No. 671,221. Patented Apr. 2, 1901.

J. B. MILLER.

PROCESS OF COOLING AND CONDENSING FLUIDS.

(Application filed Mar. 22, 1900.)

(No Model.)

Fig. 1.

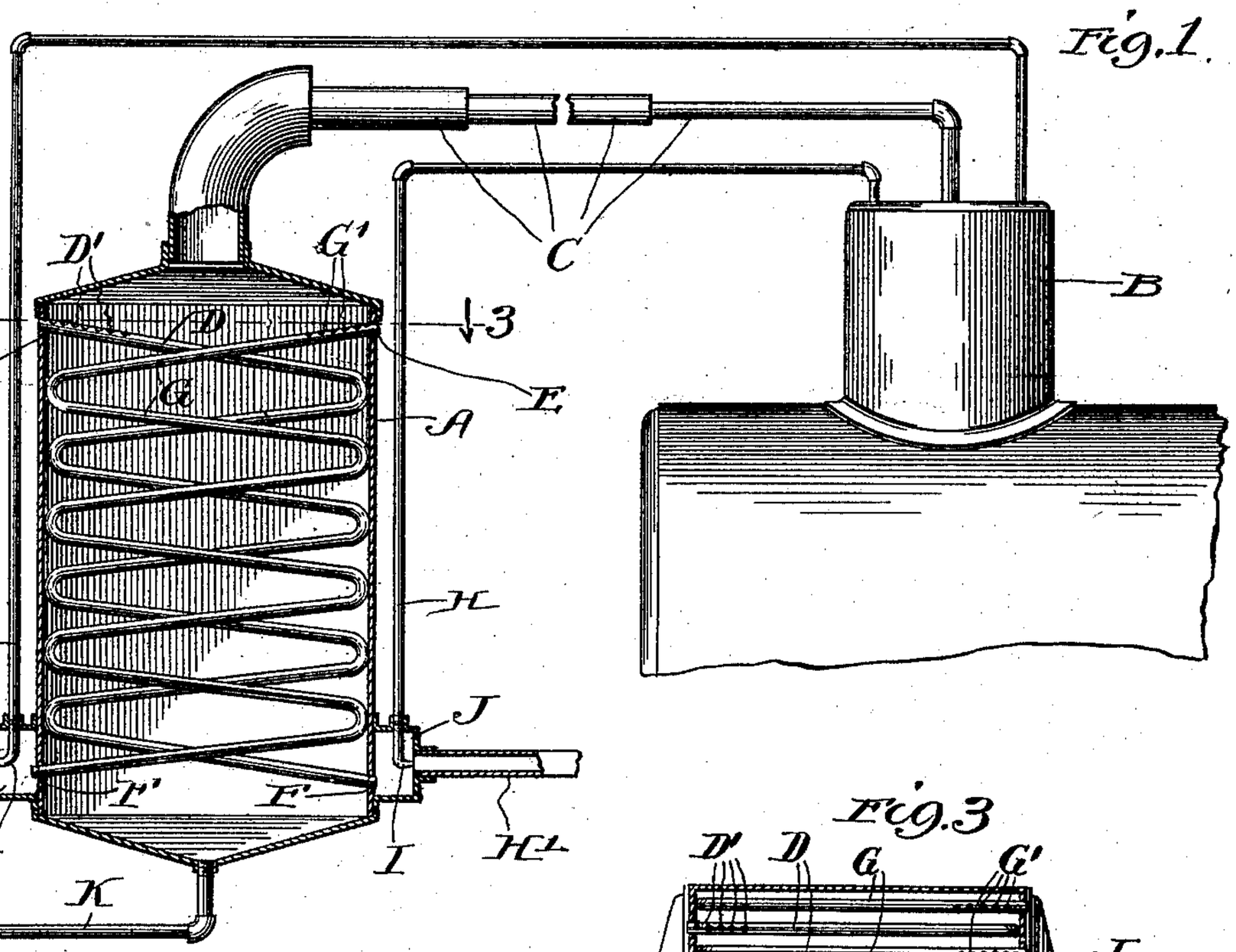


Fig. 2.

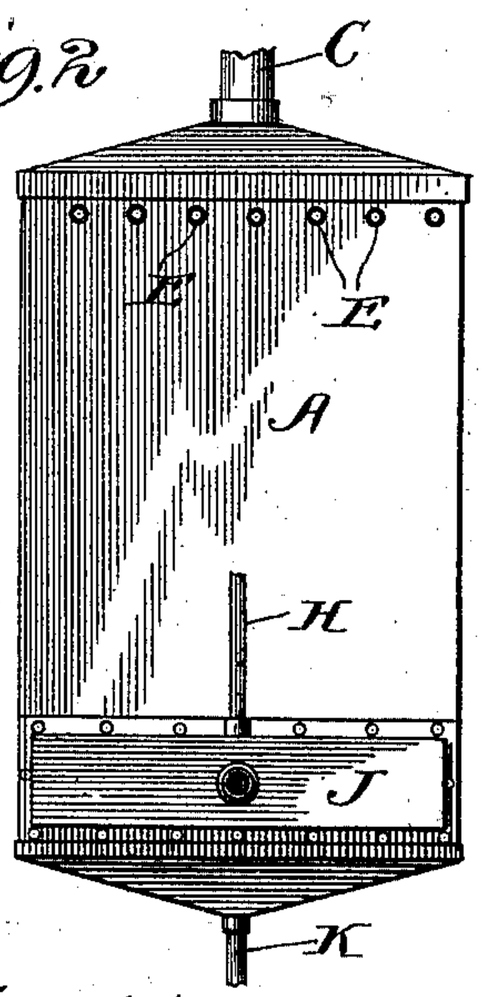


Fig. 3.

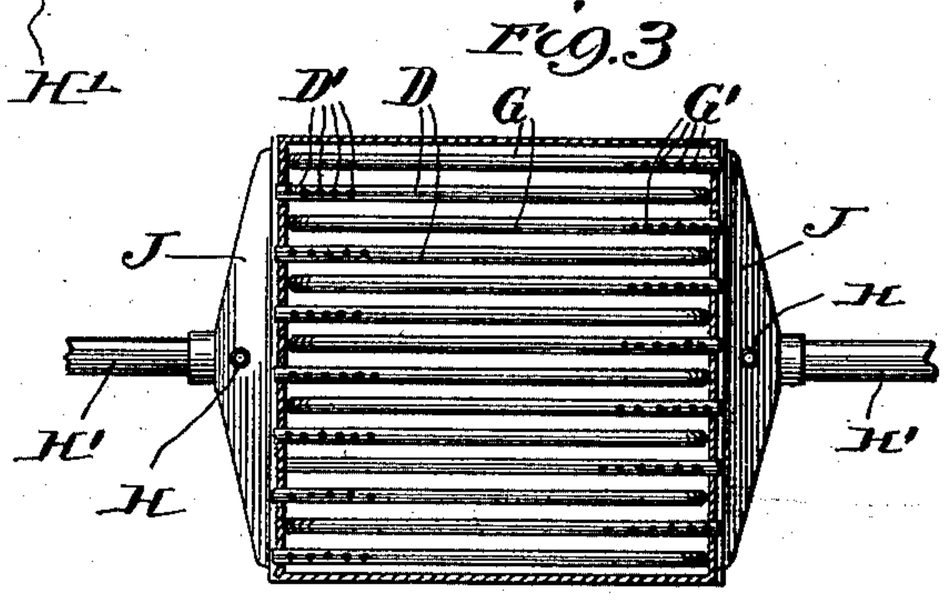


Fig. 5.

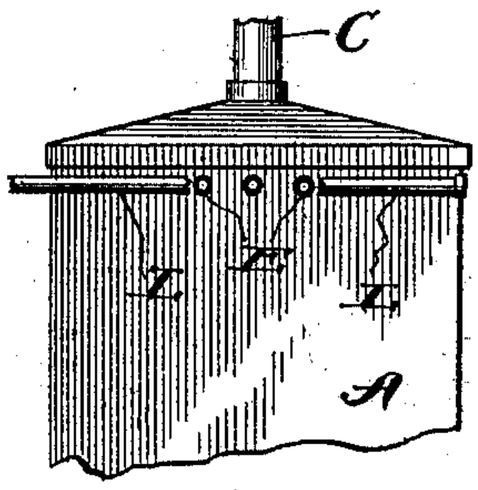
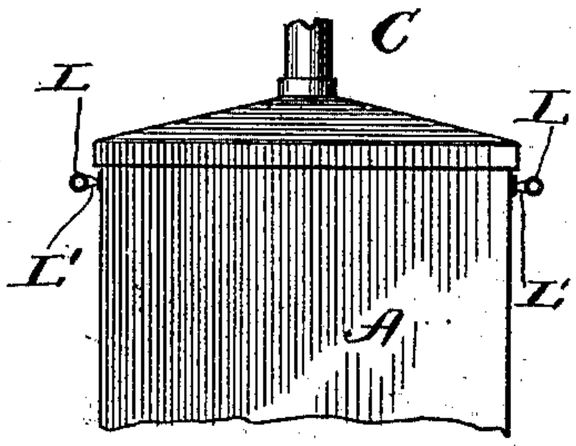


Fig. 4.



Witnesses:
Harold D. Bartlett
Frank O. Blanchard

Inventor:
John Ballard Miller
By Parker & Burton
his Attys.

UNITED STATES PATENT OFFICE.

JOHN BALLARD MILLER, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO FRANCIS W. PARKER, OF SAME PLACE.

PROCESS OF COOLING OR CONDENSING FLUIDS.

SPECIFICATION forming part of Letters Patent No. 671,221, dated April 2, 1901.

Application filed March 22, 1900. Serial No. 9,667. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN BALLARD MILLER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Processes of Cooling or Condensing Fluids, of which the following is a specification.

My invention relates to a process of cooling or condensing various fluids, and has for its object to provide a new and improved process of that description.

I have illustrated in the accompanying drawings one means of carrying out my process.

Figure 1 represents a diagrammatic view of one form of apparatus. Fig. 2 is a side view of the reservoir shown in Fig. 1. Fig. 3 is a section on line 3 3, Fig. 1. Fig. 4 is a view of the reservoir shown in Fig. 1, with a modified construction for mixing vapor with the air passed through the reservoir. Fig. 5 is a side view of Fig. 4.

Like letters refer to like parts throughout the several figures.

For purposes of explanation I will illustrate and describe my invention in connection with steam; but it is of course evident that this invention has various applications, which will readily occur to those versed in the art, and I therefore do not limit myself in this particular.

In using my invention in connection with steam I prefer to expand the steam and then to pass through it a mixture of vapor and air or other gas, said mixture being separated from the steam by a suitable intervening heat-conducting substance. I have found that this mixture of vapor and air or other gas lowers the temperature of the fluid acted upon, and when this fluid is steam it is condensed into water.

Referring now to Fig. 1, wherein I have shown diagrammatically a simple apparatus by means of which my process may be carried out, I provide a suitable compartment or reservoir A of the desired cross-sectional area, said reservoir being connected by suitable connections with a source of supply B. I prefer to interpose in this connection a suitable expanding device, which expands the steam to a certain degree before it enters the reservoir A. This expanding device may be of any desired construction and may consist of an engine or other energy-producing or steam-using device. As illustrated in this figure, this expander consists of a series of pipes C, increasing in diameter, the number and size of the pipes depending upon the conditions to be met—such, for example, as the temperature of the steam and the like.

The reservoir A is preferably considerably greater in cross-sectional area than the connection leading from the source of steam-supply, so that the steam as it enters the reservoir is expanded. This reservoir contains a series of pipes or other passage-ways placed therein, so as to provide a comparatively large surface-area with which the steam comes into contact. Any form or arrangement of the pipes or passage-ways may be utilized. I have illustrated the reservoir as provided with a series of pipes D placed side by side, each pipe being connected with an opening E at the upper end of the reservoir and with the opening F at the lower end of the reservoir. There is also a second series of pipes G, which are connected with similar openings in the reservoir on the opposite side. Some suitable means is provided for moving a current of air through the pipes D and G and of also mixing with this air a suitable quantity of vapor, so that the mixture of air and vapor will pass through the pipes. Any suitable means for this purpose may be used. As shown, for example, in Fig. 1, I provide one or more small openings D′ G′ at the upper end of each of the pipes D and G, so that a small quantity of steam from the reservoir A may pass into said pipes and mix with the air entering through the openings E. Some suitable means is provided for passing the air, or rather the mixture of air and vapor, through these pipes. I prefer to provide some construction at the exit or lower end of the pipes D and G, so as to draw the air through, as this drawing of the air tends to more or less relieve the pressure and expand the mixed air and vapor and aids the process or increases its efficiency. Any suitable air-moving device may be used—such, for example, as a pump, fan, or the like. As shown in Fig. 1, the air-moving device consists of

an ejector which is connected with the ends of the pipes. In the present instance two of these ejectors are used and are operated by means of steam from the source of supply, the steam being conveyed by means of the pipes H to the ejectors I. These ejectors may be of any of the ordinary forms and I have not shown them in detail. I have illustrated one of the simplest constructions for this purpose, which consists in simply connecting the pipes H with the pipe H', leading from the casing J. It will be seen that the steam passing through the pipes H tends to draw the mixture of air and vapor along with it, thus producing a circulation through the pipes D and G. The openings F, or, more properly speaking, the ends of the pipes D and G, are inclosed by a suitable casing J, and the ejectors are connected to this casing, so that one ejector is connected with the series of pipes D and the other with the series of pipes G. The steam as it condenses drops to the bottom of the reservoir A and is carried away to the point desired by means of a suitable pipe or the like K.

Instead of having the vapor enter the pipes D and G from the reservoir A through the openings D' G', I may insert it in said pipes or mix it with the air in any other desired manner. For example, I may provide a tube L or other device, as shown in Figs. 4 and 5, which is connected with any source of steam-supply and which passes along the face of the reservoir opposite the open ends of the pipes D, a similar device being located opposite the open ends of the pipes G. This tube is provided with a small opening L' opposite the mouth of each pipe, so that a small amount of steam may be forced into the pipe. These openings of course will be small, and their size will depend upon the conditions under which the device is operated, and I have not tried to show the exact dimensions in the drawings.

Instead of connecting the tube L with a source of steam-supply I may connect it with a source of water-supply, so that a small quantity of water will be forced through the openings L' into the mouths of the pipes D and G. As these pipes will be warm when the device is in use, this water will be converted into vapor and will mix with the air, so as to produce the desired result. In many instances it would be preferable to use water instead of steam in the tube I. I may also use the water-spraying apparatus in connection with the device for mixing steam with the air in the pipes D and G—as, for example, by using the tube L, connected with a source of water-supply, in connection with the construction shown in Fig. 1, or arranging the parts in any other desired manner. These variations and the different sources of vapor-supply and the different ways of mixing vapor with the air going through the pipes D and G will of course depend upon the conditions to be met in any given case.

I have shown in detail a simple construction by means of which my process may be carried out; but it is of course evident that various apparatus for this purpose may be used, and I therefore do not limit myself in any particular to or by the means I have herein illustrated and described.

I have found that when the steam is expanded in the reservoir A and the mixture of air and vapor is passed through the pipes D and G the steam on coming in contact with said pipes is rapidly condensed and an efficient, cheap, durable, and highly satisfactory means of condensing the same is obtained.

As my device may be used in many different ways, I have illustrated it diagrammatically in Fig. 1. The source of supply of the fluid to be cooled or condensed is of course immaterial, as it is only necessary to conduct this fluid to the reservoir and pass it therethrough, so that it comes into contact with the pipes through which the rapidly-flowing current of mixed air and vapor passes. When the fluid, cooled or condensed, is some fluid other than steam, the small openings D' G' in the tubes D and G are not used, but the vapor to be mixed with the air passed through the tubes D and G is obtained from some suitable outside source, as shown, for example, in Figs. 5 and 6.

In the operation of my invention it is necessary that the vapor in the mixture passed through the tubes D and G shall be water in a gaseous state as distinguished from water in a liquid state and that this vapor shall be below the temperature of steam at atmospheric pressure. I use the term "vapor" in the description and claims with this meaning.

I claim—

1. The process of cooling or condensing fluids, which consists in forming a mixture of air and vapor and passing this mixture in a rapidly-flowing current through suitable confining devices, and simultaneously bringing the fluid to be cooled or condensed into contact with said confining devices.

2. The process of cooling or condensing fluids, which consists in forming a mixture of air and vapor and passing this mixture in a rapidly-flowing current through suitable confining devices and expanding the fluid to be cooled or condensed, and simultaneously bringing it into contact with said confining devices.

JOHN BALLARD MILLER.

Witnesses:
A. H. BOWEN, Jr.,
HOMER L. KRAFT.