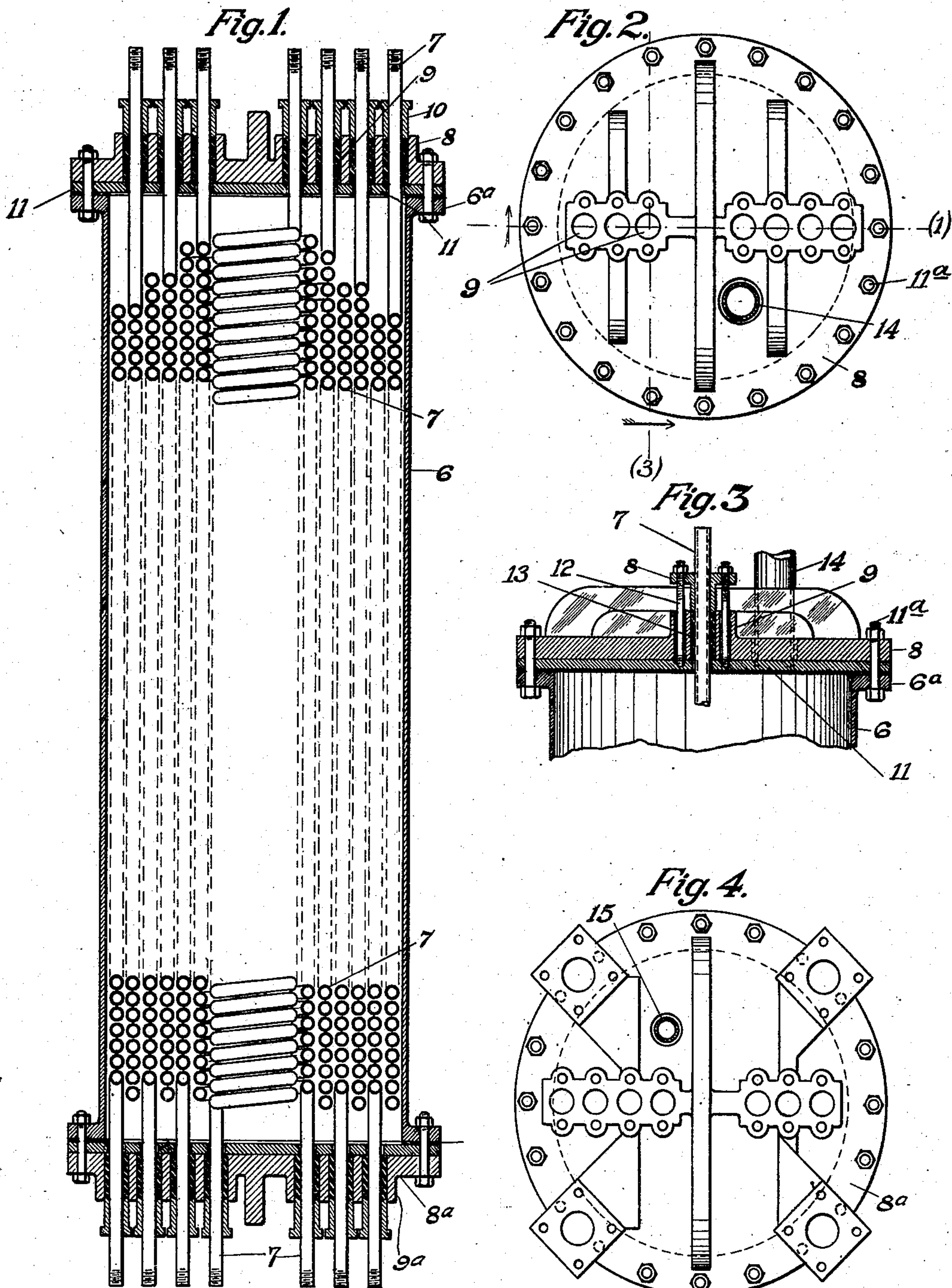


No. 854,976.

PATENTED MAY 28, 1907.

W. J. WOODCOCK.
REFRIGERATOR CONDENSER.
APPLICATION FILED JULY 24, 1906.



Witness:
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UNITED STATES PATENT OFFICE.

WILLARD J. WOODCOCK, OF BROOKLYN, NEW YORK.

REFRIGERATOR-CONDENSER.

No. 854,976.

Specification of Letters Patent.

Patented May 28, 1907.

Application filed July 24, 1906. Serial No. 327,530.

To all whom it may concern:

Be it known that I, WILLARD J. WOODCOCK, a citizen of the United States, residing at Brooklyn, in the State of New York, have
5 invented certain new and useful Improvements in Refrigerator-Condensers, of which the following is a specification.

My invention relates to the construction of
10 vessels for containing or condensing volatile liquids having penetrative qualities, and is particularly applicable to the construction of the condensers such as used in ammonia refrigerating apparatus, where the problem is
15 to deal with a gas under high pressure which has peculiar properties enabling it to penetrate castings and destroy rust and eat through ordinary metallic joints.

The primary objects of the invention are,
20 to eliminate the use of castings in contact with the gas in such vessels; to render the construction of the vessels both efficient and cheap, and make certain and prompt the successful construction, before test; to provide means by which the glands for packing
25 water pipes may also protect and be supported by the vessel lining, and to gain certain other advantages which will hereinafter appear.

The invention is illustrated as applied to
30 ammonia apparatus in the accompanying drawing.

Figure 1 is a central vertical section through a condenser, the coils and the two heads, the section being on line (1) in Fig. 2.
35 Fig. 2 is a top plan view of the tank with glands removed, and Fig. 3 is a partial vertical section taken on the line (3) in Fig. 2 with glands in place. Fig. 4 is a bottom plan of the lower head shown in Fig. 1.

40 Heretofore it has been the practice in the making of the shells which contain the volatile liquid and cooling coils for water, in refrigerator apparatus, of a cylinder with welded flanges at the ends, and the ends are
45 closed by a cast iron head through which pass the various water pipes. It is well known that great difficulty is experienced in holding such gas as ammonia and certain other volatile liquids, and in particular that
50 it will frequently pass through cast iron or cast steel, in which the pores are not sufficiently close. Also it has been found that the quality of cast metal being irregular and uncertain, when a test is made it frequently
55 develops pin holes and other weak points

rendering it unfit for such uses. Cast metal often is not dense enough to hold such gases under pressures of from 150 to 250 pounds, where wrought metal has closer pores and is impervious. For these reasons such shells
60 made with cast heads frequently have to be taken down after erection and test, and the castings replaced with other castings, because in the test some point develops especially weak or some unexpected porosity ap-
65 pears. Such defects cannot be foreseen and greatly increases the cost of manufacture of these shells and renders it very uncertain when a satisfactory casting can be supplied,
70 frequently several castings being discarded in succession. Its fitness for the purpose can never be determined until after erection and actual test.

Partly to avoid the objections just stated, and also to enable the use of imperfect cast
75 heads, it will be seen from the drawings that I make the shell 6 which contains the water pipes 7, out of sheet steel welded at its joint and having welded flanges 6^a. The top end of this shell is closed as usual by a cast iron
80 head 8, which has bored in it a series of holes 9 to receive the glands 10 for packing the outwardly extending ends of the pipes 6 and also holes to allow the introduction of the gas
85 pipes 14, 15. But instead of subjecting this casting to the action of the gas, I place underneath it a wrought steel or iron plate 11
90 which is bored with holes for the connecting bolts 11^a and studs 12, and also holes to admit the water pipes 7, fitting these latter quite closely. These holes of course stand
95 concentric with the holes bored in the casting 8. The packing gland 10 is made to fit the holes 9 and it will be observed that when the pipe is in place the packing 13 will not only
100 come in contact with the pipe 7 but will also cover the joint between the casting and the wrought iron or steel plate 11. This joint is made rigid and perfectly tight by passing the tightening studs 12 for the glands loosely
105 through the casting 8 and tapping them into the plate 11,—but not quite through the thickness of this plate. The pipes 14, 15, are also tapped into the plate 11. A packing is of
110 course used between the plate and the welded flange of the shell, but none is necessary on the outside of the plate. It will be seen that by this construction the cast head, however imperfect it may be, will suffice, as it amounts to nothing more than an abutment

to hold the plate 11. The packing in the glands 10 completely closes the gas off from the casting as well as the pipe and the plate furnishes a rigid support for it; thus there is
 5 no cast iron in contact with the ammonia gas at any point. It will be observed also that the packing may be renewed from the outside by merely removing the glands 10.

The bottom head 8^a with its sockets 9^a for
 10 the glands, and outlet pipe 15, is similar in construction to that just described. The rejected castings that have failed under test, in the present practice, may be used in my construction, as the casting is not required
 15 to make a joint at any point. Since the quality of the steel can be foretold before making, the use of such construction as described enables the manufacturer to accurately estimate the cost of the condensers and
 20 to fix a definite time for furnishing them, which is an advantage and great saving of cost over the present practice. Other advantages of the construction will occur to those familiar with the art.

25 Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent, is the following.

1. A condenser shell for ammonia and the
 30 like comprising an inclosing cylinder, cast heads for closing the cylinder, a wrought iron or steel lining plate under the heads, and means to pack a pipe passing through the head and also means to seal the joints between the head and lining, whereby the cast
 35 head supports the pressure but is not exposed to the gases in the shell, substantially as described.

2. In a condenser shell for ammonia and
 40 the like, the combination with a cylinder, of cast heads for closing the ends of the shell provided with pipe glands, a wrought iron or steel plate placed under the casting and perforated for pipes, and means for sealing off
 45 the pipe and the joints between the plate

and casting to protect the latter from the contents of the tank.

3. A condenser for volatile liquids comprising a coil and an inclosing shell closed by
 cast heads, sheet iron or steel linings under 50 said heads perforated for the outlet of the coil pipes, and packing glands formed in the cast heads concentric with said perforations, whereby the packing for the pipes also closes the joints between the casting and the lining, 55 substantially as described.

4. The combination with a steel tank, of a cast head for closing the tank, a steel lining plate under the head, gland studs tapped into but not through the lining plate, and gland 60 openings in the head closed at the bottom by said plate, whereby the packing for pipes running through said gland openings also closes the joint between the casting and said plate.

5. In an ammonia tank the combination of
 a steel shell, a cast head closing the shell, a perforated steel plate under the head, gland sockets in the casting, gland studs tapped into but not through the steel plate, and a 70 packing to surround a pipe passing through the head and at the same time close the joint between the steel plate and the casting, substantially as described.

6. A condenser comprising a coil and an 75 inclosing cylinder having a wrought metal closing disk at the end, and the cast metal support for said disk, and means to pack the pipes of the coil and the surfaces of the cast support, whereby the said cast support may 80 resist the pressure but is not exposed to the gas in the condenser, substantially as set forth.

In testimony whereof, I have hereunder signed my name, in the presence of the two 85 subscribed witnesses.

WILLARD J. WOODCOCK.

Witnesses:

F. W. H. CLAY,
 F. E. GAITHER.