

No. 670,106.

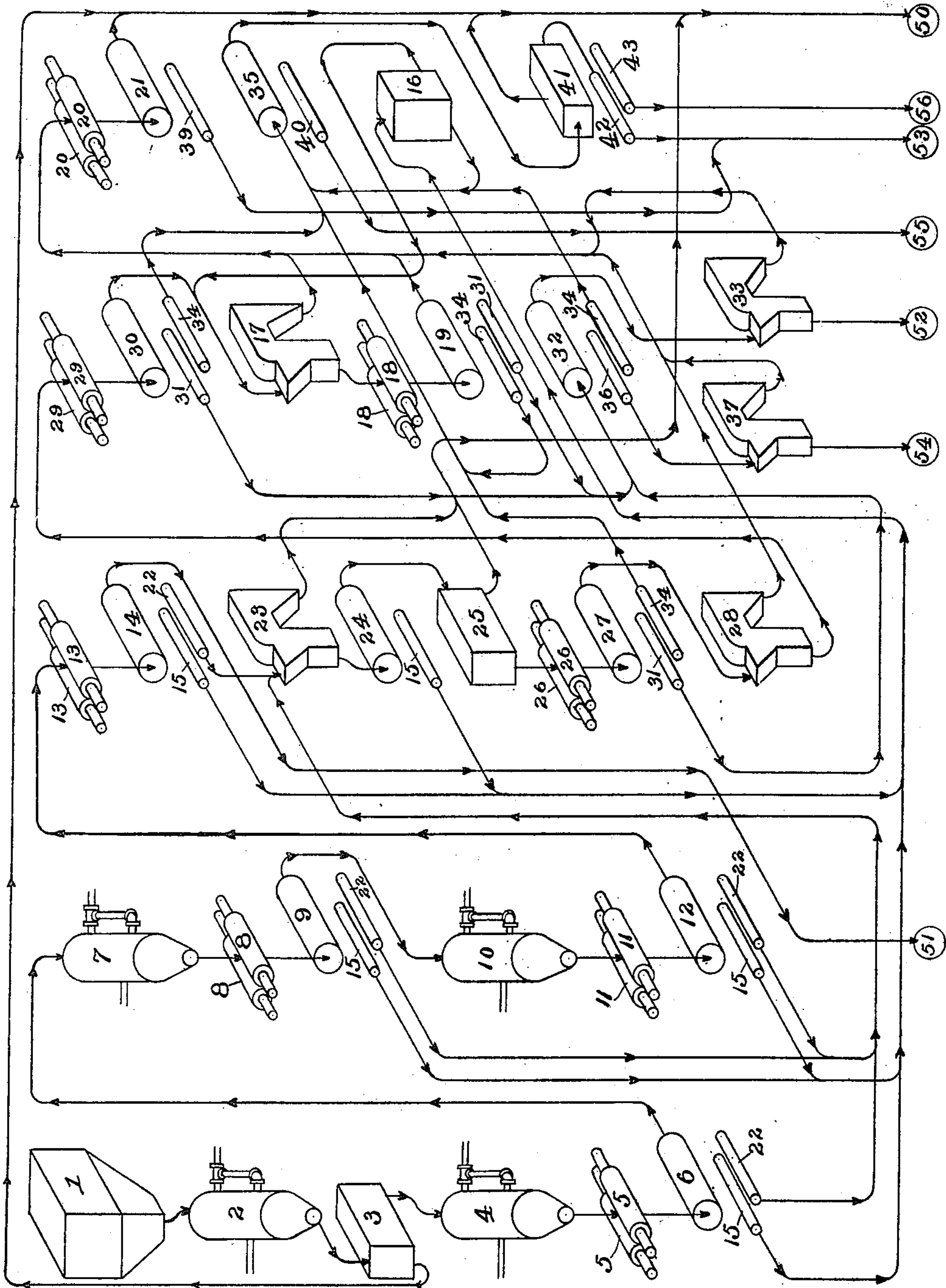
Patented Mar. 19, 1901.

M. W. HUNT.

PROCESS OF DEGERMINATING GRAIN.

(Application filed Oct. 11, 1900.)

(No Model.)



WITNESSES:

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MARTIN W. HUNT, OF INDIANAPOLIS, INDIANA, ASSIGNOR OF ONE-HALF
TO NORDYKE & MARMON COMPANY, OF SAME PLACE.

PROCESS OF DEGERMINATING GRAIN.

SPECIFICATION forming part of Letters Patent No. 670,106, dated March 19, 1901.

Application filed October 11, 1900. Serial No. 32,704. (No specimens.)

To all whom it may concern:

Be it known that I, MARTIN W. HUNT, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Processes of Degerminating Grain, of which the following is a specification.

It is desirable in many forms of corn products that the germ should be removed from the remainder of the kernels, both portions being more valuable for many purposes when separated from each other than when mixed together. It is especially desirable in the preparation of brewers' stock, where the removal of the germ containing fusel-oil is of paramount importance. I have discovered, as a result of much experimenting on the subject, that the separation of the two parts can be effected much more thoroughly and completely than otherwise when the corn is in a highly-heated condition. Steaming or any process analogous to cooking injures the grain and the product, while a high heat, but less than a cooking heat, if dry, while completely effecting the desired result, has no damaging or deleterious effect. So far as the germ is concerned steam will soften it and make it tender and apt to be torn apart in the roller-mill operation, while dry heat makes it tough, elastic, and difficult to break, which is the ideal condition for facilitating its removal. The machinery and mill appliances used by me are in themselves such as are usual in modern mill construction, and therefore need no special illustration or description herein and may be understood to be of any proper construction desired.

The drawing therefore is diagrammatic instead of illustrative of construction and is meant merely to indicate the relative arrangement of the several machines and the course of the product as it passes through the apparatus and is discharged therefrom at various points. In other words, it is substantially what is among mill-builders usually denominated a "flow-sheet."

It should also be understood that while a complete milling system in which my invention is embodied includes all the machines and appliances shown or their equivalents,

still, so far as the process of extracting the germs is concerned, the system ends where the germs are discharged from the apparatus, as at 51, and that the substantial novelty of the apparatus resides in the treatment ending in this separation of the germs from the starchy portions of the grain.

As is obvious, any suitable receptacle, as a bin 1, may contain the supply of corn. Thence it is taken to a heater 2, in which it is heated to the degree required. This may be any desired degree of heat less than that at which the fusel-oil will be started, which is about 204° Fahrenheit. I have found 196° to be a suitable heat for the purpose, although the apparatus is operative with a considerably less degree of heat, say as low as 100°. In the best method of carrying out my invention the corn after it has been heated is passed from the heater 2 to a scourer 3, by means of which chitty ends and light stuff or "scourings" are separated from the solid portions of the kernels and are thence conveyed away and discharged from the apparatus, as at 50, for feed. As the corn will lose some of its heat in being scoured, it is conveyed thence to a second heater 4, in which the maximum heat desired is restored. The corn after leaving this heater passes between a pair of rolls 5, which rolls are substantially like those used in ordinary roller-mill construction, except that the corrugations are preferably somewhat coarser and less sharp than those used for grinding corn or grain into meal or flour. These rolls mash and break the kernels of corn somewhat and produce a certain amount of meal and hominy or grits stock. They also loosen the germs, which, as is well known, contain oil, and when heated as described have a sufficiently oily exterior to facilitate ready separation from the remainder of the kernel. The product passes to a reel 6, by which certain portions are separated or graded off, while as the separation is not completely effected by one set of rolls the remainder is tailed over and passes immediately to another heater or drier 7, where it is subjected to about the same degree of heat as in the first heater and in which any moisture which may be inherent in the grain will be driven off. From this heater or drier it passes through a second set of rolls 8,

Said rolls also, as well as the rolls 5, are of a somewhat special corrugation, but otherwise similar to ordinary rolls. The product, as before, passes to a reel 9, which separates 5 and discharges a portion of it, while the remainder is tailed over and passes to another heater 10, where its temperature is again raised to the desired point, and thence to a third set of rolls 11, where a further reduction is effected. The product passes to a reel 12 and is separated as before, that portion containing the germs passing to a set of rolls 13 and thence through a reel 14, by which 10 other portions of the product are separated off, while that portion which is tailed over is substantially pure germs and is switched off and discharged at 51 from the apparatus, being conveyed away either to an oil-mill for 15 further manipulation or to some suitable receptacle for feed or otherwise, as the case may be. 20

Under the several reels 6, 9, 12, and 14 are suitable conveyers 15 and 22, by which separate portions of the product are conveyed 25 away. The portions which have by the several reductions been reduced to meal are handled by the conveyers 15, and these are all led to the meal and grits duster 16, where this portion of the product is suitably dusted, 30 and thence conveyed to an aspirator 17. The coarser portion or grits stock is then treated by a pair of rolls 18, whence it passes to a reel 19, and from this product certain portions are separated by said reel, while the remainder, as well as a portion discharged 35 directly from the aspirator 17, is led to a pair of rolls 20, from which, after being subjected to the action of said rolls, it is discharged into a reel 21. Returning to the conveyers 40 under the reels 6, 9, 12, and 14, the conveyers 22, which receive the hominy and grits stock, discharge to an aspirator 23. A portion of the product from this aspirator passes to the reel 24, and that which is too coarse to 45 be sifted through this reel passes to the hominy-scourer 25, the product of which passes to the pair of rolls 26, and thence to a reel 27. The tailings from this reel 27 pass to the aspirator 28, and the hominy constituting 50 a portion of the product from this passes to the rolls 29, which discharge to the reel 30. The tailings from the reel 30 pass to the aspirator 17 and are a part of the fine grits stock which is treated thereby. The grits 55 stock, which is separated by this reel 30, discharges into the conveyer 31 and passes thence to the grading-reel 32. The portion which tails over from this reel passes to the aspirator 33, which cleans the "sized" grits, 60 which are thence discharged at 52 as a finished product. The finer stuff, which is drawn off by this aspirator, goes thence to the pair of rolls 20, through which it passes, and thence to the reel 21. The product of this reel in 65 the shape of meal is received by the conveyer 39 and conveyed away and discharged at 53 as a finished product. The tailings of

this reel, consisting of light fluffy stuff, are tailed off and go to the feed-receptacle at 50. Returning to the reel 32, one grade of 70 sized grits is received therefrom by the conveyer 36 and goes thence to the aspirator 37, which cleans these sized grits and discharges them at 54 as a finished product. The fine stuff is drawn off and, the same as that from 75 the aspirator 33, goes to the set of rolls 20. Another portion of the product of the reel 32 is received by the conveyer 34 and goes to the reel 35. The principal product of this reel is received by the conveyer 40 and is discharged in the form of corn-flour at 55 as a 80 finished product. The remainder, which tails over from this reel, is brewers' meal and goes to the sieve-purifier 41. One portion of the product of this goes to the conveyer 42 and 85 is discharged in the form of meal at 53 as a finished product. Another portion goes to the conveyer 43 and is discharged in the form of brewers' meal or fine grits at 56 as a finished product. The light dust is discharged 90 from this machine and conveyed away and discharged at 50 to the feed-receptacle.

In the system illustrated, as will now be seen, different qualities of product are produced. First, the skins or light bran, dust, 95 chitty ends, and light stuff are drawn out at various points and in various quantities and conditions and conveyed to and discharged into a common receptacle and constitute "feed" or food for live stock, poultry, &c., 100 and, second, the germ is extracted from the grain during a time when owing to its heated condition it is tough and elastic, so that it will not break, and is conveyed away substantially separately either to an oil-mill or to a 105 feed-receptacle, as the case may be. Three separate grades of brewers' stock are produced—viz., coarse brewers' grits, medium brewers' grits, and fine brewers' grits or brewers' meal. In addition fine cornmeal for domestic purposes is produced and also a fine 110 corn-flour. Thus the product which is led off from time to time may be hominy, grits, meal, flour, or feed, according to the arrangement and design of the milling system. As 115 before stated, it is of great importance, especially in the case of brewer's stock, that these hominy, grits, and meal products shall be entirely separate from the germs, and this I effectually accomplish. 120

In order that the processes may be completely understood, I have shown all the machines and apparatus necessary to completely produce the finished result and have shown 125 by means of lines bearing arrow-heads the course of the stock from one machine or piece of apparatus to another. It will be readily understood, however, that a milling system of this kind may be elaborated to any extent desired and that the number and arrangement 130 of machines employed may be varied according to requirements without departing from my invention.

Having thus fully described my said inven-

tion, what I claim as new, and desire to secure by Letters Patent, is—

1. That process of degerminating grain which consists in successively heating and partially reducing the grain until the germs are extracted therefrom, employing in the several heaters a degree of heat below that which is required to start the flow of the fusel-oil but high enough to keep the germs in a softened, tough and elastic condition, and separating the various grades of mill products at each operation, substantially as and for the purposes set forth.

2. That process of making corn products which consists in first subjecting corn to a dry heat, then scouring the same, then again subjecting the scoured corn to a high heat, then crushing the same in rolls, then separating the product of the rolls and conveying the reduced product away, thence conveying the unseparated product to a third heater, then subjecting the same to the action of a second set of rolls, then separating this product and conveying away the separated portions, again subjecting the remainder to the action of heat, and then passing the same to a third set of rolls and separating the product, again taking the remainder to a fourth set of rolls, again separating said product, and at this point conveying away the germs to a separate receptacle, substantially as set forth.

3. That process of making corn products which consists in subjecting the corn successively first to heaters and then to grinding and cleaning and separating apparatus, and

repeating these steps successively until the germs are completely separated from the remainder of the product.

4. The process, substantially as herein described, of separating the germ from corn, which consists in heating the grain, passing it successively through several series of roller-mills, reels, and aspirators, reducing the particles of grain in each series, reducing the size of the screenings in each series, separating out the starchy particles progressively as screenings, separating out the starch particles completely from the bran and germ, and conveying the bran and the germ away and discharging the same separately.

5. The process, substantially as herein described, of degerminating corn, which consists in heating the grain, passing it successively through several series of roller-mills, reels and conveyers, reducing the particles of grain in each series, separating out the starch particles successively as screenings, collecting the several screenings in common, drying and heating the stock at various points during the process, separating out the starch particles completely from the bran and germ, and conveying away and discharging the germ for further manipulation or use.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 25th day of September, A. D. 1900.

MARTIN W. HUNT. [L. S.]

Witnesses:

CHESTER BRADFORD,
JAMES A. WALSH.