

(No Model.)

4 Sheets—Sheet 1.

J. H. ROSENTHAL.
SUPERHEATER FOR STEAM GENERATORS.

No. 597,887.

Patented Jan. 25, 1898.

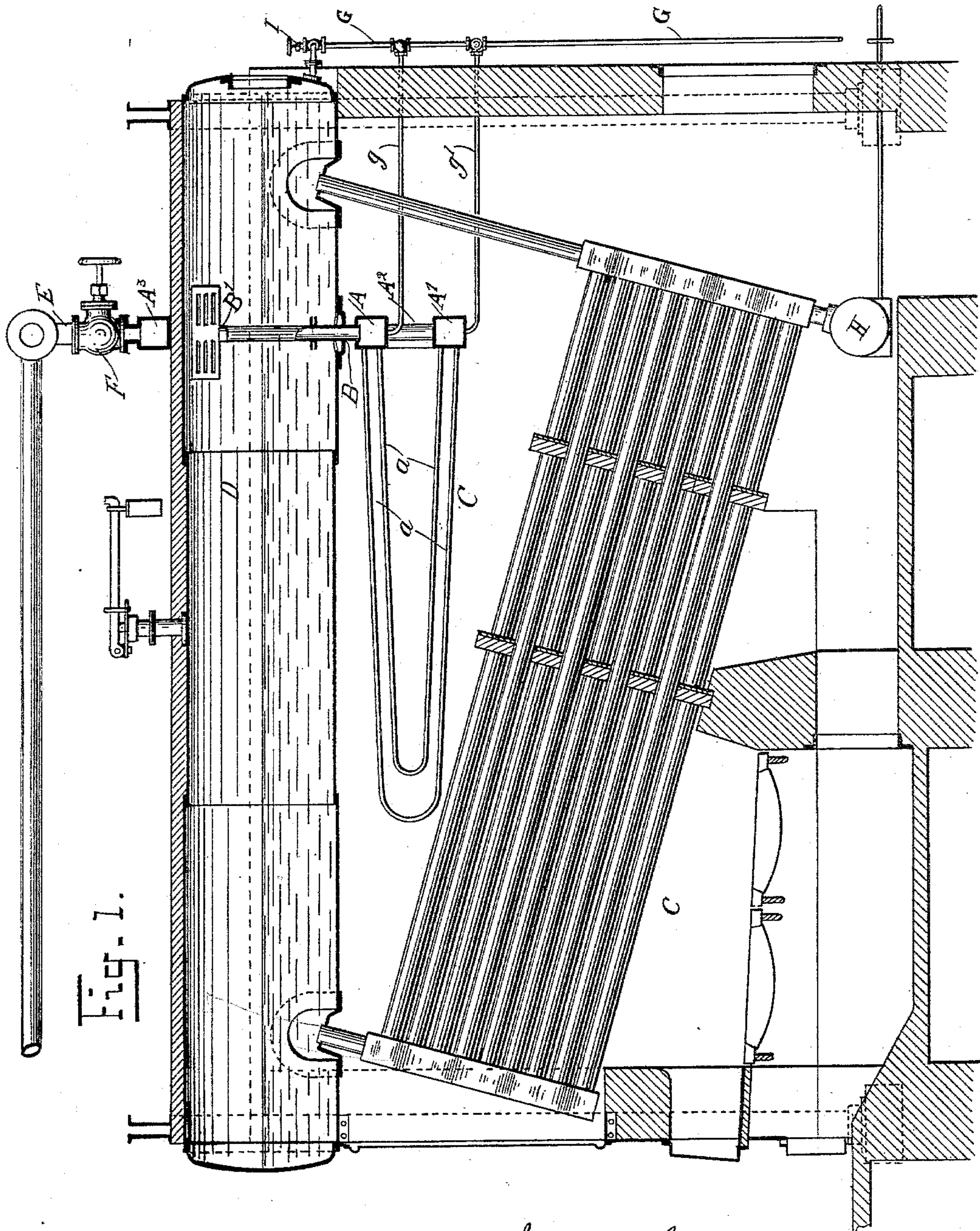


Fig. 1.

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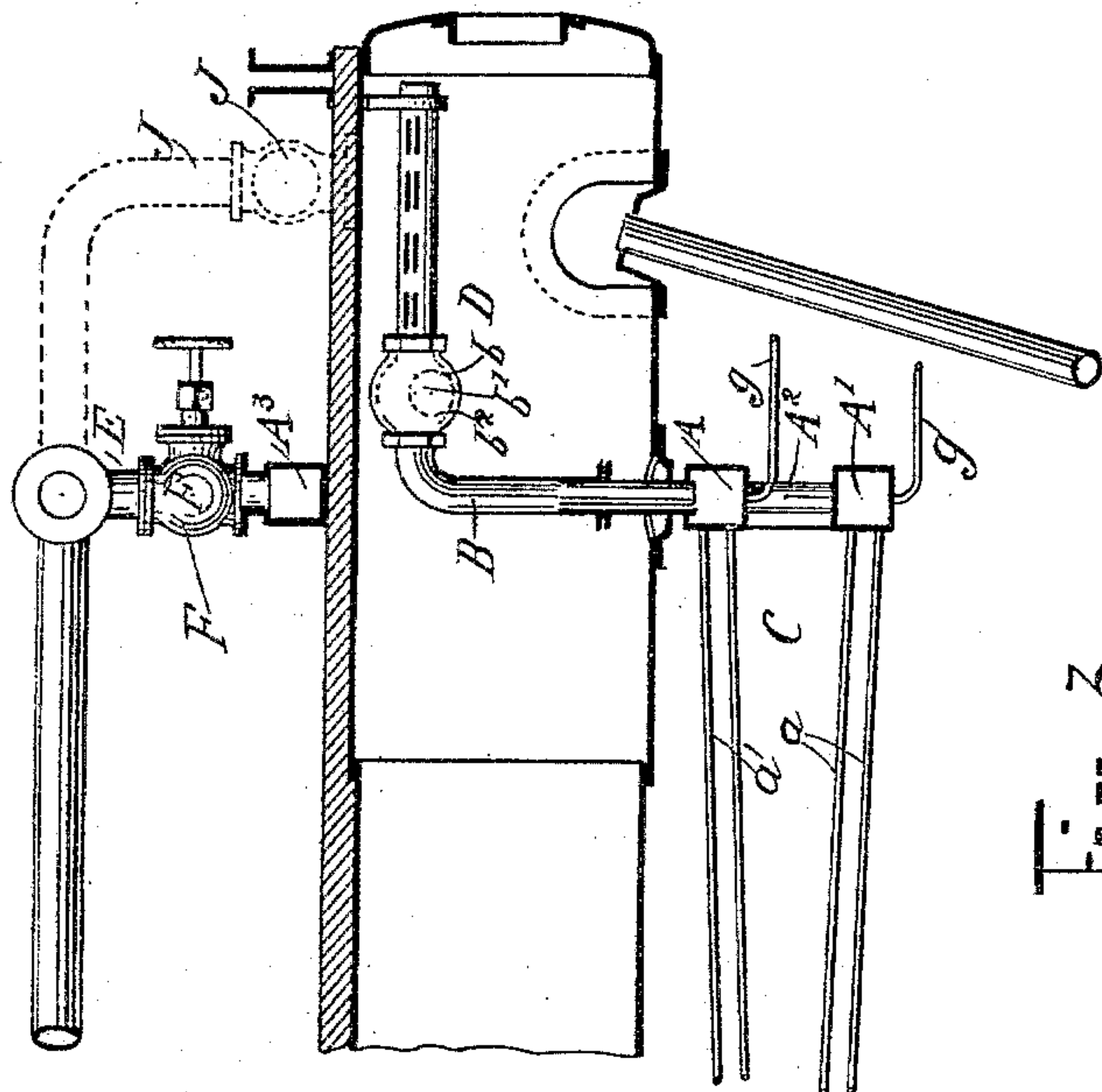


Fig-3.

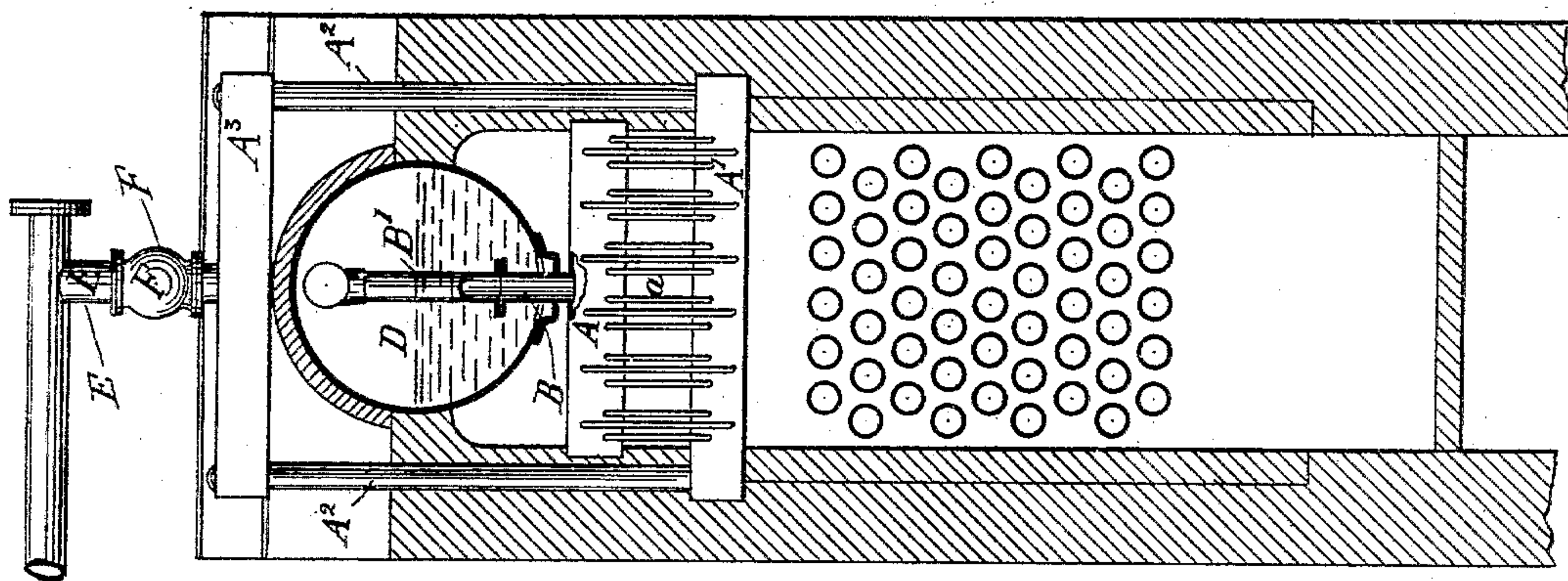


Fig-2.

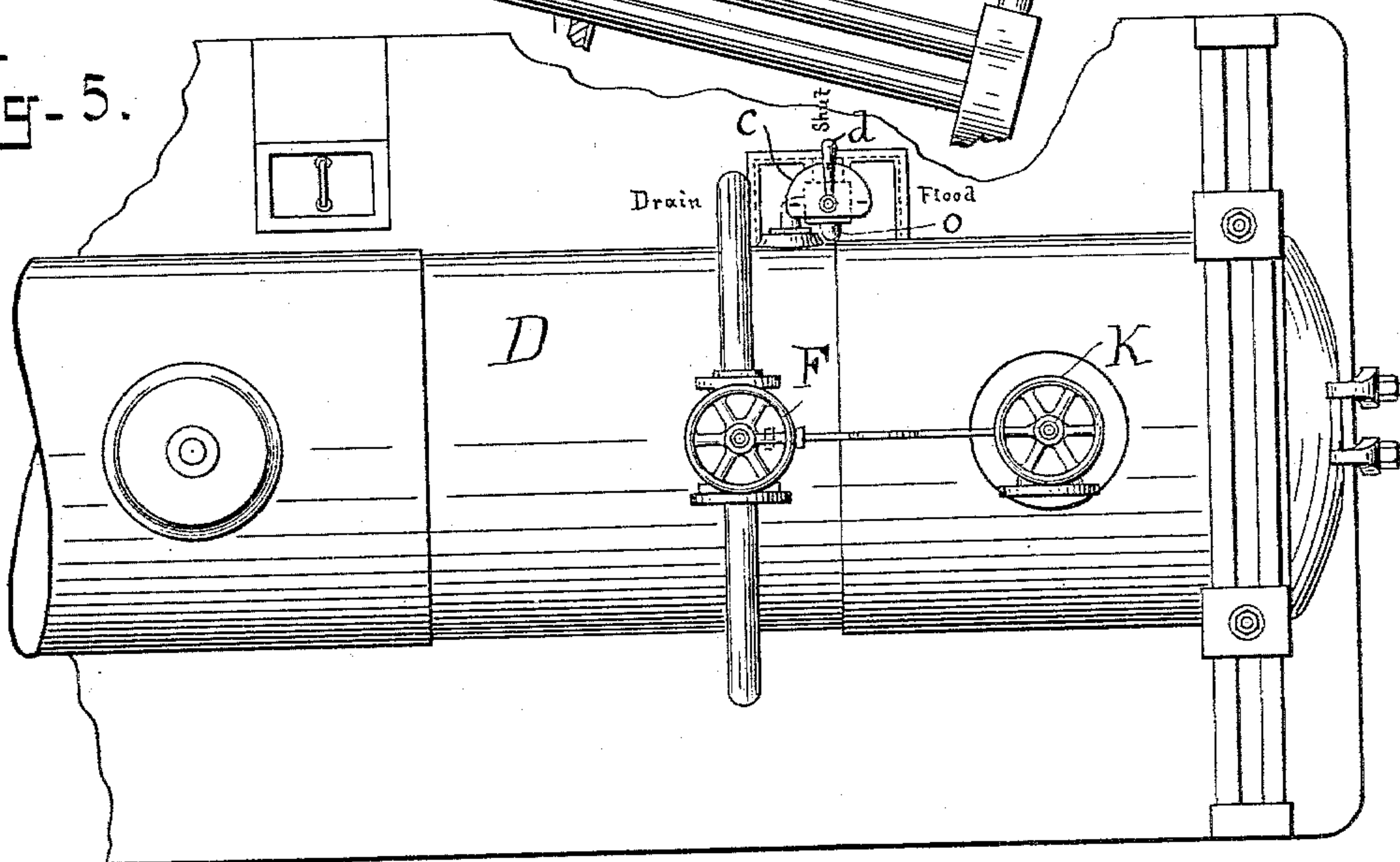
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4 Sheets—Sheet 3.

No. 597,887.

Patented Jan. 25, 1898.



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(No Model.)

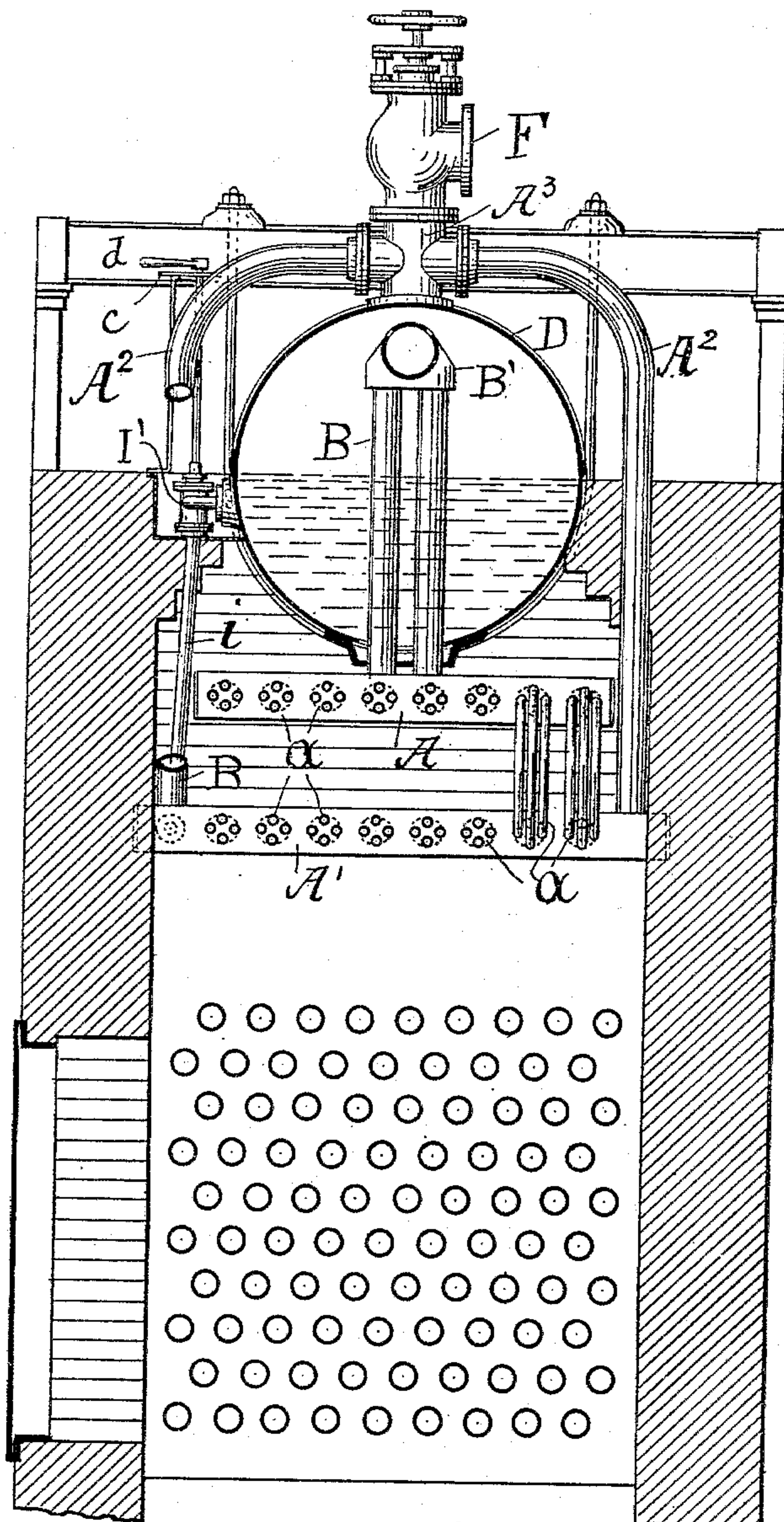
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Fig. 6.



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UNITED STATES PATENT OFFICE.

JAMES H. ROSENTHAL, OF LONDON, ENGLAND.

SUPERHEATER FOR STEAM-GENERATORS.

SPECIFICATION forming part of Letters Patent No. 597,887, dated January 25, 1898.

Application filed March 13, 1897. Serial No. 627,393. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. ROSENTHAL, a subject of the Queen of Great Britain, residing at London, England, have invented a new and useful Improvement in Superheaters for Steam-Generators, of which the following is a specification, taken in connection with the accompanying drawings, in which—

Figure 1 is a vertical section of a water-tube steam-generator with the invention applied; Fig. 2, a sectional end elevation; Fig. 3, a side view; Fig. 4, a side view of pipe and valve attachment for regulating the circulation of the water; Fig. 5, a plan view, and Fig. 6 an end view, of the same.

The superheating apparatus is composed of two cross-boxes A A', preferably of wrought-iron or steel, arranged within the combustion-chamber C, substantially as shown, and connected by a number of long tubes *a*, bent to U or other shape, the bent portion projecting into the combustion-space and presenting a large surface for the absorption of heat. The upper cross-box A has connected to it a vertical pipe B, which passes into the drum D and terminates in a perforated cross-pipe B'. The lower cross-box A' is connected by vertical tubes A² with a third cross-box or chamber A³, resting on the top of the drum D and which supports the apparatus and serves as a collector of the dry and superheated steam.

E represents a steam-delivery pipe attached to the collector A³ and is provided with a stop-valve F.

The ends of the vertical tubes A² are preferably expanded into the cross-boxes A' and A³; thus avoiding flanged and bolted connections.

With the construction and arrangement described the saturated steam from the drum D passes through the perforated cross-pipe B' into pipe B and cross-box A, and thence through the bent tubes *a* into the cross-box A' and upward through the tubes A² to the collector A³, it being superheated during its passage.

In order to maintain a circulation of water while the steam is being raised and avoid damage to the apparatus by the action of the fire, I connect to the cross-boxes A A' pipes *g g'*, which are also connected to a pipe G, attached at one end to the drum D and its other end either left open or connected to a steam-

trap. A two-way cock is provided at the junction of the pipe *g* with the pipe G and a three-way cock at the junction of the pipe *g'*, the pipe G being also provided with a stop-valve I. By opening these cocks water is admitted from the drum D into the cross-boxes A A' and tubes *a*, thus maintaining a circulation while steam is being raised.

When it is desired to pass steam through the superheater, it may be drained by closing the valve I and turning the way-cocks upon the pipe G, which will be readily understood. This feature of the invention—that of circulating the water through the superheater during the generation of the steam—greatly increases its durability, facilitates the operation, and enables the superheater to be used as auxiliary boiler-heating surface.

In Fig. 3 the perforated pipe B' is supplied with a casing *b*, within which a ball *b'* or other valve is placed, the object being to prevent the escape of steam in the event of the bursting of the superheater, the rush of steam automatically forcing the ball *b'* against the seat *b²* and thereby shutting off the steam from the superheater. In this arrangement a separate pipe connection J with the drum D is provided, having a stop-cock J' to convey steam directly to the steam-pipe E for use. A modification of this device which may be considered more convenient in use is shown in Figs. 4, 5, and 6. The stop-cock I' is open at its bottom and located at the side of the drum D and nearer the superheater and is fitted with a quadrant-plate *c* and handle *d*. When the handle *d* is turned to the position marked "Flood" on the quadrant-plate, the water from the drum D passes through the branch pipe *h* and the open bottom, through the pipe *i* of the cock I', into the box A', thereby establishing a circulation, and any steam that is generated in the superheater will pass through the pipe B B' into the drum D.

When it is required to drain the superheater, the handle *d* is turned to the position on the quadrant-plate marked "Drain," which establishes communication from the superheater-tube *a*, through the open bottom of the cock I', to the outlets *o*. The handle *d* is thus brought to the position on the quadrant-plate marked "Shut," and steam can then be passed through the superheater.

A second stop-valve K may also be provided, as shown in Figs. 4 and 5, in case it is required to use saturated steam alone, and to use a mixture of the saturated steam and the superheated steam a pipe *m* and valve *u* may be placed between the valves F and K.

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

1. In combination with a steam-generator, a superheater composed of two or more cross-boxes arranged in contact with the products of combustion; communicating with the steam-space of the generator, and connected together by tubes of U shape, substantially

as shown, and an exterior elevated cross-box from which the superheated steam is used communicating with one of the superheater cross-boxes, substantially as set forth.

2. A superheater for steam-generators communicating with the steam and water circulation and provided with a valve system whereby the superheater is made to form a part of the generator during the raising of steam, substantially as described.

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