G. B. PETSCHE.

CONDENSER.

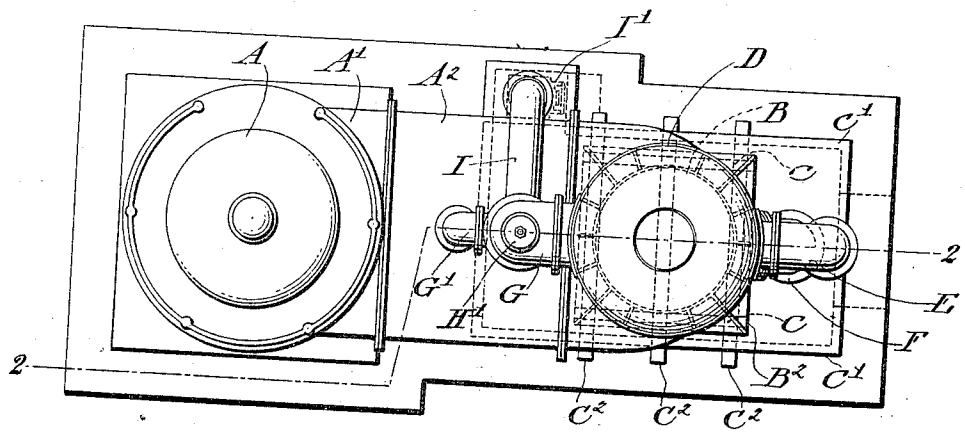
APPLICATION FILED DEC. 17, 1907. RENEWED DEC. 20, 1911.

1,036,698.

Patented Aug. 27, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



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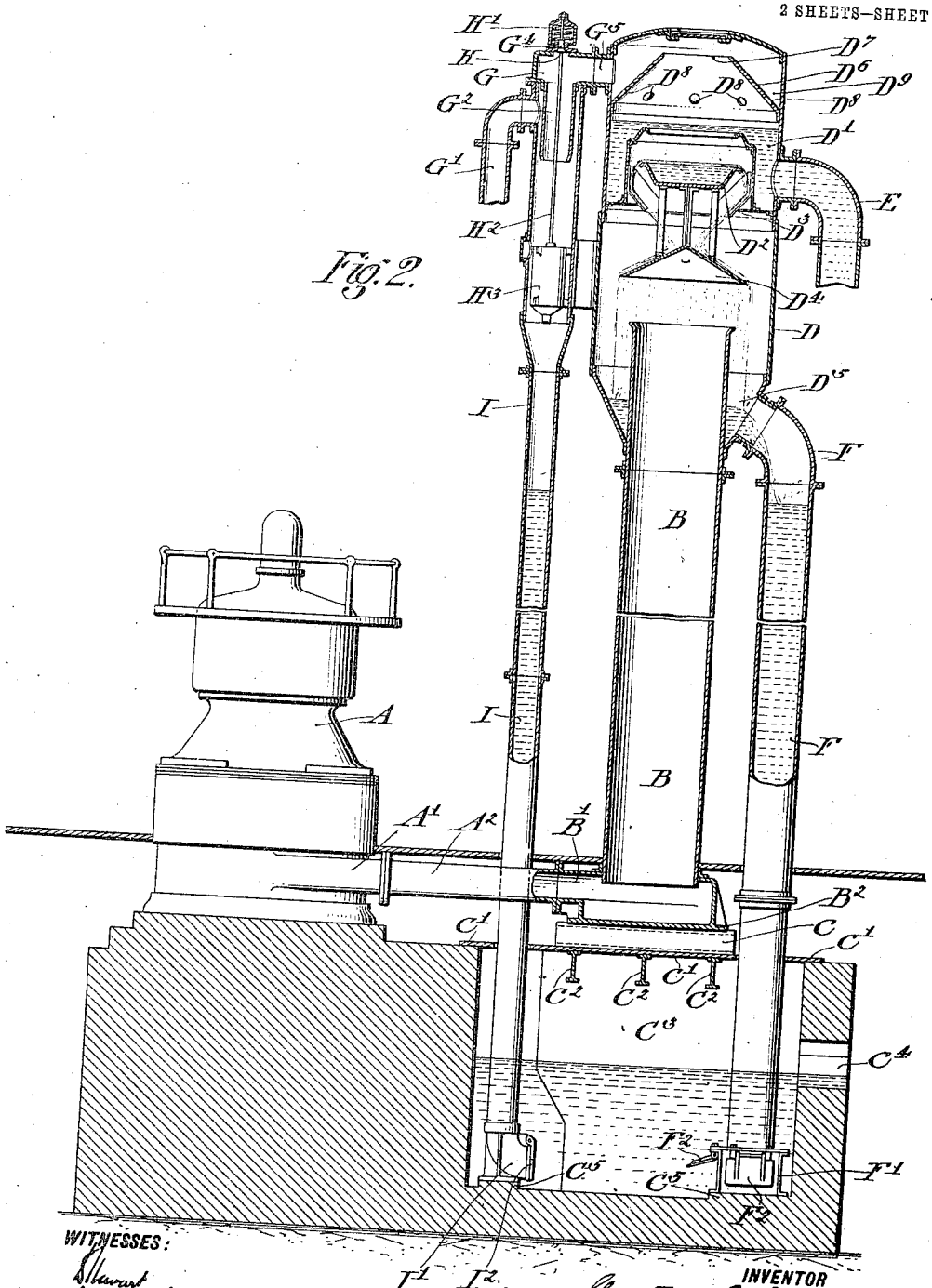
2 SHEETS—SHEET 2.

Fig. 2.



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CONDENSER.

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To all whom it may concern:

Be it known that I, GUSTAV B. PETSCHE, a subject of the Emperor of Germany, residing in the city and county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Condensers, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

The present invention relates to steam condensers, and has for one object the production of a condenser which is simple and compact in its mechanical construction.

Another object is the production of a condenser construction in which suitable provision is made by which the expansion and contraction of the condenser parts resulting from the varying temperatures to which the condenser is subjected may take place without injury to the condenser.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, and the advantages possessed by it, reference may be had to the accompanying drawings and descriptive matter in which I have illustrated and described one of the forms in which the invention may be embodied.

Of the drawings, Figure 1 is a plan, and Fig. 2 is a sectional elevation taken on the line 2—2 of Fig. 1.

In the drawings I have shown the condenser as employed in conjunction with a steam turbine A. The exhaust chamber A′ of the steam turbine being connected by the lateral pipe section A^2 to the base member or chambered bottom member B′ from which rises the vertical steam pipe B of the condenser proper. The bottom of the base member B′ is slidingly supported on the horizontal slide rails C, which, as shown, extend parallel to the pipe section A^2. The slide rail C rests upon the cover C′ of the hot well C^3, the cover being supported on the transverse beams C^2.

The condensing chamber is formed by a drum D which is supported by the exhaust pipe B. The upper end of the pipe B projects some distance into the drum D, which is of materially larger diameter than the pipe B, thus forming a reservoir or space D^5 into which the hot water collects and from which leads the main tail or waste pipe F. Between the upper and lower ends of the drum D is connected the cold water supply pipe E and the outlet G^5 for the exhaust or vacuum pump. Connection G leads from the side of the drum D adjacent its upper end. The drum D is provided with the usual water reservoirs D′ and D^2 and baffles or water spreaders D^3 and D^4, and with a separator member or baffle D^6. The member D^6 is in the form of a hollow truncated cone secured at its base to the member D below the outlet to the connection G and projecting in front of said connection, and as shown having its open upper end D^7 extending above the outlet G^5. Provision is made, as by ports D^8, for allowing water collecting in the space D^9 to pass downward into the reservoir D′.

The pipe G′ which runs from the connection G to a pump or other pressure exhauster not shown, leads from the connection G above the lower end of a tubular member G^2, which serves to prevent water which may be carried in to the connection G from passing into the pipe G′. The connection G has an air inlet port G^4 controlled by the valve H, which is normally held in position to close the port G^4 by the spring acting on the external cap H′ connected to the outer end of the valve stem H^2. The lower end of the connection G is open to the hot well through the tail pipe I. The lower ends of the hot well tail pipes F and I extend into casings I′ and F′ respectively, having flap outlet valves I^2 and F^2 and normally resting on the seat C^5 provided at the bottom of the hot well.

In normal operation, water enters the condenser chamber D through the conduit E, and passing downward eventually flows to the hot well through the tail pipe F, the steam entering the condenser chamber D from the engine through conduit B being condensed by this water. Any considerable flow of water out of the condenser D into the connection G which may occur from time to time results at once in the accumulation of sufficient water in the leaky receptacle H^3 to pull open the valve H against the action of the spring normally holding it closed, thus admitting air to the condenser

chamber to break the vacuum therein and restore the normal downward flow of the water in the condenser. When the normal counter current action of the condenser is interrupted and water begins to pass upward instead of downward, the conical separator D^6 tends to check the flow of the condensing water into connection G, as the change in direction of flow of the water produced by the separator or baffle D^6 permits the water to accumulate in the space D^9 from whence it may pass down, in part at least, through ports D^8 into the lower portion of the condensing chamber. It will be understood that tail pipes F and I project above the surface of the water in the hot well C^3 a distance exceeding the height of a barometric column of water.

With the construction described, the exhaust pipe B supports the rest of the condenser proper and is entirely free to expand without injuring in any way the parts of the apparatus supported by it. The result of such expansion and contraction being merely to raise and lower the upper end of the condenser. Similarly, the lateral connection between the engine and the pipe B may expand and contract freely without any injurious consequences, since the only effect of such expansion and contraction is to move the condensing apparatus toward and away from the engine. The mounting of the condensing apparatus on a suitable platform such as is formed by the slide rails C permits this contraction and expansion to take place without injuring or interfering with the operation of the apparatus in any way. The advantages of a construction which permits the condensing parts and the connection between it and the engine to expand and contract freely and without straining any connections or causing the parts to warp or buckle will be appreciated when it is realized that the diameter of the steam pipe B may well equal or exceed eight or ten feet, and that the range of temperatures to which the apparatus is subjected is several hundred degrees.

The construction disclosed possesses the advantage of having a free and unobstructed communication between the exhaust chamber of the engine and the condensing chamber proper, and economizing space and material, since the steam pipe itself forms the supporting structure for the rest of the apparatus. By making the vacuum pump connection to the side of the condensing chamber proper and arranging the separator member D^6 within the condensing chamber, as shown, the height of the complete apparatus is reduced, an important consideration where the head room is limited, as where the condenser is located beneath overhead cranes or the like. By preference, as shown, the connection G and tail pipe I are arranged at one side of the pipe B and the tail pipe F at the other side, so that the weight of each of these connections tends to counterbalance that of the other.

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

1. In combination in a steam condenser, vertical steam pipe, a condensing chamber supported at the other end thereof, a lateral steam supply conduit connected to the lower end of the steam pipe, and a horizontal support on which said pipe rests and on which it is free to move as the lateral connection expands and contracts.

2. In combination in a steam condenser, a vertical steam pipe, a condensing chamber supported at the upper end thereof, a lateral steam supply conduit connected to the lower end of the steam pipe, a horizontal support on which said pipe rests and on which it is free to move as the lateral connection expands and contracts, and a hot water waste pipe and a vacuum pump connection secured to and depending from opposite sides of said condensing chamber.

3. In combination in a steam condenser, a vertical steam pipe, a condensing chamber supported and surrounding the upper end of the steam pipe, and a hot water waste connection leading from the space D^5 formed between the inner wall of the condensing chamber and the portion of the steam pipe entering the chamber.

4. In combination in a steam condenser, a vertical steam pipe through which the steam ascends, a condensing chamber, through which the condensing water normally flows downward, supported by the steam pipe at its upper end, cold water supply, vacuum pump and hot water waste connections to said chamber, the vacuum pump connection leading from the side of said chamber adjacent its upper end and the cold water supply connection leading to a reservoir within the condensing chamber having its water level located below the vacuum pump connection, and means for causing water which passes above the normal cold water reservoir level to be carried above the vacuum pump connection and then permitting such water to flow below the vacuum pump connection.

5. In combination in a steam condenser, a condensing chamber through which the condensing water normally flows downward, a vacuum pump connection leading from the side of said chamber adjacent its upper end, means for supplying condensing water to said chamber at a level below said connection, means for supplying steam to be condensed to said chamber at a level below the first mentioned level, and a baffle extending from the inner wall of the condensing chamber below the vacuum pump

connection and projecting above said first mentioned level and in front of said connection, said baffle being arranged to permit water carried above its upper end to flow downward into the condensing chamber from the space between the baffle and the wall of the condensing chamber.

6. In combination in a steam condenser, a condensing chamber, a vacuum pump connection leading from the side of the condensing chamber adjacent its upper end, an overflow reservoir for condensing water located below said connection, a steam supply connection to the condensing chamber at a level below said reservoir, and a baffle extending from the wall of the condensing chamber at a level below said vacuum pump connection and projecting above the reservoir level and in front of said vacuum pump connection, said baffle being apertured to permit water carried into the space between it and the wall of the condensing chamber to flow back into the condensing chamber.

7. A barometric condenser having a suction pipe connected with the upper portion of its condensing chamber, a steam inlet pipe extending vertically upward through the bottom wall of the condenser and terminating within said chamber, and means for discharging water into said chamber intermediate of the upper end of the steam pipe and of the point of connection of the suction pipe, the suction pipe acting to create a counter current of steam upwardly through the discharged water; substantially as described.

8. A barometric condenser having a suction pipe connected with the upper portion of its condensing chamber, a steam inlet pipe extending vertically upwardly through the bottom wall of the condenser and terminating within said chamber, means for discharging water into said chamber intermediate of the upper end of the steam pipe and of the point of connection of the suction pipe, the suction pipe acting to create a countercurrent of steam upwardly through the discharged water, and a tail pipe connected to the lower portion of the condensing chamber to one side of the steam pipe and adapted to contain a barometric column of water; substantially as described.

9. A barometric condenser having a suction pipe connected with the upper portion of the condensing chamber, a steam inlet pipe extending vertically upward through the bottom wall of the condenser and terminating within said chamber, means for discharging water into said chamber intermediate of the upper end of the steam pipe and of the point of connection of the suction pipe, the suction pipe acting to create a countercurrent of steam upwardly through the discharged water, and said pipe having means at its upper end for preventing the discharge of water thereinto; substantially as described.

10. In a barometric condenser, the combination with the condensing chamber, of a vertical steam pipe attached at its upper end to, and serving as a support column for, said condensing chamber, an external water supply conduit leading to said condensing chamber, and a tail pipe connected at its upper end to the lower end of said chamber arranged externally of said steam pipe.

11. In a barometric condenser, a structure comprising a hollow supporting column serving as a steam pipe and a shell carried at the upper end of said column of larger internal horizontal section than said column and serving as a condensing chamber, a tail pipe leading down from the lower end of the condensing chamber externally of the column, means including an external supply conduit for discharging condensing water into the condensing chamber adjacent its upper end, and provisions within the condensing chamber for causing the condensing water and water of condensation to pass out of the condensing chamber into said tail pipe.

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Witnesses:
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