

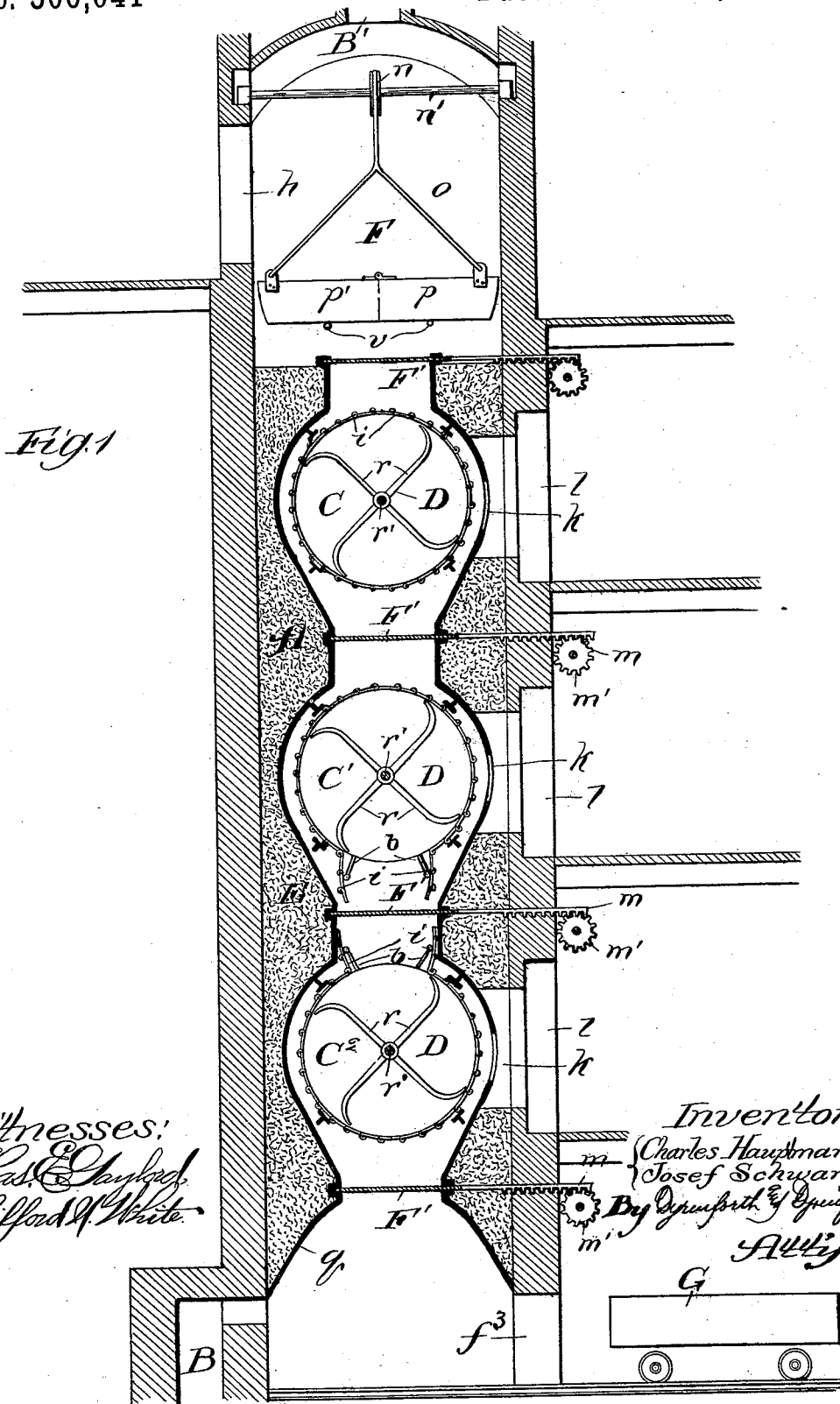
(No Model.)

3 Sheets—Sheet 1.

C. HAUPTMANN & J. SCHWARZ.
APPARATUS FOR DRYING MALT.

No. 506,041

Patented Oct. 3, 1893.



Witnesses:
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(No Model.)

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Fig. 2.

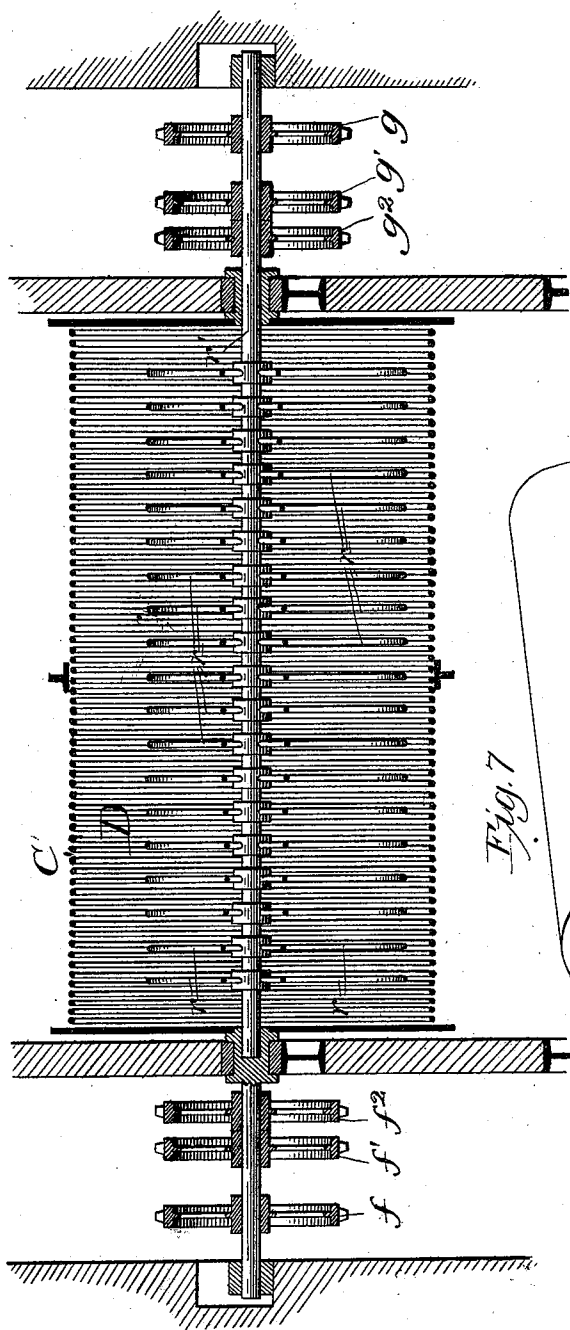
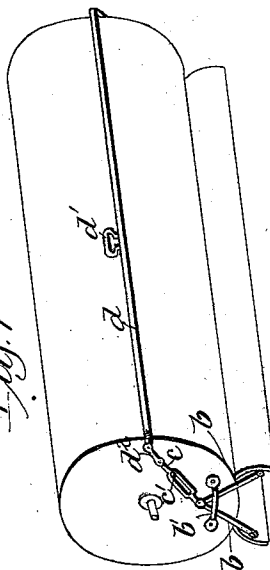


Fig. 7



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(No Model.)

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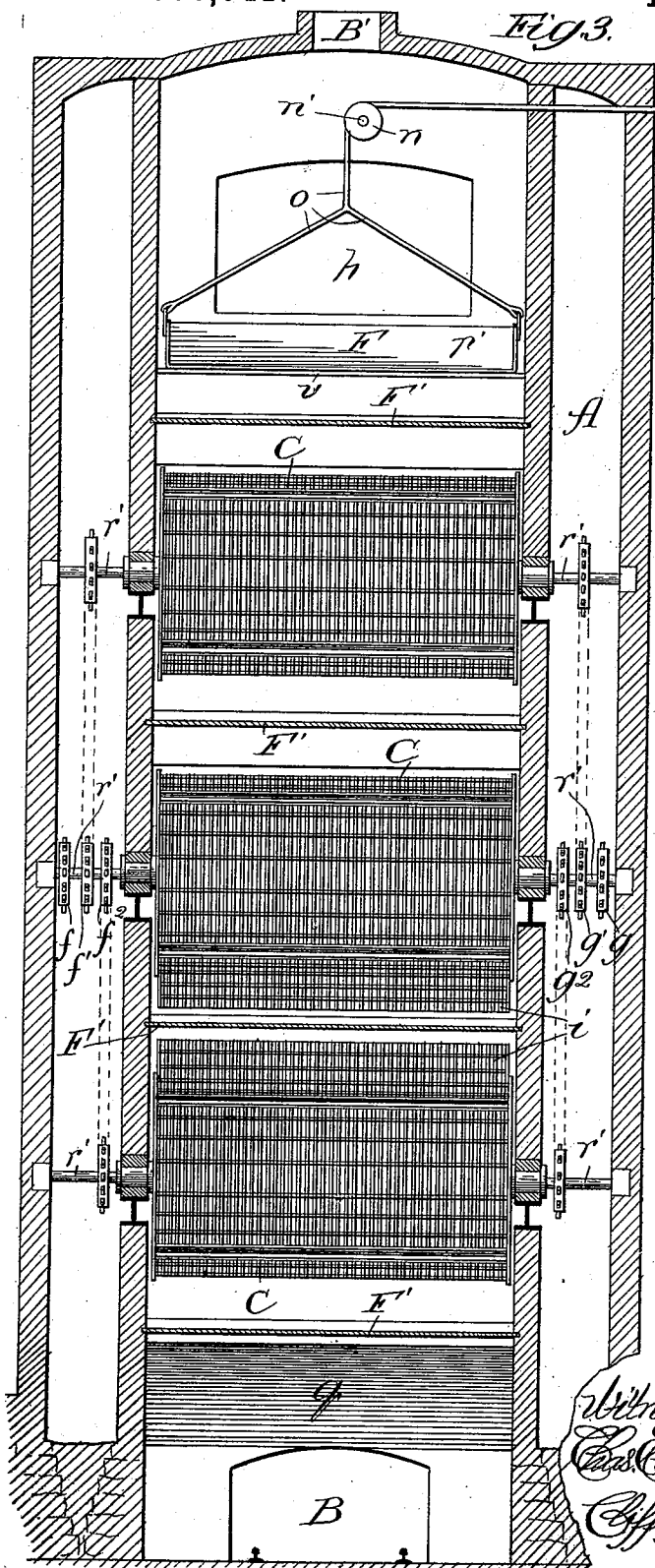


Fig. 3.

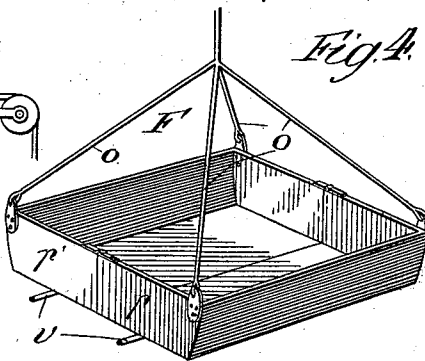


Fig. 4.

Fig. 5.

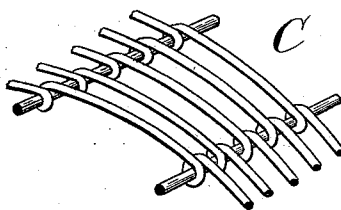
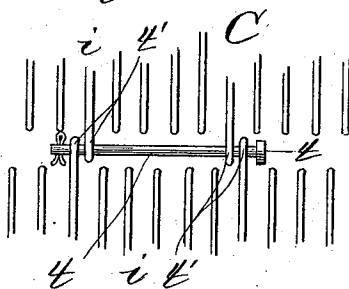


Fig. 6.



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UNITED STATES PATENT OFFICE.

CHARLES HAUPTMANN AND JOSEF SCHWARZ, OF CHICAGO, ILLINOIS.

APPARATUS FOR DRYING MALT.

SPECIFICATION forming part of Letters Patent No. 506,041, dated October 3, 1893.

Application filed April 5, 1892. Serial No. 427,911. (No model.)

To all whom it may concern:

Be it known that we, CHARLES HAUPTMANN, a citizen of the United States, and JOSEF SCHWARZ, a citizen of Bohemia, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Apparatus for Drying Malt, of which the following is a specification.

Our invention relates to that portion of the proceeding employed in the manufacture of malt, in which the germinated grain is dried in a kiln.

The objects of our improvement are to provide for drying the malt economically and expeditiously and for maintaining the procedure under the control of the operator, whereby it may be regulated, according to his desire, to produce malt of different qualities, as to a paler or darker color, in a comparatively short time.

Our improved drying apparatus, or kiln, is illustrated in the accompanying drawings, in which—

Figure 1 is a view in cross-sectional elevation of our kiln-drying apparatus. Fig. 2 shows by an enlarged view in longitudinal sectional elevation the central one of the three rotary drums we prefer to employ, supported on its journals. Fig. 3 is a sectional view taken vertically and transversely through the center of Fig. 1. Fig. 4 is a perspective view of the folding dumping-tray detail. Fig. 5 is an enlarged view of a broken section of a rotary drum, illustrating its reticulate construction. Fig. 6 is a broken view showing means for locking and unlocking the drum-gates; and Fig. 7 is a broken perspective view of one of the drums showing means thereon for operating its gate.

A is the kiln-shaft, preferably surmounting the heat-supply, indicated in part at B, in Fig. 1, which may be a hot-air flue, and having at its upper end an escape-flue, indicated at B'. Within the shaft A are supported rotary drums, C, C' and C², one above the other and preferably three in number, though there may be two (to the detriment, however, of the product) or more than three, each drum containing a rotary stirrer D comprising arms *r* on a rotary shaft *r'* journaled to be rotated in the direction contrary to that of rotating the drum. The drums which are cir-

cumferentially open and involve, each, by preference only, however, the reticulate of the drum shown and described in our Letters Patent, No. 479,421, granted June 26, 1892, for an improvement in apparatus for the manufacture of malt, are enveloped circumferentially in a jacket E, which is best formed of sheet-metal and should be continuous or single for all the drums. The jacket terminates at its lower end in a species of hood *q* covering the base of the shaft to direct all the heat from the flue B, upward through the jacket and drum to the outlet B' past a tilting tray F above the series of drums in the shaft and shown as comprising two sections *p* and *p'* preferably perforated and hinged together to extend normally in horizontal position over the shaft and there sustained by supports *v* and suspended from opposite edges by chains *o* hung at their center from a pulley or drum *n* on a rotary shaft *n'*, journaled in the walls of the shaft. Above and below each drum is supported in the jacket and a wall of the shaft a horizontally sliding gate or valve F' for regulating the amount of heat to be permitted to ascend past them, and which may be withdrawn, accordingly, to any desired extent, each being provided, as means for its adjustment, with a rack *m* toward its outer end, engaging a pinion *m'*, the pinion being within convenient reach from a suitable platform or floor from which ready access may be had to the interior of the kiln through an opening *l* in a wall of the shaft, at which the jacket is provided with a door-way, *k*. Each drum contains a hinged gate *i*, forming, (by two hinged meeting sections, provided with any suitable fastening means,) a segment of its circumference, and which is adapted to be swung open to the position represented on the central drum in Fig. 1, and thereby open the drum throughout its entire length, with which the length of the door-sections corresponds.

As will be noticed, the jacket E is contracted about the drums above and below each to form a guide or hopper for the grain introduced into each, and from the uppermost to each of the others in succession.

To dry the grain we proceed as follows, the slide-valves F' having previously been opened each to a desired extent to permit the passage past them of heat from the flue B. The

previously steeped wet or moist malt is introduced through an opening *h* in a side near the upper end of the shaft and dumped upon the folding tray *F*, the uppermost drum having previously been turned to present its opened gate *i* to the tray. For locking and unlocking the gate-sections *i* of the drums, the means illustrated in Fig. 6 may be employed, involving a rod *t* inserted through eyes *t'* on the ends of mutually overlapping portions of the door-sections. The rod may be inserted and removed for the locking and unlocking when the gate is brought coincident, by the rotation of the drum, with the opening *h* in the jacket *E*, through which an operator has, readily, access to the drum. Means suitable for operating the gate-sections are represented in Fig. 7, and comprise a rod *d* extending lengthwise of the drum, being provided with a handle-portion *d'* and bent at right-angles at its opposite ends, thereby forming ears *d²* at which the rod is pivoted to the ends of the drum. To the free ends of the ears *d²* are pivoted longitudinally links *c*, guided at their slots by studs *c'* projecting through them from the heads of the drum; and the end of each slotted link is pivotally connected with one end of a pair of fingers *b*, which pass thence through a guide *b'*, and the opposite ends of which are pivoted to the respective hinged gate-sections. By this means, when a drum is turned to the position of the drum *C²* in Fig. 2, its gate may be opened by manipulating the rod *d* in one direction; and it may be as readily closed by manipulating the rod in the contrary direction, access to the rod being had through the openings *l, k*. If desired the grain may remain for a time in the perforated tray to be partially dried out by the rising heat. From the tray, by turning the shaft *n'* after opening wide the adjacent slide-valve, the grain is dumped (by raising the tray-sections *p* and *p'* on their hinges, which opens the tray at its base) into the drum *C*, the gate *i* of which is then closed. From time to time the drum is rotated in one direction, being supported for the purpose on journals, extending from its ends in bearings, as shown in Fig. 2, while the rotary stirrer or mixer shaft *r'* is supported independently of the drum, in bearings. The mixer-shaft *r'* of the central drum *C'* carries a driving-pulley *g* on its projecting end, and pulleys *g'* and *g²* to be geared, respectively, with corresponding pulleys (not shown) on the mixer-shafts of the drums *C* and *C²*; and the projecting end of the journal of the drum *C'* carries a driving-pulley *f*, and pulleys *f'* and *f²* to be geared, respectively, with corresponding pulleys (not shown) on the adjacent journal-ends of the drums *C* and *C²*. Thus each stirrer or mixer *D* may be rotated, as is our intention, in the direction contrary to that of rotating its drum, whereby the grain is always thoroughly mixed and evenly distributed. The grain admitted to the first drum *C* is stirred preferably at de-

sired intervals, by so rotating the drum and mixer in contrary directions; and when it has been partially dried, the drum is turned to bring the gate *i* (from which the locking rod *t* has been preparatively withdrawn, as described) undermost, whereby on opening it, and the adjacent slide-valve *F'*, after turning the drum *C'* into proper position for the purpose and opening its gate *i*, the contents of the uppermost drum may be dumped into the next one; and after treating the grain therein in the same manner it was treated in the first drum, still further to dry it, the third drum is brought into position to receive the contents of the drum *C'*; and when sufficiently dried in the lowermost drum by treatment similar to that in the preceding drums, it is dumped into a suitable receptacle, such as a truck or cart *G*, which may be introduced through an opening *f³* in the base of the shaft. A below the drum *C²*. A material advantage incidental to the construction of the drums with their gates is that the latter co-operate between adjacent drums in guiding the grain dumped from an upper to a lower one; and the transfer is accomplished completely without any portion of the grain being intercepted and required to be shoveled by hand. By thus subjecting the grain to be dried to different stages of treatment, each under the influence of heat graduated in intensity from the lowermost to the uppermost drum, we are enabled to produce expeditiously and mechanically, and therefore with great economy, a better quality of malt than by the methods heretofore practiced for the purpose. The drying of the grain may be perfectly regulated with comparatively small consumption of fuel, and the heat-regulation enables us to treat the grain to produce malt of any desired depth of color, the paler malt resulting from drying at a low temperature which may be obtained by so far closing the slides *F'* as to produce a partial vacuum in each drum and exhausting the air from either of the drums.

Our heat-supply may be provided in any of different ways varying from that described, as by heating each drum separately with steam or other heat; hence we do not wish to be understood as intending to be limited to the particular manner and means of supplying the heat shown and described.

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

1. In a malt-kiln, the combination with the kiln-shaft of a jacket, a vertical series of rotary perforated drums enveloped by the jacket and adapted to empty one into the other, a heat supply to the jacket, operating to pass the heat upward therein through the drums, gates in the drums extending throughout their length and operating, when opened, between adjacent drums to guide the contents of one directly into the other, and means for controlling the supply of heat, substantially as described.

2. In a malt-kiln, the combination with the
kiln-shaft A, of a jacket E, a vertical series
of rotary perforated drums C, C' and C² in
the jacket and containing stirrers D on the
5 shafts m, centrally journaled in the drums
and rotating contrarily thereto, the drums be-
ing adapted to empty one into the other, a
heat supply to the jacket, horizontally ad-
justable slide-valves F' and below the drums,
10 and provided with rack and pinion mechan-
ism for operating them substantially as de-
scribed.

3. A malt-kiln comprising, in combination,
a shaft A having openings h, l and f³, a dump-
15 ing-tray F supported in the upper end of the

shaft, a jacket E extending from below the
tray downward in the shaft, and having door-
ways k, rotary perforated drums C, C' and C²
journaled in the shaft and enveloped by the
jacket and provided with gates i, said drums 20
containing stirrers rotating contrarily to them,
a slide-valve F' above and below each drum,
and a heat-supply at the base of the kiln, the
whole being constructed and arranged to op-
erate substantially as described.

CHARLES HAUPTMANN.

JOSEF SCHWARZ.

In presence of—

M. J. FROST,

W. N. WILLIAMS.