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C. ANDERSON & A. WOOLNER, Jr.

GRAIN AND FEED DRYING APPARATUS.

APPLICATION FILED SEPT. 15, 1900.

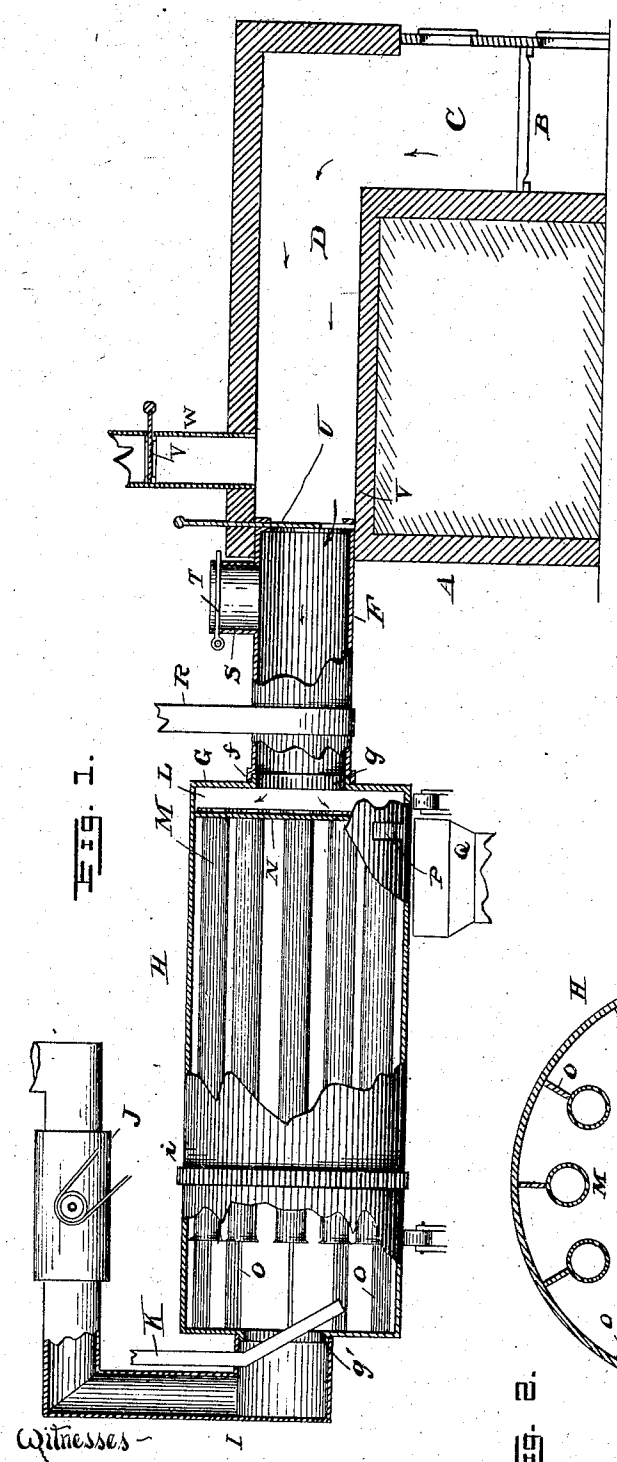


Fig. 1.

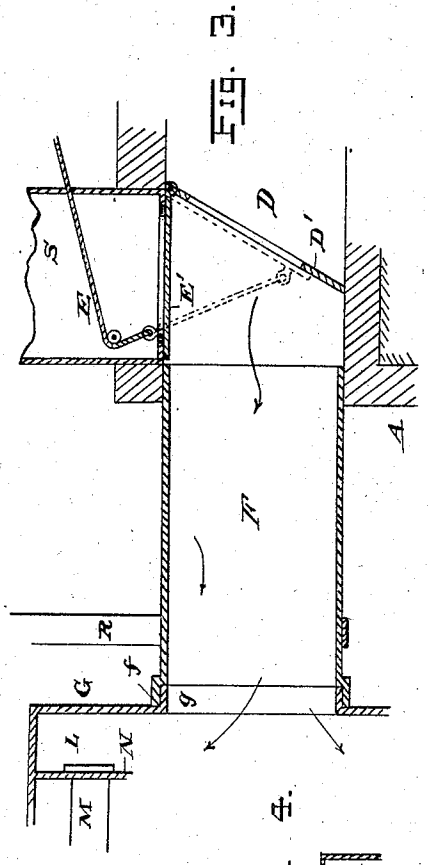


Fig. 3.

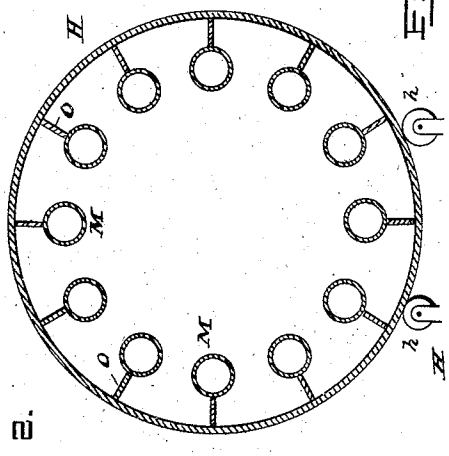


Fig. 2.

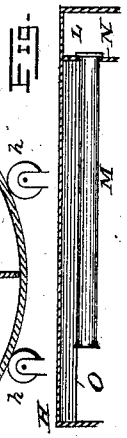


Fig. 4.

Witnesses—

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UNITED STATES PATENT OFFICE.

CHRISTIAN ANDERSON AND ADOLPH WOOLNER, JR., OF PEORIA, ILLINOIS.

GRAIN AND FEED DRYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 791,600, dated June 6, 1905.

Application filed September 15, 1900. Serial No. 30,201.

To all whom it may concern:

Be it known that we, CHRISTIAN ANDERSON and ADOLPH WOOLNER, Jr., citizens of the United States, residing at Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Grain and Feed Drying Apparatus; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to mechanism for drying grain and feed, and more particularly to a combined furnace and rotary drier and means for regulating the degree of heat from the former to the latter.

The object of the invention is to provide a complete system for drying grain and feed and furnishing a perfect regulation whereby the material under treatment will be quickly and thoroughly dried without danger of being burned.

We have illustrated and covered in our Patent No. 653,646, of July 10, 1900, a preferred construction of our drier and in connection with such we have devised the arrangement about to be described.

In the accompanying drawings, Figure 1 is a longitudinal section of a furnace and rotary drier, showing a pipe connection between the two. Fig. 2 in a transverse section of the drier. Fig. 3 is an enlarged view, in longitudinal section, of the pipe connection between the drier and furnace shown in Fig. 1 with different valve movement. Fig. 4 is a longitudinal section of a portion of the drier, showing a pipe and a partition or filler between said pipe and the wall of the drier.

In the various figures letters of reference correspond with those of the following specification.

A indicates a furnace constructed of masonry or other suitable material provided with the usual grate B.

C is the fire-space.

D is a horizontal flue for carrying away the products of combustion, and W is the smoke-flue. The said flue D is extended beyond the smoke-flue W and receives a pipe or conduit F. The opposite end of the pipe F is flared or provided with a collar *f* to inclose the open flanged end *g* of the drier H. This is a loose connection and is arranged to permit the drier to revolve freely, using such loose connection as a swivel. The drier is cylindrical in form, being carried on suitable rollers, as in common practice. A cogged rack *i*, driven by pinions, which, however, are not shown, transmits rotary motion to the drier from any source of power. The rear end of the drier has a flanged opening *g'*, similar to that already described, over which is placed a vapor-conduit I for carrying away the moist air from the material being dried, by means of a suitable exhaust-fan at J, for creating a forced draft from the furnace through the drier and said conduit I or through a chimney in place of said conduit. An inlet-pipe K introduces grain or feed to the drier through the opening in the rear, as shown. This may be also accomplished by a conveyer or analogous means. The forward end of the drier is provided with a recess L for receiving and distributing the heat from the furnace to pipes within the drier M, which open into the recess L through a partition N, which creates the said recess L in conjunction with the head G. Said pipes extend toward the opposite end of the drier and terminate in open ends substantially in the position shown. Between each pipe and the body of the drier is a partition or filler O, which extends beyond the free rear ends of the pipes to the rear end of the drier, as shown in Fig. 4. Evidently other construction of the drier may be employed, as we attach no broad claim thereto.

Openings P in the drier-body at the forward end (only one of which is shown) permit the dried feed to escape into a hopper Q, from which it is carried away for shipment or storage. This, however, is already shown and described in our former patent referred to. The pipe or conduit F is suitably supported by a bracket R, though this may not be found necessary. At the inner end of the conduit F within the flue D is a vertically-operated valve U, adapted to close the said conduit when desired. A cold-air-inlet pipe S is

connected with F and is closed by means of a valve T. The smoke-conduit W, referred to, is arranged above and connects with the flue D, substantially as shown, and a valve V controls the outlet. In practice the hot air from the furnace passes the valve U, which is normally open during the drying operation, thence through the conduit F to the drier; but should the heat be too intense the valve T is opened slightly to admit cold air and at the same time the valve U is partially closed. This cuts off part of the heat and tempers that portion entering the drier. While Fig. 1 shows this as being accomplished by adjusting the said valves U and T, the same result can also be had by using a single valve-motion, as shown in Fig. 3, in which E′ indicates the valve pivoted at one side and operated by means of a cord or wire E. Said valve rests on a seat D′ when lowered, as shown in dotted lines. The cold-air inlet S is in this figure removed from the conduit F and placed on the furnace, though, of course, this could be left in the position shown in Fig. 1. When the valve occupies the position shown, the hot air passes to the drier. When it is desired to reduce the heat, the valve is lowered slightly to induct cold air and simultaneously slightly close the flue D. In place of this valve a common "butterfly-valve" could be employed with equally good results. The operation of the entire apparatus may now be readily understood.

The fan J being in operation with the valve U, Fig. 1, open and valve T closed, the heat from the furnace will be drawn through the flue D, the pipe F, the drier-pipes M, the conduit I, through the said fan, to the exit. The grain as it enters by the pipe K will gradually work down toward the forward end of the drier and pass through the openings P. This action will obtain by reason of a downward inclination of the drier at the furnace end or by suitable adjustable carriers. The material in entering will fall among and upon the partitions O and lodge on and between the pipes, all of which are heated by the passage of heat therethrough. The proportions of the drier and the existing conditions therein are such that by the time the material has worked its way to the exits it is thoroughly dried.

In this application we wish to lay emphasis on the use of the pipe F and the valves U and T or the valve L′ controlling the heat and cold air passing through said pipe F. If the heat flowing to the drier is found to be too great, the cold-air damper T, Fig. 1, is partially opened as occasion demands, thereby admitting cold air to modify the heat to the required degree. If this is insufficient to obtain the desired results, the damper may be entirely opened and the damper U partially closed, so as to receive the proper degree of heat in the mixed air in the pipe F. At the same time the valve V may be opened slightly to withdraw the portion of heat not admitted to the drier. The length of pipe F between the inlet S and the drier is such as to provide a mixing-chamber for the hot and cold air before it reaches the drier for distribution. This assures perfect mixture of the air and proper temperature before being used.

In view of the foregoing the particular object of this invention is to combine the furnace A, valves for hot and cold air regulation, an air mixer and conductor F, and the drier H, which enables us to use any degree of temperature in the drying of various materials.

We claim—

1. In an apparatus of the character described, the furnace, the drier adjacent thereto adapted to have a rotary movement, a swiveled pipe connection between the furnace and drier, the furnace having its smoke-outlet through the drier, a valve in the pipe connection for controlling the amount of the products of combustion entering the drier, a cold-air inlet in said pipe connection, a valve therein for the purposes set forth, a heat-distributing recess in the drier for distributing heat to the material being dried, an inlet-pipe for such material, outlets for the same, and a smoke-outlet for the drier at its end most remote from the furnace substantially as set forth.

2. In a grain and feed drying apparatus, a furnace, a smoke-flue therefor, a valve therein for controlling the amount of outlet of the products of combustion or cutting off the escape of the same entirely, a revoluble inclined drier adjacent to the furnace, a heat-conductor from the furnace to the drier, a cold-air-inlet pipe in the conductor between the furnace and drier, a valve therein for governing the inflow of cold air, a valve in the end of the heat-conductor at the furnace end for governing the inflow of the products of combustion to the drier, a heat-distributing recess in the end of the drier, adjacent to the furnace, a series of flues opening therefrom into the far end of the drier, partitions between the flues and the wall of the drier an inlet-pipe for entering the material to be dried into such drier, outlets for the dried material, an escape-pipe at said far end of the drier for the escape of the heat from said drier and an exhaust-fan therein for assisting the draft from the furnace.

In testimony whereof we affix our signatures in presence of two witnesses.

CHRISTIAN ANDERSON.
ADOLPH WOOLNER, Jr.

Witnesses:
DANIEL J. FOX,
J. SHANNAHAN, Jr.