(No Model.) 3 Sheets—Sheet 1.

E. J. KERNS.

EXERCISING MACHINE.

No. 435,934. Patented Sept. 9, 1890.

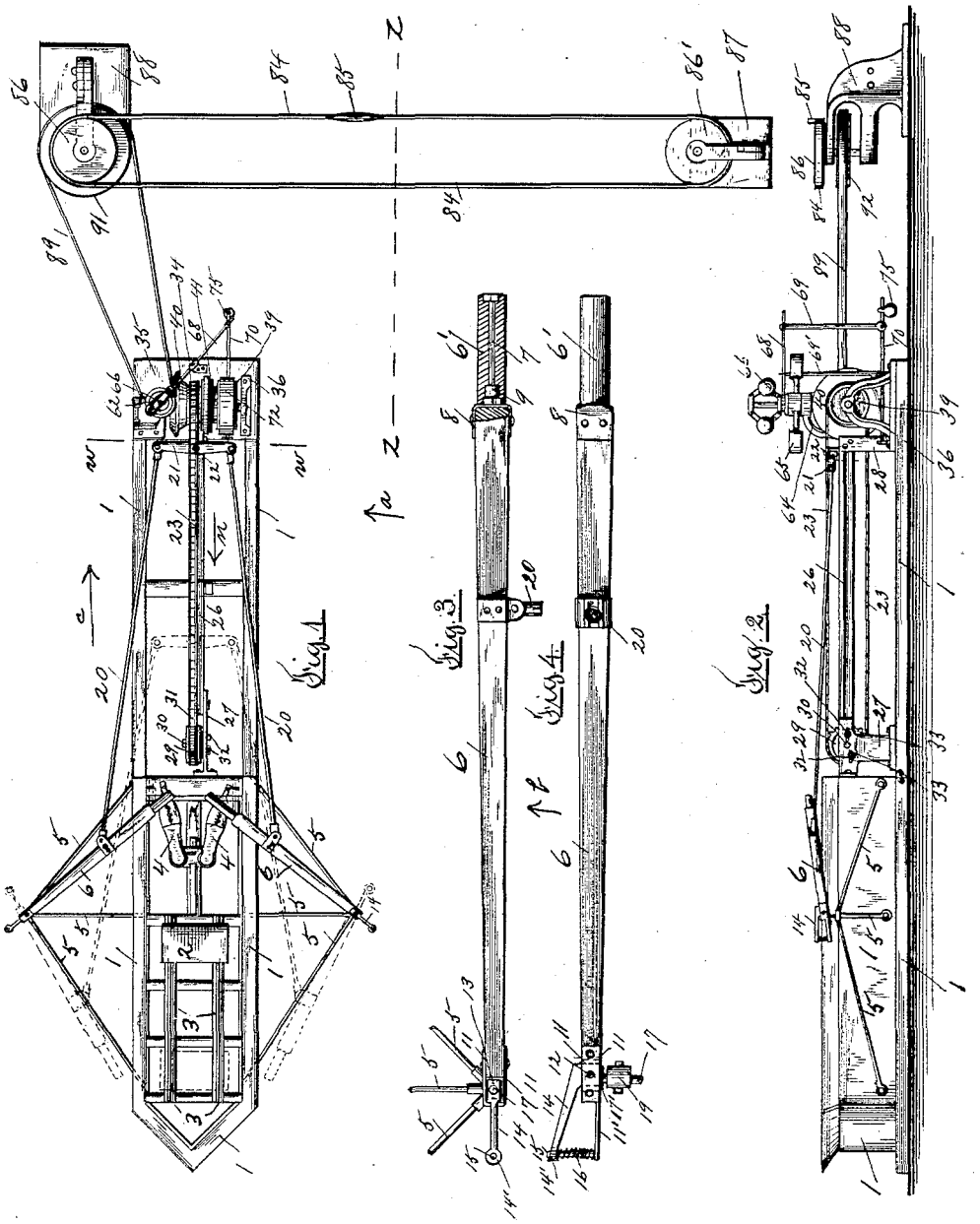

Fig. 1.

Fig. 3.

Fig. 4.

Fig. 2.

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By his Attorney
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(No Model.)

3 Sheets—Sheet 2.

E. J. KERNS.

EXERCISING MACHINE.

No. 435,934. Patented Sept. 9, 1890.

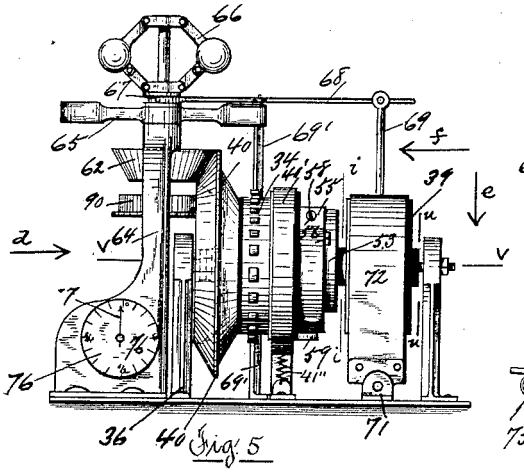

Fig. 5

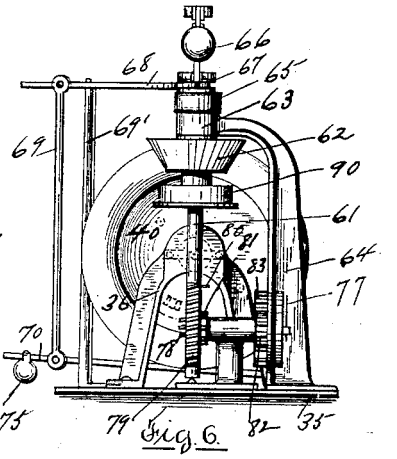

Fig. 6

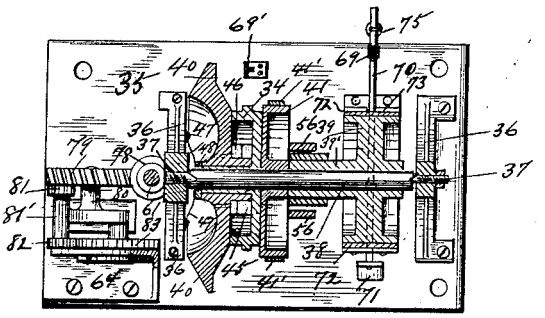

Fig. 7

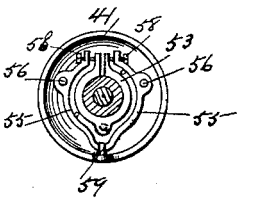

Fig. 8

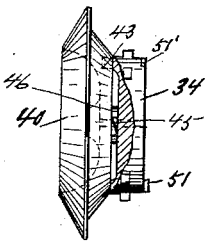

Fig. 9

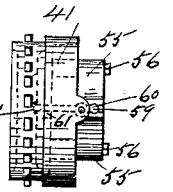

Fig. 10

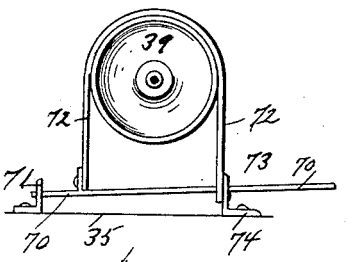

Fig. 11

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(No Model.) 3 Sheets—Sheet 3.

E. J. KERNS.

EXERCISING MACHINE.

No. 435,934. Patented Sept. 9, 1890.

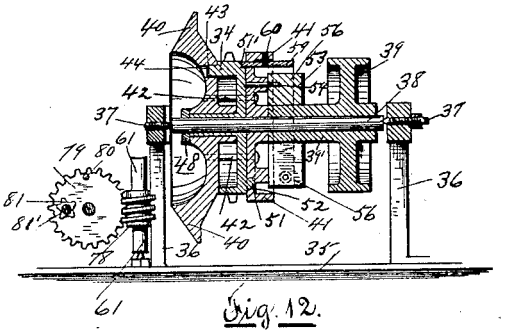

Fig. 12.

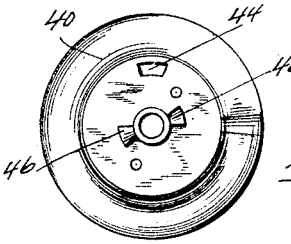

Fig. 13

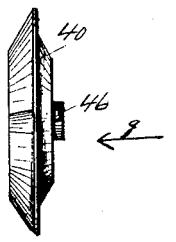

Fig. 14.

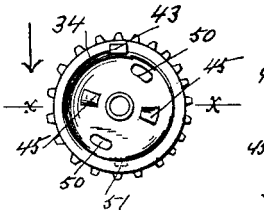

Fig. 15

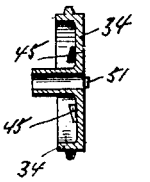

Fig. 16.

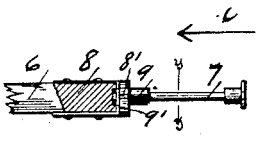

Fig. 17

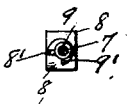

Fig. 18

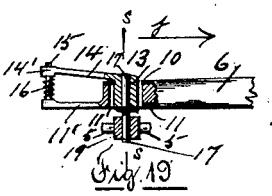

Fig. 19

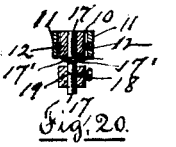

Fig. 20.

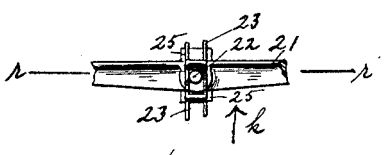

Fig. 21

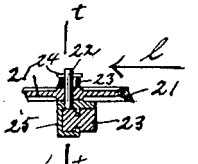

Fig. 22

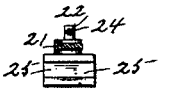

Fig. 23

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UNITED STATES PATENT OFFICE.

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EXERCISING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 435,934, dated September 9, 1890.

Application filed February 12, 1890. Serial No. 340,195. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. KERNS, a citizen of the United States, residing at Worcester, in the county of Worcester, in the State of Massachusetts, have invented certain new and useful Improvements in Rowing-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, which, in connection with the drawings, making a part of this specification, will enable others skilled in the art to which my invention belongs to make and use the same.

My invention relates to rowing-machines; and it consists in certain novel features of construction and operation thereof, as will be hereinafter fully described.

The object of my invention is to improve upon rowing-machines as ordinarily constructed, and to make the operation thereof correspond as nearly as possible with the actual operation of rowing a boat.

Referring to the drawings, Figure 1 is a plan view of my rowing-machine. Fig. 2 is a side view taken at line *z z*, Fig. 1, looking in the direction of arrow *a*, same figure. Figs. 3 and 4 are details, on an enlarged scale, of the oars, Fig. 3 being a plan, and Fig. 4 a side view, looking in the direction of arrow *b*, Fig. 3. Fig. 5 shows, on an enlarged scale, the head of the machine, taken on line *w w*, Fig. 1, looking in the direction of arrow *c*, same figure. Fig. 6 is an end view of the head shown in Fig. 5, looking in the direction of arrow *d*, same figure. Fig. 7 is a horizontal cross-section on line *v v*, Fig. 5, looking in the direction of arrow *e*, same figure. Fig. 8 is a view of the clutch mechanism for connecting the several parts with the operating-shaft, taken on line *i i*, looking in the direction of the arrow *d*, same figure. Fig. 9 is a detail of the driving-wheel and sprocket-wheel. Fig. 10 is a detail of the sprocket-wheel and clutch mechanism. Fig. 11 is an opposite end view of the head from that shown in Fig. 6, taken on line *u u*, Fig. 5, looking in the direction of arrow *f*, same figure, showing only the friction-pulley and belt and lever detached. Fig. 12 is a vertical cross-section of the head corresponding to the horizontal section shown in Fig. 7, with some of the parts shown in Fig. 5 left off. Fig. 13 is an inner side view of the driving-wheel, looking in the direction of arrow *g*, Fig. 14. Fig. 14 is an edge view of the driving-wheel, looking in the direction of arrow *h*, Fig. 13. Fig. 15 is a view of that side of the sprocket-wheel which comes against the side of the driving-wheel shown in Fig. 13. Fig. 16 is a horizontal cross-section on line *x x*, Fig. 15. Fig. 17 is a sectional detail of the oar-handle, showing the manner of connecting the movable handle, which is left off in said figure. Fig. 18 is a cross-section on line *y y*, Fig. 17, looking in the direction of arrow *i*, same figure. Fig. 19 is a sectional detail showing the manner of connecting the oar at its pivoted end. Fig. 20 is a vertical cross-section on line *s s*, Fig. 19, looking in the direction of arrow *j*, same figure. Fig. 21 is a detail showing the manner of connecting the pivoted cross-bar to the sprocket-chain. Fig. 22 is a vertical cross-section on line *r r*, Fig. 21, looking in the direction of arrow *k*, same figure; and Fig. 23 is a vertical section on line *t t*, Fig. 22, looking in the direction of arrow *l*, same figure, the supporting-bar being left out.

In the accompanying drawings, 1 is the frame or skeleton upon which the several parts of my rowing-machine are supported. 2 is the sliding seat, of ordinary construction, mounted to slide back and forth on the tracks 3. 4 are the shoes in which the feet of the rower are placed. 5 are the outriggers or rods secured to the frame 1, and in the outer ends of which are pivotedly supported the oars 6.

The oars 6 (shown in detail in Figs. 3 and 4 and 17 to 20, inclusive) consist of a bar of wood provided with handles 6′, which are adapted to turn or revolve on a pin 7, which is secured to the bar 6 in the manner shown in Fig. 17. A cap-piece 8 is secured to the end of the bar 6, provided with a hole in its outer end, through which the inner end of the pin 7 passes and is secured. Said cap-piece 8 is also provided with a stop 8′ to limit the revolving motion of the handle 6′ by means of the projection 9′ on the inner face of the thimble 9, which turns on the pin 7 with the handle 6′, and is fast in the end of said handle, coming in contact with said stop 8′. The opposite end of the oar 6 is provided with a vertical hole or opening 10 in the metal cap-piece 11, with the rigid arm 11′ extending out

therefrom in the direction of the length of the oar. In the opening 10 is pivoted by pins 12 (see Fig. 20) the hub 13, having the arm 14 integral therewith and extending out therefrom over the arm 11′. The outer end of the arm 14 is provided with a hub 14′, into which extends the upper end of the pin 15, resting on the arm 11′. A spring 16 encircles said pin 15 and is interposed between the upper side of the arm 11′ and the lower side of the hub 14′, as shown in Figs. 4 and 19. The pin 17 extends loosely through a vertical hole in the hub 13, and is provided with a shoulder 17′, extending out therefrom, upon which the hub 13 rests and has its bearing. The lower end of said pin 17 is secured by thumb-screw 18 in the block 19 upon the outer ends of the outrigger or rods 5.

By pivoting the outer ends of the oars 6 in the manner as above described, and as fully shown in Figs. 3 and 4 and 19 and 20 of the drawings, a swinging motion in a horizontal plane can be imparted to the oars, as indicated by full and dotted lines, Fig. 1, and also a slight tilting motion in a vertical plane corresponding to the dipping of the oars in the actual process of rowing in a boat.

By means of the movable handles of the oars a movement of the hand and wrist of the rower is obtained, similar to the movement of feathering the oars in the actual process of rowing in a boat, and this movement is limited, so as not to exceed the feathering movement of the oars and at the same time conveying the feeling that a rower has when his oar is in the proper position in the rowlock ready to put into the water.

The oars 6 are connected by rods 20 with the pivoted cross-bar 21. Said rods 20 are pivoted at one end to the oars 6 between the pivot-point and the handle of said oars, preferably nearer the handle, as shown in the drawings. The other ends of the rods 20 are pivoted to the outer ends of cross-bar 21. A stud 22 extends through the cross-bar 21 and acts as a pivot upon which said cross-bar turns. The upper end of said stud extends through a link in the sprocket-chain 23, and may be connected therewith at any point and attached to said sprocket-chain by a pin 24. (See Figs. 21 and 22.)

Upon the lower surface of the cross-bar 21 is pivoted by means of the stud 22 the cross-head 25, preferably of the shape shown in cross-section, Fig. 22, and to which the lower end of the stud 22 is secured. Cross-head 25, upon which the cross-bar 21 is pivotedly supported by means of the stud 22, is adapted to extend over and slide back and forth on the way 26, supported at each end on stands 27 and 28. (See Fig. 2.) On the stand 27 is supported the sprocket-wheel 29. Said sprocket-wheel revolves on a stud 30, which extends out from a plate 31, which is secured to stand 27 by means of bolts 32 extending through slots 33 in said stand. By means of the slots 33 and bolts 32 the adjustment of the sprocket-wheel 29 back and forth in a horizontal plane is obtained, so as to tighten or loosen the sprocket-chain 23, as desired. The endless sprocket-chain 23 also passes around the sprocket-wheel 34, forming a part of what I term the "head" of the machine.

The movement of the oars from the position shown in full lines, Fig. 1, to the position shown in dotted lines causes the cross-bar 21, attached to the sprocket-chain 23, as above described, to slide along on the way 26 to the position shown in dotted lines, Fig. 1, carrying the sprocket-chain 23 with it, and causing the sprocket-wheels 29 and 34 to revolve and the mechanism of the head of the machine to be operated, as will be hereinafter fully described.

It will be understood that in the construction and operation of a rowing-machine the object is to produce a resistance while pulling a stroke of the oars corresponding to the resistance of the water in the passage of the oars through the same, and to do away with that resistance in the return movement of the oars preparatory to a new stroke.

I will now proceed to describe the head of my machine, which contains the mechanism which produces the resistance while pulling a stroke of the oars and removes said resistance upon the return of the oars preparatory to a new stroke. The resistance may be increased or diminished, as desired.

The head of my machine consists of the base 35, which is supported or secured to the frame 1 at the opposite end from the sliding seat 2. Stands 36 are secured upon the base 35, and in this instance have adjustable centers 37 at their upper ends, between which centers is supported the shaft 38, said shaft having tapering holes in its ends, into which the pointed ends of the centers 37 extend. (See Fig. 7.)

Upon the shaft 38 is mounted the friction-pulley 39, fast thereon, and having its hub 39′ extending out from one side thereof. Also mounted on the shaft 38, but loose thereon, is the driving-wheel 40, having in this instance a beveled driving-face sprocket-wheel 34 and the flange-disk 41, carrying the clutch mechanism, by means of which said driving-wheel 40, sprocket-wheel 34, and flange-disk 41 are connected at the proper time with the friction-pulley 39 and shaft 38 to operate the same and the friction or resistance mechanism connected therewith.

Driving-wheel 40, sprocket-wheel 38, and flange-disk 41 are connected together by pins 42, (see Fig. 12,) the purpose of said pins being to hold the driving-wheel 40 and flange-disk 41 in line, while the sprocket-wheel 34 is operating the mechanism connected therewith. A strap 41′ extends around the flange-disk 41, and is fast at one end to the stand 35 and adjustably secured at the other end by a spring 41″. The object of the strap 41′ is to produce friction enough to hold the flange-disk 41 and clutch mechanism, and

also the driving-wheel 40, until the sprocket-wheel 34 operates the mechanism connected therewith. The adjacent faces of the sprocket-wheel 34 and the driving-wheel 40 are each provided with inclined surfaces 45 and 46, which are adapted to come in contact with each other and ride upon each other to press the driving-wheel 40 away from the sprocket-wheel 34, when said sprocket-wheel is moved in one direction, against the action of the springs 47, secured to the inner stand 36, (see Fig. 7,) which press the collar 48, loose on the end of the shaft 38, against the hub of the driving-wheel 40. The opposite movement of the sprocket-wheel 34 disconnects the inclined surfaces 45 and 46 and allows the springs 47 to act on the collar 48 and press the driving-wheel 40 back into its normal position, as shown in Fig. 12, so as not to operate as a driving-wheel. The holes 50 in the sprocket-wheel 34, through which the bolts 42 pass, are made elongated, and the knob 43 is made to fit loosely in slot 44 in wheel 40, so that there may be a slight movement of the sprocket-wheel 34 in either direction without moving the driving-wheel 40 in a rotary direction, but pushing it outward and away from the sprocket-wheel.

Connected with the opposite face of the sprocket-wheel 34 from the driving-wheel 40, by means of bolts 42, is the flange-disk 41, carrying the clutch mechanism. A knob 51 extends out from the face of the sprocket-wheel 34 and fits into a slot 52 in the flange-disk 41. (See Fig. 12.) By means of the elongated slots 50 in the sprocket-wheel 34, through which the bolts 42 pass, and the slot 52 in the flange-disk 41, a slight movement may be given to the sprocket-wheel in either direction without moving the flange-disk 41.

The flange-disk 41 carries the clutching mechanism for clutching the hub 39′ of the friction-pulley 39 fast on the shaft 38, causing said pulley and shaft to revolve with the driving-wheel 40, sprocket-wheel 34, and flange-disk 41, and to operate the mechanism connected with said shaft when moving in one direction, and for releasing the hub 39′ of the pulley 39, and allowing the same and the shaft 38 to remain stationary when the driving-wheel 40, sprocket-wheel 34, and flange-disk 41 are moved in the opposite direction. The clutch mechanism supported on the flange-disk 41 consists in this instance of a split ring 53, secured by screw 54 (see Fig. 12) on flange-disk 41, and mounted on the hub 39′ of the friction-pulley 39, (see Figs. 7 and 8,) and two levers 55, pivoted by pins 56 on the flange-disk 41, and provided at one end with adjusting-screws 58, the inner ends of which come in contact with the ends of the split ring 53. (See Fig. 8.) A pin 59, pivoted by means of a screw 60 in the flanged edge of the disk 41, (see Figs. 8, 10, and 12,) extends between the opposite ends of the levers 56 from the adjusting-screws 58. The other end of said pin 59 extends into a notch 51′ in the rim of the sprocket-wheel 34. (See Fig. 12.) The inner end of the pin 59 passes through an enlarged slot 61 in the flange-disk 41, (see dotted lines, Fig. 10,) so as to allow of a slight movement of the pin 59 in one direction, causing it to spread the ends of the levers 56, between which it extends, and causing the adjusting-screws 58 in the opposite ends of said levers to compress the split ring 53 and bind it on the hub 39′, and cause said hub and the friction-pulley 39 and the shaft 38 and the parts connected therewith to revolve when the flange-disk 41 is revolved by its connection with the sprocket-wheel 34, when said sprocket-wheel is moved in one direction by the sprocket-chain 23. When the sprocket-wheel 34 is moved in the opposite direction, pivoted pin 59 is stationary, and the levers 56 are not operated to compress the split ring 53.

An upright shaft 61 is arranged in suitable bearings at the inner end of the shaft 38, and has secured thereon a beveled pulley 62, the beveled face of which is adapted to come in contact with and be operated by the driving-wheel 40, when said driving-wheel is pressed out by the inclined surfaces on the sprocket-wheel 34, as shown in Fig. 5. The upper end of the upright shaft 61 passes through and has its bearing in the hub 63 upon the upper end of the stand 64. The balance-bar 65 is mounted on said shaft and is fast thereon. A governor 66 is mounted on the upper end of the shaft 61, and is provided with a grooved collar 67 at its lower part, which rests on the hub of the balance-bar 65. (See Figs. 5 and 6.) The forked end of the lever 68, which is pivotally supported on the upper end of a bar 69′, secured to the base 35, extends into the grooved collar 67 of the governor 66. The opposite end of the lever 68 is connected by a link 69 to the outer end of the lever 70, which extends under the friction-pulley 39, and is pivoted at its inner end in a stand 71 on the base 35. A belt 72 passes over the pulley 39 and is secured at its two ends to the lever 70. Said lever 70 extends through a slot 73 in a stand 74, secured to the base 35 to hold the same in a proper position. A weight 75 may be attached to the outer end of the lever 70 to increase the friction of the belt 72 on the pulley 39.

I have shown two supplementary attachments which may be used in connection with my rowing-machine, one of which consists of a dial 76 for marking the number of miles, provided with an indicating-hand 77, (see Fig. 5,) and means for operating the same, consisting in this instance of a worm 78 on the lower end of the upright shaft 61, which meshes with the worm-gear 79, carrying a pin 80, which engages and operates a small pinion 81, fast on one end of a stud 81′, which operates pinion 82 on the opposite end of said stud and drives the gear 83, connected with the dial-hand 77. (See Figs. 6 and 7.)

My other supplementary mechanism con-

sists of an endless belt 84, having thereon a pasteboard boat or indicator 85, and passing around pulleys 86 and 86′, supported in suitable bearings on stands 87 and 88. The endless belt 84 is driven by means of an endless belt 89, passing around a flange-pulley 90, fast on the upright shaft 61, and a pulley 91, fast on the shaft 92 of the pulley 86.

The purpose of the last-above-described mechanism is in case my rowing-machine is used in exhibitions, when the endless belt 84, carrying the pasteboard boat or indicator, will exhibit the different degrees of speed between two or more rowing-machines.

The dial 76, above described, is for the purpose of recording the number of miles rowed on the machine.

The operation of my rowing-machine will be readily understood from the above description, in connection with the drawings, and is as follows: The movement of the oars 6 from the position shown in full lines toward the position shown in dotted lines, Fig. 1, in the operation of rowing will cause the cross-bar 21 to move along on the way 26 toward the position shown by dotted lines, Fig. 1, and cause the endless sprocket-chain 23 to move in the direction of the arrow, Fig. 1, and to revolve the sprocket-wheels 29 and 34. The revolution of sprocket-wheel 34 in this direction causes the clutch mechanism to operate through pin 59 and to clutch the hub of the friction-pulley 39, and cause said pulley and shaft 38 to revolve with the sprocket-wheel 34. The revolution of the sprocket-wheel 34 also causes the driving-wheel 40 to be forced away from said sprocket-wheel by means of the inclined surfaces 45 and 46, and also to revolve with said sprocket-wheel and to operate the bevel-faced pulley 62, fast on the vertical shaft 61. The revolution of said shaft 61 at varying speeds, according to the strength and quickness of the rower, operates the governor 66, and through lever 68, link 69, and lever 70 draws down the belt 72 on the friction-pulley 39, producing greater friction and resistance as the speed of the endless belt 84, carrying the boat or indicator 85, is increased. At the same time the revolution of the pulley 61 causes the dial-hand 77 to move through the intervening mechanism, and also causes the endless belt 84 to move through the intervening mechanism, as above described. At the end of a stroke the return movement of the oars from the position shown in dotted lines to the position shown in full lines, Fig. 1, causes the cross-bar 21 and the sprocket-chain 23, connected therewith, to move in the opposite direction, and the sprocket-wheels 29 and 34 to be revolved in the opposite direction. The revolution of the sprocket-wheel 34 in this direction causes the clutch mechanism to release the hub of the friction-pulley 39 and to allow the same to remain stationary. At the same time this revolution of the sprocket-wheel 34 separates the inclined surfaces 45 and 46 on said sprocket-wheel and the driving-wheel 40 and allows the springs 47 to act to force back the driving-wheel 40 to disengage the same from the bevel-faced pulley 62, thus allowing said pulley 62 and the upright shaft 61 and all the parts connected therewith to continue to operate independently of the driving-wheel 40 while the rower is recovering for another stroke. It will thus be seen that upon the return movement of the oars preparatory to a new stroke only the sprocket-wheel 34, flange-disk 41, carrying the clutch mechanism, and the driving-wheel 40 are revolved loosely on the shaft 38, requiring only about the power of the return of the oar in rowing; and, further, it will be seen that upon the forward movement of the oars all of the mechanism of the head of the machine is operated, and the proper friction or resistance is produced by the belt 72 encircling or partially encircling the pulley 39, and the operating mechanism connected therewith.

It will be understood that the details of construction of the several parts of my rowing-machine may be varied somewhat, if desired.

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

1. In a rowing-machine, the combination, with the oars pivoted at one end, of movable handles secured on the other end, and means for limiting the revolving motion of said handles, substantially as set forth.

2. In a rowing-machine, the combination, with the oar 6, having the projecting arm 11′ at its pivoted end, carrying the pin 15, and a spring 16 thereon, and having a hole 10 in the end thereof, of the hub 13, pivoted in said hole 10 and having its bearing on the shoulder 17′ of the pin 17, supported in the outer end of the outriggers, and said hub 13 having an arm 14 extending out therefrom, provided with a hub 14′, adapted to fit over the pin 15, all constructed and arranged for the purpose stated, substantially as set forth.

3. In a rowing-machine, the combination, with the oars, connecting-rods, cross-bar pivotally supported and adapted to slide on a track or way, of an endless sprocket-chain connected with said cross-bar and passing around and operating two sprocket-wheels, one of said sprocket-wheels contained in the head of the machine and adapted to operate a clutch mechanism when moved in one direction to operate the friction or resistance mechanism, and to release the clutch mechanism and not to operate the friction or resistance mechanism when said sprocket-wheel is moved in the opposite direction, substantially as shown and described.

4. In a rowing-machine, the friction or resistance mechanism, consisting of the upright shaft 61, carrying a pulley 62, a balance-wheel and a governor, a pulley 39, shaft 38, belt 72, passing around said pulley, and the interven-

ing connections between said belt and the governor for regulating the friction of said belt, means for operating said friction or resistance mechanism at the proper time, and for releasing the same, consisting of the driving-wheel 40, sprocket-wheel 34, operated by a sprocket-chain, and the flange-disk 41, carrying the clutch mechanism and mounted on the shaft 38 and constructed and operated substantially as shown and described.

5. The combination, with a rowing-machine, of an endless belt or chain having the representation of a boat or indicator thereon, and two pulleys around which said belt passes, and mechanism connecting said belt with the operating mechanism of the rowing-machine to operate said belt and to indicate thereby the speed of the rowing-machine, substantially as set forth.

6. In a rowing-machine, the combination, with the oars, connecting-rods, and cross-bar pivotally supported and adapted to slide on a track or way, of an endless sprocket-chain connected with said cross-bar and passing around and operating two sprocket-wheels, one of said sprocket-wheels contained in the head of the machine and adapted to operate a driving-wheel when moved in one direction, which operates a vertical shaft carrying a governor and regulates the resistance-friction, and to release the driving-wheel when said sprocket-wheel is moved in the opposite direction, substantially as shown and described.

7. In a rowing-machine, the combination, with the upright shaft 61, carrying a worm 78, and means for operating said shaft, of the indicating mechanism consisting of the worm-gear 79, carrying a pin 80, pinions 81 and 82, gear 83, and movable hand 77, and dial-face, substantially as shown and described.

EDWARD J. KERNS.

Witnesses:
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