

(No Model.)

2 Sheets—Sheet 1.

W. E. KEYES.

MEANS FOR COOLING MASH IN DISTILLERIES, &c.

No. 354,709.

Patented Dec. 21, 1886.

Fig. 1.

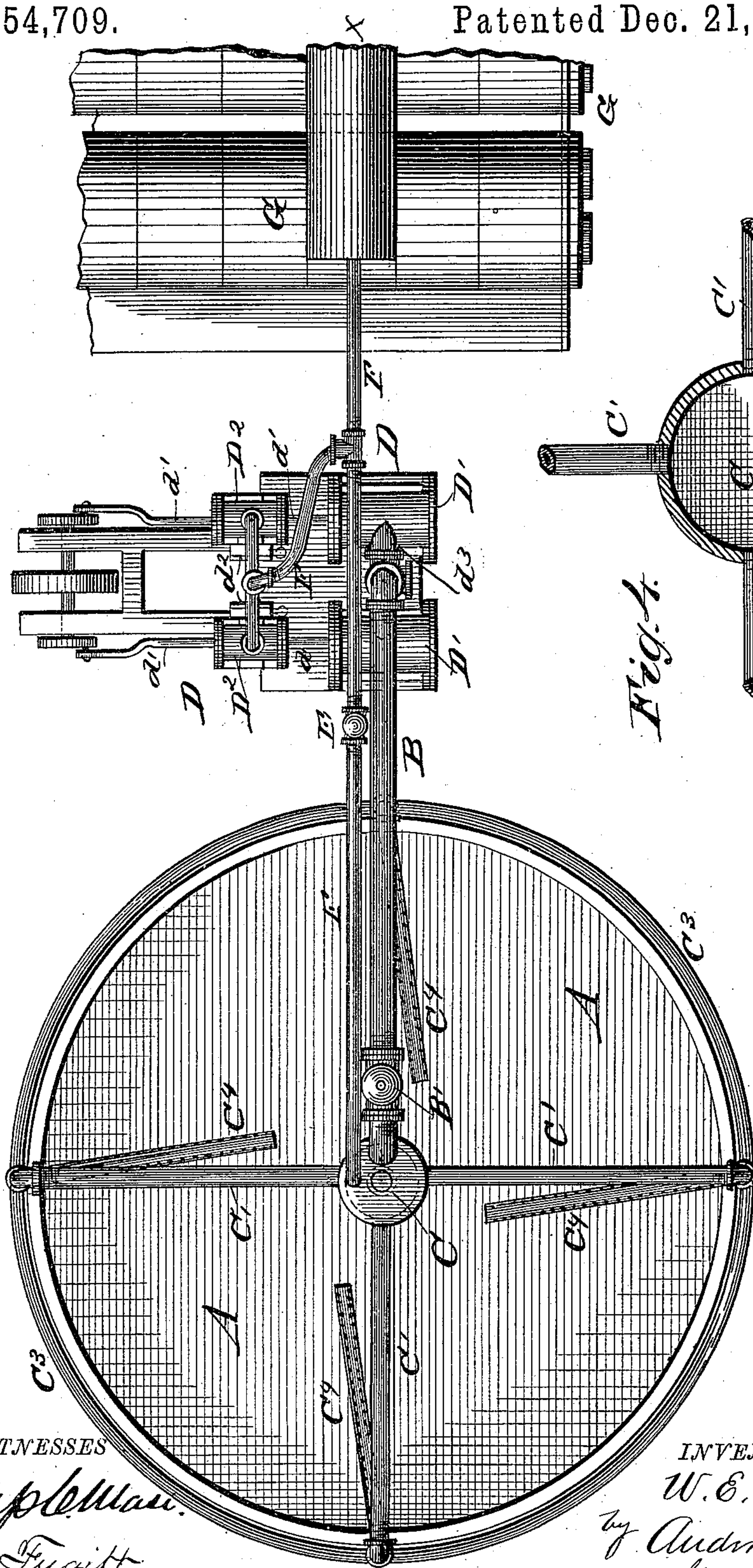
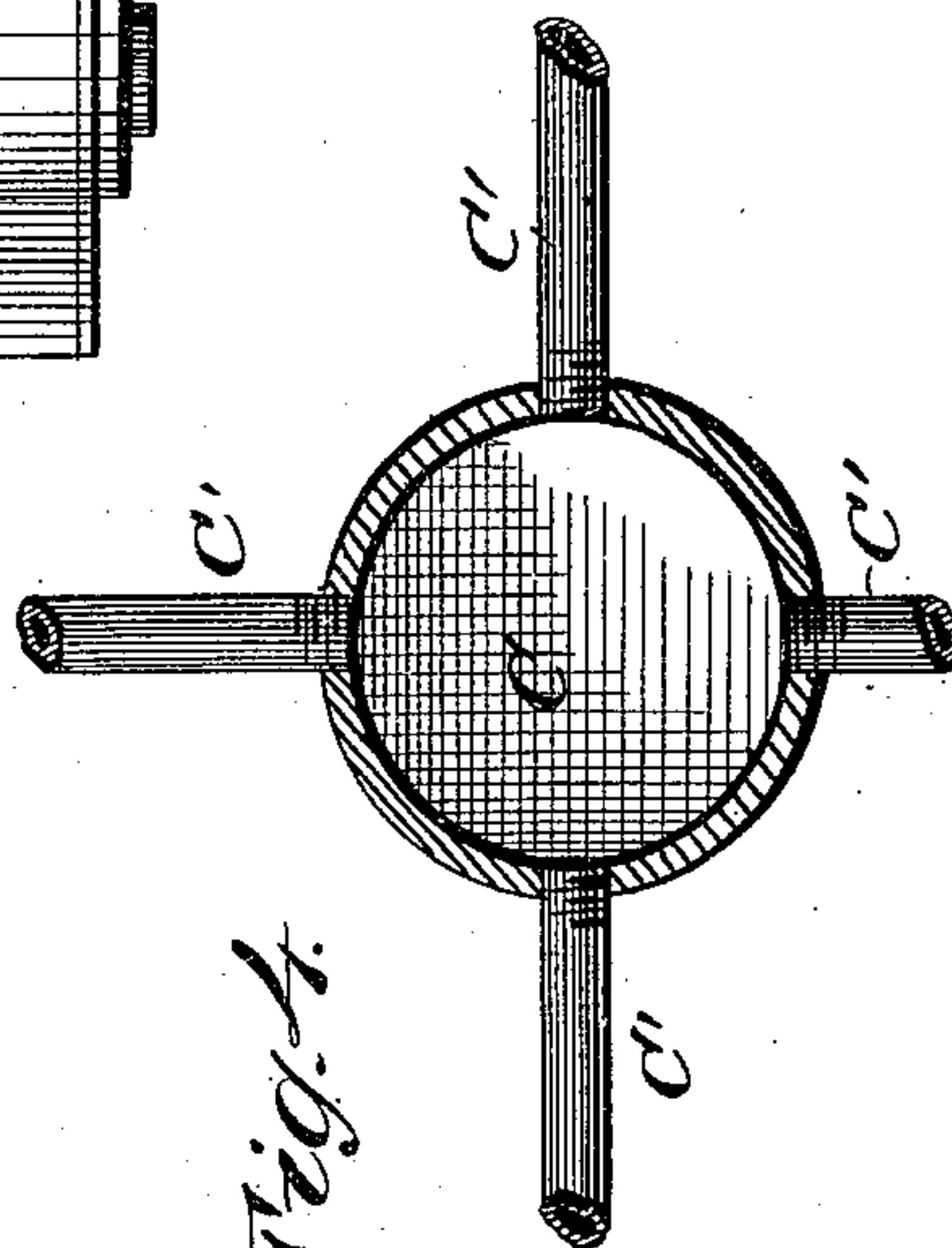


Fig. 2.



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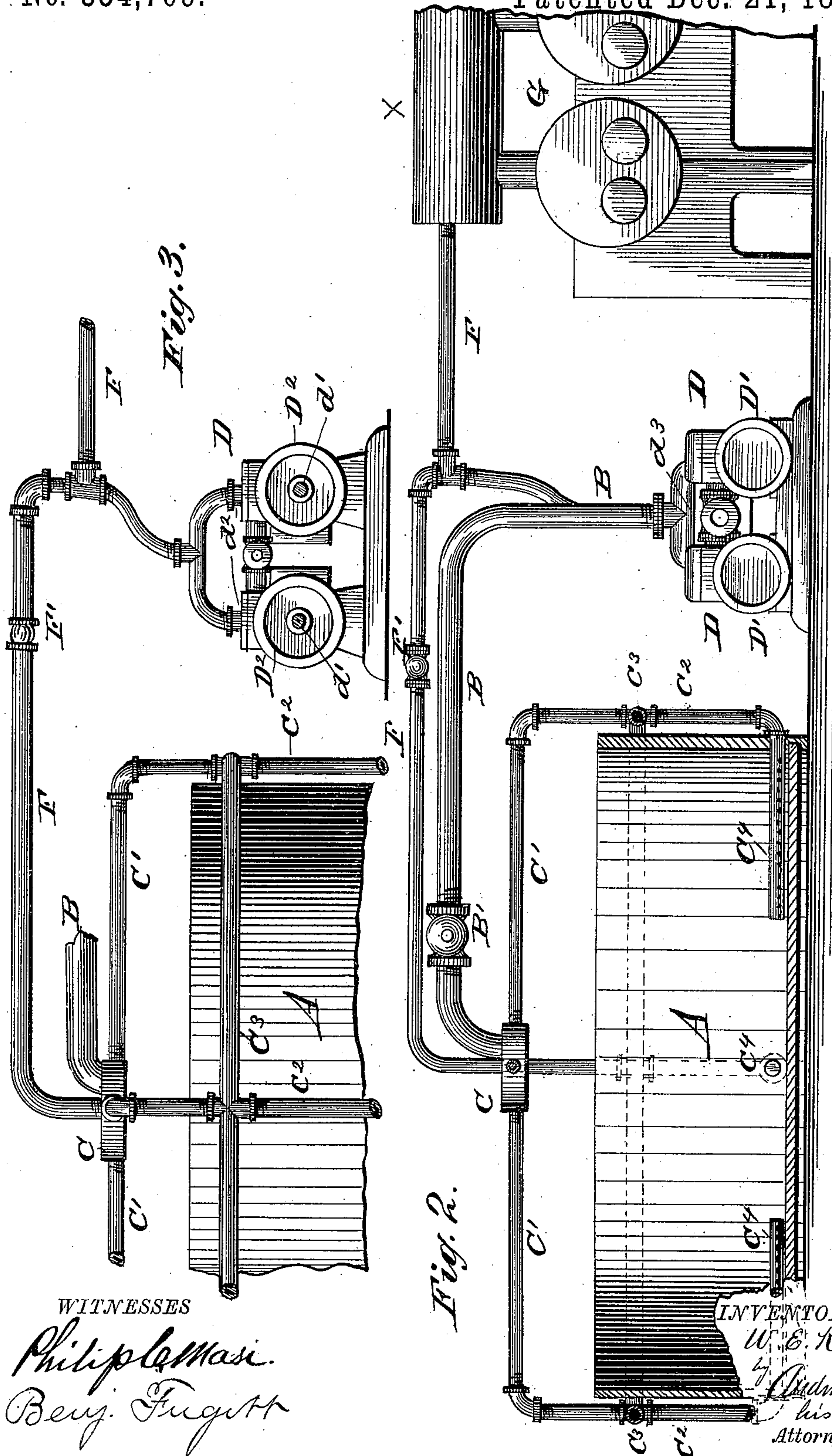
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# UNITED STATES PATENT OFFICE.

WILLIAM E. KEYES, OF LOUISVILLE, KENTUCKY.

## MEANS FOR COOLING MASH IN DISTILLERIES, &c.

SPECIFICATION forming part of Letters Patent No. 354,709, dated December 21, 1886.

Application filed April 3, 1886. Serial No. 197,709. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM E. KEYES, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Means for Cooling Mash in Distilleries, &c.; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a representation of a top or plan view. Fig. 2 is a side elevation, partly in section. Fig. 3 is a sectional side view of the tub A, showing the pipes connected with the distributing-chamber C, with each other, and with the forcing pumps. Fig. 4 is a horizontal sectional view through the distributing-chamber C, showing the pipes connected therewith.

This invention relates to improvements in apparatus for cooling mash in distilleries and vinegar-factories, its object being to economize the time required in cooling same.

Referring by letter to the accompanying drawings, A designates the mash-tub, of suitable form and size, and B is the air-pipe which connects with the distributing-chamber C at the center and top of the mash-tub A.

B' is a valve located near the distributing-chamber C, from which four pipes radiate and are joined to an encircling pipe, C<sup>3</sup>, on the outside of mash-tub A, said encircling pipe connecting the vertical pipes and conveying steam or cold air, as the case may be, to all of them, thereby equalizing the pressure in said vertical pipes. The four pipes above mentioned equal the area in cross-section of the pipe F between the air-cylinder X and the sum of the areas of the distributing-chamber C, from which vertical pipes C<sup>2</sup> run down along the vertical wall of the mash-tub A, and enter the mash-tub A near its bottom, and extend inwardly along the bottom and a short distance above the bottom to near the center of the vat or tub. Those portions C<sup>4</sup> of the pipe C<sup>2</sup> that enter the mash-tub A are perforated to permit air to be forced into the mash in the tub. The perfo-

rations in pipes C<sup>4</sup> are not confined to any size or shape, but may be made round or oblong, and the number and size of said pipes will be controlled by the capacity of the mash-tub A, which will be varied according to requirements of distilleries and vinegar-factories in which they are used.

D D are forcing or air pumps, each composed of an air-cylinder, D', and a steam-cylinder, D<sup>2</sup>, and a piston-rod, d', with piston-heads to fit air-cylinder D' and steam-cylinder D<sup>2</sup>. The steam-piston works in the steam-cylinder D<sup>2</sup>, running through the cylinder-head of D', and made tight with a stuffing-box, and thus moving the piston-head in cylinder D', to which the piston-rod d' is attached. The steam-cylinder takes steam from the steam-chest d<sup>2</sup>, and is connected with a proper boiler, which supplies the steam, and may be the boiler G. In that case the steam-pipe F connects the boiler with the steam-chest d<sup>2</sup>, the steam-pipe being bifurcated, so as to connect with both steam-chests, and is provided with a throttle-valve, F', to cut off steam when necessary. The air-cylinder takes air during the outward reciprocation of the piston through proper inwardly-opening valves, and during the inward reciprocations of said pistons they deliver air through proper outwardly-opening valves to the pipe B.

The air-pump, being of the ordinary construction, needs no further description. The pipe B rises from the air-chest d<sup>3</sup> between the cylinder D D', is bent outwardly, and at its outer end is bent downwardly and enters the distributing-chamber C.

The total area in square inches of a transverse section of the delivery-pipe B should be and is one-fourth of that of the piston-head, in order to prevent heating of the air under compression in passing from the cylinders to the mash-tub A.

The size of the delivery-pipe B should be ten inches in diameter, which I have found to be ample for the purpose.

The method of operating the apparatus is as follows: The mash is introduced into the tub A and raised to the proper temperature, which is the boiling-point. When the boiling has been continued long enough, the valves B' and F' are opened, and the air-pumps are set in operation and force cool air in through the pipes E, C, C', and C<sup>2</sup> into the mash, which is



agitated by the rakes and quickly cooled, the air passing through it from below upward.

The rakes mentioned are those commonly used in stirring the mash, and will be understood by persons skilled in the art to which the invention relates without further reference or illustration.

The air in summer-time may be cooled by a refrigerating apparatus, either before entering the cylinder or while passing through the pipe B to the mash-tub A.

The encircling pipe may be made small enough to extend around the inner circumference of the tub, in order that the vertical pipes may run down on the inside of the outer wall of the mash-tub A.

A mash-rake comprising a hollow rake-head provided with hollow rake-teeth having central cutting-edges has been supplied with steam through feed-pipes connected by a pipe with the rake-head, and an air-pipe, combined also with a pipe leading to the rake-head, has been used in this connection for supplying a current of cold air to the rake-head to cool the mash. Further, I am aware that a carburetor has been constructed and used prior to my invention in which three communicating chambers have been combined with a water-tank, an air-pipe surrounding the carburetor-chamber, pipes descending from the air-pipe to a lower oil-chamber, having perforated partitions in said chamber, and means for forcing air through the air-pipes. Further, an apparatus for removing B. S. oil from oil-tanks has been used, consisting of a drum provided with a series of radiating pipes which have disks at their lower ends, said drum being arranged to be supplied with steam, hot air, or hot water from a suitable source, and having a main exhaust-pipe con-

nected with a force-pump or other exhausting apparatus, and I make no claim to either of said constructions herein.

Having described this invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with the mash-tub and the forcing-engine, of the exterior encircling pipe, the central air-chamber, the horizontal pipes connecting the air-chamber with the encircling pipe, and the external vertical pipes having the horizontal perforated extension entering the mash-tub near the bottom and extending to near the center thereof, substantially as specified.

2. The combination, with the mash-tub provided with the air-chamber, the horizontal pipes, and the external vertical pipes having the perforated horizontal portions extending into the mash-tub near its bottom, of the air-pumps and the delivery-pipe having a total area in cross-section in square inches which is equal to one-fourth of that of the piston-head, substantially as specified.

3. The combination, with the mash-tub provided with the encircling pipe, of the air-chamber, the horizontal pipes connecting the air-chamber and the encircling pipe and the vertical external pipe, and the horizontal perforated pipes entering the mash-tub near the bottom thereof, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

WM. E. KEYES.

Witnesses:

DANL. J. HARDING,  
BEN A. NEWHALL.