G. M. HILGER.

VAPOR CONDENSER.

APPLICATION FILED OCT. 26, 1909.

980,637. Patented Jan. 3, 1911.

Fig. 1.

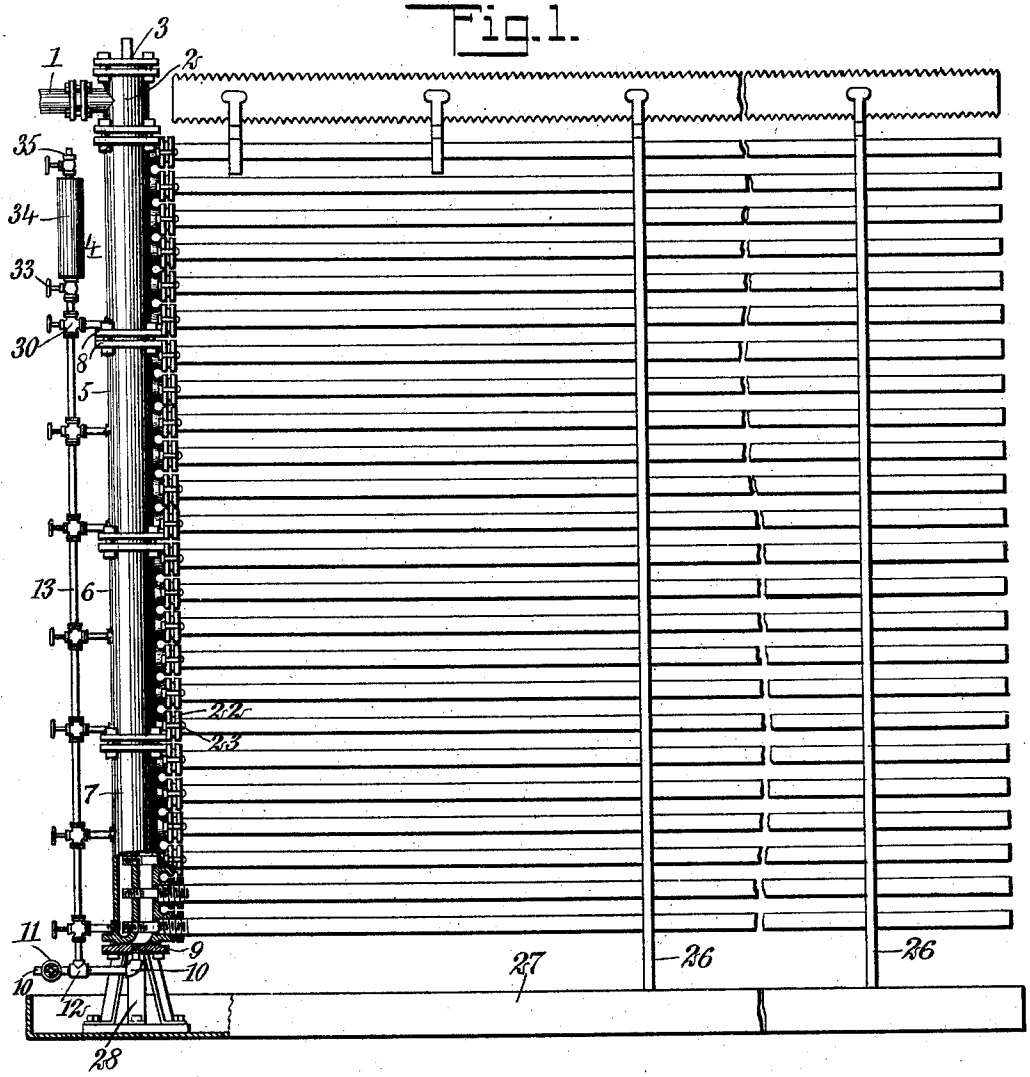
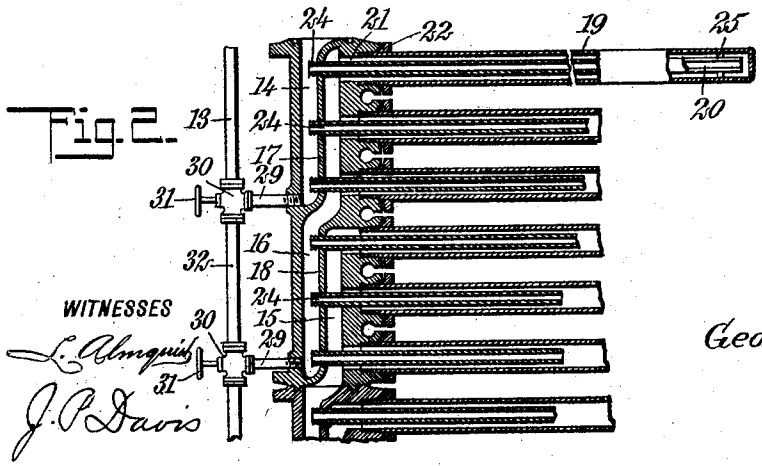


Fig. 2.



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VAPOR-CONDENSER.

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To all whom it may concern:

Be it known that I, GEORGE M. HILGER, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented a certain new and useful Vapor-Condenser, of which the following is a full description.

Among the principal objects of the present invention are:—to provide a structural unit which may be multiplied to increase the condensing capacity of the apparatus: to provide a structure wherein the mounting of the operative parts is simplified: to provide a structure wherein the joints and possible leakage are minimized: to provide a structure wherein is avoided the possibility of carrying over liquids by the in-rushing gases: to provide means for trapping and eliminating foreign gases and atmospheric air from the apparatus: to provide an apparatus wherein the condensing capacity may be varied without proportionately increasing the power circulation.

In the drawings:—Figure 1 is a side elevation of a condenser constructed in accordance with the invention. Fig. 2 is a vertical section of a segment of the condenser constructed in accordance with this invention.

The present invention is shown in the drawings as applied to the construction of an ammonia condenser.

The invention is applicable to condensers for steam radiators, for water heaters, and generally for any system wherein it is desired to extract the heat by radiation from a gaseous or vaporous substance and thereby condense the said gas or vapor to a liquid and conduct the same from the apparatus by a separate duct.

The gases are introduced through the pipe —1— to the head —2—. In the construction shown the upper end of the head is closed by the gland —3— which is seated in a suitable recess carrying any well known gasket. The gland —3— is bolted home as shown in the drawing. Directly beneath the head —2— is a column formed by the manifolds —4—5—6— and —7—. All joints in this column between the manifolds, and between the head —2— and the manifolds, are formed by forming flanges in the one end and a groove in the other end wherein may be inserted a gasket. All gaskets in said joints are compressed by means of bolts passed through perforations in flanges —8— set out from the ends of the said manifolds. At the bottom of the column a plate —9— closes the column except that it provides an outlet pipe —10— which is employed to convey off any foreign matter or uncondensed gases. This pipe is closed by a valve —11—. It is also connected by the tee —12— with the liquid return pipe —13—. The manifolds —4—5—6— and —7—, in the present instance, are similar in construction. If desired, however, manifolds of larger radiating capacity could be substituted for any one or more of these said manifolds, without changing the operation of the apparatus. By this means the condensing capacity of an apparatus so constructed may be nicely adjusted. As each manifold carries a number of radiating pipes extended from the same pressure chamber, the circulating pressure for moving the gases is not increased by thus increasing the condensing capacity.

Each manifold consists in a tubular three chambered metal casting. The open ended chambers —14— and —15— and the totally inclosed chamber, —16— extend longitudinally and are formed by the partitions —17— and —18—, cast with body of the manifold. The manifold shown in the present drawings is provided with six condensing extensions composed of the external pipes —19— and the internal pipes —20—. These extensions are in each instance similar. To receive the pipe —19—, the manifold is provided with the perforations —21—. The perforations —21— are suitably reamed to form a seat for the end of the pipe —19—. The joint is gas sealed by forming a groove surrounding the perforation —21— to receive the gland —22— which is constructed in the usual manner, having a flange adapted to seat in the said groove. The glands —22— are held in position by bolts —23—, as shown in Fig. 1 of drawings.

The pipe —19— in being mounted is inserted over the pipe —20—. The pipes —20— are preliminarily secured in the partitions —17— and —18—, in perforations concentric with the perforations —21—. The perforation in the partitions —17— and —18— are tapped to receive the screw threaded ends of the pipe —20—. The pipe —20— is extended through the partitions —17— and —18— to near the opposite wall of the chambers —14— and —16— to pro-

duce the overhanging ends —24— within said chambers. The outer or far end of the pipe —20— is supported by suitable receptacles —25— in the outer or farther ends of the pipe —19—. The pipe —19— is supported by the standards —26—26, which are of the usual construction. These standards are mounted in the drip pan —27—, in which are also mounted the standards —28— to support the columns of manifolds.

While I have herein described the manifolds as having the three chambers —14—15— and —16—, it is evident that I could divide the manifold in equal parts to produce a manifold having the chambers —14— and —16—, or —15— and —16— each by dividing the manifold, shown in the drawings, at the longitudinal center thereof. In such case each section or manifold, would carry the three extension pipes instead of, as in the present instance, the six extension pipes.

At the bottom of each chamber —14—15— or —16—, is introduced an outlet nipple —29—, which is connected to a pipe connection —30—, in which is mounted a valve —31—. The connections —30— are joined by the sections —32— which form the return pipe for the condensed liquids. Extending from the uppermost connection —30—, is a short pipe section controlled by the valve —33— which controls the entrance to the separating chamber —34—, where in the operation of this apparatus, foreign gases and atmospheric air are trapped. The said gases when trapped are expelled from the chamber —34— through the pet cock 35 with which the said chamber is provided.

An apparatus thus constructed operates as follows:—The gases or vapors to be condensed are admitted through the pipe —1— and head —2— into the chamber —11— of the manifold. From the chamber —14— the gases are forced through the pipes —20— out to the far end of the same where they are introduced into the pipe —19—. The pipe —19— is closed at the far end and opens only into the upper end of the chamber —16— of the manifold. The chamber —16— has two extensions as shown in drawings, whereby it receives the gases from the pipe —19— in the upper half of said chamber and the lower half of the chamber is in open communication with the pipes —20—. In the lower half of the manifold the action of the pipes —20— and —19— is the same as described above as transpiring in the upper half of the manifold. As the manifolds are joined, each chamber —15— is superimposed upon and is in open communication with the chamber —14— in the unit next below, whereby the combined chambers —14— and —15— form a continuous chamber similar in section to the chamber —16—. When the manifolds are coupled in column, the action of the apparatus is to force the gases outward from one chamber through a series of three or more extension pipes —20— to be returned to a different chamber by the pipes —19—. From the said second chamber the gas is conveyed to and again forced out through a plurality of pipes —20— to be again returned to a different and successive chamber by the pipes —19—. This action is repeated in each manifold, or unit, continuously transferring the gases from one to another chamber through a long outward extended and returned radiating member. These radiators may be air cooled or water cooled, as desired and as necessitated by the material being treated. Somewhere in the passage from the uppermost to the lowermost of the manifolds the vapors will be condensed, and in the condensed form be returned to the chamber —16— or —15— as liquid. The liquid will then flow down the wall of the chamber through which the pipes —19— are inserted, and continue on the walls of the partitions —17— and —18— and around the extended ends —24— of the pipes —20—. Ultimately the liquid flows to the end of the chamber —16— or —14— and is conducted thence by way of the nipples —29— through the valves —30— to the pipe —32— and thence to the uppermost valve —30— and out on the return pipe to the storage tanks provided for the liquid. It will be observed that by the extension of the ends —24— of the pipes —20—, the liquid is not carried into the pipes —20— by the inrush of the outward passing gases. In the event foreign gases are contained in the gases being condensed, these will not become liquid but will pass out of the manifolds through the nipples —29— and be thence transferred through the pipes —32— to the chamber —34—. In normal operation the valve —33— is open, and the cock —35— is closed. When the presence of foreign gases in the chamber —34— is suspected or indicated, the valve —33— is closed and the cock —35— is opened to permit the escape of the foreign gases and atmospheric air contained within the chamber —34—. The chamber —34— may be provided with any of the well known mechanical appliances for collecting the said air and gases by creating therein a rarefied atmosphere. The gases having been withdrawn from the chamber —34—, the cock —35— is then closed and the valve —33— opened, when the accumulation of the foreign gases again proceeds as prior to the interruption. Any uncondensed gases which may pass to the bottom of the pile of manifolds may be returned to the circulating system through the pipes —10— to be again returned through the condenser until condensed.

Having thus described my invention, what is claimed is:—

1. A condenser comprising a plurality of manifolds having two chambers formed by an inner partition integrally formed therewith to produce a receiving and a distributing chamber, said chambers being so formed that the receiving chamber of the one manifold registers with the distributing chamber of the manifold immediately below, a series of radiator pipes extended from the distributing chamber through the receiving chamber in each manifold, a series of return pipes opening into and delivering into the said receiving chamber in said manifold, and a return liquid system adapted to extract the liquid from the lower end of said distributing chambers in each manifold.

2. A condenser comprising a plurality of manifolds, said manifolds having formed therein a plurality of unconnected parallel channels forming upper and lower vapor distributing and receiving lapped channel extensions; a plurality of parallel radiator distributing pipes connected with the distributing channel extensions; a plurality of condensation return pipes opening into the said receiving extensions; means for connecting said manifolds in a vertical column; a return liquid collecting pipe extended in parallel relation with the said manifolds and connected with each of the receiving extensions of the said channels therein by means of pipe nipples; a plurality of valves for controlling the flow through each of said nipples; and a main return liquid delivery pipe connected with said return liquid collecting pipe and with the lowermost of said manifolds.

3. A condenser comprising a plurality of manifolds, said manifolds having formed therein a plurality of unconnected parallel channels forming upper and lower vapor distributing and receiving lapped channel extensions; a plurality of parallel radiator distributing pipes connected with the distributing channel extensions; a plurality of condensation return pipes opening into the said receiving extensions; means for connecting said manifolds in a vertical column; a return liquid collecting pipe extended in parallel relation with the said manifolds and connected with each of the receiving extensions of the said channels therein by means of pipe nipples; a plurality of valves for controlling the flow through each of said nipples; a main return liquid delivery pipe connected with said return liquid collecting pipe and with the lowermost of said manifolds; and means disposed on said return liquid collecting pipe for eliminating foreign gases from said return liquid.

4. A condenser comprising a plurality of manifolds, said manifolds having formed therein a plurality of unconnected parallel channels forming upper and lower vapor distributing and receiving lapped channel extensions; a plurality of parallel radiator distributing pipes connected with the distributing channel extensions; a plurality of condensation return pipes opening into the said receiving extensions; means for connecting said manifolds in a vertical column; a return liquid collecting pipe extended in parallel relation with the said manifolds and connected with each of the receiving extensions of the said channels therein by means of pipe nipples; a plurality of valves for controlling the flow through each of said nipples; a main return liquid delivery pipe connected with said return liquid collecting pipe and with the lowermost of said manifolds; and means connected with said return liquid collecting pipe for permitting the escape of foreign gases connected with said return liquid.

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Witnesses:
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ERNEST L. SINCLAIR.