P. PROVOST.

GRAIN DRIER.

APPLICATION FILED DEC. 27, 1912.

1,074,977.

Patented Oct. 7, 1913.

2 SHEETS—SHEET 1.

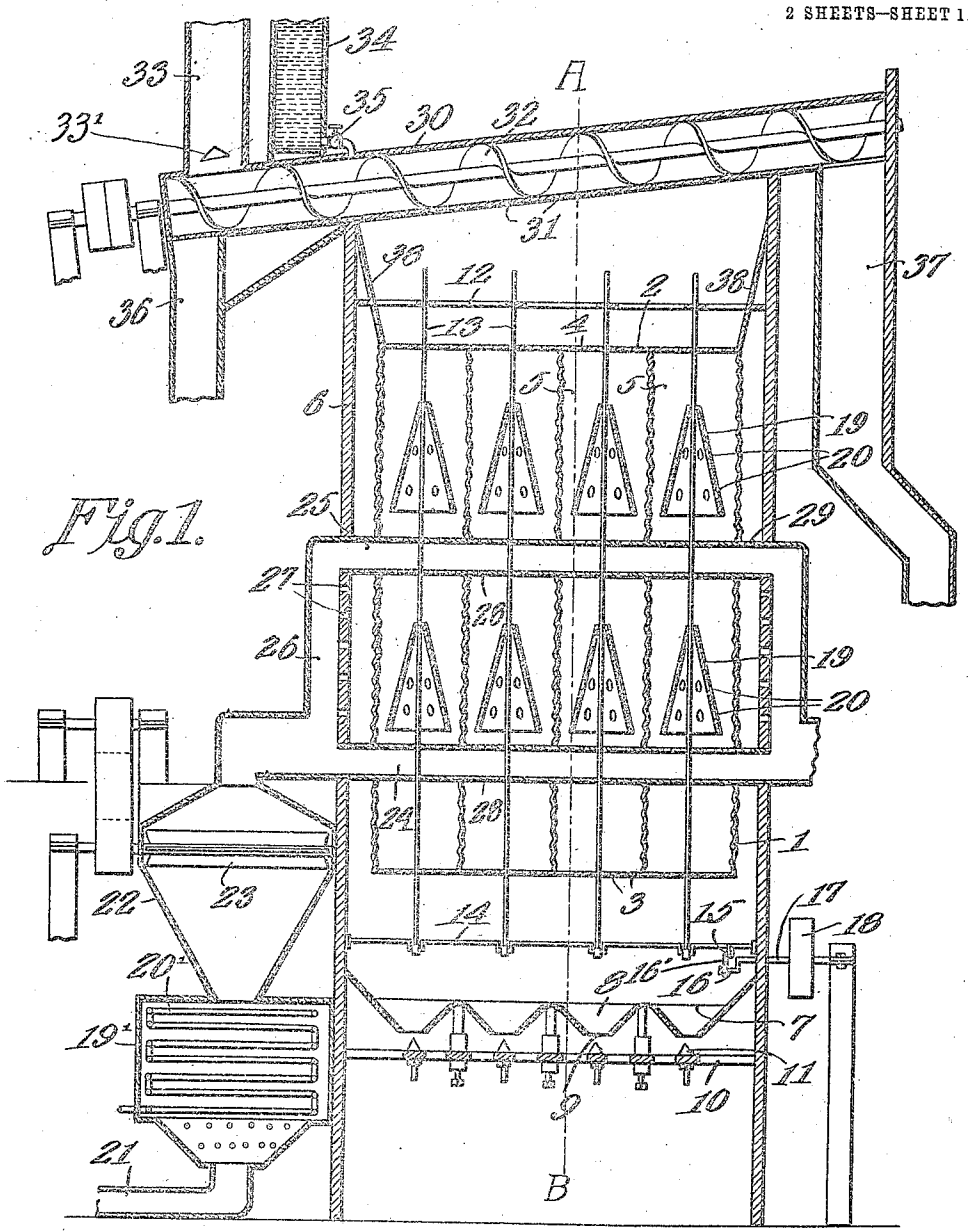


Fig. 1.

Witnesses

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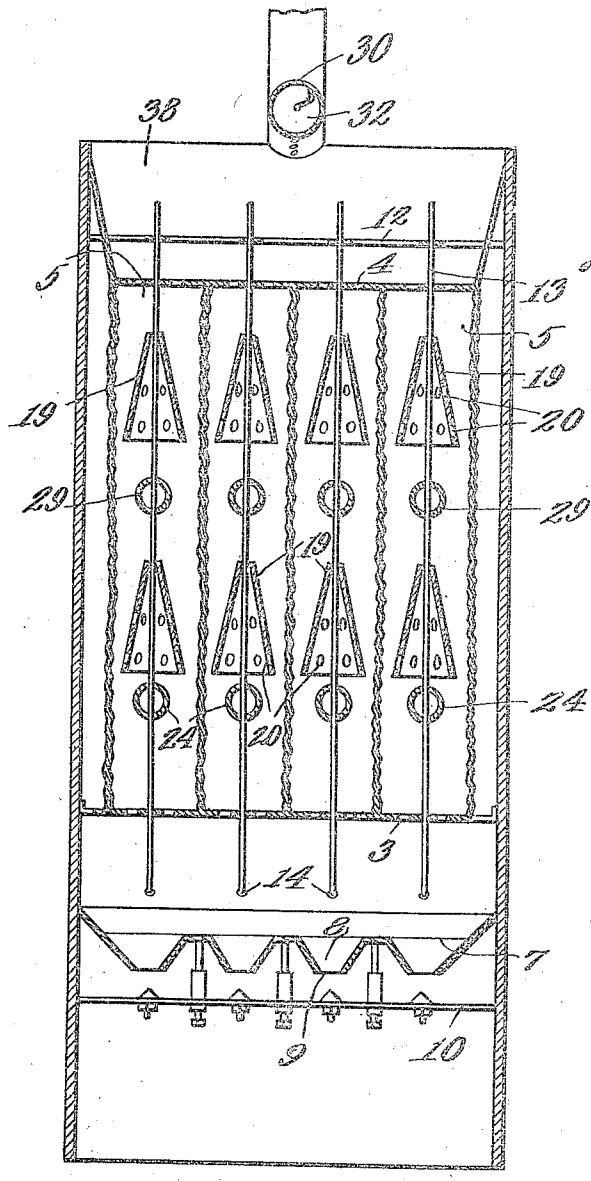


Fig. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

PETER PROVOST, OF MILWAUKEE, WISCONSIN.

GRAIN-DRIER.

1,074,977. Specification of Letters Patent. Patented Oct. 7, 1913.

Application filed December 27, 1912. Serial No. 738,354.

To all whom it may concern:

Be it known that I, PETER PROVOST, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Grain-Drier, of which the following is a specification.

This invention relates to grain driers and is more particularly an improvement upon driers of that type such as shown, for example, in Patent No. 1,000,120, issued to me on August 8, 1911.

One of the objects of the invention is to provide improved means whereby a forced circulation of heated air can be set up through the grain while falling through the apparatus, further means being provided for thoroughly agitating the grain during this movement so that all portions thereof will be subjected to the action of the heated air before the grain arrives at its point of discharge.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed; it being understood that changes in the precise embodiment of the invention herein disclosed, can be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings:—Figure 1 is a vertical transverse section through the complete apparatus. Fig. 2 is a section on line A—B Fig. 1.

Referring to the drawing by characters of reference 1 designates a casing of any desired cross sectional contour, the same being provided at its upper and lower ends with heads 2 and 3 respectively provided with apertures 4 through which communication is established with flues extending vertically within the casing and the walls of which are preferably transversely corrugated as shown. The upper portion of the casing 1 is flared upwardly from the head 2 and is secured in any suitable manner, at its upper edge, to the upper end of a drum or jacket 6 which is spaced from and concentric with the casing 1. A retaining plate 7 is arranged within the drum 6 below the head 3 and is preferably formed with depressions 8 having openings 9 in the bottoms thereof. A frame 10 is supported under the plate 7 and carries valves 11 which are located directly under the openings 9 and are for the purpose of controlling the passage of grain through said openings. These valves do not constitute any part of the present invention inasmuch as they are fully disclosed in my patent hereinbefore referred to.

A skeleton frame 12 is fixedly mounted in the upper portion of the drum or jacket 6 and also within the flared portion of the casing 1, this skeleton frame constituting a guide for rods 13 which are extended longitudinally within the flues 5 and are connected, at their lower ends, to a crank shaft 14. This shaft extends transversely within the jacket 6 between the plate 7 and the head 3 and is provided, near one end, with a radially extending finger 15 adapted to be actuated by a crank arm 16 located upon a shaft 17 which may be driven in any suitable manner, as by means of a belt mounted on a pulley 18. This arm is connected to the finger by a pitman 16'.

Secured to the rods 13 at desired points within the flues 5 are conical agitators 19 provided with apertures 20. It will be apparent that when shaft 17 rotates, crank arm 16 will raise and lower the finger 15 and thus cause the shaft 14 to rotate in one direction so as to elevate the rods 13 and the agitators 19 carried thereby. As soon as the crank arm 16 passes its dead center, the rods 13 and agitators 19 will be pulled down to their initial positions.

Arranged adjacent the jacket 6 is a casing 19' having a radiator 20' therein, there being an air conduit 21 leading to the lower portion of the casing and below the radiator. The upper portion of the casing communicates with the interior of a fan casing 22, the fan 23 being driven in any suitable manner. From this fan casing extend a suitable number of distributing pipes 24 and 25 which are extended transversely through the flues 5 at different elevations. One of the pipes, 25, can be extended upwardly short distances along opposed portions of the jacket or drum 6, as shown at 26 and apertures 27 may be provided in the drum or jacket 6 for establishing communication between the upwardly extending portions 26 and the interior of the jacket 6. Additional openings 28 are formed in the upper portions of the pipe 24 and 25 so as to permit air to escape from said pipes and into the

lower and upper portions of the flues 5. These pipes 24 and 25 also discharge, through openings 29, into the space between the casing 1 and the jacket 6.

Extending across the top of the casing 1 is a conveyer casing 30 preferably inclined as shown provided, in its bottom, with outlet openings 31. A worm conveyer 32 is mounted for rotation within this casing and extends longitudinally thereof. A feed trunk 33 opens into the top of the lower end portion of the conveyer casing and constitutes means for directing grain into said casing. A spreading cone 33′ may be located in the lower end portion of the trunk 33. A water container 34 is likewise disposed above the lower end portion of the conveyer casing and is provided with valved means, such as shown at 35, for directing water into the top of the conveyer casing. The conveyer can be rotated by any suitable mechanism provided for that purpose and discharge spouts 36 and 37 are arranged under the end portions of the conveyer casing.

It will be apparent that when the various parts of the machine are in use, the conveyer 32 will operate to direct grain from the lower end of the casing 30 longitudinally within said casing so that the grain will gravitate through the openings 31 and onto the heads 2. Before the grain is discharged onto the heads, it is moistened by water entering the casing 30 through the valved connection 35. By inclining the casing 30, as shown, water is prevented from flowing into the flared portion of the casing 1 but will pass outwardly through the spout 36, carrying therewith any dirt which may be washed from the grain. As the wet grain is discharged into the upper portion of casing 1 it is met by currents of heated air flowing outwardly through the openings 4 and through similar openings 38 formed in the flared portion of the casing 1. Thus the grain will be partly dried and will flow downwardly into the flues 5 where it will engage the agitators 19 which, obviously, are being reciprocated in the manner hereinbefore described. While passing downwardly through the flues 5, other jets of warm air are brought against the grain, these jets being discharged through the openings 28. The air entering the space between drum or jacket 6 and casing 1 serves to heat the wall of the casing and said wall thus constitutes an additional drying means. As the walls of the flues are corrugated transversely, the grain, as it passes downwardly within the flues, is further agitated. By utilizing the agitators 19 and these corrugated walls, the grain is kept in motion or turned continually during its gravitation so that all parts of the surface of each grain are subjected to the direct action of the jets of heated air passing through the flues. When the grain finally passes into the depressions 8 it will be found to be thoroughly dry. Obviously the air is heated by passing through and around the radiator 20, the fan 23 serving to force the air into the pipes 24 and 25 and also into the space between jacket 6 and casing 1. If desired, the arrangement of radiator and fan can be duplicated at the other side of the jacket 6, although it has not been deemed necessary to illustrate the same in the present structure. Any large particles which are not free to gravitate through the openings 31 will be conveyed to the spout 27.

What is claimed is:—

1. A grain drier including a casing having parallel upwardly extending flues, air distributing pipes extending transversely through and opening into the flues, and means for directing heated air into the pipes and flues.

2. A grain drier including a casing having parallel upwardly extending flues, air distributing means extending transversely of and opening into the flues, and means for directing heated air into said distributing means and flues.

3. A grain drier including upwardly extending flues, grain agitating means therein, and means for directing heated air into the upper and lower portions of the flues.

4. A grain drier including upwardly extending flues, hollow conical agitating means therein having apertures, and means extending through the flues and under the respective agitating means for directing heated air into the flues.

5. A grain drier including upwardly extending flues, hollow agitating means within the flues, rods connecting said means and extending within the flues and beyond one end thereof, crank shafts connected to the rods, and means for intermittently actuating the shafts to reciprocate the rods and agitating means.

6. A grain drier including a casing having flues therein, a jacket surrounding the casing and spaced therefrom, and means for directing heated air into the space between the jacket and casing and into the flues.

7. A grain drier including a casing, a jacket spaced therefrom, flues within the casing, means for directing grain into the upper ends of the flues, means for agitating the grain during its movement downward through the flues, means for directing heated air into the space between the casing and jacket and into the flues to dry the agitated grain.

8. A grain drier including a casing having flues therein, means for directing heated air into the flues and into the upper end portion of the casing, a conveyer casing discharging into the upper end portion of the

first named casing, means for directing grain into the conveyer casing.

9. A grain drier including a casing having upwardly extending flues therein, means for directing heated air into the flues and into that portion of the casing above the flues, a conveyer casing for directing grain into the upper portion of the first named casing, a conveyer movably mounted within the conveyer casing, means for directing grain into one end portion of the conveyer casing, and means for directing a moistening agent into said conveyer casing.

10. A grain drier including a casing having upwardly extending flues therein, means for directing heated air into the flues and into that portion of the casing above the flues, a conveyer casing for directing grain into the upper portion of the first named casing, a conveyer movably mounted within the conveyer casing, means for directing grain into one end portion of the conveyer casing, and means for directing a moistening agent into said conveyer casing, said conveyer casing being inclined to prevent the moistening agent from flowing into the flues and their casing.

In testimony that I claim the following as my own, I have hereto affixed my signature in the presence of two witnesses.

PETER PROVOST.

Witnesses:
CHAS. F. KAEMPFER,
ROBT. W. RILEY.