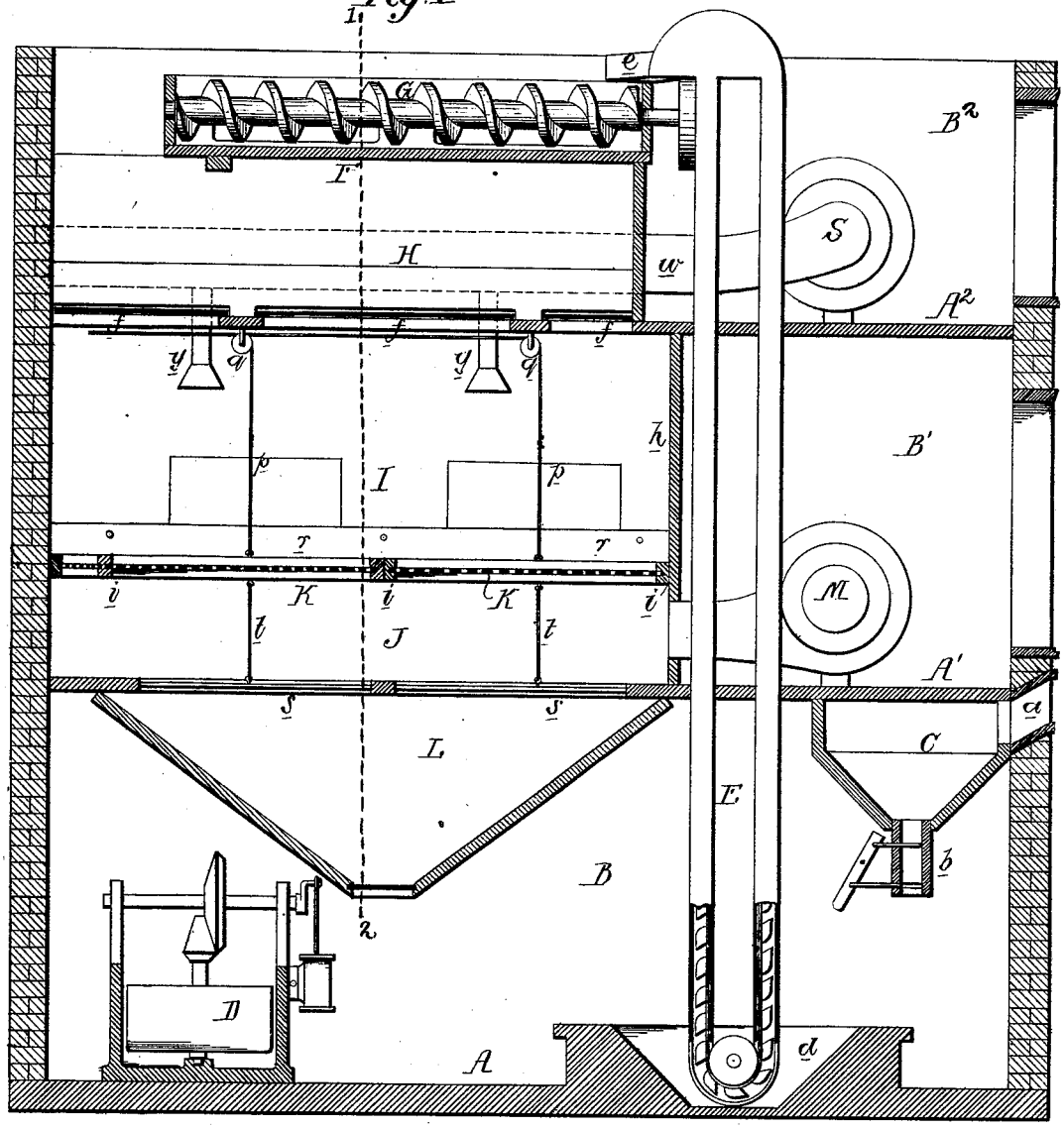
2 Sheets—Sheet 1.

H. & S. H. CHAPMAN.

PROCESS OF AND APPARATUS FOR DRYING BREWERS' GRAINS.

No. 195,573. Patented Sept. 25, 1877.

Fig. 1.



Witnesses.
Harry Smith
John K. Rupertus.

Henry Chapman
and
Samuel Hudson Chapman
by their Attorneys
Howson and Son

2 Sheets—Sheet 2.

H. & S. H. CHAPMAN.

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Fig. 2.

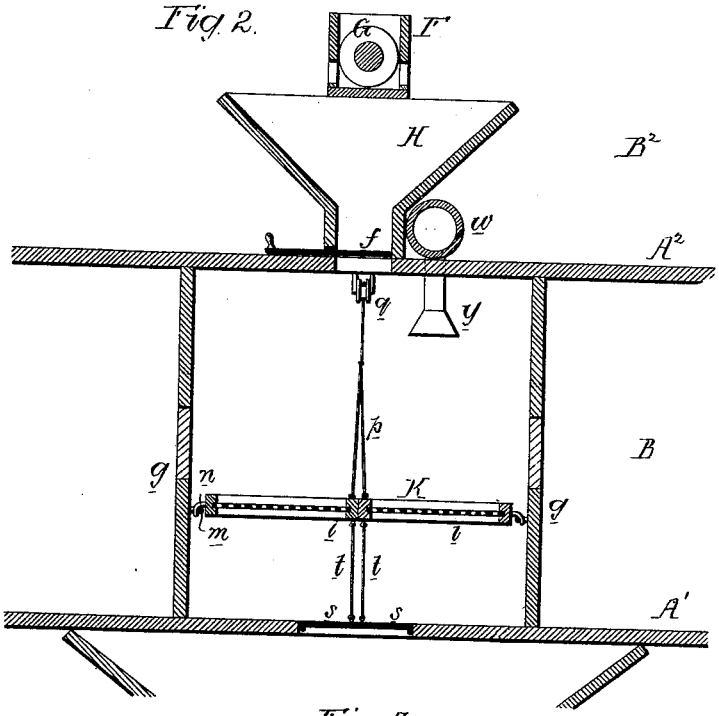


Fig. 3.

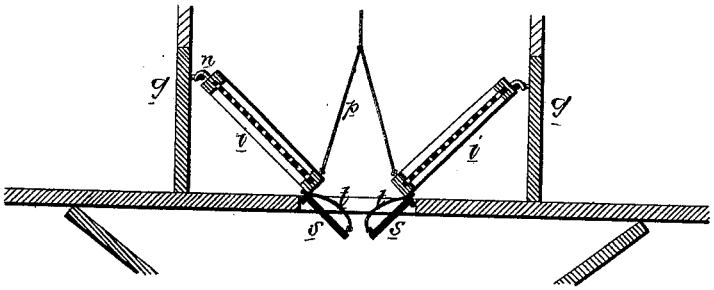
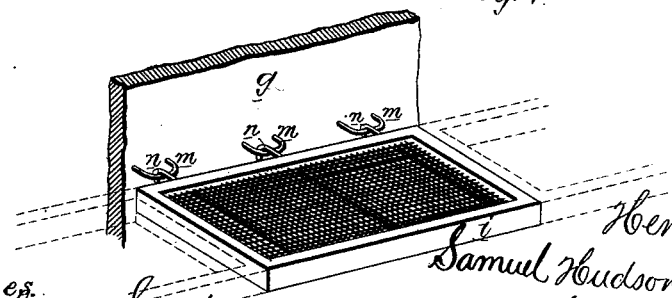


Fig. 4.



Witnesses.
Henry Smith
John Rupertus.

Henry Chapman and Samuel Hudson Chapman
by their Attorneys
Howson & Howson

UNITED STATES PATENT OFFICE.

HENRY CHAPMAN AND SAMUEL HUDSON CHAPMAN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO SAID HENRY CHAPMAN.

IMPROVEMENT IN PROCESSES OF AND APPARATUS FOR DRYING BREWERS' GRAINS.

Specification forming part of Letters Patent No. **195,573**, dated September 25, 1877; application filed December 29, 1876.

To all whom it may concern:

Be it known that we, HENRY CHAPMAN and SAMUEL HUDSON CHAPMAN, both of Philadelphia, Pennsylvania, have invented an Improved Process of and Apparatus for Drying Brewers' Grains and similar substances, of which the following is a specification:

The main object of our invention is to so treat brewers' grains or similar substances that they will be thoroughly and quickly dried, a further object being to construct a simple and efficient apparatus for this purpose. These objects we attain in the manner which we will now proceed to describe, reference being had to the accompanying drawing, in which—

Figure 1 is a side view, partly in section, of our improved apparatus; Fig. 2, a transverse section on the line 1 2; Fig. 3, a view of a portion of Fig. 2, with the parts in a different position; and Fig. 4, a detached perspective view, illustrating one of the features of our invention.

A, A^1, and A^2 are a series of platforms, which may represent the floors of different rooms in a building in which the apparatus is contained, the lowermost room B containing the devices for receiving the wet and discharging the dried grains, the room B^1 above containing the kilns, and the topmost room B^2 the devices for distributing the grains and conveying them to the kilns, as described hereinafter.

At one side of the room B is a receptacle, C, communicating through a chute, *a*, with the outside of the building, and having a discharge-spout, *b*, provided with a suitable device for delivering a certain quantity of the grains at a time. In this room B is also placed a centrifugal machine, D, of any suitable construction. Extending from the lower room B to the upper room B^2 is an endless bucket-elevator, E, the lower end of which communicates with a pit, *d*, in the room B, while its upper end has a spout, *e*, which discharges into one end of a trough, F, in which turns a screw, G. The trough F has a number of openings near the bottom, provided with suitable valves, so that the grains may be discharged through any of the openings which may be desired. Upon leaving the trough the grains fall into a hopper, H, in the bottom of which are also formed openings provided with valves *f*.

In the room B^1, beneath the hopper H, is arranged a kiln, which is formed by means of longitudinal partitions *g* and transverse partitions *h*, inclosing a space, which is divided into two chambers, I and J, by means of a perforated horizontal partition, K, which forms the floor proper of the kiln. This partition is peculiarly constructed, as shown more fully in Figs. 2, 3, and 4, and consists of a series of frames, *i*, inclosing sheets of wire cloth.

These frames may be of any desired length, and are preferably half as wide as the kiln, so that when the inner edges of two frames are placed together their outer edges are adjacent to the partitions *g*, to rods or staples *m* on which are adapted hooks *n* on the frames, which are thus hinged at the edges, and can be raised or lowered at the center through the medium of the cord or chain *p* and pulley *q*. Strips *r*, of suitable material, are secured to the partitions *g*, so as to project over the hinges and prevent the access of grains to the same. The bottom of the chamber J is furnished with hinged doors *s*, which are connected to the frames *i* by means of cords or chains *t*, so that when said frames *i* are lowered at the center the doors *s* are allowed to open, but when the frames are raised the simultaneous closing of said doors is effected. Beneath the floor A^1 is a bin or hopper, L, provided at the bottom with a discharge-spout having a suitable cut-off valve.

The chamber J beneath the perforated partition of the kiln communicates with the discharge-pipe of a blower, M, which receives a supply of heated air from any suitable source, and the chamber I above the partition communicates, through a pipe, *w*, and branches *y*, with an exhaust-fan, S.

The treatment of the grains with the above-described apparatus is as follows: The grains are emptied into the receptacle C from the outside of the building, and are then drawn off from the same, as required, and conveyed to the centrifugal machine D, by which they are deprived of at least one-half of the water with which they were saturated. The grains

are then removed from the centrifugal machine, and emptied into the pit *d*, from whence they are removed by the buckets of the elevator E, which carries them up to the top room B^2 and discharges them into the end of the troughs F, the endless screw G in which feeds them along the same and discharges them from the first uncovered opening in the trough. The grains fall into the hopper H, and when a sufficient quantity has accumulated therein the valves *f* are opened and the grains allowed to descend onto the perforated floor K of the kiln. The valves *f* are then closed, and the blower M and fan S set in operation.

A blast of hot air from the blower enters the chamber J, and, induced by the partial vacuum created above the mass of grains by the action of the exhaust-fan S, passes up through said grains, the draft of hot air thus commenced being maintained until the grains are perfectly dry.

When the grains are dry the frames *i* are allowed to turn down on their hinges, thereby releasing the doors *s* and allowing the same to open, so that the dried grains may be discharged directly into the bin or hopper L, from which they may be withdrawn, as required.

When the dried grains are all discharged the frames *i* are drawn up, and the kiln is then ready to receive from the hopper H the grains which have accumulated therein while the drying operation was in progress.

It will be seen that the above operation is continuous, and that by the use of the trough F, its screw G, and the hopper H, and its valves above the kiln, and by constructing the kiln with a floor made in two parts, hinged at the edges, and capable of being raised or lowered in the center, the filling and discharging of the kiln are effected without any handling of the grains.

An important feature of our invention is the subjecting of the grains to the action of a centrifugal machine before they are placed in the kiln, thereby removing the greater portion of the water from the grains, and thus reducing the time required to thoroughly dry them in the kiln.

By forming the perforated bottom of the kiln of a series of frames adapted to be readily hooked to the partitions, a kiln may be constructed or its capacity increased very rapidly and at very small expense, while the kiln can be easily repaired by substituting new frames for those which have become worn out, without necessitating the removal of the entire floor.

It will be evident that, although we have described our invention as applied to the drying of brewers' grains, it may be applied with advantage to drying other articles of a moist nature, such as fruit, fish-refuse, the residue from starch-factories, &c.

We are aware that sugar has been heretofore treated by subjecting it to the action of a centrifugal machine, and subsequently baking or drying it; but we have ascertained by experiment that in order to effect the drying of such substances as brewers' grains the heat must be applied in a manner differing from that in which it is applied to effect the drying of sugar; hence the peculiarity of the second branch of our process, which consists in passing streams of heated air through all portions of the mass of grains in the kiln, so as to keep the same in what may be termed an aerated state while being dried.

We claim as our invention—

1. The within-described process of drying brewers' grains and similar substances, consisting in first removing a portion of the water by means of centrifugal force, and then depositing the partially-dried grains in a kiln, and forcing or drawing a number of jets or streams of heated air through the mass, as set forth.

2. The combination of the hinged frames *i* *i* with the cord or chain *p* and pulley *q*.

3. The combination of the hinged frames *i* *i* with the hinged doors *s*, connected to and moving with the same, as set forth.

4. The combination of the elevator E, the trough F, and its screw G, the hopper H, a kiln or heating-chamber, and the receptacle L, all arranged as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

HENRY CHAPMAN.
SAMUEL HUDSON CHAPMAN.

Witnesses:
HERMANN MOESSNER,
HARRY SMITH.