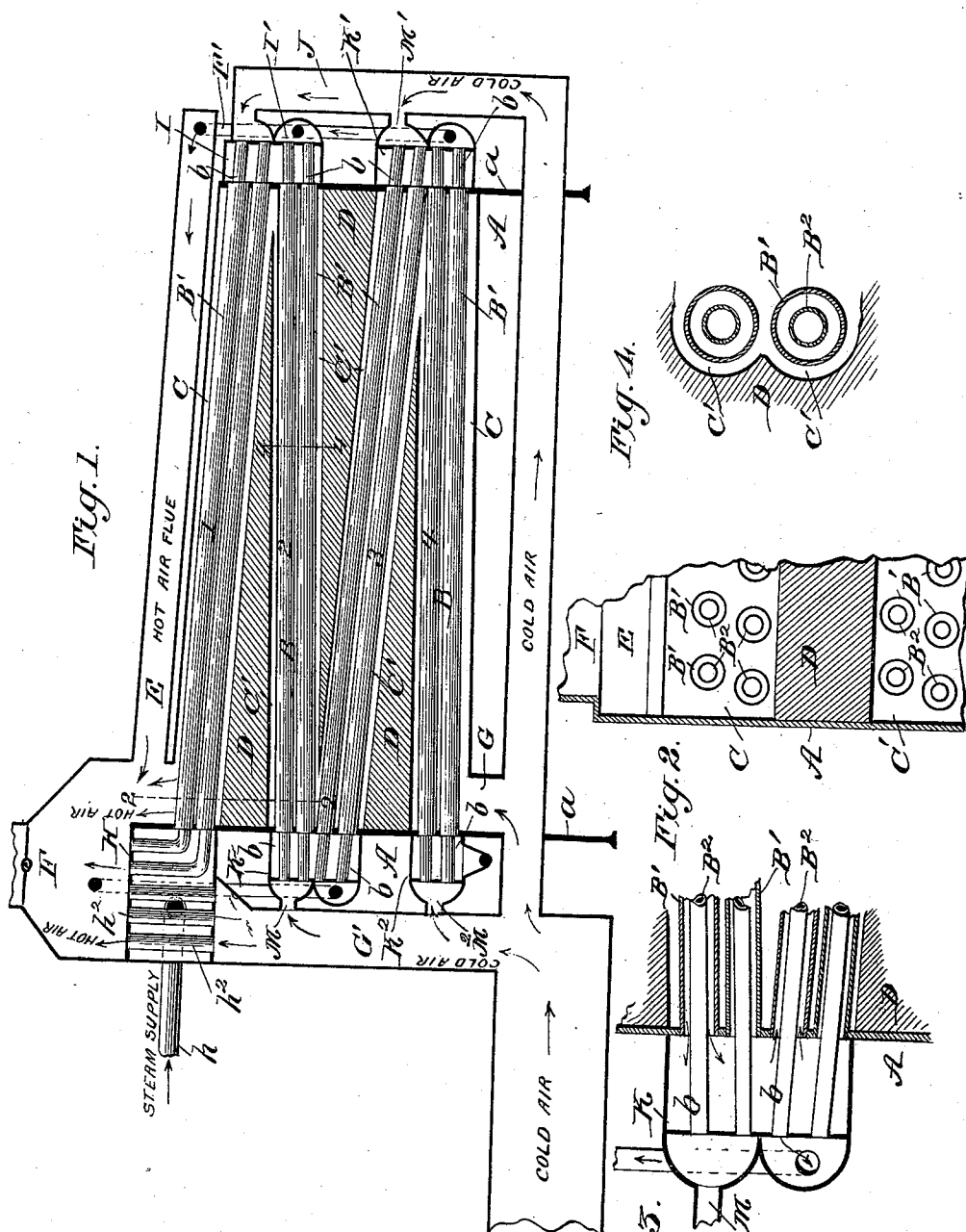


(No Model.)

A. HOBERECHT.
SURFACE CONDENSER.

No. 544,621.

Patented Aug. 13, 1895.



WITNESSES:
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ALBERT HOBERECHT, OF ENSENADA, MEXICO.

SURFACE CONDENSER.

SPECIFICATION forming part of Letters Patent No. 544,621, dated August 13, 1895.

Application filed November 7, 1894. Serial No. 528,131. (No model.)

To all whom it may concern:

Be it known that I, ALBERT HOBERECHT, residing at Ensenada, Mexico, have invented a new and Improved Surface Condenser, of

5 which the following is a specification.

My invention is in the nature of an improved surface condenser adapted for use in connection with stationary, marine, portable, traction, or locomotive engines, either of
10 high or low pressure, and also for condensing spirits in all kinds of distilleries and breweries; and such invention primarily has for its object to provide a condenser which operates without the use of water or other
15 agency for cooling, except air from either a natural (with stack) or artificial draft or suction.

It has also for its object to provide a condenser in which the steam or the fluid to be
20 cooled in its passage passes at all times over an interior and exterior condensing-surface, and having, as it were, a double condensing-surface contact at all times.

Furthermore, it has for its object to provide a condenser having passages for the
25 steam or liquid to be condensed, which form the exterior condensing-surfaces, and means for forcing cold air interiorly through the volume of steam or liquid as it passes through
30 the said passages.

A still further object is to provide a condensing system having independent interior passages, whereby continuous annular condensing-passages are formed, and having
35 means for forcing air through the interior passage, arranged in a simple and compact form, and which will positively, economically, and effectively serve for the intended purposes.

With other minor objects in view, which hereinafter will appear, my invention consists in such novel features of construction and peculiar combination of parts as will be first described in detail, and then be pointed
45 out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section, partly in elevation, of a condenser constructed in
50 accordance with my invention. Fig. 2 is a vertical transverse section of a portion thereof on the line 2 2 of Fig. 1. Fig. 3 is a longi-

tudinal section, partly in elevation, of a portion of one of the double surface-condensing pipes or conduits. Fig. 4 is a transverse
55 section thereof on the line 4 4, Fig. 1.

In its practical application my improved condenser is the more especially adapted for use in connection with locomotive-engines for condensing the steam and using the water over
60 and over, and also for maintaining a vacuum, it being, however, understood that the same will be found useful and effect a great saving in water on any engine located at points where water is scarce.

In its general construction my invention embodies, broadly, a series of passages or conduits, each of which consists of an outer pipe or tube and an inner pipe or tube of a smaller diameter, and means for supplying
70 air to such inner tubes. If desired, the inner and outer tubes may be of metal, nested together, arranged spirally or coiled; but I prefer to arrange them as shown in the accompanying drawings, as thereby the complete
75 condensing means can be the more compactly and economically constructed.

Referring to the accompanying drawings by letters and numerals of reference, A indicates a casing and B a series of tiers of condensing-
80 conduits.

In the drawings I have shown four tiers, indicated by 1, 2, 3, and 4, respectively, the upper one 1 and the intermediate one 3 being inclined downwardly and rearwardly, while
85 the tiers 2 and 4 incline forwardly and downwardly, the ends of the several tiers being supported in the end walls *a a* of the casing, as shown. Each of the conduits comprises an outer tube *B'*, preferably a two-inch steam-
90 pipe, and an inner pipe *B''*, preferably one inch in diameter, and such inner pipes extend beyond the end walls *a a*, as shown at *b b*. The upper and lower casing walls extend over and under the upper face of the upper tier of
95 conduits or passages and under the lower tiers, whereby spaces *C C* are provided, which extend around the said tiers and which communicate with similar spaces *C' C'* around the intermediate tiers, which spaces *C'* are
100 formed by the partition members *D*, as clearly shown. The upper space or spaces *C* connect with an air-flue *E*, which discharges into the stack *F*, while the lower section (of sec-

tions) C' opens into a main cold-air supply-duct G. By arranging the spaces about the conduits and connecting the upper and lower ones with the stack and supply-duct in the manner shown, it will be manifest a continuous current of cold air will surround the several tiers of conduits or passages at all times, whereby to cool the outer pipes B' and form their inner faces into exterior condensing-surfaces. At the forward end the upper tier of pipe sections B' open into steam-collecting compartment H, supplied from the feed-pipe h, and the inner pipes of such tiers, at the said end, extend through such steam-compartment and enter the stack, in which the draft is increased by the pipes h² h², which pass through the compartment H and connect the cold-air space G' and the stack, as shown. At the rear end the upper tier of pipes B' open into a space or chamber I, into which the rear ends of the second tier of pipes B' open, while the corresponding ends of the upper tier of inner pipes B² extend through the said space I and connect with an air-supply duct J. The rear ends of the second tier of inner pipes also pass through the chamber I and discharge into a collecting-space I', which discharges into a flue F', which enters the stack. (See Fig. 1.) The remaining tiers of conduits or passages are similarly connected with steam-spaces and air-ducts K K', L L', and M M', respectively, and the lowermost one of the steam-spaces M has a discharge which conveys the condensations to a well or reservoir. (If used in connection with vacuum, the suction-pipe of the vacuum-pipe is connected therewith.)

It will be noticed by reference to Fig. 1 that the spaces which surround the outer pipes of the several tiers while communicating with each other are practically independently arranged, so as to hold the cold air close about such pipes, and as the air enters at the bottom and the discharge is connected with the stack a continuous draft of cold air will circulate about the outer pipes. Furthermore, by connecting each tier of interior air-pipes each independently at one end with a cold-air supply and at the other with a stack-flue, each tier of air-pipes will receive cold air, thereby providing for positive double condensation-surface in each of the steam conduits or passages.

While I prefer to arrange the air-supplying devices substantially as shown, it is manifest

the same may be varied without departing from the broad idea of my invention, as the several pipes may in some instances be braced together to give them the required strength.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A surface condenser comprising a casing a series of steam or fluid conducting tubes arranged in tiers, air spaces surrounding each tier of tubes held independent of but communicating with each other, an air supply connected with such spaces, air tubes passed through the steam tubes and independent air supplying means connected with each tier of air tubes as specified.

2. An improvement in surface condensers the combination with the casing A, a series of fluid conducting tubes B' arranged in tiers and having their ends projected through the end of the casing and held in communication with each other, air spaces C' surrounding the tubes B' arranged independent of but held to communicate with each other, air tubes B² passed through the tubes B', each tier having an independent air jacket at the ends, and air supplying means connected with such pockets and the spaces C' all arranged substantially as and for the purposes described.

3. An improved surface condenser comprising a casing, a series of steam tubes held therein, air spaces surrounding such tubes, steam spaces connected to the ends of such tubes and in turn having a steam supply, a series of air tubes held within the steam tubes, a cold air duct connected therewith and having laterals discharging into the said air tubes and the air spaces as specified.

4. In a surface condenser the combination with a casing, a series of steam tubes arranged in tiers, steam chambers or pockets connecting the ends of such tubes, a steam supply connected with one of such pockets, air spaces surrounding such tubes, a cold air duct, having an outlet opening into the said air spaces, said spaces having a discharge entering the stack, a series of air pipes passed centrally through the steam tubes, connected with the cold air duct at one end and with the stack at the other end, all arranged substantially as shown and described.

ALBERT HOBerecht.

Witnesses:

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