B. HERSHEY.

AIR AND STEAM-BLOWERS FOR FURNACES.

No. 187,381. Patented Feb. 13, 1877.

Fig. 1.

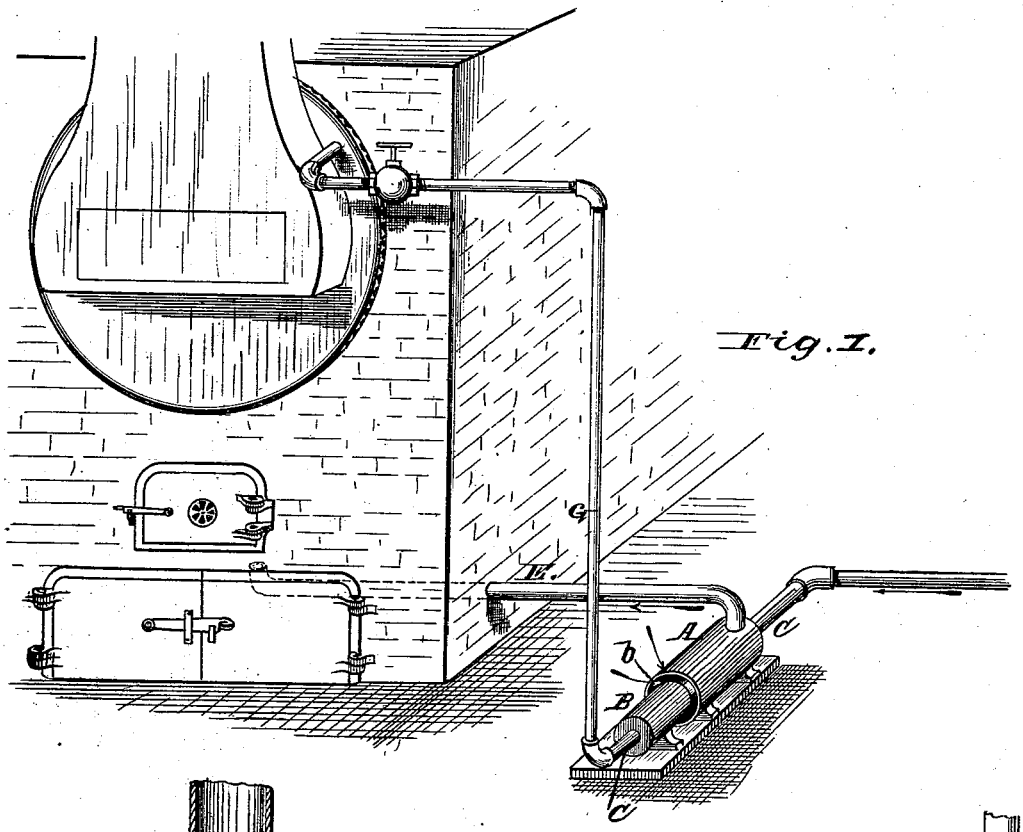
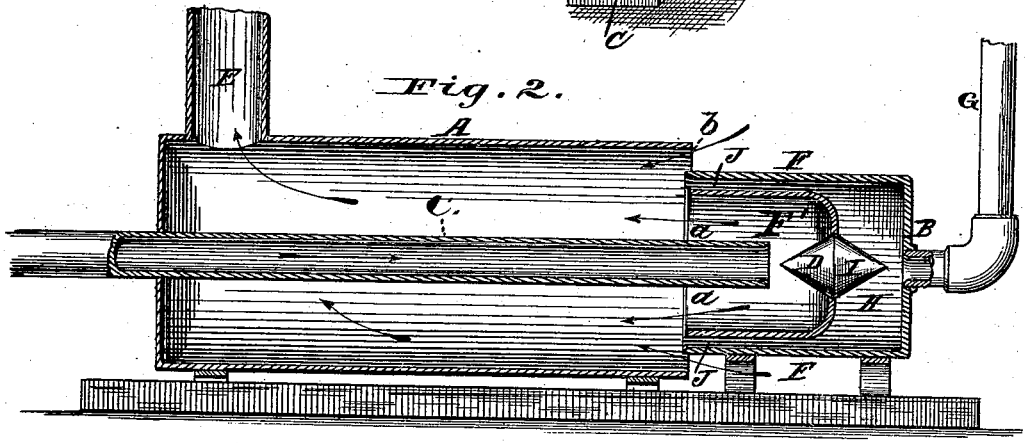


Fig. 2.



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BENJAMIN HERSHEY, OF ERIE, PENNSYLVANIA.

IMPROVEMENT IN AIR AND STEAM BLOWERS FOR FURNACES.

Specification forming part of Letters Patent No. **187,381**, dated February 13, 1877; application filed January 16, 1877.

To all whom it may concern:

Be it known that I, BENJAMIN HERSHEY, of Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Air-Blowing Apparatus for Steam-Engine Furnaces, of which the following is a specification:

The proper supply of air to furnace-grates is a matter of very great importance. I have designed an apparatus which I call a blower, the special adaptation of which not only produces the best results in giving the proper supply of heated air to the fuel for combustion, but such supply is evenly mingled with steam or vapor to increase the combustion.

The blower is of simple construction, and can be conveniently applied to stationary, marine, or locomotive boiler-furnaces. A distinguishing feature of my invention is embraced in the employment of a chamber in which the steam from the exhaust and the boiler is caused to act by suitable pipes and open cylinders through a clear and unobstructed space, within which cylinders the air is taken to give the supply under the grate. The cylinders of the blower are not open at both ends, but only at their junction ends, so that the blower may be said to be formed of two parts, an open air-chamber and an open blower, and these two parts, with the steam-pipes, are combined so as to produce highly satisfactory results.

In the accompanying drawings, Figure 1 represents an end elevation of a steam-boiler furnace, with my invention applied thereto; Fig. 2, a horizontal section of the apparatus or blower enlarged.

A very marked advantage of my blower consists in its adaptation for continuing the supply of air to the furnace when the engine is not running, by opening the blower-connection direct with the boiler.

Two cylinders or chambers form the blower. One of these, A, is the largest and forms the air-chamber; while the other, F, is much smaller and forms the blower, because within this the steam is caused to act. These two cylinders or chambers are not joined together, but form an open junction at their open ends. This junction may be a sort of telescoping one, in which the open end of the blower may extend within the open end of the air-chamber, or they may, as shown, be slightly separated; in either case the effect is the same, in leaving an open space, *b*, through which the air is supplied to the air-chamber and from thence to the furnace. This space is formed by the difference in the diameters between the two cylinders or chambers, as shown, but it may be obtained in any other way. The outer ends of these two cylinders or chambers are closed, in order to form the air-chamber and blower. A small pipe, C, extends through the air-chamber past its open end and into the blower. This pipe connects with the exhaust and delivers the exhaust steam directly against a cone or deflector, D, fixed to the inner side of the closed end of the inner cylinder, F′, which will be hereinafter described, the effect of which is to turn back the steam through the open end of the blower and through the space *a* into and through the air-chamber. This air-chamber connects by suitable pipe or pipes, E, with the ash-pit chamber. The steam, therefore, passing into and through the air-chamber must draw in the air through the open junction space and force it into the furnace to assist and keep up a proper combustion. The open junction space *b* must, of course, be sufficient to admit the required quantity of air, and its area may be increased or diminished, if found necessary, by suitable devices in a manner well understood. The cone D stands in such relation to the open end of the exhaust-steam pipe as to give the best effect, and the direction of the steam from the blower and the drawing of the air into the air-chamber are indicated by the arrows.

The blower as described is complete in connection with the exhaust, but this does not admit of increasing the power of the blower, which is often very desirable. It is for this purpose that I make the blower a sort of double one, by adapting it for direct use with the boiler. This I accomplish by combining an outer cylinder with the inner blower—that is to say, I form the blower of a double cylinder with an annular space between them, and an end chamber, the outer cylinder F being longer than the inner one F′, and like the latter has a closed end and an open end, the former being connected by a pipe, G, directly with the boiler, and entering the head space H between the two closed heads, delivers the

steam upon a cone or deflector, I, secured to the outer side of the inner head, and preferably just opposite to the inner cone D, so that the steam is forced out through the annular space J of the double blower and past the space *a* into the air-chamber. By this means I can not only increase the force of the draft of the furnace, but the volume of the air and steam in the combustion-chamber. The head space H and the annular chamber J may be suitably proportioned, and the open end of the outer cylinder should terminate with that of the inner one, and both be in proper relation to the "take in" air-space.

The principle upon which the air is drawn into and forced through the long chamber will be well understood; and the steam acting upon the body of air contained in the supply-chamber drives it into the chamber under the grates, the steam of course mingling with the air and assisting combustion. By lengthening the air-chamber, and dividing that portion of the exhaust-pipe passing through it into smaller and longer tubes, considerable hot and pure water (because distilled) from the steam may be saved for re-use, while at the same time the air will be proportionately heated by the increased heating surface. The amount of air admitted to the grate may be regulated by suitable valves.

Having thus described my invention, what I claim is—

1. The combination, with a steam-boiler furnace, of a blower having direct connection with the exhaust-steam pipe of the engine, with the live steam space of the boiler and with the ash-pit of the furnace, substantially as described, for the purposes set forth.

2. The combination, in a blower for furnaces, of the main cylinder A, live-steam cylinder F, inner cylinder F′, and cones D and I, and pipe C, substantially as and for the purpose described.

3. The combination, with a boiler-furnace and the exhaust-steam pipe, of an air-chamber and a blower, having a clear space at their open junction ends into and through which the supply of air is made, by the force of steam, substantially as described.

4. The combination, with the air-chamber and the furnace, of the exhaust-steam pipe, the blower cylinder F′, and its cone D, arranged in relation to each other substantially as and for the purpose described.

5. The combination, with the air-chamber and the furnace, of the double blower, consisting of the inner and outer cylinders, the annular space, the outer cone, and the steam-pipe connecting the boiler, substantially as described.

6. A blower and an air-chamber formed with the clear space *b*, and connected with each other, the furnace, and the exhaust-steam pipe, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand and seal in the presence of the subscribing witnesses.

BENJAMIN HERSHEY. [L. S.]

Witnesses:
GEO. P. GRIFFITH,
M. HOGAN.