No. 803,220. PATENTED OCT. 31, 1905.

F. S. FARNSWORTH.

SURFACE CONDENSER.

APPLICATION FILED JUNE 21, 1904.

2 SHEETS—SHEET 1.

Fig. 1

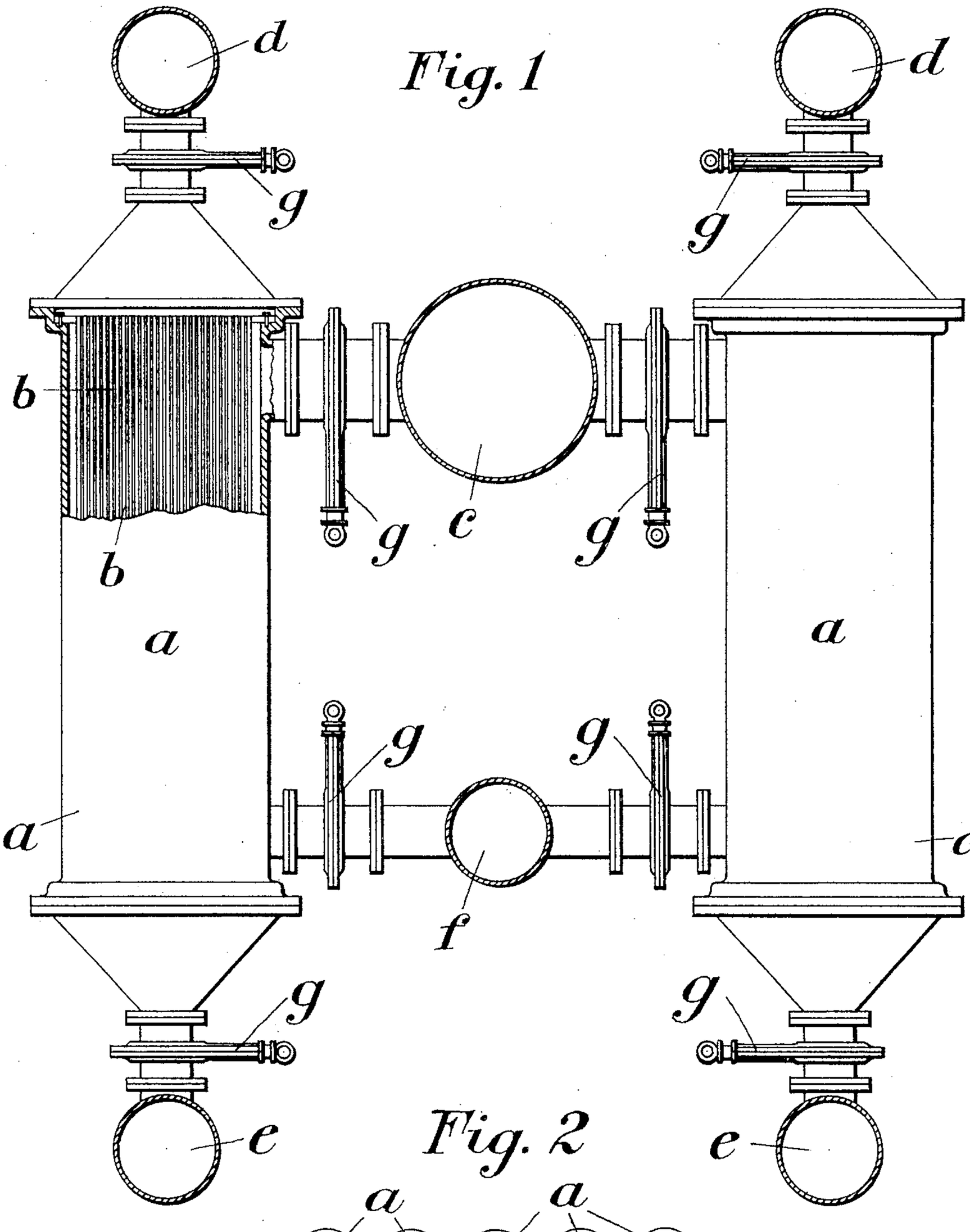


Fig. 2




Witnesses

Wm. Kuehne

John A. Percival

Inventor

Frank S. Farnsworth

By Richards & Co.

Attorneys

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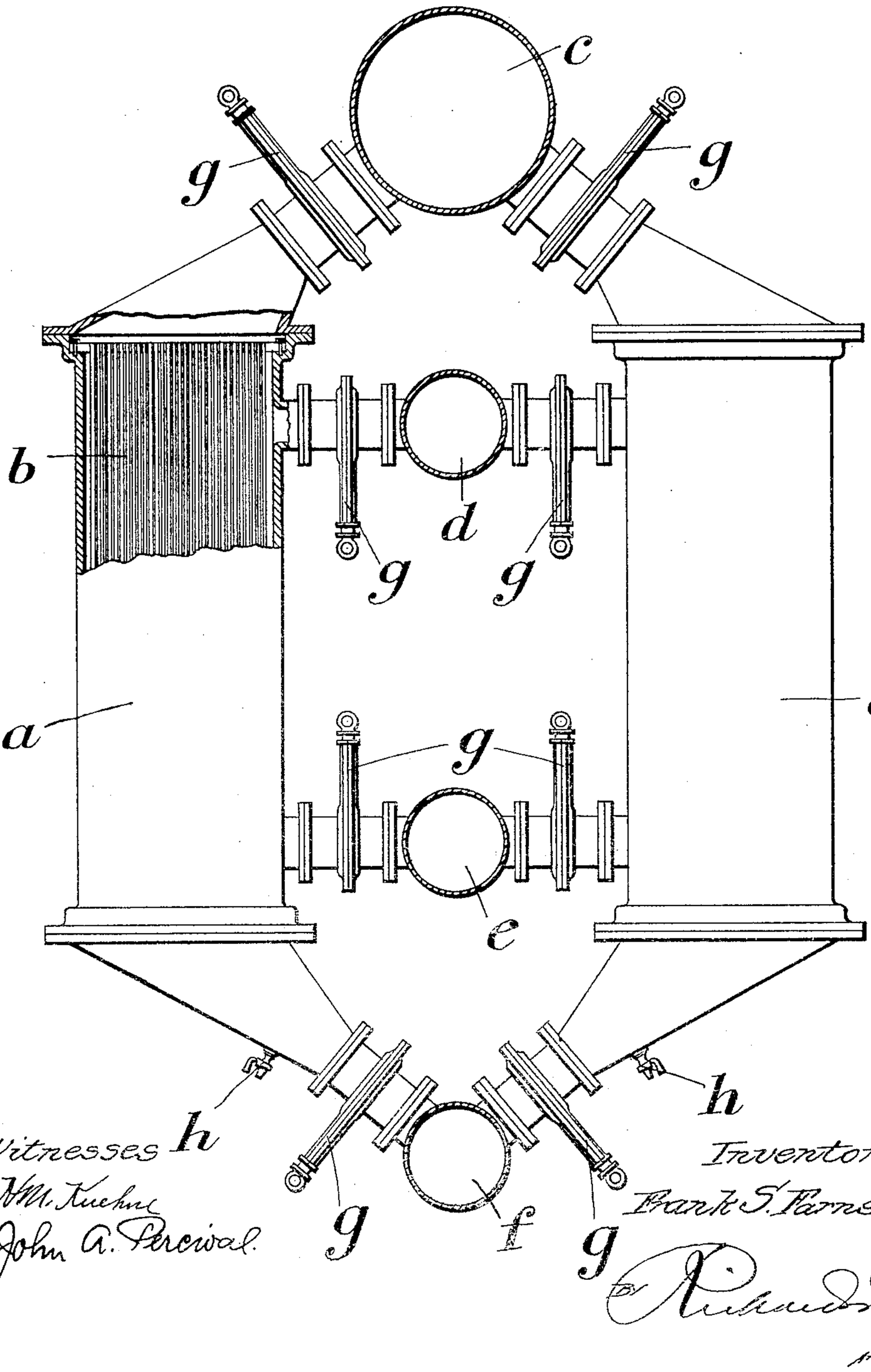
2 SHEETS—SHEET 2.

*Fig. 3*




Witnesses
W. M. Kuehn
John A. Percival.

Inventor
Frank S. Farnsworth.
by Richards & Co.
Attorneys

# UNITED STATES PATENT OFFICE.

FRANK SMEDLEY FARNSWORTH, OF MICKLEOVER, ENGLAND.

## SURFACE CONDENSER.

No. 803,220. Specification of Letters Patent. Patented Oct. 31, 1905.

Application filed June 21, 1904. Serial No. 213,570.

*To all whom it may concern:*

Be it known that I, FRANK SMEDLEY FARNSWORTH, a subject of the King of Great Britain and Ireland, and a resident of The Oaklands, Mickleover, in the county of Derby, England, have invented a certain new and useful Improved Surface Condenser for Steam-Engines, (for which Letters Patent have been applied for in Great Britain in the name of Alfred William Farnsworth as a communication from me when abroad, said application being numbered 23,789 and dated November 3, 1903,) of which the following is a specification.

The object of my invention is to provide a device or means of obviating the defects of the ordinary types of marine or land surface condensers.

Referring to the drawings, which form a part of this specification, Figure 1 is a part-sectional elevation of two sections of one type of my invention, as will be hereinafter explained. Fig. 2 is a diagrammatic plan drawn to a smaller scale, showing one application of a number of sections of my improved condenser of the type shown on Fig. 3. Fig. 3 is a part-sectional elevation of two sections of another type of my invention, as will also be hereinafter explained.

In carrying out my invention I construct my improved condenser in sections *a*. Each section is separate and distinct, but of the same pattern, and can be readily cut off and isolated from any or all of the other sections, as described hereunder. Thus when cleaning, testing, repairing, or other operations have to be performed each or any of the sections may be isolated from the other sections of the condenser and the operation carried out without interfering in any way with the proper and effective working of the other portions or sections. These sections *a* may be of any size, shape, or number, but are preferably all of one pattern in the same condenser. They may be either vertical or horizontal or inclined to any angle and assume any position or grouping that may be desirable to suit the proposed position of the condenser, an example of one form of grouping that may be arranged being illustrated by the diagrammatic plan of Fig. 2. They may be made of cast-iron, wrought-iron, steel, brass, or any other suitable metal or mixtures of metals or metals and other materials, as may be found most desirable. They will be filled with tubes *b*, as is customary in surface condensers, which may be of brass, copper, or any other suitable metal and may be of round, square, or other desired section, arranged in any convenient position according to the shape of the sections. The steam which is to be condensed may be allowed to pass either through or outside of the tubes *b*, as may be desired, the connections from the exhaust-pipe *c*, circulating-water inlets *d*, circulating-water outlets *e*, and air-pump suction *f* being varied to suit.

Each section *a* is isolated from any or all of the other sections, circulating-water inlets *d*, outlets *e*, exhaust-pipes *c*, and air-pump suction *f* by means of gate or other approved valves *g*. Suitable pet or other cocks *h* are provided for each section *a*.

By closing the gate or other valves *g* in the pipes connecting any section or set of sections *a* to the remaining section or sections of the condenser steam and the circulating water may be prevented from circulating through the first-named section or sections, and any operation of cleaning, testing, repairing, or the like may be readily and easily conducted by taking out the section or sections thus isolated without interfering with the proper and efficient working of that part of the condenser not cut off from the steam and water supply, and, further, by making all the sections of one condenser of the same pattern only that particular form of section need be stored for repairs.

Auxiliary condensers may be dispensed with where my invention is used, since one or more sections only may be used when otherwise an auxiliary condenser would be employed, a suitable arrangement of the pipes and valves being made to allow of this.

As all cooling-surfaces will have an even distribution of steam, each section receiving its due share, less circulating water will be required than in the case of the condensers commonly used to maintain the same vacuum.

By the use of sheet metal in building the sections of my condenser they may be made lighter per square foot of cooling-surface than any other form of condenser.

It will be noticed that in arranging the sections of my improved surface condenser in the manner illustrated no long connecting-pipes are used between the main exhaust-pipe and sections, so that the steam is distributed over the sections in the most efficient manner to produce a high vacuum and keep the condensed water at a high temperature.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

In a sectional surface condenser, a series of sections, a main water-supply, a main water-exhaust, a main steam-supply, a main connection from the vacuum-pump, pipes connecting the sections to each of said mains and valves in said pipes whereby each section may be cut off from the mains, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

FRANK SMEDLEY FARNSWORTH.

Witnesses:
T. M. RAFFIN,
K. TOYODZ.