

(No Model.)

C. W. KENNEDY & J. W. GRANTLAND.  
MANUFACTURE OF STEEL INGOTS.

No. 478,936.

Patented July 12, 1892.

Fig. 1.

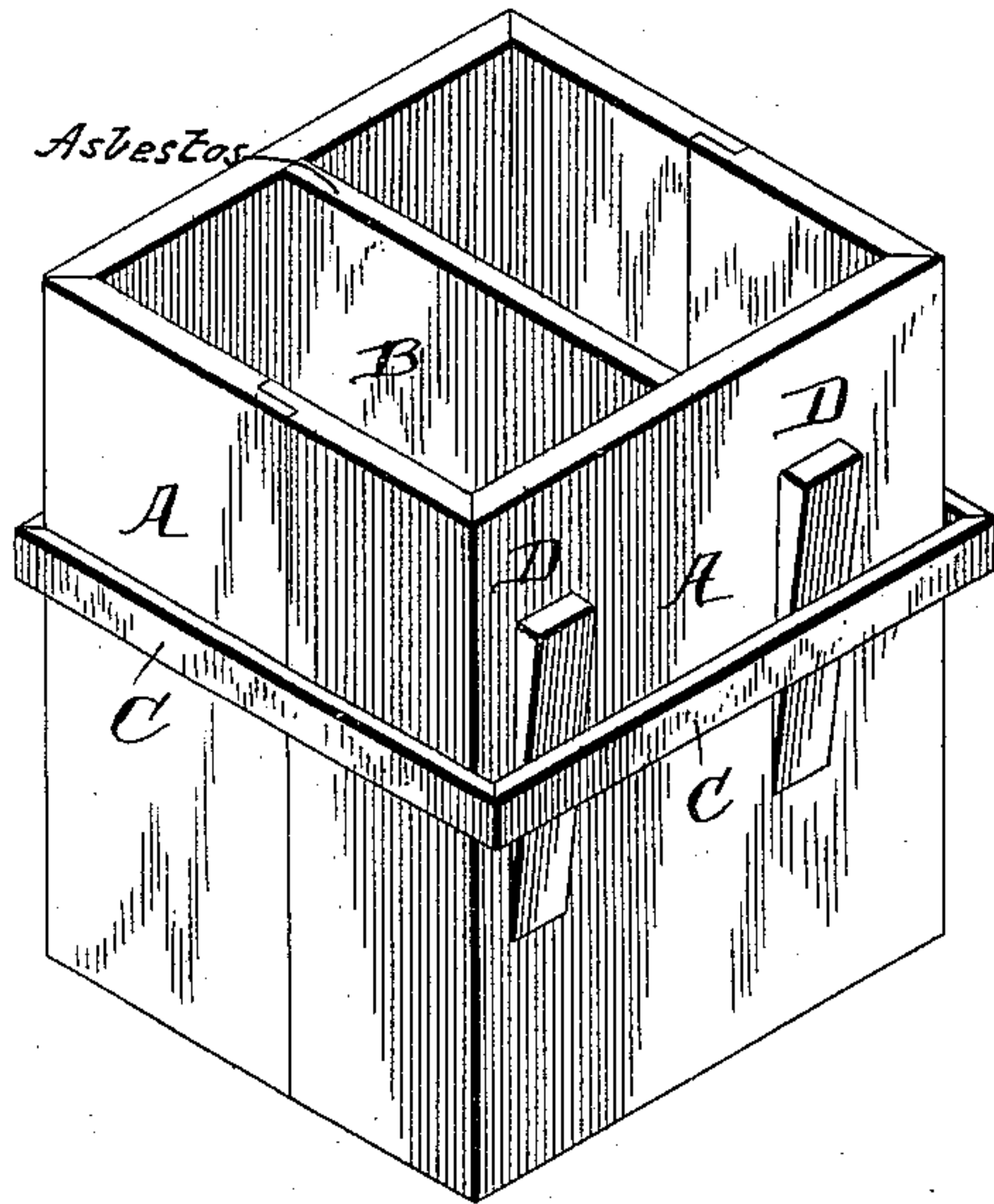


Fig. 2.

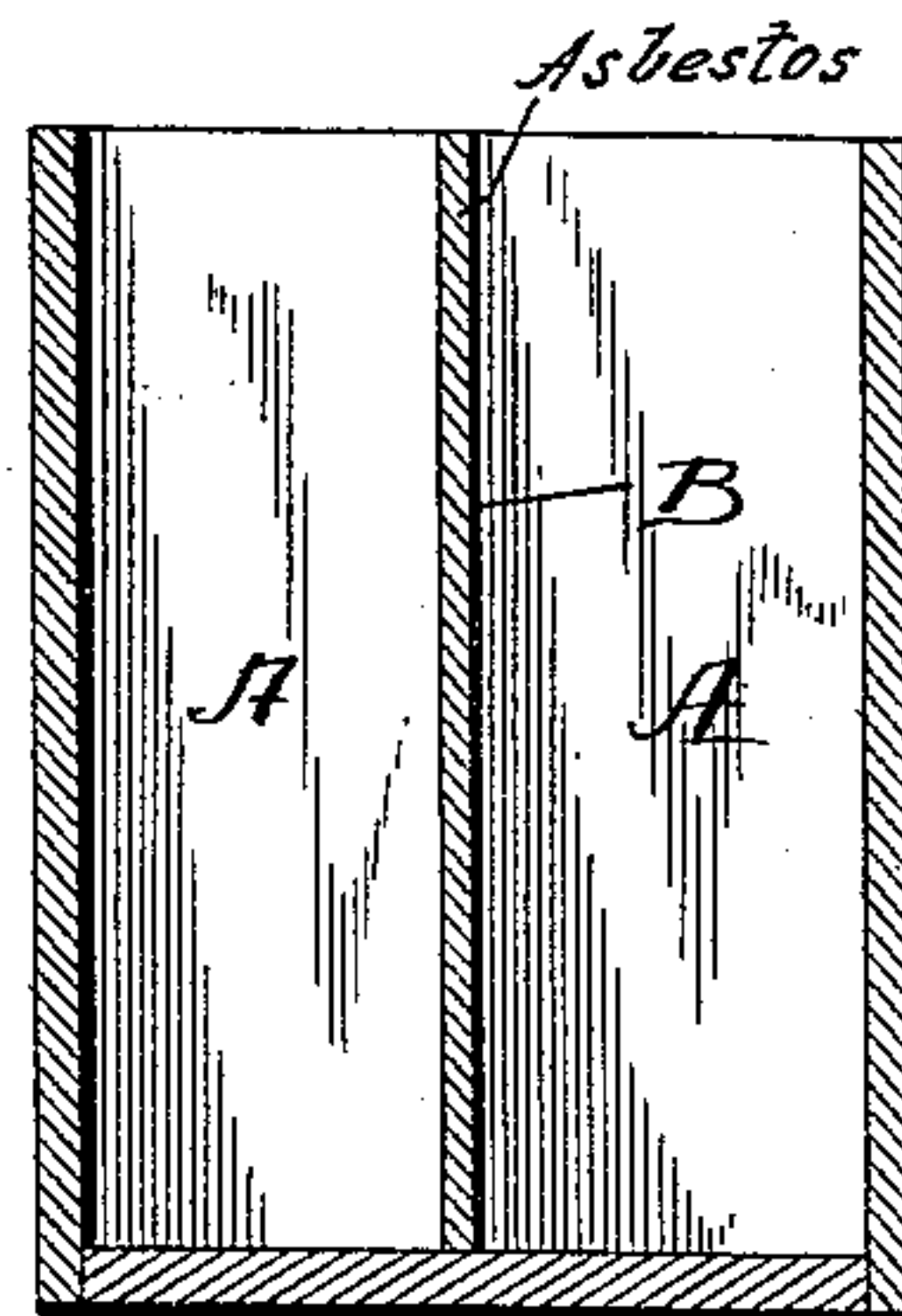
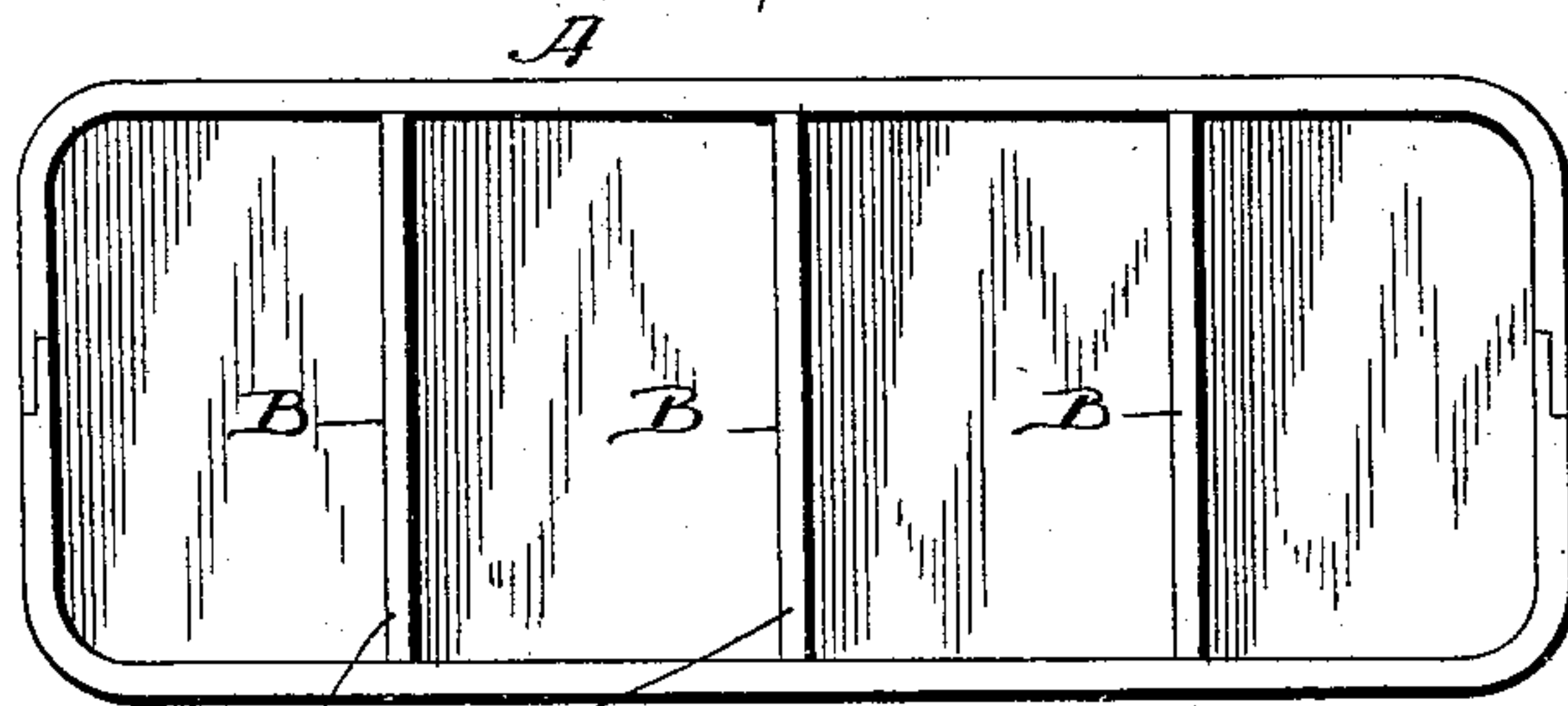


Fig. 3.

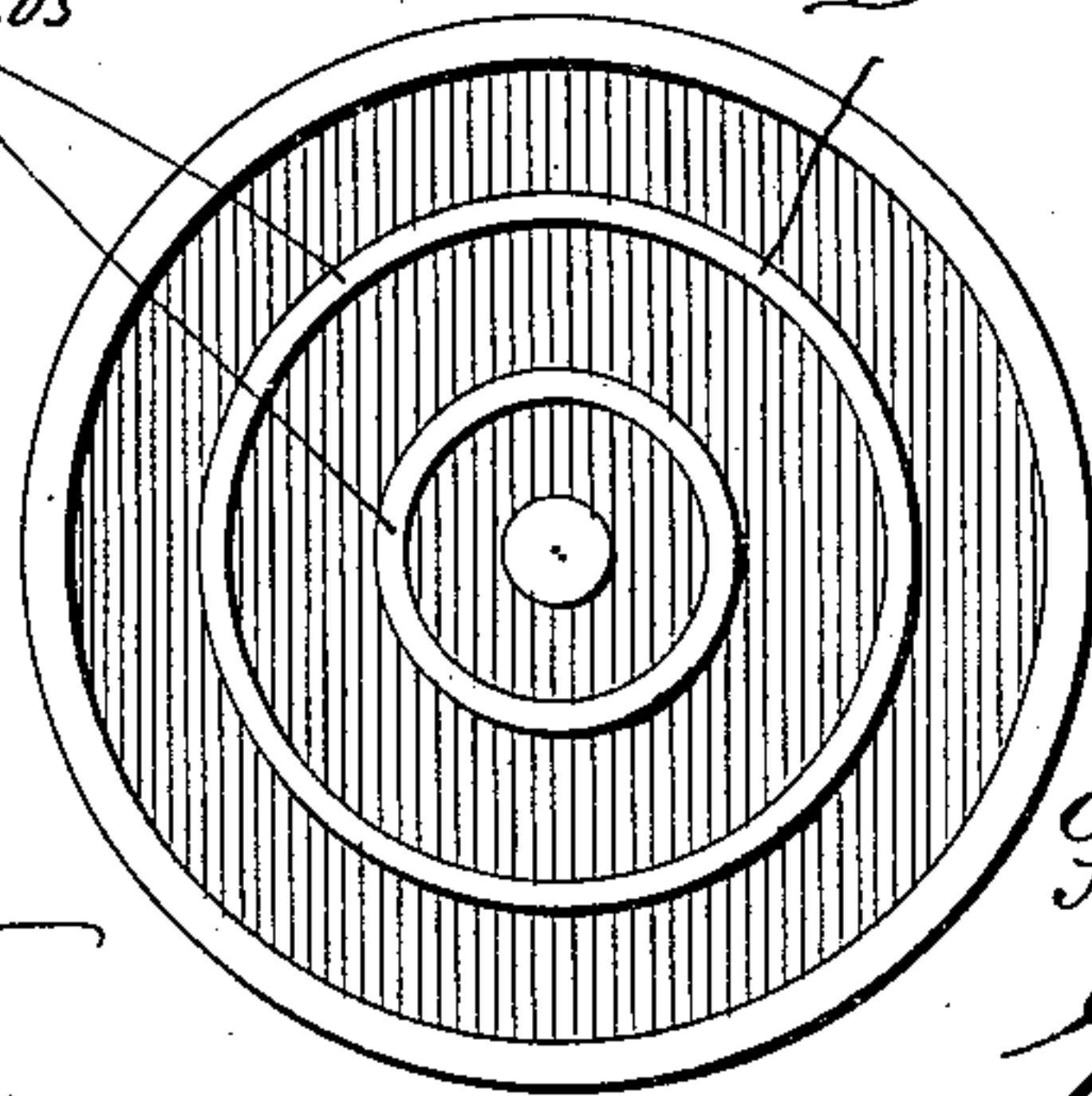


Asbestos

A

B

Fig. 4.



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# UNITED STATES PATENT OFFICE.

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PENNSYLVANIA; SAID GRANTLAND ASSIGNOR TO SAID KENNEDY.

## MANUFACTURE OF STEEL INGOTS.

SPECIFICATION forming part of Letters Patent No. 478,936, dated July 12, 1892.

Application filed May 20, 1891. Renewed May 16, 1892. Serial No. 433,124. (No model.)

*To all whom it may concern:*

Be it known that we, CHARLES W. KENNEDY and JOHN W. GRANTLAND, residents of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in the Manufacture of Steel Ingots; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a perspective view of an ingot-mold as it may be used by us in carrying out our invention. Fig. 2 is a longitudinal sectional view of the same on a vertical plane. Fig. 3 is a plan or top view of a similar mold adapted for the casting of ingots containing three or more perfectly and inseparably united strata of steel or other metal of varying degrees of hardness, and Fig. 4 is a plan view of a cylindrical mold for casting ordnance or ingots of cylindrical or tubular shape.

Like letters of reference denote corresponding parts in all the figures.

Our invention relates to the production of (chiefly) steel ingots adapted for the manufacture of armor-plates, railway-rails, ordnance, projectiles, and numerous other articles of manufacture and commerce where it is a desideratum to produce an ingot composed of two or more stratified masses of steel containing different percentages of carbon (*i. e.*, of varying degrees of hardness) or two or more qualities of the same malleable metal or different metals.

Heretofore it has been customary in the manufacture of such ingots to separate the different strata of metals during the operation of casting by thin plates or diaphragms of steel, which fuse under the heat thereof and allow said strata to unite with each other. This method has been found objectionable in practice; and it is the object of our present invention to obviate such objections by substituting for such steel diaphragms diaphragms of asbestos-board or other material of a less specific gravity than the metals com-

posing the ingot and which will fuse or disintegrate at a heat of about that of molten steel.

We have found that when asbestos (preferably in the form of the ordinary asbestos-board of commerce) is substituted for metal in the construction of these diaphragms they will be entirely disintegrated and destroyed without leaving any residuum to intermingle with the commingling metals. This is due to the porous and fibrous character of the asbestos-board, which is reduced by the heat to an impalpable powder or dust, which, being lighter or of a less specific gravity than the metal, will rise to the surface thereof in the form of scum or slag.

The asbestos-board should be coated on both sides with a flux of silicate of soda, which must be allowed to dry before the plates are used. This flux causes the rapid and complete deterioration and disintegration of the plates, so that the metals will flow together and form a perfect and inseparable union or juncture without faults or flaws.

Materials allied to asbestos—such as tremolite, actinolite, and hornblende, or analogous asbestos substances consisting, essentially, of a mixture of silica, magnesia, lime, and oxide of iron—may be substituted for asbestos as equivalents therefor by forming such substance into sheets of the proper texture and thickness.

The method of casting the ingot is the same as described in another application of even date herewith, entitled "improvement in the manufacture of steel ingots," (Case A,) Serial No. 393,487, and produces the same result—viz., a compound ingot in which two or more strata of different grades, qualities, or kinds of metal are inseparably united in a solid block capable of being rolled, hammered, pressed, or treated in any of the well-known ways for producing the article it is desired to manufacture.

In the said drawings the reference-letter A designates the mold-sections, B the diaphragm, and C a metal strap encircling the mold-sections and securing them together.

DD are wedges interposed between the said strap and one of the mold-sections for tightening the strap.

Having thus described our invention, we claim and desire to secure by Letters Patent of the United States—

1. The method of manufacturing compound  
5 ingots composed of inseparably united strata of metal, which consists in casting two malleable metals or two qualities or grades of the same malleable metal simultaneously in a mold on opposite sides of a diaphragm made  
10 of a material of less specific gravity than said metals and capable of being disintegrated and reduced to impalpable powder by the heat of the poured metals, substantially as and for the purpose set forth.

15 2. The combination, with a mold for metals,

of one or more interiorly-arranged diaphragms or partitions of asbestos-board or its equivalent capable of being disintegrated and reduced to impalpable powder by the heat of the poured metals, substantially as and for 20 the purpose set forth.

In testimony that we claim the foregoing as our own we have hereunto affixed our signatures in presence of two witnesses.

CHARLES W. KENNEDY.  
JOHN W. GRANTLAND.

Witnesses:

FRANK P. KENNEDY,  
THEO. H. MCCALLA.