No. 804,690.

PATENTED NOV. 14, 1905.

U. WEDGE.

PREPARING IRON PYRITES FOR DESULFURIZATION.

APPLICATION FILED MAY 6, 1904.

Fig. 1.

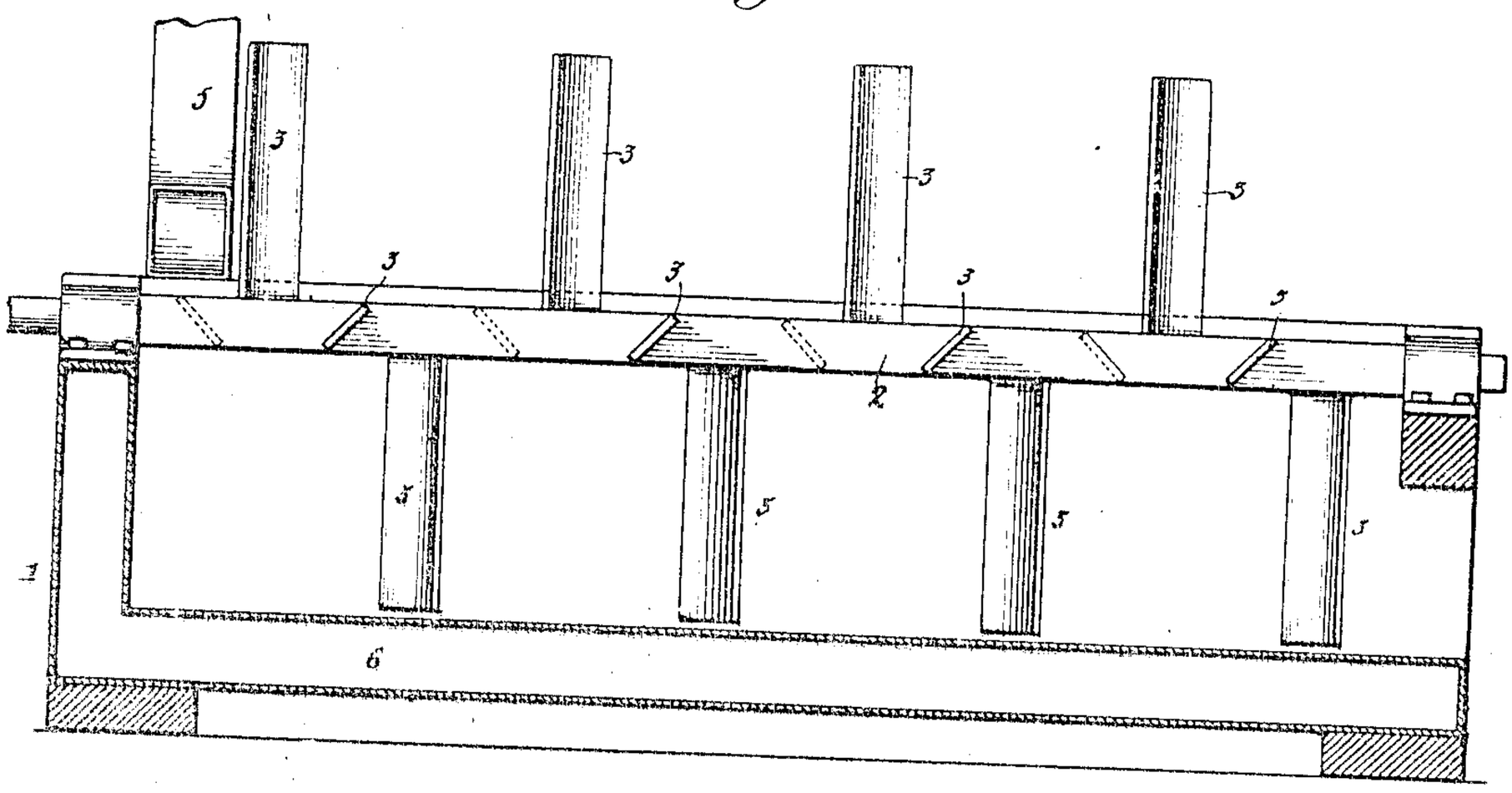
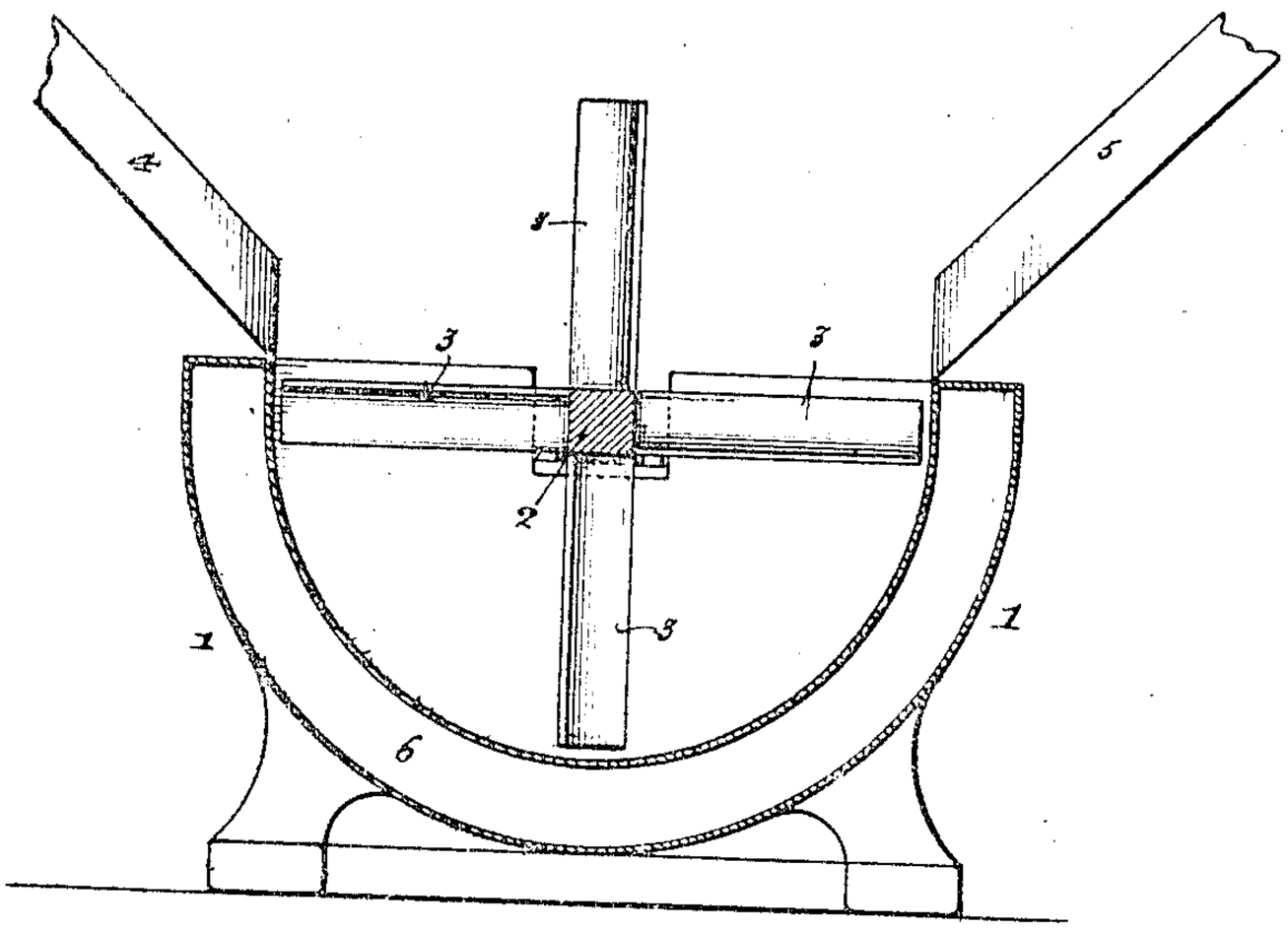


Fig. 2.



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UNITED STATES PATENT OFFICE.

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PREPARING IRON PYRITES FOR DESULFURIZATION.

No. 804,690. Specification of Letters Patent. Patented Nov. 14, 1905.

Application filed May 6, 1904. Serial No. 206,730.

To all whom it may concern:

Be it known that I, UTLEY WEDGE, a citizen of the United States, residing in Ardmore, Pennsylvania, have invented certain Improvements in Preparing Iron Pyrites for Desulfurization, of which the following is a specification.

The object of my invention is to effect the desulfurization of or prepare for desulfurization that class of iron pyrites known as "pyrites fines" or "pyrites smalls," which contains a large percentage of the pyrites in powdered or pulverulent form and to effect this object without the necessity of forming the pyrites into blocks or briquets. Much of the iron pyrites known as "pyrites fines" or "pyrites smalls," especially if it has been leached for the extraction of copper or other metals therefrom, contains such a large percentage of powdered or pulverulent pyrites that it is not susceptible of desulfurization in a mechanical furnace—that is to say, a furnace in which the material is stirred, agitated, or conveyed by mechanically-operated rabbles or stirrers while resting upon a roasting hearth or hearths or by movement of the hearth itself, since the dust escapes in such quantities as to block or choke the flues or towers used in connection with the furnace even when special settling or dust-collecting chambers are employed. I find, however, that by adding to said pyrites fines or pyrites smalls containing a large percentage of powdered or pulverulent pyrites sulfate of iron or other binding agent and subjecting the compound to the action of a suitable mixing device the mixture can be made to assume a granular instead of a plastic form, the product being in the form of grains or pellets of irregular shape and size and the particles composing each grain or pellet being so firmly united that said grains or pellets can be desulfurized in a mechanical or other furnace without risk of material disintegration and without the formation of dust in objectionable quantity. The proportion of sulfate of iron or other binding agent employed will vary, depending upon the physical properties of the pyrites, from one to three or four per cent. being usually required, a high percentage of moisture in the pyrites demanding a correspondingly less percentage of binding agent and the percentage of the latter being increased to accord with a high percentage of powdered or pulverulent pyrites in the mass.

I may employ any ordinary form of mixer which will prevent the agglomeration of the pyrites in large masses, the mixer which I prefer being similar to that shown in the accompanying drawings, in which—

Figure 1 represents a longitudinal section of the mixer, and Fig. 2 is a transverse section of the same.

In the drawings, 1 represents a trough of segmental cross-section provided with a rotating shaft 2, having blades or vanes 3, which exert a combined stirring and feeding effect upon the material in the trough, the pyrites fines and the sulfate of iron or other binding agent being introduced at the head of the trough through suitable feeders 4 and 5 in such proportion that the mass only assumes a moderate degree of plasticity, the effect of the mixing and conveying blades or vanes of the device being to break up any large bodies or lumps of the mixture, so that the properly-united particles of ore are discharged from the delivery end of the trough in the desired granular or pellet form. The integrity of the grains or pellets may be increased by heating the pyrites, and said heating may be effected while the pyrites is in the mixer by providing the latter with a suitable steam-jacket 6 or other heating appliance, or the granular product may be passed through a special heater of any desired character before being introduced into the desulfurizing-furnace, or it may, if desired, be conveyed directly from the mixer to said furnace and may receive its initial heating in the latter. When the preliminary heating of the granular product is effected in the mixer or in a special heater, the temperature should be so low as not to effect any driving off of the sulfur from the pyrites, and in this respect my invention differs from processes of lumping iron ore by combining the same with a flux and subjecting the mixture to such high heat as to cause fusion, as such high heat would drive off the sulfur from the pyrites and defeat the purpose of my invention.

While I prefer to employ a ferric sulfate as a binder, other binders—such, for instance, as other sulfates of iron or sulfate of copper, sulfate of lead, or sulfate of zinc, or combinations of the same with the sulfate of iron or with each other—may be employed, if desired.

My invention is distinct from that forming the subject of my Patent No. 757,531, dated April 19, 1904, in that I am not compelled to

form the mass of pyrites into blocks or briquets, the expense of such briqueting operation being saved by so combining the pyrites and the binding agent and so treating the compound in the mixer that it will be reduced to and maintained in granular form, whereby its subsequent handling can be effected without the necessity of briqueting.

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

1. The mode herein described of preparing for desulfurization "pyrites fines" or "pyrites smalls" composed in part of dust or powder, said mode consisting in mixing the same with a metallic sulfate, and reducing the mixture to and maintaining it in granular form without the application of such heat as to drive off sulfur from the pyrites, substantially as specified.

2. The mode herein described of preparing for desulfurization "pyrites fines" or "pyrites smalls" composed in part of dust or powder, said mode consisting in mixing the same with sulfate of iron, and reducing the mixture to and maintaining it in granular form, substantially as specified.

3. The mode herein described of preparing for desulfurization "pyrites fines" or "pyrites smalls" composed in part of dust or powder, said mode consisting in mixing the same with a binding agent, reducing the compound to and maintaining it in granular form, and subjecting the same to heat insufficient to drive off the sulfur from the pyrites, substantially as specified.

4. The mode herein described of preparing for desulfurization "pyrites fines" or "pyrites smalls" composed in part of dust or powder, said mode consisting in mixing the same with sulfate of iron, reducing the compound to and maintaining it in granular form, and subjecting the same to heat, substantially as specified.

5. The mode herein described of effecting desulfurization of "pyrites fines" or "pyrites smalls," composed in part of dust or powder, said mode consisting in mixing the same with a metallic sulfate, reducing the compound to and maintaining it in granular form, without the application of such heat as to drive off sulfur from the pyrites and then subjecting said granular mass to stirring or agitation upon the hearth of the desulfurizing-furnace, substantially as specified.

6. The mode herein described of effecting desulfurization of "pyrites fines" or "pyrites smalls," composed in part of dust or powder, said mode consisting in mixing the same with sulfate of iron, reducing the compound to and maintaining it in granular form and then subjecting said granular mass to stirring or agitation upon the hearth of the desulfurizing-furnace, substantially as specified.

7. The mode herein described of effecting desulfurization of "pyrites fines" or "pyrites smalls," composed in part of dust or powder, said mode consisting in mixing the same with a suitable binder, reducing the compound to and maintaining it in granular form, subjecting the compound to heat insufficient to drive off sulfur from the pyrites and finally to stirring or agitation upon the hearth of the desulfurizing-furnace, substantially as specified.

8. The mode herein described of effecting desulfurization of "pyrites fines" or "pyrites smalls," composed in part of dust or powder, said mode consisting in mixing the same with sulfate of iron, reducing the compound to and maintaining it in granular form, subjecting the compound to heat and finally to stirring or agitation upon the hearth of the desulfurizing-furnace, substantially as specified.

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

UTLEY WEDGE.

Witnesses:
JAMES MCMORRIS,
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