

(No Model.)

F. M. & C. H. WHEELER.
SURFACE CONDENSER.

No. 510,373.

Patented Dec. 5, 1893.

Fig. 1.

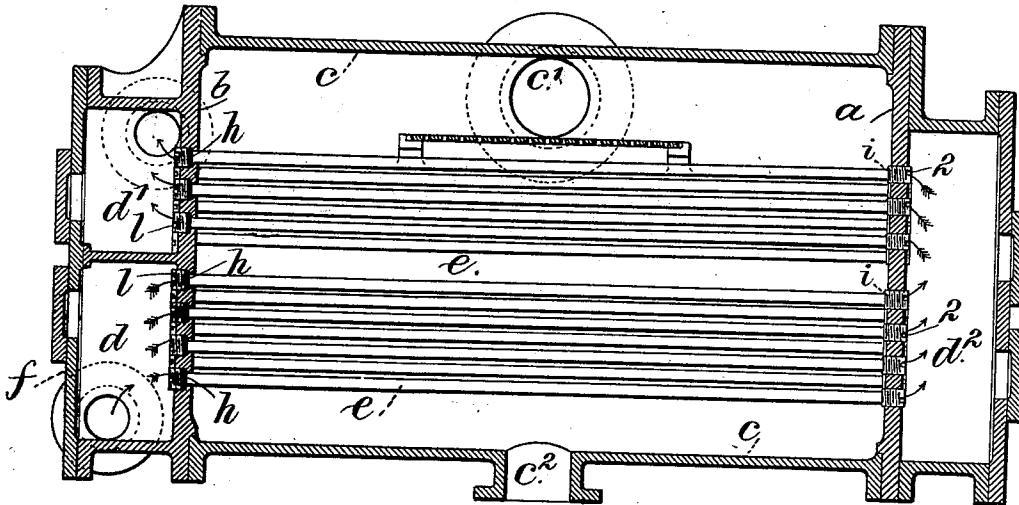
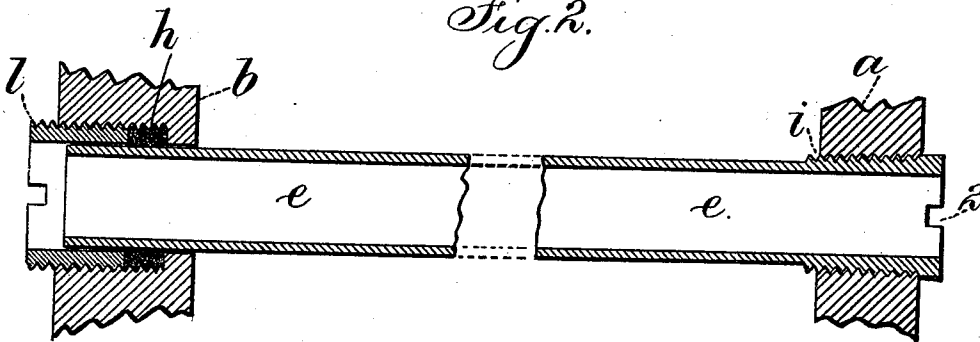


Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

FREDERICK MERIAM WHEELER, OF MONTCLAIR, NEW JERSEY, AND CLIFTON H. WHEELER, OF FLATBUSH, NEW YORK, ASSIGNORS TO THE WHEELER CONDENSER AND ENGINEERING COMPANY, OF MONTCLAIR, NEW JERSEY.

SURFACE CONDENSER.

SPECIFICATION forming part of Letters Patent No. 510,373, dated December 5, 1893.

Application filed February 13, 1893. Serial No. 462,022. (No model.)

To all whom it may concern:

Be it known that we, FREDERICK MERIAM WHEELER, of Montclair, in the county of Essex and State of New Jersey, and CLIFTON H. WHEELER, of Flatbush, in the county of Kings and State of New York, citizens of the United States, have invented an Improvement in Surface Condensers, of which the following is a specification.

In the construction of surface condensers, tubes have been extensively made use of through which the condensing water usually has passed, the steam passing around the outside of such tubes, or the reverse; and these tubes either of copper or brass have most frequently been of uniform size from end to end and they have passed through the heads of the condenser and been rendered tight by tube packings composed of ferrules of wood, vulcanized fiber or other suitable materials, or else the condenser heads have been recessed for the reception of screw-threaded sleeves and packing material forming packing glands, but in practice it is found that these tubes move or crawl endwise so that one end of a tube will be drawn out from such packing. To prevent this, the ends of the tube have been spread or flared outwardly or else the screw-threaded sleeves have been made with inward projections to arrest the end movement of the tube.

Our present improvement is made with reference to lessening the number of packings made use of in the condenser and for facilitating the insertion or withdrawal of the tubes whenever necessary. With this object in view a screw-thread is provided around the outside at one end of each tube, such screw-thread being of larger diameter and preferably tapering so as to be screwed firmly and permanently into one head of the condenser, and the other end of such tube passes into or through any desired packing at the other head of the condenser, so that the plain end of the tube is free to move in such packing endwise as the tube expands or contracts, thus requiring only half the number of packings heretofore usually employed, and when a tube requires to be removed for repair or otherwise the screw-threaded end is

unscrewed from the condenser head so that the tube can be withdrawn from the packing at the other end and taken out of the condenser with facility, or such tube can be replaced with but little trouble.

In the drawings, Figure 1 is a longitudinal section of a condenser illustrating the present improvement. Fig. 2 is a longitudinal section in larger size showing the end portions of one of the tubes.

The condenser is of any desired size or character, and in Fig. 1 the heads *a* and *b* are represented as united by the cylinder *c*, and at *c'* is the inlet pipe for the steam and at *c''* is the opening for the discharge of the water of condensation, and the movable head *f* incloses the inlet water way *d* for the condensing water that passes through the tubes *e* into the chamber *d'*, returning through the upper tubes to the chamber *d''* and escape pipe, it being understood that the parts in Fig. 1 are illustrative of a condenser in which the present improvements may be applied; and that the steam may be introduced through the tubes instead of around them. The tubes *e* are of any desired material and of the proper length to extend from one head to the other, and at one end each tube is left plain, as shown in Fig. 2, and the other end is provided with a screw-thread at *i* which is of larger diameter than the exterior of the tube and preferably slightly tapering, so that the tube can pass freely through the screw-threaded hole in the condenser head and be screwed into place with facility and made perfectly tight either by the screw-threads fitting accurately or by the application of such material as red lead to the screw-thread, and it is advantageous to make use of notches 2 in the end of the tube for the reception of any suitable key or wrench. The plain end of the tube passes into or through the head *b* of the condenser, at which point any suitable packing is to be applied around the plain exterior of the tube. Numerous packings have heretofore been made either of which is adapted to making the plain end of the tube tight.

Ferrules of wood, vulcanized fiber or other suitable material can be made use of, either passing through the head *b* and expanded at

each side thereof for the tube *e* to pass into or through, or such packings may be inserted into recesses in the condenser head.

We have represented a screw gland formed of the sleeve *l* screwed into the screw-threaded recess in the head *b* and acting to compress a gasket or packing of corset lace or other fibrous material at *h* so as to make a tight joint around the tube *e*, but it is to be understood that we do not limit ourselves to any particular character of packing.

By the present improvement one end of the condenser tube is permanently and reliably connected to one head of the condenser, and the other end of the tube is free to expand or contract within the packing at the other head of the condenser. Hence the tubes are kept tight at each end, crawling is prevented, and any tube can be removed with facility whenever desired.

We are aware that tubes have been made with screw threads at the two ends and also that the screw thread at one end has been larger than the exterior of the tube, so that the tube will pass freely through the hole into which the enlarged end is screwed. We are also aware that packing glands have been applied at both ends of the tube and that the tube has been retained in position so that it will not be displaced endwise by expansion or contraction by means of projections upon the collar or screw ring, and also by projections upon the tubes themselves. In our present invention the enlarged screw thread at one end of the tube permits the tube to be passed freely through the hole into which the enlargement is subsequently screwed, not only to make a tight joint, but to retain the tube against longitudinal movement, and in consequence of this construction the other end of the tube is made plain and smooth for any desired length, and such plain smooth portion passing through the packing, the joint is rendered tight by such packing and the expansion and contraction do not act in any manner to injure the packing. In cases where a tube has been plain at one end and a screw-thread cut in the other end, such tube is not adapted to a condenser, because the power for rotating the tube and screwing it into place has to be applied at one end of the tube and the screw at the other end. Hence the tube is liable to be twisted and injured, and this is the case whether one end of the tube is plain and slides in a plain hole in the tube sheet, or whether the end of the tube is adapted to receive a packing. By our present improvement the screw-thread being

larger than the tube the power to screw the same into place is applied immediately adjacent to the screw, and torsion upon the tube is prevented, and the distant end of the tube being plain is free to turn in the tube sheet even without the friction of the packing which is preferably set up after the tube has been screwed into place. For these reasons our construction is more reliable and has proved to be specially useful in surface condensers where the sudden changes in temperature to which the parts are subjected have heretofore tended to injure the packings or to give motion endwise to the tubes until arrested by a stop. In consequence of one end of the tube being held firmly by the tube sheet no movement can be given to the tube in the packing except that slight and uniform backward and forward movement resulting from expansion and contraction, and we are enabled to make a perfectly tight condenser with only one packing to each tube.

In Patent No. 228,908, granted June 15, 1880, screw-threads are shown cut into the surface of the tube with a packing at the other end. In Patent No. 41,545, granted February 9, 1864, the tubes are provided with threads cut into one end and with notches at the other end by which the tubes are screwed into position, and in Patent No. 18,669, granted November 24, 1857, thimbles are represented at the two ends of the tube, and in Patent No. 366,234, granted July 12, 1887, the tube has an enlarged screw-thread at one end and a screw-thread cut into the metal at the other end.

We claim as our invention—

The combination with the condenser heads, of tubes passing through such heads, each tube having an enlarged screw-thread around one end and means adjacent to the screw-thread for rotating the same, whereby such tube is screwed into the screw-threaded hole for permanently connecting such tube with one head, the smooth and free portion of the tube at the other end being within the opposite head, and a packing surrounding this end of the tube, and means for compressing the same around the tube, substantially as set forth.

Signed by us this 8th day of February, A. D. 1893.

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Witnesses:

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