



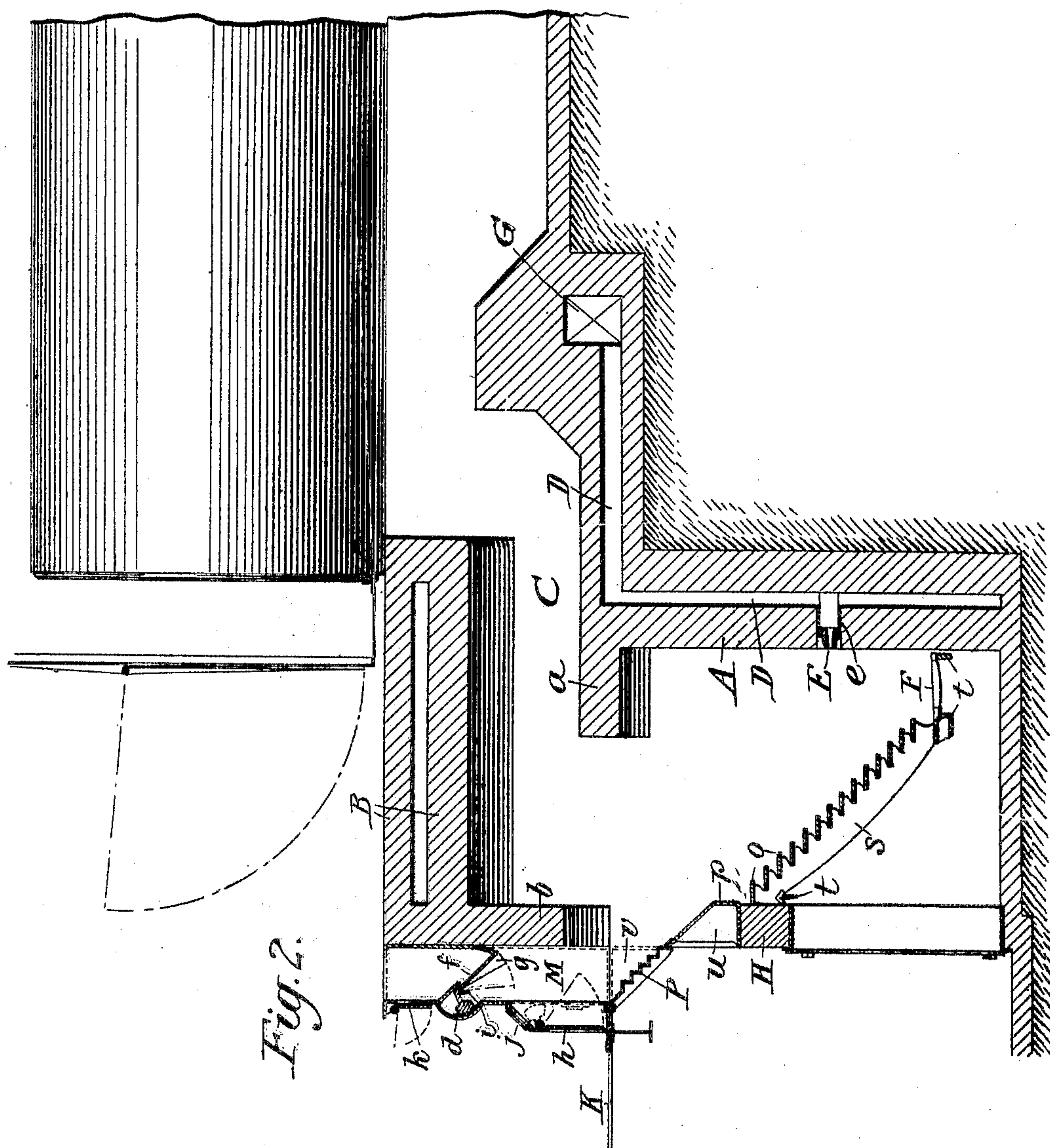
No. 797,805.

PATENTED AUG. 22, 1905.

H. G. GINACA.  
BAGASSE BURNING FURNACE.

APPLICATION FILED MAR. 23, 1904.

4 SHEETS—SHEET 2.



Witnesses:

J. M. Wrenner

E. C. Schuermann.

Inventor:

H. G. Ginaca,

By his attys.

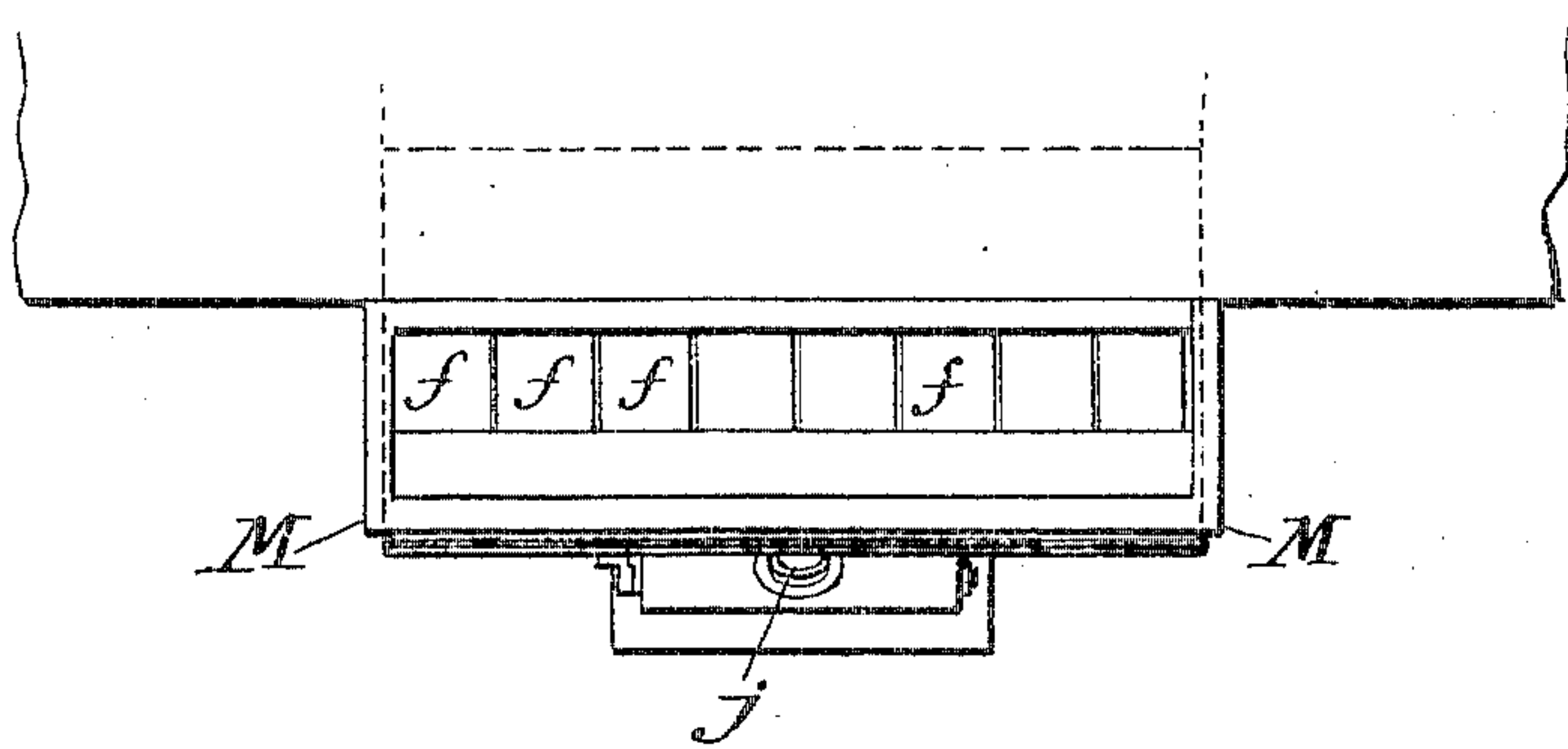
Russell Goldborough



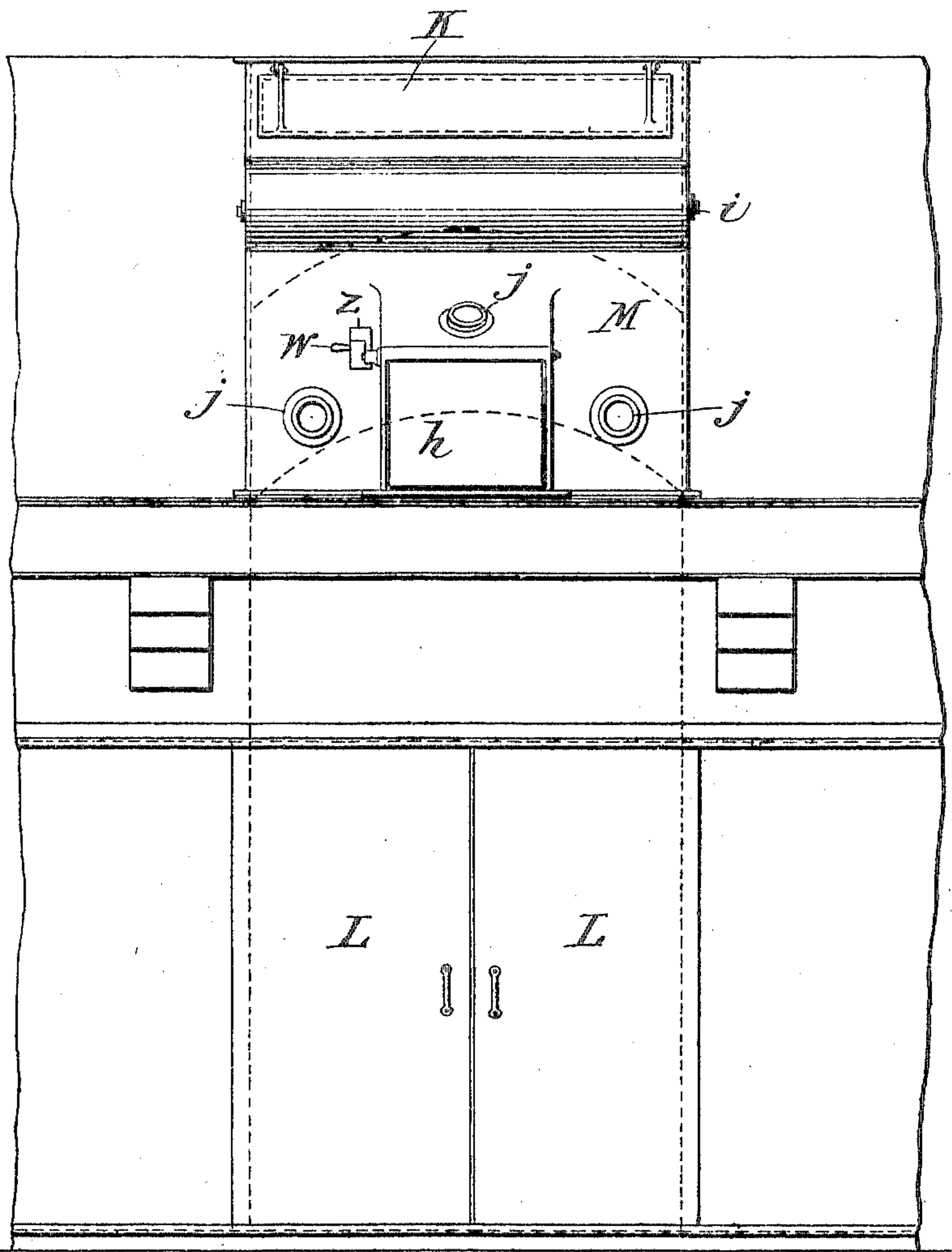
H. G. GINACA.  
BAGASSE BURNING FURNACE.  
APPLICATION FILED MAR. 23, 1904.

4 SHEETS—SHEET 3.

*Fig. 4.*



*Fig. 3.*



*Witnesses:*

*J. M. Wrenn*  
*E. C. Schuermann.*

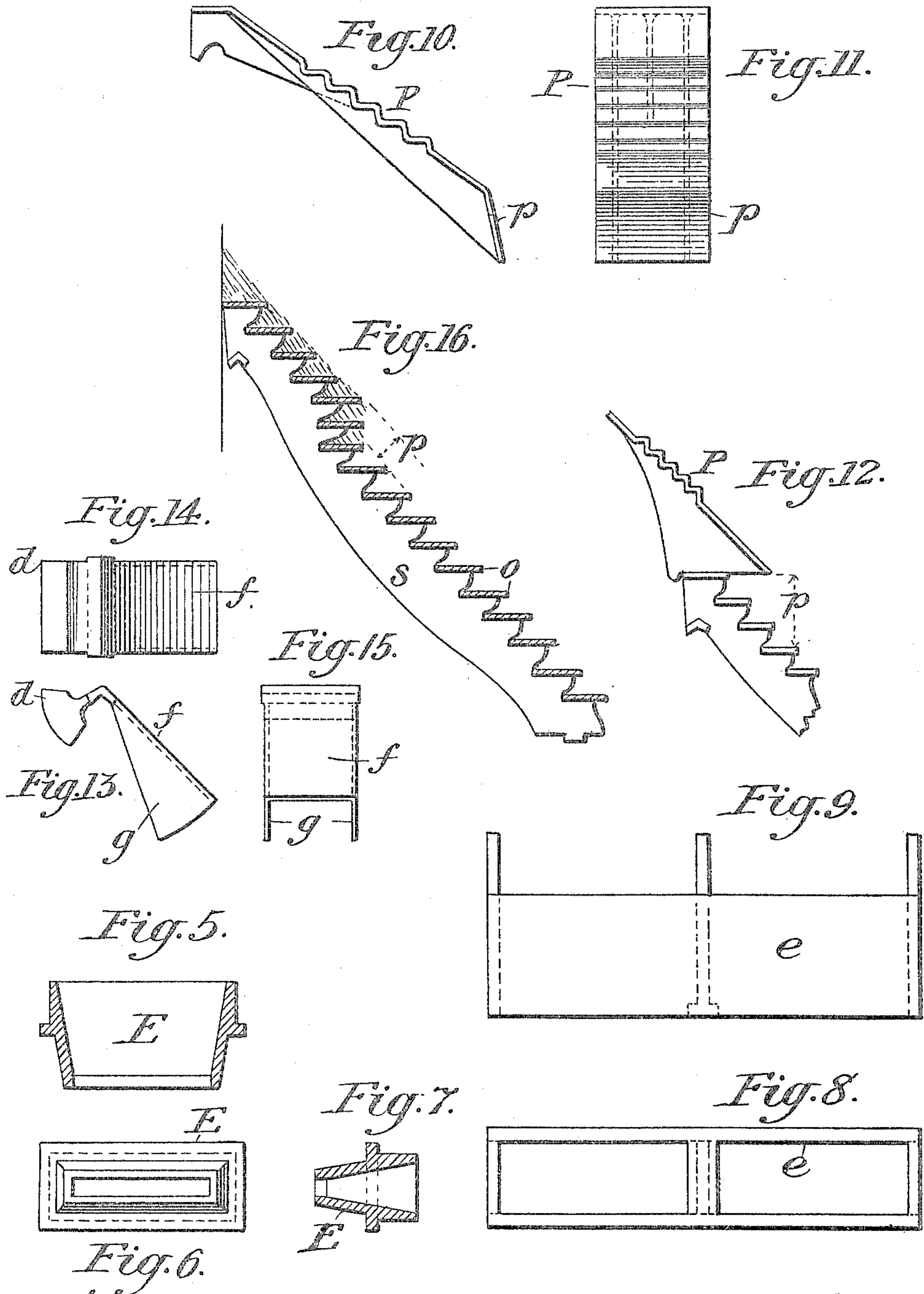
*Inventor:*

*H. G. Ginaca,*  
*By his attys.*  
*Reine & Goldborough*

H. G. GINACA.  
BAGASSE BURNING FURNACE.

APPLICATION FILED MAR. 23, 1904.

4 SHEETS—SHEET 4.



Witnesses:  
J. M. Mann  
E. C. Schuermann.

Inventor:  
H. G. Ginaca  
By his attys  
Rumsey & Co. Boston



# UNITED STATES PATENT OFFICE.

HENRY GABRIEL GINACA, OF HONOLULU, TERRITORY OF HAWAII,  
ASSIGNOR OF ONE-HALF TO ALVIN WELTY KEECH, OF HONO-  
LULU, TERRITORY OF HAWAII.

## BAGASSE-BURNING FURNACE.

No. 797,805.

Specification of Letters Patent.

Patented Aug. 22, 1905.

Application filed March 23, 1904. Serial No. 199 545.

*To all whom it may concern:*

Be it known that I, HENRY GABRIEL GINACA, a citizen of the United States, residing at Honolulu, Island of Oahu, Territory of Hawaii, have invented new and useful Improvements in Bagasse-Burning Furnaces, of which the following is a specification.

My invention relates to furnaces for burning bagasse or trash—the woody-fiber refuse of sugar-cane discharged from the juice-extracting machinery—and particularly to such furnaces as employ step-ladder grates.

The same principles are applied in this invention as were stated in an application for patent, Serial No. 178,768, filed October 27, 1903, by A. W. Keech and myself; but by the improvements in construction as are hereinafter shown and described a cheapening of the cost of installation may be effected and certain other advantages are obtained, as are hereinafter set forth.

In the accompanying drawings, Figure 1 represents a longitudinal sectional elevation of a bagasse-burning furnace embodying my invention. Fig. 2 represents a similar view showing some of these improvements as applied to an existing furnace setting. Fig. 3 represents in elevation the front of the furnace shown in Fig. 1. Fig. 4 represents a top plan view of the feeder forming part of the furnace-front. Figs. 5, 6, and 7 represent views of one of the twyers. Fig. 8 represents a front elevation, and Fig. 9 a top plan view, of one of the frames for setting in the brick-work for holding the twyers. Fig. 10 represents, on a larger scale, a side view of one of the plates under the feeder in Fig. 1. Fig. 11 represents an elevation at right angles to that shown in Fig. 10. Fig. 12 represents a modification of these plates. Fig. 13 represents, on a larger scale, a side view, Fig. 14 a top plan view, and Fig. 15 a rear elevation, of one of the feeder-flaps. Fig. 16 represents a side elevation of a step-ladder bearer and its grate-bars in section, showing a drop-off mentioned hereinafter.

Similar letters of reference indicate similar parts throughout the several views.

Referring to the drawings, it will be noted, Fig. 1, that the rear wall A of the furnace is carried up square, its top ending sufficiently below the arched top B of the furnace to permit of a suitable passage C to under the

boiler. This wall A may have an arched projection *a* from or near its top for the purpose of deflecting the gases, causing them to go forward, then upward and over this arched projection *a* before passing through the passage C to under the boiler. It also tends to confine the heat in the furnace. The rear wall A contains an air-flue D, supplying air to the furnace through the twyers E above the grates F. This air-supply, which is regulated by a gate G, becomes heated in passing through the passage D in the hot wall A previous to entering the furnace, the object being to admit this air through the twyers with sufficient velocity to cause a whirl and produce a thorough admixture of this air and the combustible elements rising from the burning mass on the grates. It is necessary to admit this air above the grates, as the thick layer of fuel on the grates prevents sufficient air from passing through the grates to effect complete combustion. The twyers E are preferably made with an elongated opening, as shown in Figs. 5 and 6, and are placed in a horizontal row in the rear wall A, so that the air enters through them in a layer almost the entire width of the furnace and immediately above the layer of burning bagasse on the lower grates in order that this air may combine with the combustibles as soon as they rise from the surface of the layer of fuel, so that combustion may be completed as soon as possible thereafter. Frames *e* (shown in Figs. 8 and 9) for holding the twyers E may be set in the rear wall A, by which arrangement the twyers E may easily be removed for cleaning or be replaced. The front wall H contains the ash-pit door-opening, with its frame, and in Fig. 1 is shown carried up to the level of the hand-firing floor K. The ash-pit doors are usually made double, rights and lefts, and are hinged to their frame so as to open outward. One or both doors have to be opened to clean the fire, and the amount these doors are opened governs the amount of air admitted and allowed to pass through the grates into the furnace, which is the present practice of regulating the draft. As hinged doors are not easily held open in any desired position so as to regulate the amount of this air, I have shown sliding doors L in Figs. 1 and 3, which will remain opened any desired amount. These doors L may



slide in grooves or be mounted on wheels and are moved parallel to and just outside of the front wall. The arched top B of the furnace ends at its forward end in the arch *b*, sprung from about the level of the hand-firing floor K and carried up to the level of the top of the furnace. I prefer to locate this arch *b* a short distance in the rear of the front wall H, as is shown in Fig. 1, although my improvements may be applied by building the arch *b* in the front wall of a furnace as at present constructed, as shown in Fig. 2. In front of the face of this arch *b* is the feeder M, with its projecting or swelled front resting upon the top of the wall H, as in Fig. 1, or upon a suitable support or on the hand-firing floor K, as in Fig. 2. This feeder M has the flaps *f* placed side by side on the bar *i* and each slightly overcounterweighted to tend to keep the feeder closed. When the weight of the bagasse upon a flap *f*, having entered the feeder through a chute, is sufficient to overcome the action of the counterweight *d*, the flap *f* drops to allow the bagasse to pass through the feeder, and as soon as relieved of the weight of bagasse the flap again closes. By using a number of flaps *f* in the width of the feeder M and providing each of them with ribs *g* underneath and at their edges, as shown in Fig. 13, very little air passes through the feeder when any of the flaps *f* are operating. The feeder M is preferably provided with a flap or door *h*, hinged at its top and located to cover an opening in the swelled front or lower projecting part of the feeder for use when firing by hand—as when starting up, for example. This flap or door may be counterweighted *z* to tend to keep it closed and may have a handle *w*, both of which are shown in Fig. 3. The object of the door *h* being made thus is to prevent as much as possible air from entering with the bagasse. When operated, the bagasse is pushed through the opening against the door *h* and the action of its counterweight *z*. The front of the feeder M is provided with bull's-eyes *j* or peep-holes with covers of mica to permit of examination of the furnace at all times. An inspection-door *k* may be located in the front of the feeder, above the flaps *f*, and is desirable when the chute supplying the feeder is a closed chute. By the construction as shown very little air is allowed to enter through this feeder and that which does enter has to pass down under the arch *b* and mingles with the gases rising from the fuel on the grates. This feeder may be easily removed for repairs to itself or to the wall or arch *b*, and being below the level of the bottom of the boiler instead of on the top of the furnace, as is the present practice, it permits of the boiler-tubes being cleaned from their front end without the removal of the feeder. The expense of the brickwork required for the construction of the furnace-front as shown in either

Figs. 1 or 2 is less than for that shown in application Serial No. 178,768, previously mentioned.

In bagasse-burning furnaces of the step-ladder type it has heretofore been the practice to place bearing bars or beams transversely across the furnace, with their ends set in the brick side walls of the furnace. Upon these bars *t*, Fig. 2, rest the step-ladder bearers *s*, which are usually placed one on each side of the furnace and near to and parallel with the side walls, one or two intermediate bearers being also employed, depending on the width of the furnace. Upon these step-ladder bearers *s* rest the grate-bars *o*, while the short horizontal grate-bars F at the rear of the furnace usually rest directly upon transverse bearers *t*. I make the bearing-beams shorter than is the present practice, their length being less than the distance between the side walls. I support these beams by a suitable frame N. Said frame may be mounted upon wheels *n*, forming a carriage, so that the grates may easily be withdrawn from the furnace-inclosure through the ash-pit doors for the purpose of cleaning or for repairs either to the grates or to the brickwork. This frame N may form the step-ladder bearers, as shown in Fig. 1. The short grate-bars F may be set as heretofore, as shown in Fig. 2, or they may also be supported on the carriage N, as in Fig. 1. By the construction shown in Fig. 1 the grates are, with their supports, independent of the brickwork, and therefore the brickwork is not effected by the expansion and contraction of the beams due to the heat of the furnace. Just inside the front wall H in Fig. 1 and above the ash-pit door-opening are plates P, forming a surface sloping downward and rearward, starting from about the level of the hand-firing floor K and ending in what I term a "drop-off" *p* above the top or upper step-ladder grate-bar *o*. These plates P are anchored to the front wall H or are hooked near their upper end over an anchored cross-bar *m* and rest upon another bar *q*, anchored under and near their lower end so as to allow the plates P to expand and contract due to the heat of the furnace. The bearers *m* and *q* for these plates P may be supported by brackets *r*, projecting inward and secured to the side walls or to the front wall H over the ash-pit door-opening. These brackets *r* may be provided with adjusting-screws by which the bearers *m* and *q* may be altered in position for the purpose of adjusting the slope of the plates P. The upper surfaces of the plates P are made rough with corrugations or serrations, as shown in Figs. 10, 11, and 12, although I do not confine myself to these shapes, the object being to cause the bagasse when falling upon these plates to rest and pile upon same and to prevent it from bouncing from said plates out into the furnace. The bagasse from the feeder M falls and piles upon the rough



surfaces of the plates P until the angle of repose is reached, beyond which the bagasse will slide down upon the top of the layer of fuel on the grates on account of the drop-off. This drop-off may be accomplished in various ways; but whatever way effected it amounts simply to having the plates placed at a higher elevation than that of the grates. It may be accomplished by the use of a cast piece or pieces *u* above the top step-ladder grate-bar, upon which the lower end of the plates P rest, as in Fig. 2, or these pieces *u* may rest upon or be part of the top step-ladder grates, by which the slope of the plates P is elevated above the slope of the step-ladder grates *o*. Special step-ladder bearers could be used made longer at their upper ends than has heretofore been the practice, which would not only support the grate-bars, but also the plates P, with their drop-off *p* or with separate pieces to form said drop-off. Step-ladder bearers could be made as shown in Fig. 16, and while they would have the advantage of the drop-off, yet they would be open to the objection of allowing air to pass through between the upper grate-bars, which is detrimental to the efficiency of the furnace. The openings between these bars could, however, be plugged or filled with fire-clay or other suitable material, as shown dotted, and thus in a measure obtain the desired result. In Fig. 2 a plate *v* is shown bolted to the bottom side of the feeder M to close up the triangular-shaped opening at each side of the feeder and between the plates P, the front wall, and the bottom of the feeder. These plates *v* may also act as brackets and be bolted to the front wall and aid in supporting the feeder.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a bagasse-burning furnace, the combination of the top B, the rear wall A extending upward so as to have a throatway C between it and the furnace-top B, said wall A having the overhanging arch or ledge *a*, and the front wall *b* depending from the furnace-top to near the level of the ledge *a*.

2. In a bagasse-burning furnace, the combination of the top B having the wall *b* depending from its front end, the rear wall A extending vertically upward so as to leave a throatway C between it and the furnace-top, an inclined step-ladder grate and an inclined floor having a roughened surface extending from the upper end of the grate upward past the wall *b* to the feeding-door, said floor being raised above the level of the grate to form a drop-off.

3. In a bagasse-burning furnace, the combination of the top B, having the wall *b* depending from its front end, the rear wall A extending vertically upward so as to leave a throatway C between it and the furnace-top, an inclined step-ladder grate, an inclined floor extending from the upper end of the grate upward past the wall *b*, and a feed-chute of which the wall *b* forms the rear side.

4. In a bagasse-burning furnace, the combination of the top B having the wall *b* depending from its front end, an inclined step-ladder grate, an inclined floor extending upward from the grate under the wall *b*, and a feed-chute delivering onto the floor, the wall *b* forming the rear wall of the chute.

5. In a bagasse-burning furnace, the combination of the top B having the wall *b* depending from its front end, a feed-chute of which the wall *b* forms the back side, and a sectional weighted flap *f* in the chute.

6. In a bagasse-burning furnace, the combination of the top B having the wall *b* depending from its front end, a feed-door at substantially the level of the wall *b*, a feed-chute of which the wall *b* forms the rear side, and a sectional weighted flap in the chute above the door.

7. In a bagasse-burning furnace, the combination of the rear wall A extending upward so as to leave a throatway C between it and the furnace-top, an inclined step-ladder grate, an air-flue in the wall-opening just above the lower end of the grate, frames *e* secured in said openings, and removable twyers in said frames.

8. In a bagasse-burning furnace, the combination of the rear wall A extending vertically to near the furnace-top as shown, an inclined grate, an opening cut in the rear wall just above the lower end of the grate, frames *e* secured in said opening and supporting the rear wall, and rectangular twyers removably secured in said frames.

9. In a bagasse-burning furnace, the combination of the wall *b* depending from the front end of the top B and forming the back side of the feed-chute, a door for hand feeding on substantially the level of the lower end of the wall *b*, said door having a hinged flap, and a weighted flap or flaps in the chute above the door for automatic feeding.

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

HENRY GABRIEL GINACA.

Witnesses:

GEO. P. THIELEN,  
ROBT. J. PRATT.