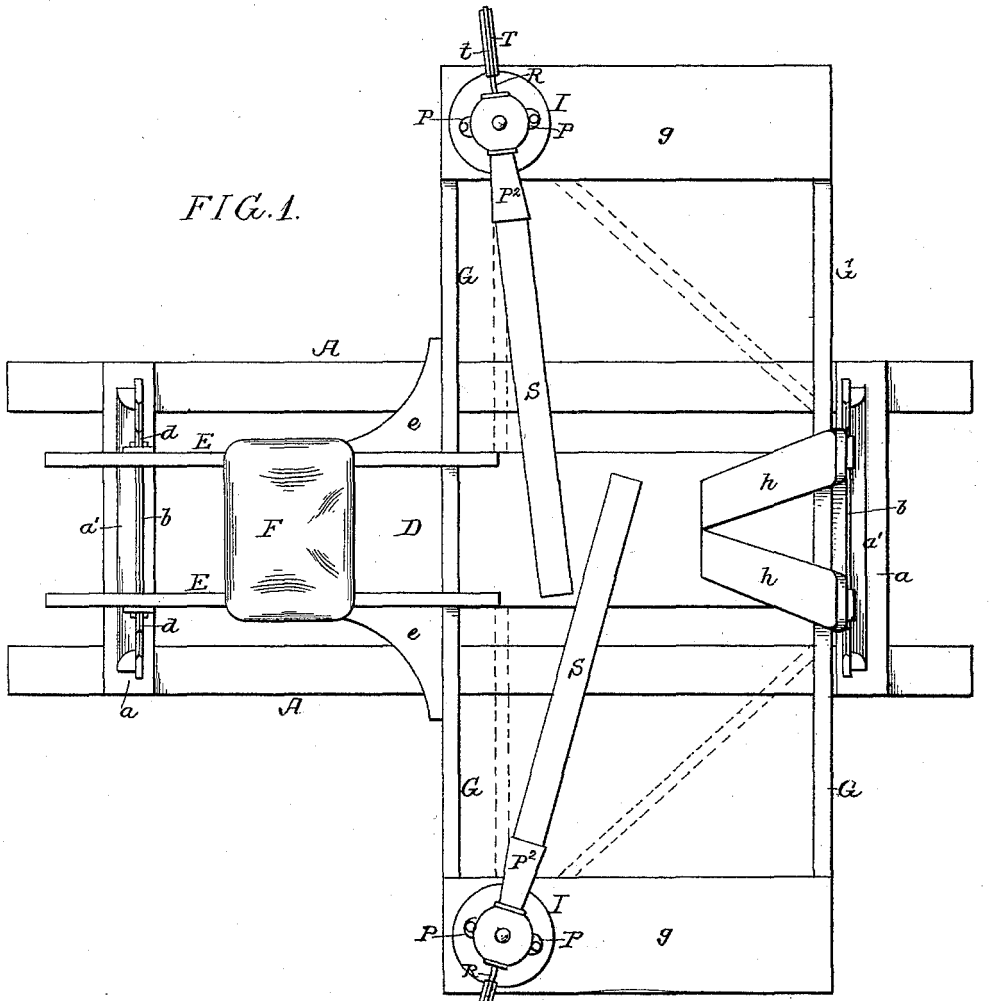
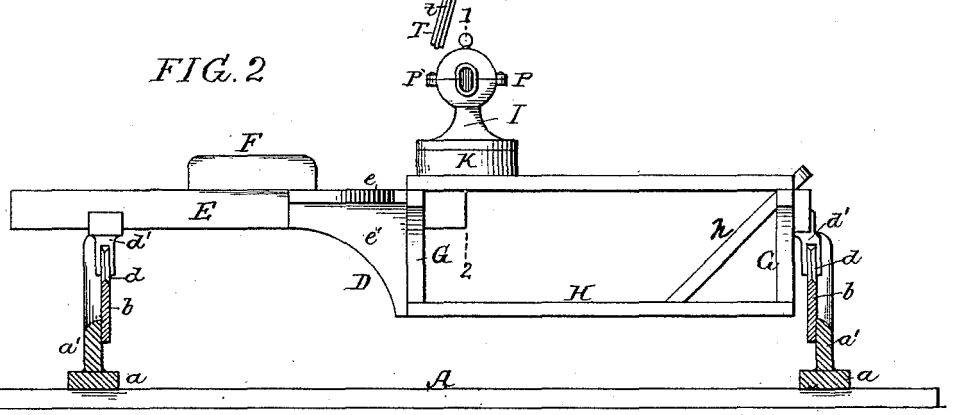


FIG. 2



Witnesses:
Alex. Barkoff
John E. Parker

Inventor
Thomas J. Bigger
by his Attorneys
Howson & Howson

(No Model.) 2 Sheets—Sheet 2.

T. J. BIGGER.

ROWING MACHINE.

No. 413,015. Patented Oct. 15, 1889.

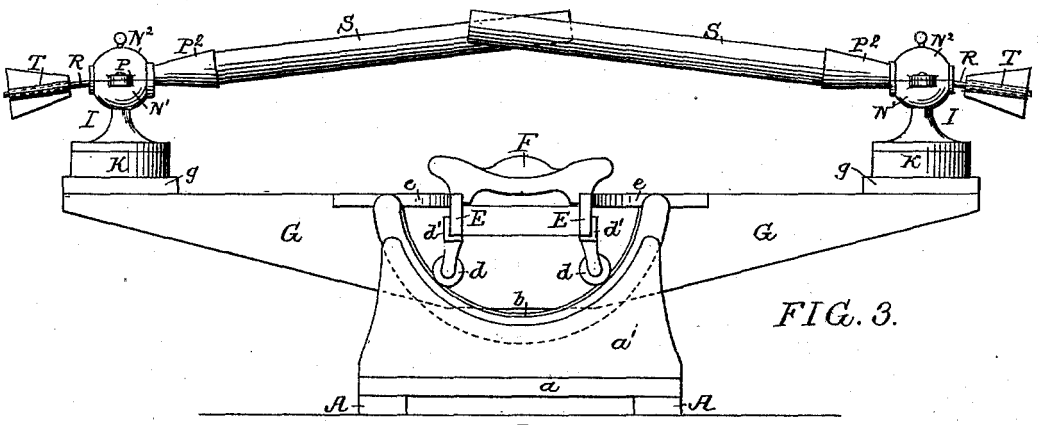


FIG. 3.

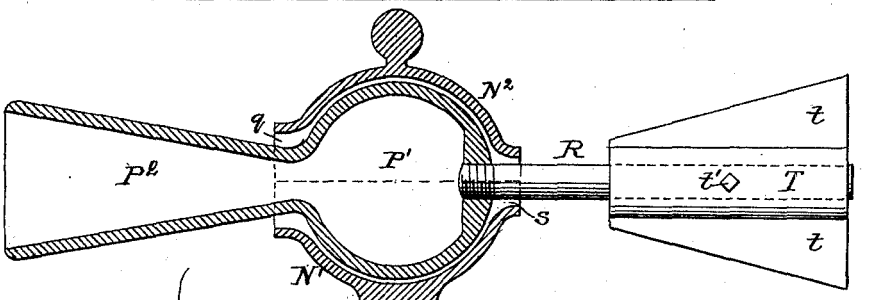


FIG. 4.

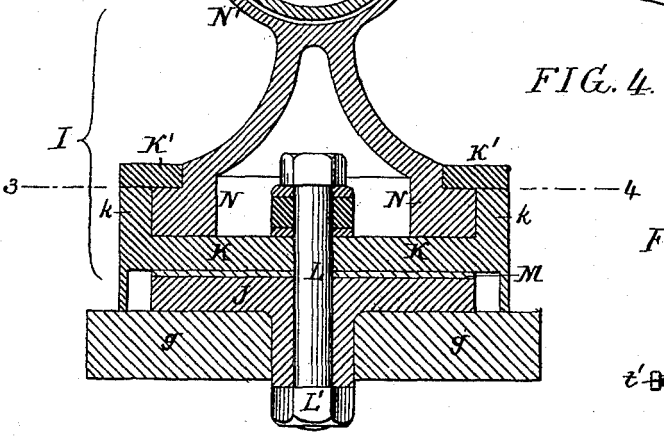


FIG. 6.

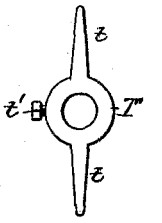
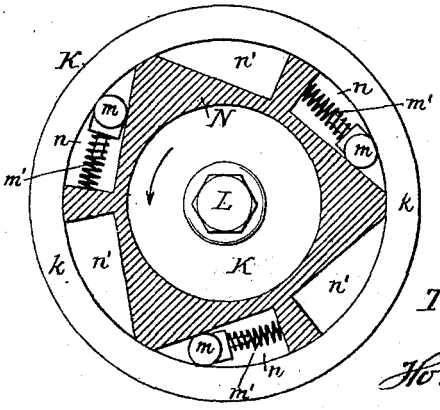


FIG. 5.



Witnesses:
Alex. Barkoff
John E. Parker

Inventor:
Thomas J. Bigger
by his Attorneys
Howson & Howson

UNITED STATES PATENT OFFICE.

THOMAS J. BIGGER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO THOMAS A. CLOUGH, OF SAME PLACE.

ROWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 413,015, dated October 15, 1889.

Application filed January 14, 1889. Serial No. 296,285. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. BIGGER, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Rowing-Machines, of which the following is a specification.

The object of my invention is to construct a rowing-machine in which the sidewise or rolling motion of the boat will be accurately imitated, and by which a person can learn to feather an oar. The mechanism can be so adjusted that different degrees of tension can be applied to the oar-pieces as circumstances require.

In the accompanying drawings, Figure 1 is a plan view of my improved rowing-machine. Fig. 2 is a side view of the boat-frame with the supporting-frame in section. Fig. 3 is an end view. Fig. 4 is an enlarged sectional view on the line 1 2, Fig. 2. Fig. 5 is a section on the line 3 4, Fig. 4; and Fig. 6 is an end view of the feathering attachment.

A A are longitudinal supporting-beams, on which are cross-bars *a a*, which tie the side beams together. On these cross-bars are vertical supporting-brackets *a'*, of the form shown in Fig. 3, being concaved, for a purpose described hereinafter. Secured to the inner side of the supporting-brackets *a'* are rails *b b*, each in the form of a segment of a circle. On these rails are wheels *d*, grooved as shown, so as to fit the ribs on the rails *b*. These wheels are supported in brackets *d'* on the boat-frame D, which is the substitute for the boat, and which consists of longitudinal bars E E, cross-beams G G, and bottom board H. The bars E E also serve as slides for the sliding seat F.

The cross-beams G G are tied together on the under side by the bottom board H, being a substitute for the bottom of the boat, to which are secured the inclined foot-rests *h h*. Brackets *e e'* tend to stiffen the frame. The outer ends of the cross-beams G G are secured together by pieces *g g*, on which are secured casings I, which are the substitutes for the oar-locks, and which contain the friction mechanism.

The detailed construction of the casing and the friction mechanism is shown more clearly in Figs. 4 and 5, in which J is the lower friction-disk secured in any suitable manner to the frame. K is the movable friction-disk mounted on a central spindle L. Between these two disks J and K is a washer M, of leather or other suitable material. Between the head of the spindle L and the friction-disk K are a series of washers, the center one of which I prefer to make of some yielding substance—such as rubber. By screwing upon the nut L' on the under side of the frame, the friction-disks can be adjusted toward and from each other, so that different degrees of tension can be applied.

The friction-disk K has a ring *k*, forming a socket, in which fits a carrier N, having recesses *n n'*. The rear walls of said recesses incline in opposite directions, as shown in Fig. 5. In the recess *n* are cylindrical rollers *m*, which are kept in contact with the inclined walls of the recesses of the carrier, and in the inner surface of the friction-disk K by a spring *m'*, so that any movement of the carrier in the direction of the arrow, Fig. 5, will tend to bind the cylinder between the two surfaces, and thus unite the carrier and disk, so that the disk will turn with the carrier; but on the reverse movement the cylinder will be released and the carrier can be returned to its normal position. Thus a pulling strain in imitation of the pull of an oar is obtained and the return-stroke of the oar is also imitated by the release of the friction mechanism.

The carrier N is secured in position on the disk K by a clamp K', which prevents the carrier from rising, but allows it to have a free oscillating movement. On the carrier N is a socket N', made in two parts, as shown in Figs. 2 and 4. The cap N^2 is removable, and is secured to the carrier by bolts which pass through lugs P. In the sockets are elongated vertical openings *q* and *s*, and in said socket fits a ball P', having a tapered extension P^2, which passes through the opening *q*, and in the socket of the extension P^2 is secured the oar-piece S, as shown in Fig. 3. Passing through the opening *s* is a rod R, having a screw-threaded end, which is tapped into the ball P'. On this rod is a weight T, and I pre-

fer to so construct this weight that it will not only act as a weight, but also as a guide in feathering by providing wings *t t*, as shown more clearly in Fig. 6, to imitate the form of the blade of an oar, so that the operator can readily determine the proper position of the oar when feathering. The weight T is adjustably secured on the rod by a set-screw *t'*. The rod may be of any required length and the weight may be of any size to balance, as nearly as possible, the oar-piece S.

The object of making the socket N with two recesses *n n'* is that one pattern will do for both sockets by merely placing the rollers and the springs in one set of recesses *n* on one side, and in the other set of recesses *n'* on the opposite casings.

It will be understood that the mechanism can be duplicated, so as to imitate a pair or double or four-oared shell, without departing from my invention, and it will be understood that instead of the beams G G a single beam may be used, as shown by dotted lines in Fig. 1, and stay-rods can be used for supporting the casings I I.

Instead of the concave rails *b b*, on which the boat-frame D is supported, the rails may be convex, gaining the same result.

I claim as my invention—

1. The combination, in a rowing-machine, of the base-frame having transverse supporting-rails, with a boat-frame supported on said rails, a seat mounted on said boat-frame, with oar-pieces and supporting devices therefor secured to said boat-frame, substantially as described.

2. The combination, in a rowing-machine, of the oar-piece-supporting casing, the oar-piece adapted to said casing, with a feathering-indicator having projecting wings, substantially as and for the purpose described.

3. The combination of the base A, the supporting-brackets, and the concave rails *b*, with a boat-frame D, having rollers *d*, adapted to said rails and carrying both the seat and the oar-piece-supporting mechanism, substantially as described.

4. The combination, in a rowing-machine, of the disk K, having a frictional surface on its under side, with a friction-disk J, secured to the frame of the machine, with a carrier N, oar-pieces connected thereto, with friction-balls between the edge of the carrier and a rim on the disk K, with an adjustable spindle L, by which the disks J and K can be drawn toward each other without binding upon the carrier, substantially as described.

5. The combination of the friction-disks J and K and intervening washer M with the carrier N and oar-pieces S, connected to said carrier, said carrier having tapered recesses in its periphery, in which fit rollers *m*, having springs *m'*, all substantially as described, whereby on the movement of the carrier in one direction the rollers will frictionally couple the carrier to the disk K, and when moved in the opposite direction the carrier will be released from the disk, substantially as set forth.

6. The combination of the disks J and K, the spindle L, the carrier N, and its rollers, said carrier having a socket and an elongated opening *q* therein, with a ball P', adapted to said socket, and an oar-piece projecting from said ball and adapted to have a free vertical movement in said opening *q*, substantially as and for the purpose described.

7. The combination of the friction-disks J and K, the carrier N, its socket, with a ball P' adapted thereto, a longitudinal slot in the wall of the socket, and a weighted rod passing through the slot and secured to the ball, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS J. BIGGER.

Witnesses:
ROBERT OSBORNE, Jr.,
WILLIAM T. TAYLOR.