R. D. TOMLINSON.

BAROMETRIC CONDENSER.

APPLICATION FILED MAY 20, 1910.

1,036,031. Patented Aug. 20, 1912.

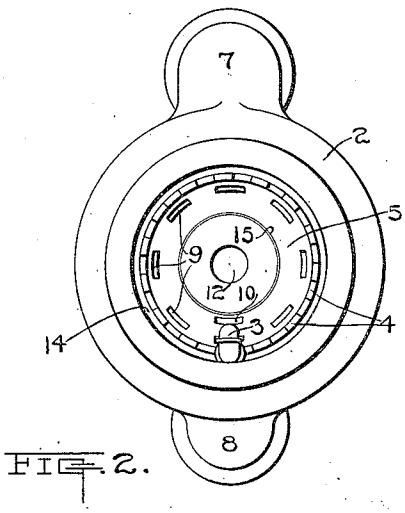


FIG. 2.

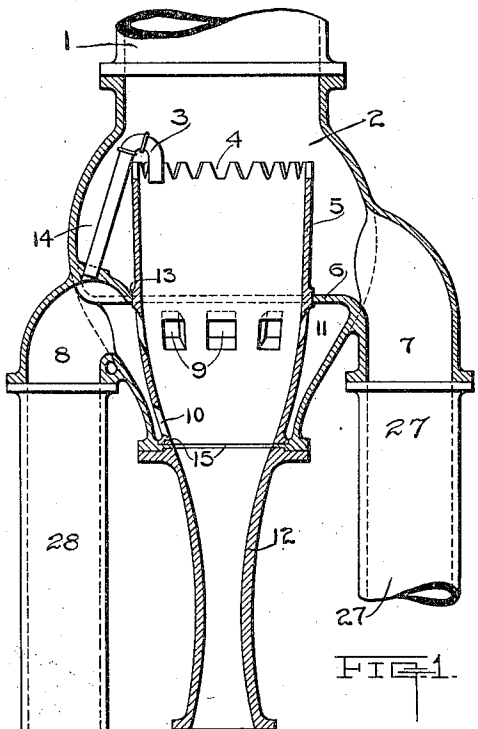
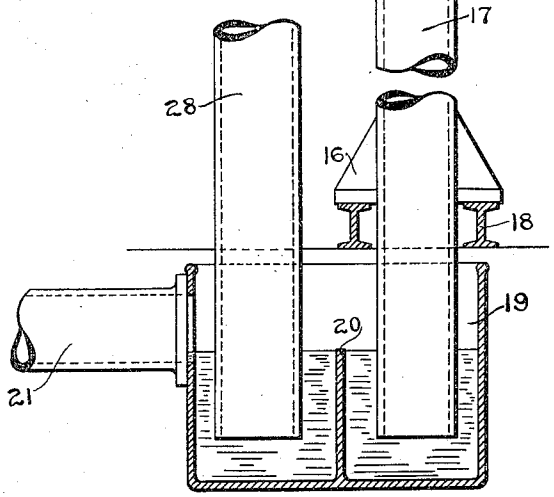


FIG. 1.



WITNESSES =

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BAROMETRIC CONDENSER.

1,036,031. Specification of Letters Patent. Patented Aug. 20, 1912.

Application filed May 20, 1910. Serial No. 562,429.

To all whom it may concern:

Be it known that I, ROYAL D. TOMLINSON, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a certain new and useful Improvement in Barometric Condensers, (Case A,) of which the following is a specification.

This invention relates to improvements in the construction of condensers, and particularly to improvements in the construction of condensers of the barometric type.

The object of the invention is to provide a barometric condenser which is simple in its construction and efficient in operation.

As heretofore constructed, the construction of most barometric condensers has been very complex, and it is the particular object of this invention to provide various improvements in the detail construction of condensers of this type which will greatly reduce the cost of construction as well as improve the efficiency of operation.

A clear conception of one embodiment of the invention can be obtained by referring to the accompanying drawing in which like reference characters designate the same or similar parts in the same or different views.

Figure 1 is a fragmentary elevation of a barometric condenser embodying the invention, the condenser head or chamber and the hot well being shown in section. Fig. 2 is a top view of the condenser head or chamber which is shown in section in Fig. 1.

The exhaust steam inlet pipe 1 terminates in the upper portion of the spherical casing 2 of the condenser head, being directed downward and toward the center of the head, and having its opposite end connected to the steam supplying source, not shown. The tail pipe 17 connects with the bottom of the condenser casing 2, being directed toward the center of the casing 2 in line with the inlet pipe 1, and having its lower end projecting into a hot well 19. A portion 12, of restricted cross-section, is formed at the upper extremity of the tail pipe 17, being in direct communication with the interior of the casing 2. The I-beams 18 which contact with the lower surfaces of the brackets 16 formed on the tail pipe 17, form suitable supports for the condenser and piping leading thereto.

The condensing water supply pipe 27 connects with the passage 7 formed at the side of the casing 2, the passage 7 being directed into the annular chamber 14. The chamber 14, which is broad at its base and restricted at its top, is formed in the upper portion of the casing 2 above the diaphragm 6. The overflow pipe 28 connects with a passage 8 formed at the side of the casing 2, the passage 8 being directed into the upper portion of the annular chamber 11. The chamber 11 is formed in the lower portion of the casing 2 below the diaphragm 6. The overflow pipe 28 extends parallel to the pipe 17 and projects into the hot well 19.

The mixing chamber 5 has the upper edge of its walls serrated by a series of notches 4 and extends downwardly from the upper portion of the chamber 14 to the bottom of the casing 2. The wall of the chamber 5 contacts with the casing 2 along a horizontal plane 15 and a short vertical circular surface both at the bottom of the casing 2 and along a vertical circular surface 13 of the diaphragm 6. The upper end of the mixing chamber 5 is of considerably greater diameter than the bottom thereof, but all diameters of the chamber 5 are less than the internal diameter of the steam inlet opening, thereby permitting withdrawal of the chamber 5 from the upper end of the casing 2.

The chamber 14 has its communicating passage to the steam inlet reduced or restricted by the outward spreading of the wall of the chamber 5 near the upper end of the chamber and also by the drawing in of the walls of the casing 2. A series of ports or downwardly inclined openings 9 extend through the walls of the chamber 5 just below the diaphragm 6, these openings 9 establishing a communication between the interior of the chamber 5 and the annular chamber 11. A small downwardly directed opening 10 is formed through the end of the wall of the chamber 5 at the lower extremity of the chamber 11. A hook or J-shaped pipe 3 connects the upper end of the chamber 11 with the upper interior portion of the chamber 5, the upper end of the pipe 3 being directed toward the bottom of the chamber 5.

The hot well 19 is divided into compartments by the wall 20, which wall projects upwardly from the bottom of the well to a point somewhat above and intermediate the

lower ends of the pipes 17, 28. The overflow or drainage pipe 21 leads away from the well 19 at a point some distance above the lower extremities of the pipes 17, 28, but slightly below the top of the wall 20.

During the operation of the condenser, the steam to be condensed is admitted to the upper end of the casing 2 through the inlet pipe 1, being directed toward the interior of the mixing chamber 5. The condensing water which is admitted to the casing 2 through the pipe 27 and opening or passage 7, enters the chamber 14 at its lower portion and rises toward the upper restricted end thereof, being there discharged into the interior of the mixing chamber 5 through the notches 4. The discharge of the condensing water into the chamber 5 is in the form of a series of jets or sprays, one at each notch 4 and each directed toward the center of the chamber 5. The entering steam upon striking these jets or sprays is condensed, the resulting water of condensation and the condensing water flowing toward the lower end of the chamber 5. As the size of pipe 17 is insufficient to immediately carry off all of the mixture of water of condensation and condensing water to the hot well 19, the mixture rises slightly in the end of the chamber 5, a portion thereof being withdrawn from the chamber 5 through the openings 9 into the annular chamber 11, and from the chamber 11 down the overflow pipe 28.

Since the velocity of the mixture in passing through the restricted portion 12 is relatively high, the air which enters the casing 2 is entrained directly down the tail pipe 17, the restricting of the area in the portion 12 thus serving as an air ejector. Some of the air however may become lodged in the upper portion of the chamber 11. This air is withdrawn from the annular chamber 11 through the pipe 3, which pipe leads from the highest portion of the chamber 11 to the interior of the mixing chamber 5.

If it is desired to use a dry air pump in connection with the condenser, the pipe 3 may be omitted and the air pump connection made with the upper portion of the chamber 11. In such construction, air is withdrawn from within the mixing chamber 5 through the downwardly inclined openings 9, the inclination of these openings tending to cause the air to assume a course of travel in direct opposition to the flow of water, rather than directly against the side of the wall of water passing through the chamber 5, thus tending to decrease the amount of water drawn into the chamber 11 with the air. Without the use of an air pump, the inclination of the openings 9 tends to reduce the leakage of air into the chamber 11, since the travel of the water through the mixing chamber is unobstructed by sharp protruding corners on the chamber walls, which construction would cause eddies or similar obstructing water currents.

During the inoperativeness of the condenser, some provision should be made to prevent the freezing of water which may remain in the casing 2. The port or opening 10 at the lower end of the chamber 11 permits the discharge of any water remaining in the chamber 11 after a shut down of the condenser. The water inlet 27 serves a similar purpose in the chamber 14, thus requiring no extra ports or openings through the mixing chamber 5. The opening 10 might also be supplanted by a pipe or similar connection leading directly from the lower end of the chamber 11 to the overflow or tail pipes.

The shape of the chamber 14 permits a better spraying or distribution of the jets of injection water within the chamber 5, since the velocity of the water rising in the annular chamber 14 is increased as it approaches the restricted portion of the chamber, being a maximum at the discharge end thereof. The serrated upper edge of the wall of the mixing chamber 5 forms a simple and efficient means for spraying the injection water into the mixing chamber.

The coaction of the mixing chamber 5 with the casing 2, permits easy insertion of the chamber into the casing. The surfaces 13, 15, are readily machined, being surfaces of revolution, to insure a tight joint between the contacting members. The lower end of the chamber 5 is, moreover, provided with a short circular surface formed perpendicular to the lower plane surface 15, which surface contacts with a corresponding surface of the casing 2. By such construction tilting of the chamber 5 within the casing 2 is positively prevented, due to the contacting of the chamber 5 with the casing 2 along two concentric circular surfaces, one of the surfaces being near the lower end, and the other some distance above the end of the chamber 5. It is, however, not essential to have a perfect contact between the short circular surface at the bottom of the wall of the chamber 5 and the casing 2, as it may be desirable to allow a certain amount of clearance between the members to permit slight relative shifting. This slight clearance would, moreover, prevent sticking of the chamber 5 within the casing 2, thus permitting easier removal of the chamber wall.

It should be understood that it is not desired to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

It is claimed and desired to secure by Letters Patent,—

1. In a condenser, a casing, a mixing chamber within said casing, a second cham-

ber adjacent said mixing chamber, an overflow pipe leading from said second chamber, a means of communication from the upper end of said second chamber to said mixing chamber, and separate means connecting the upper end of said second chamber with said mixing chamber.

2. In a condenser, a casing, an opening into said casing, and a wall within said casing forming a mixing chamber, said wall contacting at surfaces of revolution with said casing near its mid portion and at the bottom and being free from contact at the top, and said wall being removable from said casing through said opening.

3. In a condenser, a casing, a wall within said casing forming a mixing chamber, a second chamber for overflow water surrounding said wall, a separate overflow pipe leading from said chamber, and a port leading from the upper end of said second chamber and downwardly directed to communicate with said mixing chamber.

4. In a condenser, a casing, a wall within said casing forming a mixing chamber, a second chamber for overflow water surrounding said wall and communicating with said mixing chamber, a separate overflow pipe leading from said chamber, and a drainage port leading from the lower end of said second chamber.

In testimony whereof, I affix my signature in the presence of two witnesses.

ROYAL D. TOMLINSON.

Witnesses:
H. C. CASE,
G. F. DE WEIN.