

**No. 627,724.**

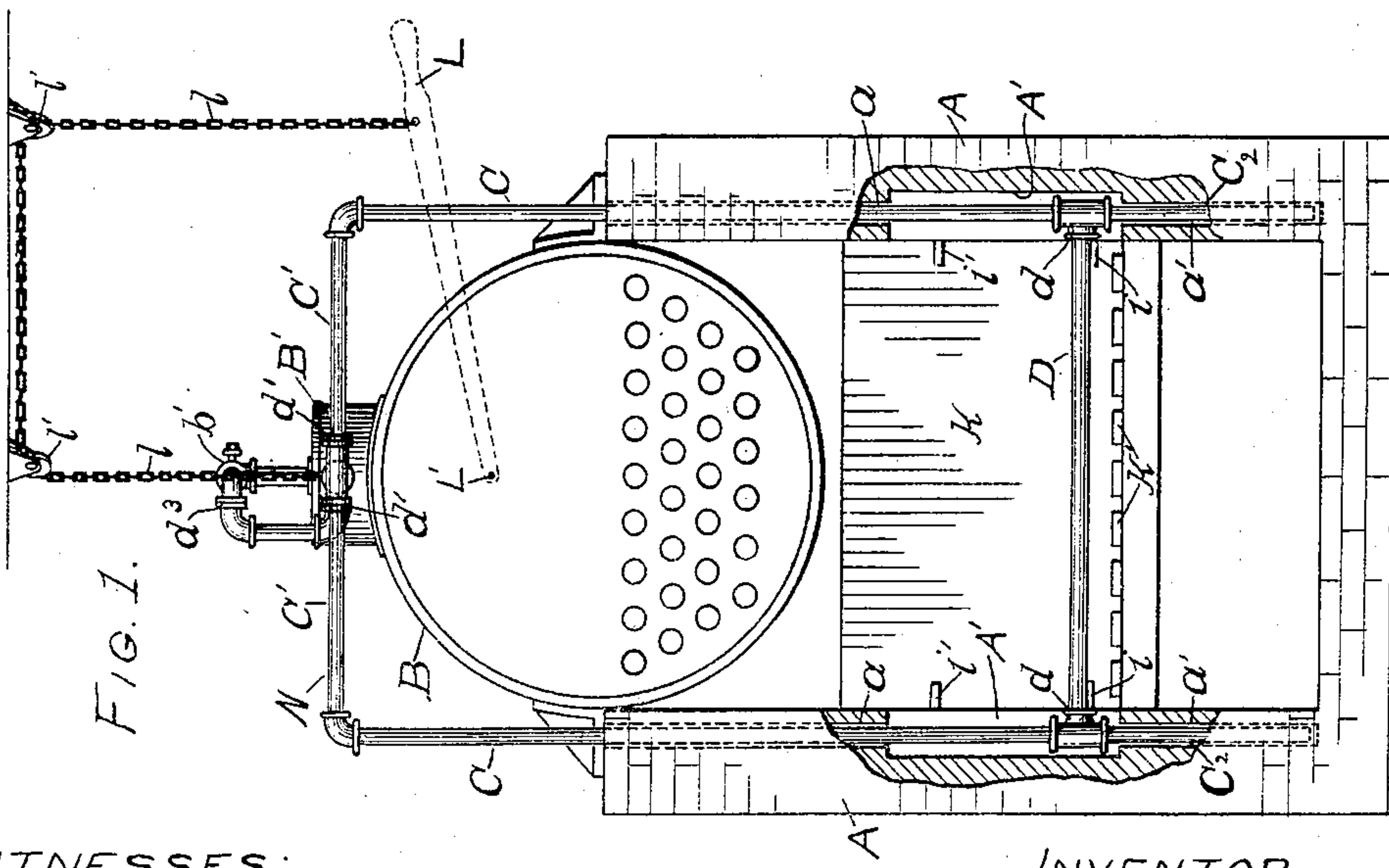
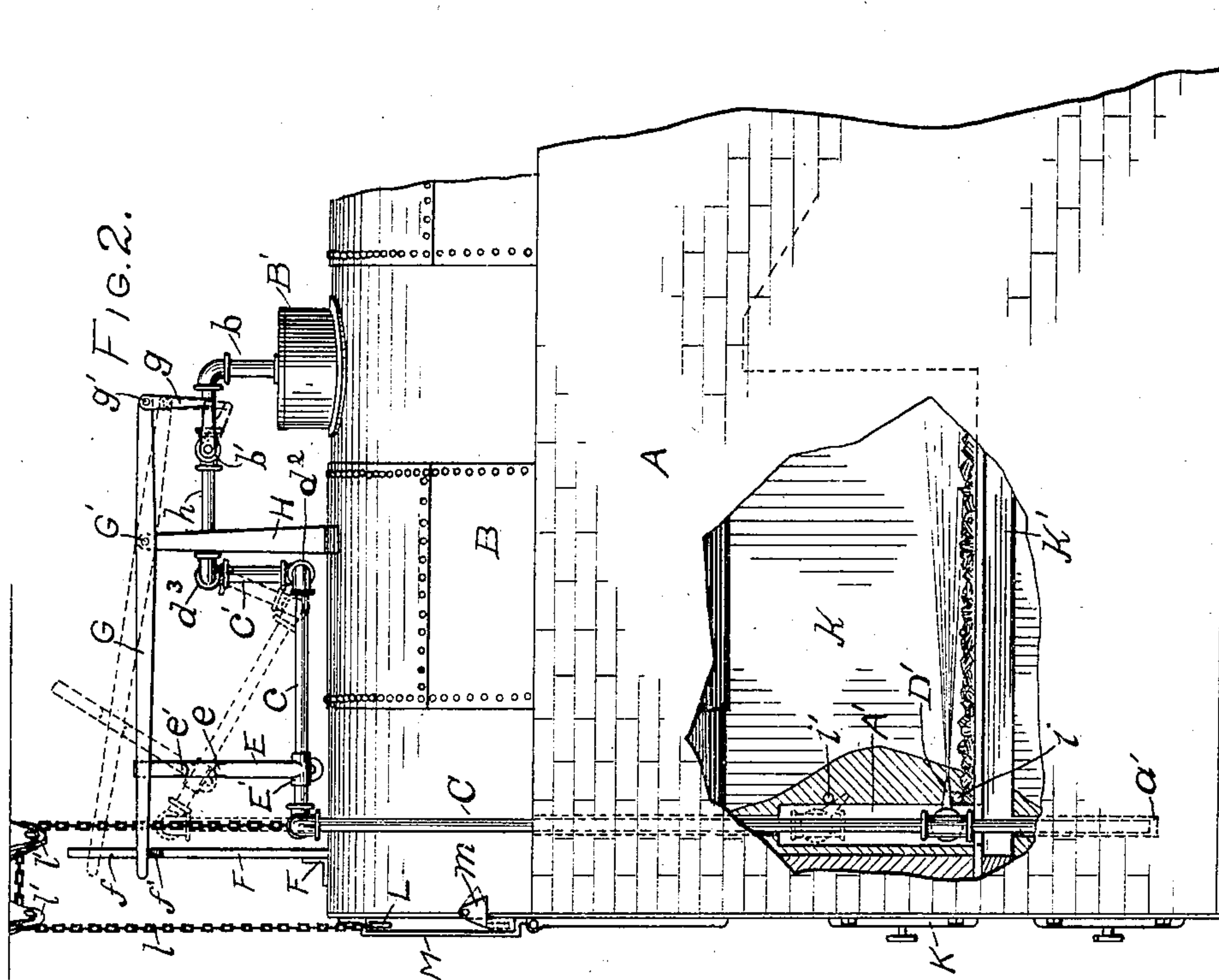
**Patented June 27, 1899.**

**E. FALES.**  
**STEAM JET FOR BOILERS.**

(Application filed Oct. 28, 1898.)

(No Model.)

**2 Sheets—Sheet 1.**



WITNESSES:

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FIG. 3.

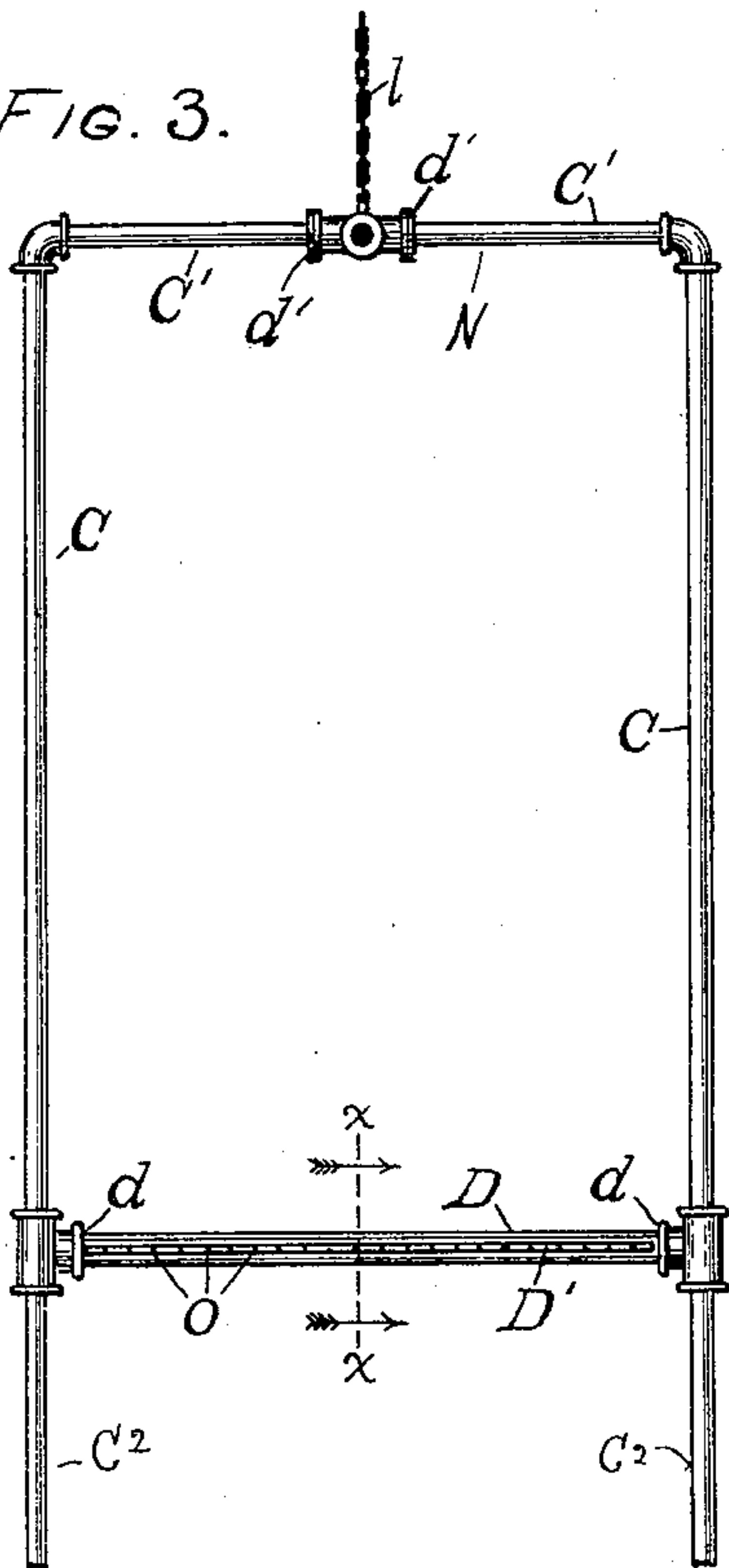


FIG. 6.

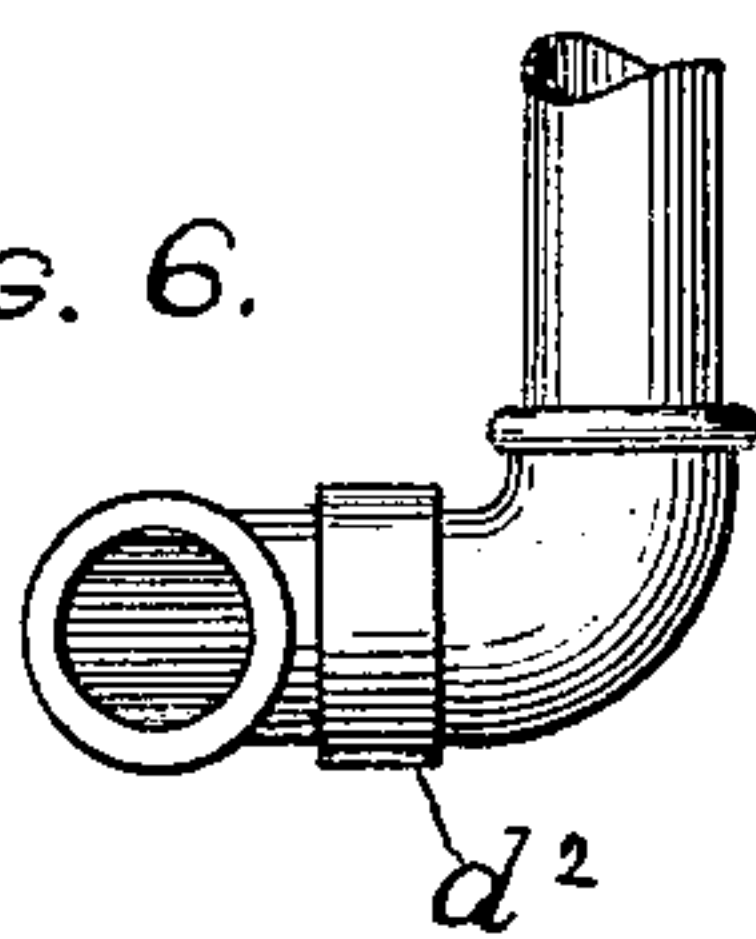


FIG. 5.

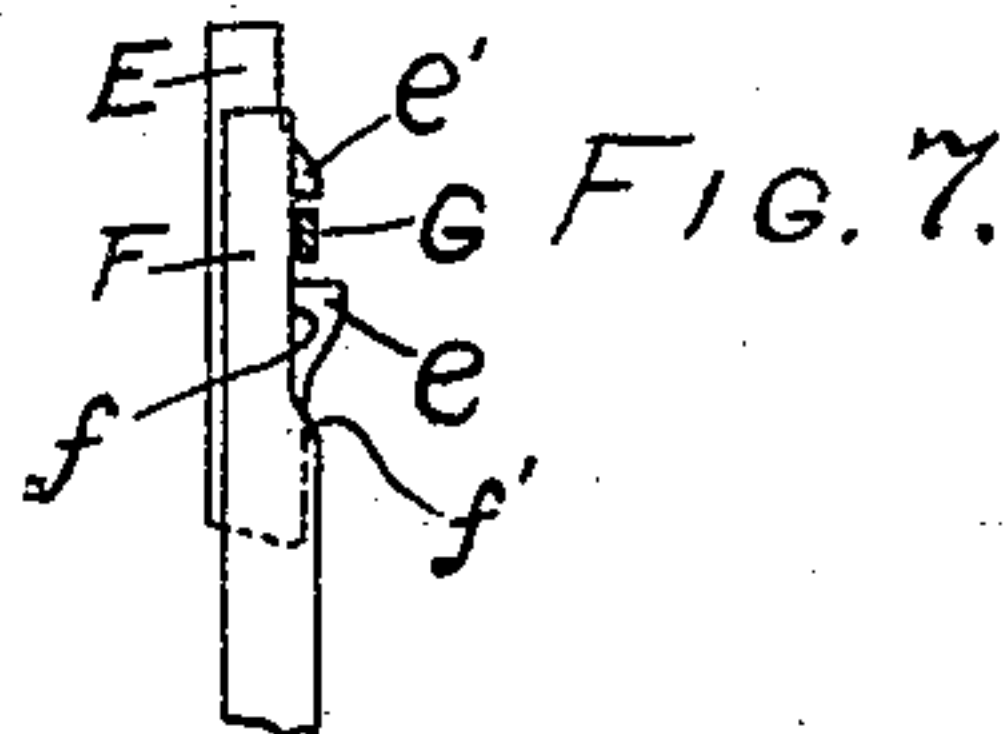
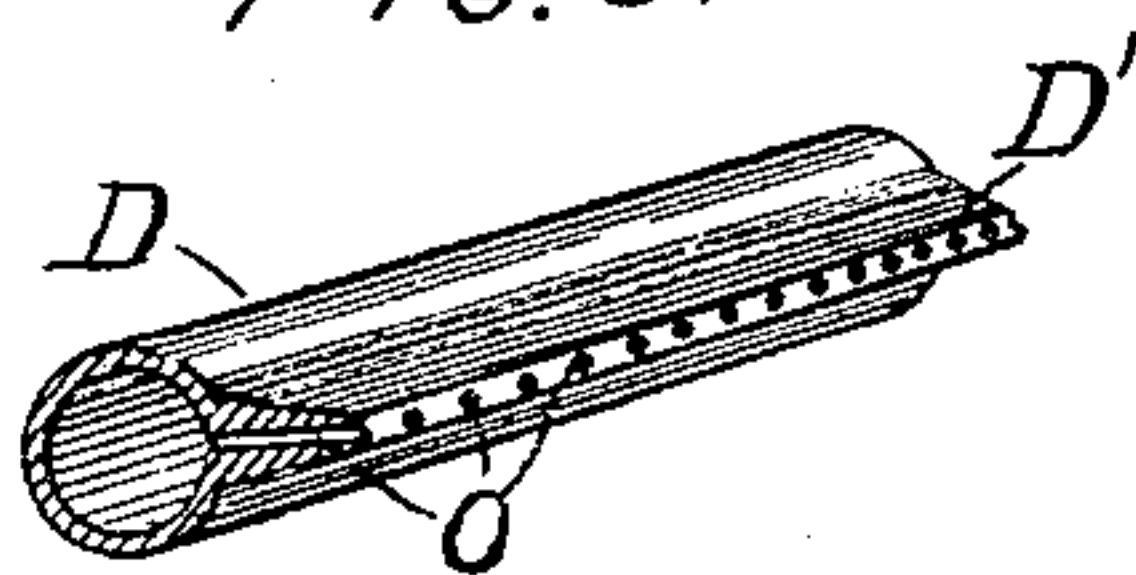
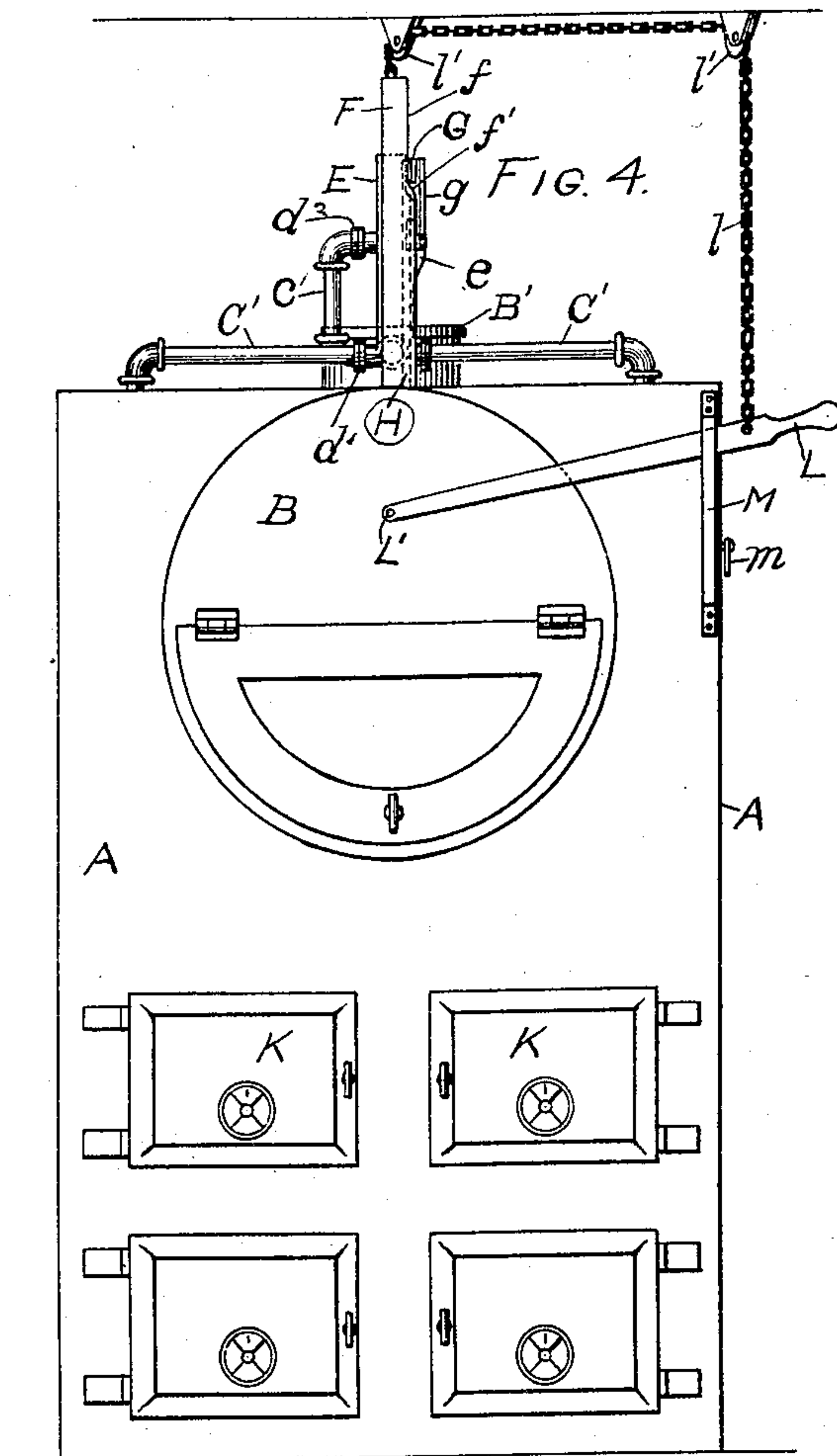


FIG. 7.



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# UNITED STATES PATENT OFFICE.

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## STEAM-JET FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 627,724, dated June 27, 1899.

Application filed October 28, 1898. Serial No. 694,836. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD FALES, a citizen of the United States, residing at Winthrop, in the county of Suffolk, State of Massachusetts, have invented a new and useful Improvement in Steam-Jets, of which the following is a specification.

My invention is related to all kinds of steam-generating furnaces; and it consists in providing a system of steam-supply pipes so arranged that the steam-jets may be raised or lowered to suit the kind or quality of coal used and to project the steam horizontally over the fire; and the objects of my improvement are, first, to produce a more perfect combustion, and thereby prevent the formation of black smoke, and, second, to enable the stoker to set the steam-jets at the exact point where the best results may be obtained. I attain these objects by a mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a vertical front view of a steam-boiler and furnace with the boiler-front removed and with a portion of the side walls cut away to show the pipe connections with the steam-jets. Fig. 2 is a vertical side view of a boiler B and furnace-wall A, with a part of the side wall cut away to show the position of the steam-jet bar and the connections on top of the boiler. Fig. 3 is a perpendicular back view of the frame carrying the jet-bar. Fig. 4 is a front view of the furnace, showing the stanchions on top of the boilers and the operating-lever L. Fig. 5 is a perspective view of the steam-jet bar. Fig. 6 is a perspective view of the device used to connect the movable joints. Fig. 7 is a detailed view showing the stanchions *f* on hook-rod E.

Similar letters refer to similar parts throughout the several views.

The letter A indicates the furnace, and B the boiler, of an ordinary steam-generator.

The letter N indicates a vertically-movable tubular frame which is composed of two vertical side tubes C C, a horizontal injector-tube D, connected with the lower ends of the vertical tubes by means of T-shaped couplings *d* and two upper horizontal tubes C' C', connected with the upper ends of the vertical tubes by means of suitable elbow-couplings. The inner ends of the tubes C' C' are

loosely secured in the arms of a central T-coupling *d'* for the purpose to be hereinafter explained. In the side walls of the furnace are cut vertical channels *a' a'* for the reception of the vertical tubes C C, so that the frame may have a free vertical movement therein, and a portion of each channel is somewhat enlarged, as shown at A', to provide for the unobstructed movement of the T-couplings *d*. In the lower arm of each T-coupling *d* is secured a rod C<sup>2</sup>, which serves to guide the lower end of the frame in its vertical movement.

Secured in the rear arm of the central T-coupling *d'* is a horizontal tube *c*, which, extending rearwardly, has its rear or inner end connected with the lower end of a short vertical tube *c'* by means of a union-joint *d'*<sup>2</sup>, Fig. 2. The upper end of the vertical tube *c'* is connected, by means of another union-joint *d'*<sup>3</sup>, with one end of a horizontal tube *h*, which is provided with a valve *b'*, and the other end of said tube *h* is connected with the steam-dome by means of an elbow and nipple *b* in the usual manner. Attached to the T-coupling *d* is one end of a chain or cord *l*, the other end of which passes over pulleys *l' l'*, secured to the ceiling or other suitable place, and is attached to a lever L, pivoted to the boiler-front L'. The lever moves vertically in a guide M, to one side of which is pivoted a triangular swinging catch *m*, which is adapted to hold the lever when it is pulled down to raise the tubular frame N. Secured to the top of the boiler forward of the dome is a standard H, to the upper end of which at G' is fulcrumed a lever G. The outer or rear end *g'* of this lever is connected to the handle of the valve *b'* by means of a connecting rod or link *g*, and secured to the tube *c* is a hook-bar E, which is provided with a hook *e'*, adapted to engage the front end of the lever G to hold it in normal position. A short distance below the hook *e'* on the bar E is formed a bracket *e*, which projects outwardly a slight distance beyond said hook and serves to engage the lever as it moves upward. A standard F is attached to the top of the boiler at F' just in front of the frame N and serves as a guide for the front end of the lever G. The standard F a suitable distance below its upper



end is provided with a cam  $f'$ , which tends to throw the lever G out of its engagement with the hook  $e'$  in the bar E on the downward movement of the frame.

5 Secured to each inner side wall of the fire-box K are two sets of studs or pins  $i$   $i'$ , the lower set of which,  $i$ , are arranged to limit the downward movement of the tubular frame and the upper ones,  $i'$ , to contact with the  
10 tongue portion of the injector-tube on its upward movement and cause said tube to turn in the arms of the T-coupling  $d$ , thereby deflecting said tongue portion.

The operation of the device is as follows:  
15 The tubular frame rests normally on the studs or pins  $i$ , as shown in Figs. 1 and 2, and these studs or pins are so arranged that the injector-tube will be immediately in the rear of the feed-doors  $k$  and will inject the steam along  
20 and over the fuel-bed as near the point of combustion as may be required. In charging the furnace with coal the frame is raised out of the way by pulling down the lever L until it passes the swinging catch  $m$ . After the lever has  
25 passed the catch said catch swings across the top of the lever and holds it in place. The loose connections between the inner ends of the tubes  $C'$   $C'$  and the T-coupling  $d'$  and the union-joint  $d^3$  permit of the free vertical move-  
30 ment of the frame. After the furnace has been charged the frame is lowered to normal position and the steam turned on at the desired moment. When it is necessary to supply coal, the lever L is pulled down to again  
35 raise the frame. As it moves upward the tongue  $D'$  of the injector-tube comes in contact with the studs  $i'$   $i'$ , which will cause it to tip downward, as shown by dotted lines in Fig. 2. Just before the furnace reaches its  
40 limit of movement the bracket  $e$  in the hook-bar E engages the lever G, moving its front end upward and its rear end downward. This movement of the lever actuates the valve  $b'$  to automatically cut off the supply of steam.  
45 When the coal has been supplied, the lever L is released from its engagement with the swinging catch and the frame is permitted to descend to normal position. As the slightly-deflected tongue  $D'$  comes in contact with the  
50 lower studs  $i$  it will be returned to normal position. At the same time the hook  $e'$  will engage the lever G, pulling it down until it is released by engaging with the cam  $f'$  on the standard F. As the lever G is forced down-  
55 ward the valve is automatically operated to turn on the steam.

In using different kinds of coal it is found necessary to set the injector-tube at different points. This may be accomplished whenever  
60 required by adjusting the frame until the proper joint necessary for the best combustion has been ascertained, it being understood that such adjustment will be limited between the normal position of the injector-

tube and a point just below the extreme limit 65 of movement of the frame.

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

1. In a smoke-consuming device, the combi- 70 nation with a vertically-movable injector-tube frame, and a union-jointed supply connection between said frame and the boiler, of means for automatically turning on and cutting off the steam and means for raising and 75 lowering the frame to automatically cut off and turn on the steam-supply.

2. In a smoke-consuming device, the combination with a vertically-movable frame, composed of an injector-tube, vertical side tubes, 80 and two horizontal tubes centrally connected by a loose T-coupling, of means connecting said frame with a source of steam-supply, automatic means for turning on and cutting off the steam-supply, and means for raising and 85 lowering the frame to operate the automatic means.

3. The combination with the injector-tube and side tubes, the upper horizontal tubes loosely connected together by a T-coupling, 90 a union-jointed connection between the injector-tube and a source of steam-supply, a valve or cock located in the steam-supply, of a fulcrumed lever, connected with said valve, and means for raising and lowering said in- 95 jector-tube, whereby said lever may be operated to automatically open and close the valve.

4. The combination, with the vertically-movable injector-frame having the inner ends of its upper tubes loosely connected by a T- 100 coupling, and union-jointed connection between said frame and the source of steam-supply, of channels cut in the side walls of the furnace for the reception of the vertical frame, and means for raising and lowering 105 said frame.

5. The combination, with the vertically-movable injector-frame, operating in channels formed in the side walls of the furnace, of means for raising and lowering the injector- 110 frame, and means secured to said side walls for limiting the vertical movement of said injector-frame and operating the injector-tube.

6. The combination, with the vertically-movable injector-frame, means for raising 115 and lowering said injector-frame, and a union-jointed supply connection, of a fulcrumed lever having one end connected with the supply valve or cock, and the other end movably engaged with a hook, secured to the union- 120 jointed connection, and means for raising the outer end of the lever, when the frame is raised and for depressing it when said frame is lowered.

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Witnesses:

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