B. F. STURTEVANT.

COMPOUND AIR HEATER AND STEAM CONDENSER.

No. 100,241. Patented Feb. 22, 1870.

Fig: 1.

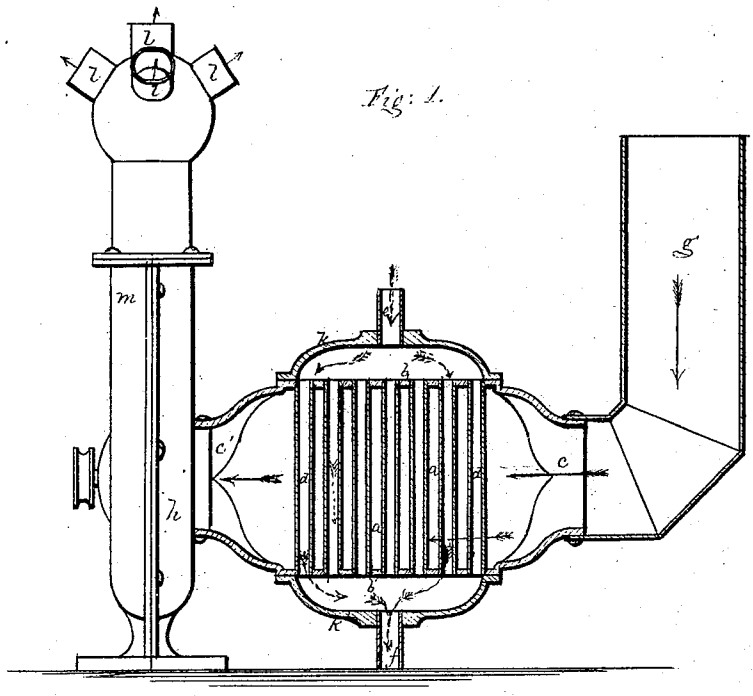
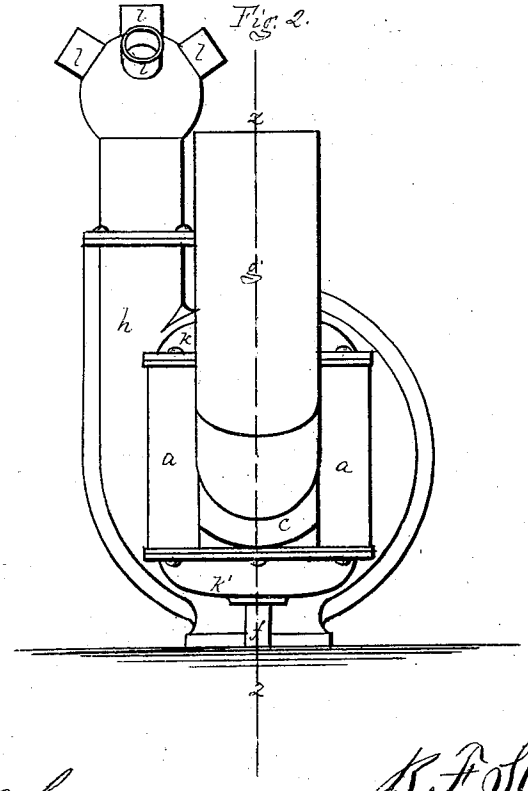


Fig: 2.



Witnesses: J. B. Crosby, C. Warren Brown

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United States Patent Office.

B. F. STURTEVANT, OF JAMAICA PLAIN, MASSACHUSETTS.

Letters Patent No. 100,241, *dated February* 22, 1870.

IMPROVEMENT IN COMPOUND AIR-HEATERS AND STEAM-CONDENSERS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, B F. STURTEVANT, of Jamaica Plain, in the county of Norfolk, and State of Massachusetts, have invented an Improvement in Air-Surface Condensers; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

In that class of apparatus in which air moved rapidly under the action of a rotary blower is used to condense steam, it is necessary that the metal used to separate the air and steam-currents should be made very thin, in order to conduct heat rapidly, and it is further necessary, to give sufficient strength to the metal, that it should be used in the form of small tubes, through which the steam passes, the air surrounding and passing along the outside of the tubes.

To produce the best results, it may be desirable that the tubes should be arranged in a vertical or inclined position, instead of in a horizontal position, as shown in my patent for blast-apparatus, dated July 13, 1869, numbered 92,490, and in my patent for a compound air-heater and condenser, of even date herewith, so that the water of condensation will drain rapidly from them, and not remain therein as it will in horizontal tubes, lessening materially the effective conducting-surface of the tubes with which the steam is in contact.

My invention consists in the combination of a rotary blower with a condenser made with vertical or inclined tubes, through which steam is made to pass, the tubes being inclosed in a case, and the top and bottom ends of the tubes opening out of and emptying into chambers separate from the air-space in which the tubes are contained, one of said chambers receiving the steam from a conducting-pipe, and the other or bottom chamber receiving the water of condensation and the uncondensed steam, which then flow off through a suitable conducting-pipe, when the blower is arranged to force or to draw air rapidly through the air-space surrounding the tubes, the operation causing the steam to condense by giving up its heat to the air, which heated air may be impelled by the blower to any location for any desired purpose.

The drawings represent, in Figure 1, a vertical sectional elevation of my improved air-surface condenser, the section being taken in the plane of the line *z z*, Figure 2.

a denotes the condenser-case, made with tube-heads *b* and air-entering and delivery nozzles *c c'*.

Tubes *d* are secured in the tube-heads *b* either in a vertical or in an inclined position, with their open ends communicating with spaces made by the covering-bonnets *k k'*.

The inlet-steam pipe *e* enters the space under bonnet *k*, and the outlet-pipe *f* proceeds from the space above bonnet *k'*, the direction of the currents of steam and the water of condensation being shown by the dotted arrows seen in the sectional part of fig. 1.

To the nozzle *c*, an air-inlet pipe, *g*, is attached, and the suction-entrance of the blower *h* is attached to the other nozzle *c'*, so that the action of the blower will obviously be to draw air through pipe *g*, and cause it to pass around the outside of the tubes *d*, through nozzle *c'*, to and through the series of delivery or distributing-pipes, *l*, attached to the blower-outlet *m*.

The steam, in passing through the tubes *d*, is condensed against the tube-surfaces, which are cooled by abstraction of heat into and by the air-current caused by the operation of the blower, and the water of condensation flows down the tubes as rapidly as it is formed, and without accumulation therein, and is conducted off through pipe *f*.

It will be apparent that the blower may be arranged to force air through the space containing tubes *d*, instead of drawing it through, in which case the delivery-pipes *l* would be attached to one of the nozzles *c* or *c'*, the outlet of the blower being then attached to the other nozzle, and the air-inlet pipe to the suction-entrance of the blower.

I claim the combination and arrangement of a rotary blower and compound heater and cooler, having vertical or nearly vertical tubes for the steam, and transverse passages for the air, all substantially as shown and described.

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Witnesses:
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