

SMITH & HARRIS.
Drying Apparatus.

2 Sheets—Sheet 1.

No. 98,808.

Patented Jan. 11, 1870.

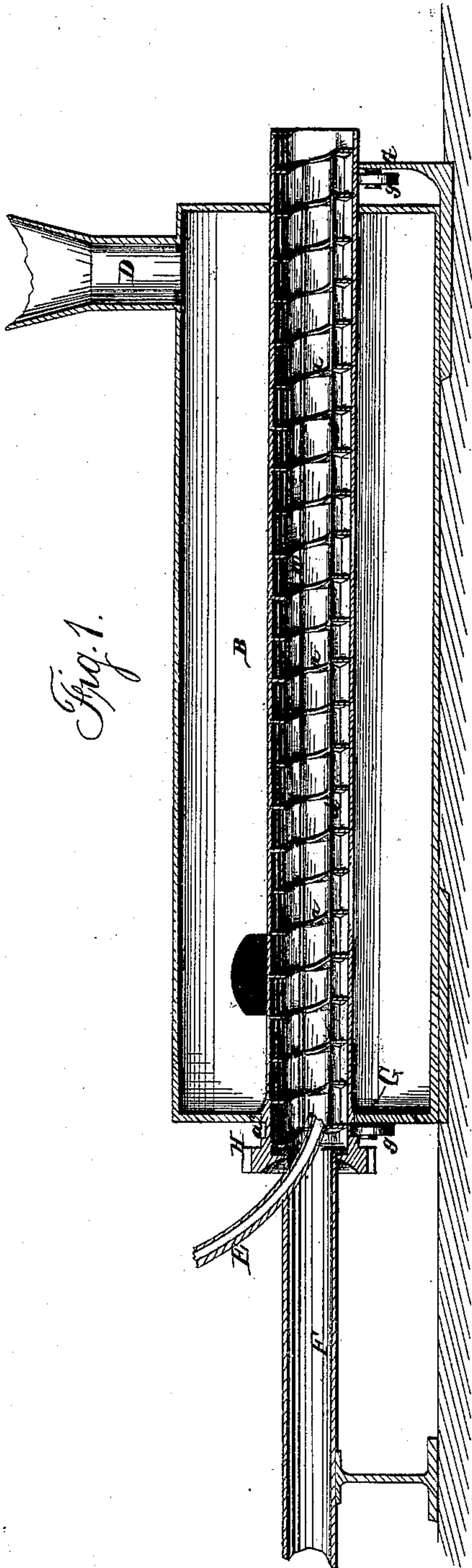


Fig. 1.

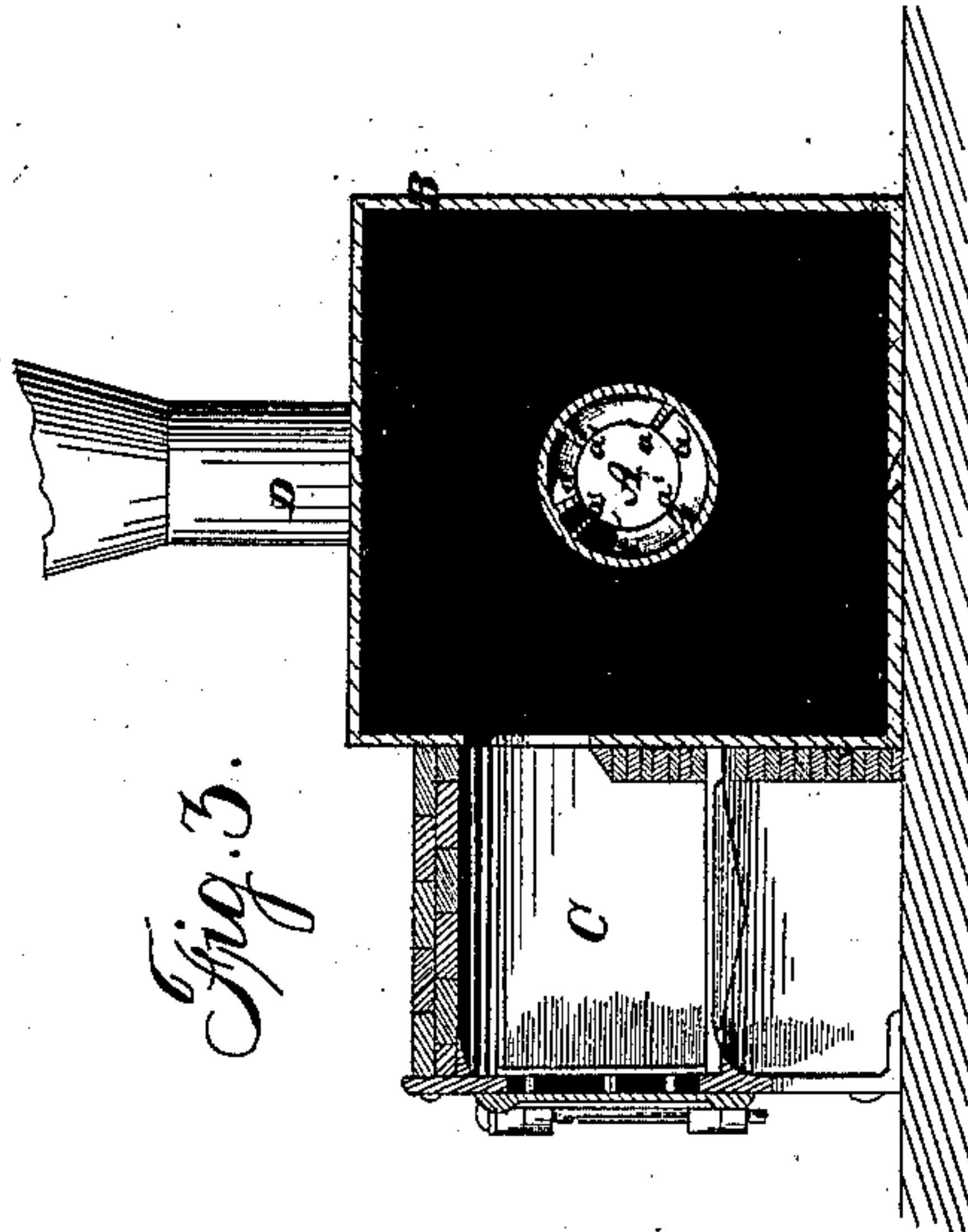


Fig. 3.

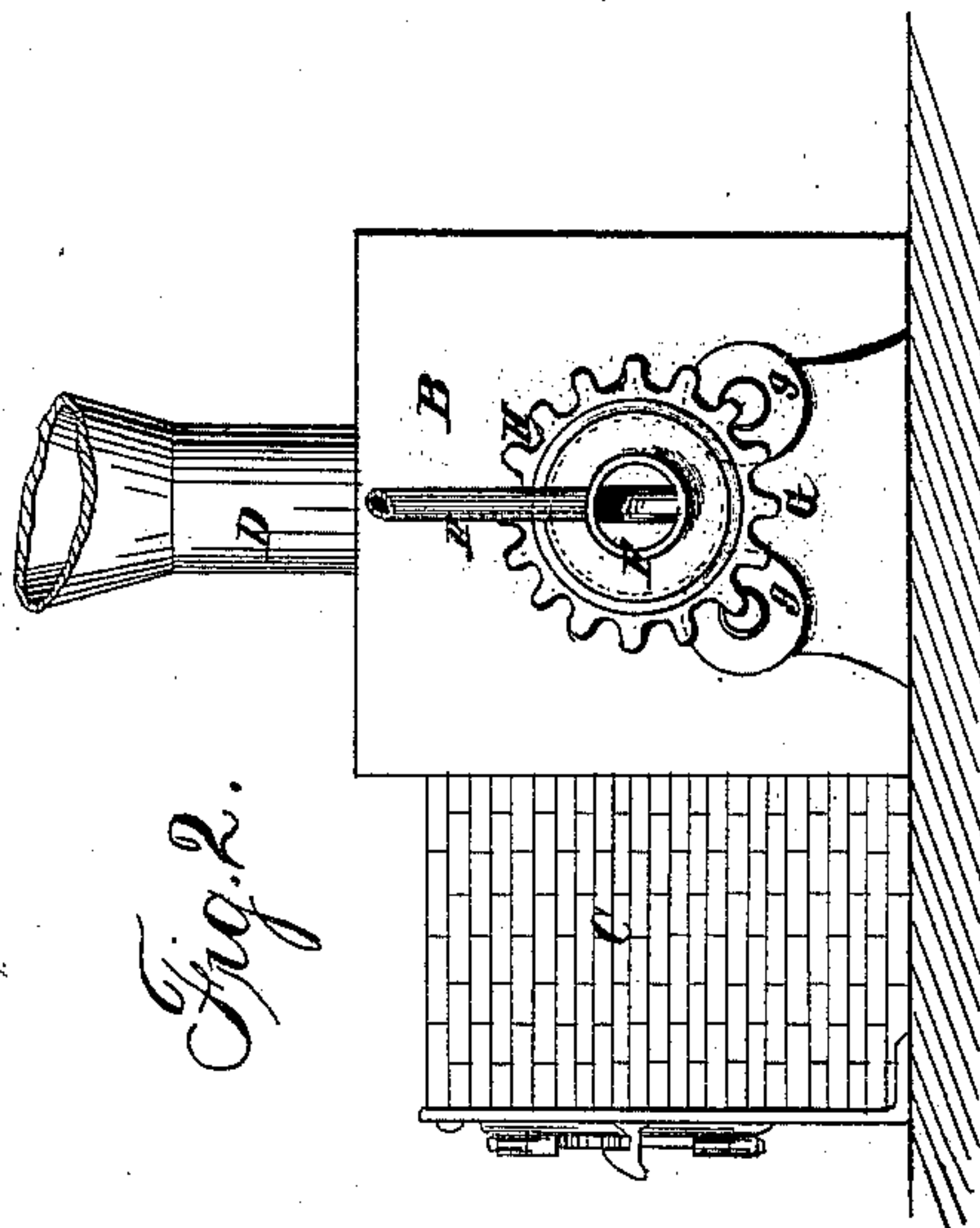


Fig. 2.

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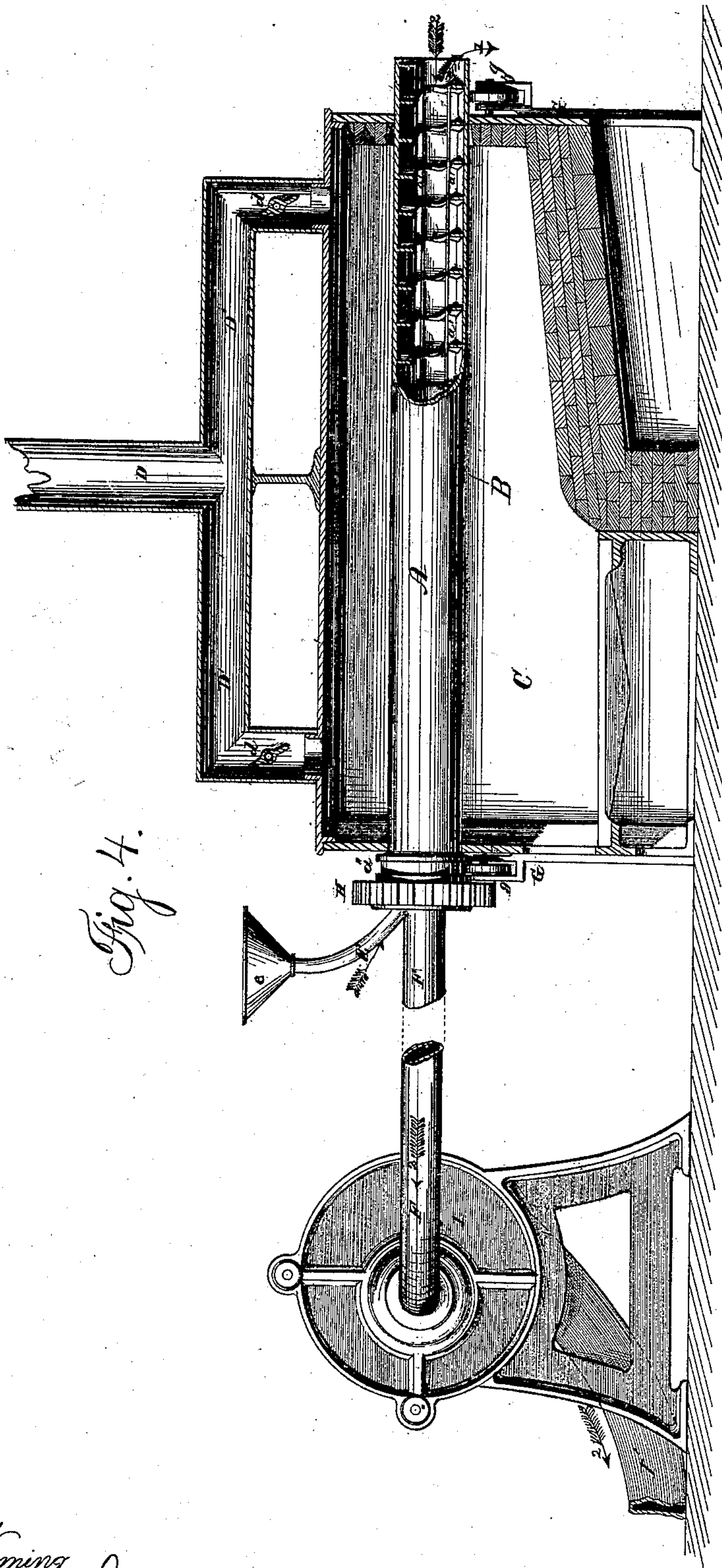


Fig. 4.

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BENJAMIN R. SMITH AND J. CAMPBELL HARRIS, OF PHILADELPHIA,
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Letters Patent No. 98,808, dated January 11, 1870.

IMPROVED APPARATUS FOR DESICCATING SUBSTANCES.

The Schedule referred to in these Letters Patent and making part of the same.

We, BENJAMIN R. SMITH and J. CAMPBELL HARRIS, of the city and county of Philadelphia, and State of Pennsylvania, have invented an improved Apparatus for Expelling Water from Substances with which it may be chemically or mechanically combined; and do hereby describe the same.

Nature and Objects of the Invention.

The drying or separating-chamber of our improved apparatus consists of a horizontal or nearly horizontal cylinder, provided with suitable means for the conveyance of the material through it, and its proper agitation during the operation. It is surrounded by a heating-chamber or jacket, which is heated by a furnace, or its equivalent; has the material to be treated supplied to it at one end, and discharges it at the other; and has connected to it, at its supply end, a suction-pipe, drawing air through it in opposite direction to the motion of the material being treated, to carry off the moisture, as separated by the heat, and keep the cylinder supplied with fresh, dry air.

Our invention consists in the provision of said means for carrying off moisture, and in the combination and arrangement of the parts referred to.

It is applicable for the drying of dye-woods, after curing, and for the expelling of the water of crystallization from various chemical salts, such as alum, and others.

Description of Drawings.

In the accompanying drawings, made a part of this specification—

Figure 1 represents a vertical longitudinal section of an illustrative form of our improved apparatus;

Figure 2, an end elevation of the same;

Figure 3, a transverse section of the same; and

Figure 4, a vertical longitudinal section, partly in elevation, of a different form of the apparatus.

Similar marks of reference indicate like parts in the several figures.

A represents the drying or separating-cylinder;

B, the heating-chamber, or jacket;

C, the furnace for heating the chamber B;

D, the pipe for carrying off the products of combustion;

E, the pipe or conduit for the supply of the material to the drying-cylinder; and

F, the suction or blast-pipe.

The arrows 1 1 (fig. 4) represent the movement of the material during the operation, and 2 2, the blast.

General Description.

The separating-cylinder A is, preferably, as shown

in the drawings, mounted in suitable bearings, G G, the surface of which may be composed of friction-rollers, *g g*, and provided with a gear-wheel, H, or its equivalent, for the application of power thereto, to rotate it. It is, in this case, provided internally with one or more spiral flanges, *a*, to propel the material through it, and with longitudinal strips or flanges *a'*, to stir or agitate the material in its passage, to secure its uniform treatment; and, externally, with a circumferential groove, *a''*, for the reception of one or each set of its supporting-rollers, *g*, (or any equivalent device,) to retain it longitudinally.

The suction-pipe F is further, in this case, attached, axially, to the separating-cylinder, a suitable swivel-joint being employed, and the supply-pipe E enters it through the suction-pipe, as represented.

Instead of this construction, the separating-cylinder may be stationary, the material being conveyed and agitated by any usual or suitable means, and the attachment of the supply and suction-pipes varied in that case, if preferred. It may be built of boiler-iron, or other suitable material, in usual manner.

The heating-chamber B may consist of a steam-jacket. It, preferably, however, constitutes the fire-space of a suitable furnace, as shown. Its construction, in either case, is variable. As constituting the fire-space of a furnace, its grate or furnace proper, C, may be built externally thereof, as represented in figs. 1 and 3, or arranged therein, as represented in fig. 4, and its flue, D, lead directly out of it, as represented in figs. 1 and 3, or be connected to it by branch-pipes D' D', as represented in fig. 4. In either case, suitable dampers, *d d*, fig. 4, may be employed to regulate its action.

The supply-pipe E may terminate in a funnel or hopper, *e*, fig. 4, through which to supply the material thereto. Its relative capacity may be varied.

The suction-pipe F may lead to the centre of a rotary fan, I, fig. 4, from which an air-discharge-pipe, I', may lead to some convenient locality.

The feed may be regulated by a spiral conveyer, such as are usual in mills, receiving its supply from a large bin, or other receptacle, and so operated by belts and gearing as to revolve as fast as desired, and so deliver just as much as the cylinder will manage.

The size and capacity of the apparatus are of course variable. It may be employed for treating any material for which it is adapted.

Operation.

The requisite heat being raised in the heating-chamber B, and imparted to the separating-cylinder A therefrom, and motion, meanwhile, imparted to said cylinder, or to the conveying and agitating-devices *a a'*,

then to the fan I by which the blast is produced, the material to be treated is fed, through the pipe E, to the interior of the separating-cylinder, and agitated and conveyed therein, receiving the heat of the cylinder, and having its moisture, as separated, carried off by the blast of air passing over and through it, through the suction-pipe F, and at the same time supplied with fresh, dry air to assist in the operation. The speed of the conveying-device and the draught of the furnace having been properly regulated, the material is finally discharged at the rear end of the separating-cylinder, perfectly freed from water. By suitably extending the separating cylinder outside of its heating-chamber, the material may be cooled, more or less, before being discharged.

The blast drawing in opposite direction to the motion of the material, the separated moisture is brought in contact with that only which is less nearly freed

from moisture, and thus its removal rendered certain, and its complete separation effected.

Claims.

We claim, as our invention—

1. The combination, with a drying or separating-cylinder, A, of a suction-pipe, F, attached at or near its supply-end, for the withdrawal of the separated moisture, substantially as herein set forth.

2. An apparatus for expelling water from substances, consisting of a separating-cylinder, A, provided with a conveyer, *a*, and agitators, *a'*, a heating-chamber, B, a supply-pipe, E, and a suction-pipe, F, arranged and operating as herein described, for the purpose set forth.

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