

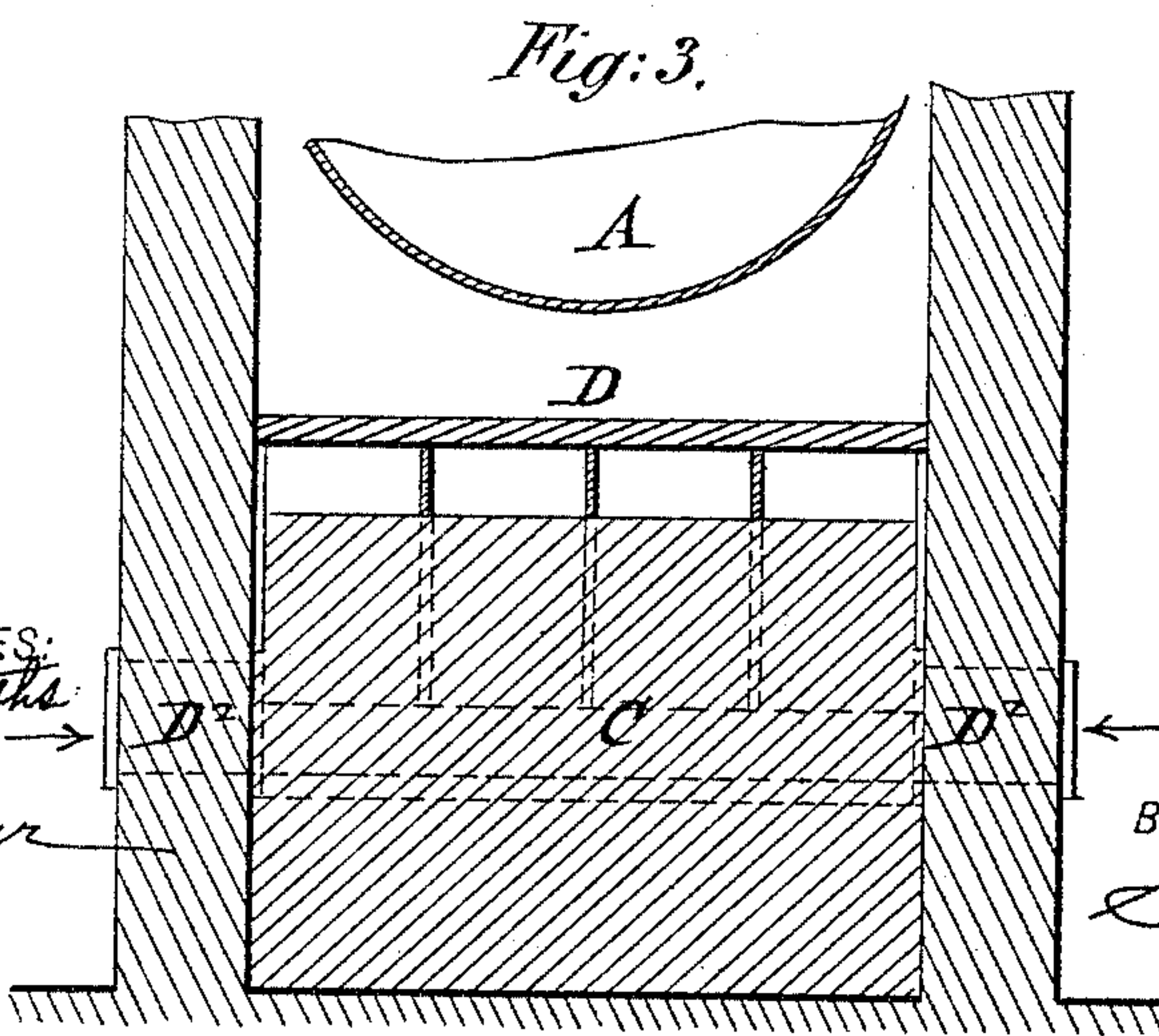
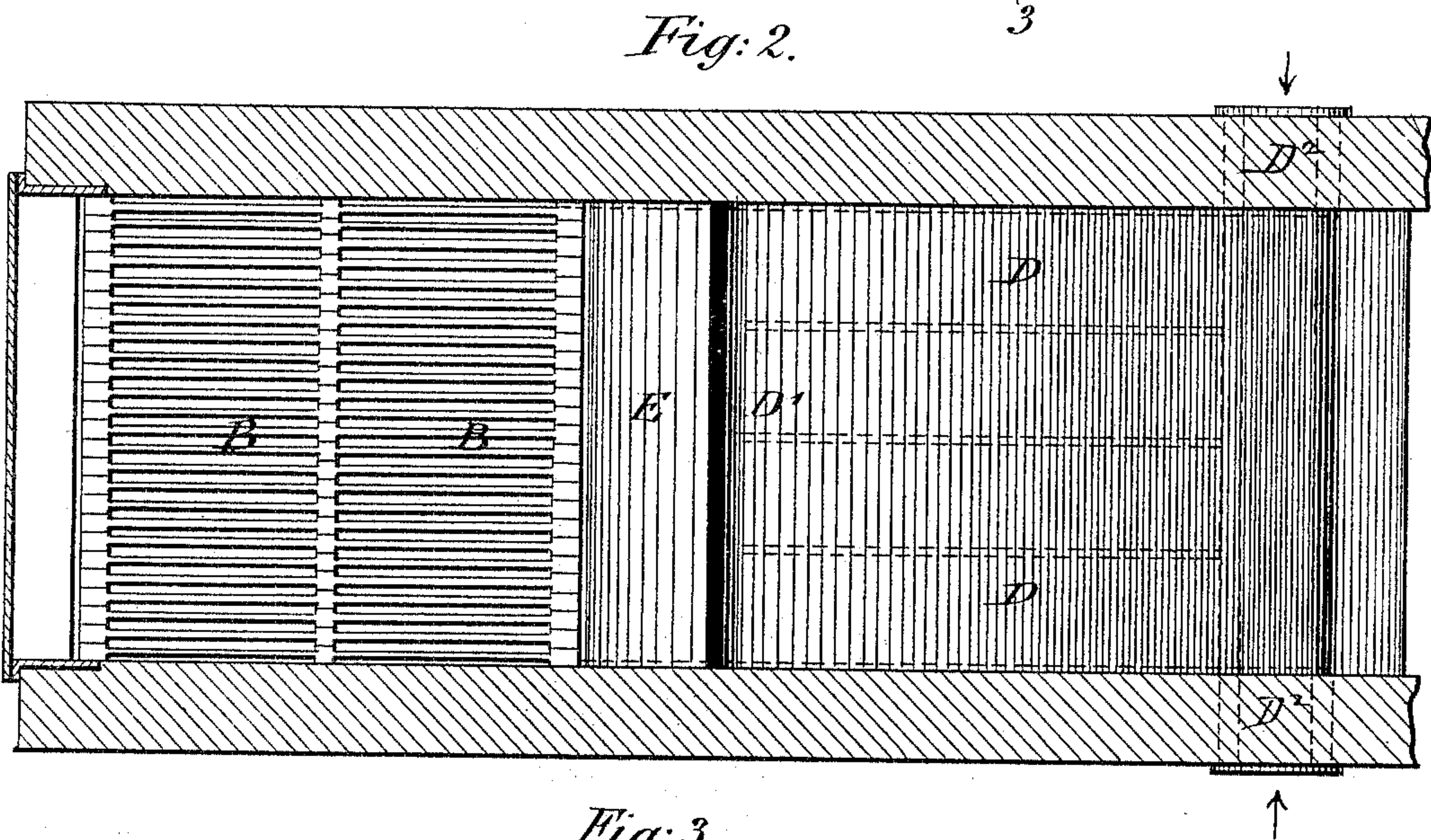
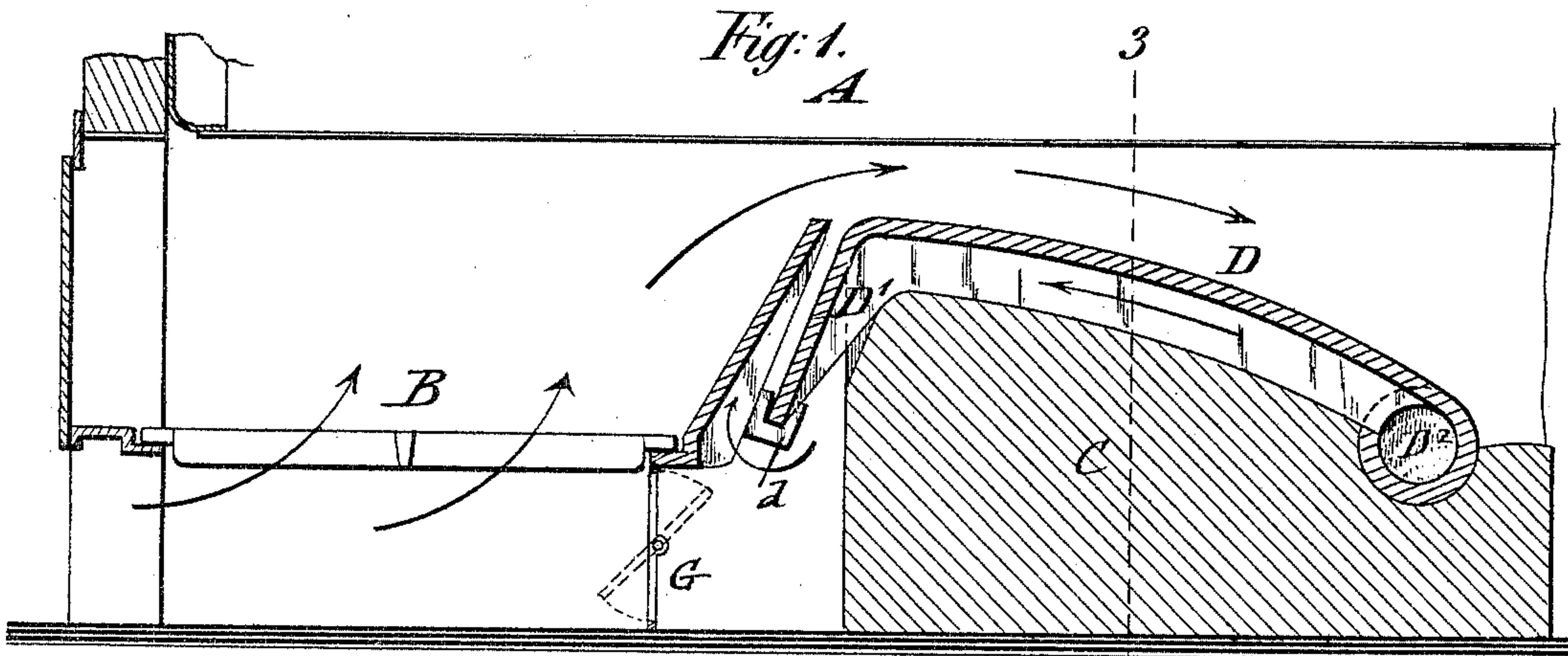
No Model.)

2 Sheets—Sheet 1.

W. ARNEMANN, Jr.  
SMOKE CONSUMING FURNACE.

No. 491,696.

Patented Feb. 14, 1893.



WITNESSES:  
Harry Ballard Griffiths  
H. Ohmayer

INVENTOR  
W. Arnemann Jr.  
BY  
George H. Reger  
ATTORNEYS



(No Model.)

2 Sheets—Sheet 2.

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Fig:4. A

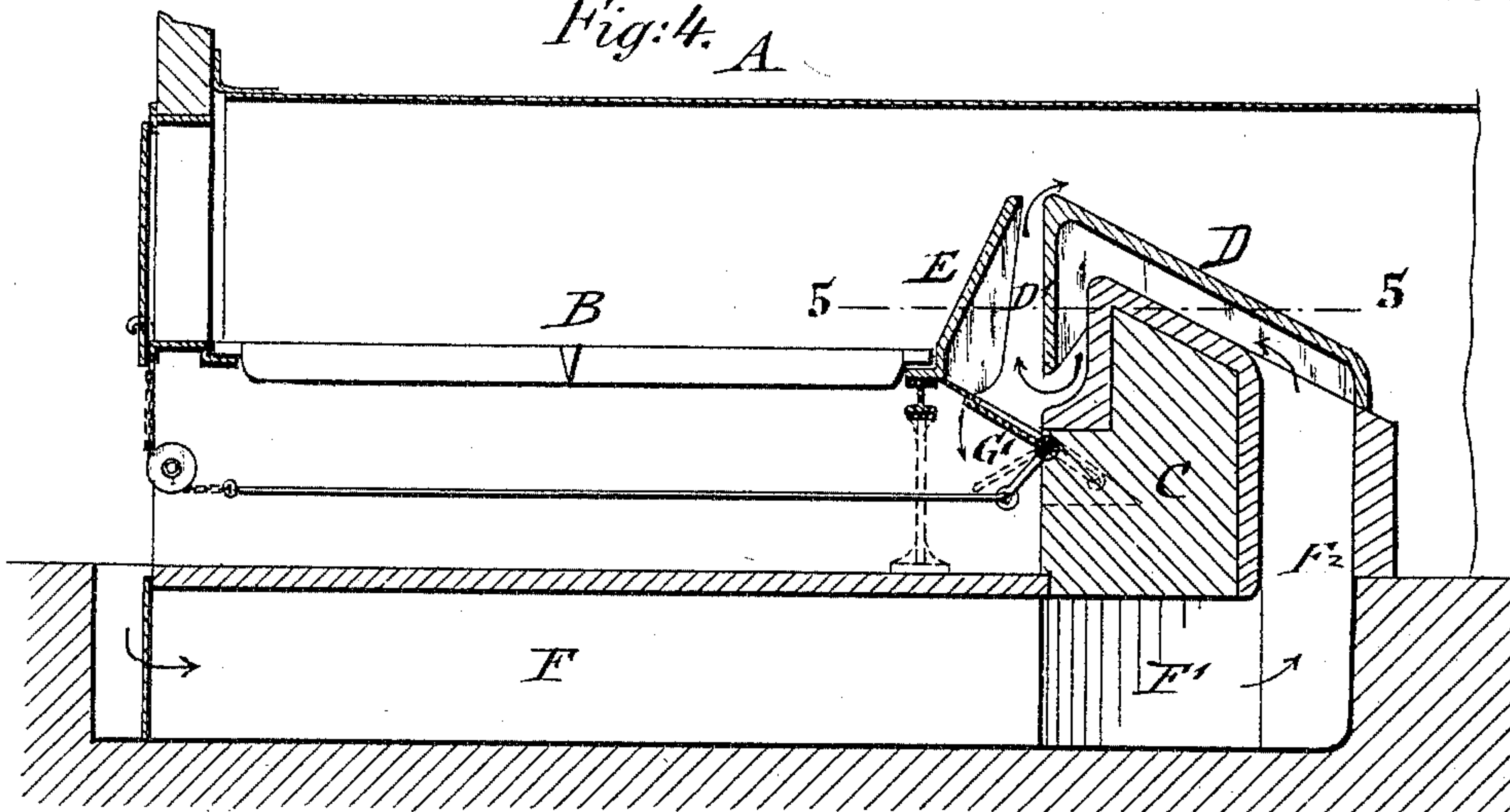
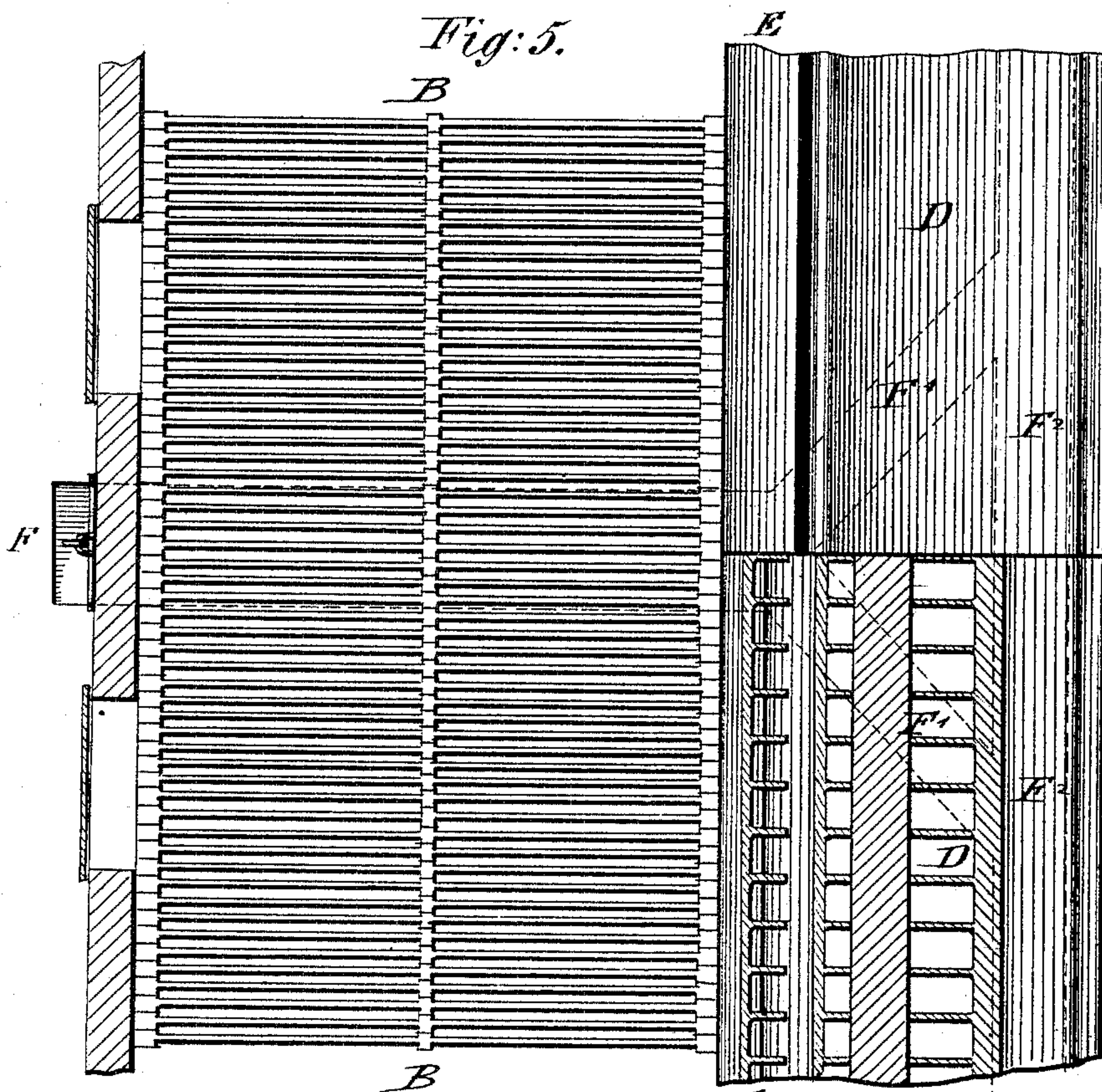


Fig:5.



WITNESSES:  
*Harry Willard Griffiths*  
*H. Obermayer*

INVENTOR  
*William Arnemann Jr.*  
BY  
*Joseph Paegener*  
ATTORNEYS.



# UNITED STATES PATENT OFFICE.

WILLIAM ARNEMANN, JR., OF NEW YORK, N. Y.

## SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 491,696, dated February 14, 1893.

Application filed December 7, 1892. Serial No. 454,325. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM ARNEMANN, Jr., a subject of the Emperor of Germany, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a specification.

This invention has reference to certain improvements in smoke-consuming furnaces of that class in which the air is drawn in and heated in its passage over the fire-bridge, so that a more perfect combustion of the carbon particles carried along by the fire-gases is obtained, whereby the formation of smoke is almost entirely prevented and more perfect combustion of the fuel fed to the grate produced, and the invention consists of a smoke-consuming furnace in which the fire-bridge is constructed of an inclined front-plate and a main-plate extending over the fire-bridge and having a downwardly-extending front portion and a curved or inclined rear-portion, both front and main-plates being provided with interior strengthening ribs, said main-plate forming with the fire-bridge channels through which the air is conducted so as to be heated to a high temperature, it being then conducted through the space between the front-plate and the depending front-portion of the main-plate so as to pass in upward direction and mingle with the products of combustion above the fire-bridge.

In the accompanying drawings, Figure 1, represents a vertical longitudinal section of my improved smoke-consuming furnace. Fig. 2, is a plan of the same, Fig. 3, is a vertical transverse section, on line 3 3, Fig. 1. Fig. 4, is a vertical longitudinal section of a modified construction of my improved smoke-consuming furnace, and Fig. 5, a plan view, which is partly shown in a horizontal section on the line 5 5 Fig. 4.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents a boiler of any approved construction, B a grate below the same, C a fire-bridge which is made in the usual manner, of brick-work and a facing of fire-brick. Over the fire-bridge C extends a curved or inclined main-plate D, which is provided with strengthening ribs at

its underside, said main-plate being by preference made of cast iron and provided with a downwardly-extending portion D', that is supported in front of the fire-bridge C and on end-lugs *d*, as shown in Fig. 1. An inclined front-plate E, also of cast metal is located at the rear end of the grate B and provided with strengthening ribs and so arranged as to converge toward the upper end of the downwardly-extending front-portion D' of the main-plate D, as shown clearly in Figs. 1 and 4. The inclined front-plate E and the front-portion D' of the main-plate D form a channel of gradually-decreasing width, which is narrowest at its upper end, so as to form a discharge-opening for the highly-heated air which is drawn in either through openings in the side walls of the furnace into a transverse channel D<sup>2</sup>, at the rear end of the main-plate D, as shown in Fig. 2 or drawn in at the front part of the furnace and conducted through a main-channel F below the ash pit, branch-channels F' and vertical channels F<sup>2</sup> in the fire-bridge, into the channels formed by the ribbed main-plate and the fire-bridge, as shown in Figs. 4 and 5. If desired the air can also be drawn in from the rear or from any other part of the furnace as it is immaterial whence the air required for combustion is taken, the heat being imparted to the same during its passage through the channels formed between the ribbed main-plate and the main-portion of the fire-bridge, as indicated by the arrows in Figs. 1 and 4. The heated air is then conducted from the channels between the main-plate and the fire-bridge around the lower edge of the downwardly depending front-portion of the main-plate into the channel formed between said portion and the front-plate E and then emitted in a highly-heated condition through the opening between said plates, so as to mingle with the products of combustion and produce the complete combustion of the unburned particles of coal contained in the same. Any ashes, cinders, &c., carried along by the fire-gases over the fire-bridge are dropped through the opening into the space formed between the front-plate and the depending front-portion of the main-plate and either removed from time to time by opening a damper G in the ash-pit as shown in Fig. 1, or by opening a damper G'



that is arranged at the lower end of the channel space between the plates E and D' as shown in Fig. 4. In both cases, a suitable lever-mechanism is employed for operating the dampers. As the plates of the fire-bridge are made of strong cast-iron plates, the same can be replaced readily at a comparatively small expense when they are burned out or otherwise injured by the heat of the fire. During the inward passage of the air through the air-supply channels the same is heated to a high temperature, so that the complete combustion of the unburned coal-particles that are carried along by the fire-gases, is produced and thereby not only better combustion of the fuel and considerable economy in the same obtained, but also the formation and emission of smoke almost entirely prevented.

Having thus described my invention I claim as new and desire to secure by Letters Patent:

1. In a smoke-consuming furnace, a fire-bridge composed of a curved or inclined main-plate, arranged above the fire-bridge proper, an air-supply channel communicating with the rear-part of said main-plate, said main-plate

having a downwardly-extending front-portion, and an inclined front-plate located at the rear of the grate and converging toward the front-portion of the main-plate so as to form a channel of gradually decreasing width for heated air, substantially as set forth.

2. In a smoke-consuming furnace, a fire-bridge composed of a ribbed main-plate extending over said fire-bridge and provided with a downwardly-extending portion in front of the same, an air supply channel communicating with the rear-part of the main-plate, and an inclined front-plate located at the rear of the grate and converging toward the front-portion of the main-plate, and a damper adapted for opening or closing the channel formed between the front-plate and the front-portion of the main-plate, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

WM. ARNEMANN, JR.

Witnesses:

PAUL GOEPEL,

CHARLES SCHROEDER.