

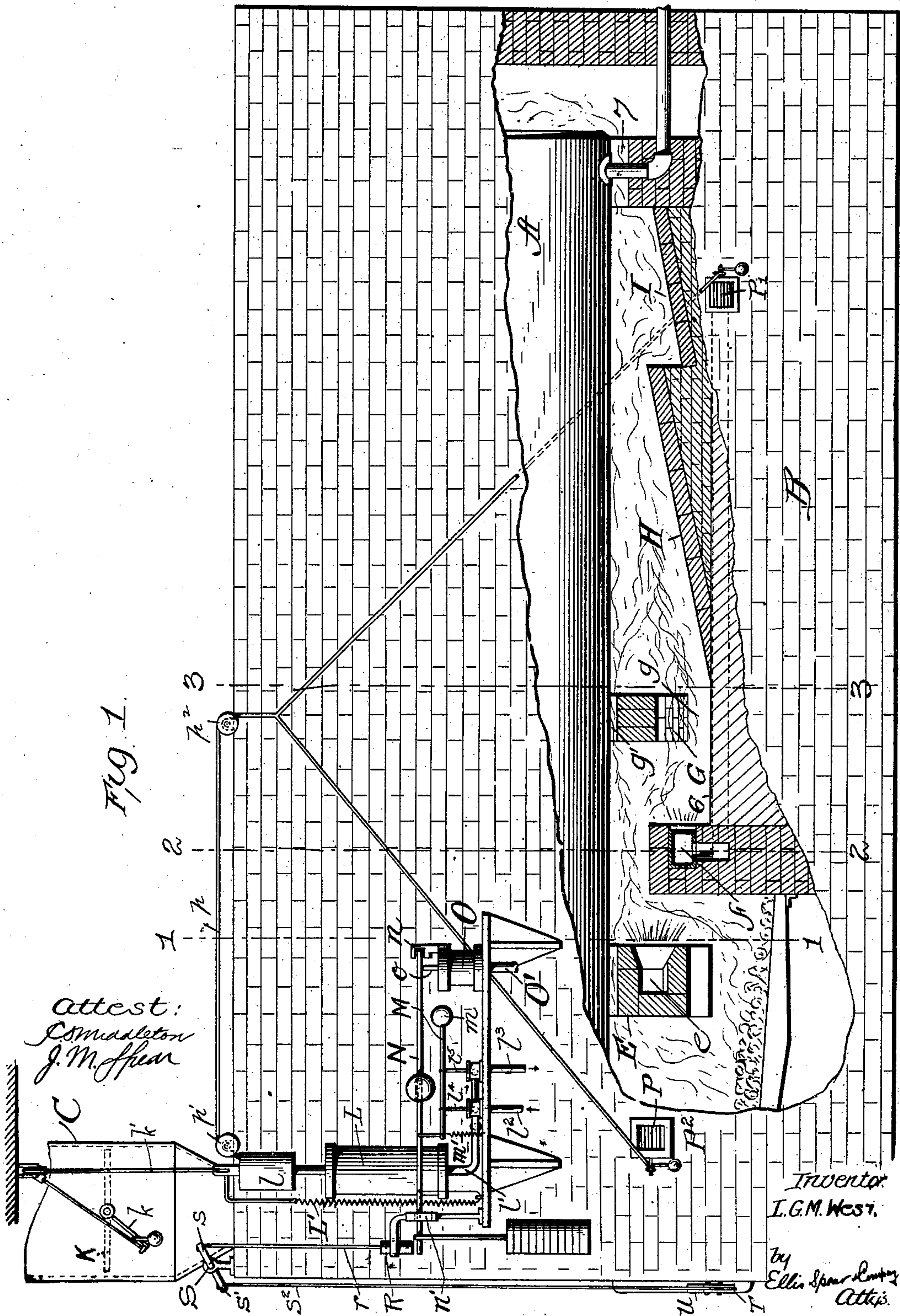
No. 755,972.

PATENTED MAR. 29, 1904.

L. G. M. WEST.
STEAM BOILER FURNACE.
APPLICATION FILED JULY 9, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

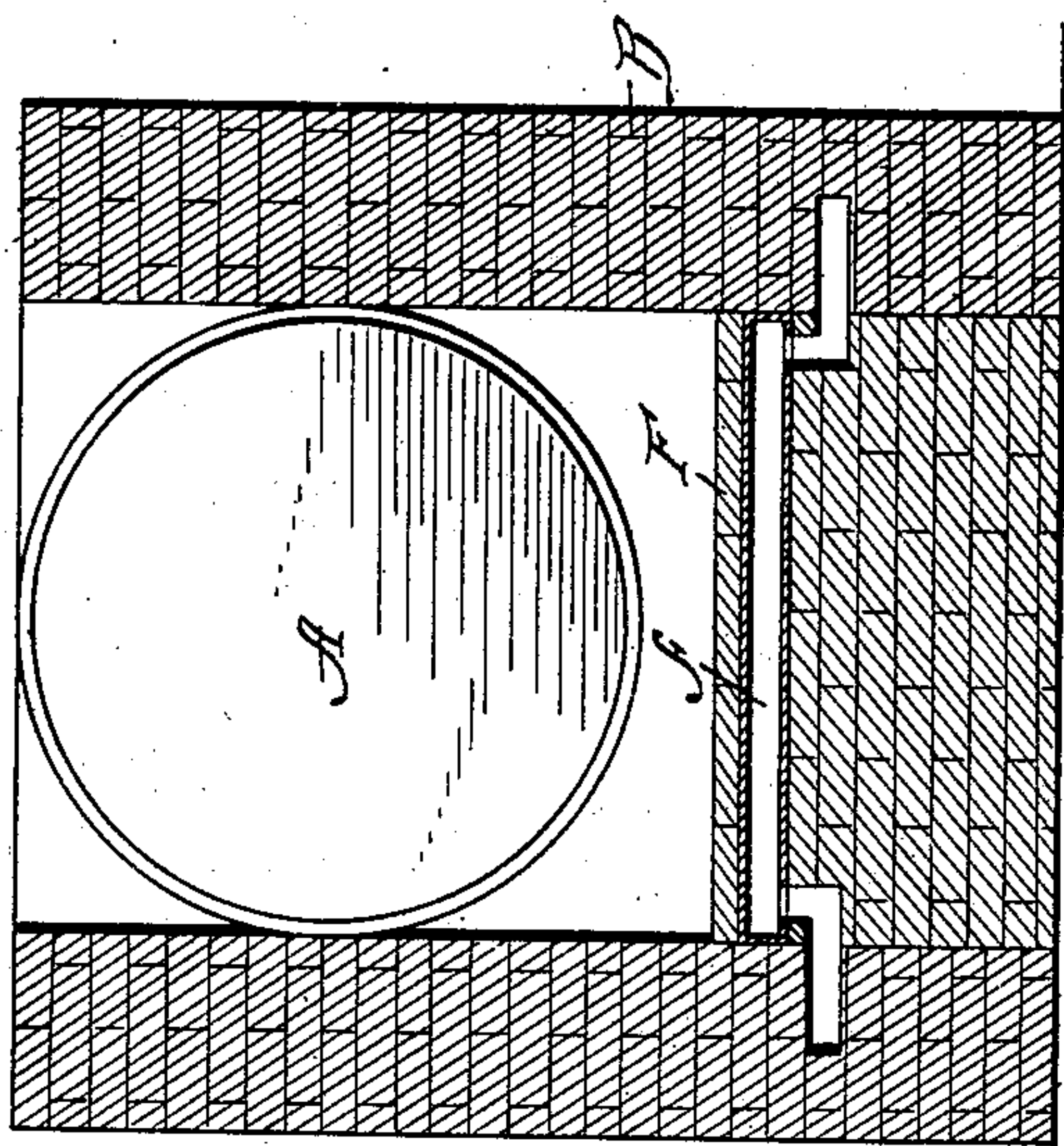


Fig. 1.

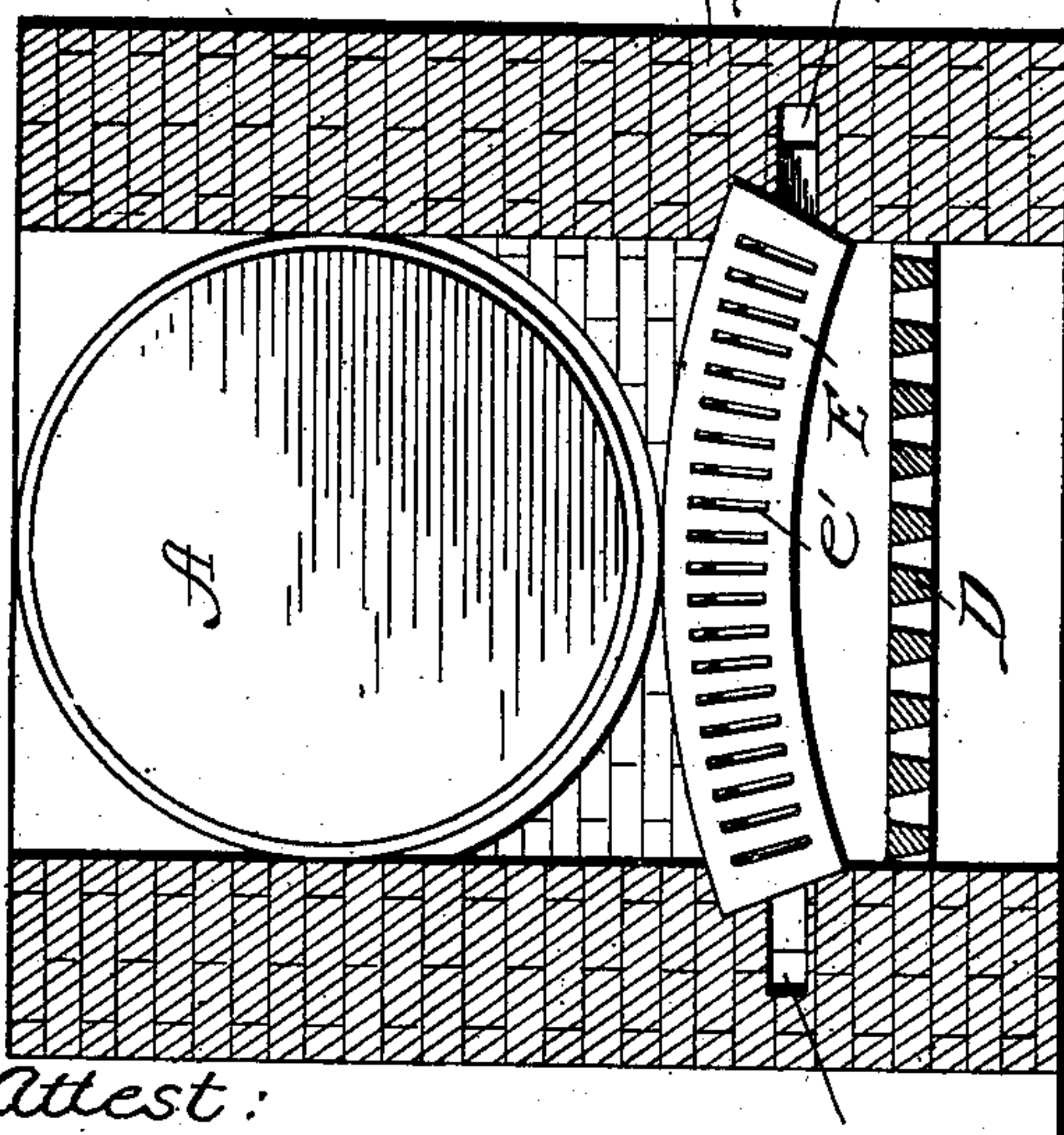


Fig. 2.

Attest:

J. Middleton

J. M. Spear

Fig. 3.

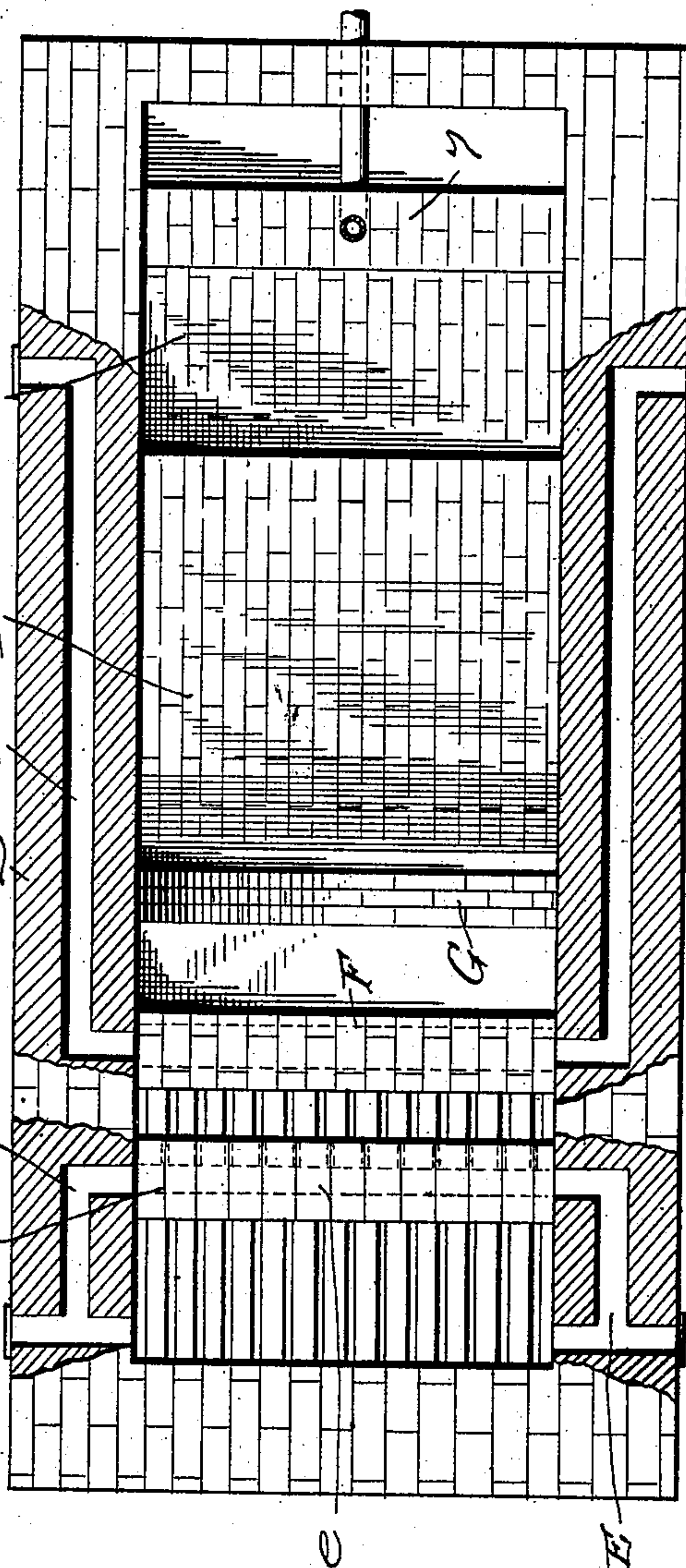


Fig. 4.

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3 SHEETS—SHEET 3.

Fig. 6.

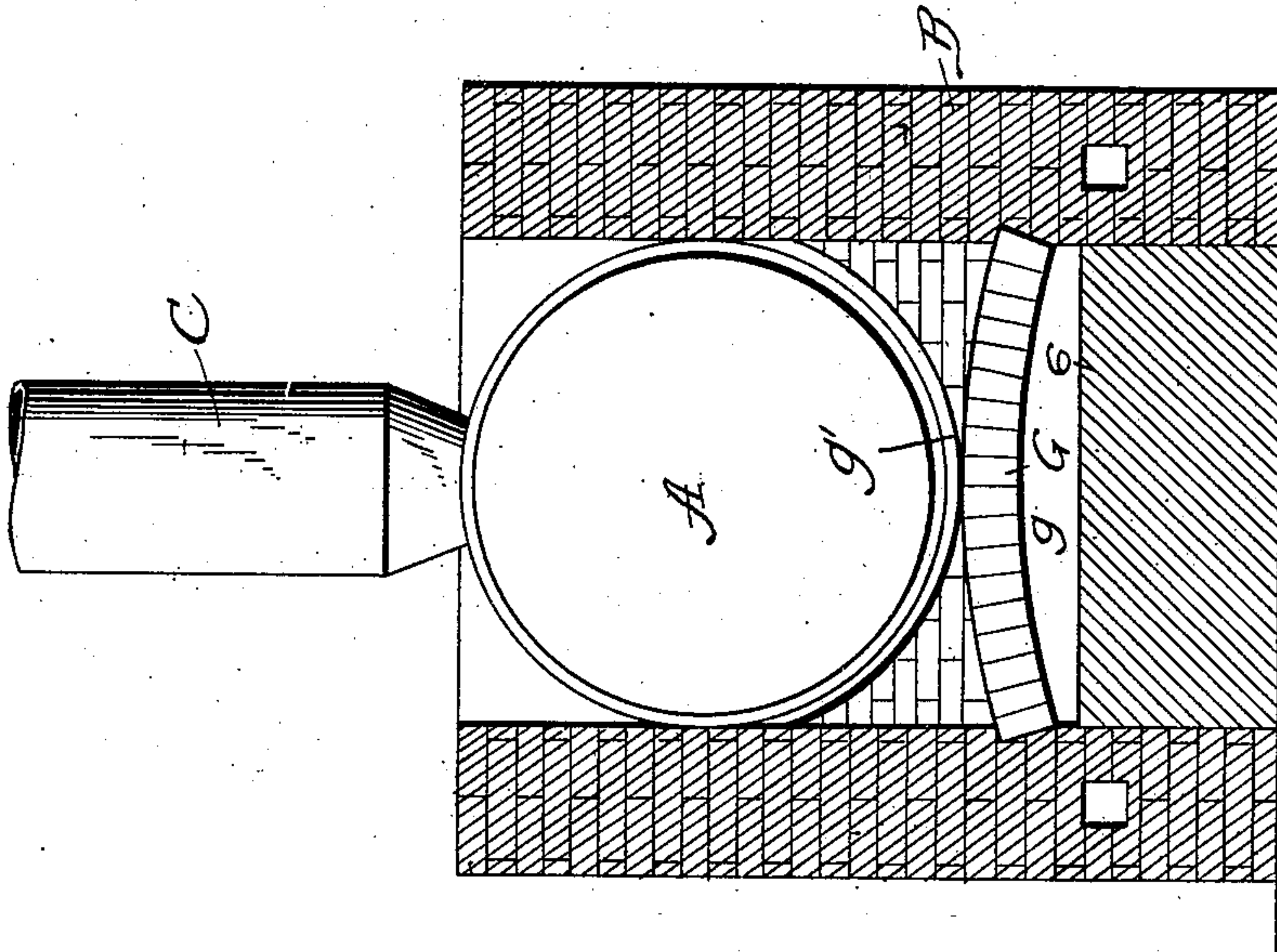
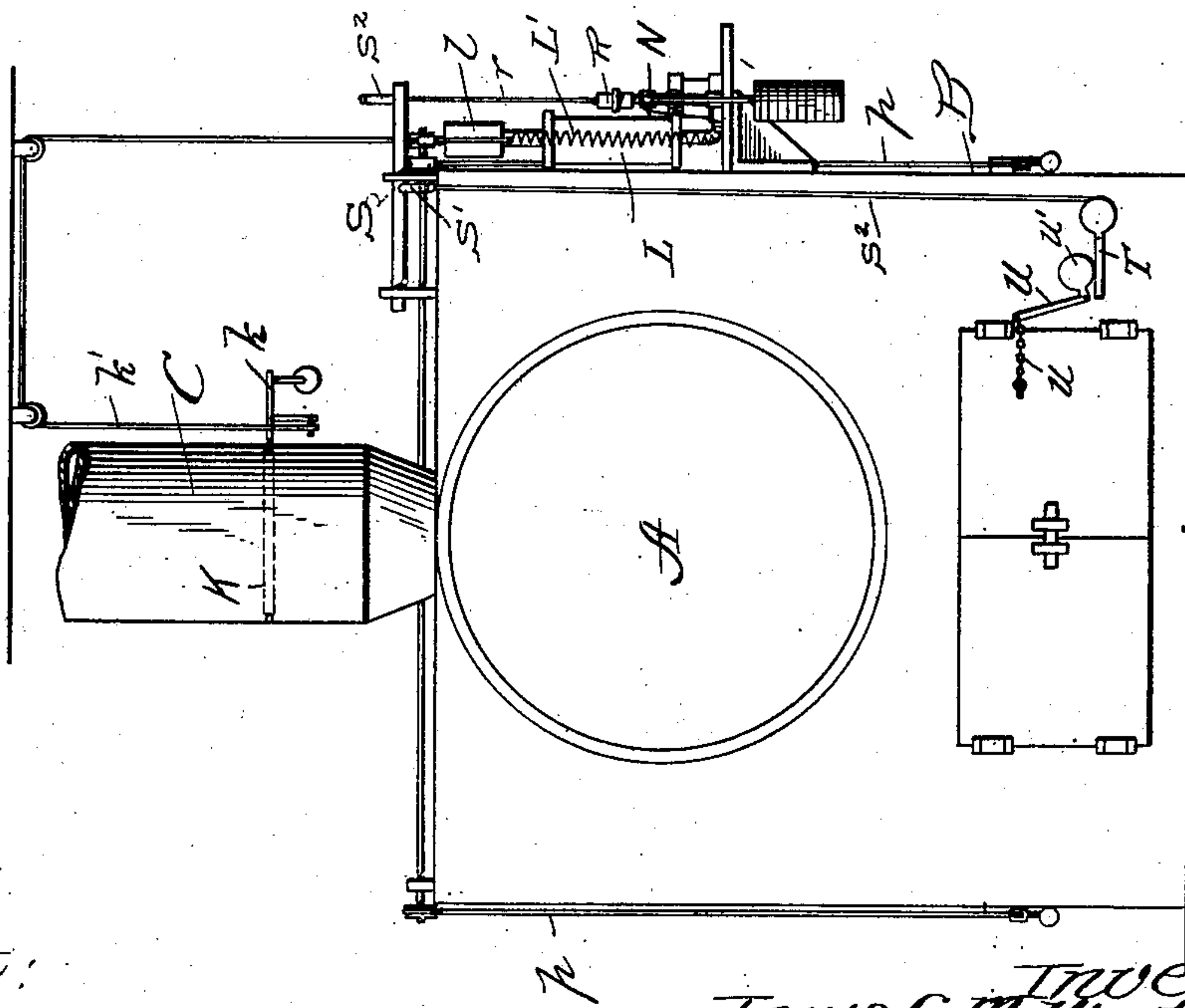


Fig. 5.



attest:
Comptroller
J. M. Spear

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UNITED STATES PATENT OFFICE.

LOUIS G. M. WEST, OF BALTIMORE, MARYLAND.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 755,972, dated March 29, 1904.

Application filed July 9, 1903. Serial No. 164,872. (No model.)

To all whom it may concern:

Be it known that I, LOUIS G. M. WEST, a citizen of the United States, residing at Baltimore, Maryland, have invented certain new and useful Improvements in Steam-Boiler Furnaces, of which the following is a specification.

My invention relates to improvements in boiler-furnaces, and more particularly to the manner of feeding and controlling the flow of air to the furnace and to controlling of the flow of the gases or products of combustion within the furnace-chamber.

The objects of the invention are to insure complete combustion, thereby preventing the formation of smoke, and to provide means for forcing in the air at certain periods during the operation of the furnace.

With these ends in view the invention comprises the construction and arrangement of parts hereinafter described, and particularly pointed out in the claims.

I have illustrated the invention in the accompanying drawings, in which—

Figure 1 is a side elevation of the furnace with parts broken away. Fig. 2 is a plan view of the furnace with the boiler removed. Fig. 3 is a section on line 1 1 of Fig. 1. Fig. 4 is a section on line 2 2 of Fig. 1. Fig. 5 is a front view. Fig. 6 is a sectional view on line 3 3 of Fig. 1.

It will be understood that the boiler is of the ordinary horizontal fire-tube type, and I have deemed it unnecessary to show the tubes herein and have also omitted various ordinary details, such forming no part of the present invention. The brickwork settings may also be of the ordinary construction, except as hereinafter specified.

Referring by reference letters and figures to the drawings, A indicates the boiler; B, the brickwork walls; C, the stack, and D the grate. These are of ordinary construction and operation.

My special construction and arrangement of the baffles and passages in relation to the bridge-wall for the purpose of securing a complete mixture of the air and products of combustion I now describe.

Above the grate I provide a baffle wall or arch E, which, it will be observed, is a plain

arch passing high enough above the grate to be clear of the bed of fuel and spaced also from the boiler to provide space between it and the boiler to permit passage of the products of combustion. This arch is in front of the bridge at a distance therefrom and is hollow to provide an air-passage *e*, the air being supplied by passages or flues *E'* and passing to the combustion-chamber through a plurality of evenly-distributed air-openings *e'*, preferably narrow and having vertically-flaring mouths opening to the rear and partly over the range of the bridge, as clearly indicated in Fig. 1.

The products of combustion coming from the front portion of the bed of fuel pass part over and part under the arch and meet each other in the rear thereof, causing an eddy in rear of the baffle-wall at the point where the air which has been heated passing through the flues *E'* issues through passages *e* between the divided current and mingles intimately with the products of combustion before and during the passage of the whole over the bridge. This insures a complete commingling of the air and products of combustion arising from the major portion of the bed of fuel.

The bridge-wall is indicated at F. It is provided with an air chamber and passage *f* and with discharge-openings to the rear of the bridge-wall, as indicated in Fig. 2. Air is supplied to the hollow bridge-wall by the flues *f'* in the side walls of the furnace, and by reason of the extent of these it will be seen that the air is thoroughly heated in its passage and is in condition to insure complete combustion.

In rear of the bridge-wall and at a distance therefrom I provide a second baffle wall or arch, (indicated at G in Fig. 1,) and this I make in the shape shown, providing a space *g* for the passage of a part of the products of combustion beneath this arch and over the raised floor 6 and another space *g'* above the arch for the passage of the remaining portion above the arch and between it and the boiler. The products of combustion and admixture of air passing over the bridge strike the second arch. The smaller portion is deflected over this second arch and against the boiler and emerges in rear of the arch and downward.

The major part of the products and air are deflected downward and pass beneath the arch. This second baffle wall or arch thus deflects and divides the products of combustion and causes an eddy in the space in rear thereof, completing the commingling of the gases with the air which has entered through the bridge-wall F. In addition to this function of causing eddies and a consequent thorough commingling of products of combustion and air the additional effect is secured of forcing a portion of the heated gases into more direct contact with the under surface of the boiler.

In rear of the baffle wall or arch is a fire-space, in which the air and gases are thoroughly mixed and consumed, and the more effectually to perform this an inclined floor H is provided, which rises gradually toward the rear, where it joins a pocket I. A contracted flue 7 from the pocket I leads into the space and passage in rear of the boiler. The pocket I gives space for another eddy before the gases escape toward the boiler-flues.

By this construction, as above described, I succeeded in distributing and continuing the commingling of the air and products of combustion from the grate, so that the combustion is complete and the effect remarkable both in point of combustion and application of heat to the bottom of the boiler. This also exercises a lifting effect upon the heated gases, aiding in forming the eddy and deflecting them upwardly against the bottom of the boiler. Thence the gases pass through the tubes of the boiler (not shown) and into the stack in the ordinary manner.

The time when a boiler-furnace generates most smoke is when fresh fuel is applied thereto.

I have provided in connection with my improved furnace an improved form of air-supplying and draft-controlling mechanism, which will now be described.

In the stack C is located a damper K, having a weighted arm k , tending normally to hold it in nearly horizontal or partly-closed position, as shown in Fig. 1. This arm k is connected by a cord or chain k' with the weighted piston-rod l , the piston of which is located in the cylinder, which is preferably a hydraulic cylinder. A pipe l' leads into the bottom of the cylinder, which communicates by pipe l'' with a suitable source of supply of pressure or motive fluid. A pipe l''' connects the said pipe l' with a waste-pipe or the like, and the communication between the cylinder and the supply and waste pipes is controlled by valves having upwardly-extending stems l^4 l^5 . The upper end of each of these is pivotally connected to a horizontally-disposed rod or bar M, having a weight m at one end and having its other end linked to a pivoted bar or lever N. This bar is pivoted at n and is engaged by the end of the rod o of the pressure-diaphragm or piston-chamber O, which chamber is connected

by pipe O' with the steam-space of the boiler. It will thus be seen that any rise in steam-pressure in the boiler will cause the bar or lever N to swing upwardly, thus pulling up the left-hand end of rod M, which will pivot upon the rod l^5 . This will cause the inlet-valve for the hydraulic supply to be opened, admitting water to the cylinder L and forcing the piston thereof upwardly, allowing the weighted arm to swing the damper into the position shown in Fig. 1. At the same time cord or chain p will be loosened and through branch pulleys p' p'' operate to allow the dampers P and P' to be opened by the weights P², admitting a normal amount of air through the passages e and f .

The free end of the lever N is guided in a bracket n' , and weights Q and Q' may be provided, as necessary, to correspond to the steam-pressure desired.

When the door is opened to supply fresh fuel, it is desirable that the lever N should be shifted to operate the damper mechanism, and to this end I provide a weight R, guided in an extension of the bracket and adapted to be lowered upon the free end of lever N by the opening of the furnace-door, so as to overcome the pressure of steam in pressure-cylinder O. This causes the bar M to be rocked, the left-hand end lowering to close the water-inlet and the right-hand or weighted end rising to open the water-outlet, so that the water in cylinder L is withdrawn and the piston allowed to settle down, opening the damper K and partly closing dampers P and P', so that part of the air-supply will be drawn in through the open door. The weight R is connected by a cord r to an arm s on a rock-shaft S. A second arm s' on this shaft is connected by a cord s^2 with the weighted end of a lever T, the weight of which is sufficient to normally hold the weight out of contact with the lever N. A second pivoted weighted lever U has one arm connected to the furnace-door by a chain u , so that when the door is closed the weight u' is elevated; but when the door is opened weight u' is lowered upon the forearm of lever T, raising the weight thereof and allowing bar or lever N to be operated, as above described.

The weighted piston l is made to rise gradually in closing the damper K by means of the spring L' , as shown. A gradual movement of lever M is also obtained by means of the spring m' .

Having thus described my invention, what I claim is—

1. In a boiler-furnace, and in combination, a grate, a bridge-wall in rear of the grate having air-flues discharging rearward, a baffle-arch located above the grate in front of said wall, with a passage-way for the products of combustion above and below said arch, and also with a passage-way for said products between it and the bridge-wall, also with air-flues discharging rearward, a second baffle-

arch in rear of the bridge-wall and separated therefrom, said second arch having passage-ways for the products of combustion above and below, whereby the products of combustion, after passing over the bridge-wall are divided, receive a supply of air and pass partly over and partly under the second arch and form eddies in its rear, substantially as described.

2. In a boiler-furnace, the combination with the grate, bridge-wall and boiler, of a single baffle-arch located above the grate and spaced from the boiler to provide a flame and gas space above and below the same, said arch having an air-flue and rearwardly-discharging exit-passages, a second arch in rear of the bridge-wall and also spaced from said boiler, and an inclined floor sloping upwardly from said rear arch toward the rear of the boiler, substantially as described.

3. In a boiler-furnace, the combination with the grate, bridge-wall and boiler, of a single baffle-arch located above the grate and spaced from the boiler to provide a flame and gas space above and below the same, said arch having an air-flue and rearwardly-discharging exit-passages, a second arch in rear of the bridge-wall and also spaced from said boiler, and an inclined floor sloping upwardly from said rear arch toward the rear of the boiler and with a pocket in rear of said inclined floor, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS G. M. WEST.

Witnesses:

HARRY MARTIN,
JOHN S. ANDREWS.