J. W. BILES.

DRIER.

APPLICATION FILED APR. 5, 1907.

907,219. Patented Dec. 22, 1908.

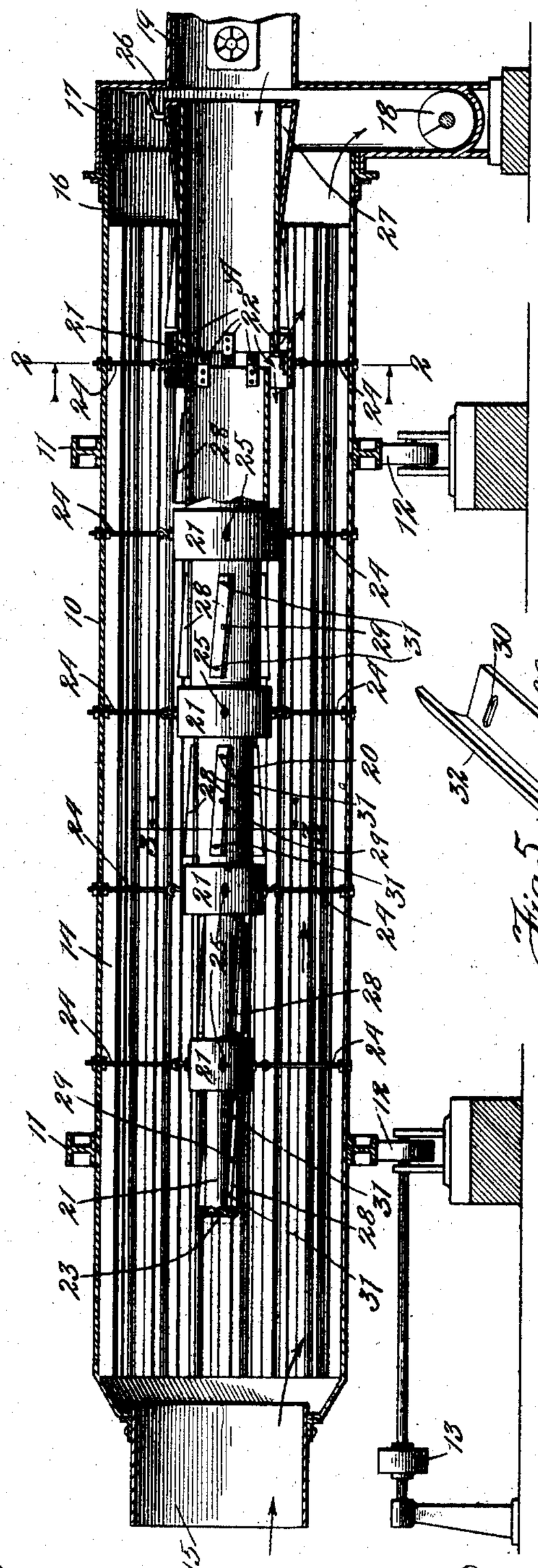

Fig. 1.

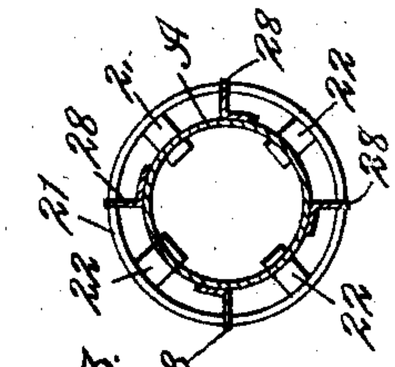

Fig. 3.

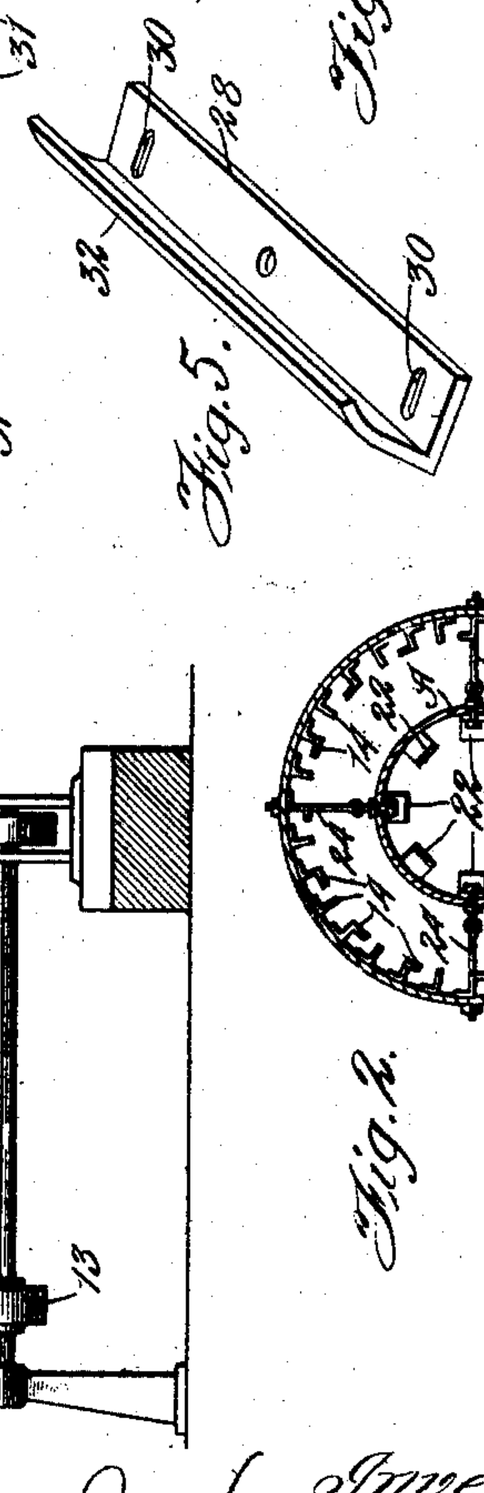

Fig. 5.

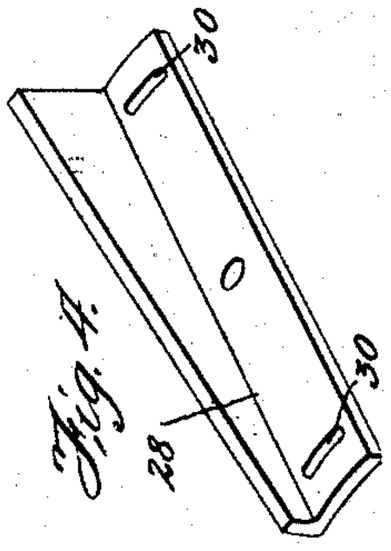

Fig. 4.

Fig. 2.

Witnesses:
B. A. D. Terry
J. H. Jochum Jr.

Inventor:
J. W. Biles
by Brown & Hopkins
Attys

UNITED STATES PATENT OFFICE.

JOHN W. BILES, OF LOUISVILLE, KENTUCKY.

DRIER.

No. 907,219. Specification of Letters Patent. Patented Dec. 22, 1908.

Application filed April 5, 1907. Serial No. 366,517.

To all whom it may concern:

Be it known that I, JOHN W. BILES, 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 Driers, of which the following is a specification.

This invention relates to improvements in driers and more particularly to that class of driers which is mounted for rotation and to which the heating fluid is supplied by means of a conduit, the material being raised and dropped into contact with the conduit, and the primary object of the invention is to provide improved means whereby the material will be caught as it falls and held in contact with the hot conduit during a portion of the rotation of the latter.

A further object is to provide an improved construction of conduit and improved means for catching the material and causing the same to advance and remain in contact with the conduit during a portion of the rotation of the latter.

A further object is to provide improved means for adjusting or varying the angle of inclination of the flights or members which hold the material in contact with the heating fluid conduit.

To the attainment of these ends and the accomplishment of other new and useful objects, as will appear, the invention consists in the features of novelty in the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawing, illustrating an exemplification of the invention and in which—

Figure 1 is a central, vertical, longitudinal sectional view of an improved drier constructed in accordance with the principles of this invention. Fig. 2 is a sectional view on line 2—2 of Fig. 1. Fig. 3 is a sectional view on line 3—3 of Fig. 1. Fig. 4 is a perspective view of one of the flights. Fig. 5 is a perspective view of a modified form of flight.

Referring more particularly to the drawing and in this exemplification of the invention, the numeral 10 designates a chamber or cylinder through which the material to be treated is adapted to pass. This cylinder may be of any desired size, preferably cylindrical in construction and provided with peripheral supporting rings 11 disposed adjacent the ends thereof and said rings rest upon suitable rollers 12.

Motion may be transmitted to the cylinder or chamber 10 to rotate the same preferably by means of a pulley 13 fixed upon an extension of the journal of one of the supporting pulleys 12 and is driven from any suitable source of power. Secured within the cylinder or chamber 10 and preferably extending longitudinally thereof are elevating members or flights 14, which may be of any suitable construction but preferably in the form of L and Z-shaped bars alternately arranged. A suitable throat or chute 15 is secured to and preferably projects within one end of the cylinder, through which the material to be treated is introduced into the chamber or cylinder. The opposite or discharge end 16 is preferably arranged to project into a stationary casing 17 which is provided with a conveyer 18 adapted to receive the material and convey it from the casing 17 as it is discharged from the chamber or cylinder 10.

Disposed longitudinally within the chamber or cylinder 10 in a direct line with a supply pipe 19 is a heat conduit designated generally by the reference letter A and said conduit extends substantially the entire length of the cylinder or chamber 10 terminating in proximity to the inlet chute or throat 15 and said conduit is preferably comprised of a plurality of tubular sections 20, which gradually decrease in diameter as they progress from the discharge towards the inlet end of the cylinder or chamber. The adjacent ends of these sections 20 are spaced from each other to form a plurality of outlets intermediate the length of the conduit for the uniform discharge of the heating fluid into the chamber or cylinder 10. The ends of these sections 20 are held spaced from each other preferably by means of deflector rings 21, which surround the apertures or spaces formed between the adjacent ends of the sections and are spaced from the periphery of the sections. These deflector rings are preferably of a length to extend for a short distance on each side of the space or aperture. Suitable angle-bars 22 are secured to the inner face of the deflector rings 20 and said bars are so disposed as to engage the extremity of the respective adjacent sections and are so arranged that the extremity of the section is adapted to en-

gage the bars to prevent the ends from contacting with each other. These bars may be secured to the respective section in any suitable manner, preferably by means of bolts or rivets. One of these deflector rings is arranged adjacent to and surrounds each of the spaces between the respective sections throughout the entire length of the conduit and the free end of the end section 21 is closed preferably by means of a suitable reticulated material 23 such as wire gauze or the like, to prevent material entering the conduit and to permit the heat to be discharged through said end and into the chamber. Any suitable means may be provided for supporting the conduit within the chamber or casing 10 so as to rotate therewith. A suitable and efficient means for accomplishing this purpose comprises a series of rods or braces 24, one end of which are adjustably secured to the wall of the chamber or casing 10, and the other end may be removably secured to the deflector rings 21 in any suitable manner, such as by means of hooks 25, engaging suitable eyes in said ends, and said rods or braces are adapted to be adjusted so as to rigidly hold the conduit in position.

A guard or shield 26 may be provided within the casing 17 so as to prevent the hot fluid which enters the conduit A from the supply 19 from passing upwardly and beyond the conduit and for directing the fluid into the conduit. This conduit may be provided with a suitable air space 27 surrounding the end adjacent the supply 19 so as to prevent the material from being scorched at this point, which will be the hottest place in the conduit.

In operation the material is fed into the cylinder or chamber through the chute or throat 15 and will advance towards the discharge end 16 in a direction opposed to the direction of entrance of the heating fluid which will at the same time enter the conduit A through the end adjacent the discharge end of the cylinder or chamber 10. A rotary motion being imparted to the cylinder or chamber 10 the material will be caught by the flights 14 and raised to a point above the conduit A, at which point it will be dropped from the flights and onto the conduit, and after leaving the conduit will fall upon the flights 14 below the conduit, to be raised again and dropped upon the conduit, upon which it will be held until thrown off by gravity as it revolves. This operation is continued as the material is advanced toward the discharge end of the chamber or casing 10. The heating fluid entering the conduit will pass through the spaces formed by the adjacent ends of the respective sections and will strike the deflector rings 21. which latter will direct or cause the fluid to be discharged in both directions into the chamber or cylinder 10, that is, in a direction opposed to the advancement of the material and also in a direction with the advancing material so as to strike or engage the material from every direction during its progress through the chamber or cylinder.

Any suitable means may be provided for catching the material as it drops from the flights 14 and holding it in contact with the conduit A during a portion of the rotation of the latter. A suitable and efficient means for accomplishing this purpose comprises a series of laterally projecting shelves or members 28 which are secured to the periphery of each of the sections 20. These shelves or projections 28 are spaced from each other and are longitudinally inclined and so disposed that the highest point of each shelf or projection will be towards the discharge end of the conduit and the lowest portion will be disposed in a direction toward the inlet or outlet end of the conduit, to meet requisites of the material being dried. Any suitable number of these shelves or projections may be provided on each of the sections 20 and are so spaced from each as to permit the material caught thereby to engage and rest against the periphery of the respective sections, thus reaping the full benefit of the radiation from said conduit. With this improved construction, when the material is dropped from the flights 14 upon the conduit the shelves or projections 28 will catch and hold the material during a portion of the rotation of the conduit or until the conduit and the shelves thereon which are holding the material assume a position to drop the material from the conduit and onto the flights 14 below the conduit which latter flights will again raise the material and drop it upon the next section of the conduit during its advancement through the cylinder or casing to the discharge end. The shelves or projections 28 in this exemplification of the invention being inclined in the direction of advancement of the material through the cylinder, will cause the material to advance for a slight distance along and in contact with the conduit during the rotation of the latter and before the conduit has assumed a position to drop the material therefrom. These shelves or projections 28 are preferably tapered and so arranged that the widest portion thereof will be disposed toward the inlet end, but if desired may be reversed to meet the requirements of the material being dried and by so tapering these shelves or projections, the material will be gradually discharged or dropped therefrom during the rotation of the conduit instead of retaining the material in contact with the conduit and discharging the same in a bulk at the same time, thereby causing the material to "thin out" and insuring contact of all of the material with the conduit. It will

be noted that with this improved construction of conduit, a greater radiating surface is provided and a greater efficiency is imparted for the fuel consumed.

The shelves or projections 28 are preferably secured in position by means of a suitable fastening means 29, preferably in the form of a bolt or screw which is located at a point intermediate the ends thereof and which form pivots about which the shelves or projections are adapted to be adjusted to vary the angle or direction of inclination thereof with respect to the conduit and to meet the requirements of the material being dried by regulating the length of time the material is to be held in engagement with the conduit. These shelves are preferably provided with slots 30 preferably adjacent the extremities thereof, through which suitable fastening means 31, such as bolts or the like, pass and engage the conduit for holding the shelves or projections 28 in their adjusted position.

In the exemplification of the invention shown in Fig. 4, the shelves or projections are preferably of a uniform width throughout their length and are provided with a curved edge 32.

In order that the invention might be fully understood by those skilled in the art, the details of the foregoing embodiments thereof have been thus specifically described but

What I claim as new therein and desire to secure by Letters Patent is—

1. The combination of a drying chamber, a heat conduit in the chamber, means for rotating the conduit, means for raising the material and depositing it upon the conduit, lateral projections on the periphery of the conduit spaced longitudinally from each other and adapted to catch and retain the material in engagement with the conduit during a portion of its rotation, and means for adjusting the projections with relation to the conduit.

2. The combination of a drying chamber, a heat conduit in the chamber, means for rotating the conduit, means for raising the material and depositing it upon the conduit, lateral projections on the periphery of the conduit arranged longitudinally thereof and adapted to catch and retain the material in engagement with the conduit during a portion of its rotation, and means for adjusting the angle of inclination of the projections with relation to the conduit.

3. The combination of a drying chamber, a heat conduit in the chamber, means for rotating the conduit, means for raising the material and depositing it upon the conduit, lateral projections pivotally supported by the conduit whereby the angle of inclination of the projections with relation to the conduit may be varied, and means for securing the projections in their adjusted position, said projections being adapted to catch and retain the material in contact with the conduit during a portion of its rotation.

4. The combination of a rotary drying chamber through which the material to be treated passes, a heat conduit in the chamber, means operatively related to the chamber for raising and depositing the material upon the conduit, and means operatively related to and adjustable with relation to the conduit for catching the material as it falls, said means extending longitudinally of the conduit and being adapted to hold the material in contact therewith and cause the same to advance a predetermined distance along the conduit.

5. The combination of a rotary drying chamber through which the material to be treated passes, a heat conduit within the chamber and rotatable therewith, means for raising the material and depositing the same upon the conduit, and spaced laterally projecting inclined flights arranged longitudinally of the conduit and around the periphery thereof for catching and holding the material in engagement with the conduit during a portion of the rotation of the said conduit, said flights being adjustable with respect to the conduit and adapted to cause the material to advance a predetermined distance along the conduit at intervals during its passage through the machine.

6. The combination of a drying chamber, a heat conduit in the chamber, means for rotating the conduit, means for raising the material and depositing it upon the conduit, lateral projections extending longitudinally of and pivotally supported by the conduit whereby the angle of inclination of the projections with relation to the conduit may be varied, and means for securing the projections in their adjusted positions, said projections being also spaced longitudinally with respect to each other and being adapted to catch and retain the material in contact with the conduit during a portion of its rotation.

7. The combination of a drying chamber, a heat conduit in the chamber, means for rotating the conduit, means for raising the material and depositing it upon the conduit, lateral projections extending longitudinally of the conduit and pivotally secured intermediate their ends to the periphery of the conduit, and means adjustably securing the ends of the projections to the conduit whereby the projections may be adjusted about their pivots to vary their angle of inclination with respect to the conduit.

8. The combination of a drying chamber, a heat conduit in the chamber, means for rotating the conduit, means for raising the material and depositing it upon the conduit, lateral projections extending longitudinally of the conduit and pivotally secured inter-

mediate their ends to the periphery of the conduit, said projections being provided with a slot and bolt connection with the conduit beyond the pivot to permit the angle of inclination of the projections to be varied with respect to the conduit and for securing the projections in their adjusted positions.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 1st day of April A. D. 1907.

JOHN W. BILES.

Witnesses:
STANLEY BRONNER,
G. R. WASHBURNE.