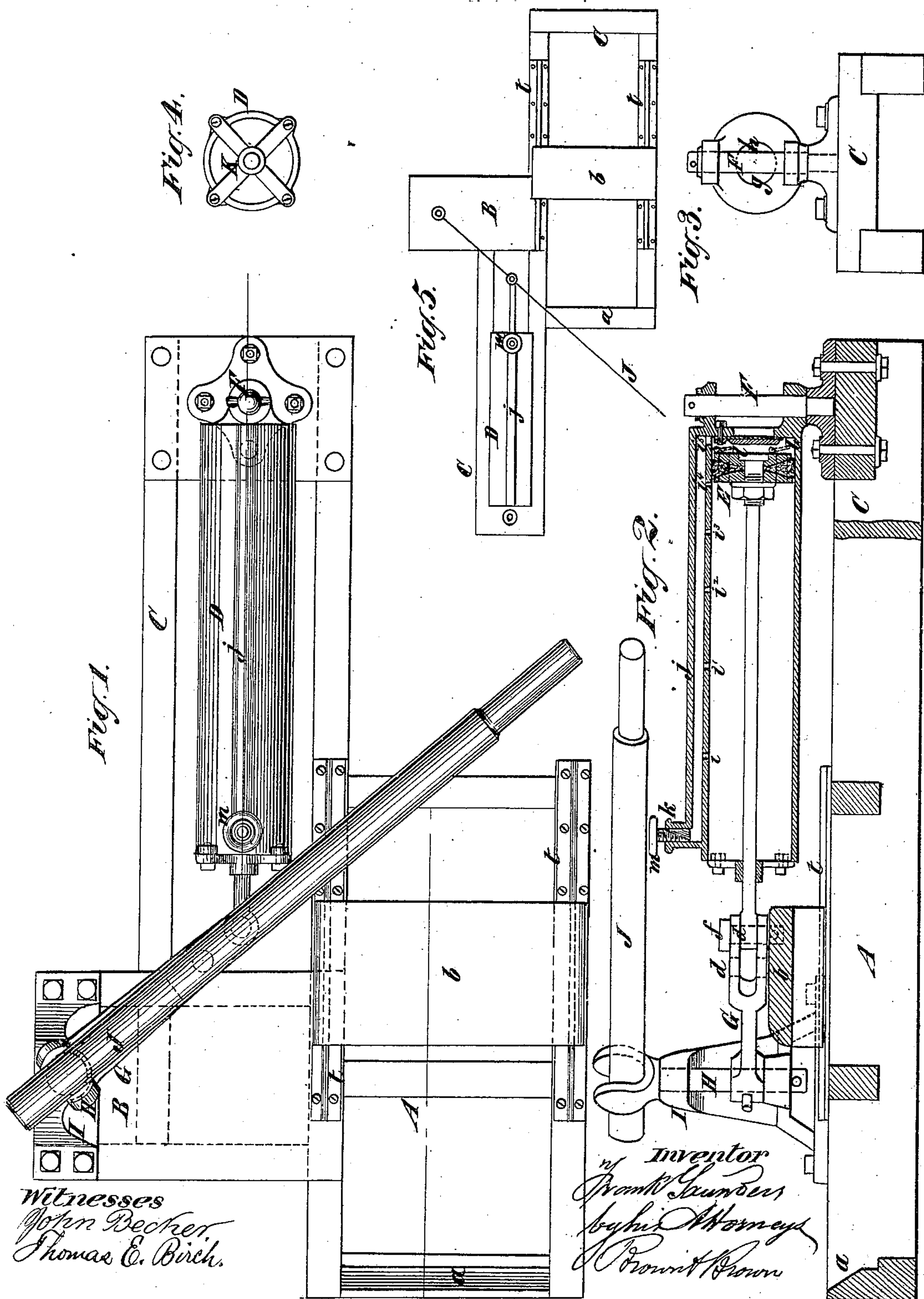


F. SAUNDERS.  
Exercising-Machine.

No. 228,277.

Patented June 1, 1880.





# UNITED STATES PATENT OFFICE.

FRANK SAUNDERS, OF BROOKLYN, NEW YORK.

## EXERCISING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 228,277, dated June 1, 1880.

Application filed November 22, 1879.

*To all whom it may concern:*

Be it known that I, FRANK SAUNDERS, of Brooklyn, in Kings county, and State of New York, have invented certain new and useful  
5 Improvements in Exercising Apparatus, of which the following is a specification.

My invention relates particularly to apparatus whereby exercise similar to that obtained in rowing a boat is afforded.

10 The object of the invention is to produce a simple and cheap apparatus destitute of resisting mediums, such as springs, which are always liable to get out of order, and independent of the use of water, because of the liability  
15 of the latter to leakage and its inelasticity.

To this end my invention consists in the combination, with an air-pump forming a resisting medium and provided with an air inlet and escape communicating with the atmosphere, of a lever susceptible of movement like  
20 an oar, whereby a simple and desirable exercising-machine having a yielding action is produced.

It also consists in the combination, with the  
25 above, of means whereby the operating-lever may act upon the air-pump when making its working stroke, and may move free of resistance, save that due to friction when making its return stroke, so as to simulate the return  
30 stroke of an oar.

It also consists in the combination, with the air-pump and operating-lever, of an adjustable air-vent in the air-pump communicating with the atmosphere, whereby the apparatus may be  
35 adjusted to suit the strength of different persons.

It also consists in the combination, with the air-pump and operating-lever, of an adjustable connection, whereby the apparatus may be  
40 adjusted to suit the strength of different persons.

It also consists in the combination, with the air-pump and operating-lever, of means whereby a resistance varying progressively through  
45 the length of the stroke, simulating the resistance offered in the stroke of an oar, is offered to the operating-lever in its working stroke.

In the accompanying drawings, Figure 1 is a plan or top view of an exercising apparatus  
50 embodying my invention. Fig. 2 is a longitudinal section taken centrally through the

part occupied by the person in exercising, and also centrally through the air-pump and its appurtenances. Fig. 3 is a view of the rear end of the air-pump and its appurtenances. 55 Fig. 4 is a view of the forward end of the air-pump, and Fig. 5 is a plan or top view of a modified form of the apparatus.

Similar letters of reference denote corresponding parts in all the figures. 60

A B C designate the base-piece of the apparatus, which may be made in any suitable manner, of wood, to conduce to cheapness and lightness; and it consists, essentially, as here shown, of three connected portions—a portion, A, containing foot-rests *a* and a seat, *b*, for occupancy of the person exercising, a portion, B, for supporting a fulcrum for the operating-lever, and a portion, C, for the support of the  
65 air-pump. 70

As here represented, the apparatus is made to afford the exercise obtained from a single oar or sweep, but may, by mere duplication of parts, be made to afford the exercise obtained from a pair of oars or sculls. It may also have  
75 any desirable kind of seat—stationary, rocking, or sliding. I have shown a sliding seat as possibly the most desirable. It has grooves or ways on the under side, fitting tracks *t*, arranged on the portion A of the base-piece of  
80 the apparatus, and is free to move back and forth thereon.

The air-pump consists, essentially, in this example of my invention, of a cylinder, D, provided with certain appurtenances, fitted with  
85 a piston, E. Its piston-rod is connected by certain devices with an operating-lever, J, grasped by the person desiring exercise, and serving, when moved forward and backward, to force or pump air through certain outlets  
90 or air-escapes in the air-pump.

The resistance offered to the escape of the air requires no little power to overcome it, and therefore entails much exercise in moving the lever, so as to effect the working stroke  
95 of the air-pump.

The cylinder D is connected at the rear or farther end from the seat *b* to a stud or post, F, erected on the portion C of the base-piece, so that it may swing to and fro laterally there-  
100 on to accommodate itself to the travel of an arm, G, extending radially from an oscillating



upright shaft, H, and to which the rod of the piston E is connected.

The shaft H is supported in a suitable frame, I, erected on the portion B of the base-piece, and provided at the top with a fulcrum-piece made, in this instance, like a rowlock, for the reception of the operating-lever J.

The rod of the piston E may be connected at different points to the arm G by passing the connecting-pin *f* through different holes *d* in the latter, in order to change the leverage and vary the resistance offered by the air-pump suitably to the strength of different persons.

The pump D is arranged behind the operating-lever J, and the said lever has to push the piston E through its working stroke.

The cylinder D, as here shown, is open at the end nearest the operating-lever J, and furnished with a spider and bearing, K, for steadying the piston-rod. At the other end it is closed, with the exception of an air-inlet opening, *g*, fitted with an inwardly-opening valve, *h*.

In the wall of the cylinder are a series of air escapes or outlets, *i i' i<sup>2</sup> i<sup>3</sup> i<sup>4</sup> i<sup>5</sup>*. Though a single air escape or outlet might suffice, I prefer to employ this series, and to arrange them at successively shorter distances apart toward the rear or closed end of the cylinder, and provide a pipe or conduit, *j*, along the exterior of the cylinder communicating with them, and provided with a terminal air-vent, *k*, communicating with the atmosphere.

As the piston makes its forward or working stroke it forces the air out of the air-escapes *i i' i<sup>2</sup> i<sup>3</sup> i<sup>4</sup> i<sup>5</sup>* into the conduit *j* and through the vent *k* at the beginning of the stroke through all of them, and, after passing them successively, through those remaining in beyond it. After passing any of these escapes the air has egress through the same from the conduit *j*, besides through the vent *k*. Therefore the air has a gradually-increasing facility of egress, and the piston is offered a gradually-decreasing resistance to the end of its stroke. The said series of air-escapes, owing to their arrangement, cause the resistance to the piston to approximately correspond to that obtained from the proper stroke of an oar, thus enhancing the interest of the exercise derivable from it.

In the apparatus shown in Fig. 5 the air-pump is reversed. Hence the air is drawn into the cylinder through the air-openings *i i' i<sup>2</sup> i<sup>3</sup> i<sup>4</sup> i<sup>5</sup>* by the piston during its working stroke. These air-openings will, in this case, need to be arranged successively nearer in the direction of the open end of the cylinder D. As the piston passes each air-opening it will have a greater area through which to draw in air, and hence will have less and less resistance offered to it as it proceeds toward the end of its working stroke. The conduit *j* and vent or inlet *k* are less necessary in this example of my invention.

Without any material modification of the

air-pump shown in Figs. 1, 2, 3, and 4, it may be moved forward of the operating-lever; but then the rod of the piston E will have to work through the closed end of the cylinder D, and the air-inlet opening *g* and valve *h* will need to be located at one side of the piston-rod.

If means for adjusting the ingress and egress of air into and from the vent or inlet *k* be employed, the resistance offered to the piston may be suited to the strength of different persons with or without changing the connection of the piston-rod and without affecting the variations of the resistance throughout the stroke of the piston. I have shown for this purpose a screw, *m*, fitted in the vent or inlet *k*, and having in one side a longitudinal groove flaring toward the inner end, so that by the adjustment of the screw up or down it will enlarge or contract the vent or inlet. On the return stroke of the piston the valve *h* opens and, admitting the ingress of air into the cylinder behind the piston, allows the latter to be moved back with little or no resistance, save that due to friction, and simulates the return stroke of the operating-lever J to the return stroke of an oar.

In lieu of or in addition to the valve *h* in the closed end of the cylinder a valve or valves, *l*, fitted to an opening or openings through the piston, may be employed to effect a balance of pressure on both sides of the piston during its return stroke.

By my invention I produce a simple and cheap exercising apparatus, whereby the stroke of an oar is almost exactly simulated, one dispensing with the use of elastic bands and other springs, which are constantly becoming so disordered as to be unfit for use, and one obviating the use of water, which is objectionable, because of its inelasticity and tendency to leakage.

I am aware that exercising-machines have been employed comprising a liquid-cylinder and piston, a pipe for effecting communication between the two ends of the cylinder, a valve for regulating the flow of liquid through said pipe, and a valve in the piston for relieving it upon its return stroke; and I do not therefore claim this as my invention.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with an air-pump forming a resisting medium, and provided with an air inlet and escape communicating with the atmosphere, of a lever susceptible of movement like an oar, whereby a simple and desirable exercising-machine having an elastic or yielding action is produced, substantially as specified.

2. The combination of an air-pump forming a resisting medium, consisting of a cylinder having one open end and one closed end, the latter fitted with a valve permitting the ingress of air, and a lever susceptible of movement like an oar, substantially as and for the purpose specified.



3. The combination of an air-pump forming a resisting medium, consisting of a cylinder having one open end and a piston provided with an opening, and a valve controlling the same and admitting the ingress of air through the piston, so as to escape to the external atmosphere, and a lever susceptible of movement like an oar, substantially as and for the purpose specified.

10 4. The combination, with an air-pump and an operating-lever susceptible of movement like an oar, of an adjustable air vent or inlet communicating with the atmosphere, whereby the resistance offered to the piston of the air-pump  
15 may be adjusted to suit persons of different strength, substantially as specified.

5. The combination, with an air-pump and a lever susceptible of movement like an oar, of an air vent or inlet communicating with the  
20 atmosphere, and a screw having a longitudinally-flaring groove fitted in the said vent or inlet, substantially as and for the purpose specified.

25 6. The combination, with an air-pump and a lever susceptible of movement like an oar,

of an adjustable connection between the piston-rod of the air-pump and the fulcrum-piece of the lever, whereby the resistance offered by the air-pump may be adjusted to suit persons of different strength, substantially as specified. 30

7. The combination, with an air-pump and a lever susceptible of movement like an oar, of means whereby a resistance varying progressively through the length of the stroke may be offered by the air-pump, substantially  
35 as specified.

8. The combination, with an air-pump and a lever susceptible of movement like an oar, of a series of air-escapes arranged at successively nearer distances to each other, and a  
40 conduit communicating with said air-escapes, and having a vent common to them, whereby a resistance varying progressively through the length of the stroke is offered by the pump, substantially as specified.

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Witnesses:

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