

### Grain Drier.

Patented July 4, 1865.

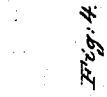


Fig. 2.

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Feb 27

Witnesses,

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*Inventor:*

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# UNITED STATES PATENT OFFICE.

SYLVESTER MARSH, OF CHICAGO, ILLINOIS.

## GRAIN-DRIER.

Specification forming part of Letters Patent No. 48,573, dated July 4, 1865.

### *To all whom it may concern:*

Be it known that I, SYLVESTER MARSH, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machinery or Apparatus for Drying Grain by Artificial Heat; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation; Figs. 2 and 3, vertical sections by planes intersecting each other at right angles upon the axis or center line of the apparatus, and Fig. 4 is a plan view of the same.

The principle which underlies this invention is embodied in several machines or apparatuses for which Letters Patent of the United States were issued to me; and it consists in the means or method of driving a current of dry heated air through a thin layer or layers of grain, whereby the dampness of the grain is not only carried off rapidly and without the least danger of burning or discoloring the grain, but whereby, also, the quality of the grain is improved, all sour and musty smell avoided, and a sweet and agreeable flavor insured.

The present invention has for its object to remedy certain defects or inconveniences attending the use in various localities of the machines or apparatuses previously invented and patented to me—that is, the use under various conditions of fuel and facilities of transportation and constructing machinery; and it relates to that class of apparatus which I call the “upright grain-drier.” As heretofore constructed, it consisted of shallow upright chambers made of flat or plane surfaced perforated plates or wire-gauze, these chambers arranged in a series of pairs, each having an intermediate space, which, being inclosed by air-tight walls except at the bottom, acted as the flues through which the heated air was forced up and through the said chambers, and thus constituted the heating medium of the laterally-adjointing chambers or grain-receivers. This construction is expensive owing to the numerous joints which the general form of the flues and chambers involves. They are also liable to some extent to get out of order, and although very economical in point of space as compared with other grain-driers, yet not fully utilizing the allotted space.

The first part of my invention therefore consists in making the chambers cylindrical or continuous. To this effect I use for each apparatus but one single chamber, which is composed of two concentric perforated cylindrical plates, A and B, of such respective diameters as will admit between its two plates of the requisite thickness or quantity of grain. They are united on top by means of concentric roofs, cones, or domes C D, the upper dome or roof being provided with a hopper or chute, E, through which the grain is poured or entered into the chamber. At the bottom the two cylindrical plates are united by means of a series of downwardly-converging plates, F, having at their points of convergence discharge-pipes G, forming a number of funnel-shaped outlets for the grain around the cylindrical chamber. These chambers are less expensive to construct than the flat chambers, because the plates can be readily united along their edges, and they are less liable to break at their joints or become otherwise out of working order. Moreover, the peculiar form of this chamber admits of a larger quantity of grain being passed through at a given speed and within a given space. It is, indeed, the most economical form both as to construction, space, and facility, and expeditiousness of operation.

The second part of my invention relates to the method or means of discharging the grain after it shall have passed through the drier. It is absolutely important to regulate the discharge of the grain. This has been done by means of valves or gates, whether operated by hand or by machinery—that is, automatically—as shown in the apparatus for which Letters Patent were issued to me. These valves or slides were liable to clog, and consequently to get out of order, by becoming filled with dust or other matters. To remedy this I convey the discharge-pipes G through the base of the cylindrical brick inclosure M, which at that portion is square-faced, and provided with a trap or traps, H, hinged on their lower edge, which for that purpose is provided with lugs or projecting pins fitting staples I secured in the wall. If more than one trap be used, they are coupled by means of side links, K, as shown in Figs. 1, 3, and 4. The trap-plate, or one of them, (if several are used,) is connected by means of rods L to a lever, N, which lever may be op-

erated by hand or automatically, at pleasure. A rack may be used to maintain the plates at any given inclination of adjustment. These traps or plates are immediately in front of the discharge-pipes, and by their operation close or uncover the openings of the pipes more or less, according to the adjustment of the plates. In this manner the means of regulating the discharge is constantly under the control of the operator. They are not liable to get out of order on account of dust or dirt depositing thereon, and require but little power to be operated, as there is little or no friction to be overcome.

The third part of my invention relates to the manner of conveying the heat or the heated air to and through the mass of grain held or confined within the space of the two concentric cylindrical perforated plates. Where anthracite or coke can be used with advantage, the blast derived from a fan or otherwise may be directed immediately over the fire or the ignited fuel, the air becoming heated and mixing with the products of combustion, which are free of solid matter, such as occasion smoke that would deposit upon and injure grain. In many farming districts, however, anthracite or coke cannot be easily obtained, the only available fuel being wood, peat, soft coal, corn-cobs, and other such materials, which, when burned, emit large volumes of smoke.

For the purpose of using the fuel last referred to in grain-drying apparatus constructed on the principle of my invention, I form within the annular or cylindrical perforated chamber a columnar furnace or heat-radiator consisting of a cast-iron or sheet-iron cylinder, O, closed on top by means of a spherical cap or plate, P, from which issues a smoke-pipe, Q. This columnar radiator is established upon a fire-chamber, R, provided with a suitable grate, S, underneath of which is an ordinary ash-pan, T.

The operation of this heating apparatus offers nothing peculiar. Like most radiators, the surrounding air is heated and rises up and out of the inclosures. In this instance it will pervade the whole mass of grain as the latter moves down the receiver or chamber.

In connection with this apparatus I use a fan-blower or its equivalent to produce a blast of fresh or cold air down on top of the heated furnace or fire-chamber for the purpose of preventing the ascending heat from burning the

grain immediately over the said furnace or fire-chamber. To this effect a fan-blowing apparatus, U, is established immediately above the fire-chamber, or that part of the furnace which emits the greatest amount of heat, and a blast-pipe is caused to discharge through holes W underneath upon the furnace. This I deem a very important improvement, since without it there would be no means of properly regulating the heat, and danger of scorching or burning the grain could hardly be avoided.

It will be understood that any smoke-stack may answer the purpose of the columnar radiator, and that a grain-drier such as hereinbefore described may in some places be constructed economically around an ordinary smoke-stack.

Having thus described my invention and the manner in which the same is or may be carried into effect, I claim—

1. The general construction and arrangement of grain-drying apparatus, substantially as herein described—that is to say, forming the grain receivers or chambers of a cylindro-conical form, in combination with a central induction and eduction pipes, arranged circumferentially, in the manner and for the purpose set forth.

2. In combination with cylindro-conical grain receivers or chambers, forming the under side of converging plates, to equally distribute the grain and insure its uniform discharge through the pipes.

3. The arrangement of the central columnar radiator or smoke-stack, in combination with concentric drying-chambers and inclosures, substantially in the manner and for the purpose herein set forth.

4. The combination of the discharge pipes or openings with hinged valve-traps, arranged for operation in the manner and for the purpose set forth.

5. The method herein described of regulating the temperature of the ascending currents by means of a blast of air down upon the furnace, substantially in the manner and for the purpose set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

SYLVESTER MARSH.

Witnesses:

JOHN W. TITUS,  
JACOB BEAN.