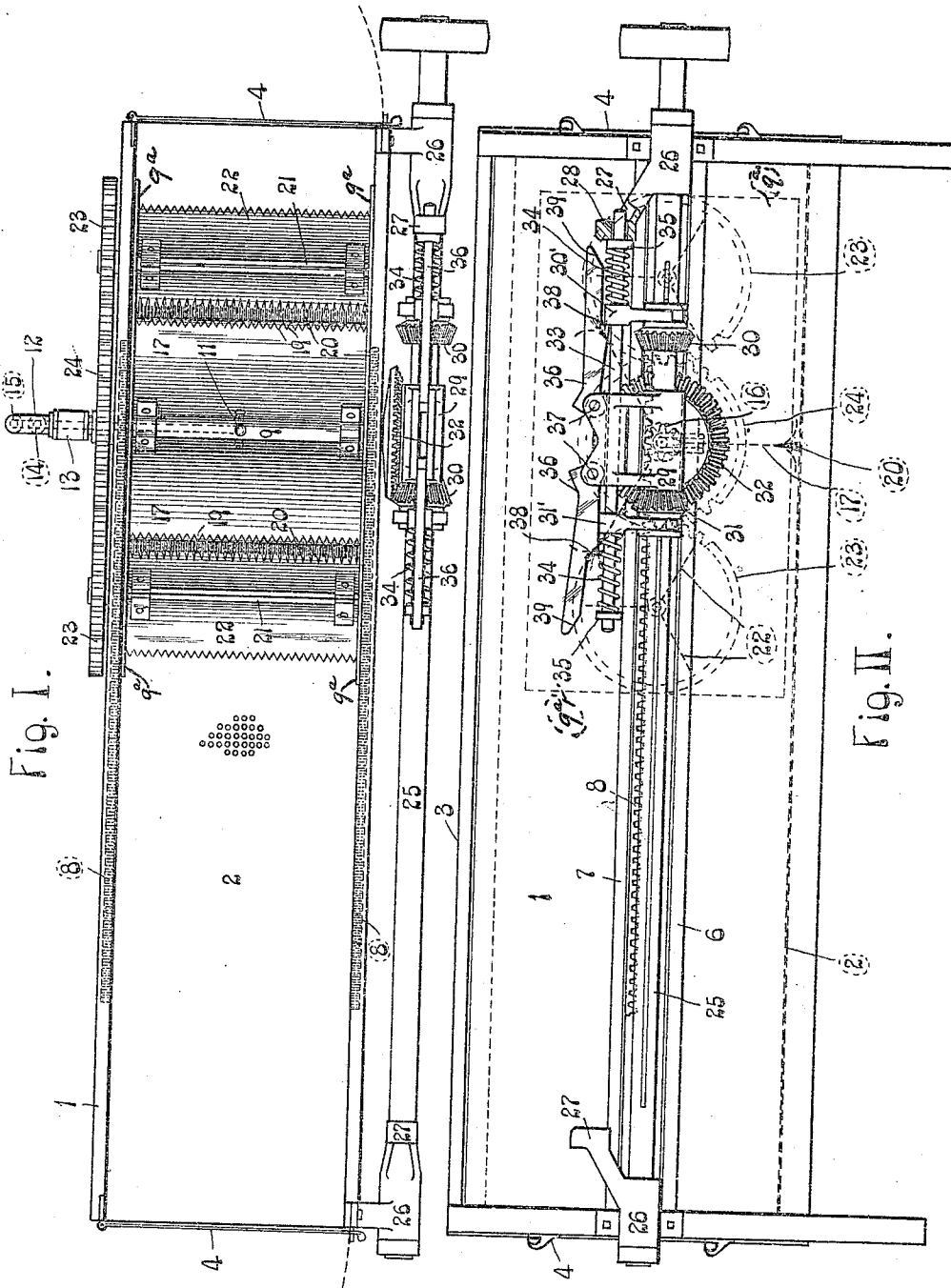


C. J. ERDMANN.
MALTING APPARATUS.
APPLICATION FILED DEC. 8, 1909.

957,664.

Patented May 10, 1910.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. IV.

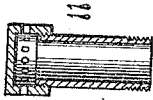


Fig. V.

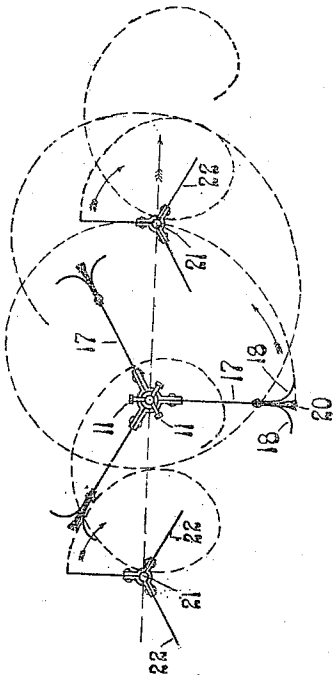
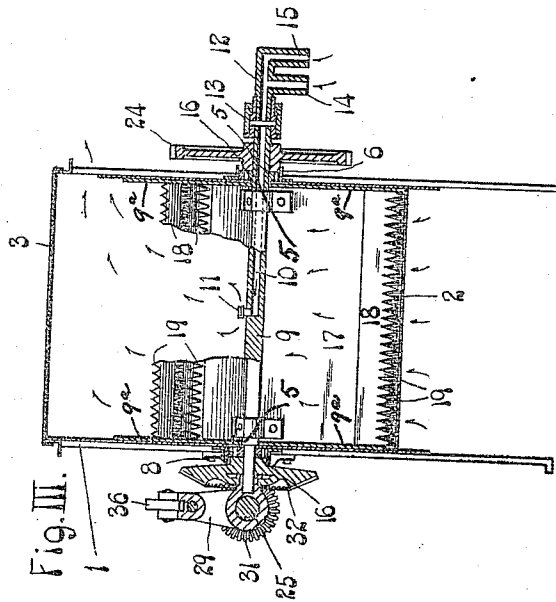


Fig. III.



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UNITED STATES PATENT OFFICE.

CHARLES J. ERDMANN, OF ST. LOUIS, MISSOURI.

MALTING APPARATUS.

957,664.

Specification of Letters Patent.

Patented May 10, 1910.

Application filed December 8, 1909. Serial No. 531,939.

To all whom it may concern:

Be it known that I, CHARLES J. ERDMANN, a citizen of the United States of America, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Malting Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to a malting apparatus in which the grain is placed for germination and which is provided with mechanical means whereby the grain may be agitated or stirred during the process of germination to facilitate it, and also to break the sprouts of the grain.

The invention has for its object to produce an apparatus of this description by which the entire mass of germinating grain is efficiently stirred and to provide a mechanism that is capable of moving first in one direction and then in an opposite direction, if desired, in order that the grain may be stirred or turned a plurality of times during each operation of the mechanism.

Figure I is a top or plan view of my improved malting apparatus. Fig. II is a side elevation of the apparatus. Fig. III is a vertical cross section of the apparatus. Fig. IV is a longitudinal section through one of the spargers utilized in the apparatus. Fig. V is a diagrammatical view illustrating the movements of the agitators in my apparatus.

In the accompanying drawings:—1 designates a box or tank in which the grain from which malt is to be produced is placed. This box is provided with a perforated bottom 2 and a cover 3. It also preferably has end doors 4. In the side walls of the box and extending longitudinally thereof are horizontal guide slots 5. Beneath the plane in which the horizontal slots are placed and at the exterior of the box are track rails 6, while above the slots are rails 7 that serve as supports for rack bars 8.

9 designates a main agitator shaft carrying side plates 9^a and extending transversely of the box 2 and through the guide slots 5 in which it is adapted to operate, this shaft being provided with a channel 10 that leads therinto from one end to a point intermediate of the ends of the shaft, and the shaft has applied to it, at the inner end of said channel, a plurality of radially ar-

anged spargers 11, one of which is shown in section in Fig. IV. The main agitator shaft has connected to it at its end from which the channel 10 leads an inlet pipe 12, loosely connected to the agitator shaft by a coupling 13, and provided with two branches 14 and 15 adapted to respectively have connected to them pipes through which air and water are introduced into the main agitator shaft and discharged therefrom through the radial spargers 11. 16 are pinions fixed to the main agitator shaft and arranged in mesh with the rack bars 8 located above the guide slots 5 in the side walls of the box 1 and adapted to travel on the rails 6.

The main agitator shaft 9 carries a plurality of stirring wings 17 attached in any suitable manner and in any desired arrangement to said shaft, each of which is provided at its outer end with a pair of scoops 18 diverging from each other, and which are provided with serrations or teeth 19, (see Figs. I and III). The combined lengths of the stirring wings 17 and their scoops 18 provide for said scoops turning in a circular path around the axis of the main agitator shaft by which they are carried, causing the scoops to approach very closely to the perforated bottom of the apparatus, with the object in view of stirring and agitating the grain at the bottom of the mass in the box 1. The scoops 18 are incapable, however, of stirring to the fullest degree the grain directly above the perforated bottom, due to the existence of the serrations 19 with which they are provided, for the purpose of more effectually breaking the sprouts from the grain during their stirring operation and I therefore introduce between the scoops of each pair of scoops a brush 20 that acts as a take up member when the stirring wings are moved to carry the outer ends of the scoops to the bottom of the box of the apparatus and whereby grain resting directly on the perforated bottom is operated upon for stirring action.

21 designates auxiliary agitator shafts arranged parallel with the main agitator shaft 9, journaled in the side plates 9^a and located opposite the sides of said main agitator shaft. These auxiliary agitator shafts are provided with stirring wings 22 that are of less length than the stirring wings 17 carried by the main agitator shaft and are adapted to operate only through the upper portion of the mass of grain in the malting apparatus.

The auxiliary stirring wings 22 just mentioned are preferably flat in shape, although they may be of any other desired shape. Each auxiliary agitator shaft 21 extends through the slots 5 in the side walls of the box 1 to travel therein, and has fixed to it at one end a spur wheel 23. The two spur wheels 23 are arranged in mesh with a driving spur wheel 24 fixed to the main agitator shaft 9 and it will, therefore, be readily appreciated that when the main agitator shaft is rotated by means to be hereinafter described it will, through the medium of the spur wheels 24 and 23, cause rotation to be imparted to the auxiliary agitator shafts, with the result that the stirring wings of all of the shafts will be caused to turn for stirring action in the mass of grain placed in the box of the apparatus, the stirring wings of the main shaft turning in one direction, while the stirring wings of the auxiliary shafts turn in the opposite direction, as indicated in the diagrammatic view, Fig. V.

25 designates a main drive shaft extending longitudinally of the apparatus and mounted in bracket bearings arms 26 supported by the box 1 at its ends, and each having an upwardly projecting trip arm 27 provided with a horizontally disposed opening 28.

29 designates a carriage loosely fitted to the drive shaft 25 and slidable thereon so that it is capable of moving longitudinally of said drive shaft.

30 and 31 are bevel pinions splined to the drive shaft 25 and both of which are adapted to be moved into mesh with a bevel gear wheel 32 fixed to the main agitator shaft 9, one of said bevel pinions providing for rotation of said gear wheel and main agitator shaft in one direction, while the other bevel pinion provides for rotation of said parts in the opposite direction.

33 is a shifter rod mounted on the carriage and arranged parallel with the drive shaft 25 above which it is located. This shifter rod has fixed to it a pair of depending arms 30' and 31' that engage the grooved hubs of the bevel pinions 30 and 31, respectively, to provide for their movement longitudinally of the drive shaft when the shifter rod 33 is actuated through means to be presently mentioned.

34 are springs surrounding the shifter rod 33 and located between the shifter arms 30' and 31' and the ends of the shifter rod upon which are loosely mounted collars 35 against which the outer ends of the springs 34 rest. The shifter rod 33 is located in the same plane as that in which the openings 28 in the trip arms 27 of the bracket bearing arms 26 are located, and consequently said shifter rod is adapted to enter said openings.

36 designates dogs pivoted at 37 to the carriage 29 and which normally extend parallel with the drive shaft 25 above which

they are located. Each of these dogs is provided with a shoulder 38 and with an arm that extends beyond the shoulder and is provided with a beveled upper face 39.

In the practical use of my malting apparatus, the operation is as follows: The drive shaft 25 being set in motion, acts to impart rotation to the bevel pinions 30 and 31 and either of these bevel pinions which is in mesh at the time being with the gear wheels 32, performs the office of imparting rotation through said gear wheel to the main agitator shaft 9. This main agitator shaft consequently performs the office of imparting rotation to the auxiliary agitator shafts 21 through the medium of the spur wheels 24 and 23, and during the rotation of said agitator shafts the pinions 16, by meshing with the rack bar 8, act to cause movement of the entire number of agitator shafts and the carriage 29 on the drive shaft longitudinally of the apparatus, in order that the stirring wings carried by said agitator shafts may operate on the grain in the box 1 from one end of said box to the other end thereof. These stirring wings, therefore, partake of the movements illustrated diagrammatically in Fig. V, the stirring wings carried by the main agitator shaft moving throughout the entire depth of grain and the stirring wings carried by the auxiliary agitator shafts moving only throughout the upper portion of the mass of grain. The movable parts of my apparatus are shown in the positions assumed when they are moving toward the right hand end of the apparatus, (see Figs. I and II), the bevel pinion 31 being at this time in mesh with the bevel gear wheel 32. At this time, the shoulder 38 of the dog 36 nearest the right hand end of the apparatus is in engagement with the shifter arm 30' and the bevel pinion 30 is consequently held out of engagement with the gear wheel 32 and is maintained out of such engagement pending the approach of the dog to the trip arm 27 at the right hand end of the apparatus. Before this dog reaches the trip arm just referred to, the shifter rod 33 passes into said trip arm and, as a consequence, the spring 34 between the shifter arm 30' and the trip arm is compressed to store power therein. Then, when the inclined under face 39 of the dog rides into contact with the dog, said trip arm is elevated to release its shoulder from the shifter arm 30', said shifter arm is released of restraint, and the spring between it and the trip arm acts to impart longitudinal movement to the shifter rod in a direction toward the left hand end of the apparatus. As a result, the shifter arm 31' is caused to move the bevel pinion 31 longitudinally of the drive shaft and out of mesh with the gear wheel 32, while the shifter arm 30' carries the bevel pinion 30 into mesh with said gear wheel. The driv-

ing connection between the drive shaft 25 and the main agitator shaft 9 is, therefore, so altered that the agitator shafts will be rotated in directions the reverse of their previous directions of rotation whereby they are conducted toward the farther end of the malting apparatus, in continued operation thereof.

It is to be noted that when the shifter rod is spring actuated in the manner explained, the shifter arm 31' is moved sufficiently to cause it to be engaged by the shoulder 38 of the dog 36 above it, for the purpose of maintaining the bevel pinion 31 out of engagement with the gear wheel 32 and the bevel pinion 30 in engagement with said gear wheel, until said dog has been tripped at the end of the apparatus toward which it is moved in the same manner as the other dog was tripped, and following the compression of the spring 34 resting against the shifter arm 31'. It will be understood that the reversal of the mechanism and the to and fro movement of the stirring apparatus may be continued as long as desired during the operation of the drive shaft 25.

It is sometimes desired to impart a movement to the stirring mechanism in one direction only and to cause the stirring mechanism to be thrown out of action at the end of its movement longitudinally of the apparatus, notwithstanding continued rotation of the drive shaft 25. In such an instance, the cessation of operation of the stirring devices may be discontinued by elevating the dog 36 farthest removed from the end of the apparatus at which actuation of the stirring devices is to be discontinued in order that said dog may not become effective to hold the bevel pinion that has been moved to the gear wheel 33 in mesh therewith. For illustration, if the dog 36 farthest removed from the right hand end of the apparatus seen in the drawings is moved to an elevated position prior to the tripping of the dog nearest said end, the bevel pinion 30 will only be moved into engagement with the gear wheel 32 and not be restrained in such engagement due to holding influence exerted upon the shifter rod 33 by the dog that engages the shifter arm 31', and consequently said bevel pinion will work away from said gear wheel, instead of imparting rotation thereto, for actuation of the stirring devices.

I claim:—

1. In a malting apparatus, a box, a stirring device rotatably mounted in said box and provided with a gear member, a drive shaft, a pair of pinions splined to said drive shaft and either of which is adapted to operate the gear member of said stirring device, spring controlled means for governing said pinions, and means for controlling said spring controlled means to maintain

one of said pinions in engagement with the stirring device gear member and the other pinion out of engagement with said gear member.

2. In a device for actuating the stirring device of a malting apparatus, a drive shaft, a pair of pinions splined to said shaft and either of which is operable upon said stirring device, a shifter for controlling said pinions, dogs for controlling said shifter, and means whereby said dogs are automatically thrown out of positions to control the shifter.

3. A mechanism for actuating the stirring device of a malting apparatus, comprising a drive shaft, a pair of pinions splined to said shaft, a carriage loosely fitted to said shaft, a shifter rod, members carried by said shifter rod whereby said pinions may be moved, a pair of dogs carried by said carriage and adapted to engage said shifter members to restrain the shifter rod from movement, springs associated with said shifter rod by which movement may be imparted thereto, and means whereby said dogs may be tripped to release said shifter after said springs have been compressed.

4. A malting apparatus comprising a box having longitudinal guide slots in the side walls thereof, an agitator shaft extending transversely of the box and operating in the guide slots, rack bars secured to the side walls over the guide slots, pinions fixed to the agitator shaft, and meshing with the rack bars, a bevel gear wheel fixed to the agitator shaft, a drive shaft, bracket bearing arms each having a trip arm provided with an opening, a carriage loosely fitted to the drive shaft, bevel pinions splined to the drive shaft and adapted to alternately mesh with the bevel gear wheel, a shifter rod having end collars and mounted on the carriage, depending arms slidable on the shifter rod and engaging the bevel pinions, springs surrounding the shifter rod between the slidable arms and the end collars, and dogs pivoted to the carriage and each having a shoulder adapted to engage a depending arm and an inclined face adapted to ride on a trip arm.

5. A malting apparatus comprising a box having longitudinal guide slots in the side walls thereof, a main agitator shaft extending transversely of the box and operating in the guide slots, a driving spur wheel and side plates mounted on the main agitator shaft, auxiliary agitator shafts journaled in the side plates spur wheels fixed to the auxiliary agitator shafts and meshed by the driving spur wheel, rack bars secured to the side walls over the guide slots, pinions fixed to the main agitator shaft, and meshing with the rack bars, a bevel gear wheel fixed to the main agitator shaft, a drive shaft, bracket bearing arms each having a trip

arm provided with an opening, a carriage
loosely fitted to the drive shaft, bevel pin-
ions splined to the drive shaft and adapted
to alternately mesh with the bevel gear
5 wheel, a shifter rod having end collars and
mounted on the carriage, depending arms
slidable on the shifter rod, and engaging
the bevel pinions, springs surrounding the
shifter rod between the slidable arms and
10 the end collars, and dogs pivoted to the

carriage and each having a shoulder adapt-
ed to engage a depending arm and an in-
clined face adapted to ride on a trip arm.

In testimony whereof, I have hereunto af-
fixed my signature, this 4th day of Decem- 15
ber, 1909.

CHAS. J. ERDMANN.

In the presence of—

M. C. HAMMON,

E. B. LINN.