A. W. HUTCHINS.

DRYING MACHINE.

APPLICATION FILED SEPT. 19, 1917.

1,259,101.

Patented Mar. 12, 1918.

3 SHEETS—SHEET 1.

Fig. 1

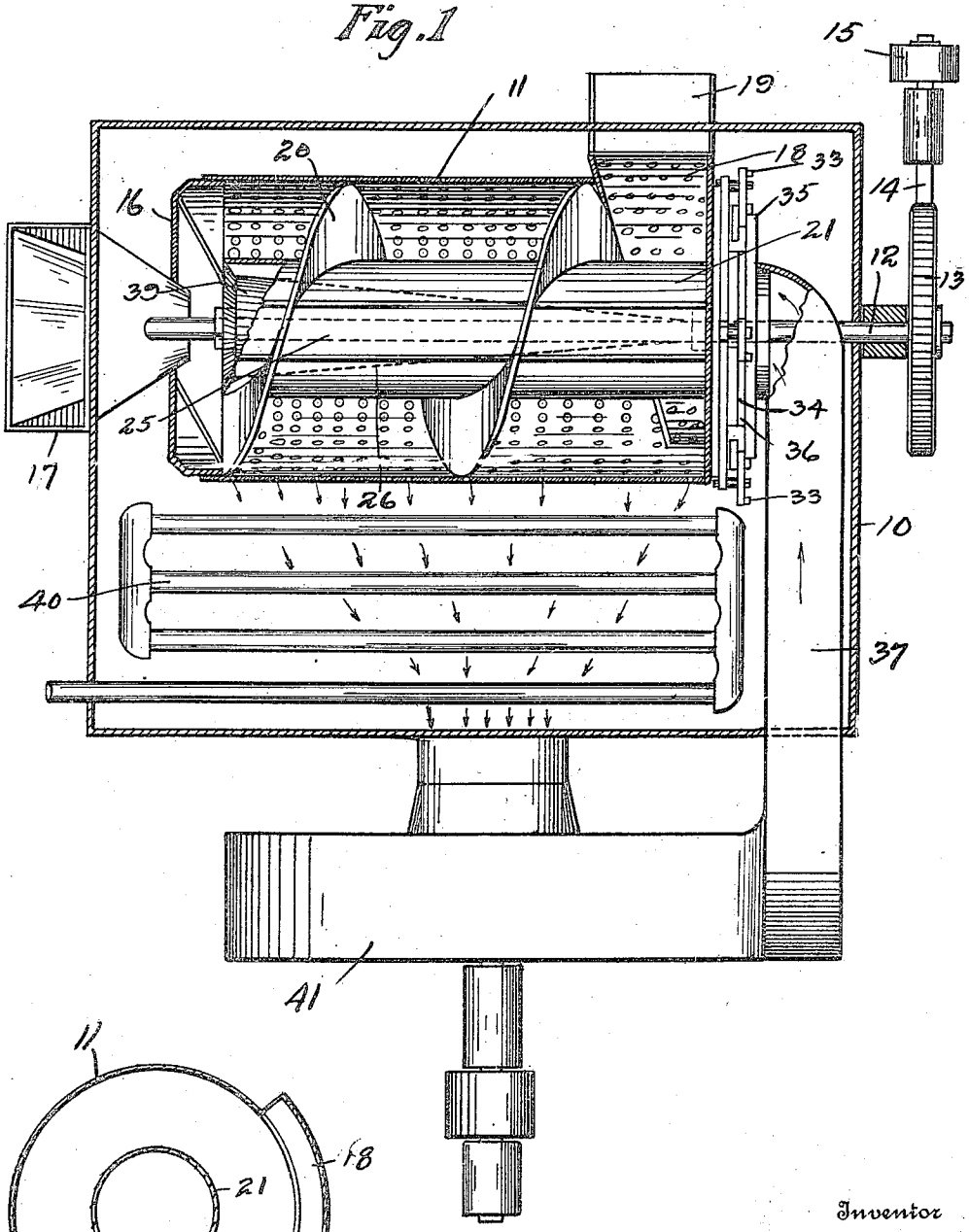


Fig. 7.

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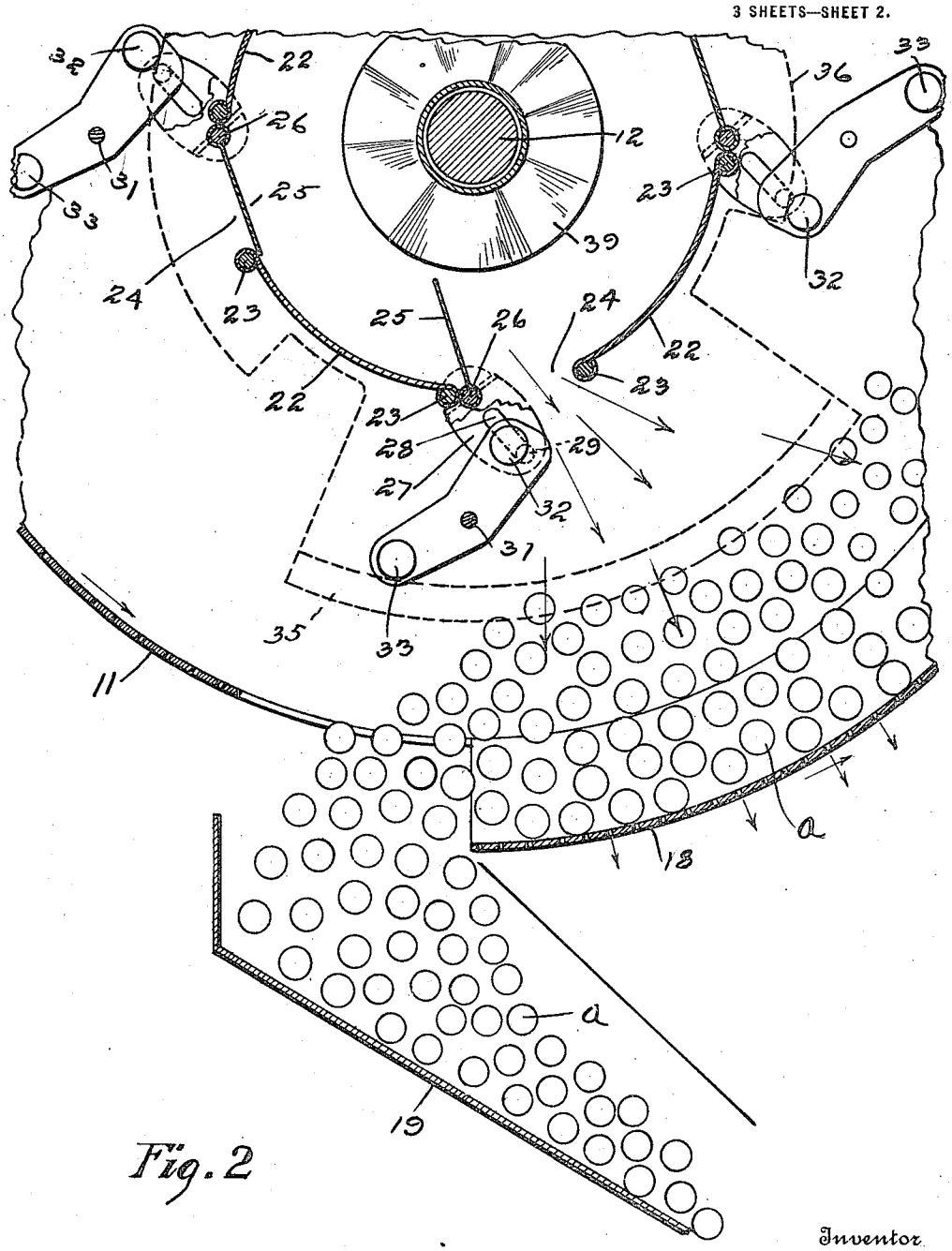


Fig. 2

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3 SHEETS—SHEET 3.

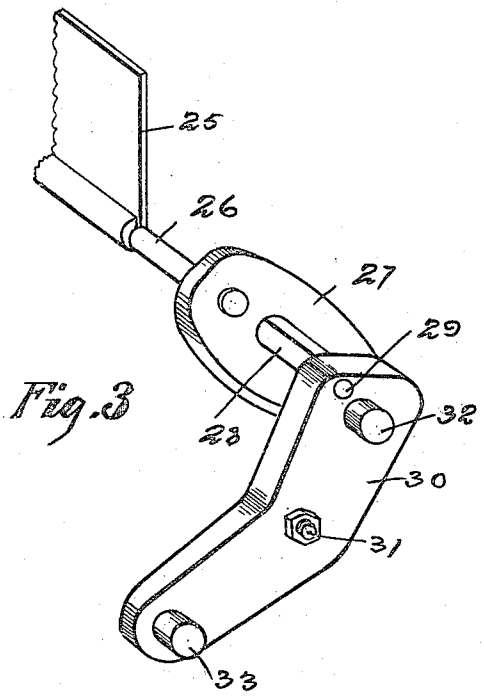
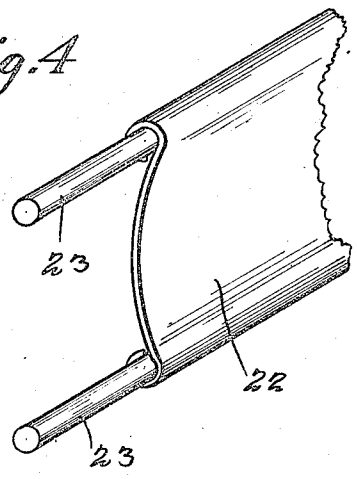


Fig. 3

Fig. 4



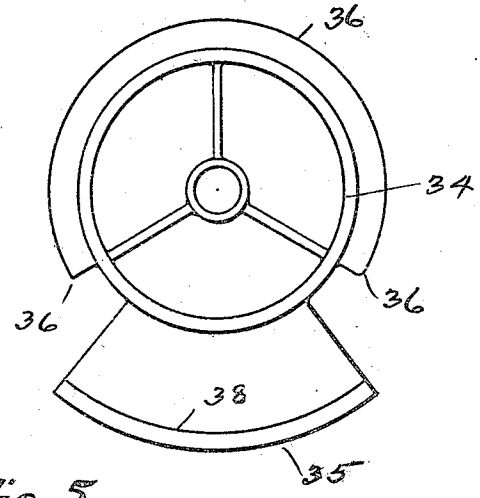
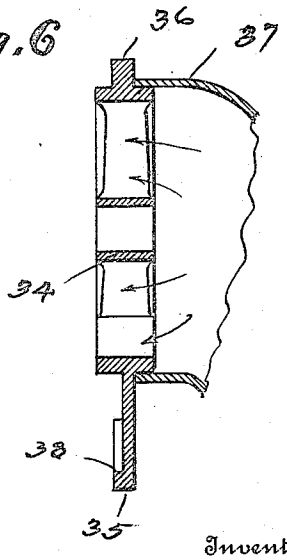


Fig. 5

Fig. 6



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UNITED STATES PATENT OFFICE.

ARTHUR W. HUTCHINS, OF EDGEWOOD, RHODE ISLAND.

DRYING-MACHINE.

1,259,101. Specification of Letters Patent. Patented Mar. 12, 1918.

Application filed September 19, 1917. Serial No. 192,039.

To all whom it may concern:

Be it known that I, ARTHUR W. HUTCHINS, a citizen of the United States, and resident of Edgewood, Cranston, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Drying-Machines, of which the following is a specification.

This invention relates to machines for drying metal parts after having been subjected to a liquid bath, and has for its object to provide such a machine comprising a rotatable drum having means therein for advancing the work, and also means in the drum for forcing air through the work-parts during its passage through the drum.

A further object of this invention is to provide longitudinally disposed valve controlled openings in the walls of the air-conducting tube, whereby the blast may be directed onto the assembled work-parts while tumbling in the drum.

A further object of the invention is to provide means for gradually reducing the storage capacity in the air tube from the entrance toward the opposite end thereof to provide a substantially uniform pressure throughout the length of the discharge opening.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1— is a plan view partly in section illustrating the general arrangement of my improved drying machine.

Fig. 2— is a diagrammatic view partly in section illustrating the arrangement of the valves and valve-actuating mechanism for controlling the outlets from the central air tube.

Fig. 3— is a perspective view showing a set of cam-actuated levers which operate the air-control valves.

Fig. 4— is a perspective view showing an end portion of one of the sections which form the inner air-conducting tube.

Fig. 5— is an end view of the air-valve operating cam.

Fig. 6— is a sectional edge view of the air-valve operating cam.

Fig. 7— is a sectional end view of the drum showing the enlargement at the discharge end thereof.

Referring to the drawings, 10 designates the housing which completely incloses the operating mechanism of my improved drying apparatus. Within this chamber a cylinder 11 is fixed to the shaft 12 by which the cylinder is rotated slowly through the worm gear 13 and worm (not shown) and short shaft 14 from the pulley 15 from any convenient source of power. The outer shell of this cylinder or drum is perforated to permit the blast or drying air to pass outward therethrough after having passed through the pile of work-parts. One end of this cylinder is provided with a head 16 through which a chute 17 projects for conducting the work from the outside of the chamber to the inside of the cylinder.

At the opposite end of this cylinder a narrow portion of the wall is set outward slightly as at 18 enlarging the cylinder and forming a shallow work-storage pocket into which the work-parts are forced just before they are discharged by the rotation of the cylinder into the chute 19, which conducts them through an opening to the outside of the housing, see Fig. 1, which pocket relieves congestion and so prevents the piling or backing up of the parts at the discharge end.

In order to convey the work through the cylinder from the entrance to the discharge end thereof, I have provided a helically-disposed strip or plate 20 which as the cylinder revolves acts upon the rolling, tumbling parts to advance them from the entering end to the opposite end thereof where they are discharged through the chute 19.

In order to facilitate the drying of these parts as they pass through the cylinder, I have provided a central longitudinally disposed air-conducting tube 21 which extends through this cylinder, and in the structure illustrated is arranged to rotate therewith. This tube may be made in any suitable way, but for convenience, I have constructed the same of a plurality of concave sheet metal sections 22, see Figs. 2 and 4, the opposite edges of which are rolled or folded about the rods 23 which extend the length of the cylinder and are fixed in the heads at opposite ends thereof. The edges of these sections are spaced apart leaving longitudinal slots, openings or ports 24 therethrough, which ports are designed to be closed if desired by the gate-valves 25. Each of these gate-valves is preferably constructed of a sheet metal strip, one edge of which is folded

about a longitudinally-disposed rod 26 which lies adjacent one of the tube section rods 23. Each gate is designed to swing across and close its opening.

In order to operate these valves at the proper time to open the desired port and close the others, I have fixed an arm 27 on the outer end of each valve rod 26, said arm being slotted as at 28 to receive the actuating pin 29 which is mounted in the lever 30. This lever is pivoted at 31 to the cylinder head and is provided with two laterally projecting operating pins 32 and 33 located at opposite ends thereof.

In order to throw this lever to close and open its valve at the proper time as the cylinder slowly revolves, I have constructed a double-faced cam 34 which is held against rotation by being connected to the inlet air pipe 37, one portion 35 of which cam is adapted to engage the outer pin 33 and move the lever to the position illustrated in Fig. 2, carrying the valve 25 to open position and holding it in this position by means of the pin 33 engaging the over-hanging lip 38 for about one-quarter of a revolution of the cylinder. The other portion 36 of the cam is designed to engage the inner pin 32 of the other lever arms to move and hold the valves in closed position during about three-quarters of a revolution of the drum or cylinder. The central portion of this cam is removed so that the air from the inlet pipe may pass therethrough into the tube 21.

By this construction it will be seen that but one valve is open at a time and that at the point where the work-parts have accumulated which is slightly to one side of the lowest portion of the cylinder, due to gravity and the revolving action of the cylinder.

It will therefore be seen that by closing all of the other ports the air pressure is concentrated and the air delivered only at the point where its action is effective on the tumbling work.

It is found in practice that in order to obtain a draft of substantially uniform pressure throughout the length of the cylinder through the open slot, that it is necessary to graduate or gradually reduce the storage capacity of the tube.

In order to accomplish this I have provided an elongated cone-shaped member 39, see Fig. 1, which is smallest at the air entering end and which gradually increases in diameter toward the opposite end thereof by which construction the pressure of air passing through the discharge opening is substantially uniform throughout the length of the cylinder.

In order to render most effective the pressure of air impinging upon the work-parts I have mounted the whole mechanism within an outer casing or housing 10 and have provided a set of heating pipes 40 within the same, and have mounted a blower 41 outside of the housing by which arrangement the air is drawn from the interior thereof over and around the heating pipes 40 into the blower from which it is discharged through the pipe 37 into the central air-conducting tube 21 from which tube it is discharged as above described directly onto the assembled or piled-up work-parts, the force of the air being such as to act with double effect upon the moisture covering the parts; first, the heat has a tendency to evaporate and carry away the moisture; and second, the great force with which the air is blown against the parts serve not only to evaporate but to force away and drive off the moisture from their surfaces as the parts are tumbling and rolling over each other in the slowly rotating drum.

I have described a central air tube mounted within the cylinder arranged to rotate therewith and which is provided with a plurality of valve-controlled slots, only one of which is designed to be open at a time, but I do not wish to be restricted to the use of this particular arrangement of air-conducting tube having a plurality of outlets and valves as any arrangement of tube may be employed and provided with any number of ports or slots and which may operate either with or without the use of valves and cams; and further it is desired to be understood that I do not restrict myself to the exact construction of the parts of the device illustrated and described, but that I reserve the privilege of resorting to all the mechanical changes to which the device is susceptible, the invention being defined and limited only by the terms of the appended claims.

I claim:

1. A machine of the character described comprising a rotatable work-carrying drum having an internal helically-disposed portion, means for admitting the work at one end and discharging it from the opposite end of said drum, and a central tube in said drum provided with an aperture in its side wall through which fluid is directed onto the assembled work during its passage through the drum.

2. A machine of the character described comprising a rotatable work-carrying drum having a perforated outer wall, a work-advancing helical member arranged within said drum, means for admitting the work at one end and discharging it from the opposite end of said drum, an axially disposed air-conducting tube in said drum, said tube being provided with an air outlet arranged to direct the flow onto the assembled work-parts in the drum.

3. A machine of the character described comprising a work-carrying drum having a perforated outer shell, a work-advancing member arranged within said drum, means for admitting work to advance it from the

drum, means for rotating said drum, an axially disposed air-conveying tube in said drum provided with a plurality of openings in its periphery, and means for closing some of said openings at predetermined periods.

4. A machine of the character described comprising a work-carrying drum having a perforated outer shell, a work-advancing helix within said drum, means for admitting work at one end and discharging it from the opposite end of said drum, means for rotating said drum, an axially disposed air-conducting tube in said drum with a plurality of longitudinal slots in its periphery and arranged to rotate with said drum, and a valve for controlling each of said openings.

5. A machine of the character described comprising a rotatable work-carrying drum having a perforated outer shell, a work-advancing helical member arranged within said drum, means for admitting the work at one end and discharging it from the opposite end of said drum, an axially disposed air-conducting tube in said drum with one or more elongated peripheral slots arranged to direct the flow onto the assembled drum in the cylinder, and means within said tube for gradually reducing its storage area from the inlet toward the opposite end thereof.

6. A machine of the character described comprising a work-carrying drum having a perforated outer shell, a work-advancing helix within said drum, means for admitting work at one end and discharging it from the opposite end of said drum, means for rotating said drum, an axially disposed air-conducting tube in said drum with a plurality of longitudinal slots in its periphery and arranged to rotate with said drum, a set of independently operated valves for controlling said openings, and a cone-shaped member within said tube for gradually reducing its storage capacity from the inlet toward the opposite end thereof.

7. A machine of the character described comprising a work-carrying drum, means for rotating the drum to tumble the work therein, means for advancing the work longitudinally through said drum, an axially disposed air-conveying tube in said drum provided with a plurality of openings in its periphery, a valve for controlling each opening, and cam-actuated mechanism for operating said valves.

8. A machine of the character described comprising a work-carrying drum, means for rotating the drum to tumble the work therein, means for advancing the work longitudinally through said drum, an axially-disposed air-conveying tube in said drum rotatable therewith and provided with a plurality of openings in its periphery, a valve for controlling each opening, and a cam for operating said valve to open each successively at a predetermined point in the revolution of said tube to direct the air into the assembled parts in the drum.

9. A machine of the character described comprising a rotatable work-carrying drum having an internal helically disposed portion, means for admitting the work at one end and discharging it from the opposite end of said drum, said drum being also provided with a work-storing enlargement at the discharge end thereof, and a central tube in said drum from which air is forced through the work during its passage through the drum.

10. A machine of the character described comprising a work-carrying drum having a perforated outer shell, a work-advancing helix within said drum, means for admitting work at one end and discharging it from the opposite end of said drum, said drum being also provided with a work-storing enlargement at the discharge end thereof, means for rotating said drum, an axially disposed air-conducting tube in said drum with a plurality of longitudinal slots in its periphery and arranged to rotate with said drum, and a valve for controlling each of said openings.

In testimony whereof I affix my signature in presence of a witness.

ARTHUR W. HUTCHINS.

Witness:
HOWARD E. BARLOW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."