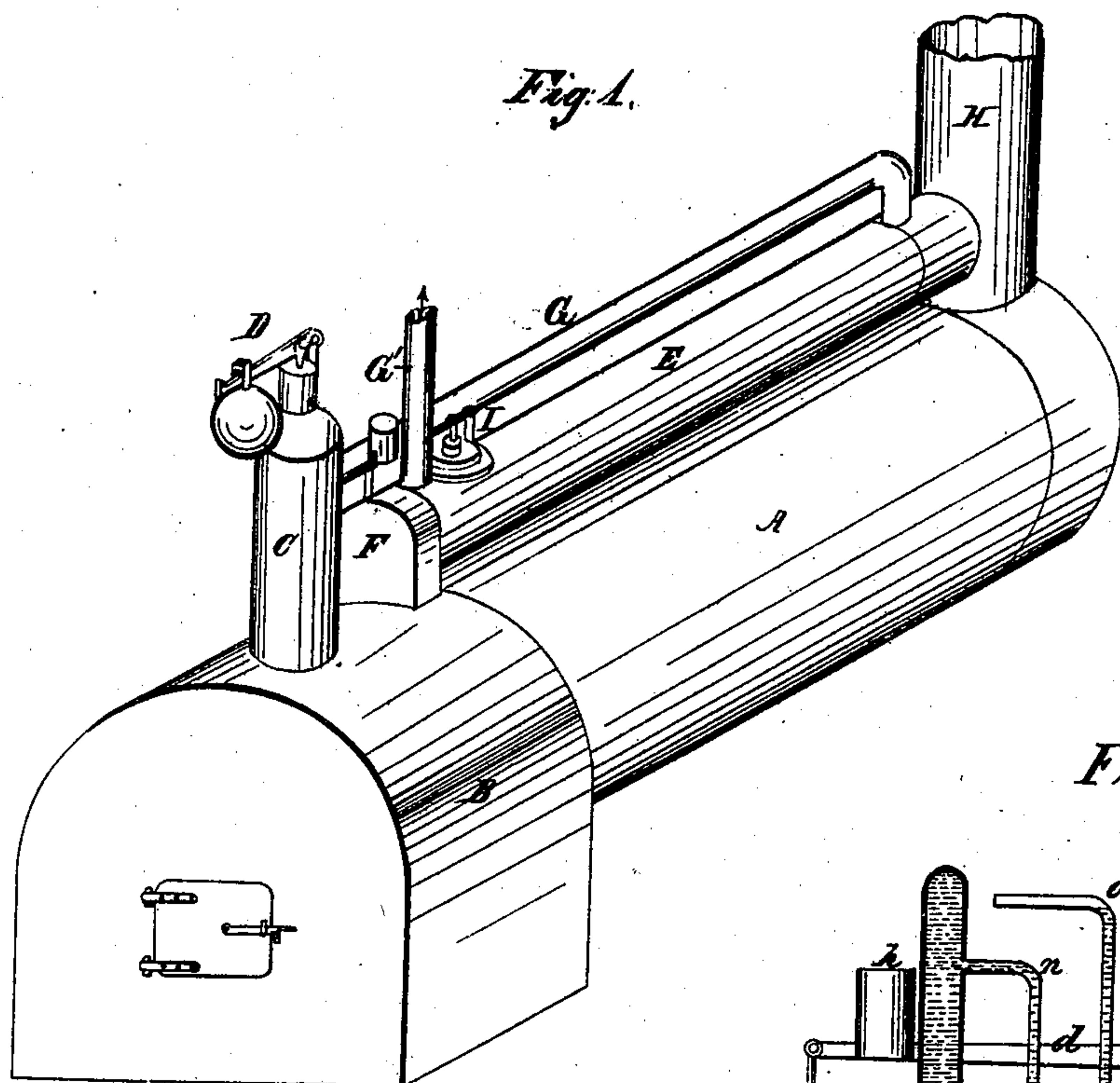


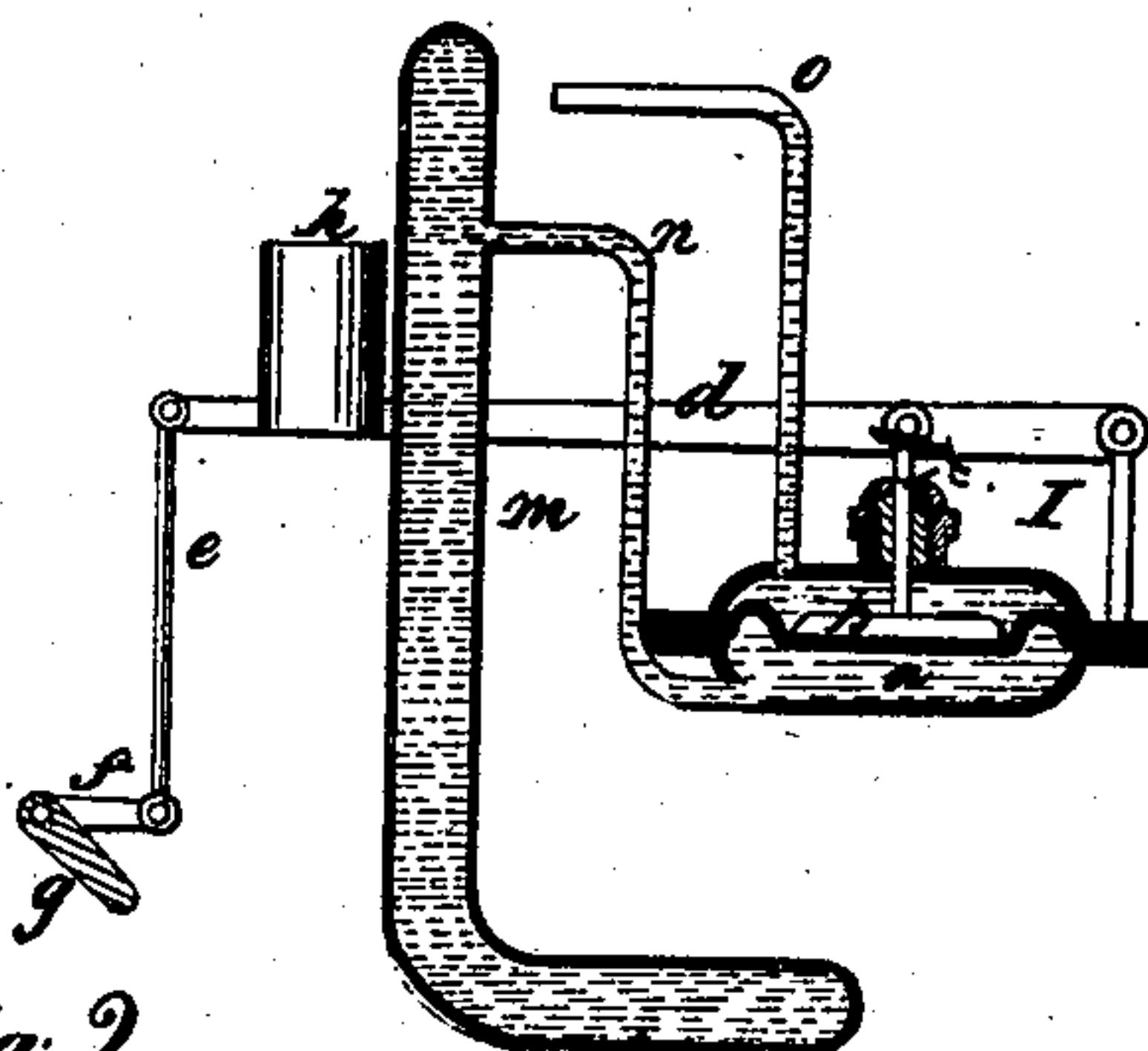
O. M. STILLMAN & S. WILCOX, Jr.  
THERMOSTAT FOR STEAM BOILERS.

No. 23,747.

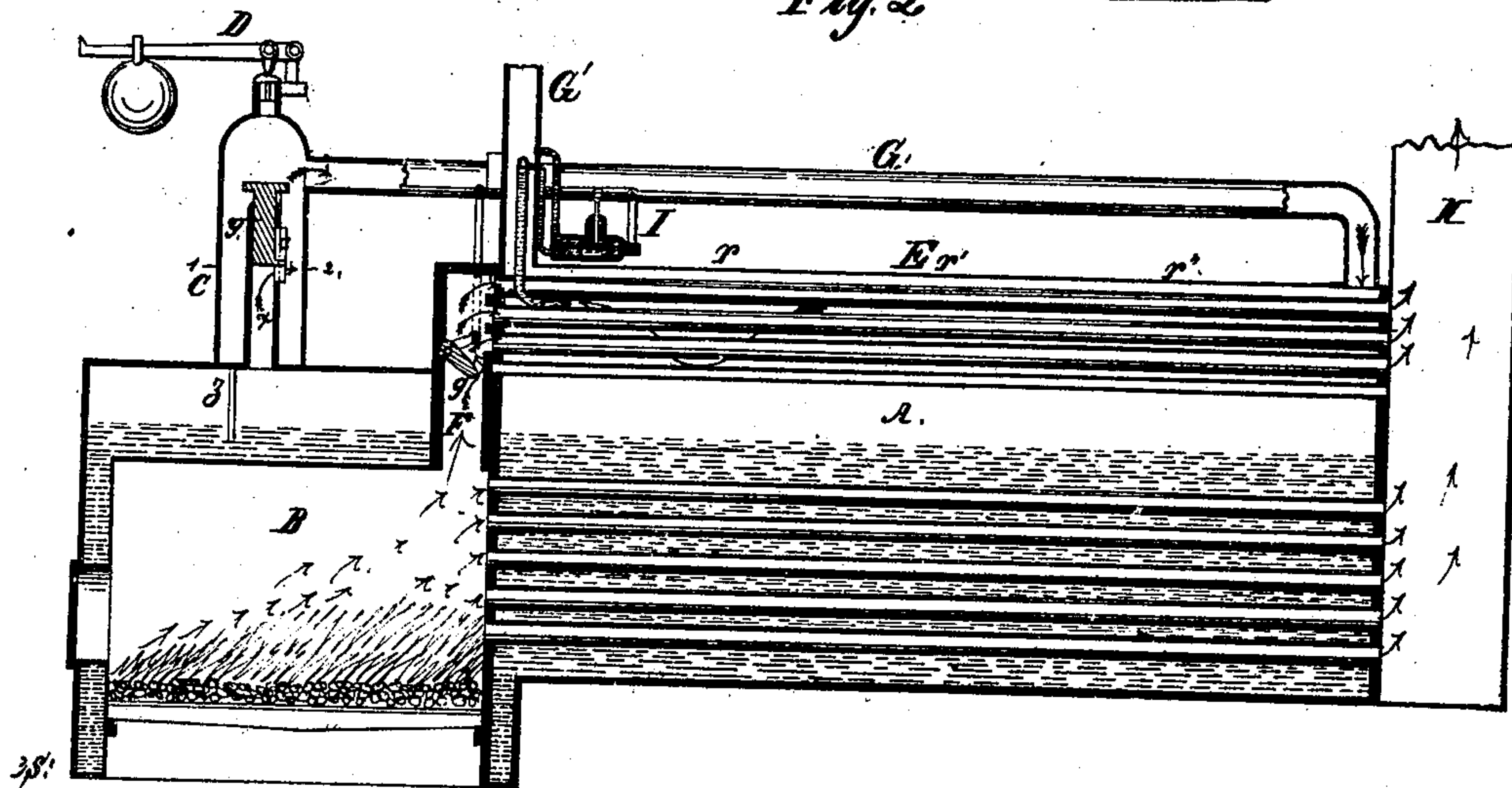
Patented Apr. 19, 1859.



*Fig. 3.*



*Fig. 2.*



Witnesses:

Charles H. Hyde  
William P. Coy.

Inventors:

O. M. Stillman  
S. Wilcox Jr.



# UNITED STATES PATENT OFFICE.

O. M. STILLMAN AND S. WILCOX, JR., OF WESTERLY, RHODE ISLAND.

## IMPROVED THERMOSTAT FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. 23,747, dated April 19, 1859.

### *To all whom it may concern:*

Be it known that we, O. M. STILLMAN and S. WILCOX, Jr., of Westerly, county of Washington, and State of Rhode Island, have invented certain new and useful Improvements in Superheating Steam; and we do hereby declare that the following is a full and exact description thereof, reference being made to the annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view of a steam-boiler with our improvements attached. Fig. 2 is a vertical section. Fig. 3 is an enlarged section of the thermostat, and similar letters refer to like parts throughout.

Our invention consists in certain improvements in the superheating of steam.

The construction and operation are as follows:

The form of boiler which we have chosen to illustrate our invention is the ordinary locomotive-boiler; but the improvements are equally applicable to other forms of boilers.

A is the cylindrical portion of the boiler; B, the furnace; C, the steam-dome; D, the safety-valve; H, the chimney; G G', the steam-pipes; I, the thermostat; F, flue leading from furnace to superheater E; g, damper in flue F. Pipe *x* and valve *y* form a separator. C is the steam-dome.

The superheater E is a cylinder filled with flues and laid on the top of the boiler, and having one end connect with the chimney and the other with the furnace through flue F, so that part of the heat of the furnace may pass through the flues in E to the chimney.

*r r' r''* are partitions extending part of the way across E to break up the currents of passing steam and compel them to circulate around the flues. The steam to be superheated enters E at the back end through G, and as it passes forward it continually encounters more highly-heated surfaces until it escapes through G' at the desired temperature.

The thermostat consists of two saucer-shaped pieces with their concave sides toward one another, as shown at I, Figs. 2 and 3, their edges compressing a diaphragm of some tight material, as vulcanized rubber. Upon the top of the diaphragm rests a piston, *b*, having a rod, *c*, passing through a stuffing-box and connecting with lever *d*. From the long end

of *d* a link, *e*, connects with crank *f* on damper-shaft *i*. It will be seen that when the diaphragm rises lever *d* must rise, and through its connections shut the damper, and when the diaphragm falls the damper will open. *h* is an adjustable weight on lever *d*. *m* is a tube (in exit steam-pipe G') filled with water, and has a small tube, *n*, connecting it with I below the diaphragm. Pipe *o* communicates between steam-pipe G' and I above the diaphragm, so that the upper side of the diaphragm has the boiler-pressure upon it, while the under side will have a pressure corresponding to the temperature of tube *m*, and *m* will have the same temperature as the steam by which it is surrounded. Hence if there is no superheating there will be no difference in pressure between the two sides of the diaphragm; but as the steam in passing through E acquires heat above that due to its pressure and the same degree of heat is communicated to *m*, which converts more of the water in *m* into steam and produces a greater pressure below the diaphragm than exists above, this excess of pressure depends entirely upon the amount of superheating, and as the superheating increases the pressure below the diaphragm will exceed that of weight *h* above, when the diaphragm will rise and shut the damper. The supply of heat being cut off, the passing steam soon cools down *m*, so that the pressure is not sufficient to sustain the weight, and the damper opens. After a few vibrations it reaches a mean point, where just enough heat is admitted to sustain the required temperature, and by adjusting weight *h* the temperature can be varied at pleasure.

The operation is as follows: Upon starting the engine the steam passes from the boiler through the separator to dome C, from which it passes through pipe G to E and circulates among the heated flues, as indicated by the arrows, and passes out at G' fully superheated. If the heat were allowed to pass through E without interruption, the flues would soon burn out; but the action of the thermostat varies the damper to suit the condition of the fire and the quantity of steam to be superheated, so as to maintain a nearly uniform temperature at a degree the tubes can safely bear.

We do not claim immersing in the superheated steam bars composed of two metals and controlling the heat by the deflection of the same, as this or an equivalent use of such apparatus is well known and has been described in Dr. Ure's *Dictionary of Arts*; neither do we claim inclosing within the superheated steam a tube or vessel containing air and allowing the contraction and expansion of the fluid to regulate the supply of heat to the steam, as this device or its equivalent has been before known; but,

Having now fully described our apparatus,

what we claim as our invention, and desire to secure by Letters Patent, is—

Regulating the flow of the products of combustion to the superheater by the difference in pressure between the superheated steam and that of saturated steam, substantially in the manner herein described, and for the purpose set forth.

O. M. STILLMAN.  
S. WILCOX, JR.

In presence of—

THEOPHILUS R. HYDE,  
WILLIAM P. COY.