

(No Model.)

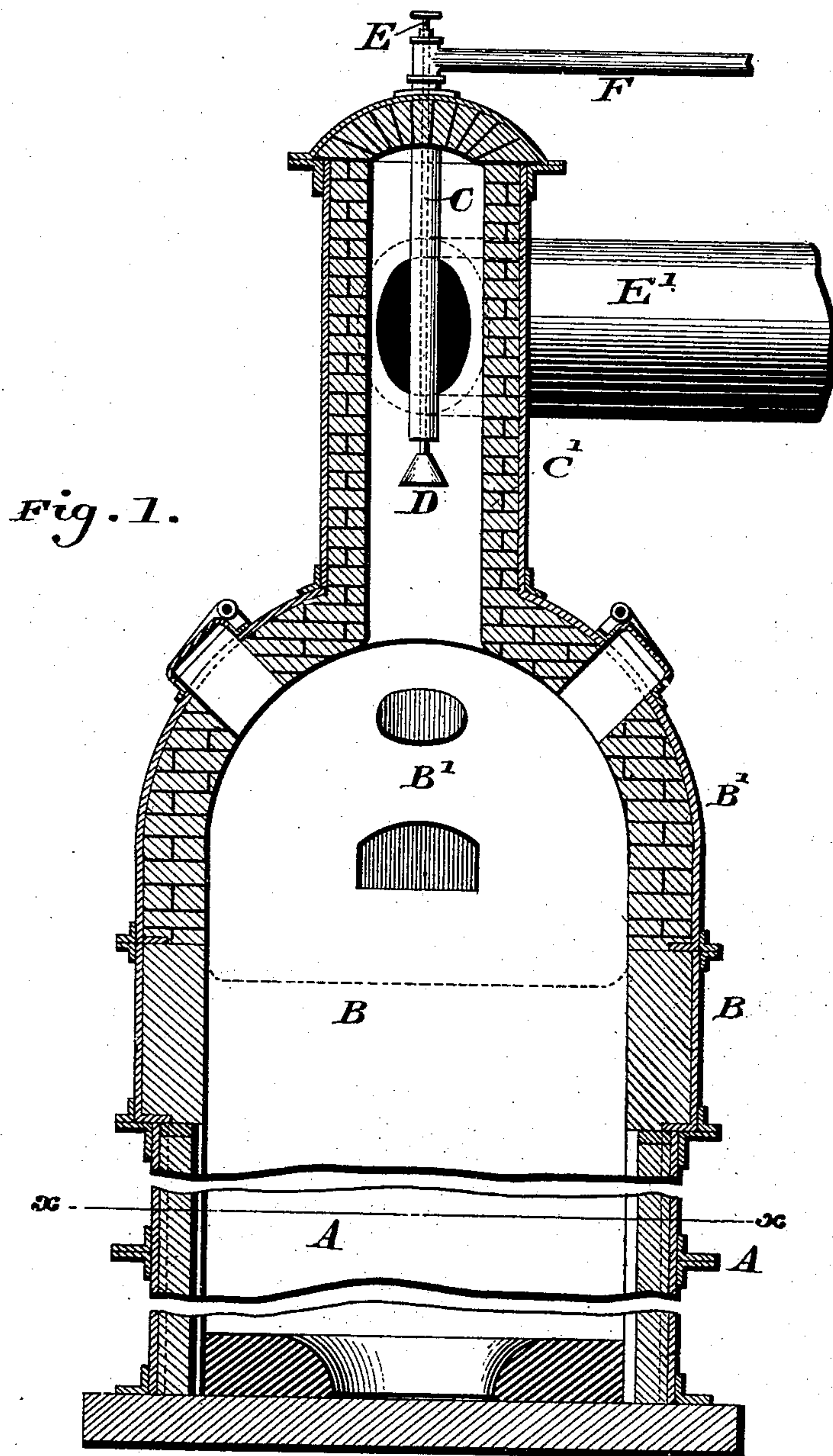
3 Sheets—Sheet 1.

O. F. LEIBERT.

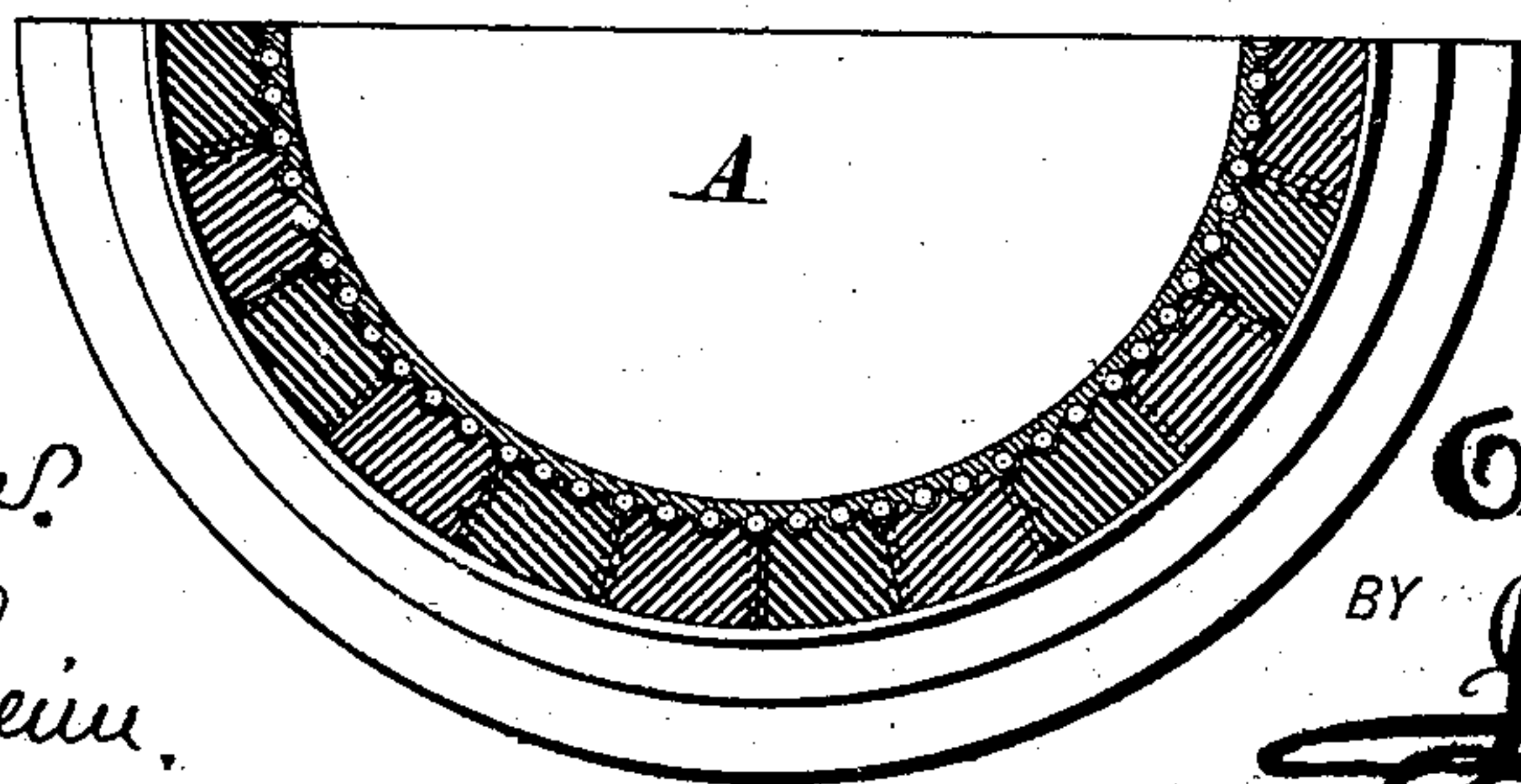
APPARATUS FOR CASTING STEEL OR OTHER INGOTS.

No. 506,518.

Patented Oct. 10, 1893.



*Fig. 2.*



WITNESSES:

*P. H. Hagler.*

*W. C. Wiedersheim.*

INVENTOR

*Owen F. Leibert,*

BY

*John A. Wiedersheim.*

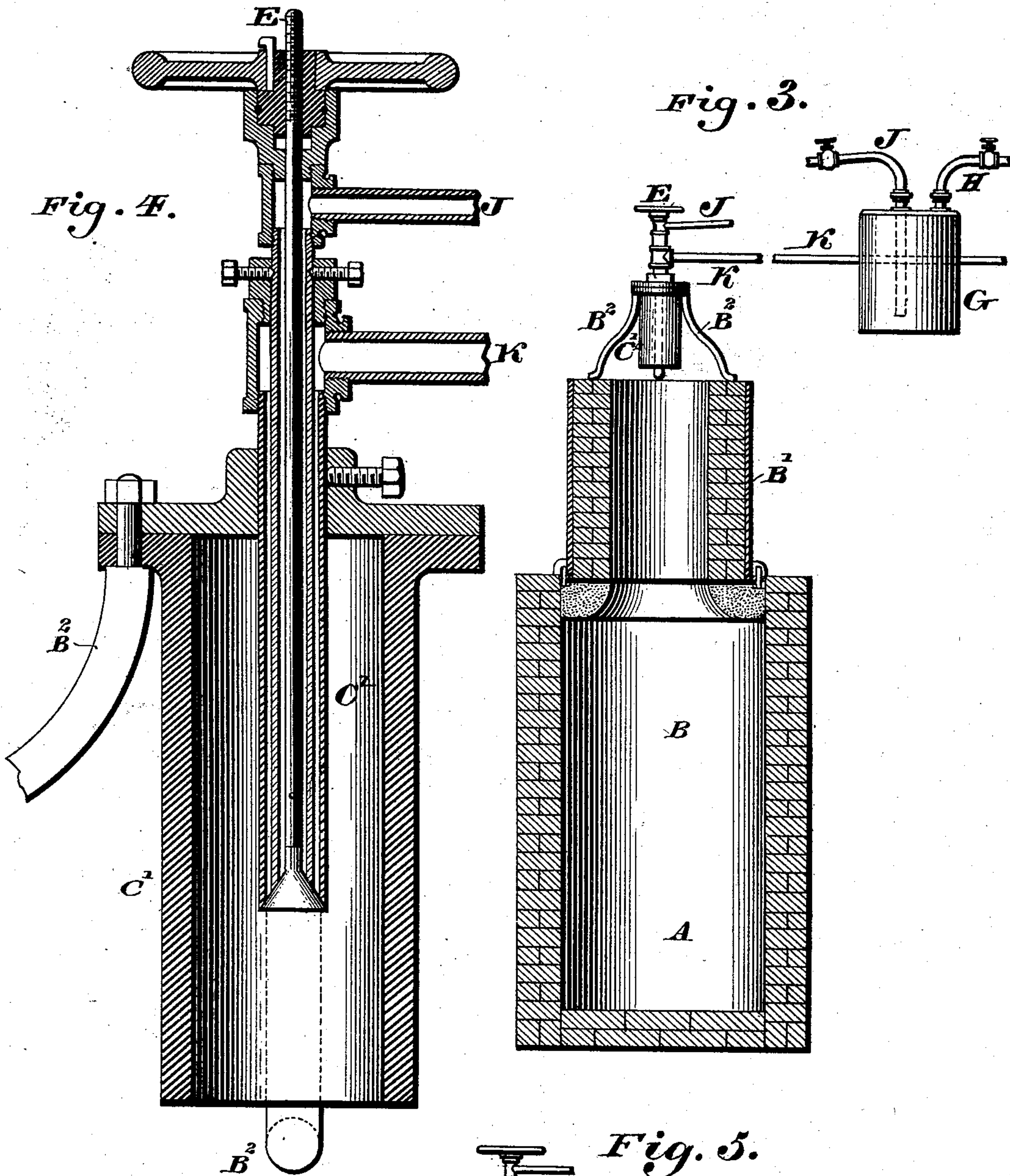
ATTORNEY.

O. F. LEIBERT.

APPARATUS FOR CASTING STEEL OR OTHER INGOTS.

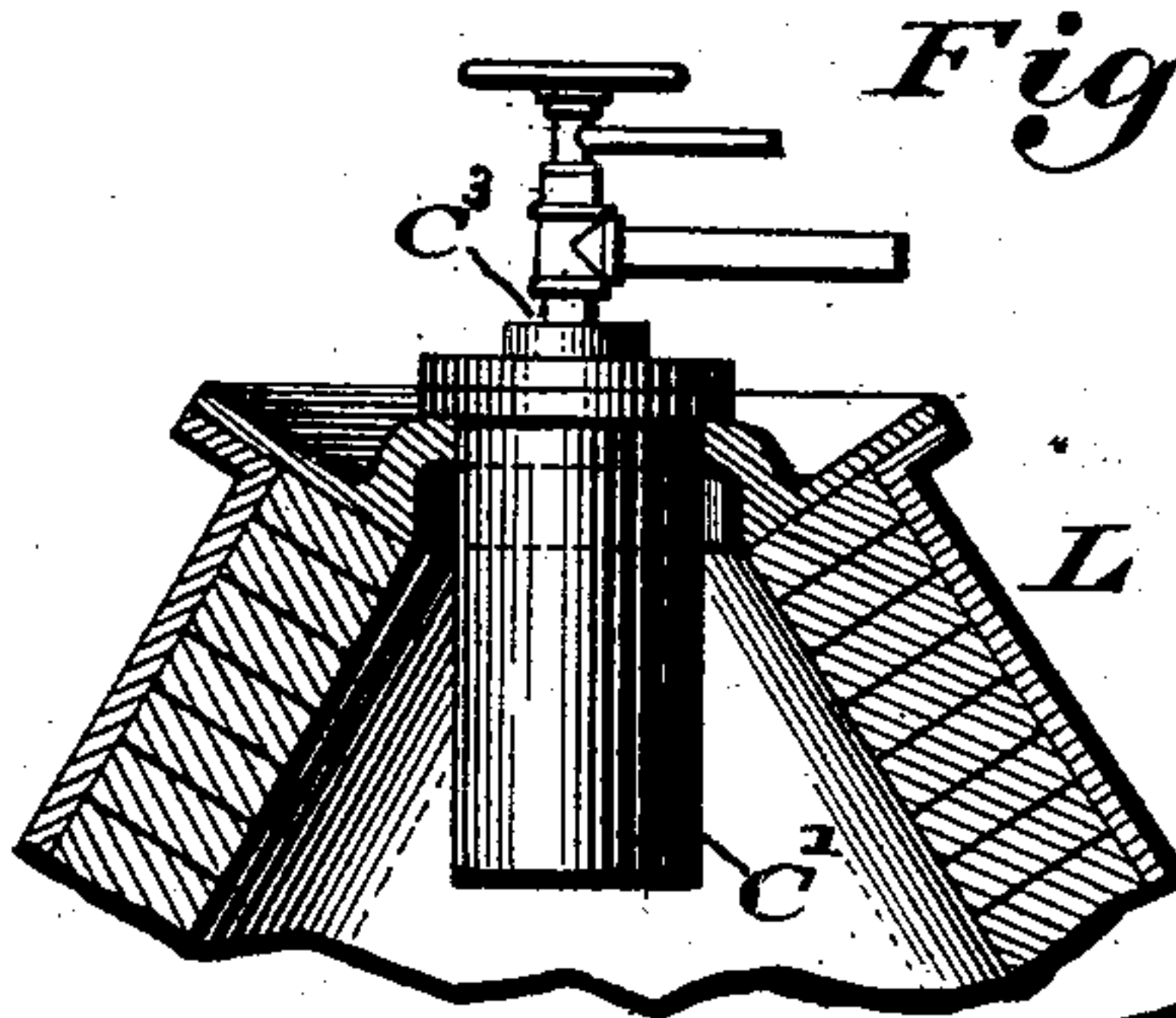
No. 506,518.

Patented Oct. 10, 1893.



WITNESSES:

P. H. Hagler.  
W. C. Wiedersheim.



INVENTOR

Owen F. Leibert.

BY

John A. Wiedersheim.

ATTORNEY.



(No Model.)

3 Sheets—Sheet 3.

O. F. LEIBERT.

APPARATUS FOR CASTING STEEL OR OTHER INGOTS.

No. 506,518.

Patented Oct. 10, 1893.

Fig. 6.

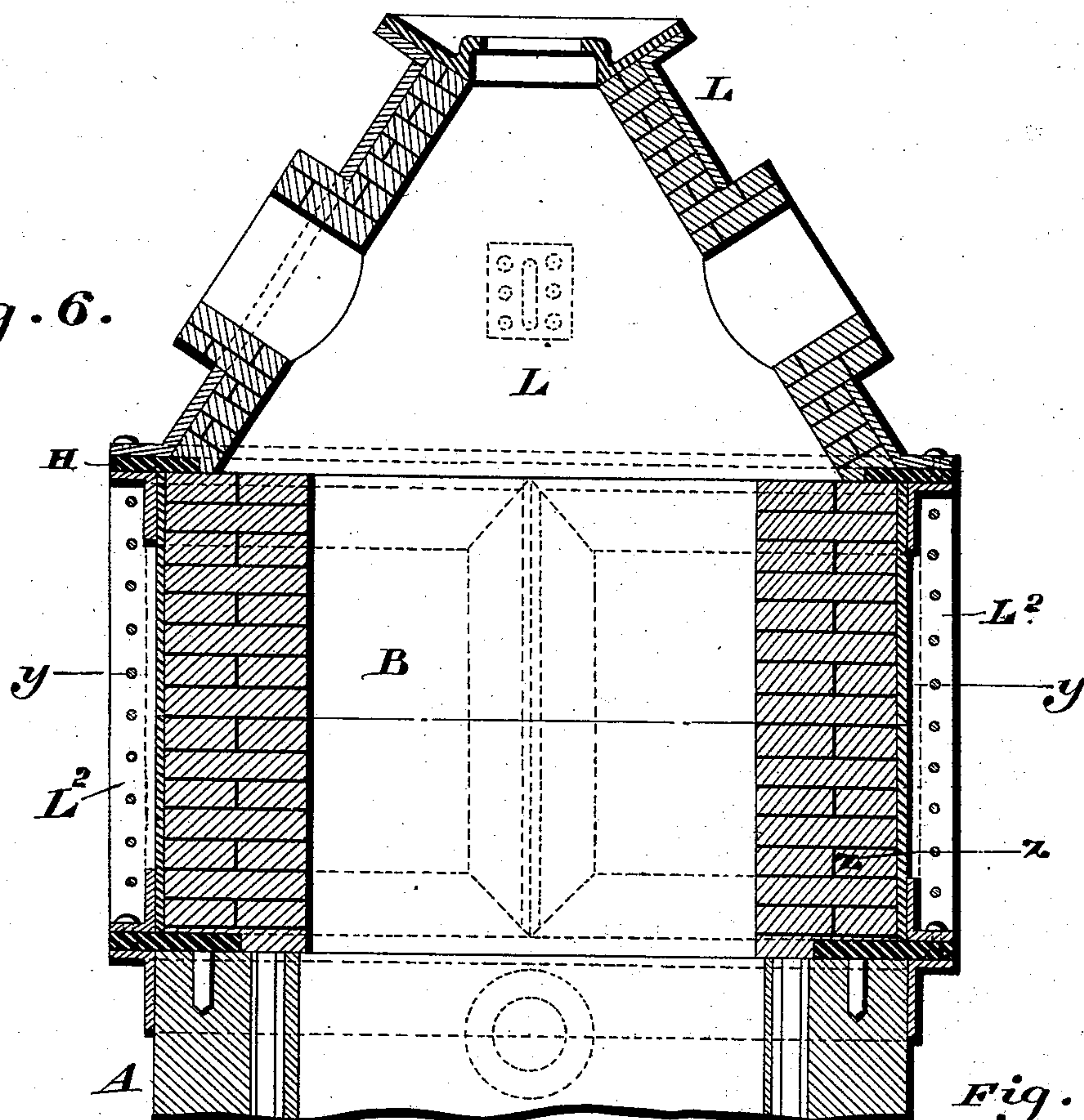


Fig. 8.

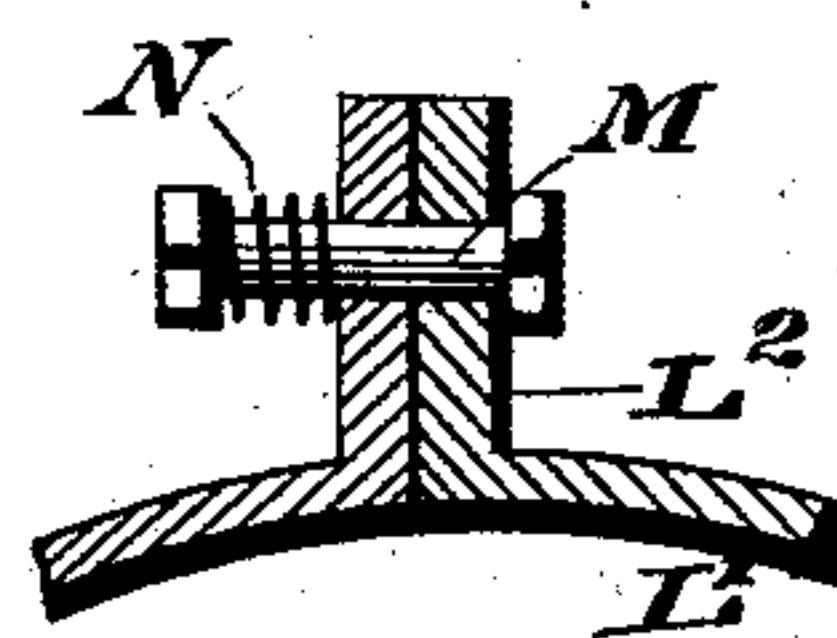
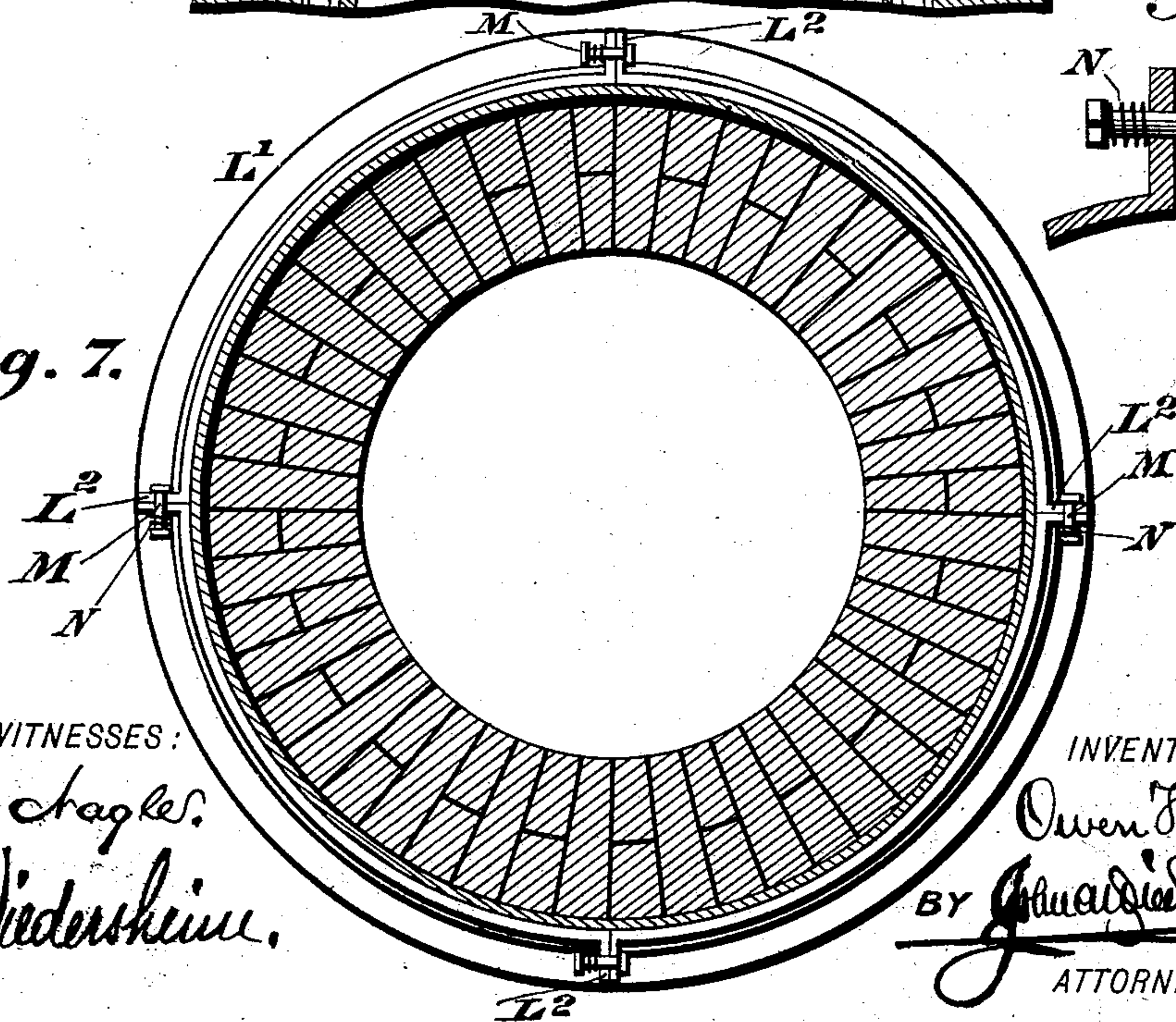


Fig. 7.



WITNESSES:

P. H. Hagler.  
W. L. Wiedersheim.

INVENTOR

Owen F. Leibert.

BY *John A. Wiedersheim*

ATTORNEY.



# UNITED STATES PATENT OFFICE.

OWEN F. LEIBERT, OF BETHLEHEM, PENNSYLVANIA.

## APPARATUS FOR CASTING STEEL OR OTHER INGOTS.

SPECIFICATION forming part of Letters Patent No. 506,518, dated October 10, 1893.

Application filed December 3, 1891. Serial No. 413,855. (No model.)

*To all whom it may concern:*

Be it known that I, OWEN F. LEIBERT, a citizen of the United States, residing at Bethlehem, county of Northampton, and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Casting Steel and other Ingots and other Shapes, which improvement is fully set forth in the following specification and accompanying drawings.

My invention consists of means hereinafter described for subjecting molten metal in the formation of ingots, &c., to the action of a heating medium injected or otherwise directed upon the top thereof, whereby segregation of the same and other objectionable features are prevented.

Figure 1 represents a vertical section of an ingot mold embodying my invention. Fig. 2 represents a horizontal section thereof on line  $x, x$ , Fig. 1. Fig. 3 represents a partial vertical section and partial side elevation of a modification thereof. Fig. 4 represents a vertical section of a portion of Fig. 3, on an enlarged scale. Fig. 5 represents a partial vertical section and partial side elevation of another modification. Fig. 6 represents a vertical section of another form of an ingot mold, the top of which is similar to that shown in Fig. 5. Fig. 7 represents a horizontal section on line  $y, y$ , Fig. 6. Fig. 8 represents a horizontal section on line  $z, z$ , Fig. 6, on an enlarged scale.

Similar letters of reference indicate corresponding parts in the several figures.

Referring to the drawings:—A designates an ingot mold, B designates a sink-head, and B' designates the furnace above said head.

C designates an injector which is located within the flue C', and adapted for directing air, steam, gas, &c., into said head, said injector being provided with a valve D at the lower end thereof, whereby by means of a screw-rod E, the volume and pressure of air, and other material or materials of combustion, admitted into the head, may be adjusted.

Connected with the flue is a flexible pipe E', the same being adapted to admit gas or other vapor into said flue, it being noticed that the supply pipe F of the injector is also flexible, owing to the necessity of raising and

laterally moving the mold and superimposed head, when the ingot is to be removed.

In Figs. 3 and 4, I show an injector C<sup>2</sup> for oil, air, &c., the same being supported on the furnace B, by means of legs B<sup>2</sup>. An oil receptacle G has an air pipe H leading thereinto, and an oil discharge pipe J leading therefrom; said pipe J being connected with the injector, with which is also connected an air pipe K. The oil escapes from the injector at the lower end, where the air is impacted thereagainst, thus atomizing the oil and directing it in the form of vapor into the sink-head.

In Fig. 5, I show an injector C<sup>3</sup> which depends within the top of a furnace L, the latter being shown more fully in Fig. 6, said furnace being supported upon the sink-head B, and the latter surrounded by segmental bands L', the ends of which are provided with flanges L<sup>2</sup> through which are passed the bolts M, between which and the heads or nuts thereof are springs N, whereby the bands are permitted to expand and afterward return to their normal positions.

It will be seen that natural or artificial gas, liquid fuel or combustible vapor under pressure or natural draft may be injected into the furnace and directed upon the top of the ingot, so that while the ingot is cooling from below, the cooling will be accomplished slowly, and gradually allow slag and other impurities to rise to the top. Now as the heat is directed upon the top of the ingot, the latter is kept in a molten condition at said top, whereby the carbon, silicon, manganese, &c., are oxidized, thus preventing the segregation of the metal of the ingot, the ingot being comparatively uniform or solid throughout, and divested of piping which is otherwise a serious detriment to heavy castings or ingots.

For long or wide plates or ingots, I may use numerous injectors. When desired, the molten steel or other metal in the mold may be covered with slag or other material, the same serving as a blanket.

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

1. An ingot mold having a removable sink head, a furnace on said head, a flue leading

into said furnace, a fuel injector in said flue having a valve at its lower end, a flexible supply pipe connected with said injector, and a flexible inlet pipe connected with said flue, 5 said parts being combined substantially as described.

2. An ingot mold having a sink head, a furnace on said head, a flue leading to said furnace, a fuel injector in said flue having a 10 valve, a flexible supply pipe connected with said injector, and a flexible supply pipe connected with said flue, said parts being combined substantially as described.

3. An ingot mold having a sink head, a furnace on said head having reinforce segmental 15 bands adjustable thereon, a flue on said fur-

nace, a flue injector with a valve in said flue, and flexible supply pipes connected respectively with said injector and flue, said parts being combined substantially as described. 20

4. An ingot mold having a sink head, a furnace on said head, a flue leading into said furnace, a fuel injector in said flue having a valve at the lower end thereof, and supply pipes connected with said flue and injector, 25 said parts being combined substantially as described.

OWEN F. LEIBERT.

Witnesses:

EDWARD WELDEN,  
A. C. PRINCE.