

(No Model.)

2 Sheets—Sheet 1.

J. F. ALLEN.
SURFACE CONDENSER.

No. 495,128.

Patented Apr. 11, 1893.

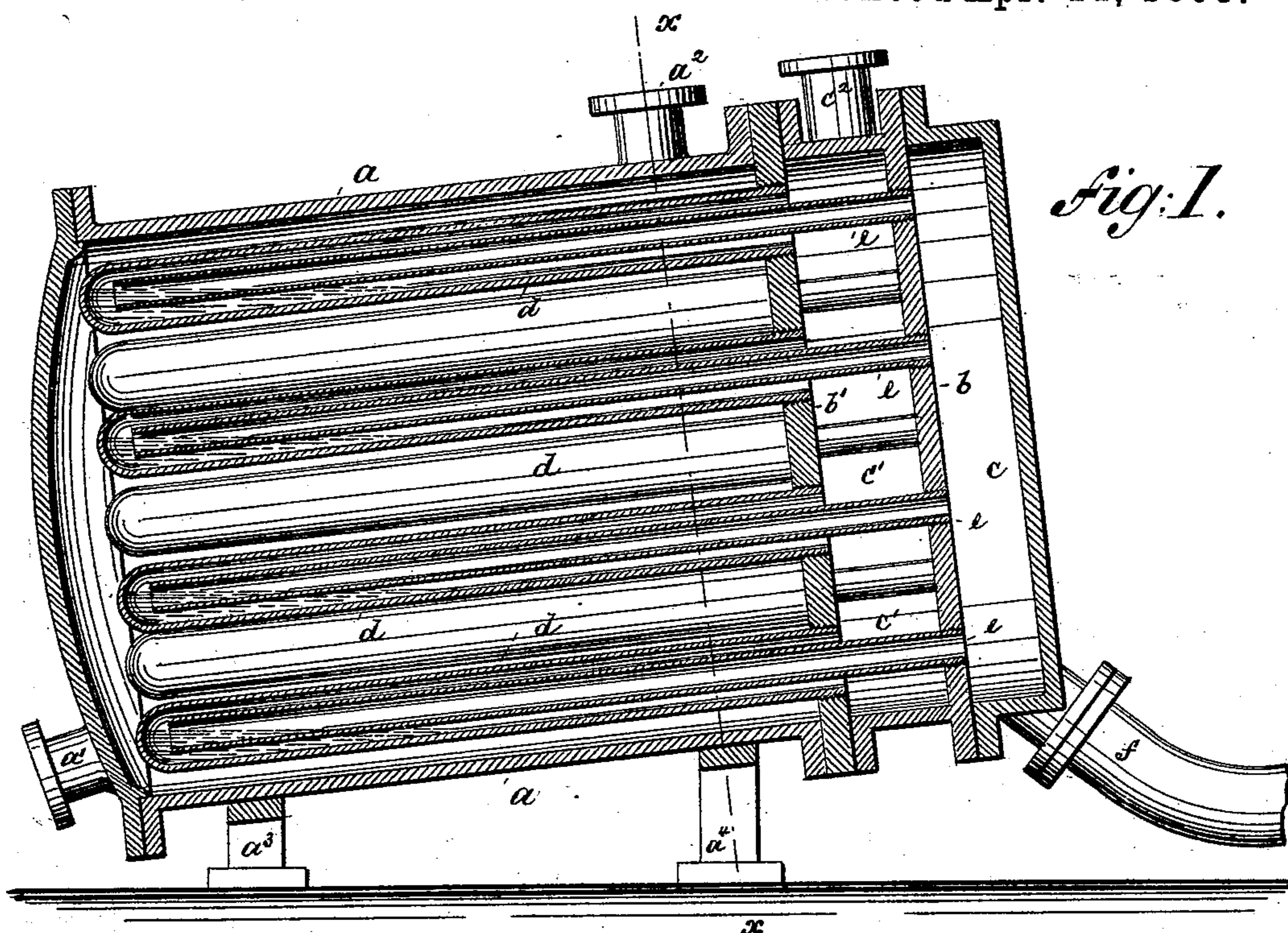


Fig. 1.

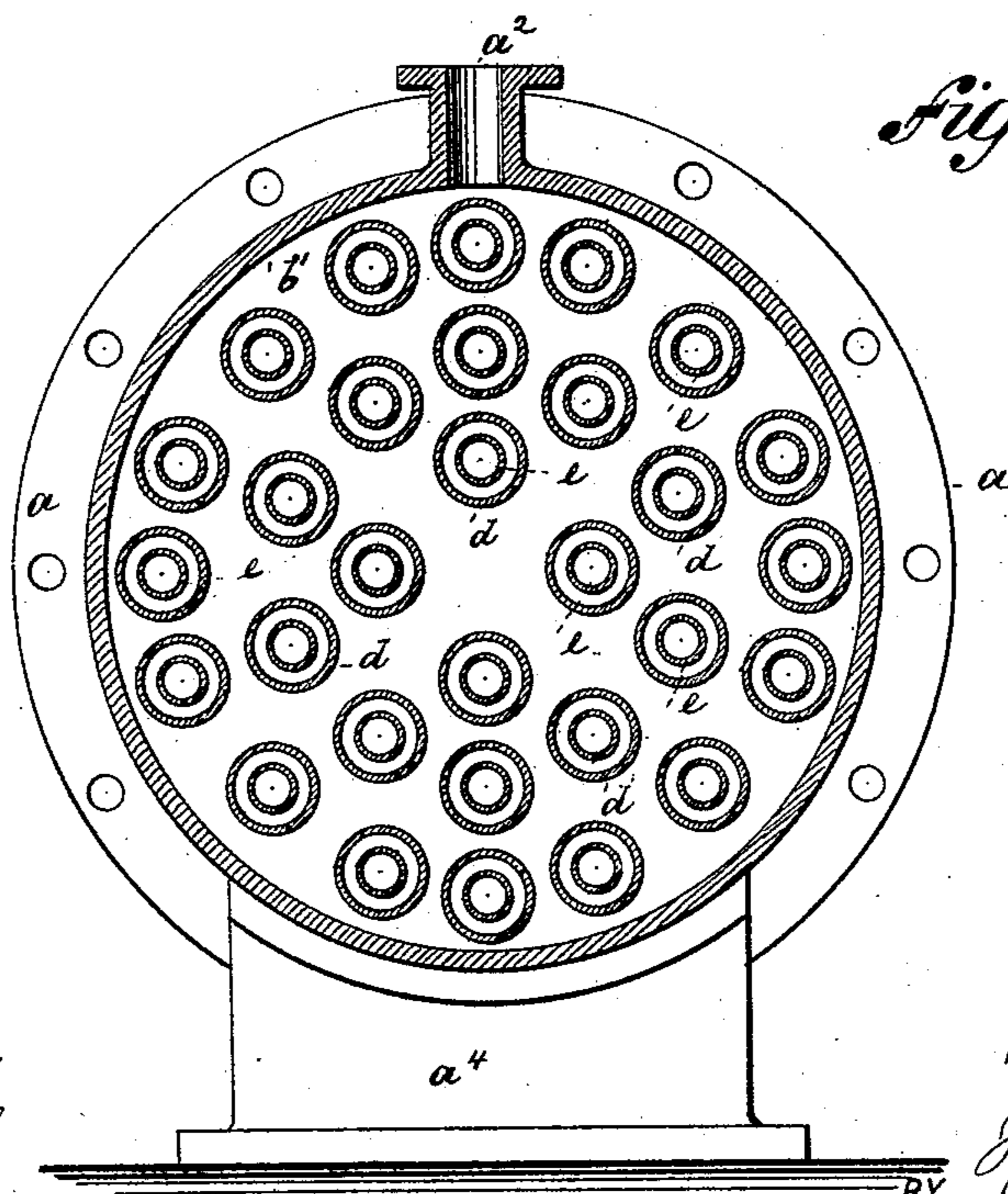


Fig. 2.

WITNESSES:

A. Schehl.
Wm. Schulz.

INVENTOR:

J. F. Allen
Wieder & Briesen
ATTORNEYS

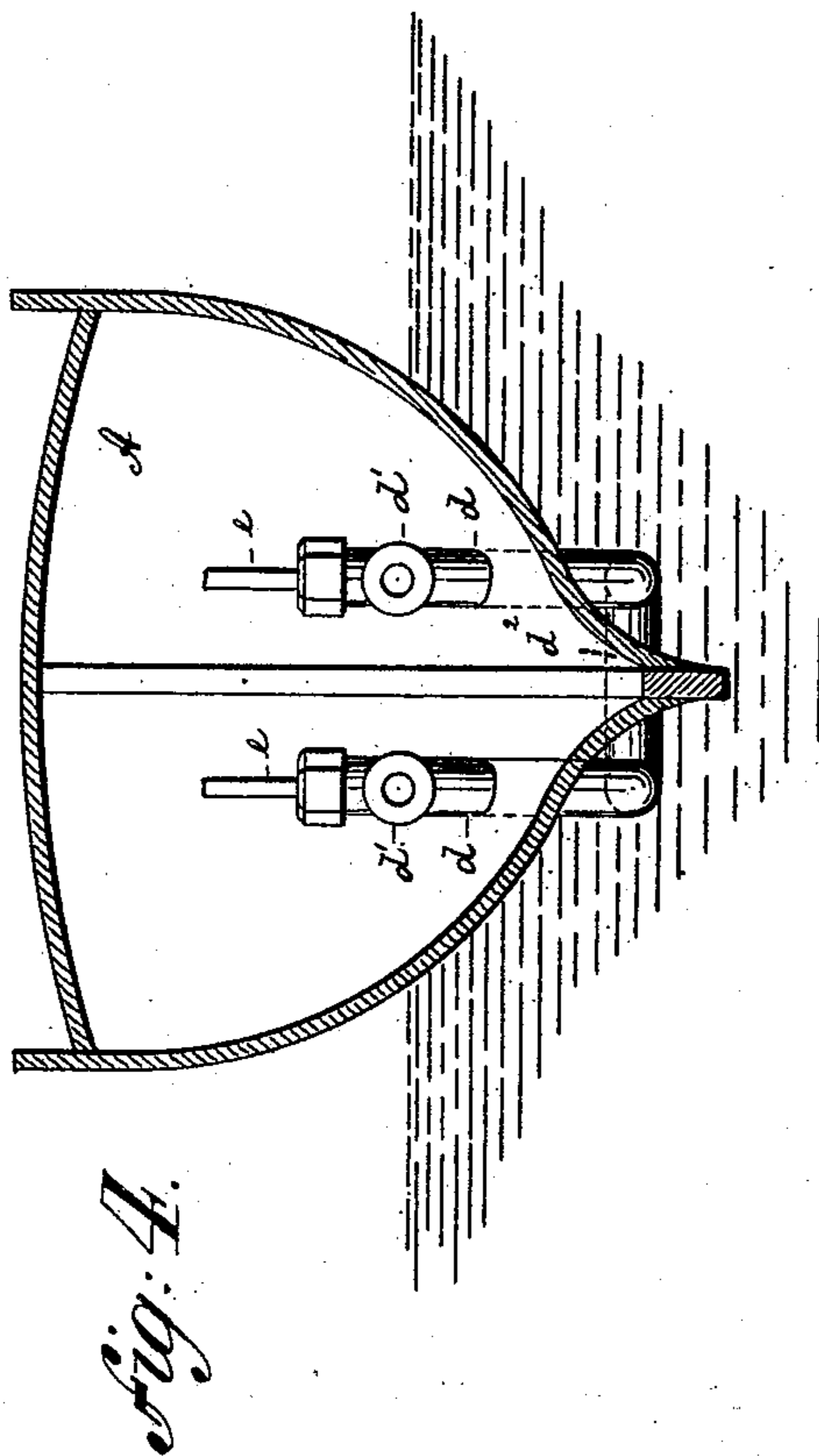
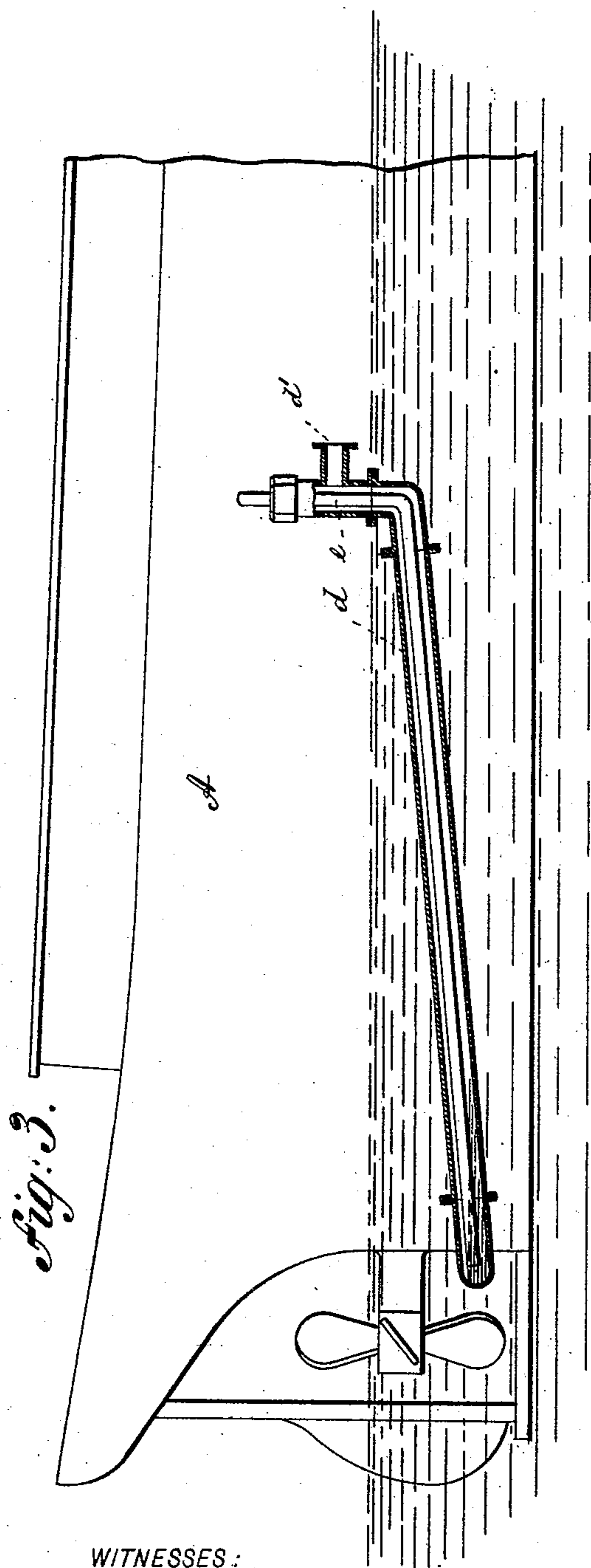
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A. Schehl.
Wm. Schulz.

INVENTOR:
J. F. Allen
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UNITED STATES PATENT OFFICE.

JOHN F. ALLEN, OF NEW YORK, N. Y.

SURFACE CONDENSER.

SPECIFICATION forming part of Letters Patent No. 495,128, dated April 11, 1893.

Application filed May 14, 1892. Renewed March 8, 1893. Serial No. 465,186. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. ALLEN, of New York city, New York, have invented an Improved Surface Condenser, of which the following is a specification.

This invention relates to a surface condenser for steam engines, that will deliver the waters of condensation at a high temperature. To this effect the condenser is provided with inclined outer condensing tubes that receive and condense the steam and with inclined inner tubes that pick up the water of condensation at the bottom of the outer tubes and convey it to the hot well. Thus the water of condensation in flowing through the inner tube is surrounded by a steam jacket, that will cause the temperature of the water, when delivered, to be considerably raised.

In the accompanying drawings: Figure 1 is a vertical longitudinal section of my improved surface condenser. Fig. 2 is a cross section on line x, x , Fig. 1. Fig. 3 is a sectional elevation of a steam yacht provided with my invention and Fig. 4 a cross section of Fig. 3.

The letter a , represents the shell of the condenser, having the cold water inlet a^1 , and the cold water outlet a^2 . The shell is placed upon feet a^3, a^4 , of unequal height so as to assume an inclined position. At one end the shell a , is provided with two heads b, b' that divide off from the shell, the first vacuum chamber c , and the second vacuum chamber c' . Into circular tapped openings of the head b' , there are screwed the surface condensing tubes d , that are inclined similar to the shell a . At their mouth the tubes d , enter the vacuum chamber c' , while at their other ends they are closed. It will be seen that the closed ends of the tubes are placed at a lower level than the mouths of the tubes and this is an important point in the construction of the condenser.

Through each tube d , there extends an inner tube e , open at both ends, and screwed into a tapped opening of the head b . This tube has, of course the same inclination as tube d , and it enters with its upper end the vapor chamber c . This chamber is provided with an exit tube f , that is adapted to be connected to a vacuum pump (not shown). This pump draws the water of condensation into the hot well from which it is picked up by the feed pump.

The operation of my surface condenser will be readily understood. The cold water circulating through the shell a , and around the condensing tubes d , the steam or vapor is admitted to vacuum chamber c' , through inlet c^2 . The vapor in flowing through the tubes d , will be condensed and the water thus formed, will settle in the closed lower ends of the tubes, which thus constitute collecting chambers, as indicated in Fig. 1. The inner tubes e , will dip into these chambers and as the vacuum pump is in operation, the water will be drawn up through the tubes e , into chamber c , and thence into the hot well. As the water of condensation flows through the tubes e , it is surrounded by a steam jacket *i. e.* the steam in the condensing tubes d . This steam will therefore heat the water and cause it to be delivered at a higher temperature than is usual in such condensers. Thus my improved surface condenser will be found to greatly economize the heat.

In Figs. 3 and 4 my surface condenser has been shown to be applied to the keel of a yacht A. Here the sea itself constitutes the cold or condensing water and the shell a , is therefore rendered unnecessary. The steam enters the inclined outer condensing tube d , at the top as at d' , and is condensed at the lower closed end of the tube. Here the water of condensation is picked up by the inner inclined tube e , that is connected to the vacuum pump, the same as previously described.

Each side of the keel may have an independent surface condenser as shown in Fig. 4 the two systems being connected by a transverse tube d^3 , extending across the stern.

What I claim is—

1. In a surface condenser the combination of an inclined outer steam condensing tube, that forms a collecting chamber at its lowermost end, with an inner water tube that dips into this chamber and conveys the water to the pump, substantially as specified.

2. The combination of a shell a , with a pair of perforated heads b, b' , forming chambers c, c' , a set of inclined inner and outer tubes secured to said heads respectively, a steam inlet in chamber c' , and a water outlet in chamber c , substantially as specified.

JOHN F. ALLEN.

Witnesses:

A. JONGHMANS,
F. V. BRIESEN.