April 12, 1932. A. W. LISSAUER ET AL 1,853,691

RETURN CURRENT DRIER

Filed May 14, 1930

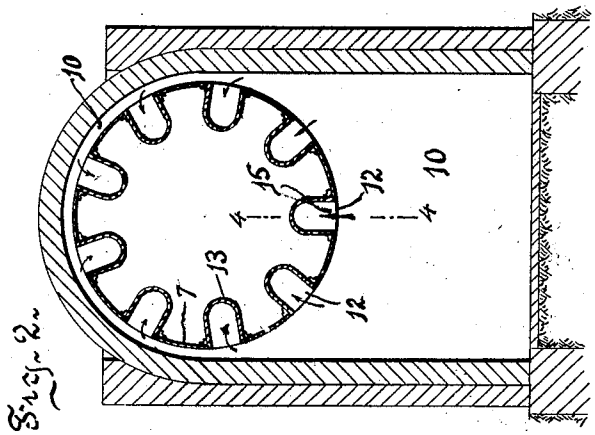

Fig. 2.

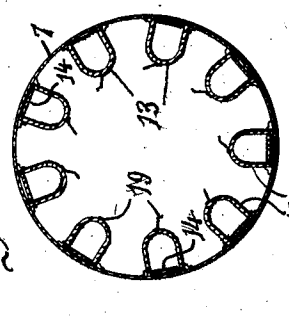

Fig. 3.

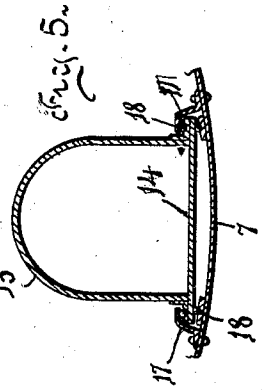

Fig. 5.

Fig. 1.

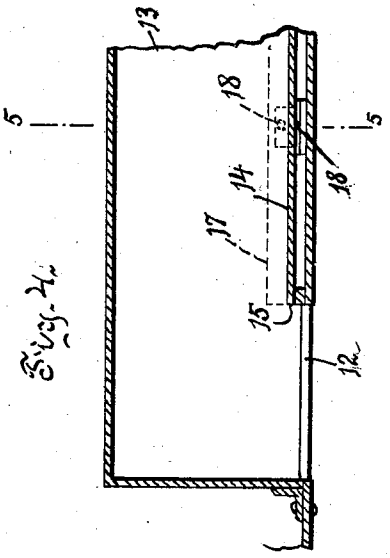

Fig. 4.

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Patented Apr. 12, 1932 1,853,691

UNITED STATES PATENT OFFICE

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RETURN CURRENT DRIER

Application filed May 14, 1930. Serial No. 452,510.

Our invention relates to return current driers of the revoluble type and has reference more particularly to the type of drier wherein the feed end is subject exteriorly to the direct action of the furnace combustion gases to prevent sticking of wet material fed into the drier.

The furnace gases about the feed end of the drier are conveyed to within the discharge end of the drier through a series of U-shaped conduits forming hollow flights, secured to the inner lateral surface of the drier and from where the furnace gases are drawn to and through the feed end by a fan.

An object of the invention is to provide a drier of the type referred to, which presents a large axially unobstructed space, through which the material to be dried is tumbled as the drier rotates.

Another object of the invention is to provide a drier of the type referred to, in which the flights for the material at the inner periphery of the shell of the drier are heated by the hotter gases.

Another object of the invention is to provide a drier of the type referred to, in which the hollow or channelled flights are of such cross-sectional area that keying or anchoring of material to be dried between the flights and the shell is reduced to a minimum.

In the appended drawings forming part of this application, Figure 1 is a longitudinal section through a drier embodying our invention.

Figure 2 is a cross-section on line 2—2, Figure 1.

Figure 3 is a similar section on line 3—3, Figure 1.

Figure 4 is a fragmentary longitudinal section through a conduit on line 4—4, Figure 2 and

Figure 5 is a cross-section through the conduit on line 5—5, Figure 4.

Referring to the drawings, 7 is the shell of the drier mounted to revolve, the driving and bearing mechanisms for same being only shown in dotted lines. The stationary feeding end 8 of the drier carries the feeding trough 9 through which material to be dried is supplied.

The portion of the shell at the feeding end is surrounded by a chamber 10, in communication with a furnace 11. The feed end 8 of the drier projects through the chamber 10 and suitable air seals are provided between said chamber and the shell 7 of the drier; similar seals are also provided between the shell and the feed end 8. The portion of the shell 7 surrounded by the chamber 10 at the feeding end of the drier is heated by the gases of combustion from furnace and prevents the wet material fed into the drier, from sticking thereat to the shell.

The shell 7 within the chamber 10 has a plurality of uniformly spaced openings 12. Each of said openings leads into a corresponding conduit 13 extending from its opening to the discharge end of the drier, whereat a stationary casing 14′ engages the shell, suitable air seals being provided at the stationary casing for the shell 7. The drier pitches to the discharge end as is common in mounting this type of drier.

Each of the conduits 13 is U-shaped in cross-section, and the top of the U-conduit is closed, substantially through its length, by a plate 14 which stops short of the closed end of the conduit at the opening 12 to form an opening 15, that registers with the opening 12 of the shell. The open end of the conduit is at the discharge end of the drier, so the gases from the chamber 10 pass through the openings 12 and 15, travel through the conduit 13, and enter into the discharge end of the drier, from where they are drawn to the feed end by the fan 16 which is in communication with the feed end 8 of the drier.

Each of the conduits 13 is anchored to the shell at the opening 12. Through its entire length, the conduit is supported on the inner periphery of the shell 7 by structural member 17, which are secured to the shell, but free from the conduit 13, although limiting its motion laterally and radially.

Interposed between the cover plate 14 of the conduit 13 and the shell 7 are balls 18 provided at suitable intervals through the length of the conduit 13; at same intervals balls 18 are also provided between the plate 14 and the portion of the structural mem-

bers 17 which overlap the plate 14 of the conduit. It is therefore apparent that although the structural members 17 limit lateral and radial movement of the conduits 13, they permit free longitudinal movement to said conduits 13 within the shell 7, although said conduits are locked to the shell at the hot gases inlets. The structural members 17 which retain the conduit 13 against the shell 7 also prevent the clogging of the material to be dried between the shell and the conduits.

By forming the conduits 13 of U-shaped cross section with the curved part directed inwardly, we provide a series of hollow heated flights for the material to be dried, which facilitate the flow of material to be dried through the drier and prevent the keying of the material as it travels through the drier. To better stir the material during its travel in the drier, the convex parts of the conduits are provided with baffles or additional flights 19, see Figure 3.

In view of the fact that the interior of the shell 7 is substantially unobstructed, the material during its travel from the feed end to the discharge end, is constantly subject to the radiant heat generated by the hollow flights or conduits 13, in addition to being subject to the return hot gases drawn through the conduits 13 by the fan 16. The absence of a central conduit in this type of drier permits the tossing of the material to be dried through the entire width of the shell.

From the above description and drawings, it will be seen that our return current drier provides a centrally unobstructed drier with a series of hollow heated flights in form of conduits, U-shaped in cross-section, secured firmly within the inner lateral surface of the drier, so that the said conduits or hollow flights, although prevented from lateral and radial movement, are free to move longitudinally.

We claim:

1. In a return current drier, a shell, a plurality of conduits, U-shaped in cross-section, disposed on the interior periphery of the shell, means securing said conduits to the lateral surface of the shell to prevent their lateral and radial movement, and rolling means interposed between the conduit and the securing means to permit a longitudinal displacement of said conduits relative to the shell, said conduits establishing communication between the exterior lateral surface of the shell and the interior thereof, at substantially opposite ends of said shell.

2. In a return current drier, a shell, a plurality of conduits U-shaped in cross-section, disposed on the interior periphery, of the shell, structural members securing said conduits to the lateral surface of the shell, to prevent their lateral and radial movement relative to the shell, and means interposed between the structural members and the conduits at suitable intervals to permit said conduits to move longitudinally in said structural members, said conduits being anchored to said inner periphery of the shell at one end thereof.

3. In a return current drier, a shell, a plurality of conduits U-shaped in cross-section, each of said conduits having a closed end and an open end, a plate covering the open part of the U-conduits substantially through its entire length, except near the closed end to provide an opening into the conduit, structural members carried on the interior of the shell for engaging the conduits in proximity of the plate to prevent the conduits from lateral and radial movement within the shell, said shell having openings at the lateral surface thereof, registering with the opening in the conduit at the closed end, and whereat said conduit is anchored to the shell, and balls interposed between said structural members and conduit at suitable intervals to permit said conduit to move longitudinally in the shell.

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