

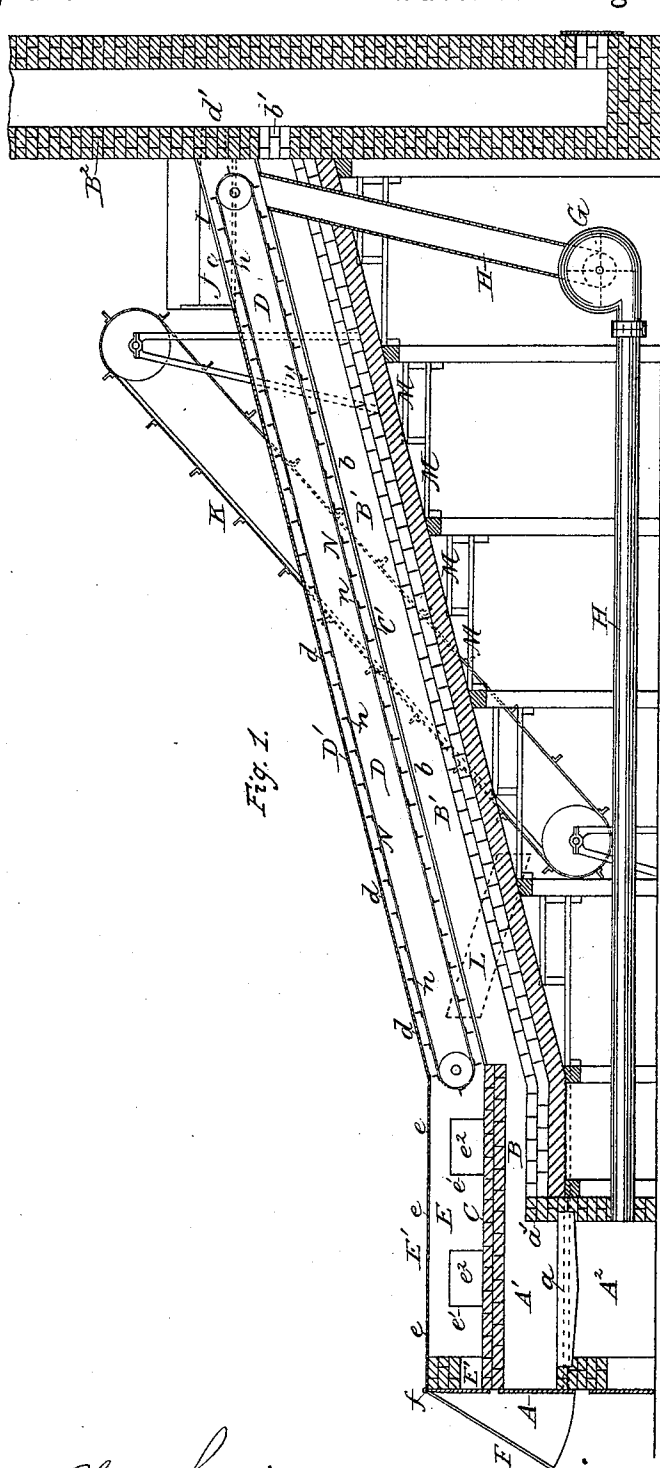
(No Model.)

2 Sheets—Sheet 1.

W. D. SUNDERLIN.
DRYING APPARATUS.

No. 481,212.

Patented Aug. 23, 1892.



Witnesses:

Charles Beckwith
A. L. Beckwith

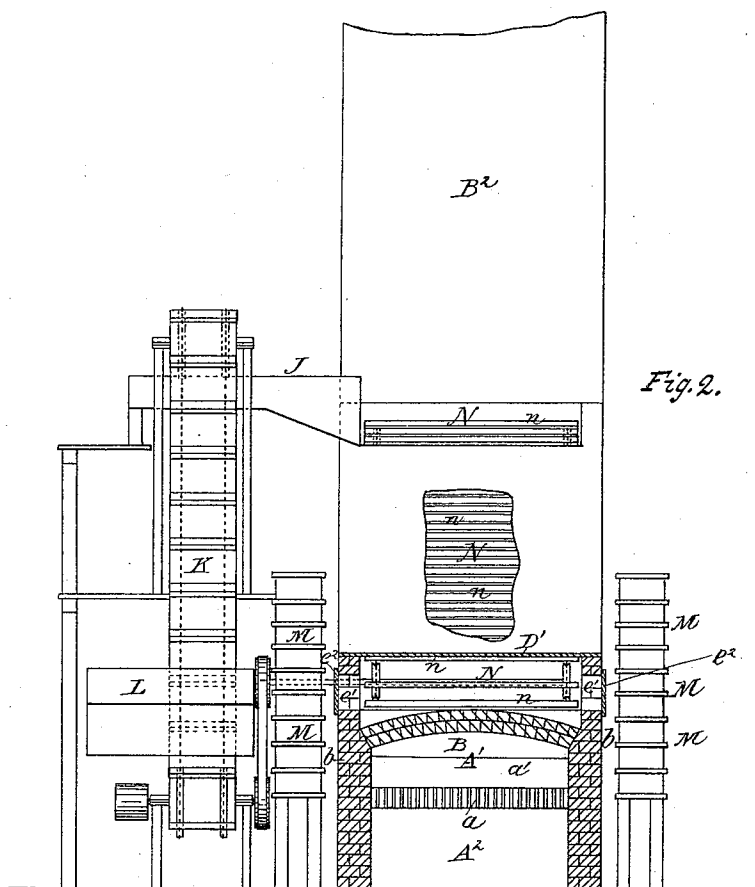
William D. Sunderlin
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2 Sheets—Sheet 2.

No. 481,212.

Patented Aug. 23, 1892.



Witnesses: Charles S. Kirk.
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By His Attorney
Alex. Leitch

UNITED STATES PATENT OFFICE.

WILLIAM D. SUNDERLIN, OF GREEN ISLAND, NEW YORK.

DRYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 481,212, dated August 23, 1892.

Application filed March 10, 1891. Serial No. 384,471. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM D. SUNDERLIN, a citizen of the United States, residing at Green Island, in the county of Albany and State of New York, have invented certain new and useful Improvements in Apparatus for Drying Substances; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in apparatus for drying substances; and it consists in the combination of devices and elements hereinafter described.

The objects of this invention are, primarily, to provide with a furnace an inclined stationary flue, an inclined metal floor heated by said flue and separating the latter from a drying-chamber, which connects with a ventilating device and is provided with means for progressively moving the material being dried to a delivery-chamber situated over the furnace; second, to combine with an inclined metallic floor, separating a heating-flue below from a drying-chamber above, a delivery-chamber at the terminus of said drying-chamber and over the fire-chamber of the furnace and provided with covered openings for discharge of the material, and a reflecting-hood in front of the furnace set at an angle, and an air-inlet leading from the chamber of the hood to said delivery-chamber, drying-chamber, and a ventilating device, and, thirdly, to provide particular combinations of devices by which the improvements in this invention may be embodied in an apparatus for drying substances or expelling water therefrom. I attain these objects by the means illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a sectional elevation, and Fig. 2 is a front elevation with a part shown in section.

The same letters of reference refer to like parts throughout the several views.

In the drawings, A represents a suitable furnace, of which A' is the fire-chamber and A² is the draft-chamber, serving, also, as an ash-pit. *a* is the grate, and *a'* is the fire-wall at the rear end of the same. The fire-chamber A' of the furnace communicates directly

with the horizontal flue B, immediately rearward of said fire-wall *a'* and beneath the rear portion of the arched-brick bed C.

B' is an inclined flue communicating from flue B to a suitable chimney or stack B². The bottom of this flue B' is preferably made of brick supported on a suitable framework, made of timber or other suitable material. The upper side wall C' of this inclined flue B' is made of metal, preferably sheet-iron, suitably supported and secured between the side walls *b b*, which latter may be made of brick or metal, or of any suitable refractory material. This metal upper side wall of inclined flue is the floor of the drying-chamber D, which said floor or wall C' separates from said flue, and the said flue, floor, and drying-chamber are made, respectively, of the same length and width, the length being from twenty-five to seventy-five feet, more or less, according to the nature of the material to be dried or the degree of dryness required to be given to the material, while the width of the same will be according to the intended capacity of the apparatus. The rear end of flue B' communicates through opening *b'* to the smoke-stack or chimney B², and the drying-chamber D communicates at its rear end with a suitable ventilating device. The metal floor C' between the drying-chamber and flue is arranged at an angle of from fifteen (15°) degrees to thirty-five (35°) degrees, according to the natural specific gravity of the material to be progressively moved over said floor from its place of entrance *c* to its discharge into chamber E above the brick bed C over the fire-chamber A' and horizontal flue B. By reason of this great incline of the floor C' materials of higher specific gravity may be moved progressively forwardly and downwardly with greater facility and by an expenditure of less power than when the said floor is at a less angle or horizontal. The lesser angle of incline will be sufficient for the same purpose with materials of less gravity.

The top wall or cover D' of the drying-chamber D is made sectional and comprised by the sections *d d*, which are suitably supported and are removable at will. The top cover of the delivery-chamber E is also made sectional and is composed of several sections *ee*, suitably supported and removable at will,

so that operators may have access to said chamber for operations for removal of the dried material from time to time, as may be required. The side walls *b b* of this chamber

5 *E* are provided with discharge-openings *e'*, having removable doors or covers *e''*, through which openings the said material may be discharged by means of a suitable rake, hoe, or other suitable instrument.

10 *E'* is an air-inlet opening made in the front end wall *b'* of the chamber *E*.

F is a heat-deflecting hood which is arranged at an angle in front of the said wall and is preferably extended across from side 15 to side of the front and is so hinged, as at *f*, as to be capable of being swung to any desired angle or be raised up out of the way, so that access may be had by an operator to the furnace-door for introducing fuel into the same. This air-inlet opening *E'* is preferably 20 made of small area, so that the volume of air admitted will be small and be moderately heated from the heat from the front of the furnace in the chamber formed between the 25 front wall and the hood *F* before its passage through said opening *E'* into the chamber *E*, in which it will be more highly heated, and thence have passage into the drying-chamber *D* to mingle with the vapor expelled from the material on the heated floor *C'* of the said 30 chamber *D*. This volume of dry and heated air operates to reduce the humidity of the chamber *D* without cooling the vapors rising from the materials being dried and mingles with said vapors and is carried with them to the ventilating device employed in connection with said drying-chamber.

The drying-chamber *D* may be ventilated by any suitable means, as by the draft of the 40 chimney when the latter is provided with a suitable opening, as at dotted lines *d' d'*, at the upper end of said drying-chamber; yet I prefer to use a ventilating-fan *G*, drawing from the drying-chamber *D* through the conduit *H* and discharging the mingled heated 45 air and vapor within the draft-chamber *A''* to contribute to the combustion of the fuel burning in the fire-chamber *A'*.

I is an opening in the cover *D'* of the drying-chamber *D* for the introduction of the material to within said chamber, and *J* is a 50 suitable platform for receiving the material before it is introduced into the said chamber.

K is a carrier for elevating the material as it receives it from the feed-platform *L* and 55 depositing it on the platform *J*.

M M constitute series of platforms for convenience of workmen, as floors on which to stand for removal or placement of the sections *d d* of the cover, or for operations with 60 the material in the drying-chamber, as occasion may require.

N is an endless carrier arranged within the drying-chamber *D* for progressively moving 65 the material from its place of deposit from platform *J* downwardly and forwardly over

the heated floor *C'*, over flue *B'* to the rear end of the delivery-chamber *E*. This carrier *N* may be made of a series of two or more 70 endless-link chains or wire cables carried by suitable sprocket-wheels or pulleys driven by any suitable power. Secured to these endless chains or cables at intervals are the horizontal bars or slats *n n*, which when moving forward in direction toward the chamber *E* 75 almost touch the upper surface of the metal floor *C'* of the drying-chamber *D* and operate to progressively, though slowly, move the material, lying a few inches deep on said floor, downwardly to the chamber *E*, from which it 80 will be moved from time to time through the openings *e' e'*.

This apparatus is adapted to be used for drying sawdust, clays, sand, fertilizing substances, lime, mud, and other substances of 85 solid nature.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a drying apparatus, the combination, 90 with a furnace, flue *B*, and inclined flue *B'*, leading from the flue *B*, a smoke-stack with which the said flues communicate, covered delivery-chamber *E* and covered drying-chamber *D*, delivering to chamber *E*, a brick bed 95 separating the delivery-chamber from the fire-chamber of the furnace, and an inclined metallic floor separating the said drying-chamber from the said inclined flue, of an air-inlet which communicates from the outside to the said 100 delivery-chamber and an air-outlet for ventilating the said drying-chamber from its upper end, substantially as and for the purposes set forth.

2. In a drying apparatus, the combination, 105 with a furnace, flue *B*, and an inclined flue *B'*, leading from flue *B* and to a suitable smoke-stack, covered delivery-chamber *E* and inclined drying-chamber *D*, delivering into said chamber *E*, a brick bed between the delivery-chamber and the fire-chamber of the furnace, 110 a metallic floor between the drying-chamber and the inclined flue, an air-inlet to the delivery-chamber, and an air-outlet from the upper end of the drying-chamber, of discharge-openings provided with doors in the walls of the 115 delivery-chamber, and an endless carrier moving through said drying-chamber in direction from the air-outlet toward the delivery-chamber, substantially as and for the purposes set 120 forth.

3. In a drying apparatus, the combination, with a furnace, flue *B*, and inclined flue *B'*, leading from flue *B* and thence to a smoke-stack, covered delivery-chamber *E* and drying-chamber *D*, communicating with each 125 other, a brick bed separating the delivery-chamber from the fire-chamber of the furnace, a metallic floor separating the drying-chamber from the said inclined flue, and an air-inlet opening from without to the said delivery-chamber, of an endless carrier working in the 130

said drying-chamber in direction toward the delivery-chamber, an air-conduit leading from the upper end of the drying-chamber, and a ventilating-fan in the course of the said air-conduit, substantially as and for the purpose set forth.

4. In a drying apparatus, the combination, with a furnace, a delivery-chamber E, having in its wall an air-inlet opening, an inclined drying-chamber communicating with said delivery-chamber, and an endless carrier working in said drying-chamber in direction from its upper end toward the said delivery-chamber, of the adjustable hood F, capable of being heated by heat from the furnace and hav-

ing its chamber communicating with the said air-inlet, an air-conduit leading from the upper end of the drying-chamber, a ventilating-fan having its inlet communicating with said air-conduit, and a discharge-pipe leading from the ventilating-fan to the draft-chamber of the furnace, substantially as and for the purposes set forth.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

WILLIAM D. SUNDERLIN.

Witnesses:

CHARLES SELKIRK,
A. SELKIRK, Jr.