SCHUYLER & WARREN.

Grain Drier.

No. 38,790. Patented June 2, 1863.

Fig. 2.

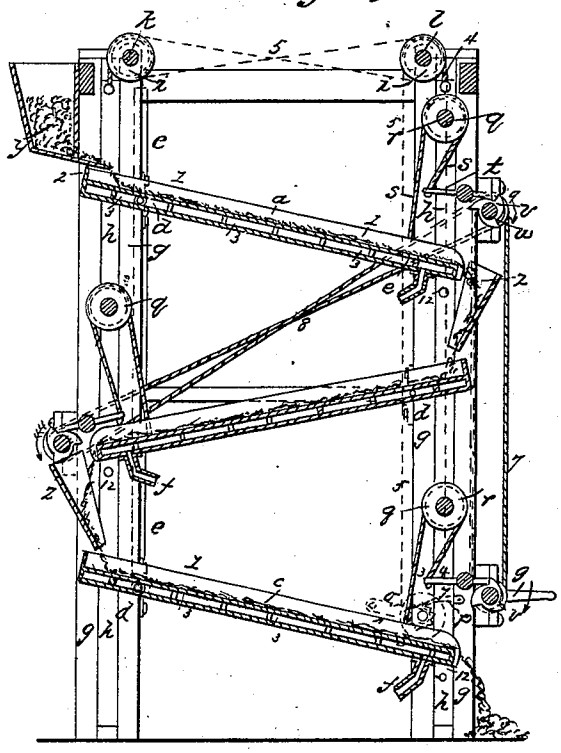
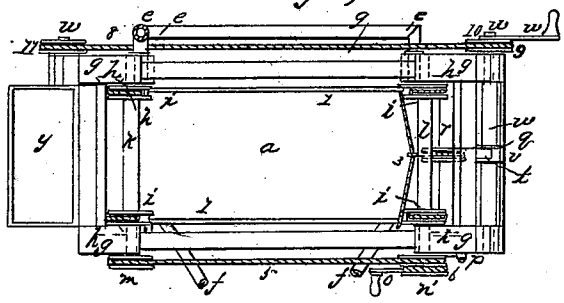


Fig. 1.



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UNITED STATES PATENT OFFICE.

PETER C. SCHUYLER AND SYLVESTER W. WARREN, OF NEW YORK, N. Y., ASSIGNORS TO PETER C. SCHUYLER.

IMPROVEMENT IN GRAIN-DRIERS.

Specification forming part of Letters Patent No. 38,790, dated June 2, 1863.

To all whom it may concern:

Be it known that we, PETER C. SCHUYLER and SYLVESTER W. WARREN, of the city and State of New York, have invented and made a certain new and useful Improvement in Driers for Grain and other Substances; and we do hereby declare the following to be a full, clear, and exact description of the said invention, reference being had to the annexed drawings, making part of this specification, wherein—

Figure 1 is a plan of our said grain-drier, and Fig. 2 is a section of the same vertically.

Similar marks of reference denote the same parts.

Grain-driers have heretofore been made of a series of inclined screens or platforms that could be adjusted to a greater or less inclination for detaining or more rapidly passing the grain along such screens or platforms, according to the condition of such grain, to effect the drying.

The nature of our said invention consists in a series of inclined hollow steam-tables, heated by the introduction of steam, so as to dry the grain as the same passes over the surface of said steam-tables, and we make use of an arrangement whereby the steam can be introduced and the table can be agitated to prevent the grain stopping upon said table; and we also employ a peculiar arrangement of mechanism for raising and lowering one end of each of the tables simultaneously, so as to vary the inclination of such tables, according to the condition of the grain.

In the drawings, *a*, *b*, and *c* are tables, each of which is made hollow, and tie-bars 3 3 are introduced to hold the flat top of the tables to the bottom part. These tables are to be made of iron cast around a sand-core that is introduced in the mold, having holes through it, whereby the said tie-bars are cast with the top and bottom plates, and the removal of this sand-core leaves the cavity for the steam.

1 1 are side pieces to said tables, and 2 2 are the end pieces, so that each forms a trough for the reception and passage of the grain or other material. Each of these tables is set and moves upon a transverse axis, *d*, in the vertical frame *g*, one of the journals of which is hollow and connects by a stuffing-box with a steam-pipe, *e*, and near the lower end of each table is a pipe, *f*, that leads away the water of condensation formed within the table. These pipes *f* may be fitted with elastic tubes leading the water away to any convenient receptacle, or said tubes *f* may be fitted in any other manner that will allow the tables to be moved, as hereinafter described.

In each of the four posts *g*, is a V-formed slide-bar, *h*, and these bars *h* can be raised and lowered simultaneously by racks and pinions, but we prefer and have shown a cord or chain, 4, from the upper end of each slide-bar *h* to a pulley, *i*, and these pulleys *i* are in pairs on the shafts *k* and *l*.

m and *n* are pulleys on the outer ends of these shafts *k* and *l* that are connected by a cross-belt, 5, (see Fig. 1 and red lines in Fig. 2,) and from the pulley *n* a belt, 6, leads to a pulley and crank, *o*, and ratchet-wheel and pawl *p*. (See red lines in Fig. 2.) By this means the slides *h h* can be simultaneously raised or lowered as required.

Between the slides *h h*, and sustained by them, are cross-shafts *r r r*, with chain wheels *q q q*, over which chains or ropes *s s s* pass. One end of each of these chains or ropes *s* is formed double to reach the respective sides of one of the drying-tables near its lower end. The other end of said chain connects to a lever, *t*, on a rock-shaft, *u*, acted upon by the cams *v* on the cross shaft *w*. Each of these shafts *w* is sustained on the main frame *g* and is rotated by competent power applied to one of said shafts *w*, as at *x*, and from that transmitted by the belts 7 and 8 and pulleys 9, 10, and 11 to the respective shafts *w*.

y is a hopper to supply the grain, and *z z* are deflecting-chutes or hoppers between the respective steam-tables. Circulating hot water might take the place of steam in the tables.

The operation of this drier is as follows: The tables are heated by steam supplied through the pipes *e*, either at a uniform temperature or the temperature of each may be regulated, as required, by the admission of steam. The grain or other substance from the hopper *y* runs over the surface of steam-table *a* and passes from one table to the next below until all the tables have been traveled over. The grain is thereby heated and dried thoroughly by the direct heat of the steam-tables themselves, and these can be regulated

in temperature as required by the admission of steam, and for this purpose a cock or valve should be applied to each branch pipe that connects to the respective table. As the grain descends it is agitated by the vertical movement given to the lower end of the tables by the cams *v v* and chains *s s*, through the levers *t*, raising the movable ends of the tables and allowing them to drop, and if the inclination of the tables requires to be varied for causing the grain to travel faster or slower, according to its condition, the same can be effected by the crank *o* and connections, raising or lowering the slides *h h* and shafts *r r* and wheels *q q*, which lift up or slacken the chains *s s*.

12 is a stud on the slide *h* to each steam-table to receive the ends of the same in case the chains *s* should break. The surface of these tables may be enameled, if desired, to prevent them becoming rusty, and any desired number of such tables may be arranged one above another at alternate opposite inclinations.

With grain that has become moldy a brush should be employed either before or after running the grain through, in order to cleanse said grain as much as possible from anything upon its surface.

If the tables require different inclinations the chains *s s* can be fitted with hooks so as to shorten or lengthen them, as required for the respective tables.

The different pulleys employed on this machine may be connected with chains or belts, and gearing might be substituted, if desired.

Our apparatus is adapted to drying grain and seeds of all kinds, drying hops, sliced fruits, and vegetables and for drying what is termed "coffee-sugar," thereby converting it into what is termed "granulated sugar" instead of drying the loaves in an oven previous to crushing and grinding, as now usual. These steam-tables may also be used for kiln-drying grain for malt-liquors and also for drying flour previous to packing for shipment to warm climates.

It will be evident that our apparatus possesses many advantages over those heretofore constructed. The vapors that rise from the grain on one table do not come in contact with the grain on the tables above, as is the case where perforated platforms or screens are employed. Each steam-table is a heater and drier in itself, whether inclosed in a casing or not, and hence our apparatus is adapted to use without requiring the expensive chambers or vertical shafts heretofore employed, and this apparatus supplies a want that has existed of a portable grain-drier that can be placed on a boat or barge and taken from place to place, as required, for drying the grain previous to shipment or for drying damaged grain in taking it from one vessel to another. Large quantities of grain are often sold in a damaged condition at a great sacrifice in consequence of the expense and time required to convey the same to a drier and then reshipping it. Our apparatus can be taken to the grain and put in work in a very short time, even in the open air, if necessary. Large quantities of the grain now shipped would be dried if it could be done without so much labor and expense. Our apparatus can be taken alongside a vessel and receive the grain from canal or other boats or barges and dry the same, after which it may be brushed, if desired, to remove any dust, and cooled by a blast of air and delivered on shipboard.

What we claim, and desire to secure by Letters Patent, is—

1. The construction of a hollow metallic steam table, connected together by the studs 3 3 and heated by steam or hot water, for drying grain or other substances, as specified.

2. The arrangement of the shafts *w*, cams *v*, levers *t*, and chains or bands *s*, in combination with the hollow metallic steam drying-tables, as specified.

3. The slide-bars *h*, adjustable as specified, in combination with the shafts *r*, wheels *q*, and shaking apparatus aforesaid, whereby said tables can be adjusted to the desired inclination and agitated, as set forth.

In witness whereof we have hereunto set our signatures this 16th day of April, A. D. 1863.

PETER C. SCHUYLER.
SYLVESTER W. WARREN.

Witnesses:
LEMUEL W. SERRELL,
CHAS. H. SMITH.