

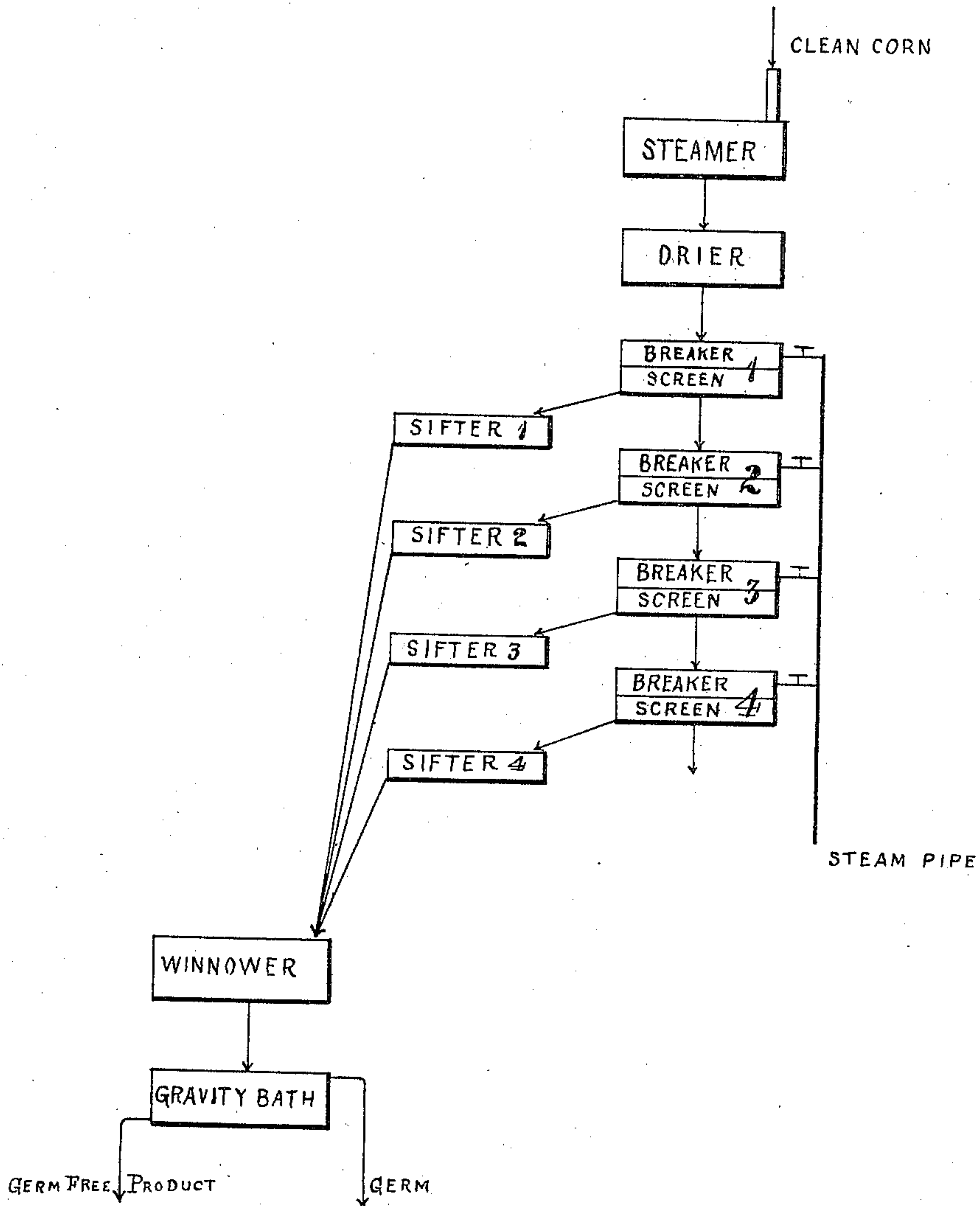
No. 707,058.

Patented Aug. 12, 1902.

T. T. GAFF & J. F. GENT.
PROCESS OF DEGERMING MAIZE OR INDIAN CORN.

(Application filed Dec. 30, 1901.)

(No Model.)



WITNESSES:

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THOMAS T. GAFF, OF BARNSTABLE, MASSACHUSETTS, AND JOSEPH F. GENT, OF INDIANAPOLIS, INDIANA; SAID GENT ASSIGNOR OF ONE-THIRD OF HIS RIGHT TO SAID GAFF.

PROCESS OF DEGERMING MAIZE OR INDIAN CORN.

SPECIFICATION forming part of Letters Patent No. 707,058, dated August 12, 1902.

Application filed December 30, 1901. Serial No. 87,821. (No specimens.)

To all whom it may concern:

Be it known that we, THOMAS T. GAFF, of Barnstable, in the county of Barnstable and State of Massachusetts, and JOSEPH F. GENT, of Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Process of Degerming Maize or Indian Corn, of which the following is a specification.

Our invention relates to the treatment of maize or Indian corn for the production of hominy, grits, flakes, and other products of corn-milling.

In the milling of maize as ordinarily practiced the initial step is the subjection of the grain to a preliminary breaking and so-called "degermination," the object of which is to destroy the adhesion of the hulls or skins and of the germs to the other portions of the grain. To accomplish this, it has been customary to introduce the grain (usually after a preliminary moistening) into a breaking-machine, the "degerminator," where it is subjected to a process of breaking or cracking, which is continued until the whole charge has been reduced to the desired extent, in so far, at least, as the imperfections or limitations of the machine employed will permit. Occasional kernels may escape unchanged or insufficiently broken; but this is due not to design but to accident or the inherent defects of the machine itself. The result of this mode of treatment is that an undue amount of the valuable starchy portion of the grain is comminuted into meal and passes over eventually into the less valuable offal or feed. This unprofitable overproduction of meal is due partly to the fact that no moisture is supplied to the grain during the process of reduction, but chiefly to the fact that inasmuch as the whole charge is retained in the machine until the entire contents have as far as practicable been reduced to the desired extent, and inasmuch as some of the kernels will during this process of reduction be brought to the condition of "finished" material before the others the retention of this finished product in the machine and its continued exposure therein to the action of the breaker results in reducing it in a greater or

less degree into meal by the time the more slowly-acted on portions of the charge have been properly modified. It is to this preliminary step in the art of corn-milling that our invention has particular reference, our object being to avoid the objectionable feature above mentioned. To this end we subject the previously-moistened grain while moving in free and continuous flow to a succession of breaking or splitting operations for the purpose of breaking the kernels into bits or fragments of a size to insure the destruction of the adhesion between the germ and starch bearing portions in contradistinction to grinding or comminuting the grain, alternating with screening operations, whereby after each breaking those bits which have been properly reduced are removed from the body of reduced grain still under treatment before the latter is subjected to the next succeeding breaking operation. This step in the process of degerming corn we believe to be broadly new with us. The portions of the charge thus successively removed consists of starch-bearing fragments or bits intermingled with hulls, germs, and some meal, all of which are subsequently separated out from the starch-bearing bits by known or suitable methods. Some meal of course unavoidably results from each breaking operation; but the percentage is very much less than has hitherto been the case. Over and beyond this, however, our invention possesses a decided advantage over the old method in this that whereas by the old method a considerable percentage of the germ necessarily was comminuted and all the offal, good, bad, and indifferent, including the comminuted germ, was discharged together, thus rendering it impossible to improve its quality by further separation by our mode of procedure, which avoids the comminution of the germ and provides for the removal of the pieces of germ practically immediately after their disassociation from the starch-bearing pieces, each successive breaking and screening leaves the portion of the charge which still remains to be treated purer and more free from germs and fiber, and consequently whatever meal

may result from each successive operation is whiter and purer—so much so, indeed, that we have found that the meal which results from the later breakings may be used for
 5 other purposes than feed for animals. The corn previous to this treatment is, as above said, moistened, and this preliminary moistening should be to such an extent only as to toughen it and promote easier hulling without destroying the structural adhesion of the starch-cells and the glutinous principle of the grain. In order to compensate for the loss of moisture due to the heat of attrition and other causes during the treatment of the
 10 grain, we supply it from time to time during its course of travel with additional moisture, so as to maintain it in the properly moist condition. As before said, the properly-reduced starch-bearing bits are separated out from
 20 the germs and other bodies by any known or suitable methods. We prefer for this purpose to subject the same to the action of a gravity-bath, as described in Gaff's Patent No. 687,219 of November 26, 1901, whereby
 25 the heavier and starchy bits are separated and carried off from the germs and lighter bodies. A separating apparatus adapted to operate on this plan is set forth in our Patent No. 687,220 of November 26, 1901. When
 30 employing this means of separation, we prefer before running the material into the bath to sift out from it the meal, although if present only in small quantity it might be run into the bath along with the rest of the material without occasioning serious inconvenience. It is also preferable before carrying
 35 the material to the gravity-bath to subject it to the action of a winnower to separate out and carry off the hulls, &c., although the hulls
 40 can be winnowed out after instead of before the gravity-bath.

To enable those skilled in the art of corn-milling to understand and practice our invention, we will now proceed to describe
 45 more particularly the manner in which the same is or may be carried into effect, reference being had to the accompanying diagram, which illustrates in sequence the principal steps of our process as we prefer to practice
 50 it, without, however, attempting to show in any sense the mechanical details of the various apparatuses and machines employed.

The first step is to preliminarily moisten the corn to such an extent only as to toughen
 55 it, so as to facilitate the hulling and at the same time decrease its brittleness. This we preferably accomplish by passing the clean corn first through a cylinder or series of cylinders, where it is subjected to the action of
 60 steam and water, after which it is passed through a drier by the action of which the surplus water is removed and the corn is brought to the proper moist but not wet condition. The next step is to break the thus-moistened corn. This we effect by passing it
 65 through a succession of breakers alternating

with screens, whereby after each breaking operation such material as has been thereby reduced to the proper size is removed and carried off, leaving only the unreduced portion of the corn to be subjected to further
 70 breaking operations. The grain itself passes along in continuous and uninterrupted flow through the succession of breaking and screening devices, there being no retardation to its
 75 movement save that which it meets with in passing between the acting faces of the breakers, and which faces are so formed and set as to break or split the kernels in contradistinction to exercising a grinding action
 80 thereon. In the diagram we have represented a series of four breakers arranged in alternating sequence with a corresponding number of screens, and consequently the corn will
 85 be subjected to four breaking operations alternating with screening operation; but the number of operations is not arbitrary and may be increased or diminished, as required or preferred. During the progress of this
 90 operation the corn, owing to the heat of attrition and other causes, will lose some of its moisture, and this moisture we replace, so as to bring the corn to its original properly moist condition, by supplying it to the corn at different stages during its treatment, preferably
 95 while it is being subjected to the breaking operations. This we have illustrated in the diagram by a steam-pipe having valve-controlled branches leading into the several breakers.

We desire to state here that in our application for Letters Patent filed October 28, 1901, Serial No. 80,253, on which Letters Patent will issue of even date herewith, we have
 100 fully described and illustrated an apparatus for the degermination and decortication of Indian corn which is designed and adapted to effectuate this step of our process.

The next step is to separate the starch-bearing portions from the germs and other
 110 lighter portions of the thus-broken corn. This we prefer to effect by subjecting the same to the action of a gravity-bath—that is to say, a bath of any suitable liquid which shall have a density sufficient to cause the
 115 germs to float, while the starch-bearing bits or fragments sink. For this purpose we use in practice a saturated solution of common salt. When introduced into such a brine-bath, the germs and lighter bodies will float
 120 and can be skimmed or otherwise run off from the top of the bath, while the starchy bits or pieces will sink and should be at once removed from the bottom of the bath. Apparatus designed and adapted for this purpose is fully described and illustrated in our
 125 Letters Patent No. 687,220 of November 26, 1901.

When using the brine-bath, we prefer to subject the successively-screened-out portions of the charge to a sifting operation for
 130 the purpose of removing and carrying off

therefrom whatever meal may have resulted from the breaking operation, and we also prefer after the sifting operation has taken place and before the broken mass is introduced into the brine-bath to subject it to a winnowing operation for the purpose of removing the hulls. This completes the degerming process, and the now separated germs and starch-bearing portions can each be subsequently treated in any desired way—as described, for example, in Letters Patent No. 687,219, hereinbefore referred to—the one for the production of hominy, flakes, and the like, the other for oil production.

Having described our invention and the manner in which the same is or may be carried into effect, what we claim herein as new, and desire to secure by Letters Patent, is as follows:

1. In the treatment of maize or Indian corn for the production of hominy, flakes, grits and other products of corn-milling, the process of degerming the corn consisting in preliminarily moistening the corn to such an extent only as to toughen it without destroying the structural adhesion of the starch-cells and the glutinous principle of the grain; then subjecting the thus-moistened grain while moving in free and continuous flow to a succession of breaking or splitting operations whereby the kernels are broken into fragments of a size to insure the detaching of the germ from the starch-bearing portions, alternating with screening operations whereby after each breaking such fragments of grain as are broken to the proper size, along with corresponding bits of germ and other bodies, are separated out and carried off from the still-unreduced portion of the charge before the latter is subjected to the next succeeding breaking operation; and finally separating and carrying off the thus-broken starch-bearing fragments or pieces from the germs and

other lighter bodies, substantially as and for the purposes hereinbefore set forth.

2. In the treatment of maize or Indian corn for the production of hominy, flakes, grits and other products of corn-milling, the process herein described of degerming the corn consisting in preliminarily moistening the corn to such an extent only as to toughen it without destroying the structural adhesion of the starch-cells and the glutinous principle of the grain; then subjecting the thus-moistened grain while moving in free and continuous flow to a succession of breaking or splitting operations whereby the kernels are broken into fragments of a proper size to insure the detaching of the germs from the starch-bearing portions, alternating with screening operations whereby after each breaking those fragments broken to a proper size are separated out and carried off from the still-unreduced portion of the charge before the latter is subjected to the next succeeding operation, and furnishing to the charge at various points in its movement during this series of operations, additional moisture, to maintain it in properly moist condition; and finally separating out and carrying off the thus-broken starch-bearing fragments from the germs and other lighter bodies intermingled therewith, substantially as and for the purposes hereinbefore set forth.

In testimony whereof we have hereunto set our hands.

THOMAS T. GAFF.

JOSEPH F. GENT.

Witnesses as to signature of Thomas T. Gaff:

E. K. LUNDY, Jr.,

GEO. W. REA.

Witnesses as to signature of Joseph F. Gent:

ARTHUR B. BELL,

KARL T. GENT.

Correction in Letters Patent No. 707,058.

It is hereby certified that in Letters Patent No. 707,058, granted August 12, 1902, upon the application of Thomas T. Gaff, of Barnstable, Massachusetts, and Joseph F. Gent, of Indianapolis, Indiana, for an improvement in "Processes of Degerming Maize or Indian Corn," an error appears in the printed specification requiring correction, as follows: In line 90, page 1, after the word "separation," a comma should be inserted; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 7th day of April, A. D., 1903.

[SEAL.]

F. I. ALLEN,
Commissioner of Patents.