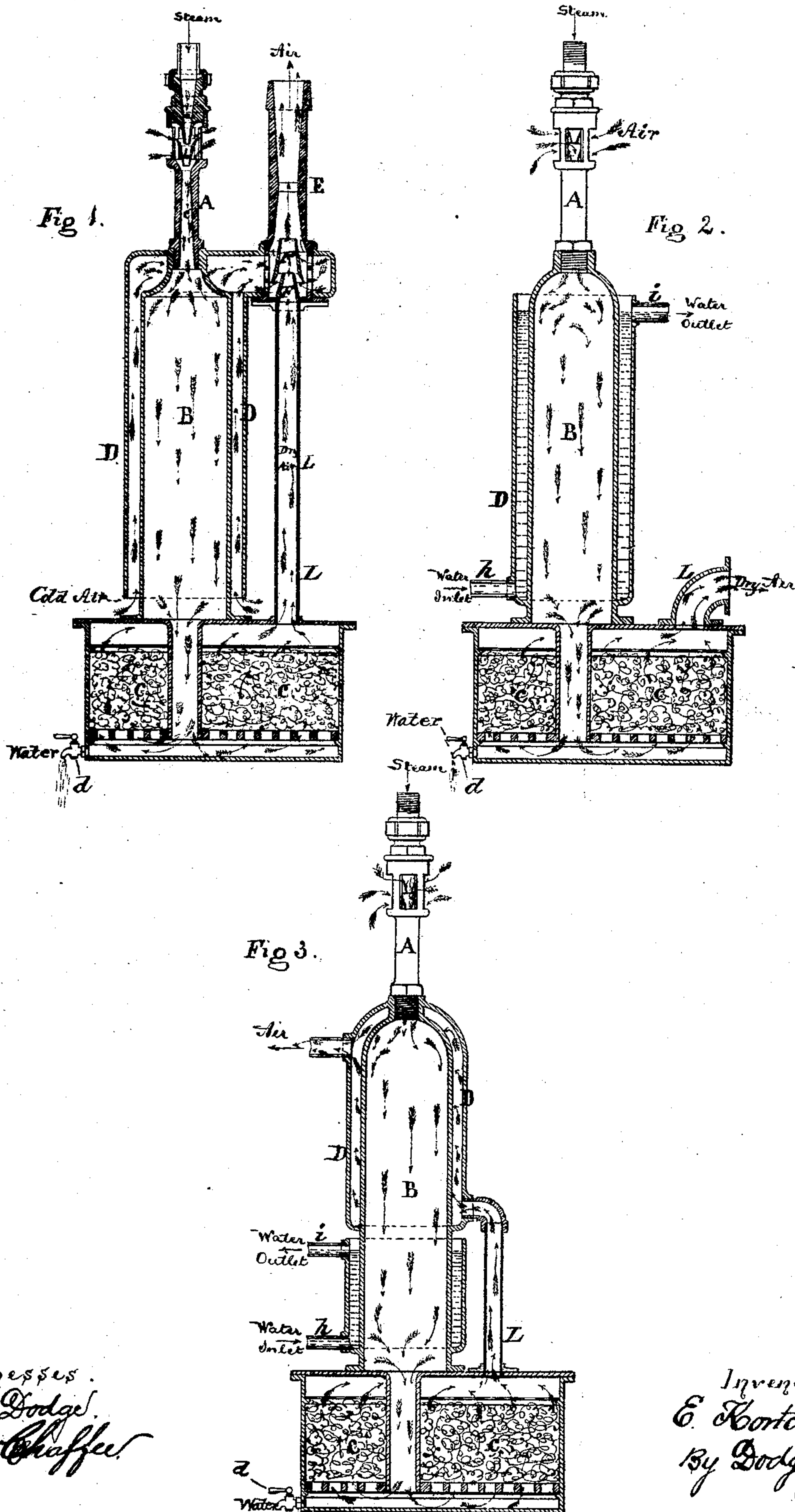


E. KORTING.
Steam-Jet Apparatus for Condensing Steam and
Forcing Air.

No. 147,141.

Patented Feb. 3, 1874.



Witnesses.
H. H. Dodge.
W. E. Chaffer.

Inventor.
E. Korting.
 By *Dodge & Chaffer*
Attys

UNITED STATES PATENT OFFICE.

ERNST KÖRTING, OF VIENNA, AUSTRIA.

IMPROVEMENT IN STEAM-JET APPARATUS FOR CONDENSING STEAM AND FORCING AIR.

Specification forming part of Letters Patent No. **147,141**, dated February 3, 1874; application filed December 20, 1873.

To all whom it may concern:

Be it known that I, ERNST KÖRTING, of Vienna, Austria, have invented certain Improvements in Steam-Jet Apparatus for Condensing Steam and Forcing Air, of which the following is a specification:

My invention relates to improvements applicable, more especially, to the apparatus for which Letters Patent were granted to me on the 16th day of September, 1873, whereby the air is more thoroughly deprived of moisture, the heat of the steam regenerated in the dry-air blast, and the steam-jet rendered more efficient and economical in its operation. The improvements consist in discharging the air and steam into a surface-cooler interposed between the steam-nozzle and the air-drying apparatus, and in applying the dry-air blast in such a manner that it reduces the temperature of the cooler, while at the same time it is heated thereby.

Figure 1 is a vertical central section through a form of my apparatus in which the cooler is surrounded by an air-jacket, and an air-jet, operated by the dry-air blast, is arranged to draw cold air through the jacket around the cooler. Fig. 2 is a vertical central section of another form of the apparatus without the second nozzles, and with a water instead of an air jacket around the cooler. Fig. 3 is a vertical central section through a form of the apparatus in which both water and air jackets are applied to the cooler and the dry-air blast brought in direct contact with the cooler.

A represents the steam-nozzles or steam-jet apparatus, arranged in the usual manner, by which the steam and air are brought in contact, the former condensed, and the latter driven forward, as fully explained in the various patents heretofore granted to me. B represents the surface-cooler, consisting merely of a long cylindrical vessel, applied to the end of the jet apparatus A, as shown, to receive the air and the uncondensed steam, if there be any, issuing therefrom. C is the apparatus for drying or removing the moisture from the air, constructed, as in my patent above referred to, with a filling of coke, charcoal, or like material, and applied to the lower end of the cooler B.

The above parts are constructed and ar-

ranged alike in all forms of my present apparatus. The jet apparatus and the drier are the same as in my last patent above referred to; but the interposition of the cooling vessel B between them is a new feature. In the present arrangement, the air, uncondensed steam, and water resulting from condensation, pass from the jet apparatus A into the cooler B, where the air is cooled, and the remaining steam condensed by coming in contact with the cold surface of the cooler. From the cooler B the air and water pass down into the drying apparatus C, where the air is deprived of its moisture, and discharged through the pipe L, while the water settles to the bottom, and is discharged through a cock, L.

In order to reduce the temperature of the cooler, I surround the same with a jacket or casing, D, leaving a space between the jacket and the cooler, through which I pass cold air, water, or any other suitable cooling medium.

In the apparatus shown in Fig. 1, in which the jacket D surrounds the upper portion of the cooler C, an annular space, *e*, is left at the bottom for the admission of air between the jacket and the vessel, and the upper end of the jacket provided with a hollow neck, *f*, through which the air escapes. In the end of the hollow neck *f* I mount an air-jet apparatus, F, consisting of two or more nozzles, arranged in the same manner as the steam-nozzles, except that they discharge upward instead of downward. These nozzles are so arranged that they exhaust the air from the neck *f* of the jacket, and discharge it into a tube or pipe, E. They are caused to operate by the air-blast from the pipe L, which is connected with, and arranged to discharge into, the nozzles, as shown.

The dry-air blast, blowing forward through the nozzles F, causes a strong current of cold air to pass up through the jacket D, around the cooler C, and thence, through the neck *f*, into the nozzles, where it mingles with the dry-air blast, and passes forward into the tube E. The cold air, passing up within the jacket in contact with the cooler C, reduces its temperature, and thereby causes a condensation of the steam and cooling of the air descending therein. The cold air, ascending in contact with the cooler B, which contains hot air and

steam, is heated thereby, so that, upon joining the dry-air blast, it raises the temperature of the whole or final blast.

Thus it will be seen that, while on the one hand the cold air serves to reduce the temperature of the cooler, the latter, on the other hand, serves to heat the air. In this way the heat of the steam which in my old apparatus was wasted by radiation, is now applied to heat the air-blast; and the air-blast applied in such manner that it cools the air and steam, and causes a more perfect or thorough deposition of the moisture held in suspension thereby.

In the apparatus shown in Fig. 2, the jacket D around the cooler is closed at the bottom, and filled with water, which is forced in through a pipe, *h*, at the bottom, and escapes through a pipe, *i*, at the top. In this case the water chills the cooler C in the same manner as the air in the first apparatus. The water, being heated by contact with the cooler during its ascent, may be economically used as feed-water for a steam-boiler, or for any other desired purpose.

In the apparatus shown in Fig. 3, I have combined both air and water jackets with the cooler C, the former being placed around the upper portion of the cooler, and the latter around the lower portion of the same. The water enters its jacket at the bottom, and escapes at the top, in the same manner as in Fig. 2.

The air-outlet L of the drying apparatus is arranged to discharge the dry-air blast into the air-jacket, which is provided with an outlet at its top, as shown. In this apparatus the air and water both assist in reducing the temperature of the cooler, the water is heated as in the apparatus shown in Fig. 2, and the dry-air blast is heated by direct contact with the cooler.

It will be seen that, while the three forms of apparatus differ somewhat in construction, they all operate in substantially the same manner.

It is obvious that the apparatus may be changed in many respects and still retain its peculiar advantages. The surface-cooler may be varied both in form and construction; and the dry-air blast may be applied in a different manner to the cooler.

Having thus described my invention, what I claim is—

1. In combination with a steam-jet apparatus, A, for condensing steam and forcing air, a surface-cooler B, constructed and arranged substantially as shown and described.

2. In combination with a steam-jet apparatus, A, for condensing steam and forcing air, a surface cooler, B, provided with a jacket, D, through which cold air or water is passed, as shown and described, whereby the temperature of the cooler is reduced, and the heat of the steam regenerated in the cooling medium.

3. In combination with a steam-jet apparatus for forcing air and condensing steam, a surface-cooler, B, arranged in such manner that the air-blast produced by the jet apparatus aids in reducing the temperature of the cooler, and is, in turn, heated thereby, substantially as shown and described.

4. In combination with the steam-nozzles A, cooler B, and jacket D, the nozzles F, operated by the air-blast produced by the steam-nozzles, as shown and described.

ERNST KÖRTING.

Witnesses:

EDMUND RICHLER,
HERZFELD.