E. KORTING.

Steam Condensers.

No. 141,361. Patented July 29, 1873.

Fig. 3.

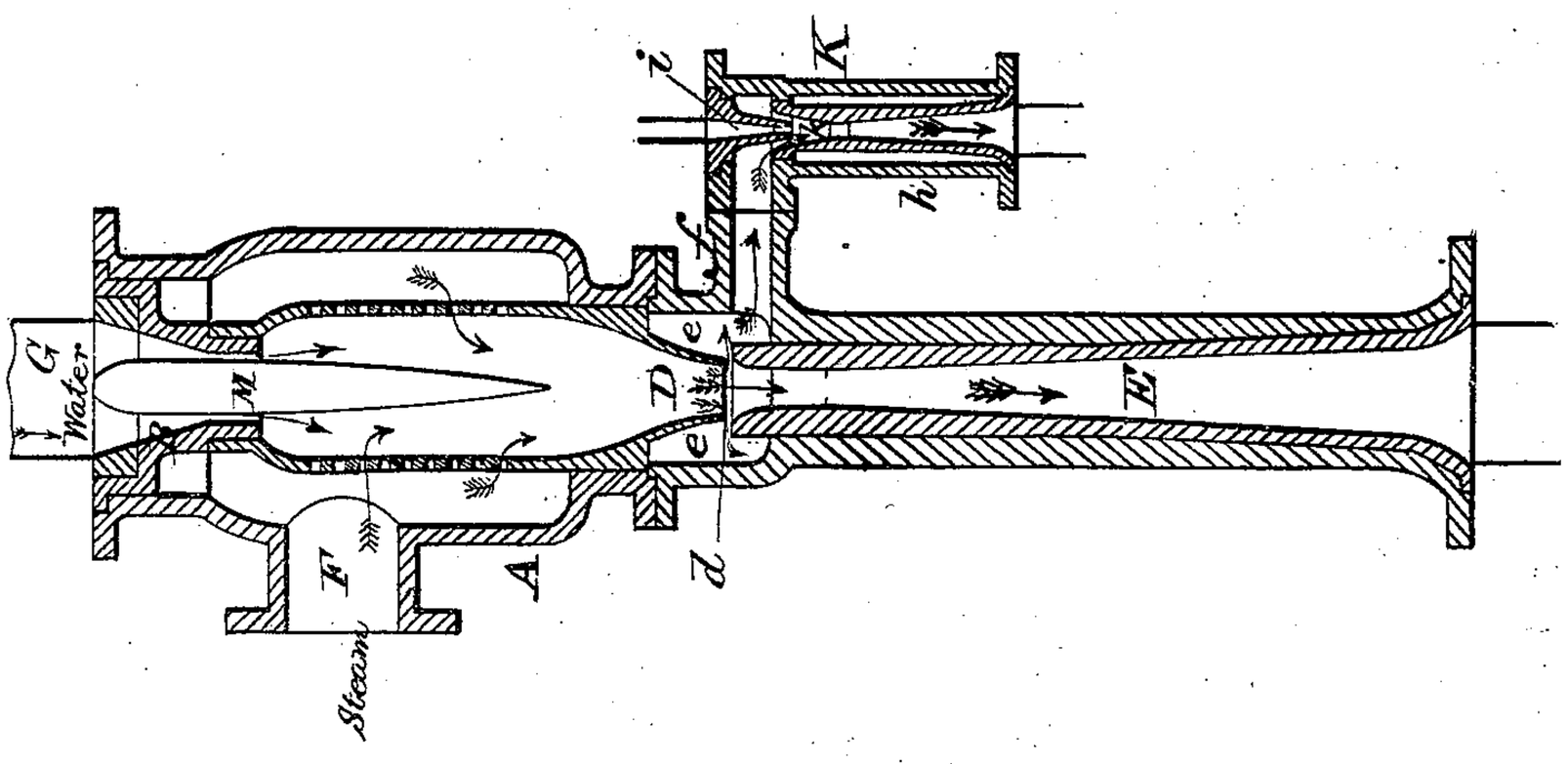


Fig. 2.

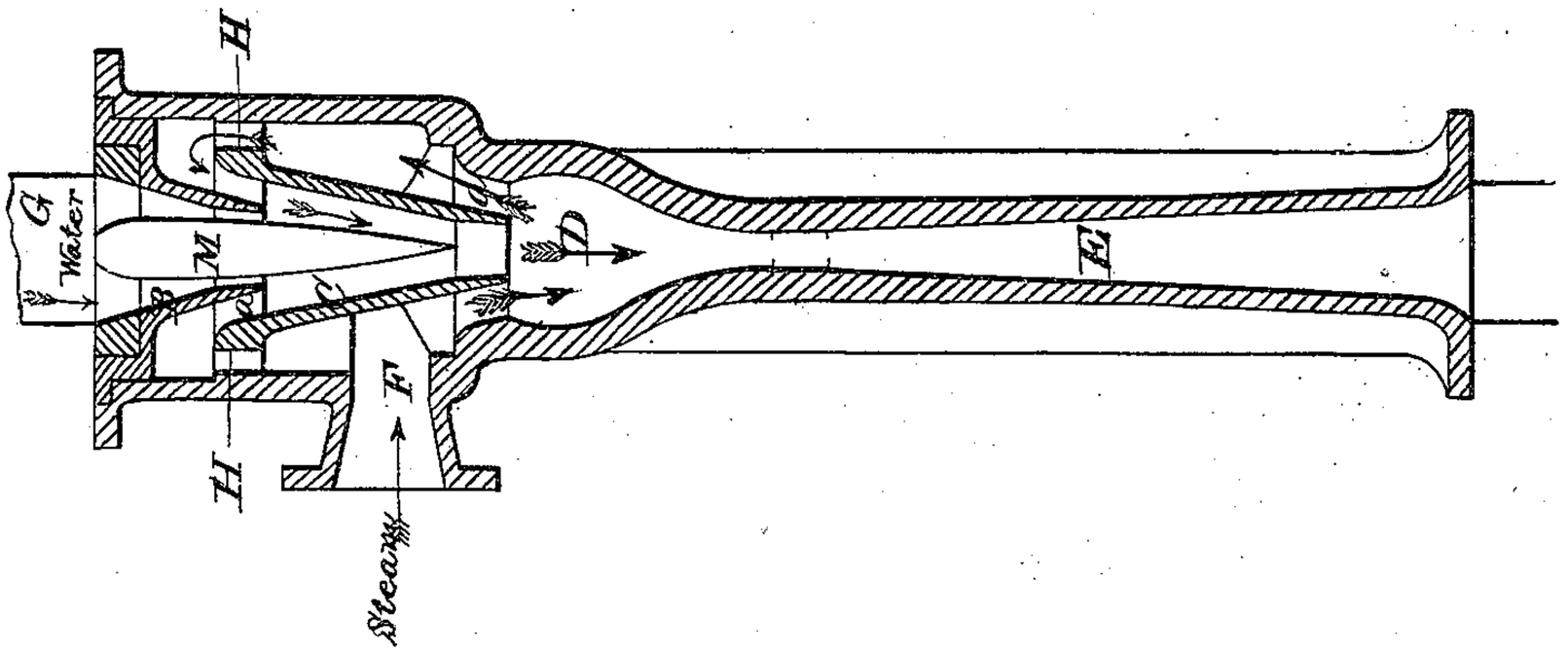
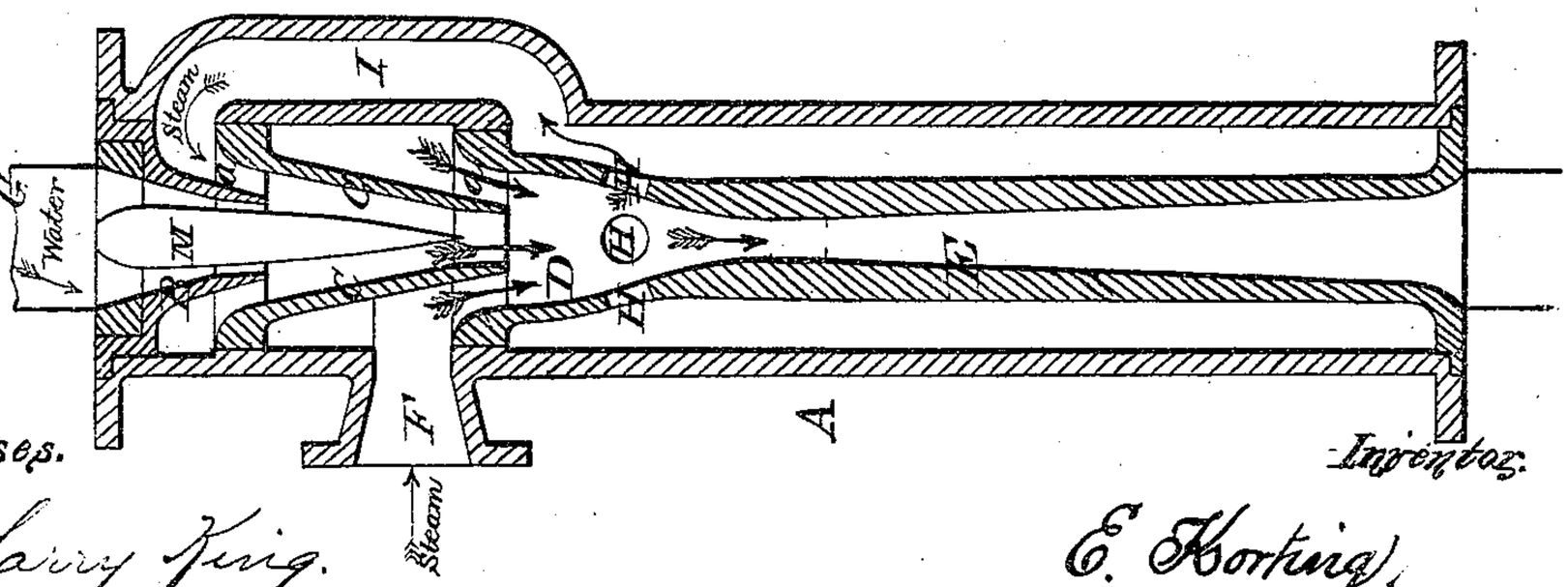


Fig. 1.



Witnesses.

Harry King.

W. H. Dodge.

Inventor:

E. Korting,
By his attys
Dodge & Son

AM. PHOTO-LITHOGRAPHIC Co. N.Y. (OSBORNE'S PROCESS)

UNITED STATES PATENT OFFICE.

ERNST KORTING, OF VIENNA, AUSTRIA.

IMPROVEMENT IN STEAM-CONDENSERS.

Specification forming part of Letters Patent No. **141,361**, dated July 29, 1873; application filed May 23, 1873.

To all whom it may concern:

Be it known that I, ERNST KORTING, of Vienna, Austria, have invented certain Improvements in Steam-Condensers, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to that class of condensers in which the steam is directed into a nozzle and draws the condensing-water therein; and the invention consists in so constructing the apparatus that the steam which is not condensed by contact with water in the first nozzle is conducted into a second nozzle, and again brought in contact with the water; and, also, in combining with the condenser a jet-exhauster, to remove any air which may find its way therein.

Figure 1 is a central longitudinal section through one form of my condenser; Fig. 2, a central longitudinal section through another form of the condenser; Fig. 3, a central longitudinal section of a condenser having the exhauster applied.

The object of my present invention is to improve and perfect the jet-condensers hitherto patented by myself and by others, and now in common use: First, by enabling them to condense all the steam which may be admitted to them, and, second, by removing all air which may accumulate in them. The first object I accomplish by conducting that portion of the steam which is not condensed by contact with the jet of condensing-water in the first or main nozzle into a second nozzle, and there bringing it again into contact with the condensing-water. The second object I accomplish by the application of an ordinary steam-jet exhauster communicating with the interior of the condenser.

In Fig. 1, A represents the body of the apparatus, and B, C, and D three nozzles mounted in the body in line with each other, so that annular spaces *a* are left between them, and that each one discharges into the large end of the next in the ordinary manner. E is a flaring or diverging tube, into the small end of which the other nozzles discharge, as usual. G is pipe connected to the nozzle B, and supplying the same with the condensing-water. F is a neck through which the steam is admitted to the apparatus around the nozzle C and into the nozzle D. H are openings through the sides of the nozzle D, allowing the uncondensed steam to escape into the body A outside of said nozzle; and I is a passage leading from the space around the openings H to the annular space between the nozzles B C. When the apparatus is in operation the steam, entering the neck F, rushes forward around and past the middle nozzle C, and into the nozzle D, thereby producing a suction in the nozzle C, and causing the condensing-water to rush forward from the pipe G through the nozzles B C D, and forward into the diverging tube or nozzle E. The steam, coming in contact with the water-jet in the nozzle D, is nearly all condensed thereby, and carried forward therewith into the tube or nozzle E. That portion of the steam which is not condensed by contact with the water in nozzle D escapes through the openings H, and, passing back through the channel I, enters around the nozzle B into the nozzle C, where it again comes in contact with the water-jet, which condenses it and carries it forward. It will be observed that there is no direct communication between the steam-inlet and the interior of the nozzle C, and that the only steam passing therein is that which is not condensed in the nozzle D through which all the steam is passed in the first instance.

The apparatus shown in Fig. 2 is substantially the same as that shown in Fig. 1. The arrangement of the body, nozzles, and steam and water pipes is the same; but, instead of making the openings H in the nozzle E, and providing the passage I to conduct the uncondensed steam to the nozzle C, the result is attained by making the openings H around the upper end of nozzle C, as shown, so that the uncondensed steam can pass back directly into the nozzle C, as indicated by the arrows. It will be seen that the openings H are back of or above the steam-inlet, and that they communicate with the space or chamber into which the steam enters. Although the steam-inlet does communicate directly with the openings H, it is found that, in practice, the steam all passes forward to the nozzle D, and that that which is not condensed therein flows back through the openings H into the nozzle

C where it again comes in contact with the water, as in the first apparàtus. It is obvious that there are various other ways in which the apparatus may be constructed to accomplish the desired end of conducting the steam, which is not condensed in the first instance, into a second nozzle, where it will again meet the water-jet.

A condenser, constructed to operate as above, is enabled to condense a large amount of steam with a very small supply of condensing-water, and to operate with great rapidity. The apparatus condenses all the steam, which enters almost instantly, and thus maintains a constant and almost perfect vacuum in its interior, so that the apparatus can be used to great advantage in connection with condensing-engines, and pans or kettles for boiling *in vacuo*.

Fig. 3 represents a condenser having a steam-jet exhauster applied, for the purpose of withdrawing any air which may find its way into the condenser. This arrangement is intended more especially for condensers which are to be applied to vacuum-pans in order to condense the steam or vapor therefrom, and thereby produce the required vacuum therein. When jet-condensers are used in connection with vacuum-pans, and in many other connections, much trouble is experienced from air entering with the steam or vapor, and accumulating in the condenser so as to render its operation imperfect, and hence it is that I apply an exhauster to remove the air. In the drawing I have shown the exhauster applied to an ordinary condenser, without the extra condensing-nozzle C, shown in Figs. 1 and 2; but it is, of course, applicable to them also. The arrangement of the body A, water-nozzle B, steam-inlet F, mixing or condensing nozzle D, and diverging-nozzle E, is essentially the same as in Figs. 1 and 2. Instead, however, of the condensing-nozzle D and diverging-nozzle E being made in one piece, they are made separate, and a small space or opening, *d*, left between them to permit the escape of any air which may find its way into the condenser. The opening *d* communicates with a surrounding chamber, *e*, which is provided with a pipe or neck, *f*, to which the exhauster K is attached. The exhauster consists of a body, *h*, provided with a steam-nozzle, *i*, the jet from which passes into a nozzle, *k*, communicating with the neck *f*, so that it causes a strong suction outward through said neck, and thereby withdraws the air from the condenser.

It is found in practice that, when the above parts are properly proportioned and arranged, the air will be all removed from the condenser, and the operation of the same allowed to proceed without interruption. The air, unlike the steam and water, passes readily through the opening *d*. The steam and water pass readily into the mouth of the nozzle E, but the air does not, and hence it is that the air is readily withdrawn without effecting their flow.

By applying the exhauster, as shown, I cause the condenser to operate steadily, continuously, and rapidly, and overcome all the difficulties encountered from the presence of air in its interior.

When the condenser is used with an exhauster attached, a perforated tube, L, is generally connected from the nozzle D to the nozzle B, as shown. This tube serves to distribute the steam, and to check its velocity, and by its use better results are attained than without it.

In all three forms of apparatus shown, a stationary pintle or core, M, is secured in the water-nozzle, to give the water-jet a tubular form; but the pintle may be dispensed with, as it forms no part of the invention.

Having thus described my invention, what I claim is—

1. A jet-condenser, in which all the steam is passed through a condensing-nozzle with the water-jet, and then the remaining uncondensed steam conducted into a second nozzle, and again brought in contact with the water, when constructed substantially as herein shown and described.

2. A jet-condenser having two or more condensing-nozzles, so arranged that the steam which is not condensed in the first or main nozzle can pass to the others, substantially as described and shown.

3. In combination with a jet-condenser, a jet-exhauster, constructed and applied substantially as shown, and for the purpose set forth.

E. KORTING.

Witnesses:
HERMANN BUMILLER,
EMILE DU FRESNE.