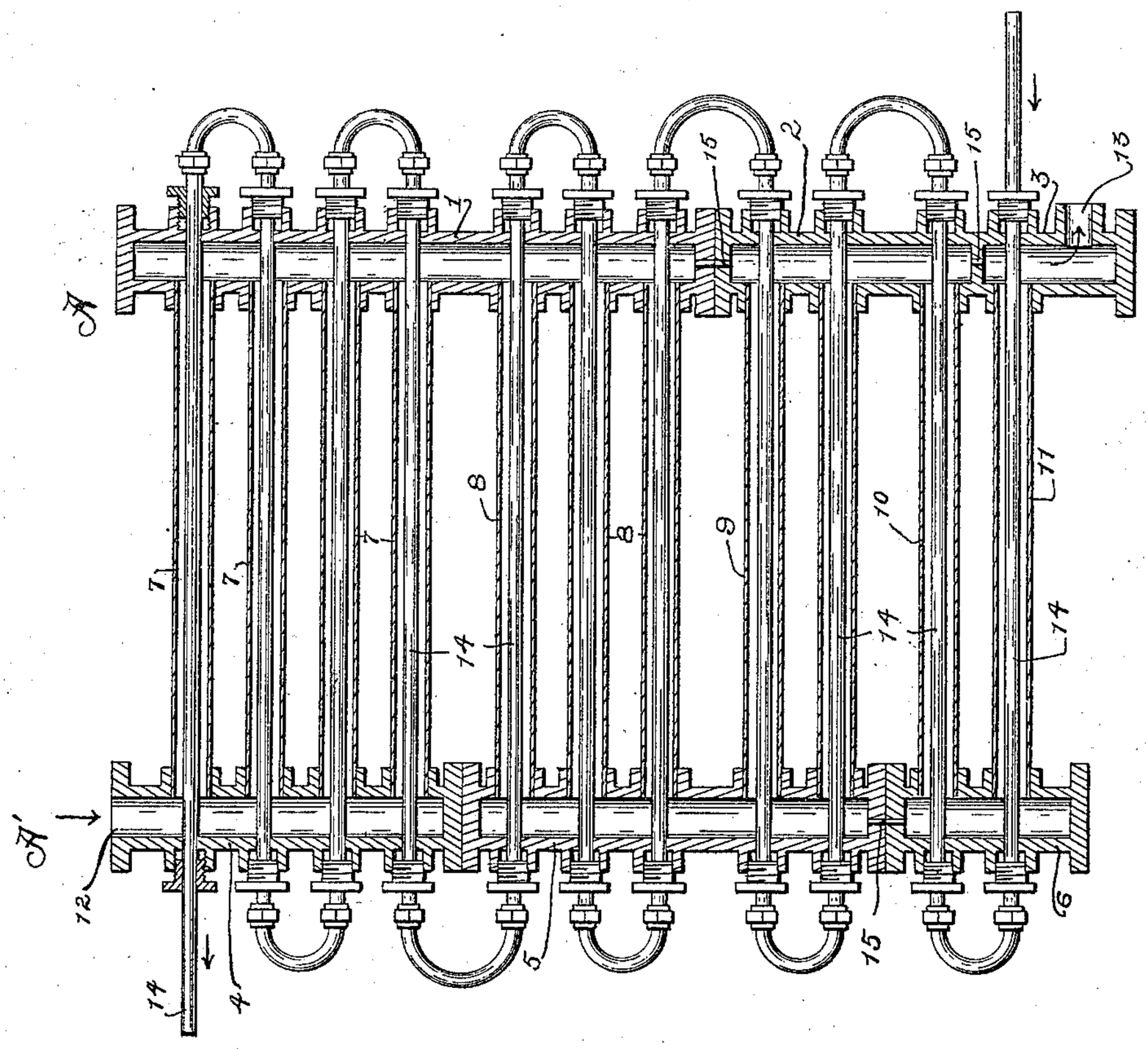
No. 685,892. Patented Nov. 5, 1901.

A. S. WHITE.

AMMONIA CONDENSER.

(Application filed Jan. 11, 1901.)

(No Model.)



Witnesses:
May W. Label.
Milton M. Alexander.

Inventor.
Alfred S. White,
By Charles A. Bonsall Cragg
Attorneys.

UNITED STATES PATENT OFFICE.

ALFRED S. WHITE, OF CHICAGO, ILLINOIS.

AMMONIA-CONDENSER.

SPECIFICATION forming part of Letters Patent No. 685,892, dated November 5, 1901.

Application filed January 11, 1901. Serial No. 42,904. (No model.)

To all whom it may concern:

Be it known that I, ALFRED S. WHITE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Ammonia-Condensers, (Case No. 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to apparatus for condensing ammonia and like gases. The principal object of the invention is to provide a practical and inexpensive form of apparatus and at the same time to arrange for the most economic and efficient action of the same.

In the accompanying drawing the figure is an illustration, partly in section and partly in elevation, of an ammonia-condenser embodying my invention.

In the apparatus shown there are a couple of series of tubular heads A A′, the series A consisting of two heads 1 and a combination-head having portions 2 and 3, arranged end to end, and the series A′ consisting of heads 4, 5, and 6, likewise arranged end to end. The two series of heads on the two sides of the apparatus are connected by connecting-pipes 7 7, 8 8, 9 9, 10, and 11. The connecting-pipes 7 7 extend between the head 4 and one side or end of the head 1. The pipes 8 8 extend between the other side of the head 1 and one side of the head 5. The pipes 9 9 extend between the other side of the head 5 and one side of the portion 2. The pipe 10 extends between the other side of the portion 2 and one side of the head 6. The pipe 11 extends between one side of the head 6 and the portion 3. In this way it will be seen that each set of connecting-pipes connects one side of one of the heads of one series with the other side of the opposite head of the other series, so that each head is connected with the adjacent or successive heads in the opposite series and a path or passage is formed for the gas to be condensed or cooled back and forth from one side of the apparatus to the other through the heads and connecting-pipes. The head 4 has an opening 12, which is understood to be the inlet for the gas, and the portion 3 has an opening 13, which is understood to be the outlet for the gas. The number of connecting-pipes is decreased in the successive sets, there being four pipes 7 7, three pipes 8 8, two pipes 9 9, and one pipe 10. In this way the volume of the gas being condensed is taken care of, that volume decreasing as it becomes cooled and the total area of the passage for the gas decreasing correspondingly.

A series of liquid-pipes 14 14 for the cooling liquid are arranged in the various connecting-pipes 7 7, 8 8, 9 9, &c. These liquid-pipes 14 14 have their ends connected with one another, so as to form a single continuous passage from one end of the apparatus to the other. The liquid-pipe 14 in the connecting-pipe 11 is understood to be the inlet-pipe for the liquid, and the pipe 14 in the end pipe 7 is understood to be the outlet for the liquid. In this way the circulation of the liquid is in a direction reverse to that of the gas, and consequently the liquid when coolest is associated with the coolest gas and when heated is associated with the hottest gas. The apparatus is simple and inexpensive in construction and is economical and efficient in operation.

By decreasing the number of connecting-pipes between the successive heads the greatest efficiency is secured from the apparatus because the area of the gas-passage is no greater and no less than necessary.

Openings 15 15 are provided, respectively, between the heads 1 and 2, 2 and 3, and 5 and 6 for the purpose of allowing condensed liquid to pass through.

What I claim as my invention is—

1. In an apparatus of the class specified, the combination of a couple of series of tubular heads, the heads in each series being arranged end to end and the two series being arranged side by side and at a distance from one another, a plurality of sets of connecting-pipes extended between said heads, the pipes and heads being arranged to form a continuous circulation-passage for the gas from one end of the apparatus to the other, the number of pipes in each set decreasing toward the outlet end, and liquid-pipes arranged within the connecting-pipes and extending through the heads and connected with one another so as to provide a single continuous passage for the cooling liquid, substantially as set forth.

2. An apparatus of the class specified, comprising a couple of series of tubular heads, the heads of each series being arranged end to end and the two series being arranged side by side at a distance from one another and the heads of the different series being arranged to break joints, a plurality of series of connecting-pipes extending between said heads, each series of pipes connecting a head on one side with a head on the other side, and each set having a number of pipes less than the number in the preceding set, the heads at the opposite ends of the two series being provided with openings adapted to form the inlet and outlet passages for the gas, and a series of liquid-pipes arranged within the connecting-pipes and extended through the heads and provided with connections adapted to connect all of the pipes in series so as to form a continuous passage for the cooling liquid, substantially as set forth.

In witness whereof I hereunto subscribe my name this 4th day of January, A. D. 1901.

ALFRED S. WHITE.

Witnesses:
HARVEY L. HANSON,
GEORGE L. CRAGG.