

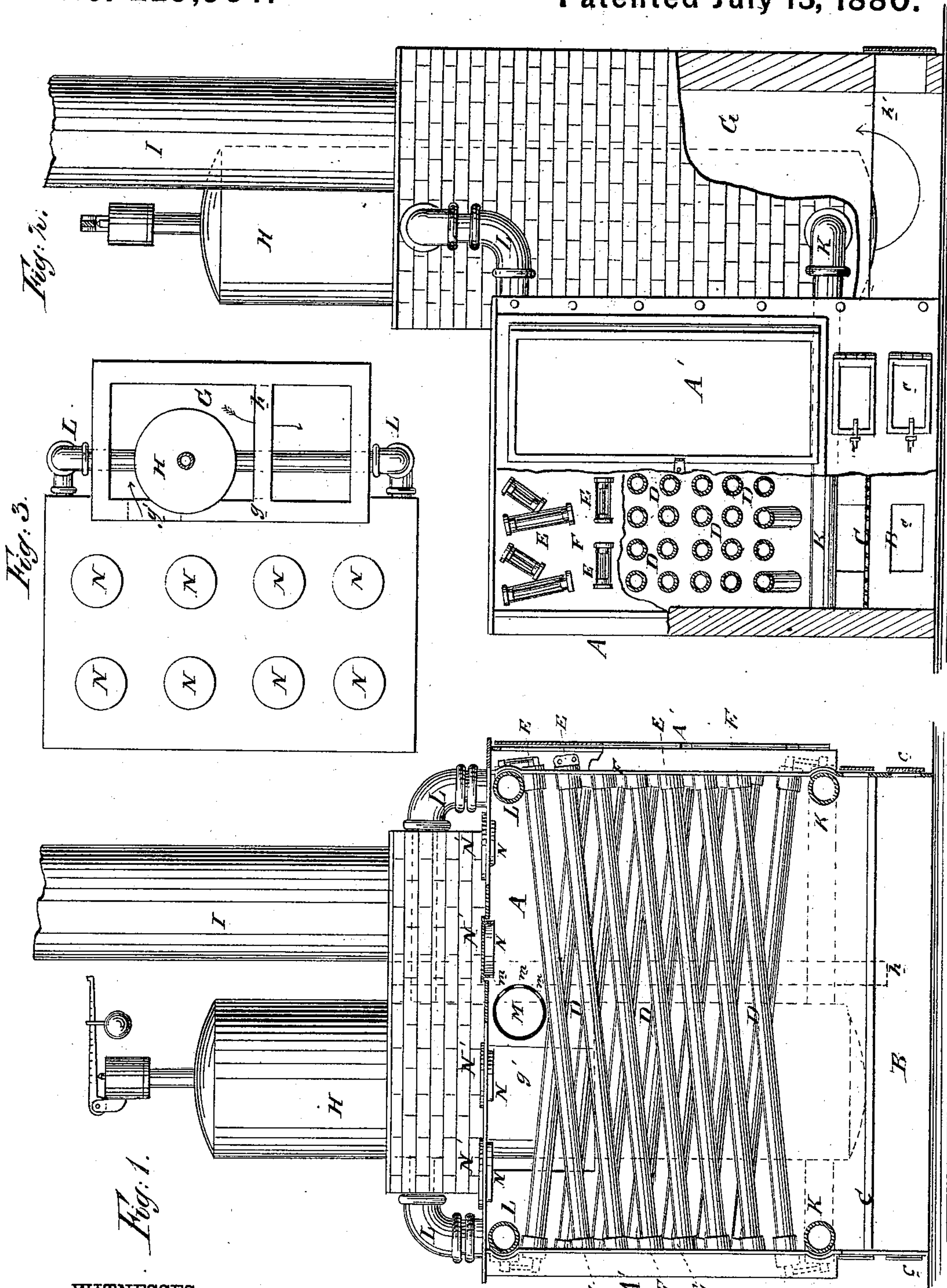
(Model.)

2 Sheets—Sheet 1.

J. G. CURTIS.  
Sectional Boiler.

No. 229,964.

Patented July 13, 1880.



WITNESSES:

*Chas. Nida*  
*C. Sedgwick*

INVENTOR:

BY

*J. G. Curtis*  
*Munn & Co*

ATTORNEYS.

(Model.)

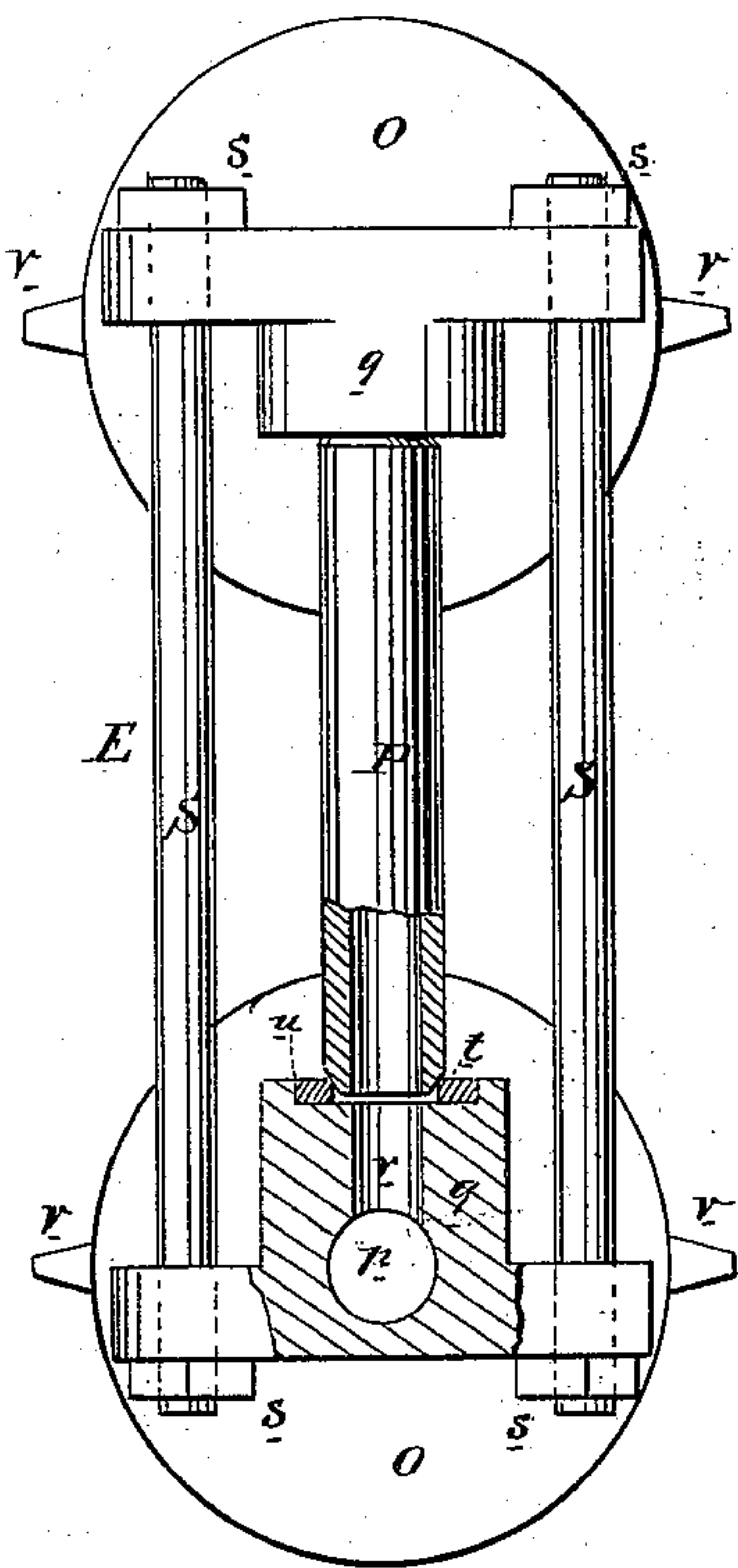
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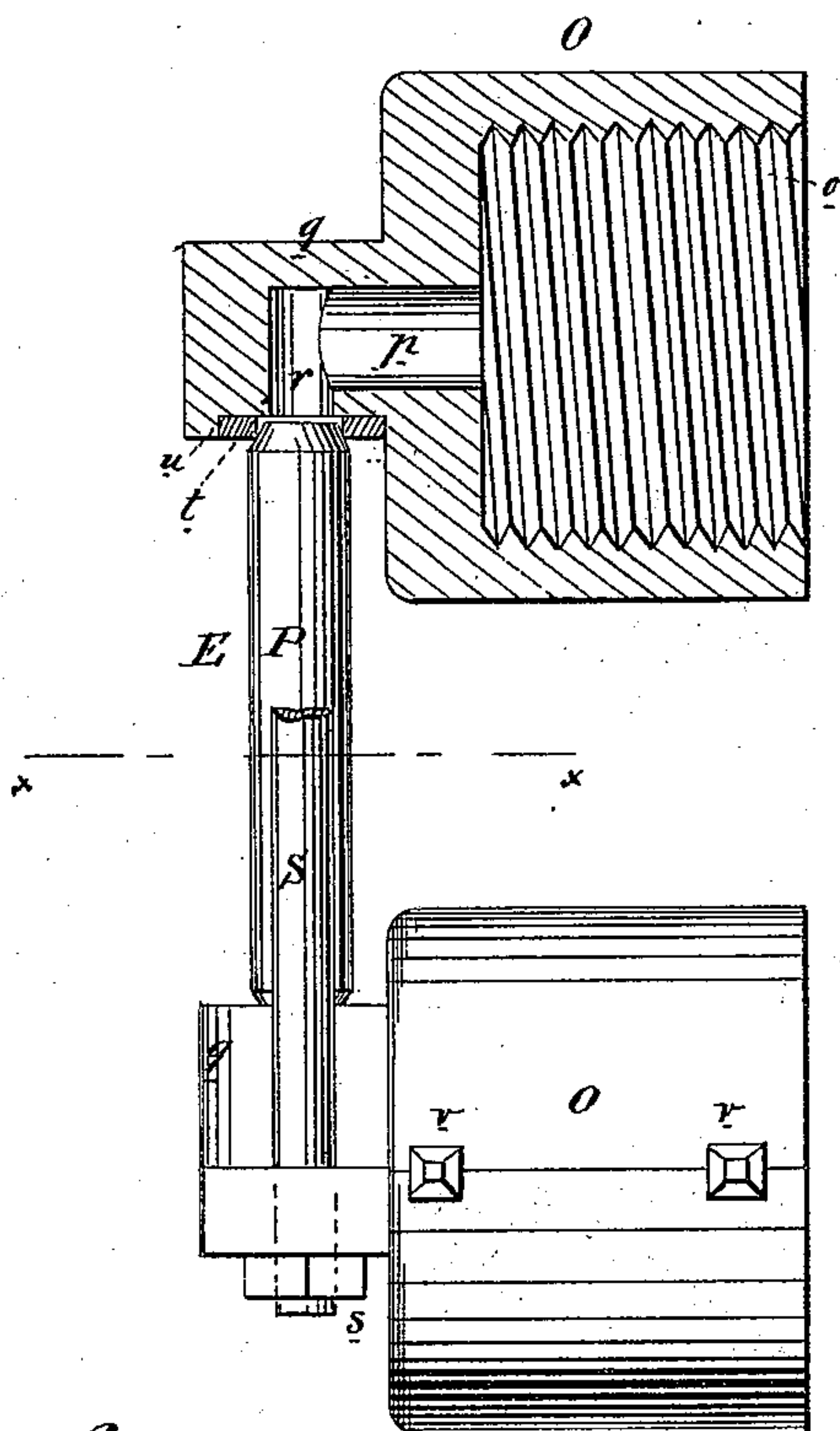
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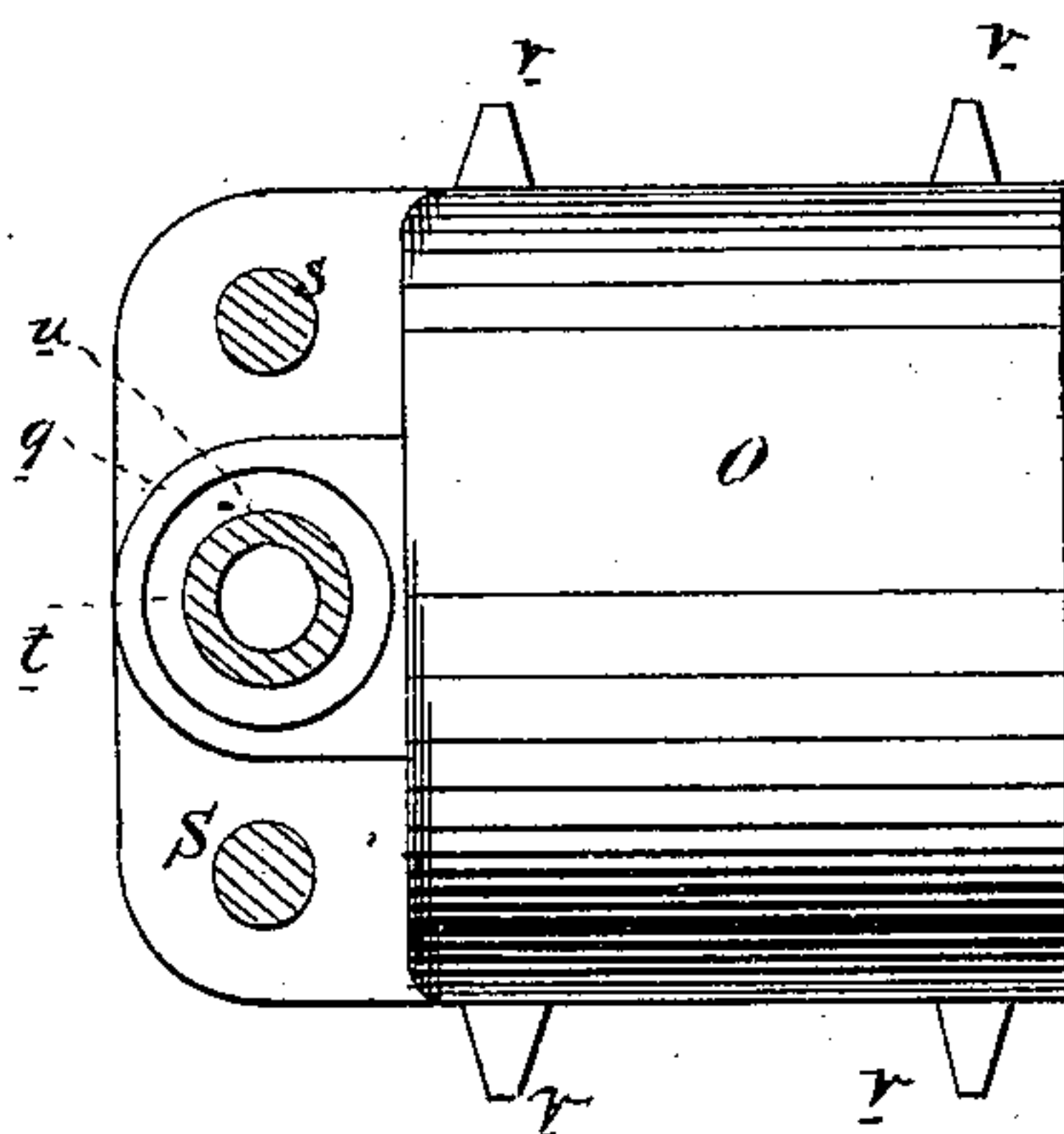
*Fig: 4.*



*Fig: 5.*



*Fig: 6.*



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# UNITED STATES PATENT OFFICE.

JOHN G. CURTIS, OF LUDLOW, PENNSYLVANIA.

## SECTIONAL BOILER.

SPECIFICATION forming part of Letters Patent No. 229,964, dated July 13, 1880.

Application filed April 5, 1880. (Model.)

*To all whom it may concern :*

Be it known that I, JOHN G. CURTIS, of Ludlow, in the county of McKean and State of Pennsylvania, have invented a new and Improved Sectional Boiler, of which the following is a specification.

The object of this invention is to provide a simple and inexpensive boiler, designed especially for burning wet tan, sawdust, &c., and so constructed that the tubes thereof may contract and expand without straining the joints, and so that any of the tubes may be removed for repairs and replaced without disturbing the others.

Figure 1 is an elevation of the device with the side of fire-chamber removed. Fig. 2 is a side elevation, partly in section. Fig. 3 is a plan of the same with the smoke-stack and top of smoke-chamber removed. Fig. 4 is a plan of the tube-connection, partly in section. Fig. 5 is a side elevation of the same, partly in section. Fig. 6 is a horizontal section of Fig. 5 on line *x x*.

Similar letters of reference indicate corresponding parts.

In the drawings, A represent the fire-chamber, provided with doors A' A'. B is the ash-pit, separated from the said fire-chamber by the grate C and provided with end doors, *c c*. D D are the water and steam tubes, arranged longitudinally within the fire-chamber A in several series of zigzags, as shown, and secured therein by having their ends supported and connected by the screw joints or couplings E E, which joints or couplings E E are entered from the outside through the end plates, F F, of said fire-chamber A.

G represents the smoke-chamber or connection, within which is set the upright cylinder H, said chamber G being divided into two parts by the vertical partition *h*, and being separated from the fire-chamber A by a division-wall, *g*, through which is a communicating opening, *g'*, opening opposite the cylinder H, and serving as a flue to conduct the products of combustion from one chamber to the other, that said products may escape by the smoke-stack I, which extends upward from the top of said chamber G.

The water-supply pipes K K extend from the front of the chamber A, along the ends

thereof, between the doors A' A' and the end plates, F F, to the cylinder H, and are connected at each end of the said fire-chamber A, by means of the couplings E E, with the two lower rows of tubes D D, while the steam-pipes L L, that extend from the front of the fire-chamber A, at its top and along its ends, between the doors A' A' and the end plates, F F, connect on either side with the upper part of the cylinder H, and also with the two upper rows of tubes D D, by means of couplings E E. Hence, when the device is in operation water entering the pipes K K will flow upward in the tubes and cylinder D D H, and, being converted into steam, said steam will enter said cylinder H through the said steam-pipes L L.

M is a smoke-flue, fixed centrally across the top of the tubes D D and aiding in supporting the top of the fire-chamber A, closed at the front end and entering the smoke-chamber G at about midway between the ends of said chamber. This flue M is provided on its side farthest from the flue *g'* with openings *m m* for the entrance of the products of combustion, and said flue M is designed for the purpose of creating a more even and central draft than would be obtained were the flue or opening *g'* the only smoke-connection between the chambers A G.

N N are openings in the top of the fire-chamber A, closed by covers N' N', through which the wet tan, sawdust, &c., is fed into the said fire-chamber, it being designed that said tan, &c., shall fall down upon the fire between the tubes D D. These tubes D D are arranged within the fire-chamber A, in the manner herein shown and described, for the purpose of intercepting as much as possible consistent with a good draft the heat given off the burning fuel; and it is evident that said flues may be multiplied to produce a boiler of any desired capacity, and that a series or sections of them may be placed on both sides of the steam-cylinder H. The grate C covers the entire surface beneath the tubes D D, thus affording ample fire-surface.

The products of combustion rising from the grate C up between and about the tubes D D enter the chamber G through the flues *g'* and M, and about the upright cylinder H, down-



ward to about the bottom of said cylinder, and beneath the partition *h*, up into the smoke-stack I.

The couplings E E are preferably made of malleable iron, each section thereof consisting of a cap or thimble, O, whose internal diameter, recess, or socket corresponds with the external diameter of the ends of the tubes D D, and has formed in it screw-thread *o*, for making connection with the ends of said tubes D D. Centrally from the rear of the socket of this cap or thimble O a small hole, *p*, extends into the ear *q*, and there connects at right angles with a transverse hole, *r*, formed in said ear *q*. This hole *p* is countersunk, as shown, and in the countersink *w* is inserted a bushing or ring, *t*, of copper or other soft metal, in which an end, beveled or tapering, of the connecting-pipe C is fitted. Parallel with the hole *r*, and on either side of it, the holes *r'* are bored for the reception of the bolts S S. These caps or thimbles O O are united and connected in pairs, as shown, by means of the pipe P, bolts S S, and nuts *s s*, and thus form a flexible coupling or joint that when fitted on the tubes D D permits said tubes to spring without leaking at the joints. These couplings E E are also provided on either side with lugs *v v*, that engage with either face of the end plates, F F, when the tubes D D are in position, and thereby prevent said tubes D D from moving endwise.

Having thus described my invention, I claim

as new and desire to secure by Letters Patent—

1. A steam-boiler constructed, substantially as herein shown and described, with fire-chamber A, series of zigzag tubes D D, outside flexible couplings or joints, E E, outside water and steam pipes, K L, cylinder H, and perforated smoke-flue M, as set forth.

2. As a means of connecting the tubes D D with the upright cylinder H, the water and steam pipes K L, substantially as herein shown and described, said pipes K L being connected with the two upper and two lower rows of tubes D D, as set forth.

3. In a boiler, the combination, with the zigzag tubes G G, cylinder H, and smoke-stack I, of the division-wall *g*, provided with flue *g'*, vertical partition H, and perforated flue M, substantially as herein shown and described, whereby the products of combustion are made to circulate about said tubes and cylinder and escape, as set forth.

4. As a means of connecting a coupling, the tubes D D, and in combination therewith the couplings E E, consisting of a recess or socketed caps or thimbles O O, provided with holes *p*, perforated ears *q*, tapering connecting-pipe P, and bolts and nuts S *s*, substantially as herein shown and described.

JOHN GOULD CURTIS.

Witnesses:

AL. BYHAM,  
W. H. CHAMBER.