

No. 625,877.

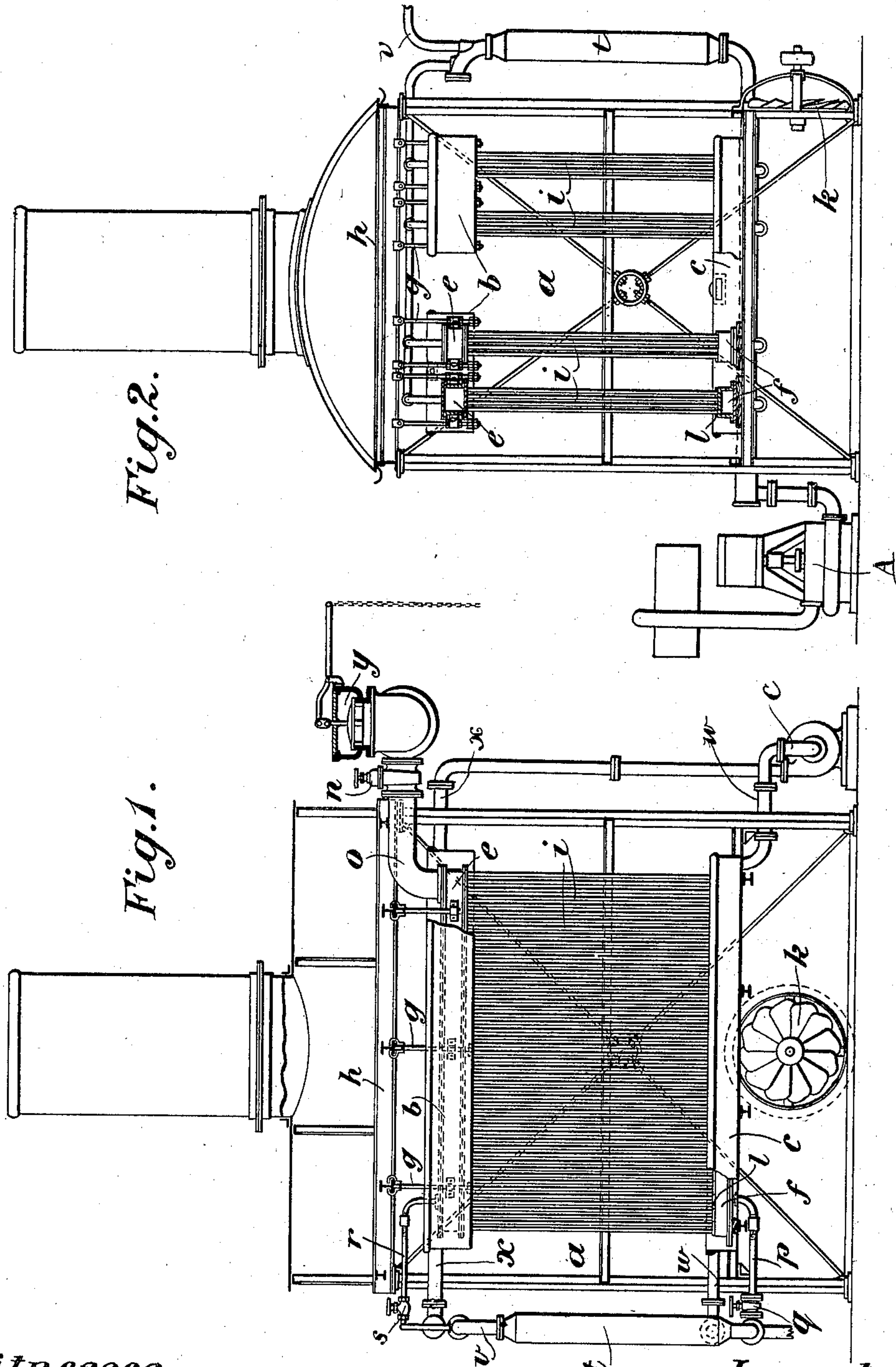
Patented May 30, 1899.

H. J. FRASER.  
EVAPORATIVE CONDENSER.

(Application filed Apr. 12, 1897.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.

Albert Jones.

Frederick Burnham.

Inventor.

Harry John Fraser

By his Attorneys.

Wheatley & McKenzie

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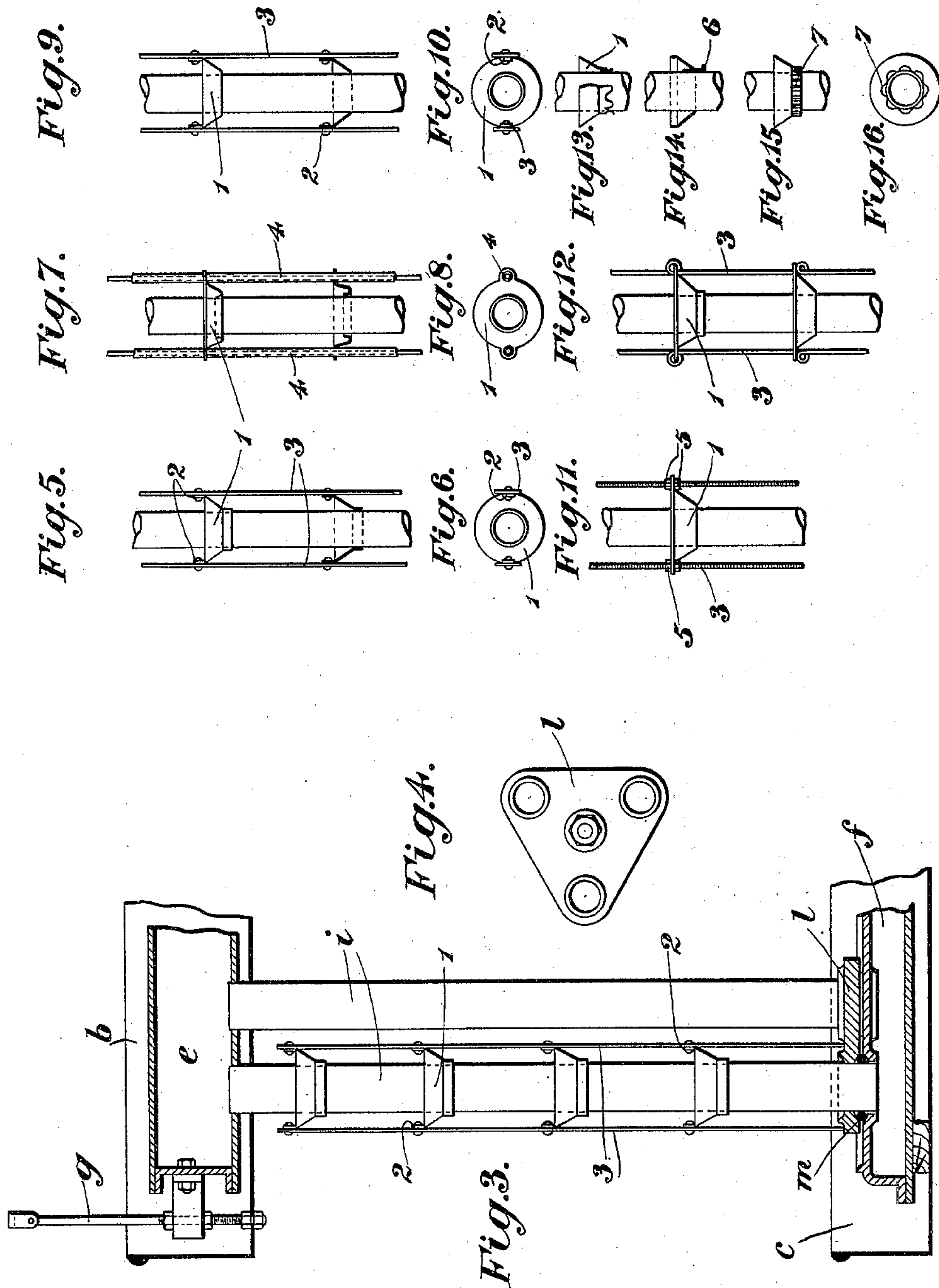
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# UNITED STATES PATENT OFFICE.

HARRY JOHN FRASER, OF LONDON, ENGLAND.

## EVAPORATIVE CONDENSER.

SPECIFICATION forming part of Letters Patent No. 625,877, dated May 30, 1899.

Application filed April 12, 1897. Serial No. 631,796. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY JOHN FRASER, a subject of the Queen of Great Britain and Ireland, residing at Millwall, London, England, have invented certain new and useful Improvements in Evaporative Condensers, (for which I have obtained Letters Patent in Great Britain, No. 4,266, dated February 25, 1896;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to condensers, evaporators, and refrigerators having vertical or approximately vertical tubes and in which a liquid is made to flow in a thin layer over the surfaces of the tubes, and has for its object to evenly distribute the liquid on the surfaces of the tubes and, if required, the keeping of the surfaces clean.

This invention consists in a series of rings supported at suitable distances apart loosely around or within each tube. Each ring collects the water distributed from the ring above and redistributes it on or in the tube between the edges of the ring and the surface of the tube more or less evenly. By means of these supports the rings can be traversed backward and forward on or in the tubes to remove any scale or dirt. In one arrangement each condenser-tube is surrounded by a series of equidistant rings supported by two or more vertical rods. The rings are quite loose on the tubes and provided with slight projections that bear on the tubes and keep them in proper position. They are dish or otherwise shaped, so that they collect and distribute the water toward the tube, and may be perforated. In a modification the rings are broken and may be bent to form a more or less inclined surface around the tube.

In the accompanying two sheets of illustrative drawings, Figure 1 is a longitudinal section through a condenser constructed according to this invention, and Fig. 2 is a cross-section of the same. Fig. 3 is a vertical section showing a single condenser-tube. Fig. 4 is a plan of the gland-jointing plate arranged for three tubes. Figs. 5 to 16 are detail views of a condenser-tube, showing various modified arrangements of the distributor-rings.

The condenser comprises a corrugated-iron casing *a*, provided with upper and lower water-tanks *b c*, within which are the upper and lower tube-boxes *e f*, the upper tank *b* and boxes *e* being supported by rods *g* from the girder *h*. The tubes *i* extend between the boxes *e f* and pass loosely through holes in the bottom of the upper tanks *b*. The upper ends of the tubes *i* are secured in the bottom of the top tube-box *e*, and the lower ends of the tubes *i* pass freely through holes in the triangular gland-plates *l* and are made tight by the packing *m*. The steam to be condensed is admitted to the upper tube-box *e* through the stop-cocks *n* and pipes *o* and passes through the tubes *i*, where it is condensed, to the lower boxes *f*, from which the air and condensed steam are drawn by the air-pump through the pipe *p* and stop-cock *q*. The upper boxes *e* are also connected to the air-pump *A* by the pipe *r*, stop-cock *s*, and condenser-tube *t*, to which water is admitted by the pipe *v*. The condensing water is drawn from the lower tank *c* by the circulating-pump *C* through the pipe *w* and forced to the upper tank *b* through the pipes *x*. The valve *y* in the exhaust-steam pipe opens automatically when the pressure in the exhaust-pipe exceeds a certain amount owing to derangement or shutting off of the condenser. Air can be circulated around the outside of the tubes *i* to increase the efficiency by means of a fan *k*.

According to this invention the condenser-pipes *i* are fitted with interceptor-distributors at suitable distances apart.

As shown in Figs. 5 and 6, the distributors 1 consist of cone or basin shaped dishes having a short cylindrical part surrounding the tubes and having ears 2, secured to rods 3, that serve to keep them at the proper distance apart and to traverse them on the tubes to clean them. The distributors fit loosely on the tubes and collect the water trickling down the tubes and cause it to flow evenly down the tube to the next distributor. The rods 3 rest on the gland-plates and serve also to traverse the rings to scrape the tubes when the condenser is being cleaned.

Figs. 7 and 8 show a modified shape of distributor 1 and also a modified arrangement of the rods 3. The lower edge of the distributor is bent upward, so as to form a small well.



The rods 3 pass through holes in the distributor and are kept at the proper distance apart by the sleeves 4, fitting on the rods.

Figs. 9 and 10 show another modified shape of distributor 1, the cylindrical part being dispensed with.

Fig. 11 shows the distributors fixed to the screwed rods 3 by nuts 5.

Fig. 12 shows two arrangements of rods 3 for holding the distributors 1, the rods being passed through holes in the distributors and then bent to retain the distributors in the proper position.

Fig. 13 shows the lower edge of the distributor formed with tongues that can be forced against the tube to keep the distributor accurately in position.

Fig. 14 shows the distributor kept accurately in position by small keys or wedges 6.

Figs. 15 and 16 show the cylindrical part of the distributor corrugated, the inner portion of the corrugations 7 fitting on the tube. The corrugations give sufficient elasticity to allow for any slight variation or inequality in the tubes.

The rings can be made in two pieces or halves, so as to allow of their removal from the tube, if required; also the rings or interceptors may be fitted within the tube, in which case they are mounted on a single central rod and may be cones or inverted cones.

What I claim, and desire to secure by Letters Patent, is—

1. The combination with a tube of a condenser, refrigerator or evaporator, of a series of interceptor or distributor rings movably arranged upon the tube and each adapted to collect the water flowing down the surface of the tube and distribute it evenly on the surface of the tube below it, and means connected with said rings and adapted to move them simultaneously along the tube for the purpose of cleaning the latter.

2. The combination with a tube of a condenser, refrigerator or evaporator, of a series of interceptor or distributor rings movably arranged upon the tube and each adapted to collect the water flowing down the surface of the tube and distribute it evenly on the surface of the tube below it, and rods arranged parallel with the tube and to which rods the rings are connected and by which they are supported, the said rods being adapted to simultaneously move the rings along the tube for the purpose of cleaning the latter.

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

HARRY JOHN FRASER.

Witnesses:

G. F. WARREN,  
FRED C. HARRIS.