No. 718,851. PATENTED JAN. 20, 1903.

F. LAMPLOUGH.

CONDENSER.

APPLICATION FILED SEPT. 30, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

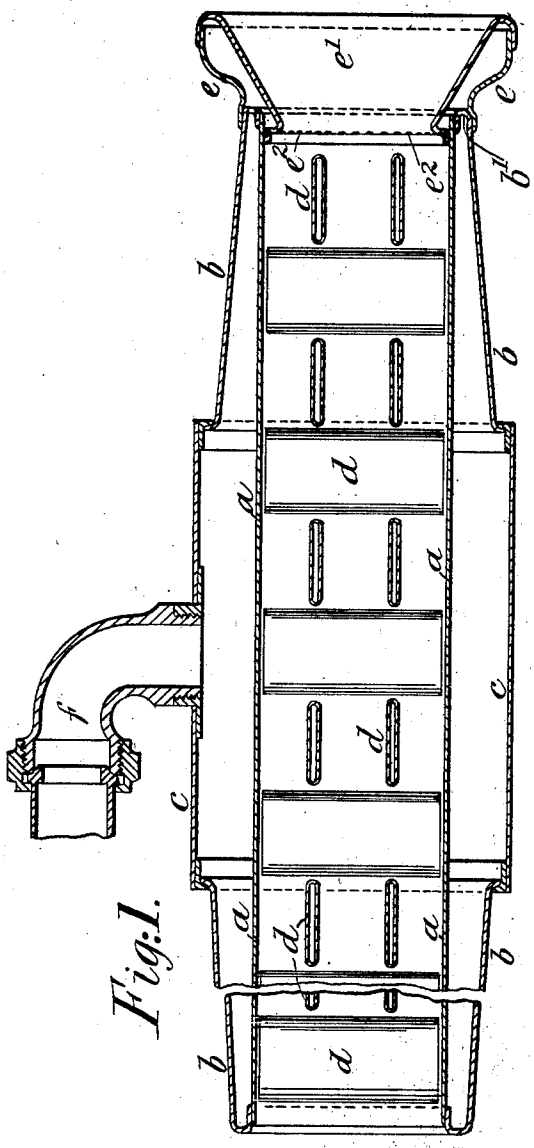



Fig. 1.

Witnesses:
J. Green.
Wm. P. Hammond

Inventor.
Frederick Lamplough.
by Knight Bros.
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 2 SHEETS—SHEET 2.

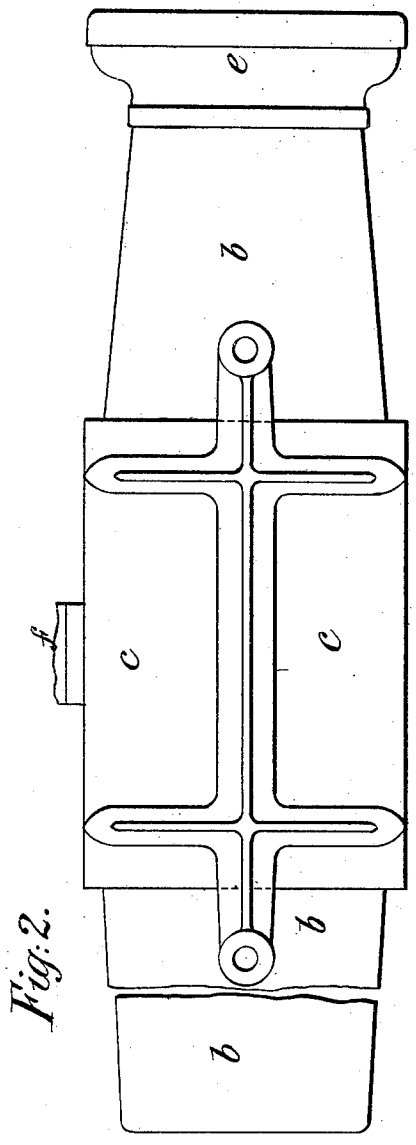



Fig. 2.

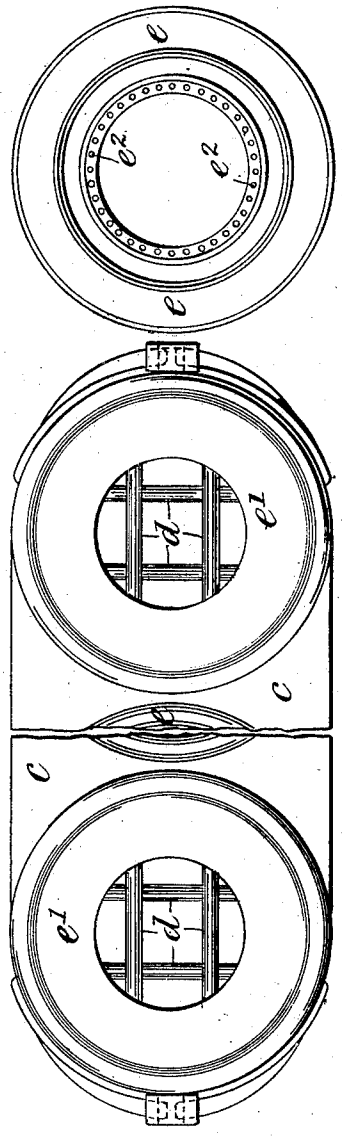



Fig. 4.

Fig. 3.

Witnesses:
J. Greene
Wm. P. Hammond

Inventor:
Frederick Lamplough
by Knight Bros.
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

FREDERICK LAMPLOUGH, OF LONDON, ENGLAND.

## CONDENSER.

SPECIFICATION forming part of Letters Patent No. 718,851, dated January 20, 1903.

Application filed September 30, 1902. Serial No. 125,357. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK LAMPLOUGH, a subject of the King of Great Britain, residing at London, England, have invented a new and useful Condenser, of which the following is a full, clear, and exact description.

The invention relates to an improved construction of condenser whereby very effective condensation is obtained.

I will describe my invention by the aid of the accompanying drawings, in which—

Figure 1 is a longitudinal section of the condenser through one of the main tubes. Fig. 2 is a side elevation; Fig. 3, an end elevation, and Fig. 4 an inner end view of one of the hollow rings separately.

According to my invention I employ a series of main tubes *a*, each of which is surrounded at each end by tubes or cones *b*, communicating with a central chamber *c*, through which the series of tubes *a* pass. Flattened cross-tubes *d* are fixed within the main tubes *a* and communicate with the spaces surrounding said main tubes.

At one end of each main tube *a* is a hollow ring *e*, formed with a conical mouth *e'* and having a ring $e^2$ of small holes around the inner end of said conical mouth. The outer portion of the hollow ring is connected to the narrow end of the cone *b* and the inner portion to the main tube *a*. A port *b'* opens from the bottom of the space between each of the main tubes *a* and the surrounding tubes or cones at one end thereof to allow of the passage of steam into the interior of the hollow rings *e*.

*f* is an inlet to the chamber *c* for the exhaust-steam.

The exhaust-steam on entering the central chamber *c* and spaces surrounding the main tubes *a* for the first time mostly condenses and passes through the ports *b'* into the hollow rings *e*, whence it is ejected through the rings of holes $e^2$. At the same time through the velocity of the exhaust a large quantity of air is propelled through the tubes *a*, which becoming mixed with the escaping water and aqueous vapor of condensation causes a further condensation of the vapor and distributes the cooled water upon the surface of the cross-tubes *d*, which latter, although shown at right angles to each other, are preferably arranged in the form of a spiral. The action of the induced current of air upon the wetted surface of the cross-tubes *d* causes a further reduction in temperature, which is communicated through the cross-tubes *d* and main tubes *a* to the interior or exhaust space, thus cooling the exhaust-steam and making more water of condensation to keep the apparatus going, so that after the first start the action is continuous.

What I claim as my invention, and desire to secure by patent, is—

1. In a condenser, the combination of a series of main tubes, a chamber surrounding the central portion of such main tubes, a steam-inlet to such chamber, tubes or cones surrounding the projecting ends of the main tubes, flattened cross-tubes fixed within the main tubes and communicating with the surrounding space, a hollow ring with a conical mouth at one end of each main tube, a port in the bottom of the space surrounding said main tube and opening into the hollow ring, and a ring of holes in the interior of the hollow ring, substantially as herein set forth.

2. In a condenser, the combination of a series of main tubes, a chamber surrounding said main tubes, flattened cross-tubes within the main tubes, and jets from the spaces surrounding the main tubes directing the partially-condensed steam through the main tubes and onto the flattened cross-tubes, substantially as herein set forth and for the purpose explained.

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

F. LAMPLOUGH.

Witnesses:

CLAUDE K. MILLS,

WM. GIRLING.