

J. LAUBEREAU.  
Air-Motors.

No. 153,440.

Patented July 28, 1874.

FIG. 2.

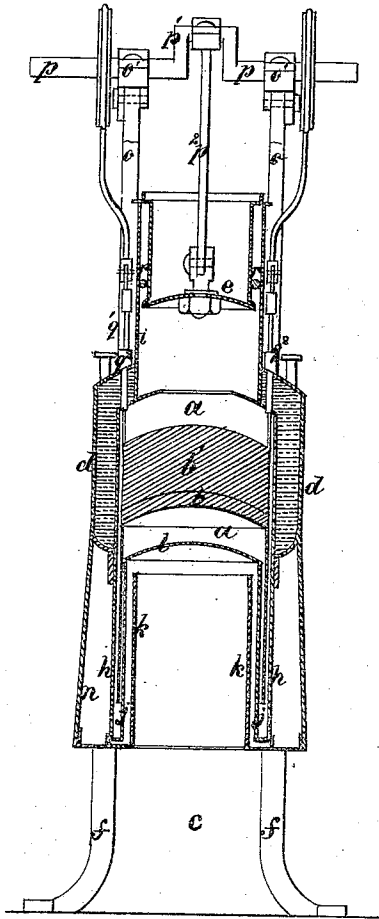


FIG. 3.

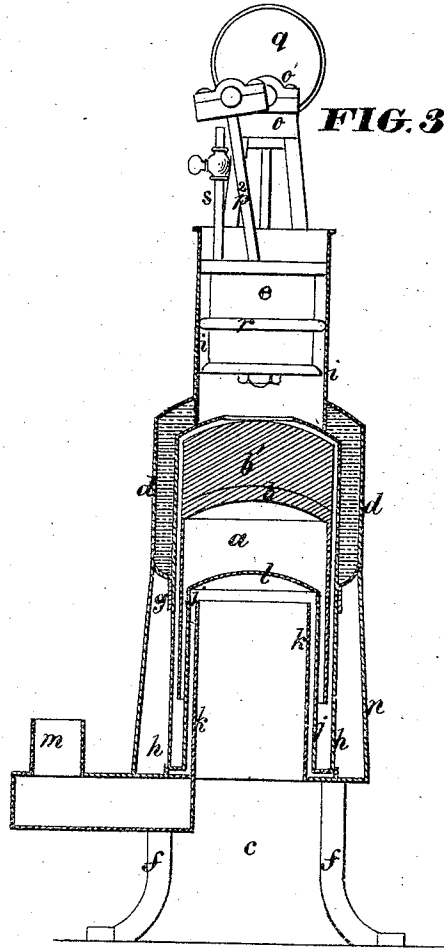
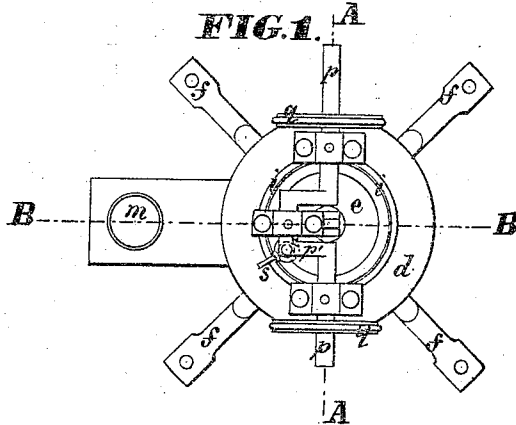


FIG. 1. A



WITNESSES

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# UNITED STATES PATENT OFFICE

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## IMPROVEMENT IN AIR-MOTORS.

Specification forming part of Letters Patent No. 153,440, dated July 28, 1874; application filed January 8, 1874.

To all whom it may concern:

Be it known that I, JOSEPH LAUBEREAU, of Paris, France, have invented certain new and useful Improvements in Air-Motors, to which the name of LAUBEREAU Air-Motor is given; and I do hereby declare that the following is a full and exact description thereof, reference being made to the three figures of the accompanying drawing, and to the letters thereon marked.

The nature of my invention relates, first, to the alternative heating and cooling of the same body of air, whereby I obtain an alternative pressure and partial vacuum applied to motive purposes; secondly, to the mechanical parts and general arrangements of same for the above purpose.

In the accompanying drawing, Figure 1 is a plan of my air-motor; Fig. 2, a front elevation in section through A A, Fig. 1; and Fig. 3, a lateral elevation of the same in section through B B, Fig. 1.

The air, alternately heated and cooled, is contained in a metallic chamber, *a*, in which is suspended a bell, *b*, actuated by a to-and-fro vertical motion. The lower part of this chamber is heated by a lamp, or any other appropriate means, placed at *c*, and the upper part is constantly maintained cooled by a supply of water contained in the jacket *d*. When the bell is raised, as shown in Fig. 3, the air driven below becomes heated, and its pressure is applied to raising the piston *e*. When the bell is lowered the supply of warm air is driven in the upper part of the chamber, where it is cooled by the refrigerating surfaces. A partial vacuum is thus formed, which is made available for drawing down the piston *e*, and thus a continuous motion is obtained, the force of which will depend on the capacity or proportion of the machine. The top of the bell *b* is covered with a thick body, *b'*, of plaster-of-paris, or other non-conducting substance, to prevent transmission of heat through the material of the bell from the lower to the upper part of the chamber *a*. In the above-mentioned figures *f* are the legs, on which the motor is erected by means of a ring, *g*, fitted round the outer cylinder *h*. The upper part

of this cylinder contains the water-jacket *d* and the working-cylinder *i*. Its lower part is turned inwardly in the shape of an internal concentric cylinder, *j*. Internally it constitutes the air-chamber *a* above mentioned. The relative positions of the working-cylinder *i* and air-chamber *a*, one above the other, are not essential to the invention. *k* is an open-ended cylinder placed within *j* for the purpose of causing the heat to strike direct on the dome *l* of cylinder *j*, from whence it passes down between *j* and *k*, and finally escapes into the atmosphere by the pipe *m*. *n* is an external lower casing for the purpose of maintaining an equal temperature around the cylinder *h*. *o* is a metallic framing attached to the cylinder *h*, with bearings *o'* *o'*, in which the driving-shaft *p* revolves. The crank *p'* of this driving-shaft is connected by a rod, *p<sup>2</sup>*, to a joint fixed in the bottom of the piston *e*, and on either end are keyed two eccentrics, *q* *q*, for the purpose of imparting the to-and-fro motion to the bell *b*, by means of the rods *q<sup>1</sup>* *q<sup>1</sup>* passing through the stuffing-boxes *q<sup>2</sup>* *q<sup>2</sup>*. *r* is an india-rubber or leather hollow ring placed round the piston *e* for the purpose of keeping it tight during its to-and-fro motion in the cylinder. The usual friction attendant on the application of india-rubber is avoided by this arrangement, since, as it will be readily understood, this hollow ring rolls up and down on the piston, and does not rub. *s* is a small pipe, provided with a stop-cock, attached in the bottom of the piston *e* for the purpose of stopping the engine by establishing a communication from the atmosphere to the chamber *a*. In practice, I prefer placing this pipe, with its stop-cock, vertically on the water-jacket in such a manner that the pipe traverses the water and opens direct into said chamber *a*. I have also used with good effect, instead of the water-jacket, a body of felt or other capillary material constantly saturated with water from a suitable reservoir, so as to cool the upper part of the air-chamber by evaporation.

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

1. The bell *b*, dome *l*, and trunk *k*, combined

and arranged, as described, to confine the heat, and cause it to act directly on the body of air within the chamber *a*, as explained.

2. The combination of the air-chamber *a*, bell *b*, cooling device *d*, piston *e*, crank-shaft *p*, and connecting-rods *p*<sup>2</sup> *q*<sup>1</sup>, operating substantially as set forth.

In testimony of which invention I hereunto set my hand this 10th day of November, 1873.

J. LAUBEREAU.

Witnesses:

P. PARBURY,  
DESHAYES.