A. Stillman.

Steam-Boiler Furnace.

No. 12,807. Patented May 1, 1855.

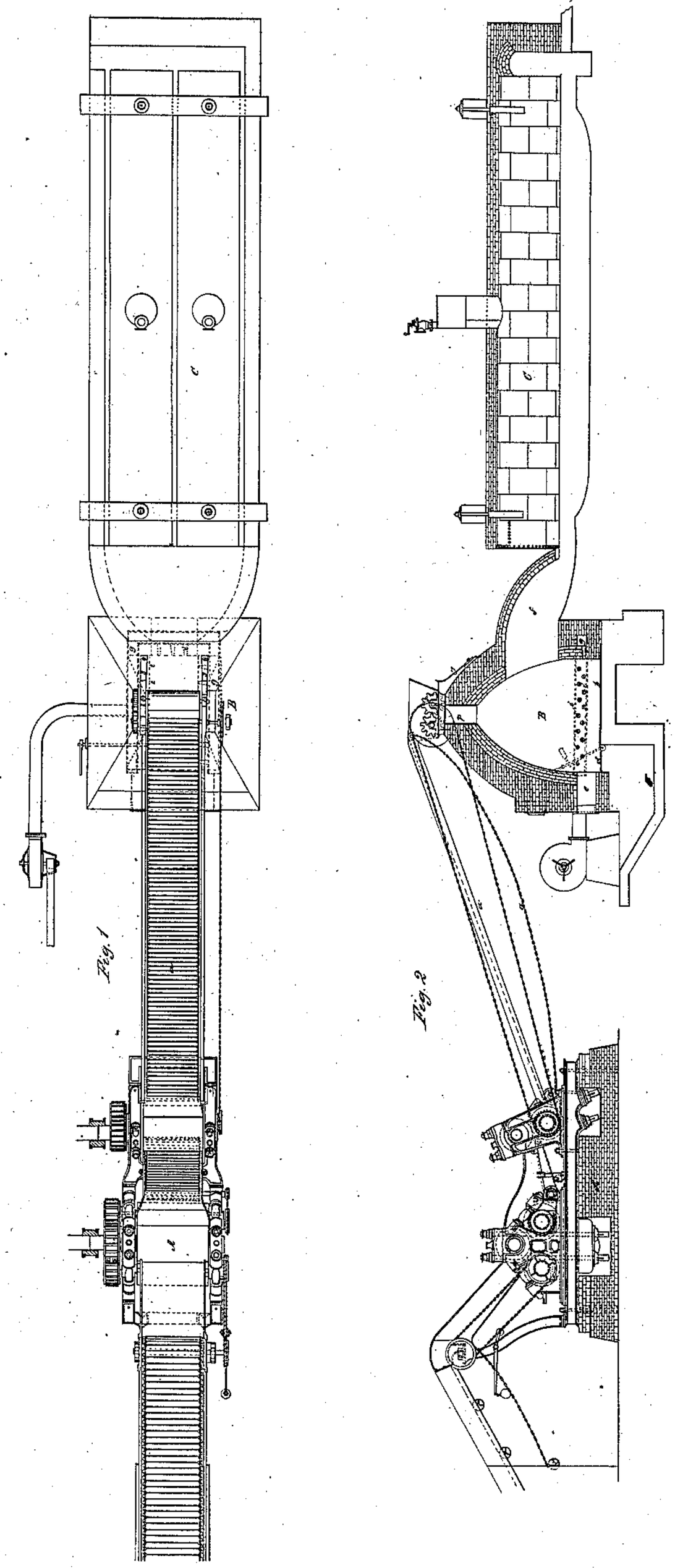

Fig. 1

Fig. 2

UNITED STATES PATENT OFFICE.

ELIZABETH A. STILLMAN, OF NEW YORK, N. Y., ADMINISTRATRIX OF ALFRED STILLMAN, DECEASED.

FURNACE FOR BURNING BAGASSE.

Specification forming part of Letters Patent No. 12,807, dated May 1, 1855; Reissued November 9, 1858, No. 619.

To all whom it may concern:

Be it known that ALFRED STILLMAN, late of the city, county, and State of New York, deceased, did invent certain new and useful Improvements in Employing Bagasse as Fuel in Sugar-Works; and I, ELIZABETH ANN STILLMAN, administratrix of the goods and estate of the said deceased, do hereby declare that the following is a full, clear, and complete description of his said invention and of the operation thereof, reference being made to the annexed drawings, making a part of this specification, in which—

Figure I is a top view or plan, Fig. II is an elevation partly in section, and similar letters indicate similar parts in both the figures.

This invention consists in a new arrangement and mode of constructing and operating a plantation sugar-mill, whereby the bagasse, without being handled, dried or otherwise prepared, is at once utilized as fuel, and consumed as fast as it is deprived of its saccharine juice.

From the commencement of the manufacture of sugar in this country, attempts have been repeatedly made to accomplish the destruction of the refuse cane and at the same time to make it valuable as fuel. In fact, merely to get rid of it from the plantations without expense would be a matter of great advantage, yet up to this time even that has not been accomplished.

It is now the custom, and is indeed necessary, to construct and keep in repair vast buildings in which to store this material for drying before it can be consumed, and this storing can only be done by the expensive process of hand labor, which must be spared too at a time when all the force is required in the sugar house.

The fact that bagasse contains much silicious matter, and also that it leaves much ashes in the process of combustion, renders a peculiar furnace necessary in order to burn it, especially when green. Such furnace must be so constructed that the blast can be maintained freely, and also that the deposits or ashes may be collected without choking up the blast. With a blast through grate-bars this cannot be accomplished with sufficient certainty of being able to maintain the operation, since the ashes accumulate so rapidly as to choke them, and in addition to this the silex melting upon them often closes them permanently. Neither will the cone-shaped-perforated bottom, such as is sometimes employed in the tan or saw-dust stoves answer, for a like reason. The furnace herein described as invented for the purpose performs the operation perfectly.

This furnace consists of a chamber having a flat solid hearth with an opening at the top to receive the bagasse, and having the blast admitted in numerous jets around the sides at a suitable distance above the hearth to allow of the accumulation of ashes; the necessity of providing for such accumulation arising from the fact that the operation of the mill must be as continuous as possible, day and night, for a considerable period of time. Several rows of such jets may be arranged one above the other so that as the ashes accumulate upon the hearth and reach the lower row, the blast may be shut off from it and transferred to the next above, and so on until it is time to clear out the whole. By combining such a furnace with the boilers and the cane-mill, the green or wet bagasse may be burned as fuel for the boilers, and without preparation or handling, thus converting a material hitherto a cause of expense and trouble, into a source of advantage and profit.

Figs. I and II represent the method of constructing and arranging a sugar-mill as above mentioned. At A is the cane mill for expressing the juice. At B is the bagasse burning furnace. And at C is the range of boilers.

The cane-mill represented at A is after the plan of "Stillman's patent" but any other kind of mill is also applicable. From the last pair of rollers, or where the cane has received the last compression and is ready to be discharged, an endless carrier is constructed so as to receive the same and convey it to the furnace in the order and as fast as delivered, said carrier being represented at (*a*). The carrier terminates at the top of the furnace, where there is a peculiar feeding apparatus constructed so as to take the bagasse and discharge it into the furnace, and yet keep the aperture closed. At (*o*, *o*,) are two rollers situated at the top of the furnace and immediately upon the square aperture (*p*) leading down into it as shown. The boxes of one of these rollers are made

so as to play back and forth horizontally, while those of the other are permanently fixed. Motion is communicated to the fixed one by an endless chain passing over a pulley and leading to and passing over another pulley at the cane-mill, a pair of gear wheels of equal size causing like rotation of the rollers.

The reason for having the rollers capable of moving apart is to allow them to yield when passing thicker pieces of cane, or in case of excessive feeding, or when some should present themselves crosswise, and were they not permitted to yield, the chain or some other part of the machine would be endangered.

The movable roller is pressed against the other by the force of springs, or other equivalent power, acting on the outside, so that by these means not only does it yield to the passage of unequal pieces of bagasse, but the moment they are through it closes up against the other roller, and thus keeps the feed aperture shut.

Many different ways may be adopted for making the rollers self-adjusting. As represented, the boxes (*o'*) are set upon guide-pieces or slides, the ends of which project beyond the hopper, as shown; on the ends of these, powerful feather springs (*s*) act to force the boxes inward toward the stationary roller. Thus the necessary play is permitted, while the surfaces of the rollers are kept as closely together as possible, seizing the bagasse as it falls into the hopper from the carrier and depositing it within the furnace. The furnace as represented at B consists of a large arched or dome-shaped chamber, having a tight and solid floor or hearth, as seen at (*b*). At the front there is an ash-pit (*c*), covered by a trap-door (*d*) operated from the outside and opposite to which in the side is a raking-hole (*e*), to haul off the ashes and dirt from the hearth. The gaseous products of combustion are discharged through the flue (*f*) and thence pass beneath the range of boilers C to the final discharge place or chimney. The necessary quantity of air to maintain combustion is admitted by means of a blast-pipe or air-channel running around the sides of the furnace and near the floor, as shown at (*g*), and from this channel a series of fine jets is projected into the furnace, similar to the action of twyers, as seen at the letters (*i*), the blast being produced by a fan-blower or other like means.

The operation is as follows: As soon as a proper fire is built upon the hearth (*b*), the cane mill A may be set in motion and the cane fed to it as usual. According to the construction of the mill A the cane receives impressions from a second pair of rollers in order to express all the juice possible. From these last the bagasse is delivered upon the endless carrier (*a*) and conveyed along to the top of the furnace B, where it is received by the feed apparatus and discharged into the furnace. The blast is so regulated as to maintain such intensity of combustion as will effect the consumption of the bagasse as fast as delivered from the mill. The flame and hot gases are discharged by the aperture (*f*) and pass along the flue under the boilers as represented. The walls of the furnace B it is proper to make thick and substantial in order to prevent as far as possible the loss of heat by radiation.

Although the furnace is herein shown as a distinct construction it may yet be so far varied as to be more intimately combined with the boilers by building it lower and placing it beneath them.

What is claimed as the invention of the said ALFRED STILLMAN and which it is desired to secure by Letters Patent of the United States is—

The herein described furnace for employing bagasse, without previous drying, as fuel for generating steam.

ELIZABETH ANN STILLMAN,
Administratrix.

Witnesses:
J. P. PIRPON,
S. H. MAYNARD.

[FIRST PRINTED 1913.]