

(No Model.)

2 Sheets—Sheet 1.

J. C. BIDWELL.

METHOD OF AND FURNACE FOR BURNING GREEN BAGASSE.

No. 285,103.

Patented Sept. 18, 1883.

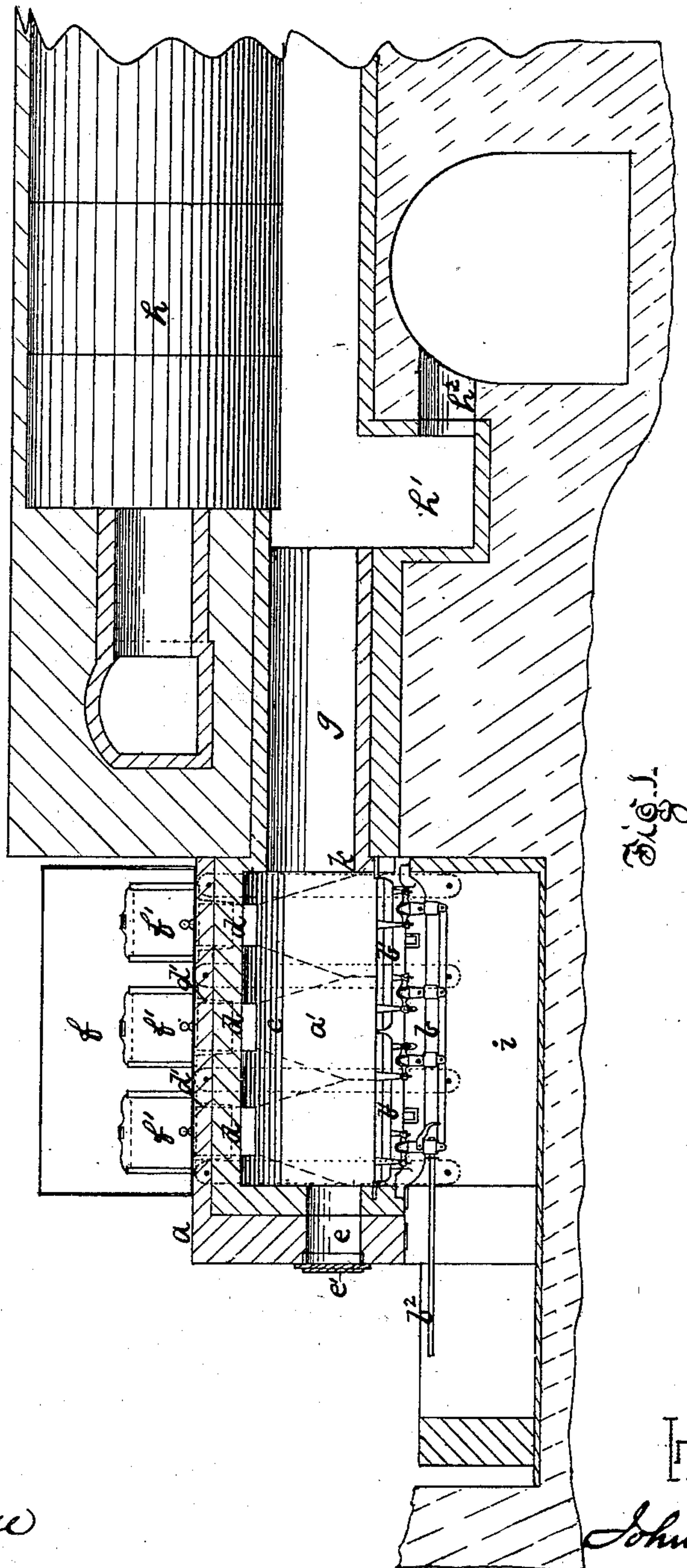


Fig. 1

Witnesses.

*R. W. Finchall*  
*J. L. Beatty*

Inventor

*John C. Bidwell*  
*by his attys*  
*Bakewell & Kern*

(No Model.)

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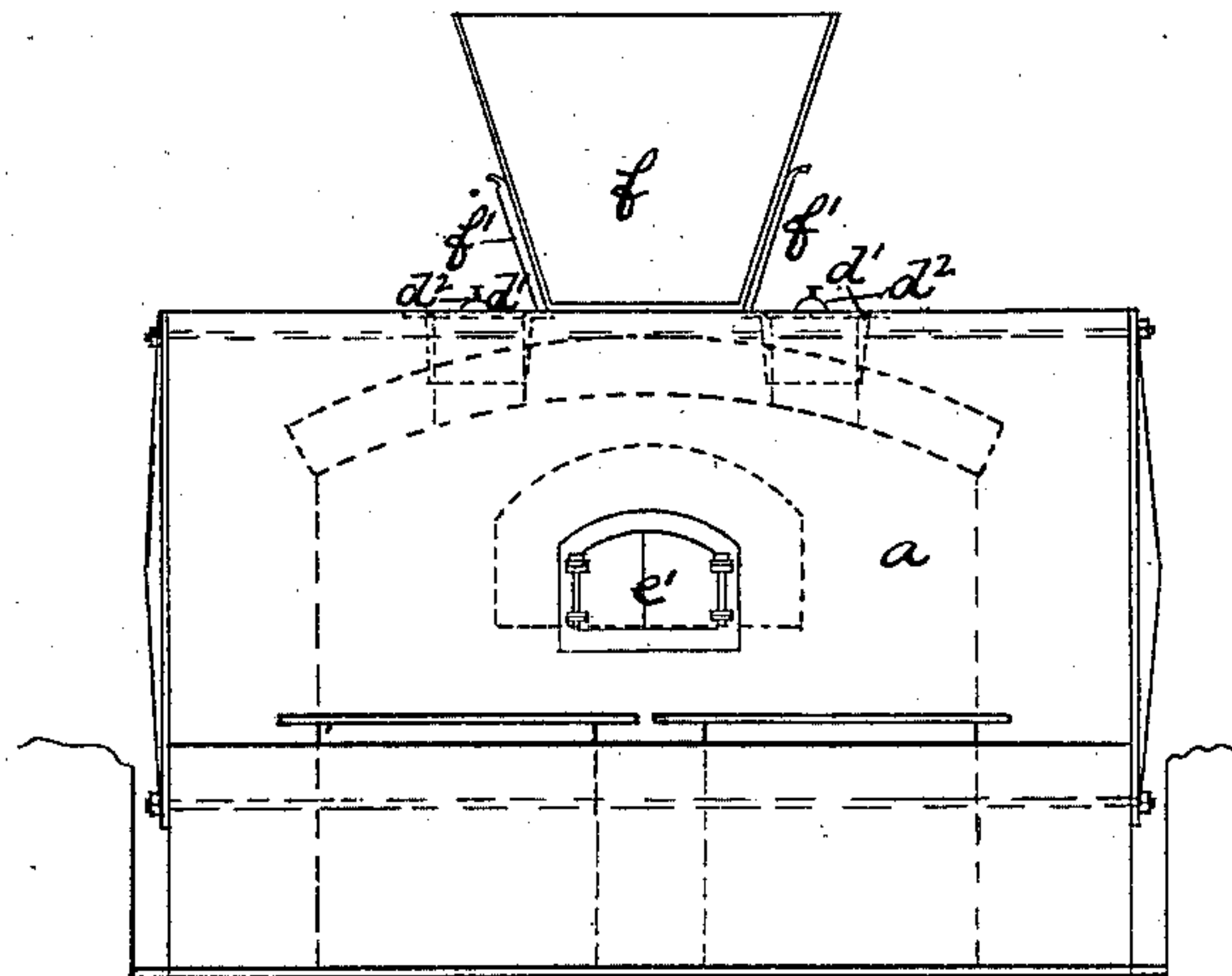


Fig. 2-

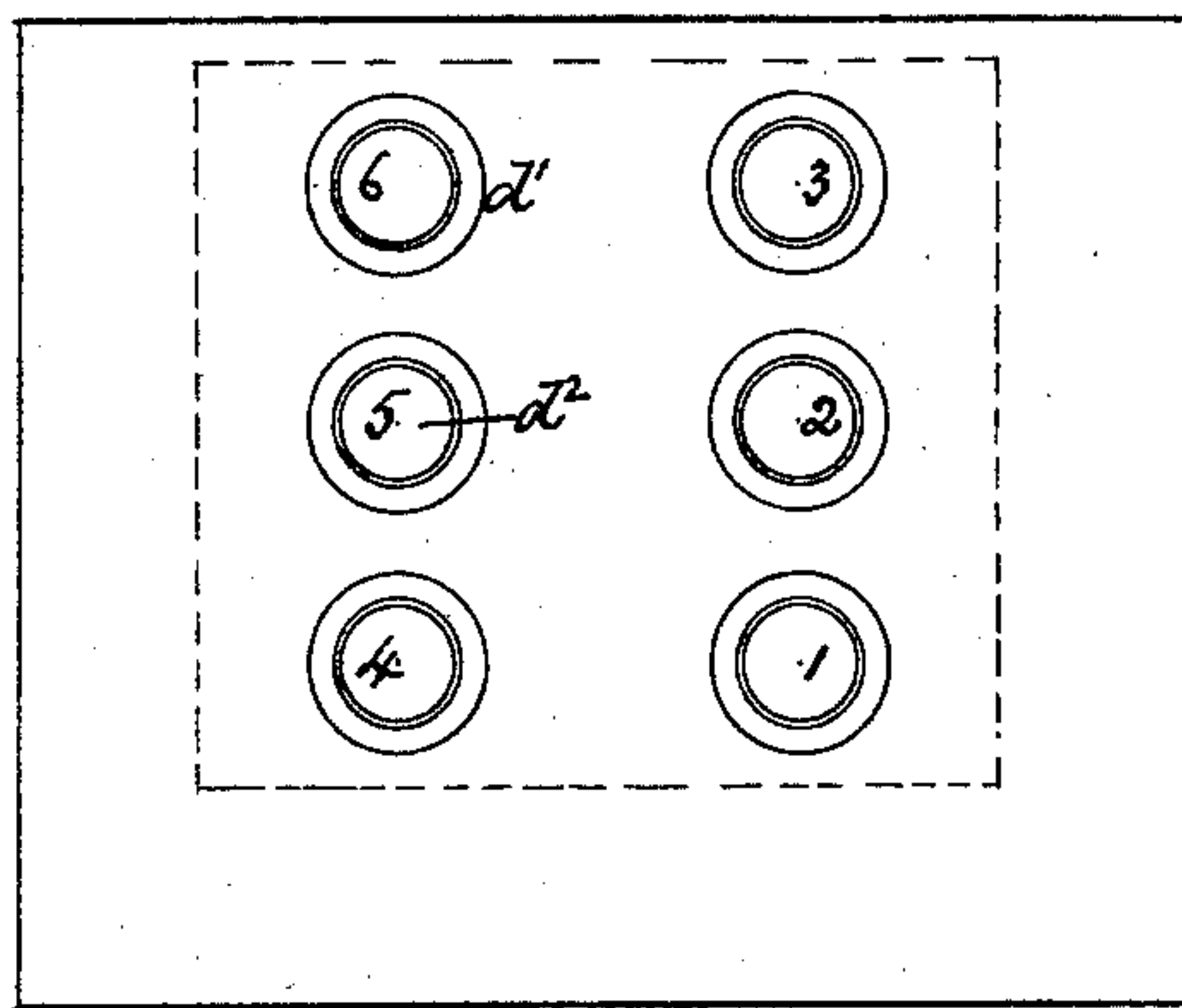


Fig. 3-

Witnesses

R. L. Wainwright  
J. L. Beatty.

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# UNITED STATES PATENT OFFICE.

JOHN C. BIDWELL, OF PITTSBURG, PENNSYLVANIA.

## METHOD OF AND FURNACE FOR BURNING GREEN BAGASSE.

SPECIFICATION forming part of Letters Patent No. 285,103, dated September 18, 1883.

Application filed December 1, 1882. (No model.) Patented in Cuba March 15, 1882.

*To all whom it may concern:*

Be it known that I, JOHN C. BIDWELL, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Methods of and Furnaces for Burning Green Bagasse; and I do hereby declare the following to be a full, clear, and exact description thereof.

Prior to my invention, so far as I am aware, no practically successful means for utilizing green bagasse, in the condition it comes from the rolls, as fuel was ever put into use. As heretofore used the bagasse was dried by exposure to the sun and frequent burnings or otherwise to make it combustible, or when only partially dried was consumed in small portions with proportionately large quantities of coal or other fuel, but it has never been used alone in a green or partially-green condition as fuel; hence in the sugar-making districts of the United States it has been considered as of little or no value as fuel, and, being of great bulk, has been carted away as refuse and either dumped into the river or collected in large piles to be burned as other refuse when sufficiently dry. I have found by practical experience with my improved furnace that green bagasse is of much more value for fuel than dry bagasse, because the alcohol and other elements which are liberated by exposure to the hot sun are still present, and by the use of my invention are made powerful auxiliaries in the combustion of the woody and fibrous parts and in the generation of heat.

To enable others skilled in the art to make use of my invention, I will now explain the same by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal section of my improved bagasse-furnace, showing its application to use with a steam-boiler. Fig. 2 is a front elevation. Fig. 3 is a plan.

Like letters of reference indicate like parts.

The furnace *a*, which is built of common brick lined with fire-brick, has an interior chamber, *a'*, of about eight feet square by about two and one-half feet in height from the grate-bars *b* to the crown of the arch *c*, (shown by broken lines in Fig. 2,) which forms the top of the furnace. In the arch *c* are a number of openings, *d*, preferably six or more,

for admitting the bagasse to the furnace, each opening having an iron frame, *d'*, and lid *d''*, whereby it may be closed tightly.

The grate *b* is provided with movable bars *b'* and a shaking-lever, *b''*. It is necessary to have either a shaking-grate or movable grate-bars, and hence I have shown a well-known and effective form of shaking-grate; but as any efficient and practical one will do, and as I make no claim to it, a detailed description of it is not necessary.

In the front wall of the furnace is an opening, *e*, closed by a suitable door, *e'*, and on top, between the two rows of feed-openings *d*, is a receptacle, *f*, for containing a supply of green bagasse, which is fitted with openings provided with sliding doors *f'*, opposite to the feed-openings *d*, so that the bagasse may be drawn out of the receptacle directly into the feed-opening.

A combustion-chamber, *g*, is located back of the fire-chamber *a'*, and between it and the boiler *h*, or other point where the heat is applied. Beyond the chamber *g* is a dust and cinder trap, *h'*, having a cleaning-opening, *h''*, which should be closed tightly by a suitable door. The chamber *g* is lined with fire-brick. The air which supports combustion is all supplied through the ash-pit *i*, the front, sides, and top of the furnace being tightly closed.

Thus constructed, the operation of my improved furnace is as follows, viz: A preliminary or starting fire is made in the chamber *a'* by means of fuel inserted through the front opening, *e*, which is then closed by the door *e'*. When the fire-chamber *a'* has become thoroughly and highly heated, a charge of the green bagasse is fed from the receptacle *f* through the openings *d* in the following manner, viz: The holes *d* are arranged in two rows, and the bagasse is charged successively through diagonally-opposite openings, so that the green charge from one opening shall not fall next to and in contact with a green charge from another opening, and also so that one green charge shall not be in front and in the line of draft of another green charge. In Fig. 3 I show six charging-holes. The first charge would be made through 6, the next through 2, the next through 4, the next through 3, the next through 5, and the last through 1, and so on in the same order again. The green



bagasse being fed through the top openings, and being permitted to fall vertically on the grate, assumes a conical or pyramidal shape, as shown by the dotted lines in Fig. 1, and as the successive charges fall the bases of the cones so formed extend into contact with each other. This form is peculiarly well fitted for the driving off of the vapors and gases of the green bagasse, as the superficial area of the several cones presents the largest possible surface of exposure to the action of the heat, and as the broad base of each cone is exposed to and rests upon the bed of hot fuel on the grate-bars, and the gases, &c., are caused to ascend through the center of the pile, while the whole superficial area of the outside is exposed to the action of the fierce flame from the more highly heated piles. The result is an extremely-rapid distillation of the gases, which are driven over the bridge-wall *k*, and are there thoroughly mingled in the combustion-chamber with the heated air and flame from other parts of the fire-chamber and completely consumed. When the furnace is fed as described, sufficient time is given between each charge to permit each cone to pass the period of distillation and come to a highly-heated state before another charge is fed in, so that the fresh gases from such other charge shall not pass over the first and check its consumption, and also so that the heat from the first shall aid in the combustion of the gases from the second.

During the operation of the furnace the grate *b* is occasionally shaken to open up the superimposed mass of bagasse for the free admission of the air, and, incidentally, to shake out the ashes. Practical experience has demonstrated the fact that my furnace, so fed and operated, not only successfully burns the green bagasse completely, leaving merely a fine dust or ash, and no clogging residuum or cinder, but also that a much more intense heat is generated therefrom than can possibly be obtained by the use of dry or partially-dried bagasse, either with or without the addition of other fuel.

The practical advantages of my invention consist in the utilization of a heretofore waste substance, without the necessity of preliminary treatment to render it useful. I save the cost of transporting it away from the mill, which its enormous bulk has heretofore rendered necessary at a cost in some large establishments of thousands of dollars per annum. The arch of the chamber *a'* causes a reverberatory action, whereby the intense heat generated by the cones which are in advanced

stages of combustion is cast down upon opposite cones, which are still in the distillation stage. Thus the heat is equalized, and all parts of the fire-chamber operate to secure the thorough combustion of the bagasse.

I do not limit myself to any particular number or arrangement of the charging-holes, except that the number and arrangement should be such as will enable the furnace to be charged as described without damping the fire therein.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A furnace for burning green bagasse, having a shaking-grate or movable grate-bars, and a series of charging-holes in the crown, arranged in parallel rows over one and the same fire-chamber, substantially as and for the purpose described.

2. A furnace for burning green bagasse, having a shaking-grate, or movable grate-bars, a series of charging-holes in the crown, arranged in parallel rows over one and the same fire-chamber, and tightly-closed walls and crown, so that all the air for combustion is supplied through the ash-pit, substantially as and for the purposes described.

3. A furnace for burning green bagasse, having a series of charging-holes in the crown, arranged in parallel rows, in combination with a receptacle placed on top of the furnace between the parallel rows of charging-holes, and having discharge openings opposite to the respective charging-holes, substantially as and for the purposes described.

4. A furnace for burning green bagasse, having a fire-chamber provided with a shaking-grate or movable grate-bars, and a series of charging-holes in the crown, said holes arranged in parallel rows over one and the same fire-chamber, in combination with a combustion-chamber placed between the fire-chamber and the point where the heat is applied, substantially as and for the purpose described.

5. The method of burning green bagasse, consisting of charging it in conical piles successively into different quarters of a furnace into one and the same fire-chamber, so that one green charge shall not fall next to or in the line of draft of another green charge, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 29th day of November, A. D. 1882.

JOHN C. BIDWELL.

Witnesses:

W. B. CORWIN,  
T. B. KERR.