

No. 745,366.

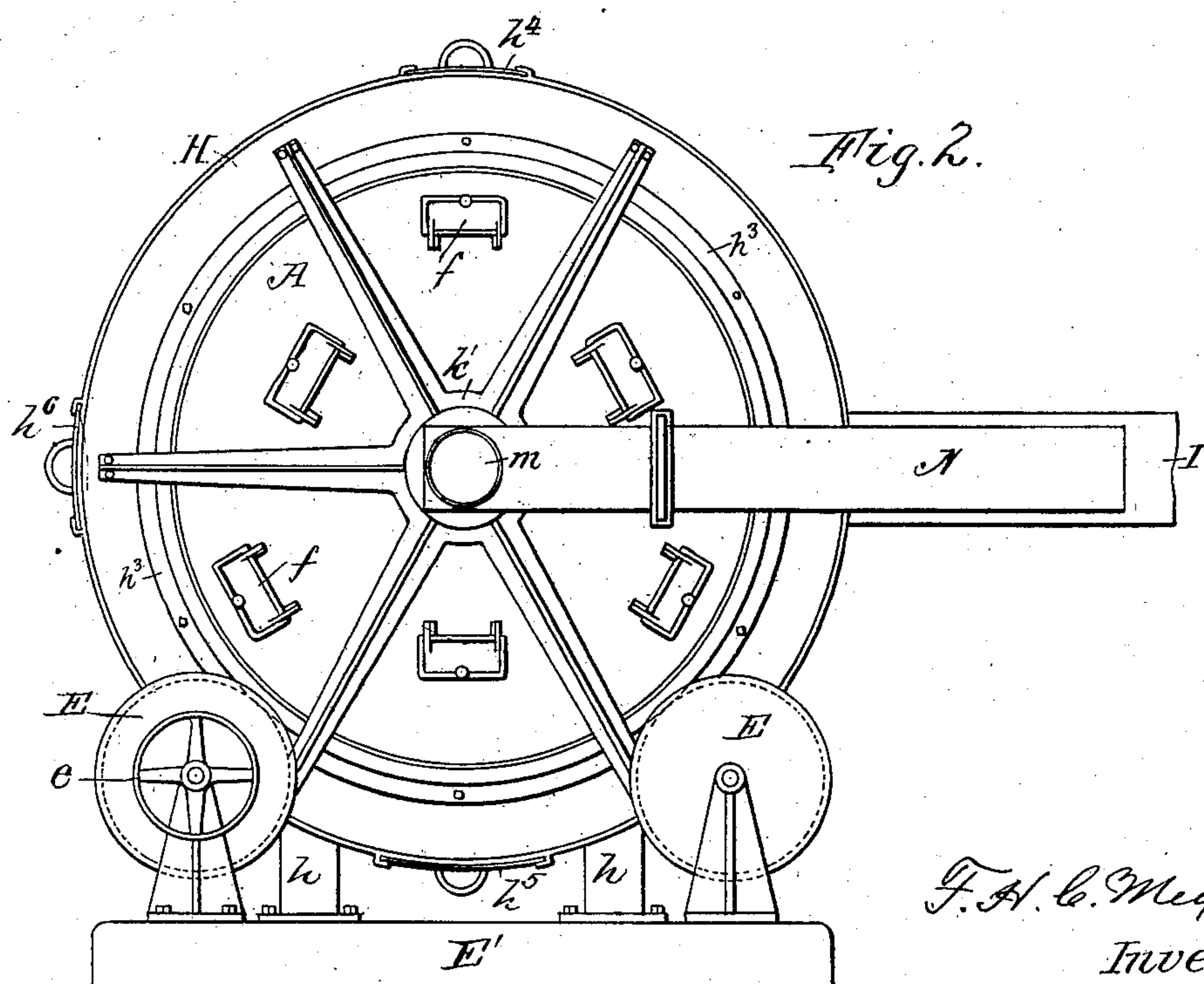
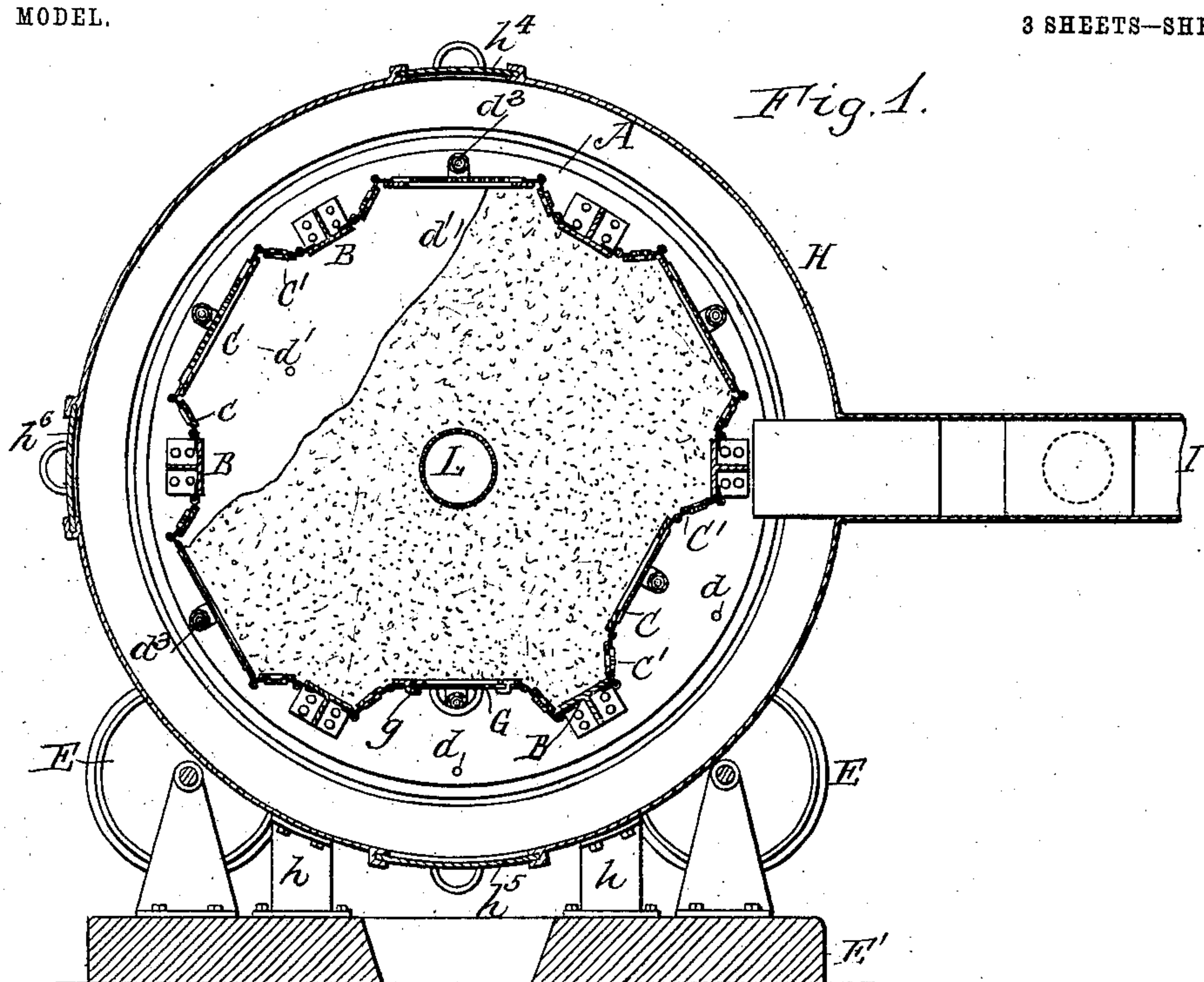
PATENTED DEC. 1, 1903.

F. H. C. MEY.
MALTING AND DRYING APPARATUS.

APPLICATION FILED JUNE 6, 1902. RENEWED MAY 5, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 3.

Fig. 4.

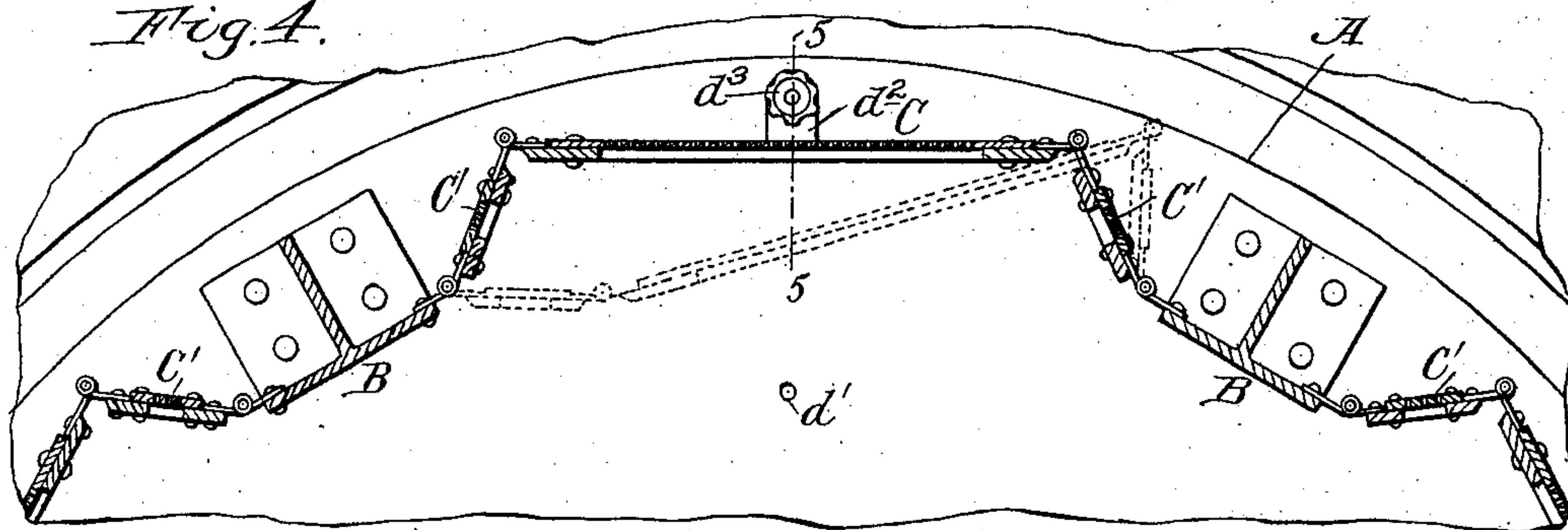


Fig. 5.

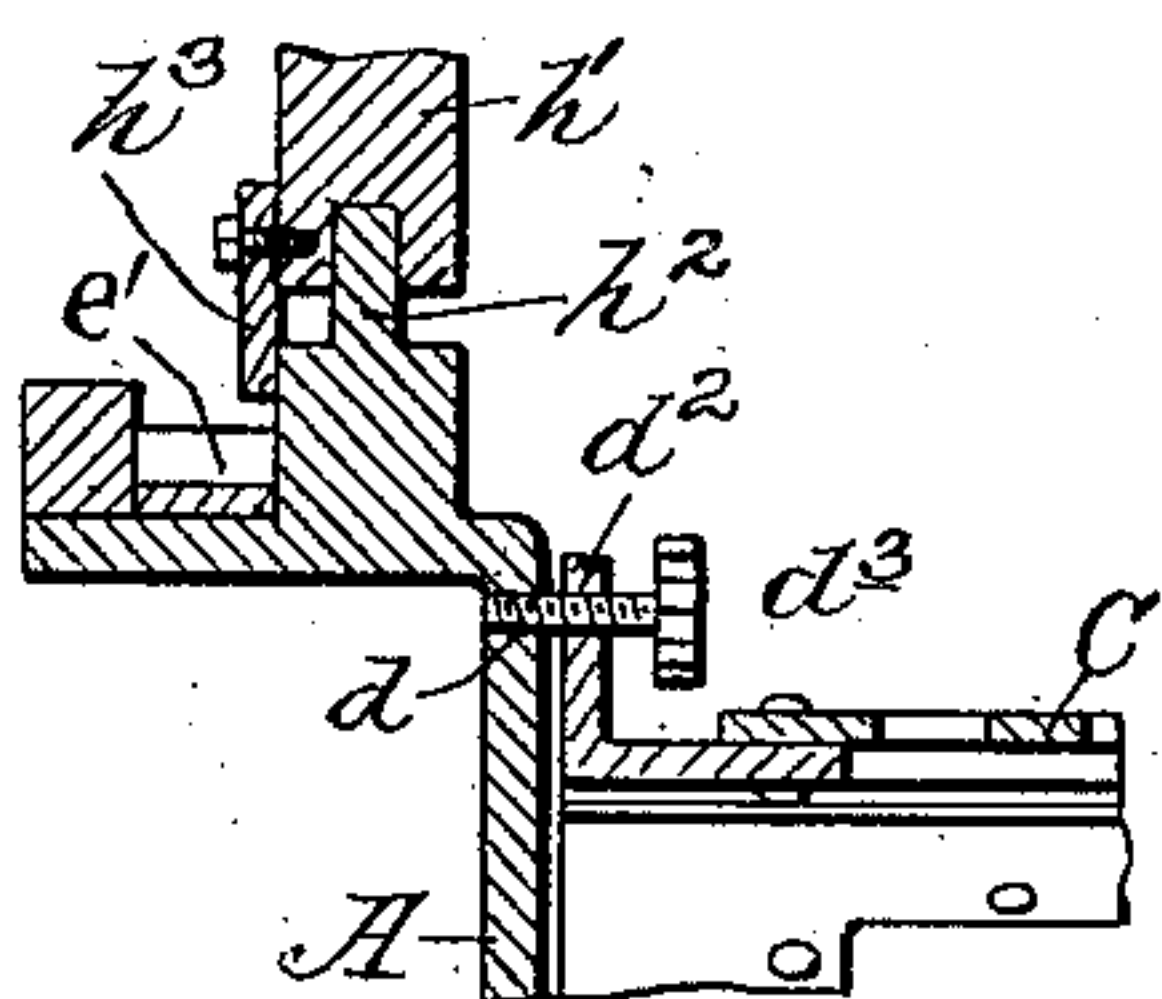
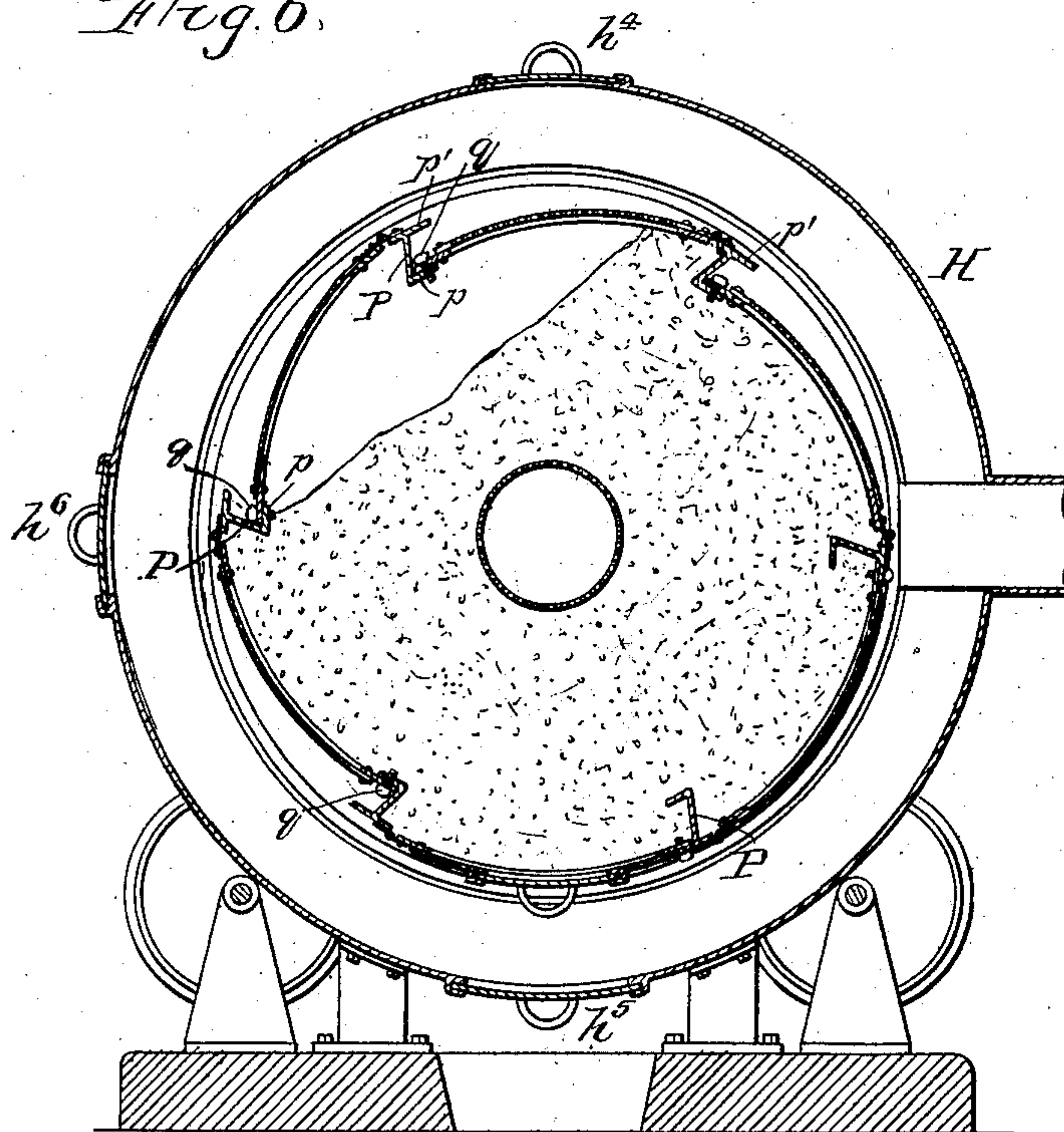


Fig. 6.



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UNITED STATES PATENT OFFICE.

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MALTING AND DRYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 745,366, dated December 1, 1903.

Application filed June 6, 1902. Renewed May 5, 1903. Serial No. 155,790. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK H. C. MEY, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Malting and Drying Apparatus, of which the following is a specification.

This invention relates to an apparatus which is designed more particularly for germinating and drying barley in the manufacture of malt, but which may be used for drying other substances. The apparatus belongs to that class of driers which comprise a perforated malting and drying drum having suitable means for slowly rotating it and connected with a fan or other air-propelling device whereby an air-current is maintained through the drum for carrying off moisture and gases evolved during the germinating stage and for drying the malt after it has germinated. Such an apparatus is disclosed in my United States Letters Patent No. 677,787, granted July 9, 1901. In the apparatus disclosed in said patent the air is circulated from an annular chamber surrounding the drum through the grain in the latter to a perforated pipe which extends centrally or axially through the drum, or vice versa, from the central perforated pipe through the drum to the annular air-chamber. In the germinating process the grain swells and sprouts, which materially increases its bulk. It is therefore usual to only partially fill the perforated drum, so as to leave room therein for the grain to swell. When the malt is dried after germination, it decreases in bulk again, leaving considerable space in the drum unoccupied by the malt. The air which is circulated through the drum for drying the malt seeks the direction of least resistance to the exit from the drum, and inasmuch as the upper portion of the drum is vacant the air tends to pass through this space, and consequently at any one time only permeates the small portion of malt which lies between the central perforated pipe and the upper portion of the perforated wall of the drum and does not pass uniformly through the greater mass of the malt in the lower part of the drum. As nearly the full effect of the hot air is thus confined to a small mass it is liable to become hard or "flinty" and unde-

sirable or useless, or the whole body of the malt will be unevenly and insufficiently dried.

The object of the present invention is to provide a contractible and expansible drum which can be contracted or decreased in size as the malt is dried and diminishes in bulk, so as to maintain a practically full drum at all times and not leave a large unoccupied space in the drum, whereby the heating-air is caused to uniformly permeate through the entire mass of the malt in the drum and evenly heat the same.

In the accompanying drawings, consisting of three sheets, Figure 1 is a vertical sectional elevation of a malting and drying apparatus embodying the invention. Fig. 2 is an end elevation of the same. Fig. 3 is a longitudinal horizontal section of the same, showing a portion of the drum in plan. Fig. 4 is a sectional elevation, on an enlarged scale, through a portion of the drum. Fig. 5 is a fragmentary section through one end of the drum on line 5 5, Fig. 4. Fig. 6 is a vertical sectional elevation showing a drum of slightly different construction.

Like letters of reference refer to like parts in the several figures.

Referring particularly to Figs. 1 to 5, the malting and drying drum shown in said figures consists of two circular ends or heads A, connected by a wall which is composed of separated fixed longitudinal wall sections or strips B, attached at their ends to opposite heads of the drum, and movable longitudinal wall sections or panels C and C', which connect the fixed wall-sections B. The movable wall-sections are arranged in sets of three between each two fixed sections, the outer two sections C' of the set being hinged to the adjacent edges of the fixed sections and the inner longitudinal edges of the outer sections C' being hinged to the opposite longitudinal edges of the intermediate movable section C. This manner of connecting the movable wall-sections enables the latter to be set so as to extend inwardly or toward the center of the drum between the fixed wall-sections, as shown at the lower right-hand side of Fig. 1, or to extend outwardly between the fixed wall-sections, as indicated at the other portions of said figure and in Fig. 4. When the

movable sections are set to extend inwardly between the fixed sections, the capacity of the drum is very considerably reduced, and the capacity can be regulated to practically any extent within its range, according to the number of sets of movable sections which are set in their inner position. When it is desired to move a set of the movable wall-sections from its outer to its inner position, the sections are first pressed over to one side or toward one of the fixed wall-sections, as indicated by the dotted lines in Fig. 4. Then by pressing the sections inwardly and in the opposite direction they pass inwardly between the fixed wall-sections and assume the inner position shown at the right-hand portion of Fig. 1. To move the sections from their inner to their outer position, this operation is reversed.

Suitable devices are provided for retaining the movable wall-sections in either their outer or inner position. In the construction shown (see Figs. 1, 4, and 5) each head of the drum adjacent to each set of movable wall-sections is provided with a hole d outside of a line connecting the adjacent fixed wall-sections and a hole d' inside of such a line. The intermediate movable section C of each set is provided with a lug or ear d^2 at each end, through which passes a set-screw d^3 , which is adapted to engage in either of the openings d and d' in the adjacent head of the drum. Either the movable or the fixed sections, or both, may be perforated. In the drawings the fixed sections are shown to be imperforate, while the movable sections are perforated and preferably composed of perforated sheet-metal plates reinforced or strengthened by suitable open metal frames. The drum A is rotatably supported in any suitable manner. For instance, as described in my said Letters Patent, the circular heads of the drum rest on rollers E, journaled in standards rising from a suitable bed E'. The drum is slowly rotated by suitable driving mechanism, such as a belt (not shown) running around a belt-pulley e , secured to the shaft of one of the rollers E, on which shaft is secured a gear-wheel meshing with gear-teeth e' , fixed to the adjacent head of the drum. The heads of the drum shown are provided with inspection-openings, which are closed by doors f , and the longitudinal wall is provided, preferably in one of the intermediate wall-sections C, with a longitudinal series of feed and discharge openings g , which are closed by slides or doors G.

The means for circulating air through the drum forms no part of the present invention and may be of any suitable construction. In the drawings these parts are constructed and arranged as fully described in my said Letters Patent, and are, briefly stated, as follows:

H represents a stationary casing, which is supported by suitable standards or legs h , which surrounds the drum and extends from

end to end thereof, so as to form an annular air-chamber around the drum. This chamber is closed on all sides, except its inner side, so that the chamber communicates with the interior of the drum through the perforations in the longitudinal wall of the drum. In order to form a practically air-tight joint between the drum and the end walls h' of the casing, and at the same time permit the free rotation of the drum, the heads of the drum are preferably provided with projecting annular ribs or flanges h^2 , which extend into annular grooves in the inner edges of the end walls, (see Fig. 5,) and metal packing-rings h^3 are secured to the end walls of the casing over the joint. Obviously the ribs and grooves could be formed, respectively, on the casing walls and heads and the packing-ring secured to the latter. The casing is provided in its top and bottom, respectively, with a longitudinal series of feed and discharge openings, which are closed by doors h^4 and h^5 , and in its front side with a longitudinal series of inspection-openings by doors h^6 .

A fan or other propelling device (not shown) has its air-trunk I connected centrally with an enlarged or outwardly-bulged portion of the casing, forming a spout j . This spout is widest at the middle of the chamber, and gradually decreases in width toward the ends of the same. The spout j is divided by a series of vertical walls or partitions into a series of diverging air channels or passages j' to j^7 , which lead from the delivery end of the fan-spout toward the middle and end portions of the drum, so as to divide the incoming air-current and distribute the same throughout the length of the air-chamber and the drum. The air-channels open into the portions of the annular air-chamber H above and below the partitions, so that the air-current is divided and distributed throughout the circumference of the air-chamber and enters the perforated drum on all sides thereof. The heads of the drum A are provided with hollow trunnions k , which turn in hubs or bearings k' , carried by radial arms or spiders secured to the ends of the inclosing casing.

L represents a perforated pipe arranged axially in the drum and communicating at its ends with the hollow trunnions k in which said pipe is secured.

m represents stationary open-ended exit-pipes connected with the hollow trunnions k by suitable union-joints m' , which permit the drum to turn about the pipes and prevent the escape of air at the joints. Each of the pipes m is provided at its outer end with a slide or damper m^2 .

N represents air-pipes or conduits leading from the opposite sides of the fan-trunk I to the exit-pipes m , and connected to the latter on the inner sides of their dampers m^2 . Each pipe N is provided with a valve or damper n .

o represents hinged valves, which are adapted to open and close the inner ends of

the pipes N, as shown in Fig. 3, or to be swung toward each other so as to bridge the fan-spout, and thus direct air either into the spout *j* and chamber H or into the pipes N.

5 The operation of the machine is as follows: The drum is turned to bring its feed-opening *g* under the feed-openings in the top of the casing H, and the proper amount of grain is introduced into the drum through said open-
 10 ings and the openings closed. The grain is allowed to remain in the drum and germinate in a well-known manner, and after this process is completed the malt is dried by circulating heated air through the drum. As ex-
 15 plained in my said Letters Patent, by properly setting the dampers *o*, *n*, and *m*² the air can be directed into the drum through the spout *j* and annular air-chamber and pass out of the drum through the perforated central pipe L
 20 and pipes *m*, connected therewith, or its direction can be changed so that it will enter the pipes N and pass into the drum through the central perforated pipe L, discharging from the drum into the annular air-chamber,
 25 from which it escapes through one or more of the doors *h'* or *h*³ in the casing, which are opened for this purpose. As the malt dries under the influence of the heated air it diminishes in bulk in the drum, leaving an un-
 30 occupied space in the latter. To prevent the air from passing to the exit from the drum through this vacant space, the drum is reduced in size by setting one or more sets of the movable wall-sections in their inner posi-
 35 tions. This is done by turning the drum until one of its sets of movable wall-sections is brought opposite to the inspection or feed openings in the casing, when by reaching in through the said openings the operator can
 40 release the holding-screws *d*³, move the movable wall-sections into their inner position, and engage the holding-screws in their inner holes *d'*, as previously described. One or
 45 more sets of the movable wall-sections is moved in at a time, according to the necessary contraction of the drum to maintain the latter filled to the proper extent. Ordinarily the sets are moved in successively, as re-
 50 quired by the shrinkage of the malt, and the drum is kept filled to the desired extent at all times. If preferred, the drum can be contracted before the introduction of the grain in the first instance and expanded by moving the wall-sections out as the grain swells
 55 in germinating and again contracted as the malt shrinks in drying.

While the construction above described and shown in Figs. 1 to 5 of the drawings is at the present time deemed preferable, the
 60 drum may be constructed in various ways to permit its contraction or expansion. For instance, as shown in Fig. 6, the longitudinal wall of the drum may be composed of a series of fixed longitudinal strips P, secured at their
 65 opposite ends to the opposite heads of the drum, and a series of movable perforated wall-sections, each of which extends from one

fixed strip to the other and is hinged at one of its longitudinal edges to one of the fixed strips. The fixed strips project inwardly 70 from the outer edges of the heads and are provided at their inner and outer edges with flanges *p p'*, respectively. The free edges of the movable wall-sections are adapted to be moved into contact with the inner flanges or 75 outer flanges of the fixed strips and secured thereto by suitable means—such, for instance, as the set-screws *q*, which cooperate with registering holes in the free edge of the movable wall-sections and in the flanges of the fixed 80 strips.

I claim as my invention—

1. The combination of a drum, means for rotatably supporting the same, said drum having wall portions movable to contract or ex- 85 pand the drum, and means for securing said wall portions in adjusted positions, substantially as set forth.

2. The combination of a drum provided with fixed wall portions, wall portions mov- 90 able to contract or expand the drum, means for securing said movable wall portions in adjusted positions, and means for rotatably supporting the drum, substantially as set forth.

3. The combination of a drum having wall portions movable to contract or expand the drum, means for securing said wall portions in adjusted positions, and means for circu- 95 lating a drying medium through said drum, substantially as set forth.

4. The combination of a drum comprising separated heads, and a contractible wall connecting said heads, means for holding said wall contracted, means for circulating a dry- 105 ing medium through said drum, and means for rotatably supporting said drum, substantially as set forth.

5. The combination of a drum comprising separated heads, and an expansible wall connecting said heads, means for holding said wall 110 expanded, means for rotatably supporting said drum, and means for circulating a drying medium through said drum, substantially as set forth.

6. The combination of a drum comprising separated heads, and a perforated contractible wall connecting said heads, means for holding said perforated wall contracted, and means for circulating a drying medium 120 through said drum, substantially as set forth.

7. The combination of separated heads, a plurality of fixed wall-sections connecting said heads, and movable wall-sections connecting said fixed wall-sections, substantially 125 as set forth.

8. The combination of separated heads, a series of fixed wall-sections connecting said heads, and perforated movable wall-sections arranged between and connecting said fixed 130 wall-sections, substantially as set forth.

9. The combination of separated heads, a series of fixed wall-sections connecting said heads, movable wall-sections arranged be-

tween and connecting said fixed wall-sections, and means for securing said movable wall-sections in different positions, substantially as set forth.

5 10. The combination of separated heads, fixed wall-sections connecting said heads, hinged wall-sections arranged between and connecting said fixed wall-sections, and means for securing said movable wall-sections in
10 different positions, substantially as set forth.

11. The combination of separated heads, means for rotatably supporting the same, a series of fixed wall-sections connecting said heads, movable wall-sections arranged be-
15 tween and connecting said fixed wall-sections, and means for securing said movable wall-sections in different positions, substantially as set forth.

12. The combination with means for rota-

tably supporting a drum, of a drum provided 20 with wall-sections movable toward and from the center of the drum, and means for securing said wall-sections in adjusted positions, substantially as set forth.

13. The combination of a rotary drum, a 25 casing surrounding the same and having annular end walls, cooperating annular ribs and grooves on the drum and end walls, and a packing-ring secured to one of said parts and extending over the joints between the drum 30 and said end walls, substantially as set forth.

Witness my hand this 29th day of May, 1902.

FREDERICK H. C. MEY.

Witnesses:

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JNO. J. BONNER.