C. J. SNOW.

CONDENSER.

APPLICATION FILED MAR. 9, 1916.

1,233,138.

Patented July 10, 1917.

Fig. 1.

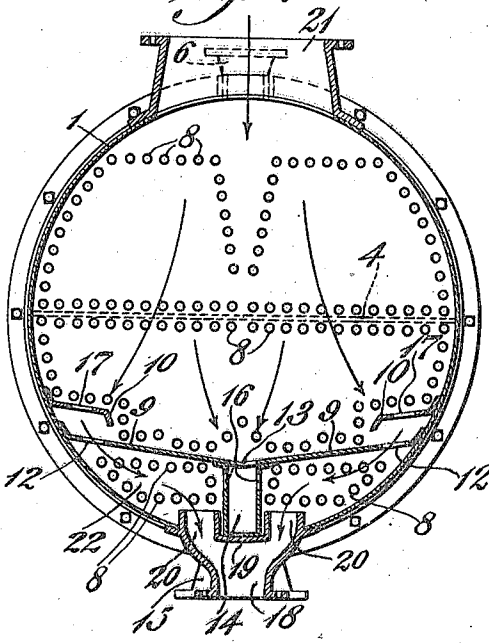


Fig. 2.

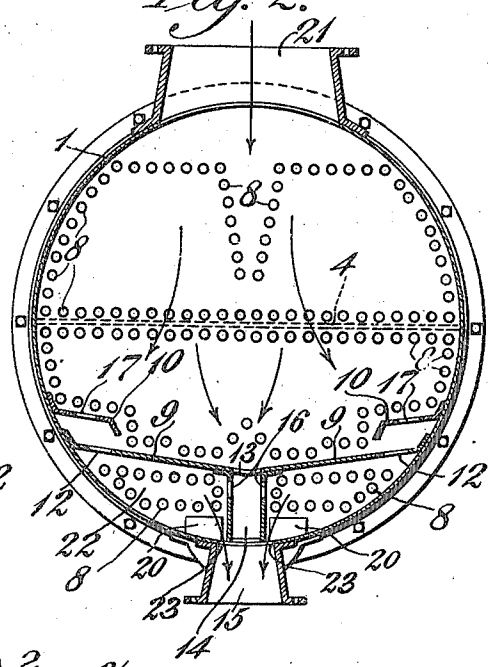


Fig. 3.

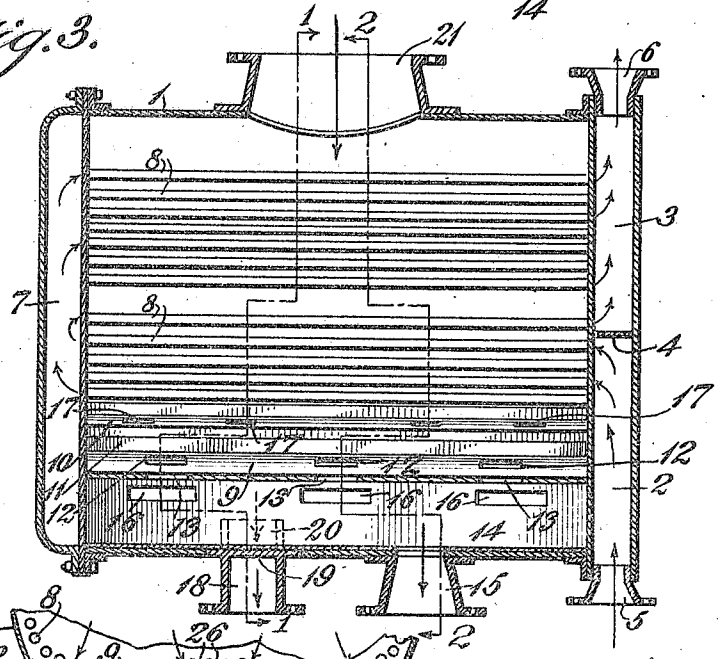
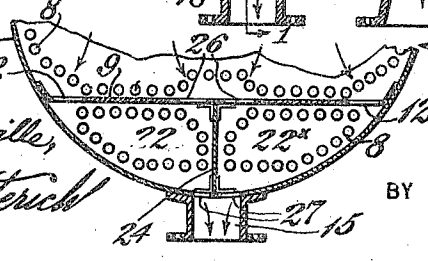


Fig. 4.



WITNESSES

L. Mouville,

H. G. Dieterich

INVENTOR

Charles J. Snow.

BY Diederich & Fairbank

ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES J. SNOW, OF REDWOOD CITY, CALIFORNIA.

CONDENSER.

1,233,138. Specification of Letters Patent. Patented July 10, 1917.

Application filed March 9, 1916. Serial No. 83,016.

To all whom it may concern:

Be it known that I, CHARLES J. SNOW, a subject of the King of Great Britain, residing at Redwood City, county of San Mateo, State of California, have invented a new and useful Condenser, of which the following is a specification.

My invention relates to the general class of condensers for which United States Letters Patent No. 956,210, were granted to me upon April 26th, 1910.

The primary object of my present invention is to secure in a steam condenser of ordinary and typical shape,—cylindrical, quadrangular or polygonal,—a thorough distribution of steam without the interposition of any considerable number, of steam deflecting baffles.

In surface condensers of this class, from which the air and uncondensed vapors are withdrawn separately from the water of condensation as is very essential in securing high vacua, and in which the air and uncondensed vapor and water are drawn off through the bottom of the condenser and the air and vapor cooled by the condensing water, it is of advantage to simplify the construction and relation of the essential parts so that the structure in its entirety may possess the capacity of uniform operation and be of comparatively simple and inexpensive construction.

With these objects in view, my invention comprehends a condenser of the general character represented in the accompanying drawings and hereinafter described, the particular features which I claim as novel being specified in the claiming clauses.

For the purpose, therefore, of illustrating my invention I have in the accompanying drawings shown two embodiments of it at present preferred by me, because in practice they give satisfactory and reliable results. It is to be understood, however, that my invention is not limited to the precise construction, formation or application of the typical components which in the preferred forms are represented and described.

In the drawings:—

Figure 1 represents a transverse, sectional, elevation, on the dotted line 1—1 of Fig. 3,—sight being taken in the direction of the arrows upon said line,—of a condenser embodying my invention.

Fig. 2 represents a view similar to that of Fig. 1 except that it is taken upon the dotted line 2—2 of Fig. 3.

Fig. 3 represents in central, longitudinal, vertical, section, the condenser of Figs. 1 and 2.

Fig. 4 represents a section of a portion of a modification.

Similar numerals of reference indicate corresponding parts.

Referring to the drawings:—

1 designates the casing of the condenser, which I have illustrated as of cylindric form. The casing is closed at one end by the water inlet chamber 2 and the water outlet chamber 3, of any preferred construction and internally divided by the diaphragm 4. Into the water inlet chamber leads the water inlet 5 through which the water is pumped by a pump, not shown, and from out the water outlet chamber leads the water outlet 6.

The opposite end of the casing is inclosed by a circular cap which forms what I designate the return chamber 7. Between the inner sheet walls of the water inlet chamber and the water outlet chamber at the one end of the casing, and the inner sheet wall of the return chamber at the other end, are introduced and swaged the ends of groups of longitudinally extending water tubes 8, which in my preferred organization are disposed in such mutual direction and relation as will be best understood from Figs. 1 and 2;—that is to say, certain of them lie closely to and in parallelism with the inner cylindrical walls of the casing,—while certain others are extended in preferably parallel and adjacent planes corresponding generally to the location of the diaphragm between the water chambers,—still others lie both above and below what I term the basal baffle plate 9, and above the lateral baffle plates 10.

An upper group of the tubes, nearly central of the casing and near its upper portion, are collocated in a form presenting, when viewed from the end, that of an inverted cone.

Across the lower part of the casing and

near its bottom is the principal baffle plate which I have, for convenience, designated as the basal plate 9, which extends the entire length of the casing and is properly flanged as at 11 for attachment to the casing, and preferably slightly dished toward its median line.

12 designates lateral ports, any desired number of which are employed, located along and cut through the outer edges of the basal baffle plate and close to the walls of the casing.

13 designates central ports along and cut through the central line of the basal baffle plate, from and through which the condensed steam water from the upper tubes drains into the trough or compartment 14, and is ultimately drawn off through the wet suction pump outlet 15.

16 designates air ports cut through and along the upper side walls of the trough 14.

17 designates apertures in the lateral baffle plates 10, relatively disposed in the desired number longitudinally of said plates.

18 designates a dry air pump outlet which is connected to an air pump, not illustrated. This outlet is preferably placed near the end of the casing which is closed by the return chamber, and its form is preferably cup-shaped as illustrated, its upper conformation being that of a central supporting plate 19 upon which the bottom of the trough 14 may rest, and two receiving throats 20 which extend sufficiently above the bottom walls of the casing to make it possible for the fluid entering said throats to enter and pass through them, the water of condensation passing out through said suction pump outlet 15.

The connections of both the suction wet air pump outlet 15 and the suction dry air pump outlet 18 with the bottom of the casing, are such as convenience of manufacture may dictate.

The steam inlet into the casing is shown as located upon the upper part of the casing and is designated 21.

22 designates a tube containing chamber formed between the basal baffle plate and the lower walls of the casing. 23 are apertures around the trough 14 which lead into the pump outlet 15.

So far as it has not already been described, the operation of my condenser will be readily understood.

The steam introduced within the casing will follow three general lines of flow, as indicated by the arrows in Figs. 1 and 2, one of these lines being from the steam inlet to the central ports 13 and the other two being from the steam inlet to each of the rows of lateral ports 12.

The condensed steam water from the tubes above the basal baffle plate will be collected, so to speak, both by said baffle plate and by the lateral baffle plates 10, and will be drained into the trough and drawn off by the suction pump of the outlet 15.

The tube-containing chamber 22 below the basal baffle plate will serve efficiently to effect air-cooling and devaporizing, as the tubes within said chamber will be protected from the condensed steam water from the tubes above the basal baffle plate.

The vapor from this chamber 22 will, as explained, be drawn off through the air pump outlet 18, while the drainage water will be drawn off through the water pump outlet 15, through the apertures 23, which surround the trough about said outlet 15.

It will be apparent that by reason of the relationship which the trough 14 bears to both of the pump outlets and to the two pumps with which they are respectively connected, the influence of the suction through the outlets will be exercised upon both the lateral and central ports of the basal baffle plate and upon the ports of the lateral baffle plates, with the result that the direction of the flow of steam across all of the tubes will be induced and made continuous, and with the further result of preventing any stagnation or accumulation of air in any part of the condenser and, therefore, of increasing its efficiency.

Referring to the embodiment represented in Fig. 4 of the drawings, I show a type of condenser where the higher, vacuate is not essential, but where efficiency secured by good distribution is as desirable as in the other type. The basal baffle plate here, rests upon a central supporting web or plate 24 and is provided both with its lateral port 12, and also with sets of central ports 26, one upon each side of the web.

In this construction the support serves no purpose except that of being a support and of dividing the tube-containing chamber 22 into two chambers which I have designated 22 and $22^{\times}$.

27 designates lower ports leading from the sides of the supporting plate into the suction pump outlet 15.

In the operation of this modified form of condenser, the lines of steam flow will be similar to those in the embodiment of Figs. 1, 2 and 3,—the provision of both the lateral and the central ports of the basal baffle plate and of the lower ports 27 into the suction pump outlet, considered in connection with the effect of the suction through both pump outlets, creating a region of low pressure about the lower ports 27, which in turn is felt at both the lateral and central ports of the basal baffle plate and thereby influences the lines of steam flow.

In this type of condenser the water and uncondensable vapors are together with-

drawn through and by means of the suction pump of the outlet 15.

It will now be apparent that I have devised a new and useful condensing apparatus which embodies the features of advantage enumerated as desirable and that while the embodiments illustrated and described have given satisfactory and reliable results, modifications of various character may be made without departing from the invention broadly considered or sacrificing any of its advantages.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A condensing apparatus of the character stated, comprising a casing having inlet and outlet water passages,—water tubes traversing the interior of the casing between said passages,—a stem inlet,—a basal baffle plate traversing the casing near its bottom and provided with both lateral and central ports,—lateral baffle plates provided with ports and disposed above the basal baffle plate,—a trough longitudinally extending within the casing, depending from the basal baffle plate, communicating with the central ports of said plate, and having air ports in its sides,—a suction outlet for the air and vapors,—and a suction outlet for the condensed water leading from out the trough.

2. A condensing apparatus of the character stated, comprising a casing having inlet and outlet water passages,—water tubes traversing the interior of the casing between said passages,—a steam inlet,— a basal baffle plate traversing the casing near its bottom and provided with both lateral and central ports,—lateral baffle plates provided with ports and disposed above the basal baffle plate,—a trough longitudinally extending within the casing, depending from the basal baffle plate, communicating with the central ports of said plate, and having air ports in its sides,—a suction outlet for the air and vapors, formed with receiving throats extending on each side of the trough above the bottom of the casing,—and a suction outlet for the condensed water leading from out the trough.

3. A condensing apparatus of the character stated, comprising a casing having inlet and outlet water passages,—water tubes traversing the interior of the casing between said passages and lying close to the side walls of the casing and also to the lateral baffle plates and the basal baffle plate, and extending within the chamber below the basal baffle plate,—a steam inlet,—a basal baffle plate traversing the casing near its bottom and provided with both lateral and central ports,—lateral baffle plates provided with ports and disposed above the basal baffle plate,—a trough longitudinally extending within the casing, depending from the basal baffle plate, communicating with the central ports of said plate, and having air ports in its sides,—a suction outlet for the air and vapors, formed with receiving throats extending on each side of the trough above the bottom of the casing,—and a suction outlet for the condensed water leading from out the trough.

4. A condensing apparatus of the character stated, comprising a casing having inlet and outlet water passages,—water tubes traversing the interior of the casing between said passages,—a steam inlet,—a basal baffle plate traversing the casing near its bottom and provided with both lateral and central ports, and dividing the casing into an upper tube-containing chamber and a lower tube-containing chamber,—lateral baffle plates provided with ports and disposed above the basal baffle plates,—a trough longitudinally extending within the casing, depending from the basal baffle plate, communicating with the central ports of said plate, and having air ports in its sides,—a suction outlet for the air and vapors, formed with receiving throats extending on each side of the trough above the bottom of the casing—and a suction outlet for the condensed water leading from out the trough.

5. A condensing apparatus of the character stated, comprising a casing having inlet and outlet water passages,—water tubes traversing the interior of the casing between said passages and lying close to the side walls of the casing and also to the lateral baffle plates and the basal baffle plate, and extending within the chamber below the basal baffle plate,—a steam inlet,—a basal baffle plate traversing the casing near its bottom and provided with both lateral and central ports, and dividing the casing into an upper tube-containing chamber and a lower tube-containing chamber,—lateral baffle plates provided with ports and disposed above the basal baffle plate,—a trough longitudinally extending within the casing, depending from the basal baffle plate, communicating with the central ports of said plate, and having air ports in its sides,—a suction outlet for the air and vapors, formed with receiving throats extending on each side of the trough above the bottom of the casing,—and a suction outlet for the condensed water leading from out the trough.

6. A condensing apparatus of the character stated, comprising a casing having inlet and outelt water passages, water tubes traversing the interior of the casing between said passages, a steam inlet, a basal baffle plate traversing the casing near its bottom and provided with both lateral and central ports and dividing the casing into an upper tube-containing chamber and a lower tube-

containing chamber, lateral baffle plates provided with ports and disposed above the basal baffle plate, a trough longitudinally extending within the casing below the basal baffle communicating with the central ports of baffle and forming between it and the bottom of the casing two chambers, a suction outlet for the air and vapors formed with receiving throats extending on each side of the trough above the bottom of the casing, and a suction outlet for the condensed water leading from out the trough and from out the two chambers.

In testimony whereof I have hereunto signed my name this 3rd day of February, 1916.

CHARLES J. SNOW.

In the presence of:—
W. T. HESS,
W. S. SOLARI.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."