

(No Model.)

W. J. O. BRYON, Jr.  
AIR CYLINDER.

No. 483,529.

Patented Oct. 4, 1892.

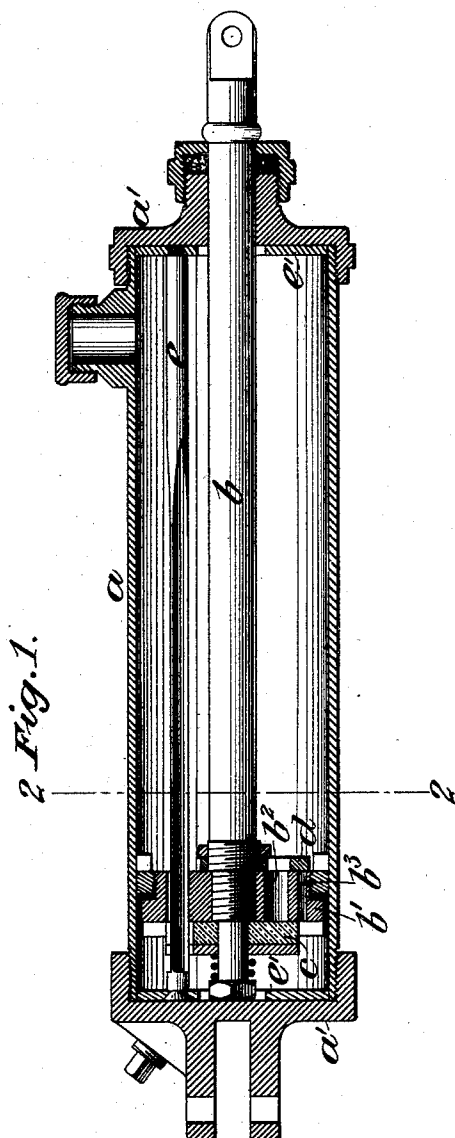


Fig. 2.

Fig. 4.

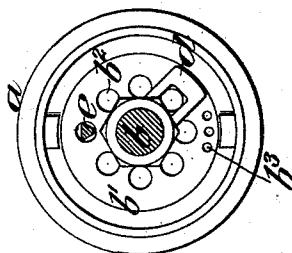


Fig. 3.



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# UNITED STATES PATENT OFFICE.

WILLIAM J. O. BRYON, JR., OF NEW YORK, N. Y.

## AIR-CYLINDER.

SPECIFICATION forming part of Letters Patent No. 483,529, dated October 4, 1892.

Application filed September 11, 1891. Serial No. 406,388. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM J. O. BRYON, Jr., a citizen of the United States, and a resident of the city, county, and State of New York, have invented new and useful Improvements in Fluid or Air Cylinders, of which the following description, taken in connection with the drawings herewith accompanying, is a specification.

My invention relates to cylinders which in the present instance are more especially adapted for use in connection with exercising-machines to serve as the resisting power in the same, although they may be equally applicable to other purposes.

The invention consists of improvements upon Letters Patent No. 446,426, granted to me February 17, 1891, the object of my present invention being to provide means whereby the resistance offered to the piston in passing from one end of the cylinder to the other during the stroke of the lever or oar adapted to be connected therewith may be automatically adjusted from a greater degree of pressure at the beginning of the stroke to a gradually and uniformly decreasing degree of pressure toward the end of the stroke, thus making the resistance offered to the "lever" or "oar," so called, connected with the rod or stem of the piston identical with that when rowing in practice. This object I attain by the combination, with the piston, of an adjusting device of peculiar construction, as will hereinafter be described in detail, and pointed out in the claims.

Referring to the drawings, Figure 1 represents a longitudinal sectional view through the center of a cylinder embodying my invention, showing the piston at the end of its stroke; Fig. 2, a cross-section through line 2 2 of Fig. 1, showing the piston-adjusting devices, &c.; Fig. 3, a cross-section of the adjusting rod or device through line 3 3 of Fig. 5, and Fig. 4 a cross-section of the same through line 4 4 of Fig. 5. Fig. 5 represents a detail view of my improved piston or stroke adjusting device removed from its position in the cylinder.

To explain in detail, *a* represents the cylinder; *a'* *a'*, the cylinder-heads; *b*, the piston-rod; and *b'* the piston, provided with a series of openings *b*<sup>2</sup> therein, which are adapted to be

closed by the valve (represented at *c*) at the forward stroke of the piston and opened to allow the water or air to pass through the same at the backward stroke of the piston in the usual manner, as well understood by those skilled in the art. The piston is also provided with a second series of openings *b*<sup>3</sup>, arranged therein at a point outside the periphery of the valve *c* in a manner to allow the water or air to pass through the same at the forward stroke of the piston and when the openings *b*<sup>2</sup> are closed by the valve *c*. The pressure to the piston at its forward stroke may be regulated by increasing or diminishing the number of the openings *b*<sup>3</sup>, as will obviously appear, and for this purpose I provide an adjusting device *d*, consisting of a movable plate supported on the piston-rod, as more clearly shown in Fig. 1, which is adapted to be moved or adjusted to cover any desired number of said openings, according to the degree of pressure desired at the forward stroke of the piston, as will be readily understood.

By means of the openings *b*<sup>3</sup> and the movable plate *d*, as described, the pressure to the piston at its forward stroke is adjusted to the same degree for its entire length; but according to my present invention I provide a device for use in combination with the cylinder and its several parts, as described, or others of similar construction, that will give a varying degree of pressure to the piston at its forward stroke. This device consists of a rod *e*, which is arranged longitudinally within the cylinder and extends through one of the openings *b*<sup>2</sup> in the piston and a corresponding opening in the valve *c*. The circumference of this rod at its forward end is such as to close the opening in the piston and from a point near its forward end gradually tapers or diminishes in size toward its opposite or rear end, as clearly shown, in order that the amount of space between the rod and the wall of the opening in the piston through which it passes may be gradually increased from a minimum amount at the beginning of the backward stroke to a maximum amount at the end, thus gradually relieving the pressure to the stroke by reason of the constantly-increasing amount of fluid or air allowed to pass through said opening, as will be readily understood.

The rod *e* in the present instance shown is provided with a supporting head or plate *e' e'* at each end thereof, which are adapted to be seated in the cylinder-heads, as shown in Fig. 1, to support said rod, although it is obvious that it may be supported in or by the cylinder-heads or other suitable means without departing from the spirit of my invention. It is also obvious that the form of the rod *e* in that portion where it is reduced in size, which is illustrated in the present instance as triangular, may be round its entire length or of any other desired form without departing from the spirit of my invention.

Having thus set forth my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A cylinder provided with a piston having one or more openings therein and an adjust-

ing-rod of gradually-decreasing dimensions from a point at or near one end toward its opposite end located within the cylinder and extending through one of said openings in the piston, substantially as described, and for the purpose set forth.

2. A cylinder provided with a piston having openings therein, a valve in rear of said piston having an opening therein coinciding with one of the openings in the piston, and a tapering rod extending through one of the openings in the piston and the coinciding opening of the valve, substantially as described, and for the purpose set forth.

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