

T. S. HARRISON.

Drying Apparatus.

No. 101,458.

Patented April 5, 1870.

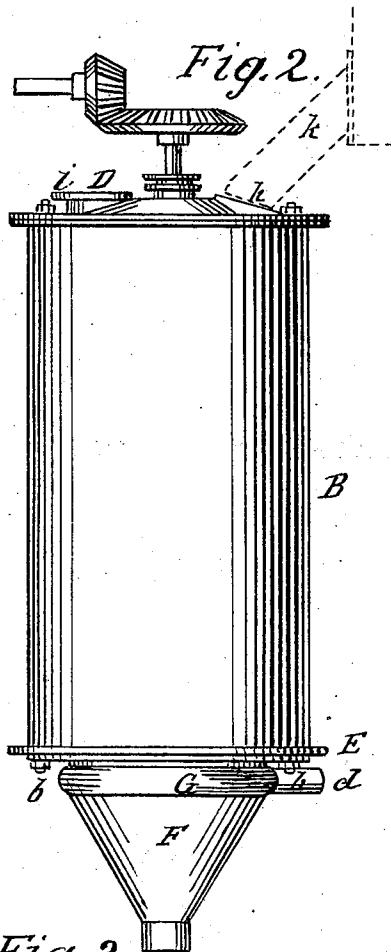
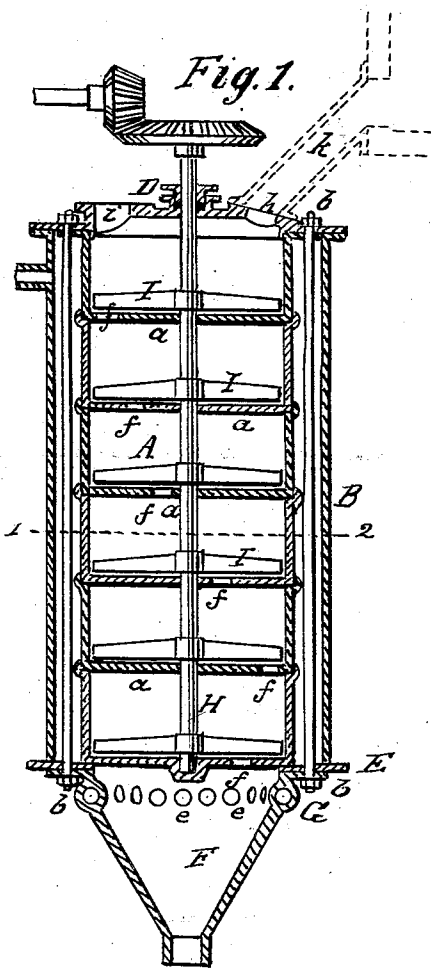


Fig. 4.

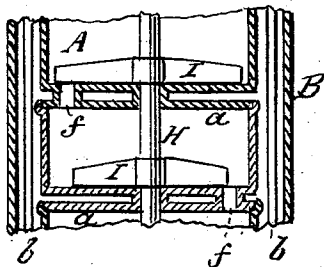
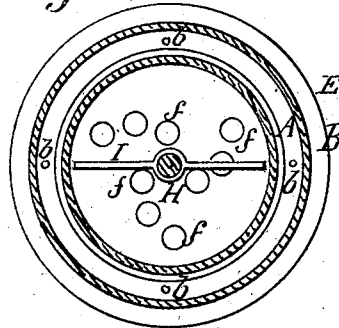


Fig. 3.



Witnesses

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THOMAS S. HARRISON, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 101,458, dated April 5, 1870; antedated March 25, 1870.

DRIER.

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

I, THOMAS S. HARRISON, of Philadelphia, Pennsylvania, have invented an Improved Drying Apparatus, of which the following is a specification.

Nature and Objects of the Invention.

My invention consists of a hollow casing, which contains a series of perforated partitions, and through which a current of dry or heated air is directed to meet the streams of the material to be dried as it falls from partition to partition, all substantially as described hereafter, the whole forming an economical drying apparatus, continuous and automatic in its action. My invention further consists of certain adjuncts to and modifications of the apparatus, and in a peculiar manner of constructing the same, all as hereinafter explained.

Description of the Accompanying Drawings.

Figure 1 is a vertical section of my improved drying apparatus;

Figure 2, an exterior view of the same;

Figure 3, a sectional plan on the line 1 2, fig. 1; and

Figure 4, a sectional view illustrating a modification of my invention.

General Description.

A is an inner cylinder or casing, composed, in the present instance, of a number of sections placed one above the other, and fixed together in the manner clearly indicated in the drawing, each section having a base, *a*, and the several bases forming partitions, which separate the interior of the cylinder into compartments, the latter communicating with each other through openings, referred to hereafter.

An outer cylinder or casing, B, in the present instance, surrounds and is arranged concentrically with the inner cylinder A, an annular space intervening between the two for a purpose explained hereafter.

A cover-plate, D, is fitted to the top, and a base-plate, E, to the bottom of both cylinders, and on the under side of the latter plate is fitted the inverted cone-shaped spout F.

The inner and outer cylinder, cover-plate, base-plate, and spout may be economically secured together by bolts *b*, passing through the annular space between the cylinders, as shown in figs. 1 and 3.

An annular chamber, G, communicating with a pipe, *d*, is formed in the spout F, near the upper part of the same, and this chamber communicates with the interior of the spout through a number of perforations, *e*.

A center shaft, H, has its lower bearing in the bottom of the inner cylinder, and passes through the several partitions *a a* and through a stuffing-box in the cover-plate D, and on this shaft are arms above

and in close proximity to each partition, but not in contact therewith, and turning with the said shaft, the latter being driven by any suitable system of gearing.

In each partition are a number of holes, *f*, which I prefer to arrange in the manner illustrated in fig. 3, but which may be differently disposed of, as the diameter of the cylinder, number of arms I, and the speed of the shaft may suggest.

In the cover-plate are two openings *h* and *i*, the former communicating through a pipe or spout, *k*, (shown by dotted lines,) with a vessel containing the white-lead or other material to be dried, and the other opening, *i*, communicating with a fan or other exhausting medium, or with such a condensing-apparatus as will catch such particles of the material as the upward current of air may direct through the exhaust-pipe.

Heated air is admitted through the pipe *d* to the annular chamber G, and is distributed through the perforations *e* into the interior of the spout F. This heated air should be perfectly dry, and may be produced by a coil of pipes placed within the furnace of a steam-boiler, when the latter is at hand, or a special furnace may be employed for heating the air.

Heated air may also be admitted to and forced through the annular space intervening between the two cylinders, or steam may be used in place of air when it cannot gain access to the inner cylinder, or the outer cylinder may be entirely dispensed with and a single cylinder or casing only be used, and if desired, this may be protected from loss of heat by radiation by a covering of felt or other non-conducting substance.

The white-lead or other material to be dried passes, by gravitation, through the pipe *k* into the uppermost compartment of the cylinder A, and falls onto the highest partition *a*, over the surface of which it is so swept by the arms I as to be directed through the partition in as many small streams as there are openings *f*, and these streams are met by the upward current of hot air induced by exhausting-apparatus with which the cylinder communicates.

The material thus falls from partition to partition in small streams, is stirred by the arms as it arrives at each partition, and the streams are constantly met by the upward current of hot air, and this continues until the material escapes in a perfectly dry condition through the spout F into any suitable receptacle.

It will be observed that the drying process is not of that abrupt or sudden character which might injuriously affect many materials, as the heated air at the top of the cylinder is necessarily cooler than it is below; in other words, as the material descends it is subjected to a constantly increasing temperature.

I prefer, in all cases, to so arrange the holes of the

several partitions that those of one partition shall not coincide with those of the next, otherwise the material would pass through the cylinder without receiving the full advantage of the stirring action of the arms and the change in the direction of the streams.

In the modifications shown in fig. 4, the partitions *a a* are hollow and communicate with the space intervening between the two cylinders, so that steam or hot air may circulate within the partitions and thus add to the drying properties of the apparatus.

It will be evident, without further description, that as the material descends by gravitation, and as the apparatus is automatic, the material, in its wet state, entering the drier and leaving it in a dry condition, and as the process is continuous, and a comparatively trifling amount of power is required to operate it and induce the upward current of hot air, the apparatus is more economical, and will dry materials more uniformly than the usual drying floors, which demand constant attendance and the tedious manipulation of the material, as well as the labor of removing the dry and replacing it with the wet material at intervals.

It will be seen that the drying is effected by causing the material to pass from one partition to another by stirring or agitating the material as it reaches each partition, and causing the material, in falling in subdivided streams, to meet an upward volume of the heated air. Although I have shown and described specific mechanism for conducting these operations, I do not desire to confine myself to the precise apparatus shown, for it may be altered and modified without departing from the main features of my invention.

For instance, the central shaft and its arms may, in drying some materials, especially if they are of a granular nature, be dispensed with, the stirring and agitation on the partition, and the direction of the material to and through the openings, being accomplished by a suitable movement imparted to the cylinder.

In using the term cylinder, I wish it to be understood that the casing containing the partitions need not, in all cases, be cylindrical, and, although I have used the terms heated air throughout the specification, there are many materials which can be dried in

the above described apparatus by the employment of simple dry air.

In drying some materials of a light nature, small particles may be carried upwards with the ascending current of air. To provide against loss in such cases, I cause the air discharged by the exhausting apparatus to pass through water, contained in an adjacent cistern, in which the particles are deposited. This adjunct to the drying apparatus will be readily understood without the aid of illustrations.

Claims.

1. A drying apparatus, consisting of a hollow casing, which contains a series of partitions, perforated substantially as set forth, and through which a current of heated or dry air is directed to meet the streams of material as they pass from partition to partition, all substantially as set forth.

2. The combination of the above, with a cistern or reservoir of water, through which the heated or dry air can be forced after passing through the partitioned casing.

3. The combination of the casing, partitioned substantially as described, with the shaft H and its arms I.

4. The cylinder or casing A, composed of a series of sections, having perforated bases, forming the above-mentioned partitions, and fitted together all substantially as specified.

5. The spout F, adapted to the partitioned casing, and having an annular chamber, G, communicating through perforations with the interior of the said casing.

6. So arranging the perforations or openings in the several partitions that those of one partition shall not be directly above those of the other.

7. The hollow perforated partition, (shown in fig. 4,) communicating with the space between the inner and outer casings.

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

THOMAS S. HARRISON.

Witnesses:

H. HOWSON,
JOHN WHITE.