

(No Model.)

B. B. SNYDER & J. J. SELDNER.
DRYING APPARATUS.

No. 603,612.

Patented May 3, 1898.

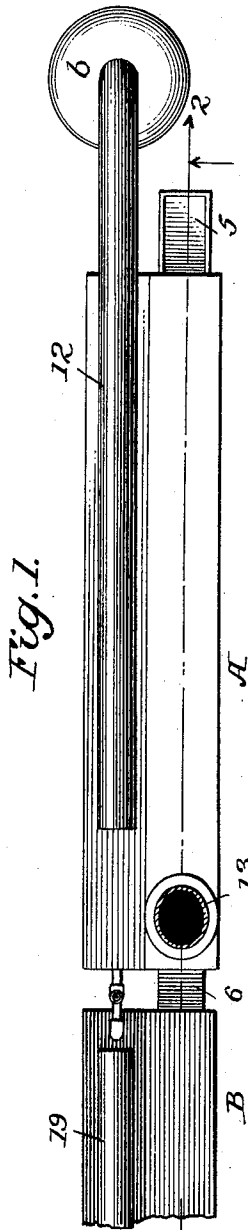


Fig. 1.

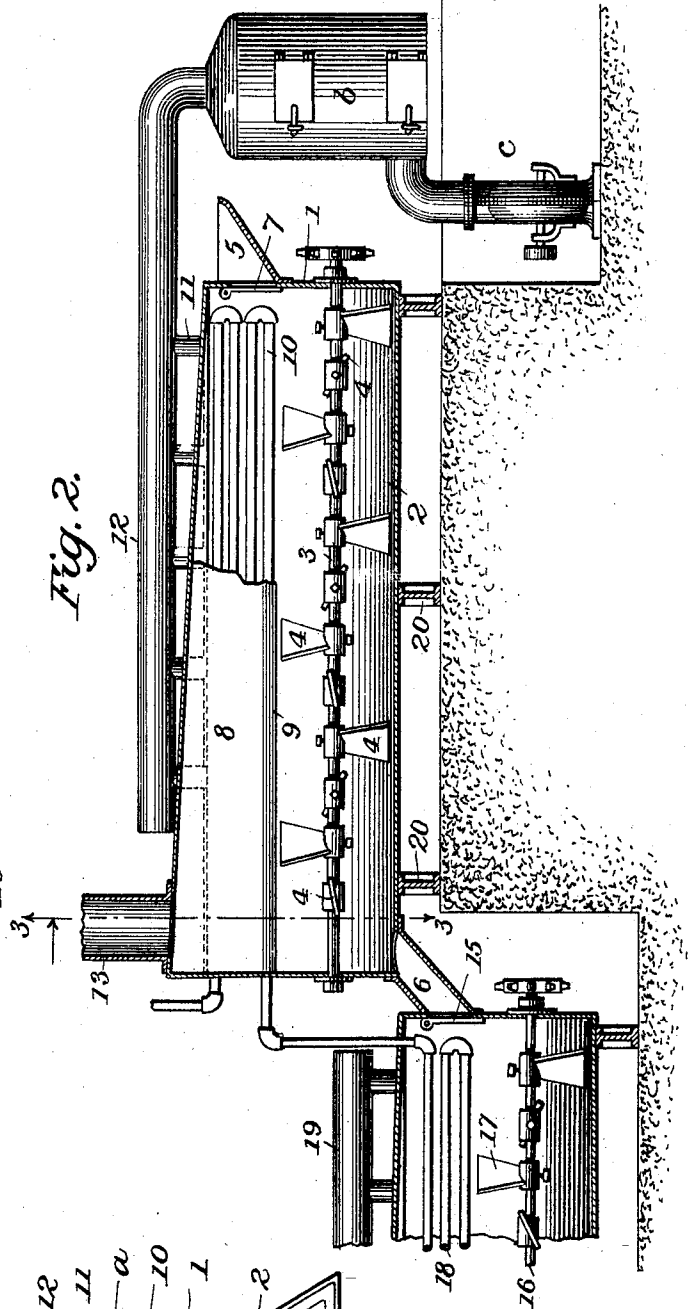


Fig. 2.

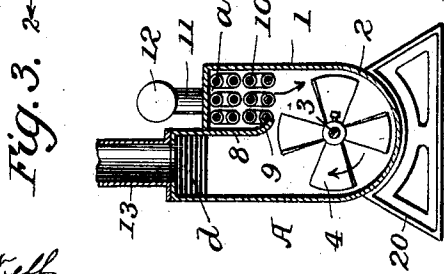


Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

BENJAMIN B. SNYDER AND JONAS J. SELDNER, OF BALTIMORE, MARYLAND, ASSIGNORS TO THE NITROGEN PROCESSING COMPANY, OF NEW YORK, N. Y.

DRYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 603,612, dated May 3, 1898.

Application filed September 25, 1897. Serial No. 653,029. (No model.)

To all whom it may concern:

Be it known that we, BENJAMIN B. SNYDER and JONAS J. SELDNER, citizens of the United States, residing in the city of Baltimore and State of Maryland, have invented certain new and useful Improvements in Drying Apparatus, of which the following is a specification.

This invention relates to improvements in apparatus for drying fertilizers and other materials in a loose or broken condition.

The invention consists in an apparatus through which the materials are conveyed and in which they are constantly stirred or circulated in contact with currents of hot dry air, the air-currents being so directed that the bulk of the air only comes in contact with the material once and then passes away, carrying the absorbed moisture. Incidentally the apparatus crushes and pulverizes the material as it is dried.

The invention further consists in novel means for regulating the temperature of the air used for drying purposes.

In the accompanying drawings, Figure 1 is a plan view of our improved apparatus. Fig. 2 is a longitudinal vertical section taken on the line 2 2 of Fig. 1. Fig. 3 is a section on the line 3 3 of Fig. 2.

In the drawings, 1 indicates the outer casing of the drier, which, as shown, is rectangular in plan. The lower part of the casing is semicircular in cross-section, forming a trough 2. Arranged longitudinally in this lower portion is a conveyer-shaft 3, which has a series of blades 4, adapted to convey material from the inlet-chute 5 along the trough to the outlet 6. The blades 4, in addition to conveying the material, stir it and mix it thoroughly, pulverize it, and toss it about, so that it becomes mixed intimately with the air. The opening to the chute 5 is preferably closed by a swinging door 7, which prevents the escape of air without interfering with the passage of material to the drier.

The upper part of the drying-chamber is divided into two compartments by a partition 8, which extends from the top down nearly to the paddles 4 and is preferably curved to one side, as at 9, to discharge the air in the direction of rotation of the paddles, which is

indicated by the arrow in Fig. 3. In the compartment *a* on one side of the partition are a number of steam-coils 10, which, as shown, extend from end to end of the drier. Above these coils are openings 11, through which air may be forced from a main pipe 12. This main, as shown in Figs. 1 and 2, receives hot air and products of combustion from a furnace *b*, the air being forced through the furnace and around the conveyer by a blower *c*. The furnace may be of any suitable construction, and the air may be heated in different ways; but it is preferred to drive the air right into the fuel and pass the red-hot gases directly through the main 12 into the compartment *a*, in which it passes over the steam-pipes and then out into the trough 2. In the trough it circulates around the shaft with the paddles and the material under treatment and then passes up the chamber *d* opposite the chamber *a*. The roof of the chamber *d* preferably inclines upward to accommodate the increased amount of gases as they travel along to a stack or chimney 13.

The materials to be treated vary greatly, some requiring more heat to accomplish the drying than others do. In some cases the apparatus may be used by passing the hot gases down through the material, and the steam-pipes may be omitted. In other cases, where it is desired, the cool air may be sent over the steam-pipes and heated by the steam.

The object of our invention is to dry materials quickly and safely, and this is best accomplished by forcing the hot air into the materials while they are wet and gradually subjecting them to cooler currents of air as they become drier. In some instances the hot gases employed upon the wet materials would scorch or ignite the same material when dried. We therefore prefer to operate our drying apparatus in sections either by using a succession of separate driers or a single drier with partitions.

As illustrated in the drawings, A indicates the drier above described, and B indicates a second similar drier into which the partially-dried material is discharged through the chute 6 and through a door 15, similar to the door 7. In this second section or drier B there

is a shaft 16, having paddles 17. The drier B may be of the same construction in all respects as the drier A. As shown, it has steam-coils 18, connected with the steam-coils 10, and if the steam be first passed through the coils 10 and subjected to the hot gases from the surface the steam in the coils 18 will be superheated, and the air from the pipe 19 may be heated solely by the coils.

10 As above stated, the preferred mode of operating the apparatus is to use very hot gases in the first section A of the drier and to use the superheated steam from said section to heat the air for the second section.

15 The drier may be set upon any suitable foundation. As shown, it is supported upon a series of castings 20. It may also be suitably incased in non-conducting materials, if desired.

20 Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a drier, the combination with the elongated casing, of a trough in the lower part of the casing, a shaft having paddles operating in the trough, a vertical longitudinal partition in the upper part of the casing having its lower edge adjacent to the paddles, means for forcing air down upon one side of said partition and an outlet for the moistened gases from the compartment on the opposite side of the partition, substantially as described.

2. In a drying apparatus, the combination of a casing having a trough, the conveyer-shaft adapted to move materials along said trough, a central longitudinal partition above

said conveyer-shaft, a furnace, means for producing a forced draft for said furnace and directing the hot gases down upon one side of said partition, and an outlet to the chamber on the other side of the partition whereby said hot gases may be circulated with the material through the trough, substantially as described.

3. In a drier, the combination with the elongated casing, of a trough in the lower part of the casing, the conveyer-shaft having paddles operating in the trough, a vertical partition dividing the casing into two compartments above the conveyer, steam-coils in one of said compartments, means for blowing air or gases over said steam-pipes, and a vent for the moistened gases in the other compartment, said air or gas being directed from the steam-coils around the conveyer-shaft along with material, substantially as described.

4. In a drier, the combination of one section thereof provided with a conveyer, steam-coils, a furnace, and means for blowing heated gases through the furnace over the coils and around the conveyer, of a second drier-section provided with a conveyer, with steam-coils supplied with superheated steam from the first section, and with means for blowing air over said coils, substantially as described.

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

BENJ. B. SNYDER.
JONAS J. SELDNER.

Witnesses:

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R. CARL FOSTER.