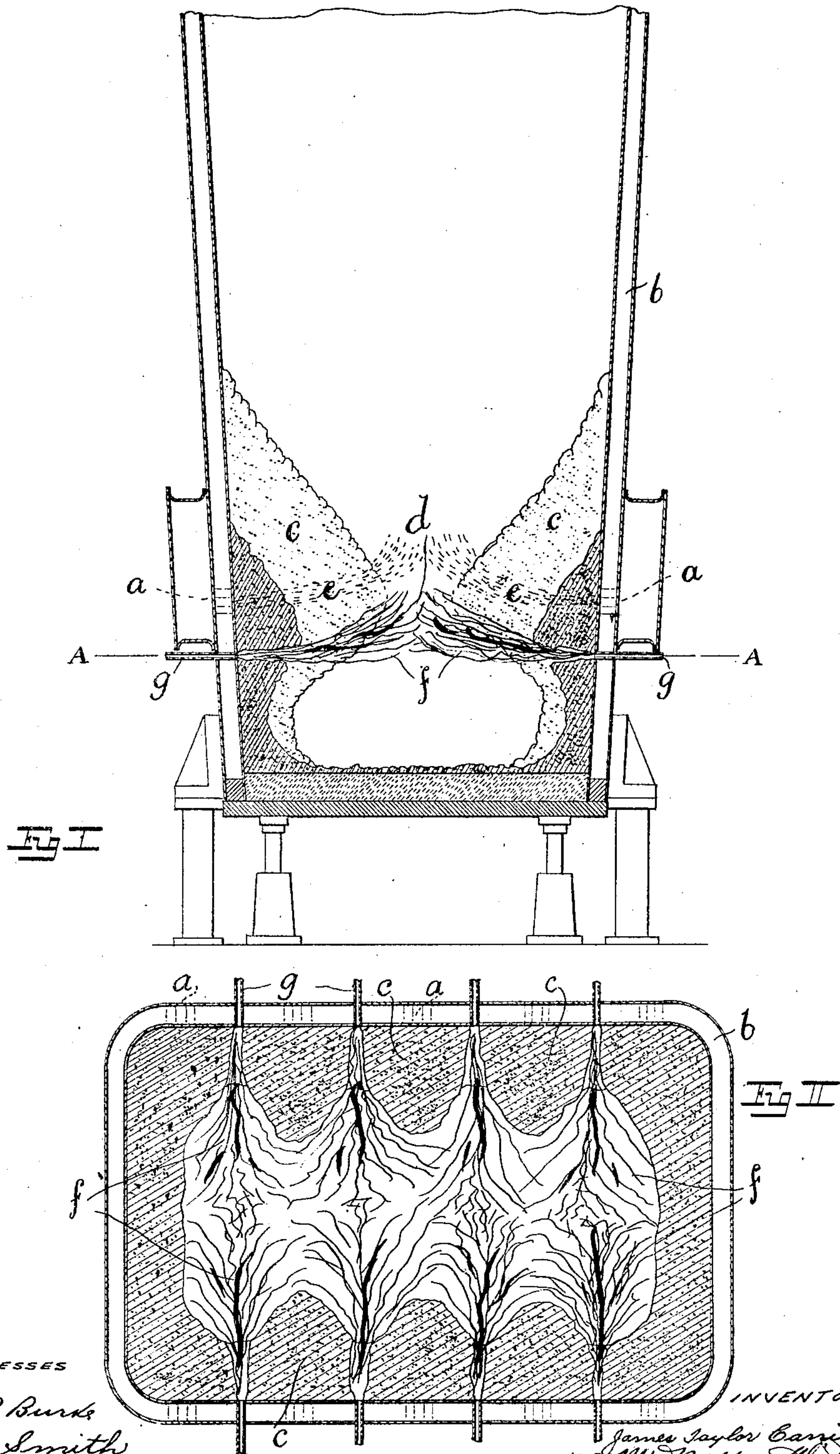


J. T. CARRICK.
PYRITIC SMELTING.

APPLICATION FILED MAY 26, 1908.

912,540.

Patented Feb. 16, 1909.



WITNESSES

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PYRITIC SMELTING.

No. 912,540.

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To all whom it may concern:

Be it known that I, JAMES TAYLOR CARRICK, geologist, a subject of the King of Great Britain, residing at the New Club, Johannesburg, Transvaal, have invented new and useful Improvements in Pyritic Smelting, of which the following is a specification.

In attempting to smelt, by pyritic methods, certain classes of copper or copper nickel ores which are otherwise suitable for the purpose, difficulty is experienced owing to the refractory nature of certain constituents of the ore, among the most important of which are certain coarsely crystalline feldspars. Such material is in a high degree chemically inert and attains no more than a plastic condition at the highest temperature ordinarily attainable in a pyritic furnace, in which condition it is incapable of readily entering upon the chemical changes necessary for its conversion into slag, but on the contrary it forms accretions which in a short time choke the furnace.

The present invention is directed to overcoming this difficulty and thereby enabling such refractory ores to be successfully smelted pyritically.

To this end the invention consists, broadly speaking, in producing in the furnace, at the base of the focus, a restricted zone of higher temperature than the rest of the furnace, such that in coming into contact with it, the infusible ore constituent becomes liquefied, when it is at once acted upon by the other parts of the charge and thereby reduced to readily fusible slag. Such zone is advisably as narrow as possible consistently with the total liquefaction of the ore, since any considerable increase in the total heat of the furnace is not aimed at by this invention, nor would it, as a rule be desirable.

The term "focus" is intended in this specification to indicate the region of active slag formation, and may be generally said to extend from about 3 feet above the twyers down to the twyer level.

Apparatus for carrying out the invention is illustrated in the accompanying drawings, of which—

Figure I is an ideal vertical section of the lower part of a pyritic furnace in action, the charge however being omitted for the sake of clearness, and Fig. II is a corresponding horizontal section upon the plane A—A Fig. I.

In the drawings *a* represents the air twyers passing through the walls *b* of the furnace. Around the air twyers are shown the false boshes *c* which build themselves up from the charge matter during the running of the furnace, and the contracted openings *d* between which, have been styled the "Bessemer slits."

When smelting ordinarily amenable ores, such "Bessemer slits" are kept open by reason of the heat evolved through combustion of the ore at this point; but in the case of the refractory ores above referred to, the partially fused material continually precipitates upon the boshes and chokes the slits so bringing the action of the furnace to a standstill.

In the furnace illustrated the special zone of intense temperature is formed immediately below the level of the air blasts *e*, by introducing flame blasts *f* through a special series of twyers *g*. The combustible may be any suitable gaseous or vaporous fuel and is introduced together with the requisite quantity of air for its combustion so that not only is the greatest possible temperature of combustion attained, but the combustion products being substantially neutral have no effect on the smelting process beyond diluting the furnace gases, and supplying some additional heat capable of assisting in the dissociation and smelting of the raw sulfid in the upper part of the furnace. The flame twyers *g* may conveniently be disposed intermediate of the air twyers so that the flame is injected into the widest parts of the "Bessemer slits" *d*.

It is recognized that with a view to overcoming the difficulties mentioned, the experiment has been tried of introducing petroleum vapor through the ordinary air twyers. In that case however the combustion of the petroleum was caused to take place in the presence of the overwhelming mass of air necessary for the combustion of the ore and concentration of the added heat was therefore impossible. The introduction of hot blast moreover was unsuccessful since the necessarily low intensity and relatively small amount of the additional heat thereby introduced, was sufficient to produce the concentrated heat zone contemplated by the present invention: the ultimate effect being in fact simply to elevate the center of the focus and thus, if anything, to aggravate the difficulty at the base of the focus. It is by reason of

these considerations that the flame blasts in the present invention are arranged just sufficiently below the regular air blasts, for the combustion of the former to be completed before they mingle with the air blasts.

What I claim is:—

1. In pyritic smelting, the process of producing in the furnace at the base of the focus region of slag formation, a restricted zone having a temperature higher than that of the rest of the furnace by injecting combustible at that point and effecting its combustion within the furnace, for the purpose stated.

2. In pyritic smelting, the process of injecting flame blasts to produce at the base of the focus region of slag formation a restricted

zone of higher temperature than the rest of the furnace, said flame blasts being such as to give off substantially neutral combustion products.

3. In a pyritic furnace, means to produce flame blasts arranged immediately below the regular air twyers and preferably intermediate thereof, substantially as and for the purpose described.

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

JAMES TAYLOR CARRICK.

Witnesses:

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