No. 769,379. PATENTED SEPT. 6, 1904.

M. A. HEROLD.

CONDENSER.

APPLICATION FILED NOV. 12, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

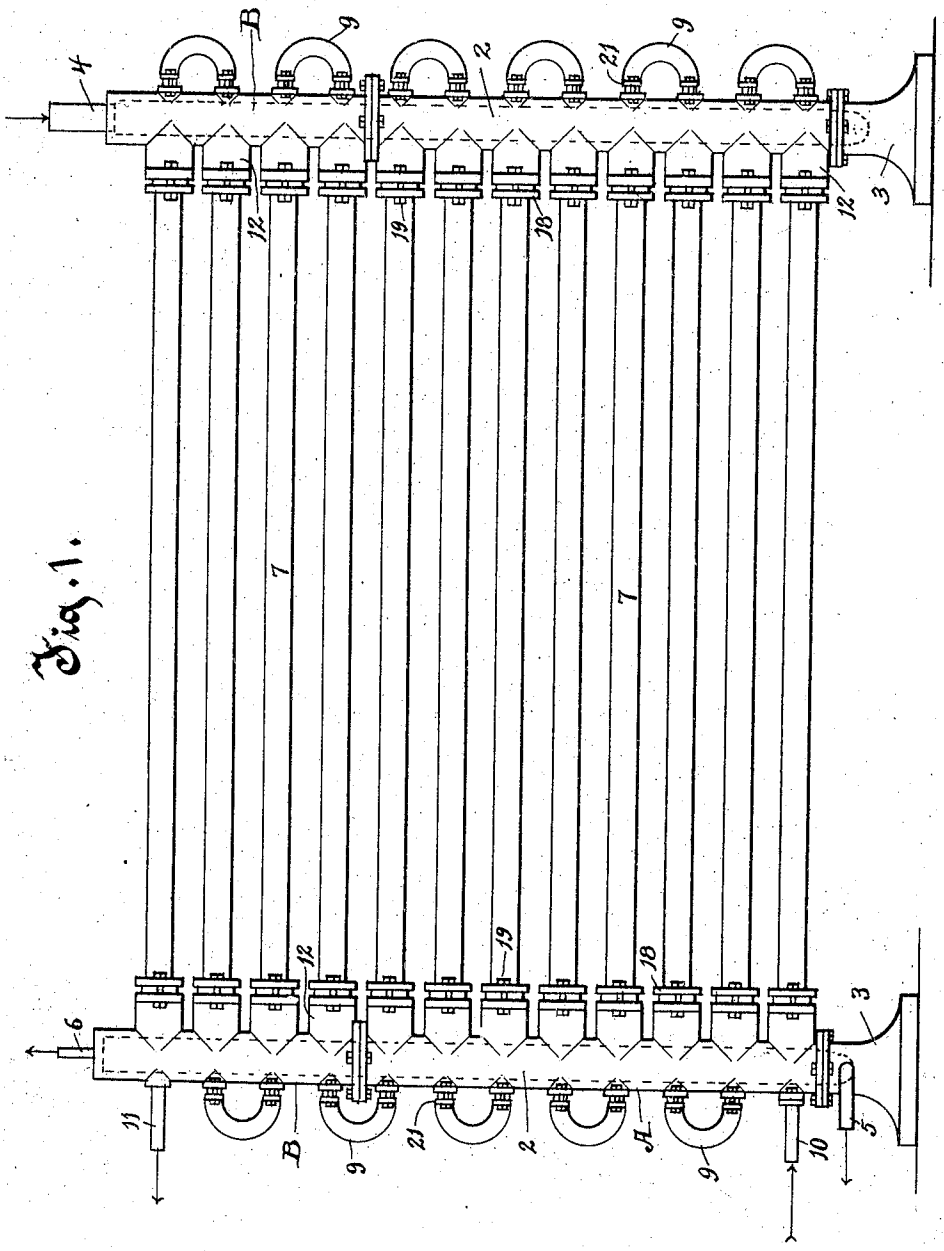


Fig. 1.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

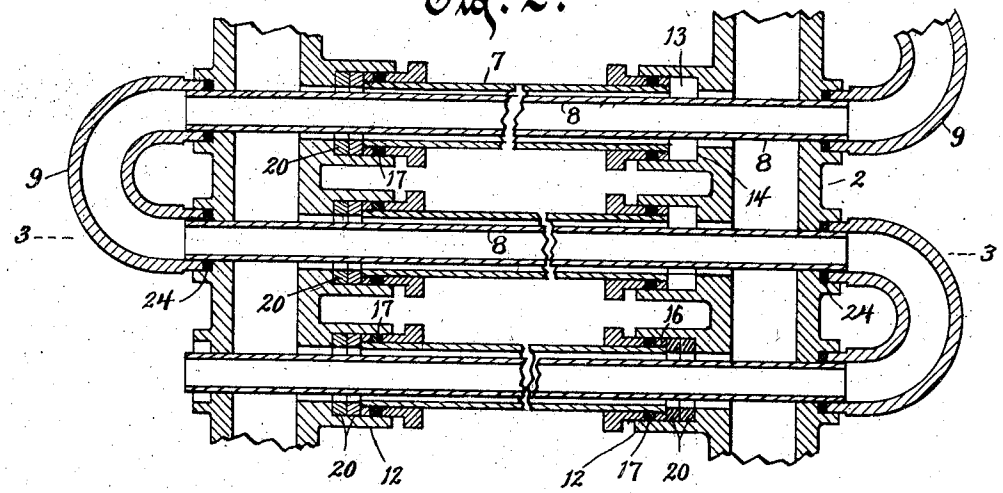


Fig. 3.

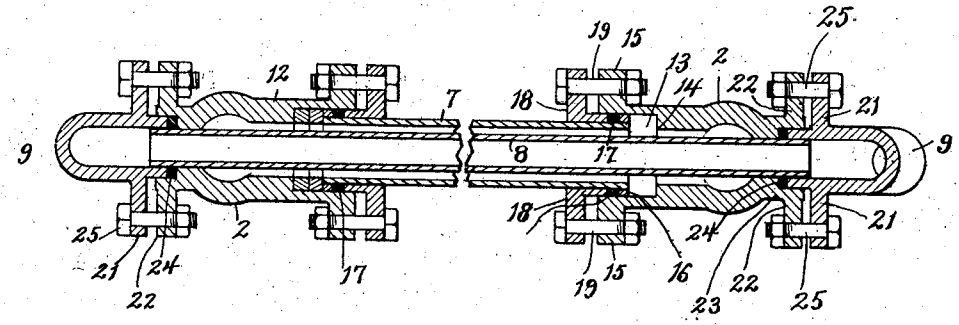
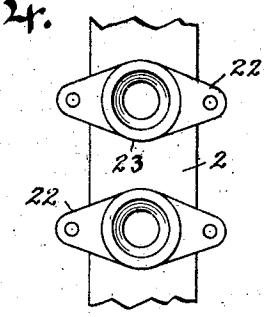


Fig. 4.



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No. 769,379. Patented September 6, 1904.

UNITED STATES PATENT OFFICE.

MICHAEL A. HEROLD, OF MILWAUKEE, WISCONSIN.

CONDENSER.

SPECIFICATION forming part of Letters Patent No. 769,379, dated September 6, 1904.

Application filed November 12, 1902. Serial No. 130,958. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL A. HEROLD, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Condensers, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention relates to improvements in condensers of a class that are adapted more especially for the manufacture of ammonia and other liquids that are obtained by the condensation of heated vapors or fumes ordinarily under pressure.

My improved condenser may be employed for any other purpose whatever for which it is adapted.

The object of my invention is to provide a condenser of simple parts, that may be inexpensively made and erected, that is strong and enduring in construction, and that can be readily separated into its parts, or more exactly a condenser from which parts may be removed for repairs or cleaning, and in case of breakage a part or parts may be removed without disturbing other parts and replaced by duplicates of the parts removed. Also the improved condenser is one of great efficiency and is capable of most satisfactory results, especially in and by the means and method of applying the cooling or condensing medium to act on the vapors or fumes and in and by the means and method for discharging the condensed product from the localities in the condenser at which they are produced directly to the place of discharge thereof from the condenser, thereby at once freeing the condenser and its several parts of the product of condensation.

Other objects of the invention are incidental to the foregoing, and will be understood or will appear from a careful examination of the improved condenser or in the use thereof.

My invention consists of the improved condenser, its parts and combinations of parts, as herein described and claimed, or the equivalents thereof.

In the drawings, Figure 1 is an elevation of a condenser embodying my improvements. Fig. 2 is a vertical longitudinal section of a fragment of my improved condenser, parts being broken away for convenience of illustration, showing the interior construction of the condenser. Fig. 3 is a longitudinal section on line 3 3 of Fig. 2 of the condenser, parts being broken away medially for convenience of illustration. Fig. 4 shows a fragment of one of the columns of the condenser illustrating a detail of the construction.

With condensers for precipitating or condensing vapors or fumes, and thereby reducing them to liquid form, it is common and desirable to employ a liquid-condensing medium, usually water, for applying cold to the vapors and fumes, and the improved condenser is so constructed as to be adapted to employ running water for supplying and applying cold to the vapor or fumes for condensing them.

My improved condenser is constructed chiefly of metal, and advisably the principal parts are of iron and steel.

In the drawings, 2 2 are hollow upright columns which may be supported on suitable bases 3 3. These columns may be of any desired height for the use therewith of any number of connecting condensing-pipes, and in the drawings I have illustrated a condenser having twelve horizontal pipes as being of sufficient size to illustrate my invention. In condensers employing this number of horizontal pipes the columns may ordinarily be each in one piece; but for the purpose of illustrating how columns of greater height can be made in sections I have in the drawings illustrated the columns as being composed of lower sections A and upper sections B, which sections in each column are continuous with each other, the sections being bolted together to make a rigid continuous column. The columns are closed at the top and bottom, except that one of the columns is provided with an induction-port 4 for supplying the vapors or fumes to the condenser and with an eduction-port 5 for the discharge of the product of condensation from the condenser. A vent 6 is provided for relieving the condenser when required or for pumping out the vapor-chambers thereof when desired. For convenience

the hollow chamber of the sections of the columns is in the drawings shown as continued downwardly into the base 3, and the eduction-port 5 is shown as leading from the condenser in the base. The eduction-port may be placed in the column-section, if preferred. The columns are otherwise closed at the bottom. At little distances apart there are horizontally-disposed pipes 7 7, connecting the two columns 2 2, thereby forming with the columns an extensive vapor-chamber, including the several pipes and the columns, in which vapor is received and condensed. These pipes for convenience may be called "vapor-condensing" pipes. Within these vapor-condensing pipes and across the columns 2 2 there is a continuous duct for water or other cold condensing-fluid medium, which includes the several water-pipes 8 8 and the return-pipes 9 9, which duct is provided with an induction-port 10 at the receiving end of the lowest water-pipe and an eduction-port 11 at the discharge end of the upper water-pipe.

The columns 2 2 are advisedly constructed of cast metal. Each column is provided with a series of annular bosses 12 12, corresponding in number with the pipes 7 7, projecting therefrom at one side. These bosses on the two columns are opposite and complementary to each other, and the horizontal connecting-pipes 7 7 are fitted and secured to these bosses vapor-tight. For securing the vapor-pipe 7 in the bosses 12 releasably the bosses are each provided with an enlarged cylinder-shaped terminal chamber 13, ending inwardly at an annular shoulder 14 in the boss. The bosses are also provided with laterally-projecting ears 15 15, provided with bolt-holes. The chamber 13 is somewhat larger than the pipe 7 which enters it, and a screw-threaded annular abutment-nut 16 is turned by this thread on the end of the pipe and is of such size as to fit movably in the chamber 13. A packing-ring 17, advisably of rubber, fits around the pipe within the chamber 13 and bears against the abutment-nut 16. A gland 18 fits movably on the pipe 7 and into the chamber 13 in the end of the boss 12 and bears against the packing-ring 17. Bolts 19 19, passing through ears on the gland and through the ears 15 on the boss, are employed to draw the gland against the packing-ring, causing it to expand and close the joint between the pipe and the boss vapor-tight. For so assembling the condenser that one or more of most of the pipes 7 can be readily removed without disassembling the entire condenser I make the pipes 7 of such length with reference to the distance apart of the colums 2 2 that the pipes do not reach to the inner ends of the chambers 13, and place in the chambers 13 at both ends of two or more of the pipes 7 (advisably one near the top and near the bottom, and perhaps some intermediate pipes) a metal washer or washers 20 20, against which the ends of these pipes bear. In connection with all the other pipes 7 7 I employ washers 20 only at one end of the pipe, whereby by loosening the glands 18 at both ends of one of these pipes it may be moved endwise in the unfilled space of the chamber 13 at one end thereof sufficient to release it from the annular boss 12 at the other end, and may then be removed from the other column of the condenser, the water-pipe having been withdrawn in the meantime.

The water-pipes 8 8, which are of less diameter than the pipes 7 and of less diameter than the bore of the bosses 12, are inserted in and through the vapor-pipes 7 and across the bores of the columns 2 2 and are connected together at their ends in alternate pairs by return-pipes 9 9, forming a continuous duct through the vapor-chamber formed in the columns 2 and the vapor-pipes 7. A desirable construction for these return-pipes and means whereby they are secured water-tight to the bosses 8 8 and in such manner as to close the passage of the water-pipes through the columns 2 2 vapor-tight includes laterally-projecting ears 21 21, cast on the return-pipes and provided with bolt-holes, and complementary ears 22 22 on annular bosses 23 23 on the columns 2. The ends of the return-pipes 9 fit into cylindrically-formed chambers therefor in the bosses 23 and around the pipes 8, and packing-rings 24 are placed around the pipes 8 in the chambers of the bosses, and the ends of the pipes 9 fit against these rings, and the return-pipes being drawn up to the columns by bolts 25 25, through the ears 21 and 22, the packing-rings are compressed endwise and expanded radially, and thereby made to close the joints between the water-pipes 8 and the return-pipes 9 water-tight, and the joints between the pipes 8 and the column vapor-tight. By removing the bolts 25 and taking off the return-pipe 9 at one side of the condenser the water-pipes 8 8 thus uncovered by removing the return-pipe 9 may be withdrawn from the condenser, either for repairs or to be replaced by other pipes. When the pipe 8 is thus withdrawn, the surrounding vapor-condensing pipe 7 may be taken out in the manner hereinbefore described.

It will be noted that in this condenser where water or other fluid medium is used for producing the cold necessary to the condensation of the vapors the water is introduced into the lowest water-pipe 8 and thence flows upwardly through each succeeding pipe and is discharged from the highest pipe. Also that the vapors or fumes are introduced into the condenser at the top and that the product of condensation is discharged at the bottom. By this means the heated vapors or fumes come into contact first with the modified cold of the water that has been warmed somewhat by the withdrawal therefrom of the cold it had originally as it entered the condenser. It will also be understood that the fluid product of the condensa-

tion of the vapors or fumes that always takes place mostly in the horizontal pipes 7 will run directly from the pipe in which the fluid is produced into one of the columns 2, and therein will go to the bottom of the condenser directly, so that in this condenser the fluid product of the condensation does not run back and forth through all the various pipes, thus to some extent covering a portion of the lower surface of each pipe and preventing direct additional condensation along that surface and to some extent obstructing the pipes, as does occur in many other condensers.

What I claim as my invention is—

1. In a condenser, upright hollow-pipe columns at a distance apart, annular bosses on the pipe-columns projecting in complementary pairs toward each other from the pipe-columns each boss having a pipe-chamber therein exterior to the pipe-column and opening outwardly laterally but closed inwardly except by an aperture into the pipe-column of less diameter than the exterior diameter of the vapor-pipe entering the outer end of the chamber, horizontal vapor-pipes each provided with encircling terminal abutment-nuts fitted slidable endwise with the pipe in the chambers of the bosses but of greater diameter than the apertures from the chambers into the pipe-columns, packing-rings about the vapor-pipes within the bosses, glands loose on the pipes adapted to enter the bosses and bear against the packing-rings, and means for drawing the glands up to their work.

2. In a condenser, two upright rigid pipe-columns at a distance apart, annular bosses rigid on the pipe-columns projecting in complementary pairs toward each other from the pipe-columns, a series of horizontally-disposed vapor-pipes each provided with encircling terminal abutment-nuts fitted with the nuts slidably endwise in but not beyond said annular bosses, two at least of which horizontal pipes are fitted and held non-movably endwise in said bosses on the vertical columns securing a rigid structure, and others of which horizontally-disposed pipes are fitted with an unfilled space at one end and slidable endwise in but not beyond said annular bosses permitting their removal severally therefrom between but not through the vertical pipe-columns, and means holding the horizontal pipes to the rigid vertical pipe-columns detachably and so as to permit the removal severally of those pipes that have unfilled spaces at their ends without the loosening of adjacent horizontal pipes.

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

MICHAEL A. HEROLD.

Witnesses:
ARTHUR E. WISHERD,
GEO. A. BINKERT.