

No. 658,322.

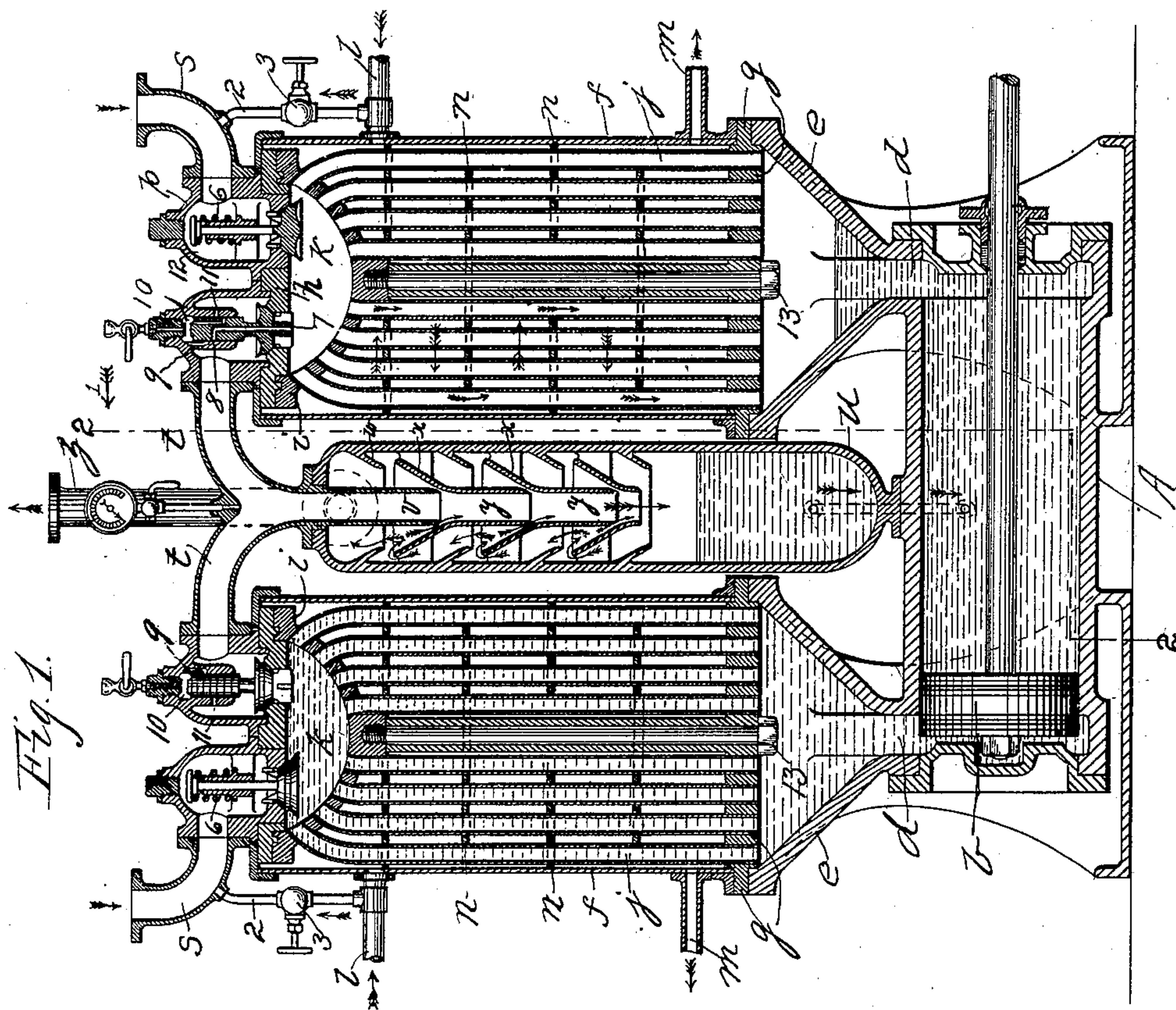
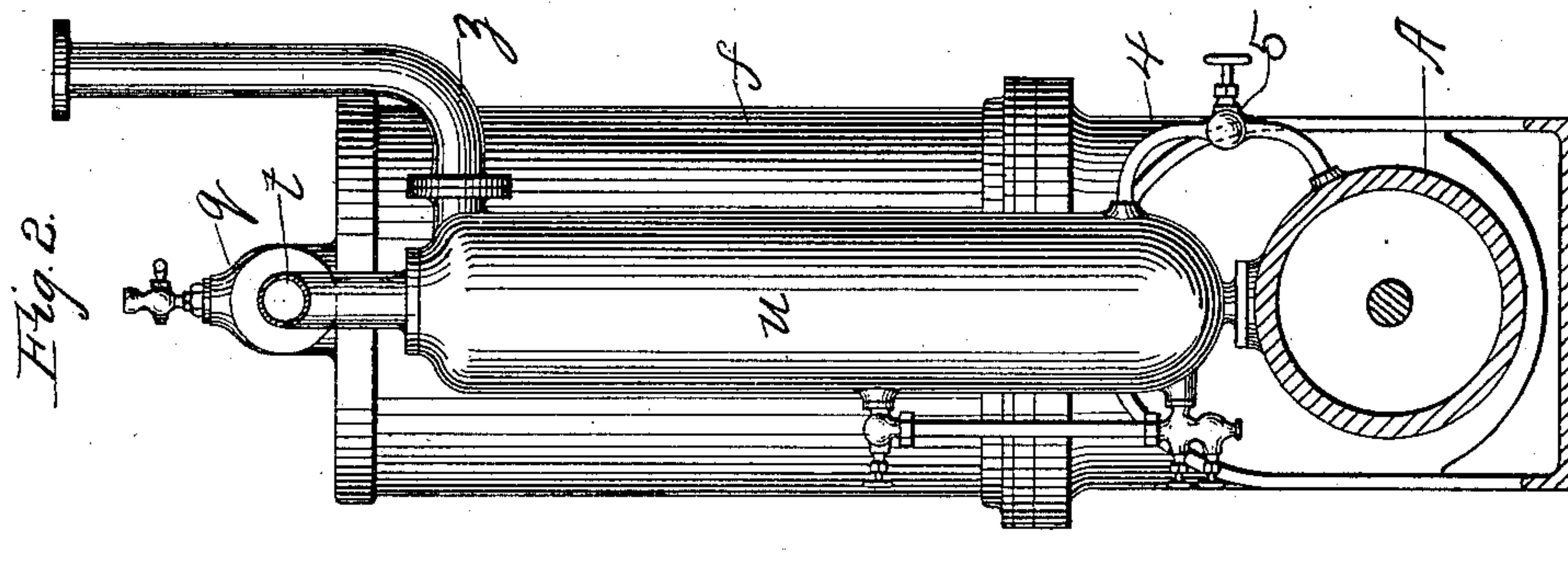
Patented Sept. 18, 1900.

O. P. OSTERGREN.

AIR COMPRESSOR AND COOLER.

(Application filed Mar. 23, 1900.)

(No Model.)



WITNESSES

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AIR COMPRESSOR AND COOLER.

SPECIFICATION forming part of Letters Patent No. 658,322, dated September 18, 1900.

Application filed March 23, 1900. Serial No. 9,880. (No model.)

To all whom it may concern:

Be it known that I, OSCAR P. OSTERGREN, a subject of the King of Sweden and Norway, and a resident of the city of New York, (Bedford Park,) borough of Bronx, State of New York, have invented certain new and useful Improvements in Air Compressors and Coolers, of which the following is a specification.

My invention relates to air-compressors in which water or other liquid packing is used intermediately of the piston and the air being compressed and provided with cooling apparatus placed intermediately of the cylinder-ports and the air induction and eduction ports and forming part of the compressing-chamber in a way to act more effectively on the air for cooling it as well as for compressing and for cooling the cylinder than when cooling by a jacket of the cylinder.

My invention comprises improvements in a separating attachment for the aqueous vapor of the air, all as hereinafter described, reference being made to the accompanying drawings, in which—

Figure 1 is a sectional elevation of my improved compressing and cooling apparatus, and Fig. 2 is a sectional elevation on line 2 2 of Fig. 1.

To facilitate understanding of the application and use of my improved separator attachment, I will first describe the compressor and cooler, which is as follows:

A represents the compressing-cylinder, and b the piston. The cylinder-ports d open out of the cylinder into funnel-shaped lower heads e of vertical cylinders f, respectively, on which tube sheets or plates g are placed intermediately of the heads of said funnels and the lower ends of the cylinders. Under the cover h of each cylinder is a concavo-convex tube-sheet i, placed with the concave side up. Circulating-tubes j are connected in these tube-sheets for free circulation of air and packing liquid between the cylinder and the chambers k, the latter being between the upper tube-sheets i and the covers h. The upper ends of the tubes are bent so as to converge for direct radial connection into the convex side of the tube-sheet, or practically so, and within a smaller field of area whereby the tube-sheets, limited in size to the interior diameter of the cylinder, may have sufficient breadth of mar-

ginal face outside of the tubes for proper connection with the cover, while the entire field of area within the cylinder below the bends is occupied by the tubes. The cylinders f have inlet and outlet pipes l and m for the cooling liquid and are provided with baffle-plates n to promote circulation. Inlet-valves p and outlet-valves q are provided to each chamber k for the air to be admitted through pipes s and expelled through pipes t. Branch pipes 2 connect the inlets l for the cooling-water with the air-inlet pipes s for supplying the water packing to the cylinder and the coolers through inlet-valves p to begin with, and for replenishing the supply from time to time as it may be reduced by absorption by the air or otherwise they have stop-cocks 3 for controlling the supply, and the lower part of the separator-cylinder u is connected by a pipe 4 with the compressing-cylinder A to discharge the accumulations in the compressing-cylinder, said pipe having a controlling-cock 5, which being opened from time to time will allow the water to gravitate into the cylinder or be drawn in by the suction of the piston. As the pressure is equal in the two cylinders, or practically so, water will not be forced into cylinder u by the piston to any material extent. The inlet-valves p are opened by the suction of the piston and have a spring 6 to close them when the suction ceases. The outlet-valves are opened by the impelling effect of the piston and closed by gravity and the reaction of the compressed air.

To cushion the outlet-valves which are liable to be thrust forcibly upward by the impulses of the piston, they are bored upward in the stem from below and laterally into the guide-cylinder for the stem, as at 7 and 8, and a passage 9 is formed in the guide-cylinder upward into the chamber 10. These passages open communication for compressed air into the chamber directly after the valve rises from the seat and permit the chamber to fill and cushion the valve. A vent is also provided to relieve the cushion immediately after the impact and prevent resistance to free opening of the valve, said vent consisting of the opening 11 through the side of the cylinder and the passage 12 in the stem, which open immediately after the operation of the cushion.

The air expelled from the compressor enters my improved separator for eliminating the water of condensation of the aqueous vapor, which consists of the upright cylinder *u*, 5 in the upper part of which are two sets of funnels adapted for favoring downward projection of the heavier aqueous vapor to the bottom as water and upward flow of the lighter vapor, so that the dry air may be taken out 10 of the top of the separator and the water may be trapped off in any approved way.

The pipes *t* unite in one pipe *v*, which enters through the top of the cylinder *u* and extends downward through the upper one of a 15 series of wide-mouthed funnels *w*, connected at the top to the inner surface of the cylinder *u* one above another at suitable distances apart. The lower end of pipe *v* terminates at the lower end of the upper one of another 20 series of funnels *x*, placed one above another and intermediately of the funnels *w*, and having downwardly-projecting nozzles *y*, reaching into the next in succession of said funnels *x* and terminating in such close proximity 25 to the roots of the nozzles thereof as to form practical injector devices for the aqueous portions of the vapor through the effect

of the impulses given to the vapor ejected by the piston, while the air relieved of aqueous vapor returns upward around the upper ends 30 of funnels *x*, between which and the surface of the tube there is space for it to reach the discharge-pipe *z*.

What I claim as my invention is—

The combination with an air-compressor, of 35 an aqueous-vapor separator consisting of the upright hollow cylinder receiving the compressed air at the top and containing injector devices consisting of the two series of funnels, the funnels of one series having the noz- 40 zles coacting with each other for injecting effects and being arranged for free upward passage of the air around them and the funnels of the other series adapted to cause the up- 45 flowing air to converge over the upper ends of the funnels having the nozzles, to favor separation of the aqueous vapor, the respective funnels of each series being placed intermediately of the funnels of the other series.

Signed by me this 22d day of March, 1900. 50
OSCAR P. OSTERGREN.

Witnesses:

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