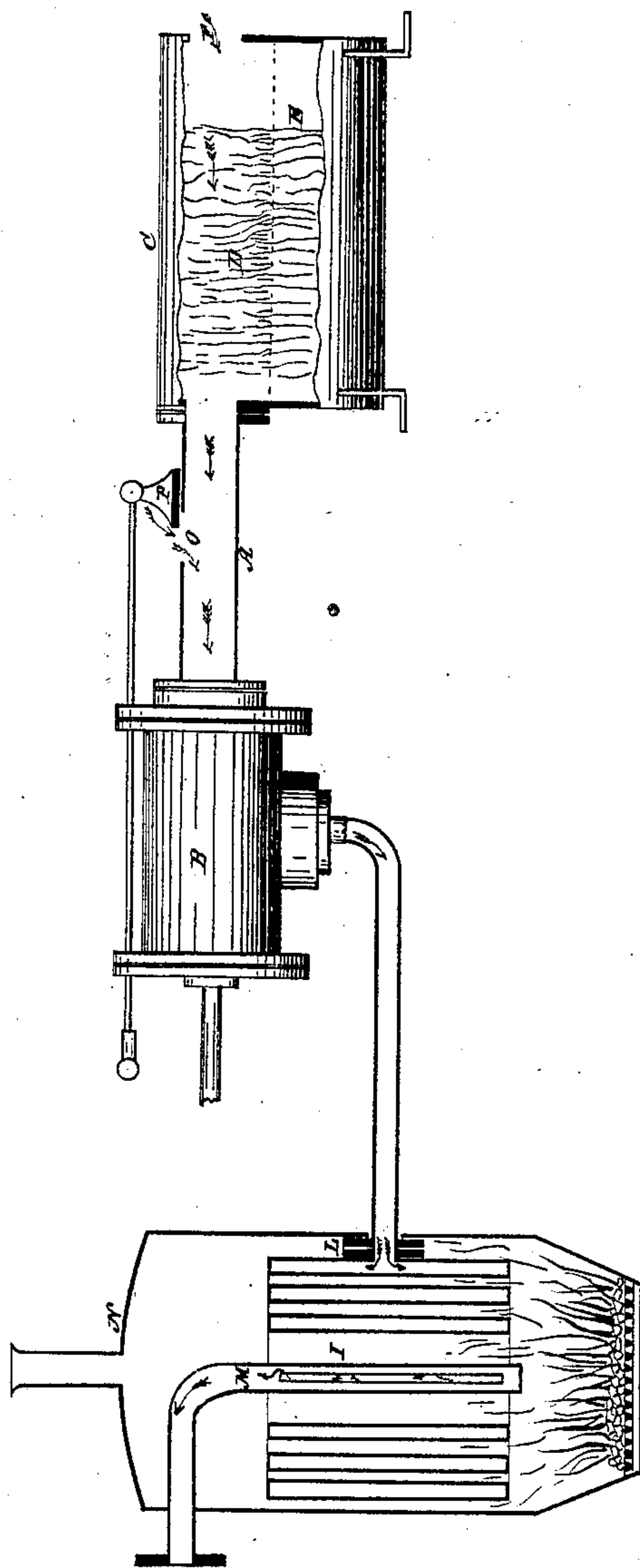


*H. M. Paine,*

*Air Engine,*

*No 22,219.*

*Patented Nov. 30, 1858*



# UNITED STATES PATENT OFFICE.

HENRY M. PAINE, OF WORCESTER, MASSACHUSETTS.

## AIR-ENGINE.

Specification of Letters Patent No. 22,219, dated November 30, 1858.

*To all whom it may concern:*

Be it known that I, HENRY MUNRO PAINE, of the city and county of Worcester and State of Massachusetts, have invented a  
5 Method of Heating Air and Applying the Same for Purposes of Motive Force; and I do hereby declare that the following is an exact and full description thereof, reference being  
10 had to the annexed drawings, making part of this specification.

The nature of my invention consists, first, in moistening atmospheric air previous to its entrance into the pump so as to refrigerate and render it highly sensitive at comparative  
15 low temperatures when pressed into the heater, and thus obtain an expansive force possessing great elasticity and lubricating property not realized in the use of air or the gases in their normal condition, and in  
20 modifying the moist condition of the air by the admixture of dry air.

In order to moisten the air the induct pipe (A) of the pump (B) is connected with a tank (C), the connection being made above  
25 the center of the tank. This tank is filled with wicking, (or other substances) (D) having capillary properties, hanging vertically, which is kept wet by having their lower ends submerged in water (E). In  
30 the end of the tank and opposite to the pump connection is an aperture (F,) corresponding in size with the pump connection. It will be seen that by such an arrangement the air entering the pump must  
35 traverse the wet interstices of the fibrous matter interposed between the opening (F) and the valve (H) and by its impingement vaporize the water and charge itself with moisture.

40 As the form of all engines actuated by aeriform bodies is as the difference between the diameter of the pump and cylinder it is important that the air should be drawn through the moistening bodies into the  
45 pump instead of forcing air in its normal condition through the moistener into the heater, for the act of moistening is also one of refrigeration.

I have found that condition of moisture

most favorable that approaches the condi- 50  
tion of the human breath and which is readily attained by causing the air to traverse some fifteen or twenty times the cubic capacity of the pump, of wet surfaces, under  
55 such velocities as will not abrade or mechanically separate the aqueous particles.

As all aeriform bodies traverse conduits with but a comparative small portion of their quantities in contact with the walls, it becomes necessary, in order to insure the  
60 best results, to reduce the space between the heated surfaces to the least possible measurement. In order to accomplish this result and secure free passage of the air currents and also provide a great amount of fire sur- 65  
face in small space, I construct the heater in the form of a hollow copper ribbon (I) concentrically coiled with a space between each coil, equal to that of the air passages, as draft spaces. The moist air is made to en- 70  
ter this coil on the outer terminations (L) and traverse its curves (M) where the cylinder pipe connects. The coil is covered with a jacket and dome (N) and the fire placed at a suitable distance below the coil. 75

In order to render the expansive force of the moist air variable and subject to the necessities of unequal resistances I make an opening (O) in the pipe (A) between the  
80 tank and pump. This opening is closed by a valve (P) which by any suitable device is connected with the governor of the engine and by its mutations made to open or close, thus admitting the air in its normal condition to mingle with the moist air and modify 85  
its properties.

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

The simultaneous moistening and refrigerating of the air previous to its entrance 90  
into the pump in combination with the modifying valve P substantially in the manner and for the purposes herein described.

HENRY M. PAINE.

Witnesses:

SAMUEL SMITH,  
GEO. W. WHEELER.