

F. R. WILLSON, JR.

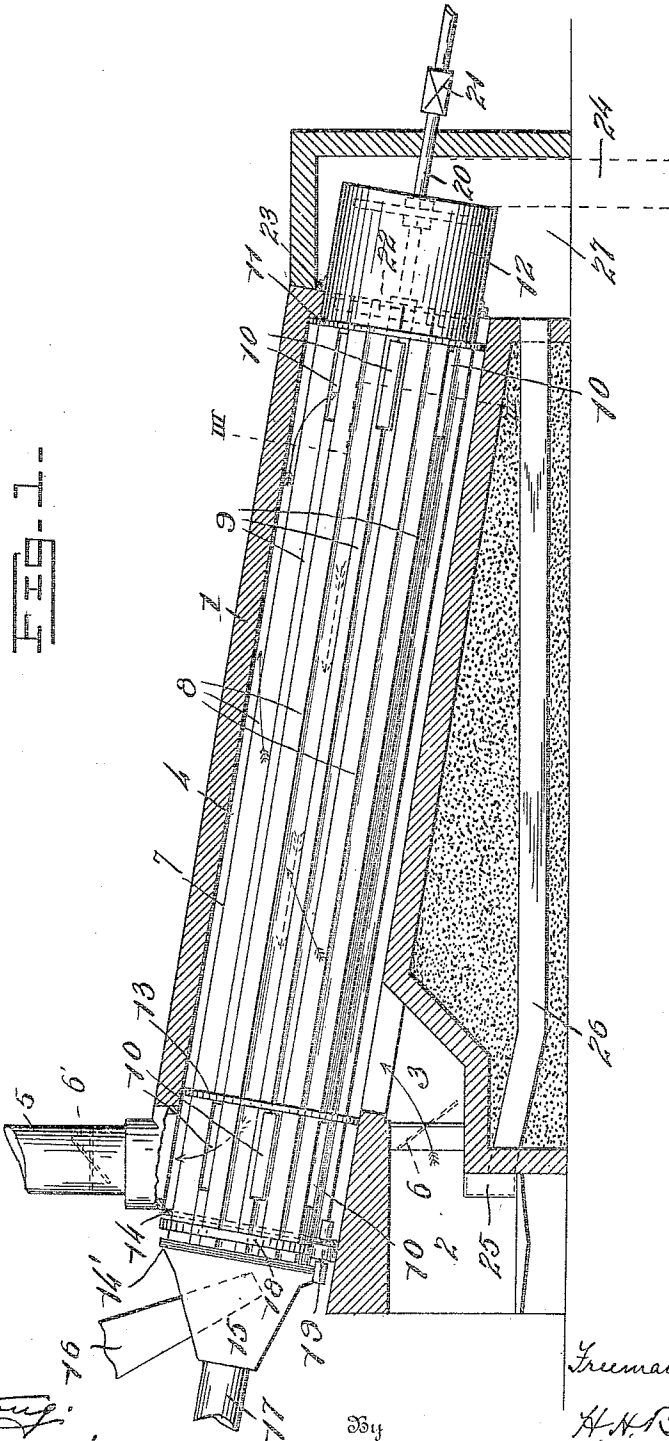
DRIER.

APPLICATION FILED JUNE 12, 1906.

953,653.

Patented Mar. 29, 1910.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

FIG. 2.

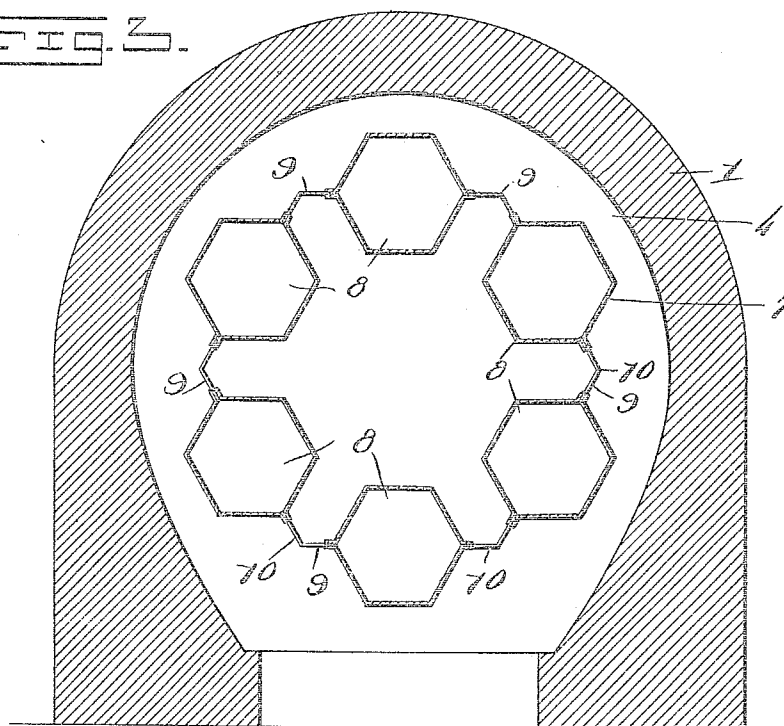
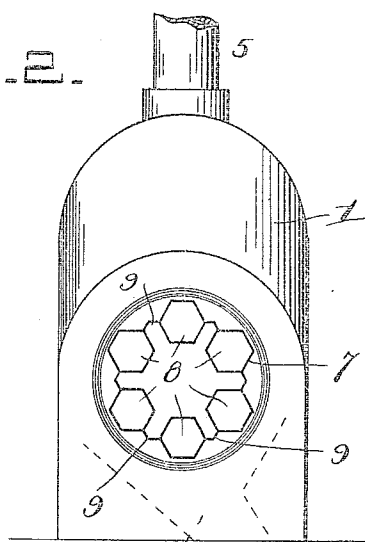


FIG. 2.



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UNITED STATES PATENT OFFICE.

FREEMAN R. WILLSON, JR., OF WORTHINGTON, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE JEFFREY MANUFACTURING COMPANY, A CORPORATION OF OHIO.

DRIER.

953,653.

Specification of Letters Patent.

Patented Mar. 29, 1910.

Application filed June 12, 1906. Serial No. 321,398.

To all whom it may concern:

Be it known that I, FREEMAN R. WILLSON, Jr., a citizen of the United States, residing at Worthington, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Driers, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to driers for pulverulent, granular and fibrous material such as finely divided coal or coke, clay, asbestos, peat, wood-pulp, grain, etc.; and its object is to provide a cheaply-constructed drier of large capacity and heating surface, which shall be practically balanced, require comparatively little power to drive, be exceedingly rapid in operation and dry materials without danger of discoloration by the furnace gases.

In the drawings: Figure 1 is a longitudinal section of the setting, showing the drier-drum in side elevation; Fig. 2 is a rear elevation; and Fig. 3 is a cross-section on the line III—III of Fig. 1.

1 is the setting, preferably of fire-brick, having at its forward end a furnace or fire-box 2, connected by a flue 3, with the interior inclined chamber 4, of the setting. A stack 5, is provided at the upper, front portion of the setting, and both the stack and flue 3 are provided with suitable dampers 6, 6.

Rotatably mounted in the chamber 4 is an inclined drum 7, made up of a plurality of tubes 8, of sheet or plate metal, preferably six in number for convenience in grouping; polygonal, and preferably hexagonal, in cross-section; said tubes being connected by angle-plates or strips 9, as best shown in Fig. 3. The plates 9 are provided with openings 10 at each end.

Rearwardly, the space between and surrounding the tubes 8 is closed by a plate partition 11 secured to and rotating with the drum, and said drum has a cylindrical extension 12, into which the tubes discharge. Near the forward end of the drum is a partition 13, similar to partition 11, surrounding and rotating with the tubes, but not filling the space between them. A third partition 14, similar to 11, closes the front of the setting and the space between the hexagonal tubes, and a similar plate 14' closes the exterior recesses and the space be-

tween the tubes, at the extreme forward end of the drum 7.

Supported in contact with the front end of the drum is a stationary, frusto-conical chamber 15, into which leads a charging chute 16; and secured to the forward end of the chamber is a connection 17, for an exhaust fan. The forward end of the drum is preferably surrounded by a ring 18, carried by suitably mounted rolls 19; and the rear end has a suitably journaled driving-shaft 20 with power connection 21, and carrying the drum by spiders 22. A friction-ring 23, of angle iron, may also be provided; and a chute 24, closed by a sliding gate (not shown) is suitably located to catch the dried material discharged from the cylinder 12.

To further hasten the drying, the back of the furnace 2 is provided with a transverse drum or chamber 25, having suitable intakes, for heating air; said chamber being connected by a flue 26 with the chamber 27. This chamber communicates through the open rear end of cylinder 12 and the interiors of the tubes 8 and chamber 15 with the exhaust-fan connection.

The operation is as follows:—The material fed into chamber 15 passes thence into the open ends of the tubes 8; being prevented from passing between them by the plate 14'. It is then constantly turned and stirred, being slowly fed by the inclination of the drum, through the tubes and cylinder 12 to the discharge chute. The furnace gases pass rearwardly, as shown by the arrows, around the exterior of the drum, thence through the rear openings 10 to the interior thereof, thence forwardly, and emerge through the forward openings 10; passing finally to the stack after having impinged upon all sides of the revolving tubes. At the same time, air entering the chamber 25 is heated, passes through flue 26, chamber 27 and the interiors of the tubes 8, in direct contact with the material, to the exhaust-connection 17; the more highly heated air coming first in contact with the drier material while in the best condition to abstract moisture therefrom.

The advantages of my invention result from the large area externally exposed to the furnace gases; the polygonal section of the tubes, which permits of low cost of construction, ease of assembling and the thor-

ough stirring of the contents; the substantial balancing of the drum by reason of the equal peripheral loading, the consequent saving of power necessary to drive the drum; and the readiness with which hot air un-
 5 unmixed with products of combustion can be brought into direct contact with the material to be dried.

Many modifications can be made in the
 10 apparatus without departing from my invention; since what I claim is:—

1. In a drier a rotatable drum comprising a series of longitudinal receptacles for the material to be treated axially arranged about
 15 a common longitudinal center and means for closing the spaces between said receptacles whereby there is formed a central flue, and means for passing a heating medium through the said flue, substantially as
 20 set forth.

2. In a drier a rotatable drum formed of a series of polygonal tubes arranged in parallel relation with each other and axially equidistant from the longitudinal axis of
 25 the drum, and plates extending between the contiguous tubes, the tubes and plates inclosing a central flue, and means for causing a heating medium to pass through the said flue, and also in contact with the outer sur-
 30 faces of the said drum, substantially as set forth.

3. In a drier the combination of a drum surrounding a central flue, a series of separate drying chambers axially equidistant
 35 from the axis of the said flue and mounted inside of the said drum, means for directing a heating medium to the central flue, and for conducting it away therefrom, and means for feeding the material to be dried
 40 to the said drying chambers, substantially as set forth.

4. In a drier, a rotatable drum comprising a plurality of peripherally-arranged tubes, a furnace, means for conducting the
 45 products of combustion therefrom over the exterior of said drum and then through the interior thereof, and means associated with said furnace for heating a current of air and passing it through the moving tubes.

50 5. In a drier, the combination of a setting in which is formed a heating chamber, means for supplying hot gases to the heating chamber, a drier tube arranged to be rotated within the heating chamber, means for
 55 feeding the material to the drier tube and means for dividing the heating chamber

into two parts, of which means the said drier tube constitutes a part, whereby it is possible to conduct the hot gases along the outside of the tube in contact with the walls on
 60 one side thereof and of returning the hot gases in the opposite direction in contact with the outside of the tube on the opposite side thereof.

6. In a drier, an inclined drum comprising a plurality of peripherally-arranged
 65 polygonal receptacles and apertured spacing members between said receptacles, means for rotating said drum, and means for passing heated gases over the exterior of said drum, then through one set of said apertures to the
 70 interior thereof and then through a second set to a discharge flue.

7. In a drier, a setting, an inclined drum rotatably mounted therein and comprising a
 75 plurality of peripherally-arranged polygonal receptacles, means for rotating said drum, means for feeding material to and through said drums while in motion, a furnace in
 80 said setting, an air-heating chamber associated with said furnace; conduits for conducting the products of combustion from said furnace first over the exterior of said drum and then through the interior thereof,
 85 and conduits for conducting air from said air-heating chamber through said receptacles in direct contact with the material and in a direction opposite to the direction of
 feed of the material.

8. In a drier, the combination of a heating
 90 chamber, means for supplying the hot gases of combustion to the heating chamber, a drier tube arranged to be rotated within the heating chamber, means for feeding the material to the
 95 drier tube, means secured to opposite sides of the drier tube for dividing the heating chamber into separate compartments whereby it is possible to conduct the hot gases along the
 100 outside of the tube in contact with the walls on one side thereof and of returning the hot gases in the opposite direction in contact with the outside of the tube on the opposite
 105 side thereof, and means for supplying hot air to the interior of the drying tube and conducting it from one end to the other thereof.

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

FREEMAN R. WILLSON, Jr.

Witnesses:

J. E. McDONALD.

ROY TIMMONS.