J. BLACK.

DRYING MACHINE.

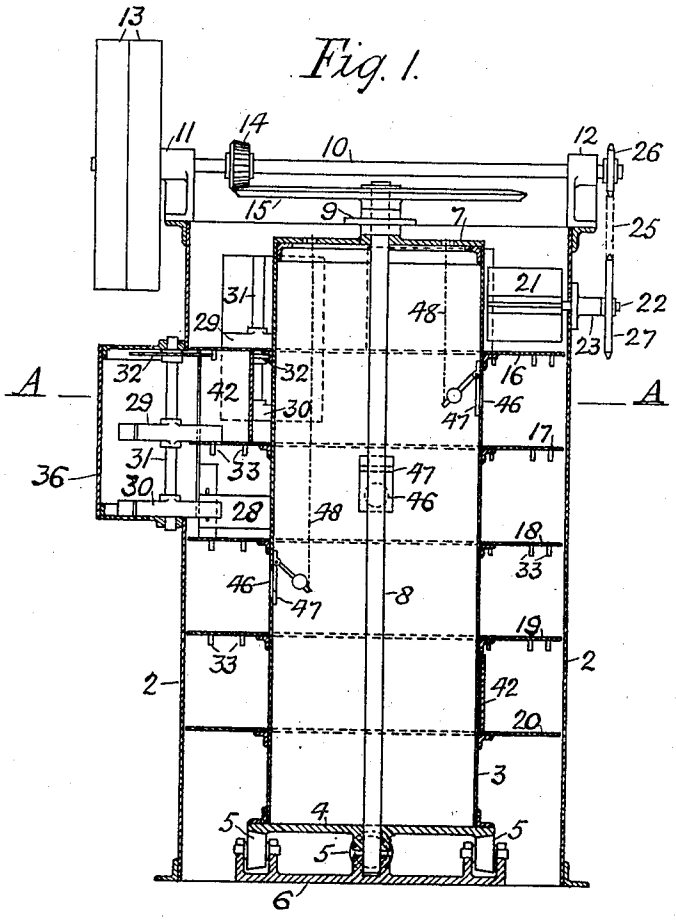
APPLICATION FILED OCT. 31, 1908.

919,529.

Patented Apr. 27, 1909.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

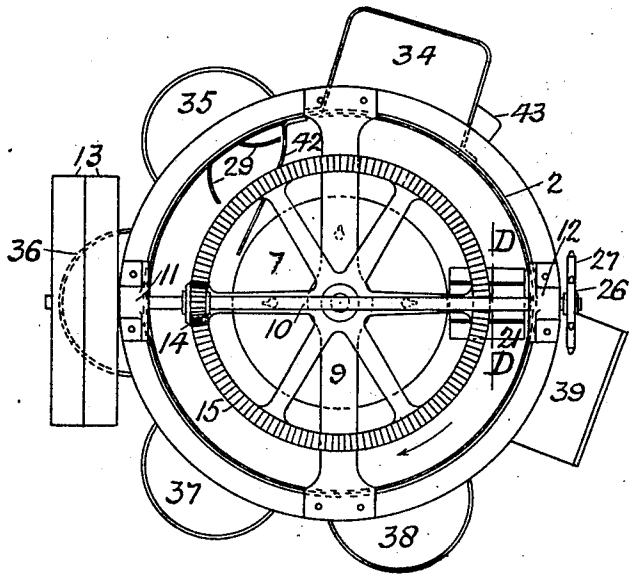
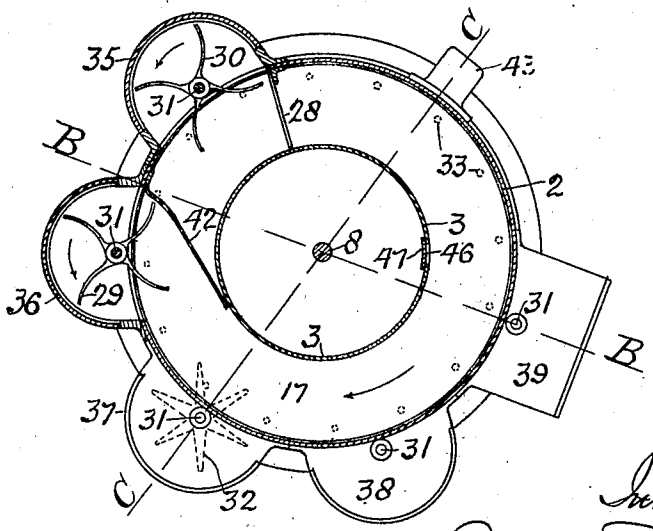


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

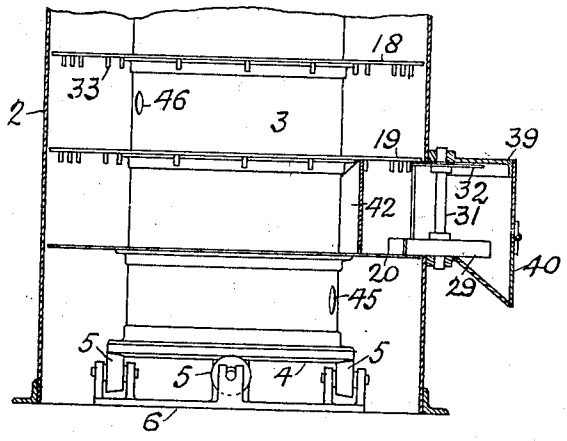


Fig. 5.

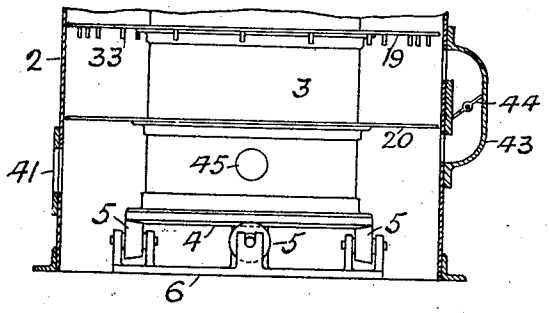
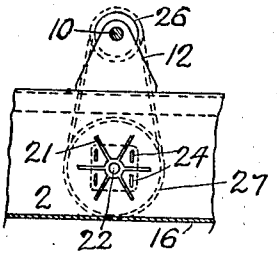


Fig. 6.



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UNITED STATES PATENT OFFICE.

JAMES BLACK, OF NEWCASTLE-UPON-TYNE, ENGLAND.

DRYING-MACHINE.

No. 919,529. Specification of Letters Patent. Patented April 27, 1909.

Application filed October 31, 1908. Serial No. 460,542.

To all whom it may concern:

Be it known that I, JAMES BLACK, subject of the King of England, residing at Newcastle-upon-Tyne, in the county of Northumberland, England, have invented certain new and useful Improvements in Drying-Machines, of which the following is a specification.

This invention relates to machines for drying grain, peat, hops, salt, and other materials, and refers to improvements in the invention described in the specification of our previous application Serial No. 424,277, filed 30th March 1908, which improvements are hereinafter fully described and specifically pointed out in the appended claims.

Referring to the annexed drawings, Figure 1 is a sectional elevation of a machine embodying the improvements; Fig. 2 is a plan view thereof; Fig. 3 is a section on the line A—A of Fig. 1; Fig. 4 is a partial section on the line B—B of Fig. 3; Fig. 5 is a partial section on the line C—C of Fig. 3, and Fig. 6 is a section on the line D—D of Fig. 2.

The construction of the outer casing 2, inner cylinder 3, shelves 16, 17, 18, 19 and 20, boxes 35, 36, 37, 38 and 39, hot air circulation, and mechanism for driving the machine numbered 8, 9, 10, 11, 12, 13, 14 and 15 is similar to that described in the above specification, but instead of using fixed scrapers and adjustably mounted spreaders on all the shelves, I make all the scrapers movable, and use a movable spreader on the top shelf, the rest being adjustably fixed. I also provide additional hot air or gas circulation.

In said drawings, 4 designates the lower cover of the cylinder 3 forming a path running on rollers 5 mounted in open topped bearings of the bed plate 6, and 7 indicates the upper cover of said cylinder 3.

The movable spreader 21 is placed above the top shelf 16 and is in the form of a radial or other vaned wheel of suitable diameter and width, and extends across the space between the outer casing 2 and the inner cylinder 3, so that all the material on the shelf must pass under it. It is carried on a horizontal shaft 22 suitably supported as by bearings 23 and radial to the center of the inner cylinder. The said bearing is attached to the casing by bolts passing through slots 24 which allow the spreader to be raised or lowered to vary the distance between the top shelf and the tips of the wheel vanes to suit the material under treatment.

The shaft 22 is driven from the main driving shaft 10 by a chain 25 passing around the sprocket wheels 26 and 27 mounted on the shafts 10 and 22 respectively (see more particularly Fig. 6). The wheel 21 revolves in the opposite direction to the motion of the shelf, and the material is delivered on the shelf at a suitable distance in front of the wheel through inlet hopper 34. The scrapers 29 are also each in the form of a vaned wheel of suitable diameter and width. There is one scraper wheel for each shelf 16, 17, 18, 19 and 20, said scraper being mounted on a vertical shaft 31 suitably supported on the outside of the casing periphery and extending from the top to the bottom of its respective box 35, 36, 37 or 38, that is, from the level of the shelf above to the level of the shelf next below that shelf which is being acted upon by the scraper. Adjustable stationary spreaders 28 are also mounted on the casing 2 above each shelf except the top one. There is also another vaned wheel 30 similar to the scraper wheel 29 on the lower part of the shaft 31. The said shaft 31 is shown as revolving in the opposite direction to the shelf, and is driven by means of studs or the like 33 equally spaced on the underside of the shelf that is being acted upon, the said studs engaging with the points or arms of a star shaped wheel 32 keyed or otherwise fixed on the vertical shaft 31. The latter may, however, revolve in the same direction as the shelves if found desirable. As the scraper wheel 29 is only just clear of the shelf, it, in revolving scrapes the material off the shelf and delivers same into the bottom of the box, from which it is delivered or scraped on to the adjoining shelf by the lower vaned wheel 30. The boxes 35 to 38 are provided with covers and the discharge box 39 has its cover provided with a hinged flap 40 at its lower part.

A plate 42 is fixed to the outer casing 2 between the shelves behind each scraper wheel to divert the hot air which circulates through the machine from the bottom to the top through the boxes and between the shelves in an opposite direction to the motion of the shelves, the air being admitted at 41 and passing from below to above the bottom shelf 20 through a pipe 43 in which

is placed a damper 44. Hot air or gas is also admitted at 45 at or near the bottom into the inner cylinder 3 which is closed at both top and bottom and openings 46 provided with doors, flaps or valves 47, opening inward, are provided in the wall of the inner cylinder 3 between each pair of shelves, through which hot air or gas can be admitted direct between any pair of shelves if required in addition to the hot air or gas entering by the ordinary circulation through 41 from the bottom to the top through the boxes as described. The said doors, flaps or valves are opened or closed by chains or ropes 48 which pass through the top of the inner cylinder.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. A machine of the character described comprising in combination a casing circular in cross-section, a central concentric revoluble cylinder within said casing, a series of shelves connected to said cylinder dividing the casing into a series of superposed compartments, means for supply of material to the uppermost shelf of said series, boxes located exterior of the casing and scrapers therein revoluble in horizontal planes for transferring material from each shelf to the shelf next below, a scraper revolving in a horizontal plane adapted to discharge dried material from the lowermost shelf, and means for the introduction and circulation of a drying medium through the chambers in succession in a direction contrary to that of the movement of the material.

2. A machine of the character described comprising in combination a casing circular in cross-section, a central concentric revoluble cylinder within said casing, a series of shelves connected to said cylinder dividing the casing into a series of superposed compartments, means for supply of material to the uppermost shelf of said series, boxes located exterior of the casing and scrapers therein revoluble in horizontal planes for transferring material from each shelf to the shelf next below, a rotatable spreader revolving in a vertical plane above the uppermost shelf, a scraper revolving in a horizontal plane adapted to discharge dried material from the lowermost shelf, and means for the introduction and circulation of a drying medium through the chambers in succession in a direction contrary to that of the movement of the material.

3. A machine of the character described comprising in combination a casing circular in cross-section, a central concentric cylinder within said casing, means for rotating said cylinder, a series of shelves connected to said cylinder and dividing the casing into a plurality of superposed compartments, means for supply of material to the uppermost shelf of said series, a series of boxes exterior of the casing and each affording communication from one chamber to the next below, scrapers revoluble in a horizontal plane for deflecting material from the respective shelf to the adjacent box, auxiliary scrapers also revolving in a horizontal plane for removing material from the boxes to the respective shelf next below, means for spreading the material over said shelves, including a scraper revoluble in a vertical plane above the uppermost shelf, a scraper revolving in a horizontal plane adapted to discharge dried material from the lowermost shelf, and means for the introduction and circulation of a drying medium through the chambers in succession by way of the boxes, in a direction contrary to that of the movement of the material.

4. A machine of the character described comprising in combination a casing circular in cross-section, a central concentric revoluble cylinder within said casing, a series of shelves connected to said cylinder dividing the casing into a series of superposed compartments, means for supply of material to the uppermost shelf of said series, boxes located exterior of the casing and scrapers therein revoluble in horizontal planes for transferring material from each shelf to the shelf next below, a scraper revolving in a horizontal plane adapted to discharge dried material from the lowermost shelf, means for the introduction and circulation of a drying medium through the chambers in succession in a direction contrary to that of the movement of the material, and auxiliary means for the circulation of drying medium comprising an inlet to the revoluble cylinder at the lower end thereof and closable communications between the interior of said cylinder and the spaces between each pair of shelves.

5. A machine of the character described comprising in combination a casing circular in cross-section, a central concentric cylinder within said casing, means for rotating said cylinder, a series of shelves connected to said cylinder and dividing the casing into a plurality of superposed compartments, means for supply of material to the uppermost shelf of said series, a series of boxes exterior of the casing and each affording communication from one chamber to the next below, scrapers revoluble in a horizontal plane for deflecting material from the respective shelf to the adjacent box, auxiliary scrapers also revolving in a horizontal plane for removing material from the boxes to the respective shelf next below, means for spreading the material over said shelves, including a scraper revoluble in a vertical plane above the uppermost shelf, a scraper revolving in a horizontal plane adapted to discharge dried material from the lower-

most shelf, means for the introduction and circulation of a drying medium through the chambers in succession by way of the boxes, in a direction contrary to that of the movement of the material, and auxiliary means for the circulation of drying medium comprising an inlet to the revoluble cylinder at the lower end thereof and closable communications between the interior of said cylinder and the spaces between each pair of shelves.

In witness whereof I have signed this specification in the presence of two witnesses.

JAMES BLACK.

Witnesses:
H. NIXON,
W. MILBURN.