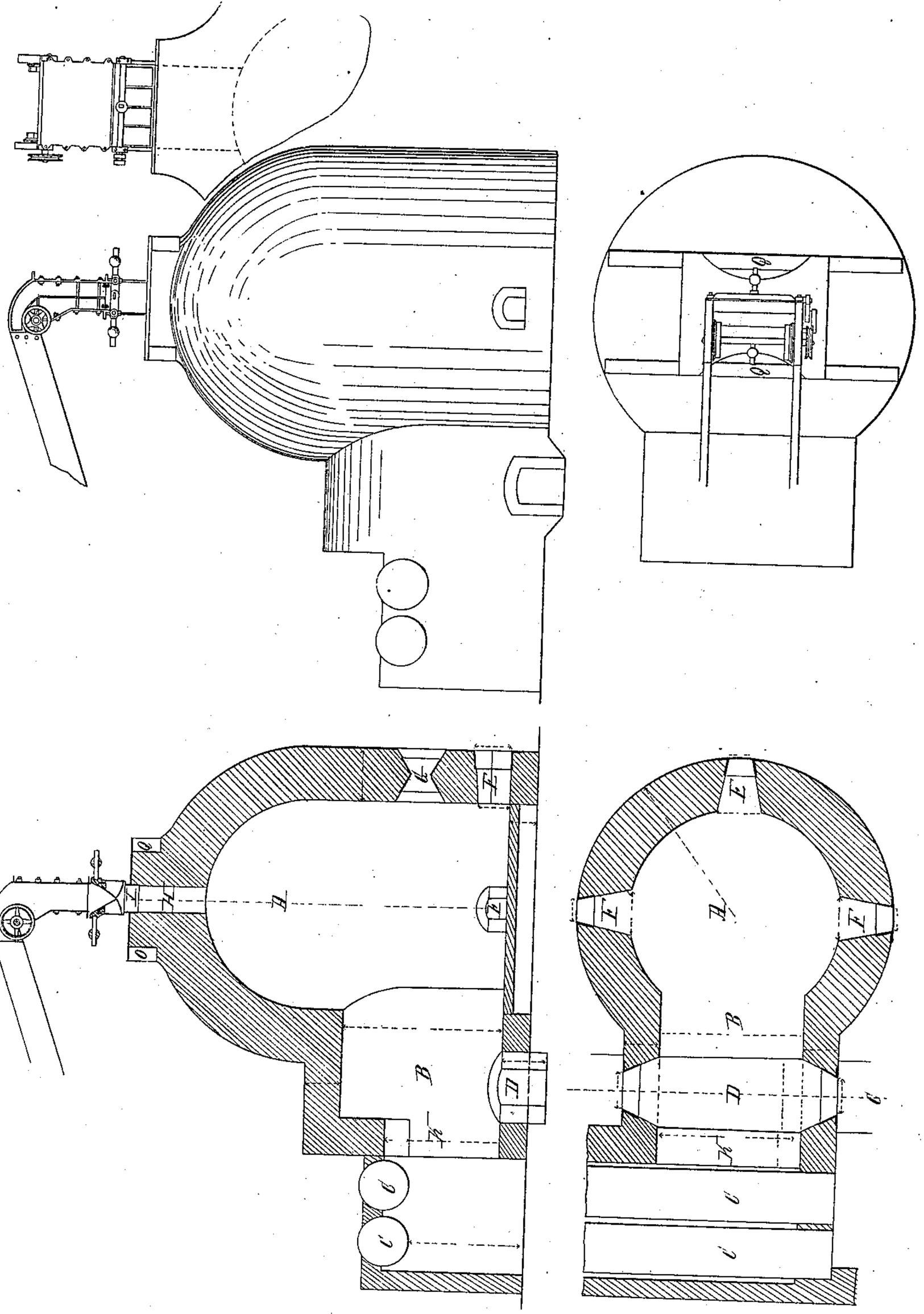
S. H. Gilman,

Steam-Boiler Furnace,

No. 15,481. Patented Aug. 5, 1856.



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UNITED STATES PATENT OFFICE.

SAMUEL H. GILMAN, OF NEW ORLEANS, LOUISIANA.

BAGASSE-FURNACE.

Specification of Letters Patent No. 15,481, dated August 5, 1856.

To all whom it may concern:

Be it known that I, SAMUEL H. GILMAN, of the city of New Orleans, in the State of Louisiana, have invented a new and useful Improvement in Furnaces for Drying and Burning Bagasse as a Fuel for Practical Purposes; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawing, which makes a part of this specification and lettered to correspond therewith.

Object of my invention and its general principles.—The object of my invention is the conversion of this said bagasse as it comes from the mill into such available fuel, in a new and more perfect and certain manner, than has heretofore been done, by means of my improvement in the bagasse furnace aforesaid.

I will now proceed to describe the nature of my invention and the general principles upon which it is based, and which entirely distinguishes it from all other furnaces heretofore made.

My object being first to dry the bagasse, I form it into a conoid pile in the furnace, and preserve the size of the pile by continual accessions at top, while burning away at, and consequently settling down to, its base, and, as the green bagasse thus settles down from the top of the pile, its temperature, and the pressure upon it, is gradually increasing, until it arrives in the form of a dry, dense mass at the burning base; having been dried by its own fire, and compressed by its own weight into a comparatively dense mass before arriving at the point of ignition. The bagasse being received, dried, compressed, and ignited, my object is to carry the products of its combustion to second part of the same furnace, where the mixture and combustion of the gases is perfected, and the ashes and silicious matter deposited.

My object also is to prevent the formation of slag in the process of the combustion of bagasse, by causing the draft through the furnace to pass over the burning surface of the pile with such a strength and direction as will carry off, to the second part, the slag generating products of combustion, and prevent their accumulation at or near the fire in a sufficient quantity to form slag or cinders.

The outlines of the interior surface of the receiving part of my furnace are all curvilinear and adapted to the conoid form of the pile of bagasse, consequently the channel around the pile for the passage of the draft of air, is also curvilinear, and the next best to a straight line for the most rapid transmission of fluids. The outlines of the interior surface of the second part of my furnace are all rectilinear; which is the best form to facilitate the confusion of the currents and reducing and causing, mechanically, the mixture of the gaseous matters, and the deposit of the solid matters, as they arrive from the first, or receiving part, of the furnace; in which first part, the curvilinear channel offers so little obstruction to the passage of air, that a natural draft is adequate to all the purposes of combustion, and carrying off the slag-generating products, without the aid of any blast.

Constructive description.—Having stated the object of my invention, and the general principles upon which it is based, and by which it is distinguished from all others, I will now proceed to describe the plan which has proved entirely successful in taking off seven entire crops, with furnaces of various sizes, the present season of 1855 and 1856; and this experience is the basis upon which this specification is written.

The time required to dry the bagasse, and the quantity to be dried and burned, in a given time, determines the size of the furnace. I found the time required to dry the bagasse, while in a self compressed, conoid pile, burning at its base, to be eighty minutes; and that the quantity of bagasse, formed in eighty minutes, when making sugar at the rate of six hundred pounds per hour, would make a conoid pile, fourteen feet high, and ten feet in diameter at its base; therefore, I construct my furnace as follows: That part of my furnace in which the bagasse is received, dried, compressed and ignited, is in the form of a vertical hollow cylinder, twelve feet in diameter, closed at the top by a hemispherical dome, the interior of which, is seventeen feet high, from the bottom of the cylinder. That part of my furnace in which the products of combustion are received, mixed, and their solid parts deposited, is of a square arch covered form eight feet wide and eleven feet high to the interior top of the arch, and opens out its full size from the aforesaid cylindrical part; making the entire length of the fur-

nace through the round and square parts, twenty feet. In the center, near the base of the rear wall of the square part, I make a throat or flue through which the available heat of the furnace passes off, to the boiler or evaporating pans; the area, of the vertical cross section, of this throat, is one third the area, of the vertical cross section, where the cylindrical and square parts of the furnace unite. To give the furnace sufficient strength, and to prevent the radiation of heat, the walls should be about three feet thick; and to give a level bearing for the bed plate of the hopper, the dome brick work is coned up on the outside, to a thickness of four feet. Through the apex of the dome, from the outside to inside, is an open throat, through which the bagasse falls, from a hopper into the furnace. This throat is made fire and smoke tight by swinging doors in the bottom of the hopper; the hearth of the furnace is solid, and at, or near the ground level. In the wall of the circular part, and directly opposite the flue through which the heat finally passes off from the square part, and on a level with the hearth, I make the draft door, about fifteen inches wide and two feet high, the opening of the door widening as it reaches the inside of the furnace wall, to thirty inches in width, and falling to twenty inches in height, the top of the door, and opening, is of an arched form, and is made of, and lined with, metal. I here give the size and proportions of this door which I consider best; they may be somewhat varied perhaps in the furnaces of different capacity, but the locality of this door I regard as essential, and it should always be situated, so that a vertical plane, passing through the middle of the square part of the furnace, and extended through the center of the circular part, would divide it vertically into equal parts. About three feet six inches, above the floor, and directly in a line above the draft door, I make a doubly conical opening in the wall, in the form of sections of two cones, meeting each other midway the chamber wall, the middle portion of this opening, is lined with sections of two hollow cones to fit it and fitted with a metal door. I call this the fire door, because in order to kindle the fires, and keep the bagasse supplied therewith, and other required purposes, wood from time to time is thrown in at this door. On the radial line, which is at right angles to the radial line on which the above doors are constructed, I make openings, one on each side the chamber; these openings are of the same size and same construction as that of the draft door, and are on the horizontal plane with the draft door aforesaid, and are for the purpose of cleansing out the furnace, when a final stoppage is made. Directly at the base of the rear wall of the square arched chamber, and through which the throat leading to the boilers or evaporating pan is made, I make across the furnace, a pit, in the earth, about four feet wide, and thirty inches deep; a door at each end of the pit, closes the openings in the side walls of this chamber. The openings are two feet square on the outside, and enlarged to the width of the pit on the inside; these openings are lined and closed with metal, and are arched at top; I call these the clear out doors of this chamber. The boilers, or evaporating pans, are set in masonry, on brick work, and are of the usual or improved styles.

Having thus briefly, clearly and fully, stated the object, nature, princples, size, structure and form of my furnace for drying and burning bagasse, I will now proceed to its operation.

Operation.—The bagasse is taken from the rollers of the mill, by the usual endless belt or carrier, which drops it into a hopper, immediately over the throat, in the dome of the furnace; in the bottom of this hopper, are two swinging doors, which open by the weight of the bagasse which falls through into the furnace, and forms a conoid pile on its hearth; a fire of wood, or coal, having been previously lighted on the hearth, in front of the draft door, and the furnace well heated, the bagasse ignites, around the base of the pile, to the height of about three feet, and burns away, and settles down, as fast as it is received on the top; and thus preserves, its size and shape uniform; the time required to form this pile, being eighty minutes, it follows that the bagasse is exposed eighty minutes, to dry by the heat of the furnace while settling down to the burning belt. The draft is admitted at the draft door, and passes around both sides of the pile, through a narrow channel, with a burning surface on one side, and a brick wall on the other side, a distance of fourteen feet, to the square part of the furnace, where the different currents meet, from the opposite directions, bringing along in their velocity, nearly all the ashes or solid products of combustion into the square part of the furnace, where the meeting and mixing of the currents, causes the solid matter to deposit in the pit, and perfects the combustion of the gaseous matter, before it passes through the throat, to the boilers or evaporating pans.

Reference to drawing.—In the drawing, which is a central and vertical section, lengthwise the furnace, and across the boiler flues, (the whole section being in the same plane) (A) is the cylindrical dome-covered chamber; (B) is the arched covered chamber; (C) are the boilers or evaporating pans, which can be set instead of the boilers. Four boilers ase shown, so as to represent a

flue and return flue under the boilers, which are all set two and two in a flue; (D) is the pit athwart the arched covered chamber; (E) is the draft door; (F) is one of the clean-out doors of chamber (A); (G) is the fire door, for wooding up; (H) is the throat leading to the hopper; (I) is the metallic lining of the top of the throat; (K) is the issue, or throat, leading to the flues under the boilers.

Having thus fully and clearly described the nature and scope of my invention, being an improvement in furnaces for drying and burning bagasse, what I claim as my invention and desire to secure by Letters Patent of the United States, is—

1. The combination of a dome-covered cylindrical chamber (A) having a circular base, with a draft door located at (E) an arch-covered second square chamber (B) a pit (D) a heat conduit or throat (K) when constructed, proportioned, located, arranged and combined in the manner, and for the purpose herein fully set forth and described.

2. I also claim the location in a bagasse furnace of the draft door or opening through which the air is admitted to support combustion, at or near the hearth level or fire bed, and directly opposite the opening through which the products of combustion leave the first chamber of the furnace, and in the vertical plane passing through the center of the two chambers (A and B) and the center of the opening where the two chambers (A and B) unite, when the hearth of the second chamber is substantially on a level with the hearth which supports the bagasse to be burned.

SAMUEL H. GILMAN.

In presence of—
W. P. N. FITZGERALD,
D. SMITH.