

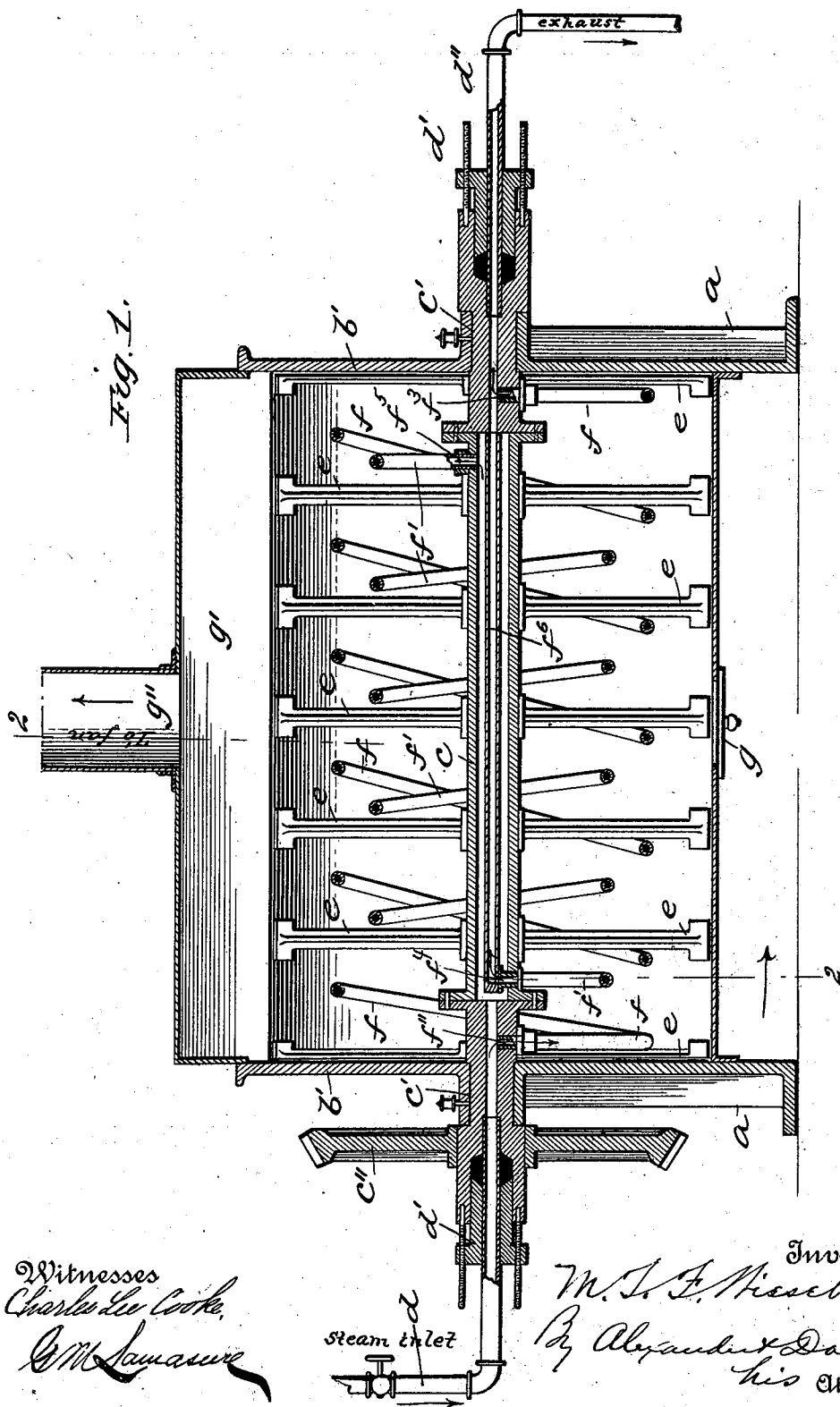
(No Model.)

2 Sheets—Sheet 1.

M. T. F. WIESEBROCK.
DRIER FOR BREWERS' GRAINS.

No. 504,099.

Patented Aug. 29, 1893.



UNITED STATES PATENT OFFICE.

MAX T. F. WIESEBROCK, OF CHICAGO, ILLINOIS.

DRIER FOR BREWERS' GRAINS.

SPECIFICATION forming part of Letters Patent No. 504,099, dated August 29, 1893.

Application filed October 17, 1892. Serial No. 449,115. (No model.)

To all whom it may concern:

Be it known that I, MAX T. F. WIESEBROCK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Drying-Machines, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

15 Figure 1 represents a vertical longitudinal sectional view of my apparatus; Fig. 2 a vertical transverse section, and Figs. 3 and 4 sectional views of details, showing slight modifications of the preferred construction.

15 The main object of this invention is to produce a novel and effectual apparatus for drying various kinds of materials, such as brewery and other waste products, grain, sand, &c., and which also may be employed for concentrating liquids by evaporation, as more fully hereinafter appears.

25 The nature, advantages and operation of the apparatus will be fully understood from the following description when taken in connection with the accompanying drawings, in which—

30 The letter *a* designates the supporting base or frame of the apparatus and *b* a stationary cylindrical shell secured to cast-iron heads *b'* mounted on or forming part of the base or frame. A hollow shaft passes centrally through the shell and is constructed of three tubular sections, the two outer or short sections being journaled in bearings in the heads *b'* and connected within the shell by the central tubular section *c* which has a steam space larger than the short sections. This shaft is revolved by means of a gear *c''* and suitable motive power. Stuffing boxes *d'* are secured in the outer ends of the shaft sections *c'* and through these boxes pass the non-rotating steam-conveying pipes *d d''*, the former of which supplies the live steam to the interior of the shaft, while the latter conducts away the exhaust steam and water of condensation.

45 The hollow shaft, within the shell, is provided with a suitable number of radial agitating-arms *e*, which extend close to the interior of the shell and serve when rotated to thoroughly agitate the material in the shell and lift the same and throw it over in the form of a shower in the direction of their rotation.

There are two agitating and drying coils *f f'* within the shell, the former being the larger and both being continuous and extending approximately the full length of the shell. The larger coil has its forward end secured to the shaft section *c'* at the forward end of the machine and communicates at *f''* with the steam inlet therein, from which point the pipe passes around and around the shaft, in the form of a left hand coil to the other end of the shell where it is secured to the other short shaft section and put in communication with the exhaust steam outlet at *f³*. The smaller coil *f'* within the larger coil takes steam at its rear end which communicates at *f⁵* directly with the live-steam space of the section *c* at its rear end, from which point it passes around the shaft, in the form of a right-hand coil, to the forward end of section *c* which it enters and communicates at *f⁴* with the forward closed end of a pipe or compartment *f⁶* supported therein and having its rear end in communication with the exhaust-outlet through the rear short-section *c'*. In this manner steam is caused to pass through the coils and out at the exhaust end of the shaft continuously during the operation of the machine, the water of condensation in the coils following the path of the steam and also passing out through the exhaust outlet.

80 An exhaust chamber *g'* is formed along the top of the shell and communicating with this exhaust chamber is an exhaust pipe *g''*, up through which a current of air is caused to pass by means of a suitable exhausting device, such as a fan or steam injector or by connecting it to a chimney having a good draft.

90 A series of openings *g⁴* is formed along one side of the shell through which a continuous supply of air is drawn by the exhausting device, and in order to deflect this current of air downwardly and prevent it passing directly up into the exhaust chamber, a deflecting-plate *g⁵* is secured within the shell, this plate extending the full length of the shell and arranged close to the inlet openings. The charging opening is formed along the full length of the shell, above the deflector and openings, and is closed by a suitable door or lid *g⁶*. The operation of the machine is evident from the foregoing. After the shaft is

started and steam is let into the coils and the exhaust mechanism put in operation, the material is charged through the filling opening until the shell is about half full, the material being evenly distributed throughout the shell by the agitating devices. The stirrers serve to thoroughly agitate the material and throw it over in a continuous shower against the current of air drawn in from one side by the exhaust mechanism, whereby the material is effectually and rapidly dried and the vapors carried off. The oppositely coiled steam pipes serve to greatly assist in driving off the moisture from the material without baking or burning the same, the continuous rotation of the coils preventing the material lodging thereon. These coils not only serve to dry the material but they also assist in thoroughly agitating it, one of them serving to convey the material toward one end of the machine while the other one conveys it in the opposite direction, thus insuring a complete mixing and agitation of the material while the air current is passing through it. This double coil arrangement gives a very large heating surface and thereby assists in hastening the process of drying the material. After the material is dried it is emptied while the agitating devices are in operation by way of a discharge opening *g* formed in the bottom side of the shell. For a material which produces corrosion of the shell, such as distillery slop, the interior of the apparatus is preferably lined with some non-corrodible material, such as wood, or the lower half of the shell may be steam-jacketed, as at *b''* in Fig. 4.

Wherever it is desired to use exhaust steam in the apparatus, the coils are arranged as shown in Figs. 3 and 4, in which case the interior of the shaft section *c* is divided into two separate compartments *c³* *c⁴* by a longitudinal partition and the heating coils are formed in a series of separate spiral coils *f⁷* instead of continuous coils, each of these separate coils having a steam inlet and outlet for itself, so that the exhaust steam has a free and unobstructed passage through the apparatus and will not exert more than a nominal back-pressure on the engine. In this construction it is preferred to have the lower

half of the shell steam-jacketed and allow the steam from the coils to pass into the jacket before finally escaping. The scrapers or stirring arms in this construction may be secured on the coils, as at *e'*, if desired.

This invention is not confined to the specific construction herein shown and described.

Having thus fully described my invention, what I claim is—

1. The combination of a shell, a hollow shaft extending therethrough and having its respective ends connected to live- and exhaust-steam pipes, said shaft having two separated steam compartments extending approximately the full length of the shell, one of these compartments being connected to the live-steam end of the shaft and the other to the exhaust-steam end, and two steam coils arranged spirally around the shaft and having their respective ends connected to the respective compartments of the shaft, substantially as described.

2. In a drier, the combination of a shell, a hollow shaft passing therethrough and having two separated steam compartments, one for exhaust steam and the other for live steam and two steam coils surrounding the shaft and having their inlet ends connected to opposite ends of the live steam compartment and their outlet ends connected to opposite ends of the exhaust steam compartment, substantially as described.

3. In a drier, the combination of a shell, a hollow shaft passing therethrough and constructed of two end-sections journaled in the heads of the shell and an intermediate section connecting the inner ends of the end sections, and provided with two steam compartments communicating with the respective end sections, stuffing boxes and steam pipes connected to the end-sections, and two steam coils having their inlet and outlet ends connected to the respective compartments, substantially as herein described.

In testimony whereof I affix my signature in presence of two witnesses.

MAX T. F. WIESEBROCK.

Witnesses:

J. C. EASTLACK,
S. L. ANABLE.