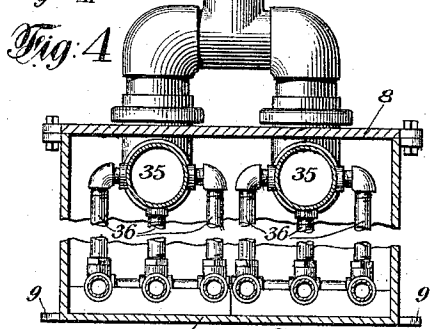
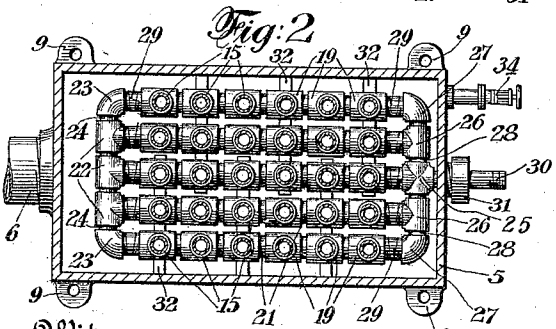
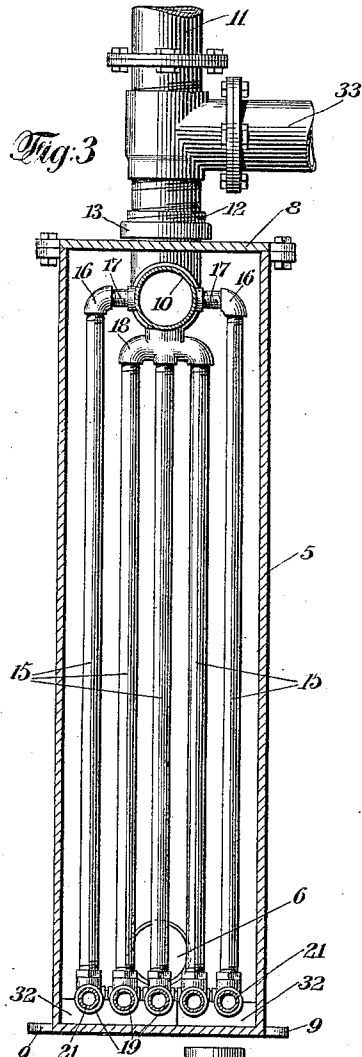
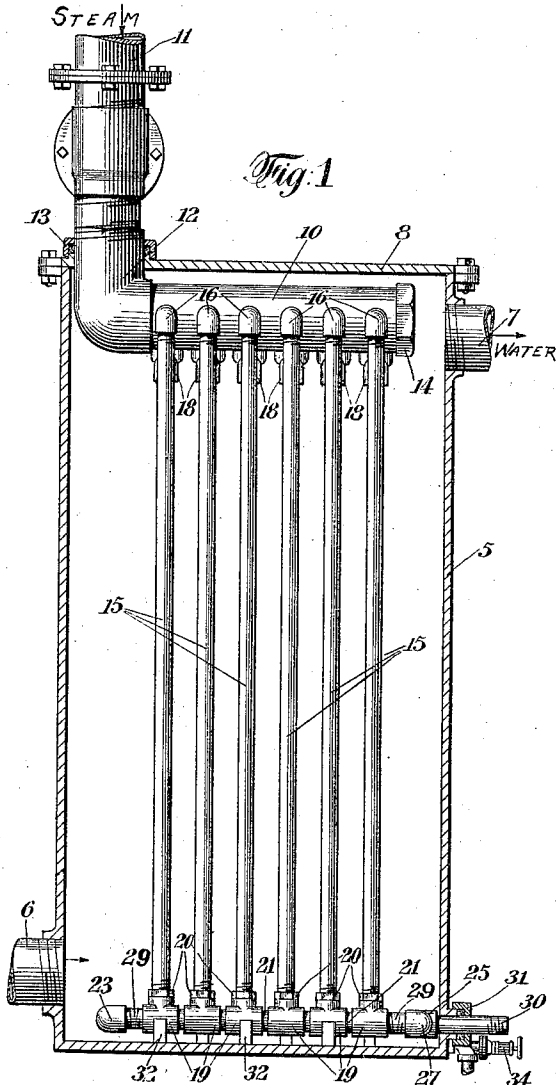


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CONDENSER.

APPLICATION FILED OCT. 19, 1911.

1,059,685.

Patented Apr. 22, 1913.



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# UNITED STATES PATENT OFFICE.

WILLIAM OBERSTE, OF LONG ISLAND CITY, NEW YORK.

CONDENSER.

1,059,685.

Specification of Letters Patent.

Patented Apr. 22, 1913.

Application filed October 19, 1911. Serial No. 655,506.

*To all whom it may concern:*

Be it known that I, WILLIAM OBERSTE, a citizen of the United States, residing at Long Island City, in the county of Queens and State of New York, have invented certain new and useful Improvements in Condensers, of which the following is a specification, reference being had therein to the accompanying drawings, forming part thereof.

My invention relates to condensers and more particularly to that general type known as surface condensers.

Objects which are accomplished by my invention are durability, simplicity of construction, economy of space, inexpensiveness of manufacture, convenience of access to all parts, readiness of manufacture in a variety of shapes and dimensions and capacities, so as to occupy available space regardless of its shape, high condensing efficiency, obviation of clogging, and many other objects and advantages which will hereinafter appear.

My invention includes means for distributing the steam and passing it continuously downward through a plurality of substantially vertical tubes surrounded by a condensing fluid, conduits connecting the lower ends of these tubes so as to provide a plurality of paths from each tube for the products of condensation.

My invention also includes features of construction and combinations of parts, as will appear from the following description.

I shall now describe the condensers illustrated in the accompanying drawings and embodying my invention and shall thereafter point out my invention in claims.

Figure 1 is a side elevation with the casing in vertical section. Fig. 2 is a median horizontal section. Fig. 3 is a transverse vertical section as viewed from the right in Figs. 1 and 2. Fig. 4 is a similar view of a slightly modified construction.

In the condenser illustrated in Figs. 1, 2 and 3, there is a casing or tank 5 which incloses the vapor-receiving parts and contains the cooling fluid, this casing having a water inlet 6 at one end at the bottom and a water outlet 7 at the other end at the top. The casing 5 may be of cast iron in one piece, but with a separate lid or cover 8 shown as held on by bolts. The cover may be omitted if desired when the condenser is employed in stationary service, but would, of course, be needed on ship-board as would also the

anchor lugs 9 provided at the bottom of the casing. The cooling or condensing liquid, commonly water, will circulate through the casing from the inlet 6 around and among the conduits or tubes of the vapor-receiving system now to be described, and the warm water as it rises will flow off through the outlet 7.

The condenser illustrated is designed for condensing steam. Its height is considerably greater than its length or width. A horizontal steam-receiving header pipe 10 extends lengthwise of the casing 5 just beneath the cover 8 and receives exhaust steam from an exhaust steam pipe 11 through a connector nipple or elbow 12 shown as passing through a stuffing box 13 in the cover 8. The other end of the header pipe 10 is closed by a screw-threaded cap 14.

A cluster of branch pipes or conduits is provided with the pipes 15 thereof disposed vertically and arranged in rows both transversely and longitudinally in respect to the header 10, as shown in the drawings, particularly in Fig. 2, the transverse rows containing five pipes and the longitudinal rows containing six pipes. The vertical pipes 15 all terminate at their upper ends in the vicinity of the header pipe 10 and communicate therewith. The outermost of the vertical pipes 15 in all of the transverse rows, constituting the two outer longitudinal rows, are connected to the header pipe 10 along its sides laterally through elbows 16 and screw-threaded nipples 17, the header pipe being integrally provided with thickened portions or bosses, as shown in Fig. 3, for receiving the nipples. The three median vertical pipes 15 of the transverse rows, constituting the three remaining inner longitudinal rows, are connected beneath the header pipe 10 thereto through branched couplings 18, each receiving the three inner pipes of a transverse row and having a single connection with the header pipe 10 beneath the header pipe by means of a screw-threaded nipple formed on the header, such nipple being of sufficient diameter to supply the three connected pipes. Each coupling 18 may be cast in one piece.

The vertical tubes or pipes 15 extend downward in parallelism to near the bottom of the casing 5 and are screw-threaded into T's 19, above which are lock nuts 20. The adjacent T's 19 of the longitudinal rows of vertical pipes 15 are connected together by

ordinary screw-threaded taper nipples 21 of slightly larger diameter than the pipes, which, with the T's 19, form longitudinal horizontal conduits which are parallel with the header 10. The opposite ends of these longitudinal conduits are connected together by two transverse horizontal conduits, the one of which is made up of T's 22, elbows 23, and nipples 24, similar to the nipples 21; and the other of which is made up of a cross 25, T's 26, elbows 27, and nipples 28. These transverse conduits are connected to the ends of the longitudinal conduits by means of right-and-left screw-threaded taper nipples 29 of sufficient length to permit the application of a wrench thereto, the other nipples in the horizontal and transverse conduits being the ordinary short taper nipples, to thereby bring the vertical pipes 15 sufficiently close together. It will be noted that the interconnected longitudinal and transverse horizontal conduits form a grid of intercommunicating horizontal conduits, so that a plurality of outlet paths are provided for each vertical pipe 15.

An outlet pipe 30 for the water of condensation leads from the cross 25, through a stuffing box 31, to the outside of the casing 5, the projecting end of the outlet pipe 30 being shown as screw-threaded for the attachment of the usual instrumentalities for conveying away the water of condensation.

The conduit means, composed of the longitudinal horizontal conduits and the transverse connecting conduits, is supported about two inches from the bottom of the casing 5 upon wood cleats 32 arranged in zig-zag fashion (Figs. 2 and 3), so as not to obstruct the free circulation of the cooling water in the casing.

In setting up the conduit system, first the longitudinal conduits, composed of the T's 19 and nipples 21, are screwed together. It will probably be found most convenient to next screw together and attach the end conduits or connecting transverse conduits, these connections being made by screwing in the right-and-left threaded nipples 29. Now the header pipe 10, with the elbows 16 and couplings 18 connected thereto, is connected to the lower conduit means by screwing in the vertical pipes 15. The upper ends of the pipes 15 are provided with ordinary short taper screw-threads and their lower ends are provided with longer straight screw-threads. First the lower ends of these pipes are screwed down into the T's 19 farther than it is intended that they shall remain, and then they are turned in the opposite direction to screw them up tight into the elbows 16, thereby screwing them partly out at the bottom, the screw-threads at the opposite ends of the pipe being in the same direction, for example, right hand. After the pipes 15 have been tightened in the elbows

16, the lock-nuts 20, which have previously been applied to the lower ends of the pipes 15, are run down tight against the T's 19 to form fluid-tight joints.

The entire conduit system, including the inlet elbow-nipple 12 and the outlet pipe 30, may suitably be of brass, and the header pipe 10 may conveniently be cast and the vertical pipes 15 formed of standard seamless brass tubing. For increased condensing capacity the header pipe 10 and casing 5 could be made longer and a corresponding additional number of vertical branch pipes 15 added. Or, according to the space available or as desired, a plurality of condenser units, such as illustrated, may be placed side by side, either in separate individual casings or in a common larger casing, and connected to operate in multiple, as indicated by the lateral branch exhaust steam pipe 33 (Fig. 3). Of course, for smaller capacity, the number of vertical branch pipes may be lessened and the condenser unit made shorter, and this may also be done to meet dimensional requirements, a number of units, each of small capacity, being arranged side by side, in multiple. As hereinbefore stated, one of the great advantages of this condenser is the readiness with which it may be built in different shapes, dimensions and capacities, according to requirements, the construction being such as to permit these results. Convenient access may be had to every part from the top of the casing, and, should occasion arise, the entire conduit system be lifted bodily from the casing. A drain cock 34 provides convenient means for emptying the casing 5. An advantage of manufacture is that all of the joints may be joined with standard pipe threads, and for the most part standard pipes and fittings may be employed.

Steam entering the header pipe 10 will be distributed substantially equally among the vertical branches 15 and flows constantly downward and forward toward the outlet 30. All water of condensation will flow by gravity toward the outlet, and it is to be noted that there is no place where water can collect and obstruct the free flow of steam before it is condensed. It is also to be noted as hereinbefore mentioned that the longitudinal horizontal conduits connected to the lower ends of the vertical branches 15 and the transverse horizontal conduits connecting the ends of the longitudinal horizontal conduits, provide a conduit at the base of grid form, with a complete conductive circuit about it and a plurality of longitudinal conductive connectors, and thus provide a plurality of paths for the water of condensation, so that it may freely flow under all conditions. An additional advantage of this grid formation of lower conduits is that it provides a strong and

rigid structure and a rigid supporting base for the entire conduit system of the condenser.

In the modified construction illustrated in Fig. 4, two header pipes 35 are employed, to each of which is connected at corresponding points three vertical branch pipes 36, the six pipes 36 shown constituting a single transverse row corresponding to one of the transverse rows of five of the pipes 15, in the hereinbefore described construction, and the vertical pipes 36 of the modified construction are duplicated in rows longitudinally of the header pipes 35 as in the first described construction. All of the vertical pipes 36 are connected at their lower ends to horizontal longitudinal conduits similarly to the pipes 15 in the first described construction, the horizontal longitudinal conduits also being similarly connected together by horizontal transverse conduits, and, as indicated in Fig. 4, in this modified construction a single conduit system unites the lower ends of all of the vertical pipes 36 from the two headers 35. The construction in other respects than noted or illustrated is substantially the same as in that first described and shown in Figs. 1, 2 and 3, and the operation is substantially the same.

It is obvious that various modifications may be made in the constructions shown in the drawings and above particularly described within the principle and scope of my invention.

I claim:—

1. A condenser comprising a vapor-receiving header pipe extending substantially horizontally and adapted to be connected to a source of vapor to be condensed, a plurality of rows of substantially vertical vapor-receiving conduits connected at their upper ends to the horizontally extending header pipe, a plurality of substantially horizontal lower conduits to each of which the lower ends of the vertical conduits in

one of the respective rows are connected, lower transverse horizontal conduits connecting together the opposite ends of the lower conduits to which the vertical conduits are connected, a liquid-containing casing loosely containing the header pipe and conduits, and an outlet for the products of condensation from one of the transverse lower conduits to the outside of the casing.

2. A condenser comprising a cluster of substantially vertical vapor receiving conduits, a substantially horizontal vapor receiving header pipe located in proximity to the upper ends of the conduits and adapted to be connected to a source of vapor to be condensed, the vertical vapor receiving conduits being arranged in rows both transversely and longitudinally in respect to the header, a single coupling for each transverse row connecting a plurality of the middle conduits in each transverse row to the header pipe at the under side thereof, separate connections for the others of such conduits to the header pipe, these connections being so arranged that the liquid of condensation will flow by gravity from the header pipe to and through the vertical conduits, a series of substantially horizontal conduits arranged longitudinally in respect to the header pipe and located at the lower ends of the vertical conduits and connected thereto, transverse conduits connecting together the opposite ends of the longitudinal lower conduits so as to form a grid of intercommunicating conduits, a liquid containing casing containing the header pipe and conduits, and an outlet for the liquid of condensation from one of the lower transverse conduits to the outside of the casing.

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

WILLIAM OBERSTE.

Witnesses:

WM. ASHLEY KELLY,  
BERNARD COWEN.