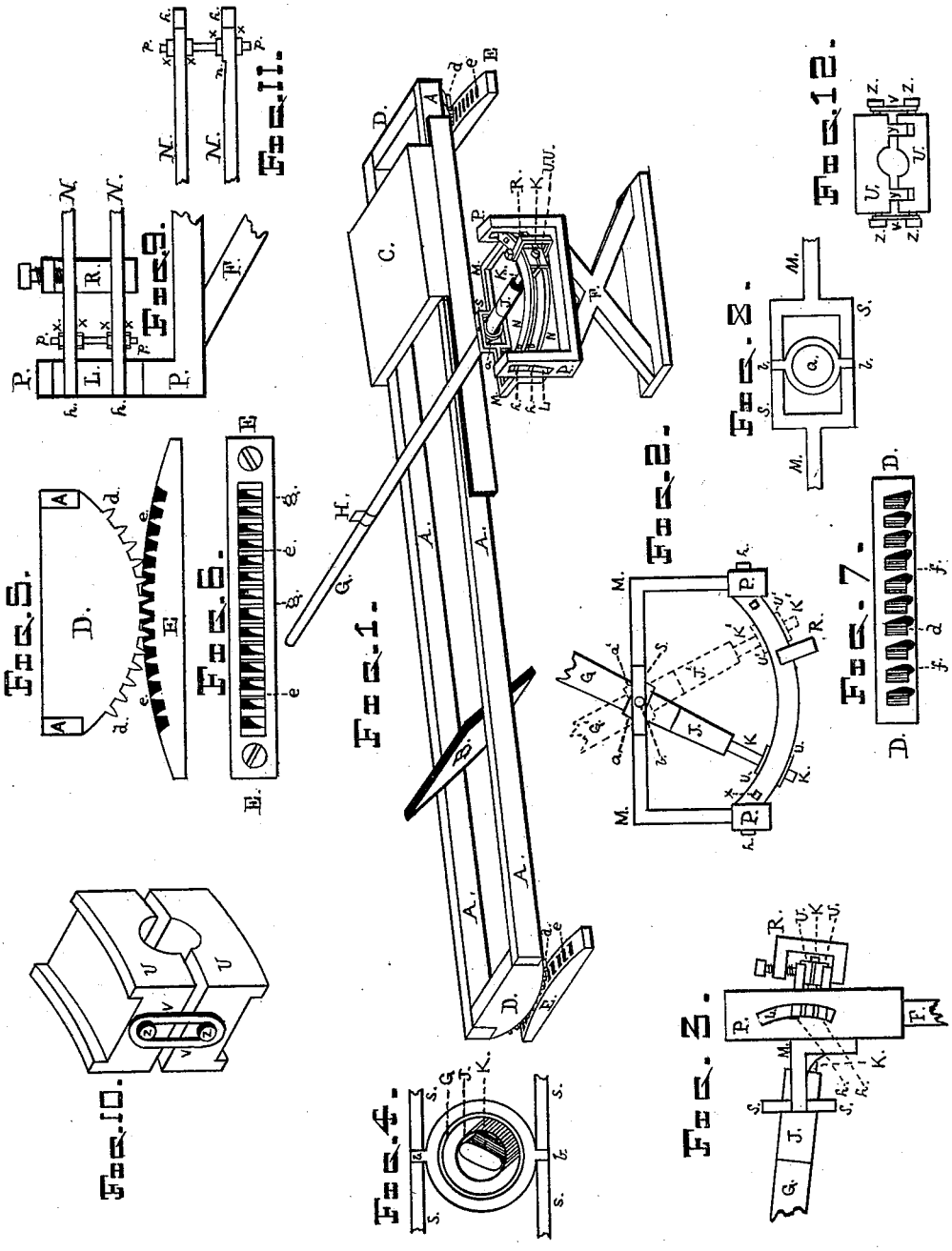
G. GOLDIE.
Rowing-Machine.

No. 199,432. Patented Jan. 22, 1878.



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UNITED STATES PATENT OFFICE.

GEORGE GOLDIE, OF PRINCETON, NEW JERSEY.

IMPROVEMENT IN ROWING-MACHINES.

Specification forming part of Letters Patent No. **199,432**, dated January 22, 1878; application filed January 16, 1877.

To all whom it may concern:

Be it known that I, GEORGE GOLDIE, of Princeton, in the State of New Jersey, have invented certain new and useful Rowing-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, which forms a part of this specification, and in which—

Figure 1 is a general perspective view of my invention; Fig. 2, a horizontal view of that part of my machine which imitates the motions and resistances of an oar in use; Fig. 3, a side view of the same; Fig. 4, a section through the swivel-ring *a*, showing the relation and relative position of adjacent working parts; Fig. 5, an end view of that portion of my machine which represents and imitates the motions of the hull of a shell-boat when in use; Fig. 6, a plan view of the rack-plate E; Fig. 7, a plan view of the rocker D; Fig. 8, a longitudinal section of swivel-ring *a* and oar-lock *s;* Fig. 9, a section through the standard P, showing the relation of the movable friction-slides N N with their fastenings *p x* and compressor R; Fig. 10, an isometric view of the slide-bearings U U with their flexible connections V V; Fig. 11, a side view of one end of curved friction-slides, showing fastenings and formation of dip end of lower slide; Fig. 12, a longitudinal section of the slide-bearings U U, showing flexible connections V V and guide-pins *y y*.

The different views are made upon varying scales to suit the convenience of illustration; and similar letters of reference indicate like parts in all the figures.

My invention has for its object the correct imitation, in a rowing-machine, of all the motions, resistances, and strains incident to the propulsion of rowing boats.

It consists of a rocking frame-work with the necessary appliances to imitate the motions of the hull of a row-boat, and a friction-machine with working parts, hereinafter fully described, to imitate and reproduce all the resistances, motions, and strains incident to the use of an oar as a means of propulsion.

For the better information of the public I will proceed to consider the arrangement and relations of the details of these parts more fully.

The rocking frame-work consists of two gunwale-pieces, A A, framed into segmental rockers D D, fitted with teeth *d d* and rolling-surfaces *f f*. The rockers roll on rack-plates E E with rack-teeth *e e*, into which the teeth *d d* work, and flanges *g g*, upon which the rolling-surfaces *f f* bear, the whole being provided with a stretcher, B, and a sliding seat, C. Any suitable material may be used in constructing the parts described.

The action of this part of my machine is extremely simple. The whole weight of the oarsman rests upon the points of contact between the rolling-surfaces *f f* and the flanges *g g*, the rocker-teeth and rack-teeth serving to guide and control in all directions the motion of the rockers, but bearing no direct weight. By this method of construction any transfer of weight to either side of the central line will cause the frame supporting the oarsman to roll toward that side, thus compelling him to keep himself at a perfect balance with reference to this line of contact, which in effect coincides with the keel-line of a boat during the forward and backward movements of the body necessary in rowing, and in this manner providing an imitation of the unsteadiness of the lighter class of row-boats, such as shells, &c.

The degree of unsteadiness, or rolling tendency, can be regulated by the surface curvature of the rack-plates, and may vary in any degree from the extreme unsteadiness of the convex form to the comparative steadiness of the concave form. (Not shown in the drawing.)

The part of my machine by which I obtain substantially the counterpart of the exercise from an oar in pulling consists of an oar-piece composed of a loom or handle, G, provided with an indicator, H, fitted to a cam-piece, J, with its cam K working into the slide-bearings U U, which slide upon the friction-slides N N. The cam-piece is swiveled in the ring *a*, about whose centers *b b* the oar-piece oscillates.

The friction-slides are provided with lugs *h h*, which work freely in the slots or guides L L cut or molded in the standards P P, and curved concentric with corresponding points on the line passing horizontally through the center of oscillation.

The friction-slides are held in position with relation to each other by bolts *p p* and double nuts *x x*, and are provided with a compressor,

R, which is a simple vise attachment, and may be placed at any point on the slides where the resistance is desired to be greatest.

The friction-slides can be made of any suitable and rigid material, and are segments of rings of which the swivel-ring points *b b* are the centers.

The lower friction-slide is cut away slightly at *n*, (the dip end,) Fig. 11, to permit the slide-bearings to come into position quickly and without jamming when the cam is thrown into position for the pull, as shown by the indicator H.

The slide-bearings U U are made with flanges on both sides of their upper and lower surfaces, and are curved to fit the friction-slides. They are also fitted with guide-pins *y y*, which serve to keep them in position with reference to each other during their action on the friction-slides.

Suitable pins *z z* are placed in the ends of the slide-bearings, around which the india-rubber bands V V are stretched to keep the cam-opening in constant contact with the cam K, and to render the translation of its motions more rapid.

The bearing-surfaces may be shod with leather, or the like material, to increase friction.

The swivel-ring *a* is pivoted in the oar-lock *s*, which is supported on outriggers M M attached to the standards P P, which are supported on the base F. The outriggers, standards, and base, forming the main frame-work of the machine, may be cast or otherwise formed without joinings.

This construction provides for the backward and forward movement of the oar-piece. The "dip" and lift of the same is provided for by allowing sufficient play in fitting the cam-piece J to the swivel-ring whose edges are rounded.

The action of my friction-machine is as follows: At the beginning of the stroke the extremity of the loom is nearly over the stretcher B. The indicator H is perpendicular, showing that the cam is pressing the slide-bearings closely home against the friction-slides, which it is enabled to do without jamming, in consequence of the extra width of the opening between the friction-slides, as shown in Fig. 11 at *n*. The slide-bearings are close to the "bow"-standard P and the friction-slides are at their lowest level, their lugs *h h* being at the lower extremity of the slots L L. As the loom is pulled in the direction of the sliding seat the slide-bearings travel along the slides in the opposite direction, offering great resistance—greatest at the point where the compressor may be attached—until the end of the stroke or pull is reached, the slide-bearings having traveled the full length of the friction-slides. At this point the "lift" and "feather" begin. The loom is lowered by the oarsman until the friction-slides have reached the upper extremity of the slots; it is then turned backward until the indicator is nearly horizontal, thus disengaging the cam, releasing the slide-bearings, and allowing them to travel back with the cam and cam-piece between the friction-slides, without resistance, until the other extremity of the slides is reached, when the cam is made to engage, as shown by the indicator. The slides are lowered by raising the loom, and the stroke repeated, as before described.

Thus I have imitated, in effect, the action and strains of an oar during the "dip," "pull," "lift," and "feather;" the "dip" obtained by lowering the friction-slides with the indicator perpendicular; the "pull" by the traveling of the slide-bearings, while engaged by the cam, through the length of the friction-slides; the "lift" by raising the friction-slides at the end of the stroke or "pull;" the "feather" by disengaging the cam shown by the horizontal position of the indicator, and causing the slide-bearings to travel freely back between the friction-slides.

The cam may be disengaged at any point of the stroke at the will of the oarsman, and the length of the stroke thus regulated.

The cam-opening is an irregular oval in cross-section, so shaped that the indicator must be kept perpendicular to insure the proper resistance, which may be regulated in intensity by the double nuts *x x* at the ends of the friction-slides and the compressor R.

The whole friction-machine may be fastened to the floor, as shown in Fig. 1, or by means of braces to the gunwales of the rocking frame.

Having fully described my invention, what I claim as that invention for which I desire Letters Patent of the United States is—

1. In a rowing-machine, rocking frames with rockers D, fitted with teeth *d d*, and rolling-surfaces *f f*, rolling upon flanges *g g*, and teeth *e e* of rack-plates E, substantially as described, and for the purpose specified.

2. The combination, in a rowing-machine, of the loom G, indicator H, cam-piece J, and cam K with the swivel-ring *a* and slide-bearings U U, traveling between movable friction-slides N N, fitted with lugs *h h*, working in the curved slots L L, substantially as described.

3. In a rowing-machine, the movable friction-slides N N, with their double-nutted fastenings *p p* and *x x* and compressor R, and cavity at *n*, substantially as described.

4. The slide-bearings U U, with their guide-pins *y y*, pins *z z*, and flexible connections V V, and cam-opening, as used in a rowing-machine, substantially as described.

5. In a rowing-machine, the combination of the cam-piece J with the swivel-ring *a*, its pivots *b b*, swinging in the oar-lock *s*, supported on the outriggers M M, in turn supported by the standards P P resting upon the base F, substantially as described.

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