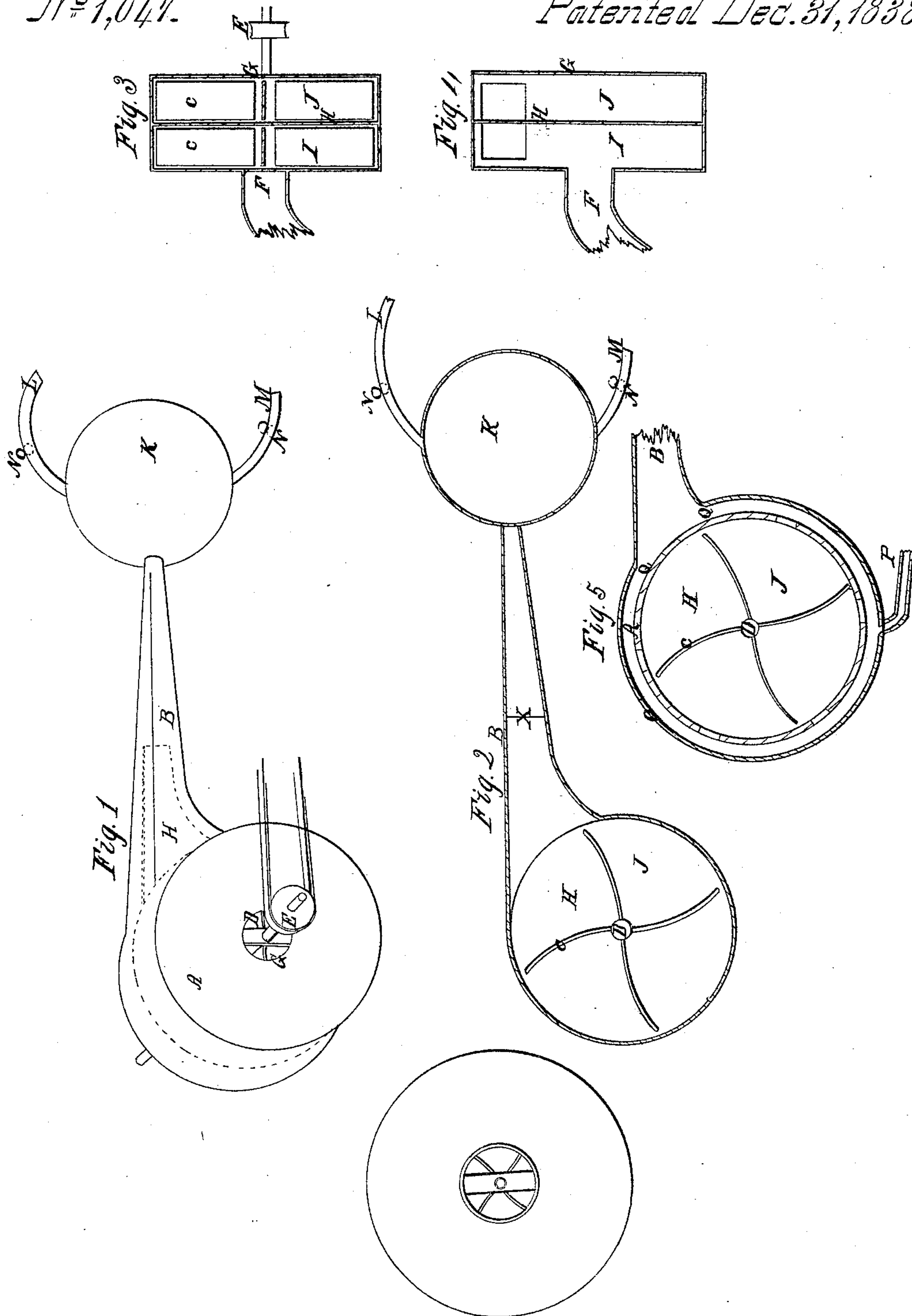


*A. Collins,*  
*Steam-Boiler Condenser.*

*No 1,047.*

*Patented Dec. 31, 1838.*





# UNITED STATES PATENT OFFICE.

ASAHEL COLLINS, OF ULSTER VILLAGE, NEW YORK.

## APPARATUS FOR CONDENSING STEAM AND FOR REGULATING COMBUSTION IN STEAM-ENGINES.

Specification of Letters Patent No. 1,047, dated December 31, 1838.

*To all whom it may concern:*

Be it known that I, ASAHEL COLLINS, of Ulster Village, in the town of Saugerties, county of Ulster, and State of New York, have invented a new and improved and useful mode of condensing steam by atmospheric air and returning and using the same atmospheric air which condenses the steam, containing the heat given off by the steam and also the vapor or gaseous matter as produced by the process of condensation, for the purpose of combining with the heated air gaseous substances, &c., as produced by the consuming of fuel, which chemical combination adds very materially in making it a great supporter of combustion, which is described as follows, reference being had to the annexed drawings of the apparatus by which the above-mentioned objects are effected.

The nature of this discovery or invention consists in admitting the steam and atmospheric air through the apertures of the case of a revolving fan, which may be divided in the center, by a partition, and causing the steam and atmospheric airs to unite in the cylinder surrounding the revolving fan, or in the tangential tube of the revolving fan, where the steam is condensed. The atmospheric air heated by the process of condensation, and a vacuum formed in the condensing cylinder, or condensed by the same process, or it may be assisted by surrounding the condenser with water of a certain, or common temperature, and delivering the condensed steam and heated air into a reservoir from whence the heated air is conducted to the furnace and the condensed steam to the boiler through suitably constructed tubes or pipes, by which process a saving of fuel is effected equal to the quantity required to bring the atmospheric air to the degree of heat acquired by the process of condensation, it being a greater supporter of combustion, and its chemical combination with the heated air and gases as produced by the consuming of fuel produces an intense heat, the steam being forced and condensed in the above specified manner viz. by the revolving fan can be condensed and a sufficient vacuum formed without reducing the steam to as low a temperature as if condensed by water and may be returned to the boiler at 200° or at a much higher temperature than though condensed the usual way.

The object proposed above may be effected by means of an apparatus constructed in the following manner or in various ways and manners embracing the same principle.

Figure 1 is a perspective view of the exterior of the apparatus. Fig. 2 is a longitudinal section through the steam chamber of the fan. Fig. 3 is a transverse section through the center of the fan case the fans being in their proper places; Fig. 4, ditto, the fans being removed. Fig. 5 is another modification of the apparatus having the case surrounding the fans perforated with holes and this again being surrounded by another case without apertures.

The letters of reference in the several figures refer to the same parts.

A represents the fan case divided in the center by a partition forming the chambers, one for steam and the other for atmospheric air in each of which revolves a fan both fixed on the same shaft having also a tangential tube for conveying the condensed steam and air to a reservoir, said tube being also divided by a partition as far as X the place where it is intended the steam and atmospheric air shall come in contact; B, tangential tube divided as aforesaid; C, revolving fan; D, axle on which the fans are fixed; E, pulley on the axle of the fans around which passes a band leading to the engine for turning them; F, tube inserted into an opening in the end of the fan case for the admission of steam; G, opening in the other end of the fan case for the admission of atmospheric air; H, partition before mentioned in the center of the fan case for dividing it into an air and steam chamber; I, steam chamber; J, atmospheric air chamber; K, reservoir for the heated air and condensed steam; L, tube for conveying the heated air to the furnace; M, tube for conveying the water of the condensed steam to the boiler; N, cocks or valves; O, Fig. 5, outer case surrounding inner case A which in this modification is to be perforated; P, tube for conveying the condensed steam collected at the bottom of the outer case to the boiler; Q, opening through which the heated air passes into the tube B.

In condensing steam with atmospheric air and heating the air by the condensing process for the supply of the furnace the fan is first put in motion by power from the engine. The steam from the cylinder is con-



ducted by the pipe E to the chamber I and the atmospheric air enters the chamber J through the opening G. The revolving fan drives both steam and air along the tube B and when at the end of the partition they unite at X, the air condensing the steam, and the steam heating the air, the condensed steam and heated air are driven into the reservoir K. From thence they are drawn off by the tubes L and M, the one to supply the furnace with heated air and the other the boiler with water.

A mercurial gage is to be attached to the boiler—set at a particular point, so as to show the degree or temperature of steam, and at the same time to act upon a lever which is to be attached to the door of the ash-pit, if the draft is produced by atmospheric pressure, or to the valve in the blow pipe, when the draft is produced by means of the bellows, which gage will prevent an explosion in all cases. When the steam arises to a certain degree or temperature before the vapor or gases is generated that produces or causes explosion the lever closes the door of the ash pit and the constant return of carbonic acid gas and deadly gases which are nonsupporters of combustion extinguish the fire and combustion ceases for want of a supply of oxygen from the atmospheric air. When the lever is attached to the valve of the blowpipe it acts similarly in closing the valve and preventing the heated atmospheric air from mixing with the carbonic acid gas and other gaseous matters produced by consuming of fuel in the furnace, and combustion ceases upon the same principle as mentioned above, viz., the absence of oxygen gas. When attached to the common boiler now in use it will serve in all cases to show precisely the height of temperature or the degrees of the steam, and will regulate the combustion according to the height of steam. The gage may be placed in the steam chamber, in the boiler, or at the exterior of the boiler, at the connecting tubes or pipes or in the usual way of employing the mercurial gage.

The objects proposed above can be effected by means of an apparatus constructed in the following manner or in various ways and manners embracing the same principle.

Drawing No. 2, Figs. 1, 2, and 3: A, mercurial gage placed in or at the exterior of

the boiler. B, piston rod which is attached to lever E; C, standard supporting lever E; D, standard supporting lever H; E, lever attached to piston of the gage on one end and the other to the rod F; F, rod attached to lever E and sliding door G; G, sliding door to the ash pit.

Fig. 3: H, lever to close the valve of the blow pipe; I, end of lever to be attached to piston rod B when the blowpipe creates the draft; J, rod attached to lever H and valve K; K, valve in the pipe or tube; L, boiler; M, furnace; N, grate; O, smoke pipe; P, revolving fan for returning the smoke, sparks, &c., to the furnace through the pipe Q which is a continuation of the pipe O. R, is the ash pit and air chamber.

To compensate for the loss of steam which must necessarily take place, such quantity of water as may be found necessary is to be forced into the condensing apparatus, by the known means of effecting that object. It should enter the condensing vessel in the form of spray, so as the more perfectly to aid the cold air in condensing the steam; the best mode of introducing the cold water for this purpose will, I am of opinion, be to cause it to enter through the shaft of the fan wheel, made hollow for that purpose; it may, however, be introduced in other ways so as to effect the intended object.

Your petitioner does not claim the sole discovery or invention of condensing steam by atmospheric air or using heated air as a supporter of combustion neither the application of the mercurial gage. He is aware they have been used but not to his knowledge in the manner herein described.

The invention claimed and desired to be secured by Letters Patent is—

The condensing of steam by atmospheric air by means of a revolving fan, and the heated air thus produced, viz., by the process of condensing used as a supporter of combustion and the application of the mercurial gage as a regulator of combustion. These severally produced by the manner before described or in any other way or manner or mode substantially the same.

ASAHEL COLLINS.

Witnesses:

M. FRELIGHT,  
JAMES WOODRUFF.