

No. 721,282.

PATENTED FEB. 24, 1903.

H. BUDERUS.  
PROCESS OF TREATING MOLTEN IRON.

APPLICATION FILED FEB. 25, 1902.

NO MODEL.

SHEETS SHEET 1.

Fig. 1.

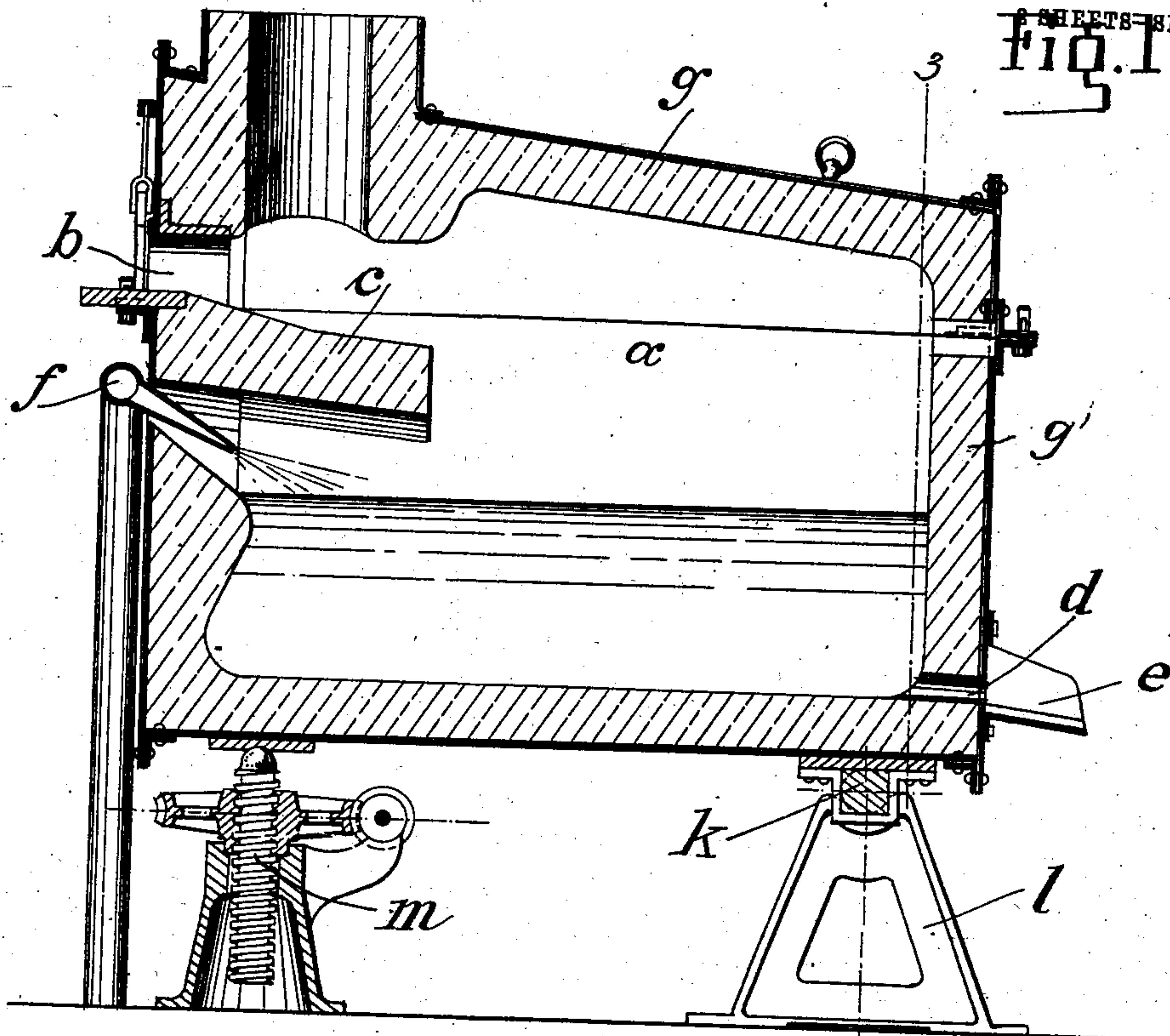
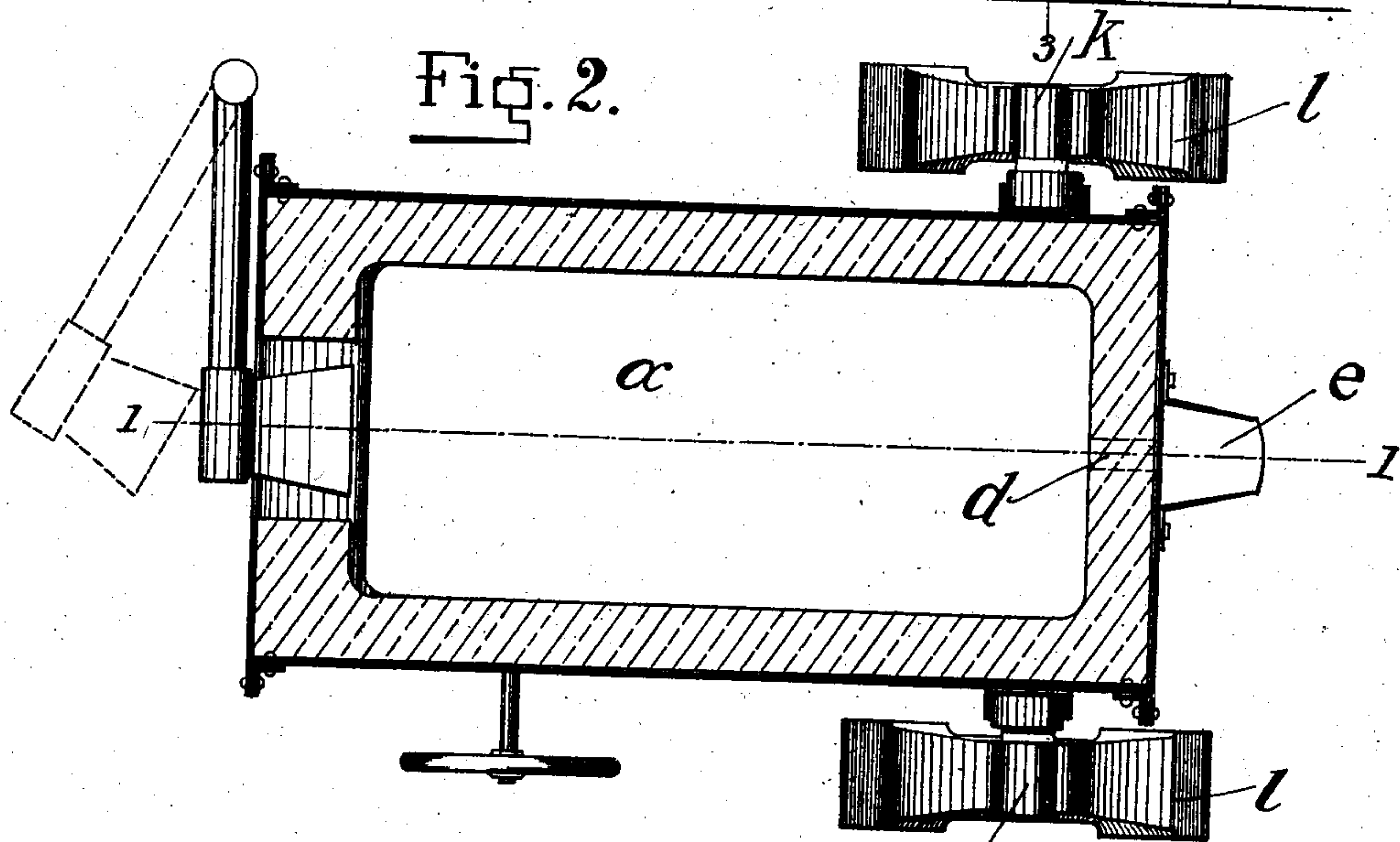


Fig. 2.



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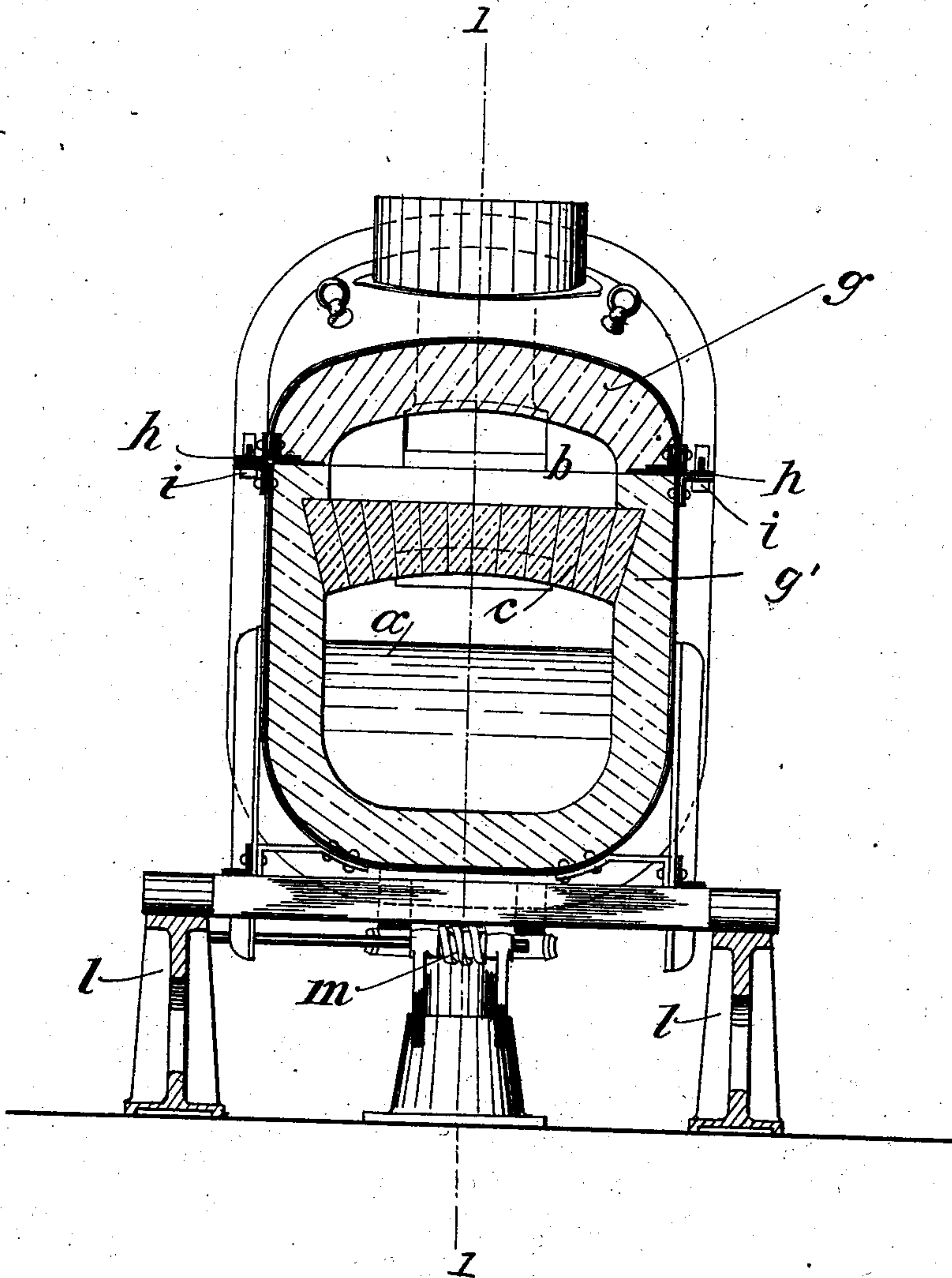
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2 SHEETS—SHEET 2.

Fig. 3.



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# UNITED STATES PATENT OFFICE.

HUGO BUDERUS, OF HIRZENHAIN, GERMANY.

## PROCESS OF TREATING MOLTEN IRON.

SPECIFICATION forming part of Letters Patent No. 721,282, dated February 24, 1903.

Application filed February 25, 1902. Serial No. 95,589. (No specimens.)

*To all whom it may concern:*

Be it known that I, HUGO BUDERUS, a subject of the German Emperor, and a resident of Hirzenhain, Germany, (whose postal address is Hirzenhain, Oberhessen, Germany,) have invented certain new and useful Improvements in Processes of Treating Molten Iron, of which the following is a specification.

It is well known that when raw iron as it comes from the blast-furnace is used for the production of castings the quality of the iron is improved by mixing it with other iron—such, for example, as iron from a cupola. (See Ledebuhr's *Eisenhüttenkunde*, 1893, Vol. II, pages 632 and 633.) It has hitherto been usual to allow the iron from the blast-furnace and the iron from the cupola to run into a mixing-chamber, wherein both metals are intimately mixed together, the mixture being afterward run into the casting mold or molds. In carrying out these operations it has been found difficult to secure in the mixture of the irons the proportions required for the castings to be made, because the quality of the iron produced by the blast-furnace frequently varies, and it is therefore impossible to establish a fixed rule for determining the quality and constitutions of the cupola-iron to be added, and there is not time to make tests for the purpose of ascertaining the quality of the blast-furnace iron and of the mixture, because on account of the time occupied by such tests the temperature of the mixture becomes so low during the taking of the tests that satisfactory casting is prevented. To obviate this disadvantage, mixing-chambers have been used in which furnaces are provided for keeping the mixture hot. (See German Patents Nos. 50,250 and 63,727.) It has been, however, impossible in these arrangements to avoid conditions which seriously interfered with the practical carrying out of the process, and the external firing is a considerable additional expense. My invention remedies these disadvantages by enabling the founder to regulate with ease and with the smallest possible consumption of fuel the mixture formed by the iron run from the blast-furnace and that run from the cupola or like furnace, as the founder can take samples and add iron or other materials to the mixture

without the heat of the mixture lessening so as to interfere with the casting operation or the mixture being affected by the action of the furnace-fires or other external causes. 55

According to my invention I construct in front of the blast-furnace and the cupola or like furnace a mixing-chamber in the form of a reverberatory furnace in which the mixture is constantly kept at the temperature most suitable for casting, whatever time the taking of sampling tests and the mixing operations occupy. A suitable quantity of liquid slag from the blast-furnace is run into the said chamber either direct from the blast-furnace or by means of portable ladles, so that the said chamber is thereby efficiently preheated, and onto this incandescent slag gaseous, liquid, or pulverulent fuel is introduced, and this ignites by contact with the said incandescent slag, so that in a very short time the chamber is raised to a high temperature or welding heat, and this high temperature is maintained by continued supply of such fuel to the said chamber. The iron from the blast-furnace and that from the cupola or like furnace are then run into the chamber so heated and will immediately sink below the molten slag, the latter floating on the molten iron, and as the fuel will be constantly supplied to the chamber the iron mixture therein will be kept at the temperature required for casting and is at the same time protected from injurious action of the fire by the aforesaid floating slag. The founder has under these conditions sufficient time to take samples from the mixture, and, according to requirements, he can allow more iron to run out from the blast-furnace, as from the cupola or like furnace, into the mixing-chamber or he can introduce directly into the said chamber and melt therein other additional materials. In this manner the founder can manufacture iron of a composition fully meeting his requirements and proceed to the casting operation as he requires without regard to the time the testing and mixing operations occupy. 60 65 70 75 80 85 90 95

A suitable mixing apparatus to carry my invention into effect is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section



on the line 1 1 of Fig. 2 or Fig. 3. Fig. 2 is a horizontal section, and Fig. 3 is a vertical transverse section on the line 3 3 of Fig. 1.

The mixing-chamber is indicated by *a*, and  
5 *b* is the opening through which the slag, iron, &c., is introduced onto a bridge *c*, whence it flows into the mixing-chamber.

*f* is a nozzle through which liquid, gaseous, or pulverulent fuel is introduced into the  
10 chamber *a*, and *d* is a tap-hole leading to a spout *e*.

The upper part *g* of the mixing apparatus is removable and is connected to the lower part *g'* by angle-bars *h* and pins or bolts *i*.

15 The mixing apparatus is pivotally mounted at its discharge end in the bearings *l* by means of the pivots *k*, and the other end may be elevated by means of the screw *m*.

The hereinbefore-described addition of liquid slag has besides the absolute protection it affords to the mixture also the great advantage that it effects a large saving of fuel, for the high temperature of the slag introduced does away with the necessity for preheating  
20 the mixing-chamber by a special furnace, as would be the case if no slag were run into the said chamber. The said chamber may be stationary or be made transportable, and it can, if desired, be so constructed as to have  
25 an oscillatory motion imparted to it to assist the mixing.

The process according to my invention is especially adapted for the cheap and easy manufacture of heavy castings from iron  
35 tapped direct from the blast-furnace and cupola or like furnace, for by means of this

process it is possible to prepare from blast-furnace iron large quantities of a mixture of different descriptions of iron suitable for casting purposes by making the mixing-chamber 40 of large dimensions or by erecting several chambers in front of both blast-furnace and cupola or like furnace, the latter plan being no obstacle to the obtainment of a uniform product, as with this improved process it is always 45 possible to render uniform the charges in the whole of the mixing-chamber.

I claim—

The process herein described of improving the quality of molten iron from blast-furnaces 50 for the production of castings and maintaining it at the temperature required for casting, which consists of first introducing molten slag into a mixing-chamber, then introducing fuel therein above the molten slag to raise 55 the temperature of said chamber and maintain the slag in a molten condition, then introducing the molten iron from the blast-furnace, and, during the continued introduction of fuel above the molten slag, introducing and 60 mixing with the molten iron material necessary to improve its quality, and finally conveying the molten iron from the chamber to molds to form castings, substantially as described. 65

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HUGO BUDERUS.

Witnesses:

FRANZ HASSLACHER,  
MICHAEL VOLK.