N. W. Wheeler,

Condenser,

No. 66,541, Patented July 9, 1867.

Fig. 1

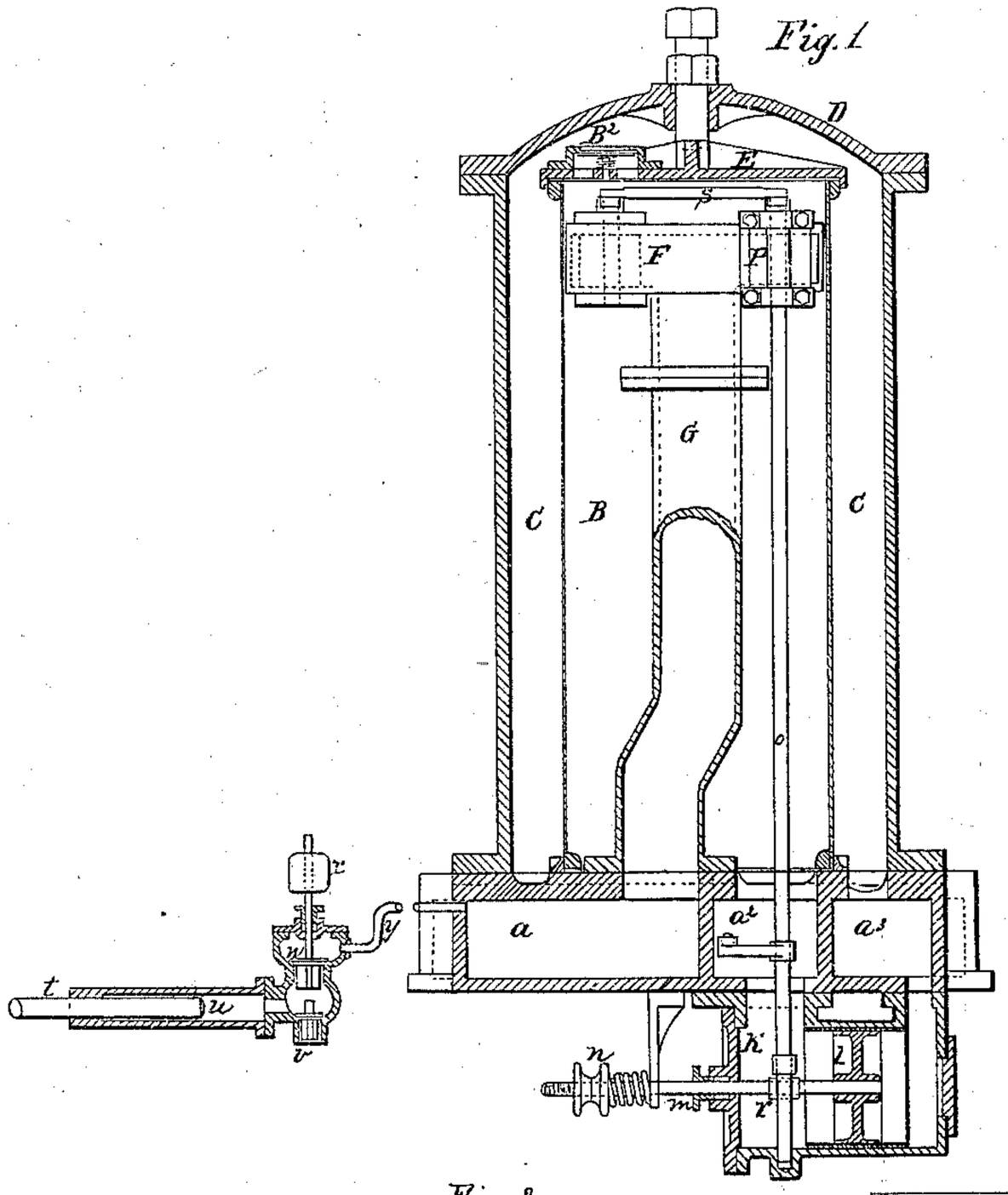
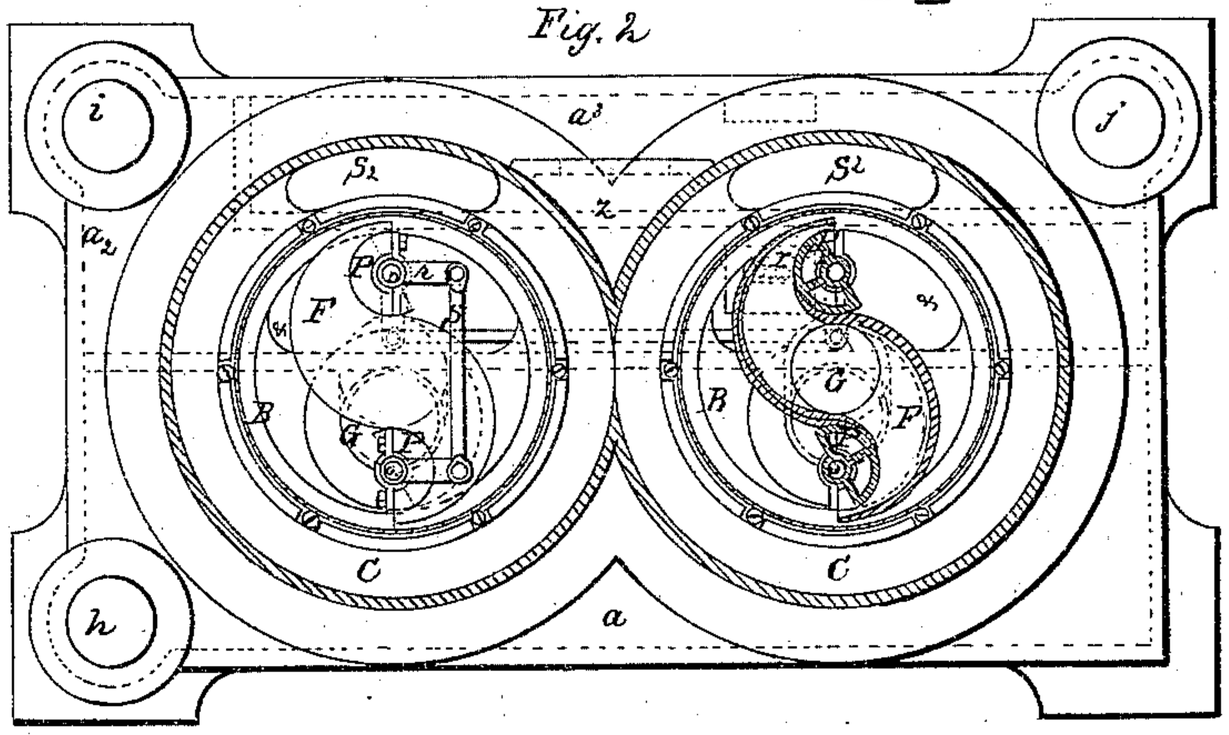


Fig. 2



Witnesses,
Frank G. Prindle
John E. Cooper

Inventor.
Norman W. Wheeler

United States Patent Office.

NORMAN W. WHEELER, OF BROOKLYN, NEW YORK.

Letters Patent No. 66,541, *dated July* 9, 1867.

IMPROVEMENT IN CONDENSER.

The Schedule referred to in these Letters Patent and making part of the same.

TO WHOM IT MAY CONCERN:

Be it known that I, NORMAN W. WHEELER, of the city of Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in Condensing Apparatus; and I hereby declare that the following is a full description of the construction and operation thereof, reference being had to the accompanying drawings—

Figure 1 representing a sectional elevation, and

Figure 2 a sectional plan of such apparatus—

And the same letters of reference marked thereon indicating like parts in the different figures.

My invention relates to surface condensers, and its essence consists in combinations of mechanism, the functions of which are the automatic regulation and control of the pressure existing in the circulatory cavities or spaces in relation to the pressure existing in the so-called vacuum cavities or spaces, preventing the minus pressure in the circulatory exceeding that of the vacuum space, and the introduction of measured quantities of air or gas, taken from space in which the comparative pressure is greater than the pressure in the space into which the air is introduced.

In the drawings, a_1 a_2 a_3 is the channel-plate; B B the condensing cylinders or pots; E their caps, the walls of which form the condensing surface; *c c* the enclosing vessels, with their caps D, the space around the condensing cylinders B B, and within the enclosing vessels *c c*, being a part of the vacuum space, and the space within the cylinders B B being a part of the circulatory space, the nozzle *z* being the place for the admission of steam into the vacuum space. *g g* are pipes, secured to the channel-plate, each within its condensing cylinder, and communicating with the cavity a_1 in the channel-plate, and bearing upon their tops the circulating heads F F. Openings *f f* are left within each condensing cylinder, which communicate with the cavity a_2 in the channel-plate, so that if a pump be attached by its suction pipe to the opening *i*, and the opening *h* be also connected by a pipe with a body of fluid, the working of the pump will draw the fluid through a_1, *g g*, F F, *f f*, and a_2, and, if the flow of fluid be obstructed, make a more or less perfect vacuum within the circulatory space. The cavity a_3 communicates with the vacuum space within the enclosing vessels by the openings S_2 S_2, and is provided with the opening *j*, to which to apply an exhausting air-pump, so that the working of the air-pump may make a more or less perfect vacuum within the vacuum space. To the circulating heads F F are fitted the valvular segmental cylinders *p p p p*, fitting against the open concave sides of the heads, and mounted upon their rods *o o o o* in such a way that, by turning them, the outlet of the heads may be increased or decreased at will, the outer or convex sides of the head forming guiding lips for the circulating fluid when the outlet is large, thus securing the requisite direction and highest velocity of circulating fluid, as it issues from the heads F F, consonant with the minus pressure maintained in the circulatory space and the area of the outlets. These valvular segments are connected together so as to be moved simultaneously by means of the rods *o o*, arms *r r r r*, and links *s s*. Attached to the channel-plate is the cylinder K, the ends communicating respectively with the cavities a_2 and a_3 by suitable passages, and within the cylinder K is fitted to move freely the piston *l*, attached to the rod *m*, and to which rod *m* is connected the arm *r*, in such a way that if the piston *l* be moved along in its cylinder the valvular segments *p p p p* will have a corresponding motion. To the rod *m*, or equivalent part, is fitted a spring, *n*, or a weight, in such a way that its action will tend to hold the valvular segments in position, to allow the smallest opening at the nozzles of the heads F F; and this spring or weight should be so attached that its energy may be varied at will.

It is obvious that if the spring *n* have no energy, and the moving parts no friction, the pressures when the apparatus is in action will be equal in the circulatory and the vacuum spaces, for the position of the piston *l* will be changed by any material difference of pressure, which change will alter the capacity of the nozzles in the heads F F. The pressure upon each side of the walls of the cylinders B B being equal, they may be made of very thin metal, and thus the transference of heat be very rapid, and yet there will be no communication between the circulatory and the vacuum spaces, and no vapor pass over from one to the other and waste, as has been the case heretofore in analogous apparatus, wherein the vapor and cooling fluid were kept separate by imperfect diaphragms. The piston may be replaced by a flexible diaphragm. And it is also obvious that the tension of the spring *n* will control the relative opening of the valves *p p p p*, and maintain a nearly constant

difference of pressure upon the opposite sides of the condensing surface, ranging below the difference between atmospheric pressure and the pressure existing within the condenser; and that the strain upon the condensing vessels or surfaces may by this means be ameliorated; and I desire it to be understood that I do not limit myself to the precise form or position of the inlet valves *p p p p*, nor to the precise form of the condensing vessels or surface hereinbefore described. If the automatic part of this apparatus be not used, the combination of the valvular segments *p p p p* with the circulatory heads F F has a value, for they are a good means of enlarging or diminishing the areas of the discharge openings by manual adjustment.

To avoid the risk of a collapsing pressure coming upon the cylinders B B, there are fitted one or more check-valves, B_2, opening inward, so that in case of such accident vapor may pass into the circulatory space, and avoid undue strain upon the apparatus.

In the example before us, the best action is obtained when the cooling liquid passes through the heads F F, and distributes itself in films over the inner surfaces of the cylinders B B, which I have found to work best when they are of a tapering form, with the smaller end downward, and which are prevented from filling with liquid by the introduction of air or gas. This introduction may be accomplished by making a small opening into any proper part of the circulatory space, which will allow air to enter the partial vacuum therein; but the size of the required opening would require frequent adjustment, and it is better to continually introduce air or gas in measured quantities, as some air will pass off with the liquid. To accomplish this result there is attached to some part of the engine or pumps an air-force pump, its barrel *u*, plunger *t*, receiving valve *v*, delivery valve *w*, and delivery pipe *y* being shown in the drawings, the pipe *y* communicating with the circulatory space. To prevent the partial vacuum within the apparatus from drawing air in through this pump, I attach to the delivery valve *w* a weight, *x*, or a spring of sufficient energy to prevent the spontaneous flow of air past the valve, yet so that it will rise and allow the passage of air in obedience to the periodical pressure generated by the stroke of the plunger *t*.

Having described my invention, I will indicate that which I consider new and useful, and for which I desire to secure Letters Patent, to wit, I claim—

1. The combination of the piston *l* with the valved circulating heads or inlets F F, or their equivalents, substantially as and for the purposes described.

2. The combination of the valve B_2 with the pot B, or its equivalent, substantially as and for the purposes described.

3. The combination of the snifting or air-force pump *t u w* with a surface condenser, when the delivery valve *w* is loaded, substantially as and for the purposes described.

NORMAN W. WHEELER.

Witnesses:

FRANK C. PRINDLE,

JOHN E. COOPER.