

J. GUARDIOLA.

Improvement in Apparatus for Making Sugar.

No. 128,541.

Patented July 2, 1872.

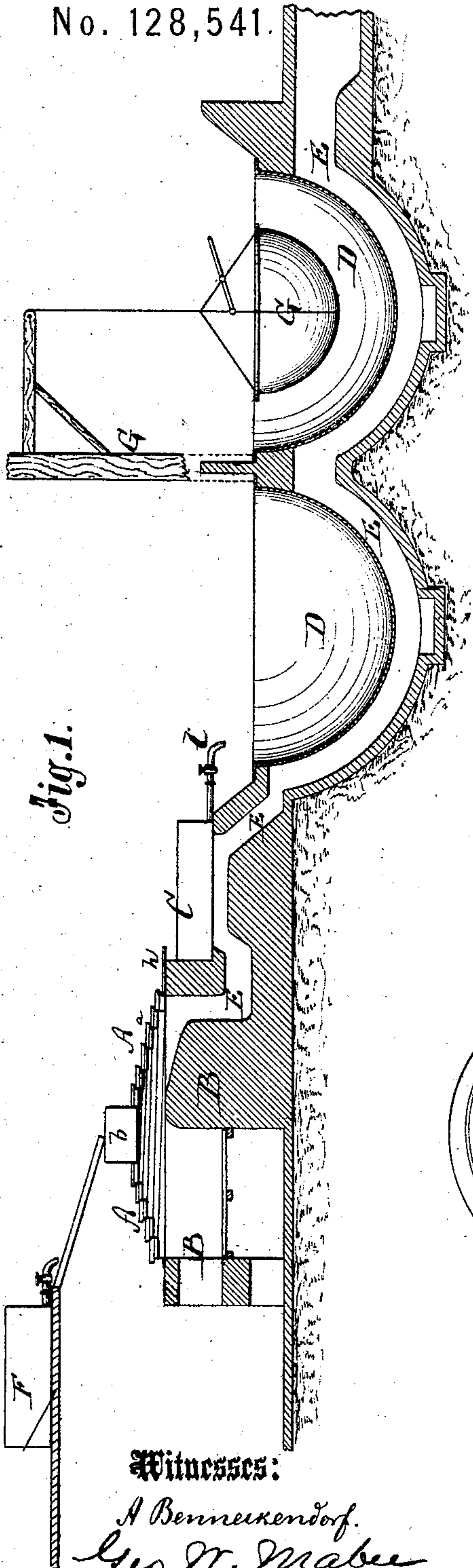


Fig. 1.

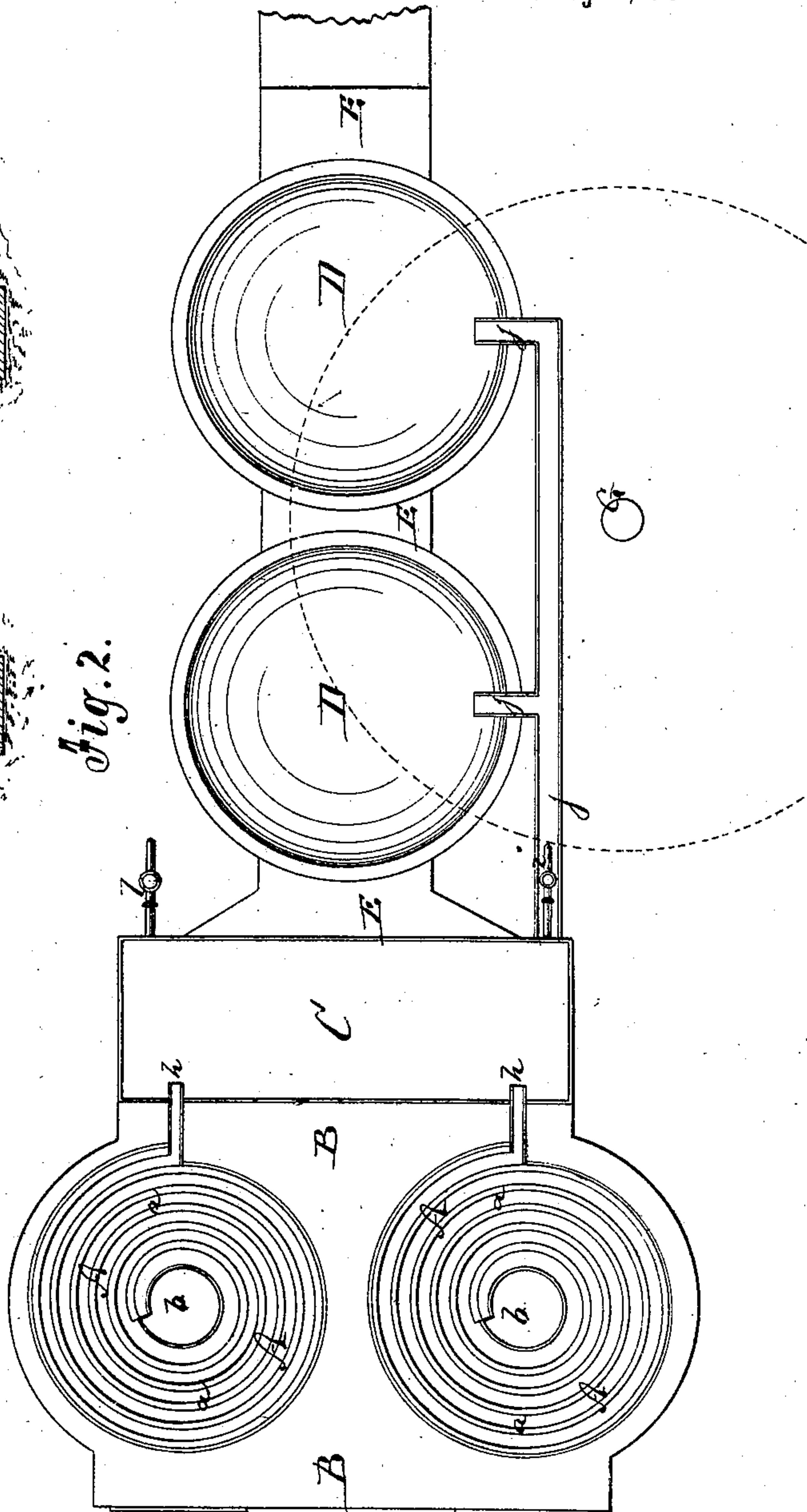


Fig. 2.

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Fig. 3.

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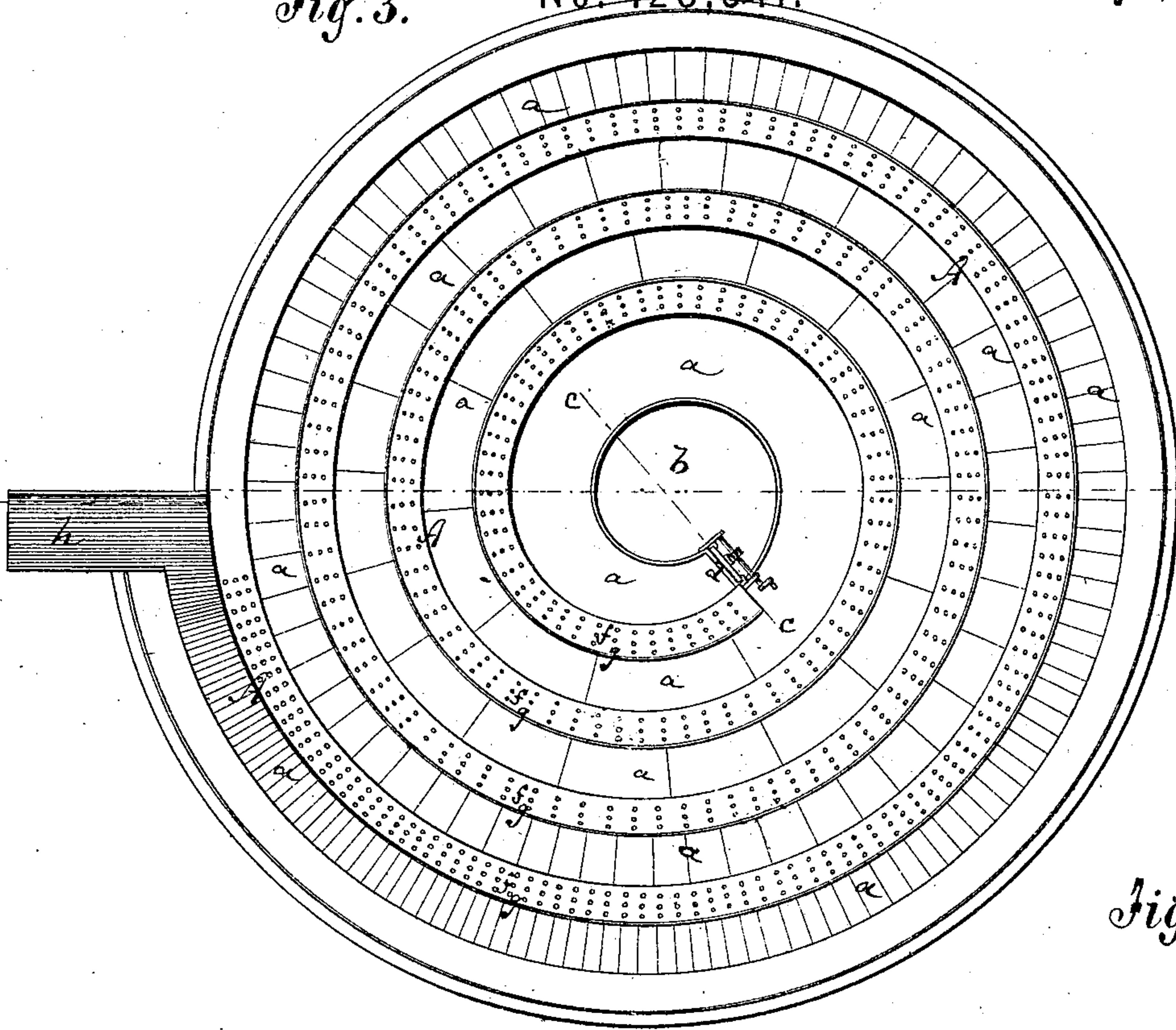


Fig. 4.

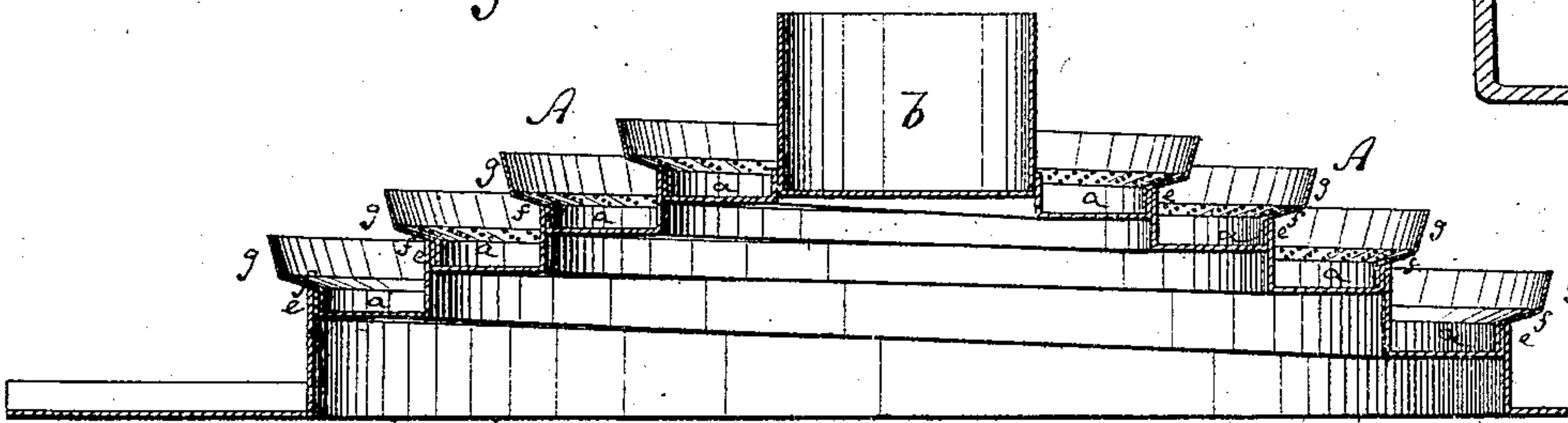


Fig. 8.

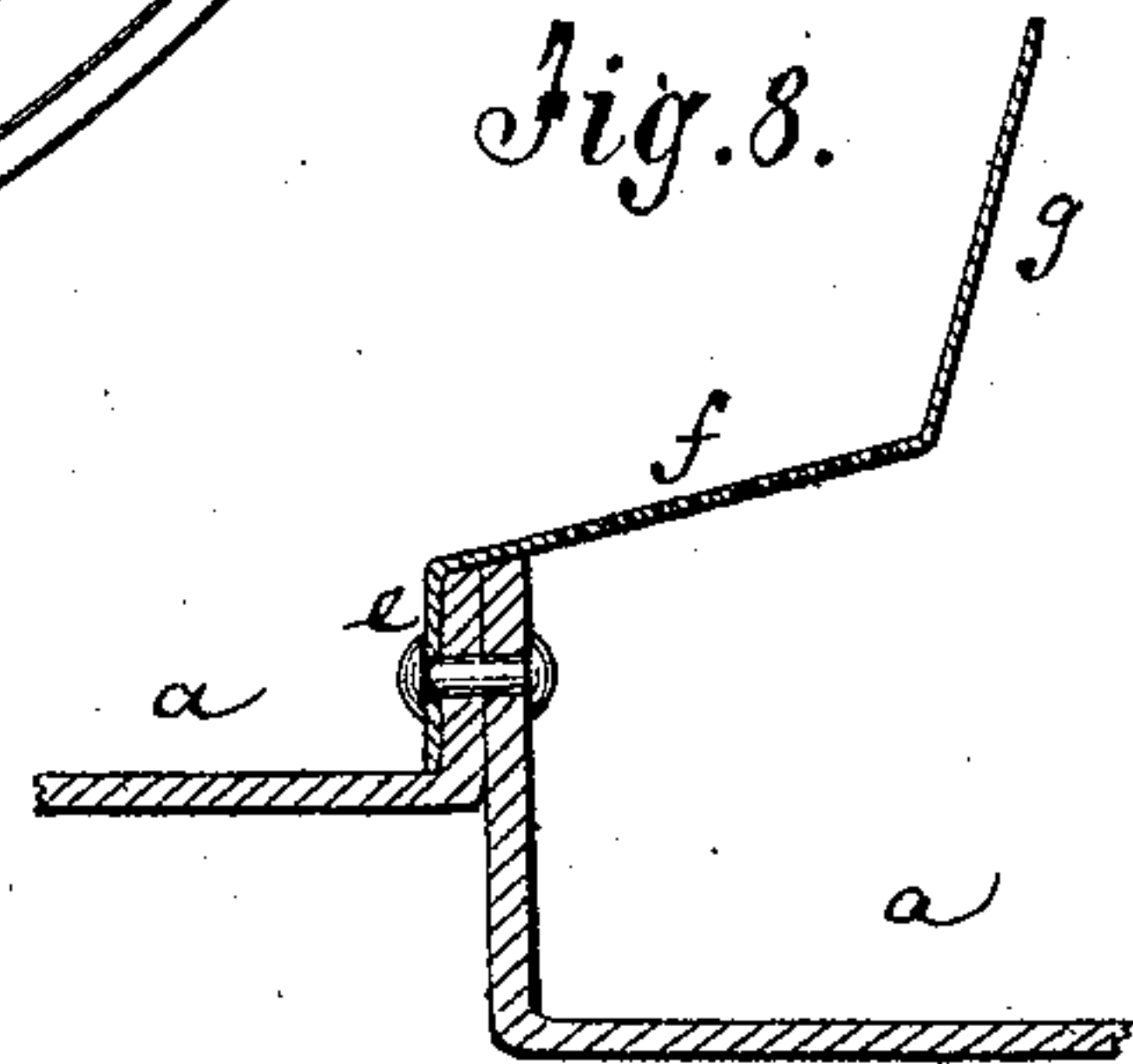
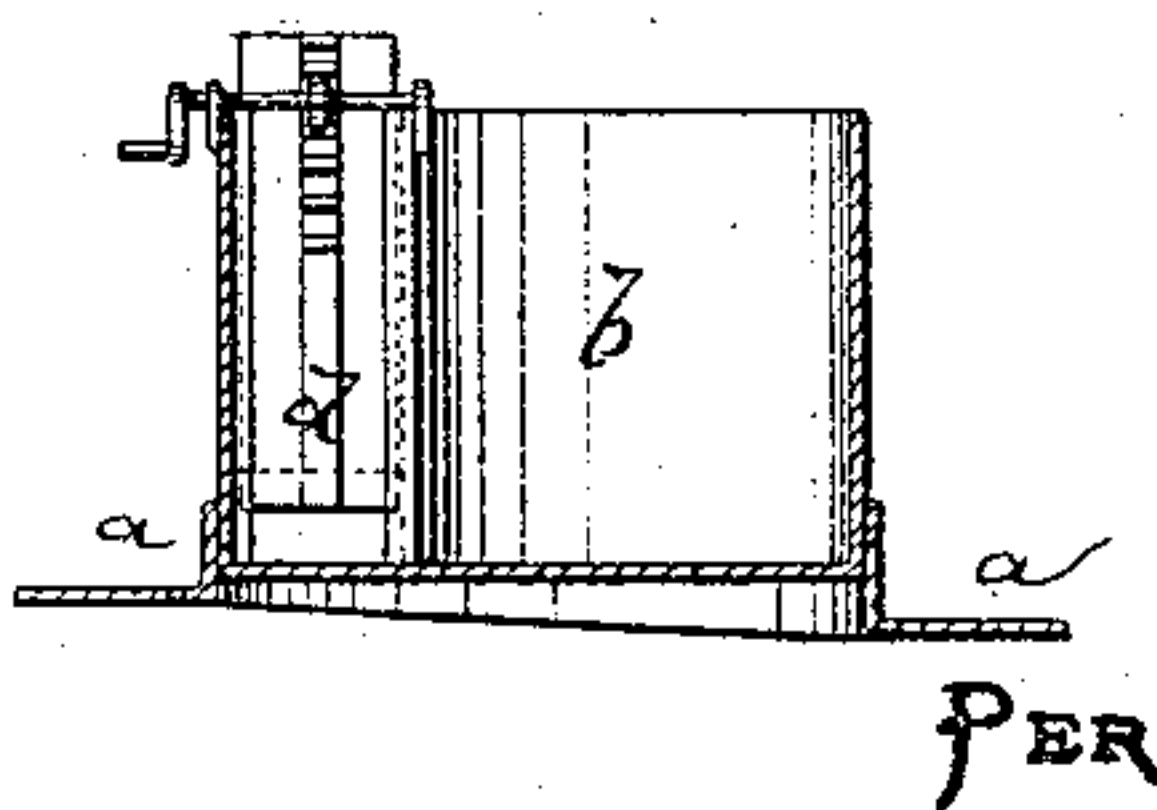


Fig. 7.



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No. 128,541. Patented July 2, 1872. *Fig. 5.*

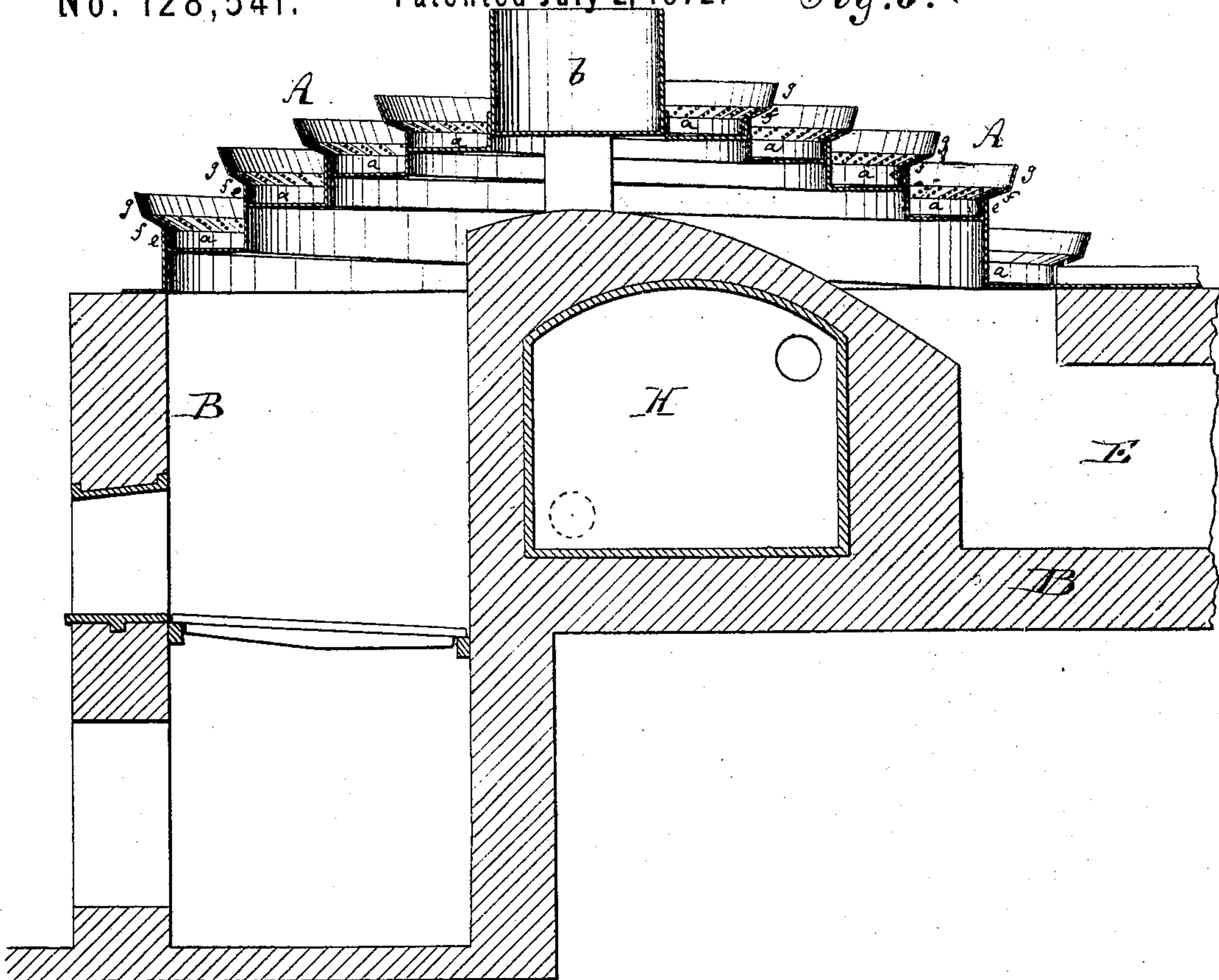
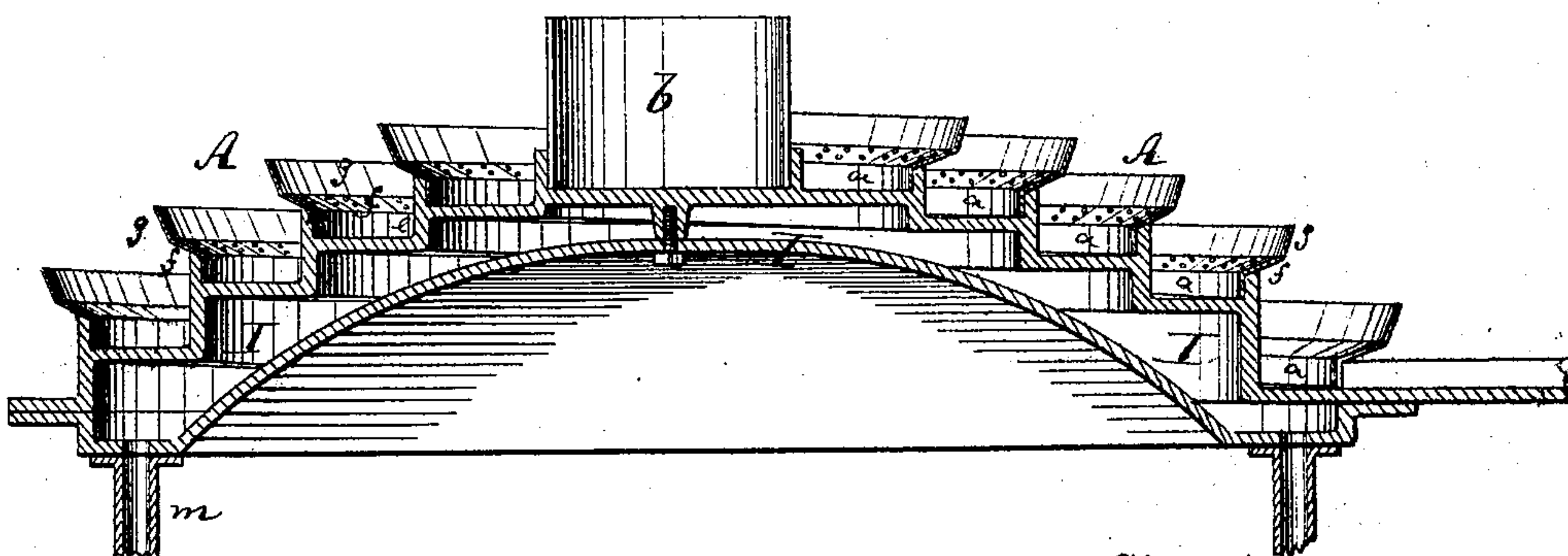


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOSÉ GUARDIOLA, OF CHOCOLÁ, CENTRAL AMERICA.

IMPROVEMENT IN APPARATUS FOR MAKING SUGAR.

Specification forming part of Letters Patent No. 128,541, dated July 2, 1872.

Specification describing a new and useful Improvement in Sugar-Making Apparatus, invented by JOSÉ GUARDIOLA, of Chocolá, in the Republic of Guatemala, Central America.

Figure 1 represents a vertical longitudinal section of my improved sugar-making apparatus. Fig. 2 is a top view of the same. Fig. 3 is a detail top view of one of the evaporating and skimming helices. Figs. 4, 5, and 6 are vertical central sections of the same, showing modifications in its arrangement. Fig. 7 is a detail vertical section on the line *c c*, Fig. 3; and Fig. 8, a transverse section of the partition between the coiled passages of the helix.

Similar letters of reference indicate corresponding parts.

This invention relates to a new sugar-evaporating apparatus, and to new means for rapidly and effectually defecating sugar-juice. It consists more particularly in a novel construction of helix, in which the syrup or juice is gradually evaporated and conveyed to tanks for further treatment, and wherein it is also skimmed by overflowing from one part of the coiled channel to another. The invention also consists in a novel combination of one or more of such helices with a series of tanks and devices for the further effectual treatment of the saccharine matter.

A in the drawing represents one form of evaporating helix employed by me in the treatment of sugar. It is made of metal to form a spiral channel, *a*, gradually descending with the distance from the center, so that it is considerably higher in the center than toward the outer part, as shown. The center of the helix is formed by a vertical tube, *b*, in the side of which is an opening for the discharge of the juice into the channel *a*. A gate, *d*, serves to close, or to more or less open this aperture, see Fig. 7, and can be adjusted up or down by means of a rack and pinion, or equivalent mechanism. The outer rim of the spiral channel *a* throughout its entire length is made in shape of a vertical ledge, *e*, which has an outwardly-projecting horizontal flange, *f*, and an upward lip, *g*, on the latter, as is more fully illustrated in Fig. 8, though also shown in Figs 4, 5, and 6. If any of the juice that flows downward along the spiral channel *a* boils over, it is thrown on the flange *f*, which is perforated, and is thereby skimmed, so that the impure parts will re-

main on the surface of said perforated flange. Along the lowermost convolution of the channel *a* the flange *f* is not perforated, so that from such lower part of the channel the juice cannot be laterally discharged. Two helices, A A, of the kind described, are placed side by side over a furnace, B, so that their discharge-spouts *h h*, which connect with the lower ends of their channels *a*, extend over or into a receiving-tank, C, as shown in Figs. 1 and 2. A faucet, *i*, on the tank C, serves to let the juice into a trough, *j*, whence it is conducted into one of two tanks, D D, of preferably circular form. The smoke-passage E extends from the furnace B all the way under the tanks C and D D, as shown in Fig. 1, and leads finally into a chimney, not shown. A faucet, *l*, may be applied to one end of the tank C, for the discharge of water when said tank is to be cleaned.

The operation is substantially as follows: The cane, beet, or sorghum juice passes from a mill into steam-defecators of ordinary or suitable construction; is then by suitable mechanism elevated to and passed through bag filters, or equivalent filtering means; whence it flows into a vat, F. From this vat it is drawn into the central tubes *b* of the helices A A. It is not necessary that two such helices A be used, as one alone may answer, though in that case the channel of the one helix will have to be proportionately enlarged—*i. e.*, elongated. From the helix-evaporators A A the juice falls into the defecator C, and through the faucet *i* and gutter *j* is conducted to either of the two last evaporators D D, to be finished to a density of from 25° to 30° Baumé, for the vacuum-pan or other process. By means of a crane and dipper, G, the syrup can be taken from the evaporators D D and deposited into a tank for final treatment. There may be a separate furnace under each helix A, the flues of both meeting under the defecator C, or but one furnace may be beneath both helices.

If it is desired to heat air, for sundry purposes, a hot-air box, H, may be placed into the bridge of the furnace, in the manner indicated in Fig. 5, and connected with a fan working at the proper speed, for blowing cold air into it, and with a proper pipe for conveying the heated air to any desired place. By means of the gate *d* the flow of the liquid to the spiral

channel can be regulated. If a helix of considerable length is used, the inclination of its channel should be increased, say every fifty feet, as the liquid gradually becomes thicker and requires more pitch to flow without burning. A long helix would also require a pipe to extend from the vat F over every convolution of channel, in order to permit the injection of juice to any place where it may be required, to prevent the burning of liquid and apparatus. A great amount of the water contained in the juice is evaporated in going through the helix, and the stream of juice or sirup coming out of it is comparatively pure. A boy with a rag or brush can clean the strainer or skimmer flange *f*, no other attendance being requisite. The juice in the pan C will be continuously boiling, and as there will always be a stream entering it, the faucet *i* will be opened and the boiling juice admitted to the pans D, of which a suitable number may be employed, these to be emptied by the crane dipper in the manner indicated. It will take but a few minutes for the juice to pass through a helix and be properly evaporated. The yield will therefore be greater and the quality of produce better than in any other apparatus for the same purpose.

In Fig. 6 is illustrated a helix placed over a steam-chamber, I, so that the juice on said helix will be heated by means of steam let into the chamber I through a pipe, *m*. Steam may, in like manner, be conducted under the pans C and D, and the furnace therefore dispensed with.

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

1. The helix A, containing the spiral channel *a* and the perforated skimming-flange *f* along said channel, substantially as herein shown and described.

2. The combination of the helix or helices A with the defecator C and pans D D, to constitute a sugar-evaporator, as specified.

3. The air-heating box H, arranged within the furnace of a sugar-evaporator, as and for the purpose specified.

The above specification of my invention signed by me this 22d day of December, 1871.

JOSE GUARDIOLA.

Witnesses:

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