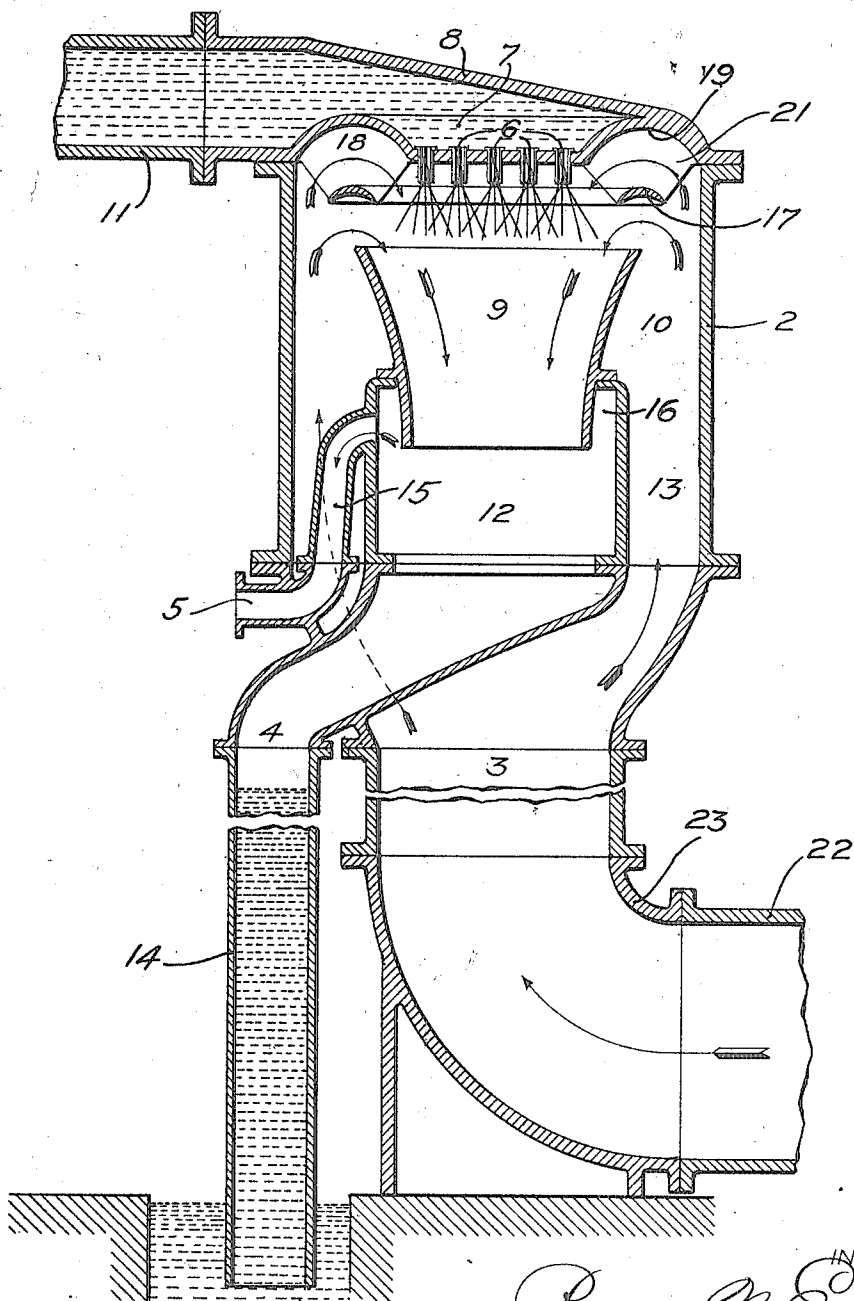


R. N. EHRHART.
 BAROMETRIC CONDENSER.
 APPLICATION FILED JAN. 16, 1915.

1,255,518.

Patented Feb. 5, 1918.



WITNESSES:

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BY

HIS ATTORNEY IN FACT

UNITED STATES PATENT OFFICE.

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ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

BAROMETRIC CONDENSER.

1,255,518.

Specification of Letters Patent.

Patented Feb. 5, 1918.

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To all whom it may concern:

Be it known that I, RAYMOND N. EHREHART, a citizen of the United States, and a resident of Edgewood, in the county of Allegheny and State of Pennsylvania, have made a new and useful Invention in Barometric Condensers, of which the following is a specification.

This invention relates to condensers and more particularly to barometric condensers. Condensers of the barometric type are ordinarily supported by or mounted on the tail pipe, that is, the pipe through which the mixture of condensing water and the water of condensation flows. Such an arrangement is liable to and does give trouble in large size condensers, due to the expansion and contraction of the exhaust line or pipe through which the steam to be condensed is delivered to the condensers. The exhaust line or pipe up to the condenser is large and consequently rigid, and if the vacuum in the condenser drops the steam temperature in the exhaust increases, but there will be no material increase in the temperature of the water discharged through the tail pipe. The result is that the exhaust pipe will expand and the amount of its expansion will be greater than that of the tail pipe, so that there will be a differential expansion between the two, which will either tear the condenser loose from its foundation, or start leaks in its joints.

The object of this invention is to provide a parallel flow barometric condenser which overcomes difficulties now encountered. This and other objects, which will be made apparent throughout the further description of the invention, are attained by means of a condensing apparatus embodying the features herein described and illustrated in the single sheet drawing accompanying and forming a part hereof.

In the drawings, I have illustrated in vertical section, a condenser embodying my invention, portions being broken away for convenience of illustration.

The condenser illustrated includes a casing 2, which is provided with a steam inlet port 3, a mixture discharge port 4, an air offtake 5, and condensing water delivery jets 6. The jets 6 communicate with and receive condensing water from a water chamber 7 formed in the head casting 8 of the

condenser, and discharge the water downwardly through a mixing tube or cone 9, located within the condensing chamber 10 and between the jets 6 and the mixture discharge port 4. The chamber 7 is shown communicating with a pipe or passage 11, through which condensing water from any suitable source is delivered.

As illustrated, the lower or discharge end of the mixing cone 9 projects into a chamber 12, which is located within the condensing chamber 10, and around which a steam delivery passage 13, communicating with the exhaust port 3, extends. The walls of the chamber 12 converge to form the flanged discharge port 4 and, as illustrated, project laterally through the casing 2 at a point above the exhaust port 3. A tail pipe 14 is suspended from the port 4, so that its lower end is free. The air off take port 5 communicates by means of a passage 15, formed within the casing 2, with an annular space 16 located between the lower end of the mixing cone 9 and the wall of the chamber 12, and the projecting end of the cone masks the inlet end of the passage 15.

The inlet port 3 of the condenser is located at the bottom of the casing 2 and is preferably concentric with the cylindrical wall of the casing. With this arrangement steam to be condensed entering the condenser through the port 3 travels upwardly through the annular passage 13, to the upper end of the mixing cone 9, where it is subjected to the cooling effect of the water discharged from the jets 6. In order to direct the flow of the steam into the mixing cone 9 and to avoid objectionable eddy currents, I have provided a directing plate 17 which, as illustrated, is in the form of a ring and is provided on the lower side with a concave face and on the upper side with a convex face and is secured to the top casting 8 by means of webs 18. The top casting is provided, at a point contiguous with the directing plate 17, with an annular directing face 19, which is concave and which forms with the convex face of the plate 17 an annular directing passage 21, which is divided into segments by the webs 18. As illustrated, the center of curvature of the convex face of the plate 17 is substantially coincident with the center of curvature of the concave face 19 and consequently the steam passage formed between

these two faces has substantially parallel walls, and is so arranged that the steam passing through it will be gradually reversed in the direction of its flow and is delivered
 5 into the converging cone with the condensing water discharged from the jets 6. The concave face of the plate 17 also operates to gradually reverse the direction of the flow of steam entering the mixing cone through
 10 the passage formed between the plate and the upper edge of the cone and it directs the steam into the cone. With this arrangement the flow of steam and water throughout the zone of condensation is parallel.

15 As illustrated, an exhaust pipe or header 22 communicates with the inlet port 3 and is provided with an elbow foot 23 on which the condenser is mounted. With this arrangement, the condenser is free to move as
 20 the exhaust pipe or header expands and contracts, since the tail pipe swings free from the mixture discharging port 4 and there is no possibility of damaging the condenser by reason of the expansion and contraction of the exhaust pipe.

25 While I have illustrated and described but one embodiment of my invention, it will be apparent to those skilled in the art that various modifications, substitutions, changes,
 30 additions and omissions may be made in the details of construction without departing from the spirit and scope of the invention as set forth by the appended claims.

What I claim is:

35 1. A parallel flow barometric condenser having a steam inlet at one end thereof, a water inlet at the other end, an exhaust pipe communicating with the steam inlet and on
 40 which the condenser is mounted, means located within the condenser for delivering steam from the inlet around the water delivery passages of the condenser to the water
 45 inlet end of the condenser, and a tail pipe communicating with a discharge port of the condenser and suspended from the condenser.

2. A parallel flow barometric condenser supported on the steam inlet pipe and having a port communicating with said pipe, a
 50 water inlet located near the top of the condenser, a water discharge port located near the bottom of the condenser, an air off-take port located between the water discharge
 55 and the water inlet port, and a passage located within the condenser for conveying steam from the steam inlet around the water and air passages of the condenser and to the
 60 water inlet end of the condenser.

3. A parallel flow barometric condenser
 60 supported on the steam inlet pipe and having a port communicating with said pipe, a water inlet located near the top of the condenser, a water discharge port located near
 65 the bottom of the condenser, and an air off-take port located between the water dis-

charge and the water inlet port, a tail pipe suspended from the water discharge port, and a passage located within the condenser and communicating with the steam inlet
 70 port for delivering steam entering the port around the water passage of the condenser to the water inlet end of the condenser.

4. A parallel flow barometric condenser having a steam inlet port near the lower end thereof, a water inlet near the upper end
 75 thereof, a water discharge port and a passage formed within the condenser and communicating with the steam inlet for conveying steam entering the steam inlet around
 80 the water passage of the condenser and to the water inlet end of the condenser.

5. A parallel flow barometric condenser mounted on the steam delivery pipe and having a port near the lower end communicating with the pipe, a water inlet near
 85 the upper end of the condenser, a discharge chamber located within the condenser receiving water from the water inlet and having a discharge port communicating therewith, and means within the condenser for
 90 directing the steam entering the steam inlet port into the discharge chamber with the water.

6. A parallel flow barometric condenser mounted on the steam delivery pipe and
 95 having a port near the lower end communicating with the pipe, a water inlet near the upper end of the condenser, a discharge chamber located within the condenser and having a discharge port communicating
 100 therewith, a steam delivery passage communicating with the steam inlet port and extending upwardly through the condenser past the discharge chamber, and means for reversing the flow of steam traversing said
 105 passage and for directing the steam into the line of flow of condensing water within the condenser.

7. A barometric condenser, having a steam inlet port near the lower end thereof, a con-
 110 densing water inlet located near the top of the condenser, a mixing cone through which the condensing water is delivered communicating with a water discharge port of the condenser, and a steam passage within the
 115 condenser communicating with the steam inlet port and with the upper end of the cone.

8. A parallel flow barometric condenser, comprising a casing having a steam inlet
 120 port near the lower end thereof, a water inlet near the upper end thereof and a water discharge port near the steam inlet port, a mixing cone located within the casing for receiving water from the water inlet, a collecting
 125 chamber communicating with the water discharge port and receiving water discharged from said cone, and a steam delivery passage formed within the casing for conveying steam entering the steam inlet
 130 port around the collecting chamber and the

delivering cone and for delivering the steam so conveyed into the water inlet end of the cone with the water.

9. A barometric condenser comprising a casing having a steam inlet port near the lower end thereof, a water inlet near the upper end thereof, a water discharge port near the steam inlet port, and an air off-take between the water inlet and water discharging ports, a mixing tube receiving water from the water inlet and communicating with the discharge port, a steam passage between the steam inlet port and the inlet end of the mixing tube passing upwardly through the condenser, and deflecting means located near the top of the condenser for reversing the flow of steam traversing said passages and for directing it into said tube.

10. A barometric condenser comprising a casing having a steam inlet near the lower end thereof, a water inlet near the upper end thereof, and a discharge port near the lower end thereof, and means within the casing for directing the flow of steam entering the steam inlet in a direction substantially parallel to the flow of water through the condenser.

11. A parallel flow barometric condenser mounted on the steam delivery pipe and having a port near the lower end communicating with the pipe, a water inlet near the upper end of the condenser, a discharge chamber located within the condenser and

having a discharge port communicating therewith, a steam delivery passage communicating with the steam inlet port and extending upwardly through the condenser past the discharge chamber, a deflector for reversing the flow of steam traversing said passage and for delivering the steam into the line of flow of condensing water within the condenser, and an air off-take communicating with the discharge chamber.

12. A parallel flow barometric condenser comprising a casing having a steam inlet port near the lower end thereof, a water inlet near the upper end, a water discharge port and an air offtake port, a mixing cone within the casing receiving water from the water inlet, a collecting chamber communicating with the discharge port and with the delivery end of the cone, a passage communicating with the air offtake port and the collecting chamber, and a passage formed within the casing for conveying steam entering the steam inlet around the collecting chamber and the mixing cone and for delivering the steam so conveyed into the water inlet end of the cone with the water.

In testimony whereof, I have hereunto subscribed my name this 13th day of January, 1915.

RAYMOND N. EHRHART.

Witnesses:

E. W. McCallister,
C. W. McGhee.