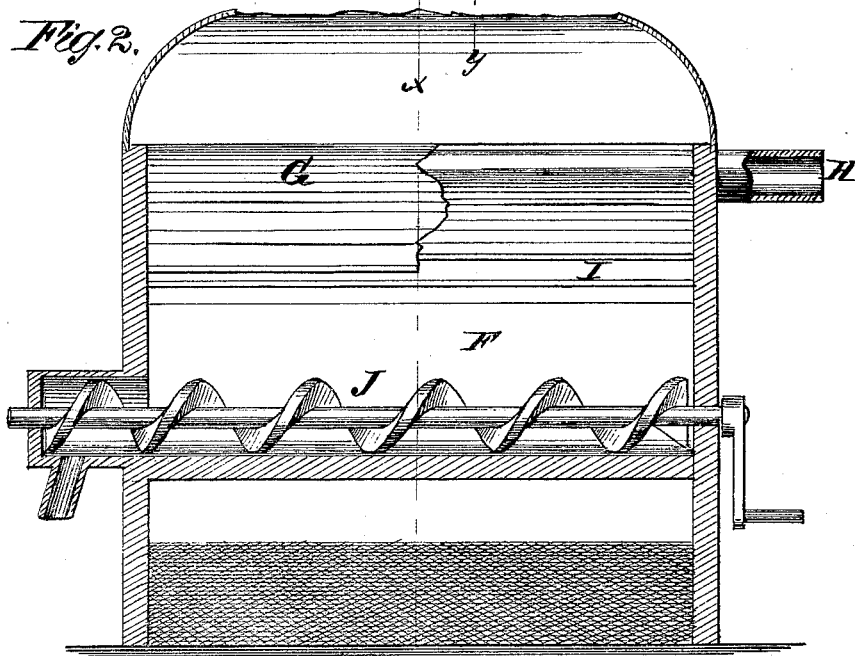
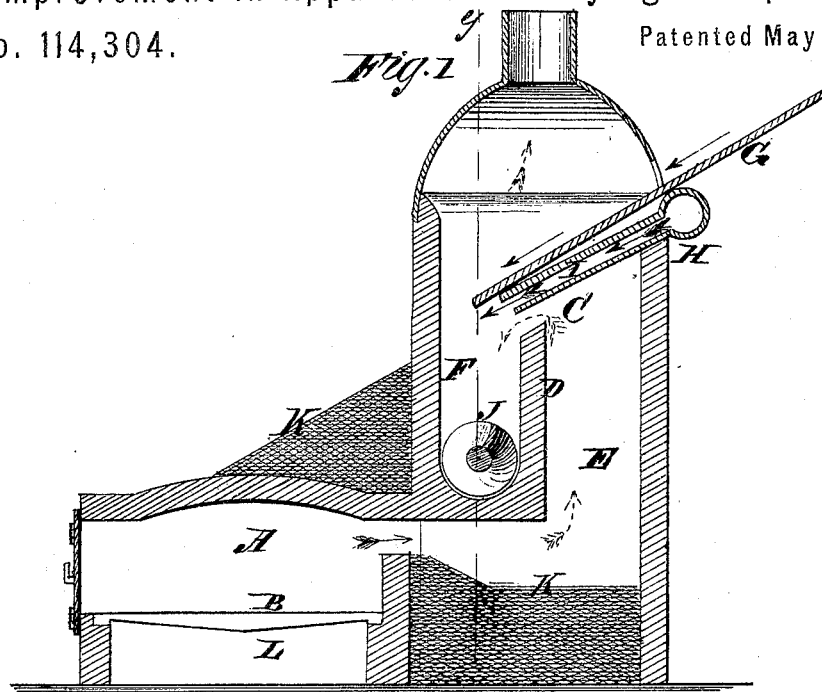


F. J. KIMBALL.

Improvement in Apparatus for Drying Phosphates.

No. 114,304.

Patented May 2, 1871.



Witnesses:
John Becker
Wm. H. C. Smith.

Inventor:
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UNITED STATES PATENT OFFICE.

FREDERICK J. KIMBALL, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN APPARATUS FOR DRYING PHOSPHATES.

Specification forming part of Letters Patent No. 114,304, dated May 2, 1871.

To all whom it may concern:

Be it known that I, FREDERICK J. KIMBALL, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Drying Apparatus for Phosphates; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification.

This invention relates to a new and useful improvement in apparatus for drying pulverized phosphates; and consists in a furnace so constructed that the phosphate is fed into the furnace and subjected to the action of the flame or products of combustion in combination with a current or currents of air, and in conveying the phosphate from the stack, as hereinafter more fully described and set forth.

In the accompanying drawing, Figure 1 represents a vertical section of the apparatus, taken on the line *xx* of Fig. 2. Fig. 2 is a vertical longitudinal section of Fig. 1, taken on the line *yy* of Fig. 1.

Similar letters of reference indicate corresponding parts.

A is the fire-place. B is the grate. C is the furnace or heating-oven. D is a partition-wall, which divides the furnace from the dry-chamber F. G is an inclined apron, which is placed in the wall of the furnace, as seen in Fig. 1, on which the crushed or pulverized phosphate is fed into furnace, as indicated by the arrows. The phosphate, as will be seen, passes into the furnace or heating-oven in a thin sheet.

H is an air tube or chamber, into which either heated or cold air may be forced by means of a fan or blower. This air escapes into the oven through the passage I in a thin broad current; or it may escape through holes, forming jets of air. This air mingles with the heated gases and products of combustion, and tends to increase or raise the temperature of the furnace.

The phosphate falls from the inclined apron

G into the dry-chamber F and onto the conveyer in contact with the flame. All organic matter is consumed by the intense heat, the carbonic acid contained in the phosphate is set free, and the moisture is expelled. The air-pipe H may be so arranged as to be surrounded by flame.

As seen in the drawing, the discharge-orifice I is exposed to the action of the heat, so that the air will mingle with the flame in a highly-heated state.

J is a spiral conveyer, which is made to revolve by the application of any convenient motive power in the bottom of the dry-chamber F. This dry-chamber, as will be seen, is directly above the flue, and is consequently heated to a high degree.

K K represent sand or any non-conducting material. L is the ash-pit.

The phosphate is delivered from the conveyer by the spout M.

Rock phosphate in its natural state contains a large percentage of water as well as other foreign matter, which it is of great importance to expel. With this apparatus the object is accomplished in the most expeditious and satisfactory manner.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The furnace C and dry-chamber F, arranged substantially as described, for the purposes set forth.

2. In combination with a furnace for heating and drying phosphate, the inclined apron or plate G, arranged substantially as and for the purposes described.

3. Introducing a current or currents of air beneath the feed-apron and so as to mingle with the products of combustion, substantially as shown and described.

4. The conveyer J, substantially as and for the purposes described.

FREDERICK J. KIMBALL.

Witnesses:

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