N. C. HERO.

MACHINE FOR DRYING FOODSTUFFS.

APPLICATION FILED JAN. 22, 1919.

1,358,313. **Patented Nov. 9, 1920.**

2 SHEETS—SHEET 1.

Fig. 4

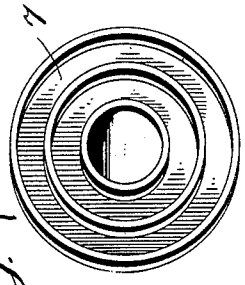


Fig. 1

WITNESSES

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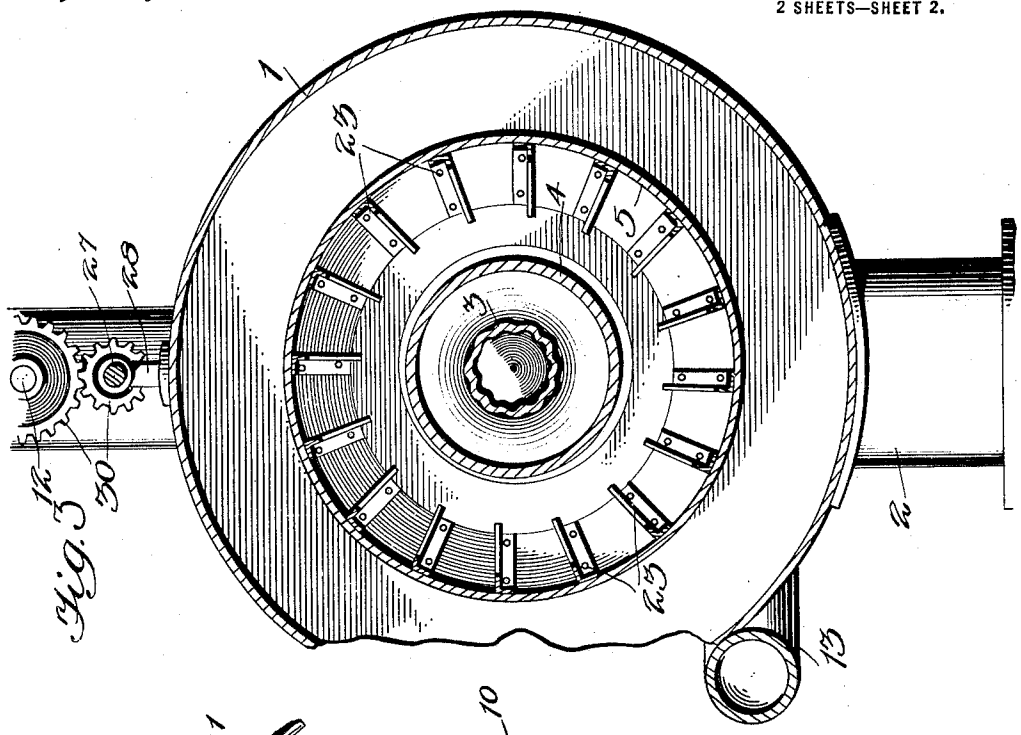


Fig. 1

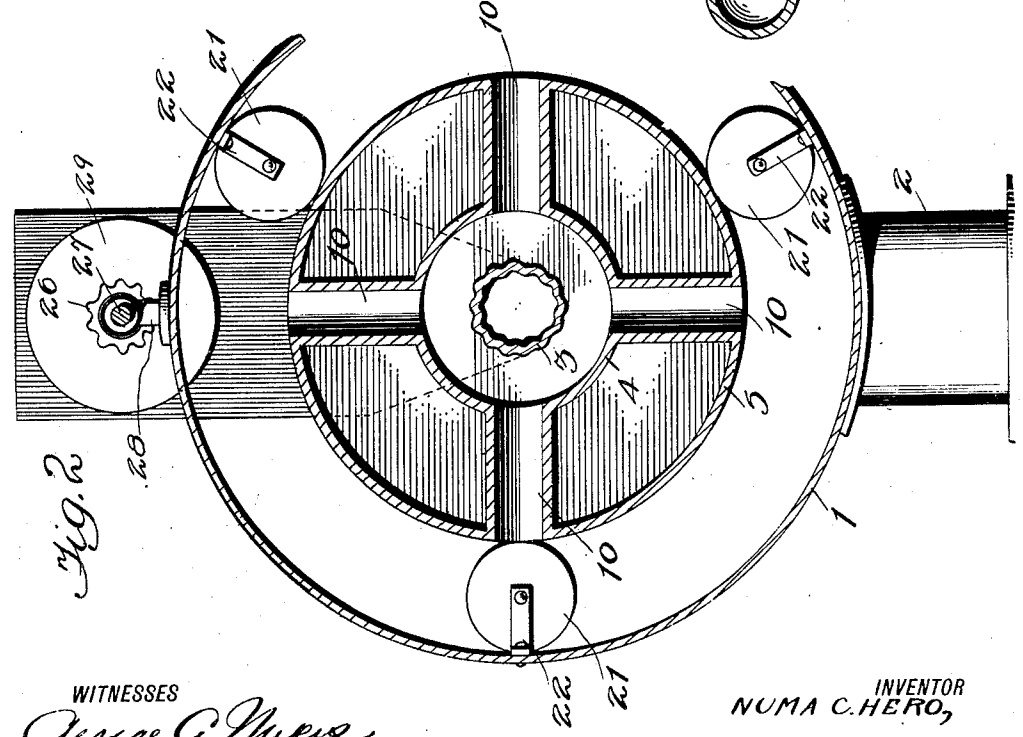


Fig. 2

WITNESSES

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UNITED STATES PATENT OFFICE.

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MACHINE FOR DRYING FOODSTUFFS.

1,358,313. Specification of Letters Patent. Patented Nov. 9, 1920.

Application filed January 22, 1919. Serial No. 272,497.

To all whom it may concern:

Be it known that I, NUMA C. HERO, a citizen of the United States, and a resident of New Orleans, in the parish of Orleans and State of Louisiana, have made certain new and useful Improvements in Machines for Drying Foodstuffs, of which the following is a specification.

My invention is an improvement in machines for drying food stuffs, as for instance hay-meal, ensilage and the like, and has for its object to provide a machine of the character specified which will quickly and thoroughly remove the moisture from the material at a low cost in a very efficient manner, and within a short time in a continuous passage.

In the drawing:—

Figure is a longitudinal vertical section of the improved drier;

Figs. 2 and 3 are sections on the lines 2—2 and 3—3 respectively, of Fig. 1;

Fig. 4 is a perspective view of one of the labyrinth elements.

In the present embodiment of the invention the improved machine consists of a shell or casing 1 in cylindrical form having suitable supporting pedestals 2, and within this shell are arranged three coaxial casings, the casings being designated from within outwardly by the reference numerals 3, 4 and 5. The innermost casing 3 is cylindrical, as is also the casing 4, while the casing 5 is tapering or frusto-conical. The casings form chambers, including the interior of the casing 3 as one chamber, and the said chambers are designated by the reference characters C, D, E and F.

A feed pipe 6 is connected with one end of the casing 3 by means of a labyrinth 7, so arranged that the casing 3 may rotate with respect to the feed pipe without impairing the communication between the feed pipe and the casing, and a fan or air compressor 8 is connected with the pipe 6 for driving a blast of air from the said pipe and through the casing 3.

At the end remote from the fan casing 3 communicates with the chamber E by means of substantially radial passages 9, the said passages inclining outwardly and away from the casing 3, as shown. The chamber D communicates with the chamber F by a series of radial passages 10, and the chamber F has an air outlet 11 in which is interposed a second fan or compressor 12. The air inlet for the fan 8 is a pipe 13, which passes outside the chamber F at the lower side of the shell 1.

A suitable furnace or other heating means 14 is arranged at the end of the machine remote from the fan 8 and the intake 15 for the pipe 13 is so arranged that it will be subjected to the heat of the furnace, so that the air drawn in by the fan 8 will be heated to any desired degree by the furnace. This furnace is arranged to discharge the heated gases directly into the chamber D, a suitable pipe 16 leading from the heating chamber of the furnace to the said chamber D. This pipe 16 is connected to an extension 17 of the casing 4 by means of a labyrinth 18. The material to be dried is fed from a suitable cutting machine or magazine 19 which communicates with the pipe 6 at the side of the fan 8. The material to be dried is driven by the blast of air through the chamber C, passing out through the passages 9 into the chamber E. The material works its way along the chamber F toward the large end thereof, and the said end is open to permit the material to discharge. A suitable conveyer 20 is arranged at this point to receive the material from the chamber E.

The casing 3, together with the casings 4 and 5, are mounted to rotate in the shell 1, the said casings 3, 4 and 5 being supported by wheels or rollers 21, which are journaled in brackets 22 in the shell 1. A series of fins or vanes 23 are arranged in the casing 5, being secured to the inner surface thereof and extending longitudinally of the casing, and it will be noticed that the vanes are inclined laterally to the axis of the machine, that is, their arrangement is slightly spiral. These vanes are so arranged that they will raise the material about two-thirds of the height of the casing, and will then dump it so that it will just miss the casing 4, falling to the bottom of the chamber E.

The labyrinth 7 consists of two portions, one of which is fixed and the other rotatable with respect to the fixed portion. The labyrinth as shown is a disk or ring having annular ribs and the ribs of one section fit between the ribs of the other section. The labyrinth 18 consists of three portions, a central and two lateral, the central turning with the casing 4, while the lateral sections are fixed. The central section has annular

ribs extending from both faces, while the lateral sections have ribs extending between the ribs of the central section.

In operation, the material to be dried is fed from the cutting machine or magazine 19, into the pipe 6, and is driven through the chamber C. This chamber is surrounded by heated gases from the furnace, and the wall thereof is corrugated longitudinally, as shown, so that it will pick up any material falling to the bottom of the same and will lift the said material dropping it downward into the air current which is heated by the current of air about the chamber. The material is discharged from the chamber C through the outlets 9, into the chamber E. The air in this chamber is also heated from the hot air in the chamber D, and the material as it is picked up and dropped is thoroughly dried, finally working out at the open end of the casing 5 in a thoroughly dried condition.

The improved machine is very compact and very efficient since all of the products of combustion pass through and give up all their heat units in their passage. Any wet material that may tend to fall out of the air current in the chamber C will be immediately thrown back into the current by the corrugations, vanes, etc., as the casing rotates. The dry air need not necessarily be superheated, but merely warm, and in dropping from the chamber C to the chamber E, it will be noted that the air and the material to be dried are acted on separately by two heat forces, namely, of the hot chamber D and the outer wall of the chamber C heated by the gases surrounding the same.

The effect of this double heat, together with the peculiar angle of the vanes causes the expanded wet gases to cling and roll out of the top of the casing, while the material to be dried is caused to fall through the drier atmosphere at the bottom and middle of the casing, where the remaining moisture is expanded and carried upwardly and off by the air passages.

Owing to the short duration of time for the passage of the material in the machine, the color and food values of the material are preserved without deterioration. All the factors which enter into the drying process are under complete control, namely, the feed, the air to the fan, the heated gases and the rotation of the casings. Any suitable means is provided for rotating the casing 3, as for instance, the large end of the casing is made cylindrical to form a pulley, and is provided with an annular series of sprocket teeth 24. These teeth are engaged by a chain 25, which connects the teeth with a sprocket wheel 26 on a transmission shaft 27 journaled in bearings 28 at the top of the shell 1. This shaft has a pulley 29 at one end which may be connected by a belt with a suitable source of power. At the opposite end the shaft is connected by gearing 30 with the fan 12.

It will be noted, referring to the drawings, that the large end of the cylinder 5 is open, while the adjacent end of the cylinder 1 is closed, by a ring 1^a, which is arranged between the cylinder 1 and the cylinder 5. A conveyer, indicated at 20, is arranged below the open end of the casing 5, for receiving the dried material and conveying it away.

I claim:—

1. A machine of the character specified comprising a shell, a series of coaxial casings arranged within the shell, the innermost casing and the intermediate casing being cylindrical and the outermost casing tapering toward one end and having passages at the said end forming communications with the innermost chamber, the intermediate chamber communicating with the interior of the shell by radial passages at the large end of the casing, said casings being rigid with each other to rotate together. means for rotatably supporting said casings in the shell, a feed tube delivering to the innermost casing at the large end of the outermost casing, means for driving a blast of air through the said innermost casing at the end remote from the communication with the outermost casing, and means delivering heated air to the intermediate casing at the opposite end of the casing.

2. A machine of the character specified comprising a shell, a series of coaxial casings arranged within the shell, said casings comprising inner, outer and intermediate casings, the inner casing having at one end means for feeding the material to be dried, and means for driving a blast of air through the said casing, said casing communicating with the outer casing at the other end, and an intermediate casing communicating with the interior of the shell at the first named end, means for rotating the three casings, means for driving heated air through the said casings at the end remote from the feeding means, and means for heating the air delivered to the end adjacent to the feeding means.

3. A machine of the character specified comprising a shell, a series of coaxial casings arranged within the shell, said casings comprising inner, outer and intermediate casings, the inner casing having at one end means for feeding the material to be dried, and means for driving a blast of air through the said casing, said casing communicating with the outer casing at the other end, and an intermediate casing communicating with the interior of the shell at the first named end, means for rotating the three casings and means for driving heated air through the intermediate casing at the end remote from the feeding means.

4. A machine of the character specified comprising a central casing to which the material to be dried is fed, an outer casing concentric therewith to which the inner casing delivers at the end remote from the feeding of the material, means for delivering a blast of air to the inner casing at the end adjacent to the feeding of the material, a common means for heating the said air and for supplying heated air to the casings, and means for rotating the casings.

5. A machine of the character specified comprising an outer shell and a series of concentric casings supported within the shell and rotatable with respect thereto, there being an inner, an outer and an intermediate casing, means for forcing a blast of air through the inner casing at one end, said casing communicating with the outer casing at the opposite end, an intermediate casing communicating with the interior of the shell at the first named end, and means for driving heated air through the said intermediate chamber and the shell.

6. In a device of the character specified, a series of concentric casings, the alternate casings communicating at one end and the intermediate casings at the other end, means for forcing the material to be dried through the alternate casings, and means for supplying heated air to the intermediate casings to heat the said alternate casings, means for feeding material to the casings, and means for communication with the heated air supplying means for supplying heated air to the blast driving means, and means for rotating the inner casing with respect to the outermost casing.

7. In a device of the character specified, a series of concentric casings, the alternate casings communicating at one end and the intermediate casings at the other end, means for feeding the material to be dried through the alternate casings, means for supplying heated air to the intermediate casings to heat the said alternate casings, and means for rotating the inner casing with respect to the outermost casing.

8. A device of the character specified, comprising concentric casings communicating with each other at one end and having means for feeding the material to be dried to the innermost casing at the other end, means for supplying heated air to the space between the casings and about the outermost casing, and means for rotating the said casings, the innermost casing being corrugated longitudinally.

9. A device of the character specified, comprising concentric casings communicating with each other at one end and having means for feeding the material to be dried to the innermost casing at the other end, means for supplying heated air to the space between the casings and about the outermost casing, means for rotating the said casings, the outermost casing having on the inner face of its peripheral wall a series of longitudinally extending vanes, for the purpose specified.

10. A device of the character specified, comprising concentric casings communicating with each other at one end and having means for feeding the material to be dried to the innermost casing at the other end, and means for supplying heated air to the space between the casings and about the outermost casing, and means for rotating the said casings.

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Witnesses:
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A. I. HERO.