

UNITED STATES PATENT OFFICE.

HALE E. HAWK, OF GREENVILLE, MISSISSIPPI.

PROCESS OF MILLING COTTON-SEED.

983,711.

Specification of Letters Patent.

Patented Feb. 7, 1911.

Application filed May 2, 1910. Serial No. 558,775.

To all whom it may concern:

Be it known that I, HALE E. HAWK, a citizen of the United States of America, residing at Greenville, in the county of Washington and State of Mississippi, have invented new and useful Improvements in Processes of Milling Cotton-Seed, of which the following is a specification.

This invention relates to an improved process of milling cotton seed, having for its object to improve the quality and to increase the quantity of the yield or product.

Under a patent previously granted to myself, on July 10, 1906, Number 825,534, a process was specified which consisted mainly in, first hulling the seed, next separating the oil bearing part of the stock into two grades, one containing substantially pure meats, and the other containing meats and some of the hulls, and then extracting oil separately from the latter grade.

Under my present invention, I still separate the substantially pure meats from the mixed meats and hulls which constitute what might be termed a second grade stock, and the substantially pure meats are separately treated, for the purpose of absolutely crushing the oil cells previous to submitting the meats to the cooking process; but the second grade stock, containing part meats and part hulls, is subjected to further separating and reducing processes, and the separated and reduced stock, which is rich in oil bearing qualities, is conveyed to the cookers, where it is mixed with the pure meats, it having been found that in this manner a high grade of oil, as well as a high grade of oil cake may be obtained; the latter product, namely the oil cake, being especially rich in ammonia and protein, and therefore of exceptional value for feeding purposes.

The accompanying drawing is a diagrammatic view of an embodiment of the system, whereby the improved process is carried into practical operation.

Through the feeder A, the seed, which has been previously subjected to a cleaning and delinting process, passes to a huller 1, which may be of the ordinary breast and cylinder type or any well known type in general use. From the huller 1, the material passes to a separator 4, which may be of any desired construction, although I prefer, in the separator, to embody the improved construction substantially shown in applications Se-

rial Nos. 493,758 and 542,028, which have been filed by myself on April 29, 1909 and Jan. 3, 1910, respectively. It may be here stated that while I do not limit myself to the use of this or to any particular form of separators, the various separators utilized in this process, and which will be hereinafter referred to, are all to be substantially of the same type; the difference between the various separators consisting mainly in the grade of screening material used. Each of the separators employed in these processes is for the purpose of effecting separation between the meats or the oil bearing stock containing meats, and the tailings, which consist, mainly, of the hulls together with the linty and fibrous particles. It may also be here stated that in connection with each separator, I employ two conveyers which may be of the spiral or of any other suitable and well known type, one of said conveyers being equipped with a screen for the purpose of effecting further separation of the material carried thereby; into two grades, one of said grades being discharged into an auxiliary conveyer arranged below and adjacent to the first conveyer. Returning, then, to the separator 4, the substantially pure meats will, in this separator, be separated from the hulls and pass to the conveyer 10, in which further separation is effected, any particles having portions of the inner hull or husk adhering thereto, being discharged into the conveyer 11, from which said particles pass along with the tailings from the separator 4 to a second huller designated by 2. The substantially pure meats will pass from the conveyer 10 to a feeder B, communicating with a set of crushing rolls, conventionally indicated at C. It is regarded as extremely important that all flakes of husks or portions of hulls be completely eliminated from the pure meats before the latter are subjected to the action of the crushing rolls, because such flakes of husks or portions of hulls would tend to keep the rolls spaced apart while passing therebetween, thus preventing the crushing action from being effectively exercised in mashing the small oil cells. All material discharged from the crushing rolls C will pass directly to the cookers D and thence to the presses E.

From the huller 2, the product is carried to a separator 5 discharging one grade of material to a conveyer 12, where separation

is again effected, the substantially pure meats passing from the conveyer 12 to the feeder B and crushing rolls C, while the meats, still having husk flakes or particles of hulls adhering thereto, are conveyed to a grinder 22. The tailings from the separator 5 pass to a disk huller 3.

The material discharged by the grinder 22 is carried to a separator 8 discharging into a conveyer 18 where further separation is effected into a conveyer 19. The substantially pure meats from the conveyer 18 are carried direct to the cookers along with the crushed meats coming from the crushing rolls, while the material from the conveyer 19 is carried to a second grinder 23 along with the tailings from the separator 8.

The material discharged from the disk huller 3 is carried to a separator 6, discharging into a conveyer 14, by which further separation is effected into a conveyer 15, the material from the conveyer 14 being carried to the grinder 22 along with the material coming from the conveyer 13, previously referred to. The material from the conveyer 15 is carried to the grinder 23 along with the material from the conveyer 19, and the tailings from the separator 8, while the tailings from the separator 6 are conveyed to another separator 7, discharging into a conveyer 16 where further separation is effected into a conveyer 17. The material from the conveyer 16 is carried to the grinder 22 along with the material from the conveyer 14, where the material from the conveyer 17 is carried to a grinder 23 along with the material from the conveyer 18 and the tailings from the separator 8. The tailings from the separator 7 constitute, what may be termed, first grade hulls which may be separately utilized for various purposes.

The stock coming from the grinder 23 is conveyed to a separator 9, discharging into a conveyer 20, where further separation is effected to a conveyer 21. The material from the conveyer 20 is carried direct to the cookers along with the material from the conveyer 18 and that discharged from the crushing rolls, while the material from the conveyer 21 is returned to the grinder 23 to be there subjected to a further reduction process, after which it is returned to the separator 9. The tailings from the separator 9 constitute a separate product which may be described as consisting of second grade hulls and linty and fluffy or fibrous substances, which may be subsequently utilized separately.

It will be noted that by the process herein described, the substantially pure meats are first separated from the remaining stock. In order to do this thoroughly and effectively, it is necessary to pass the stock through a plurality of separating devices, it being of utmost importance to separate

from the pure meats, all particles having flakes of husk or particles of hull adhering thereto, for the reason that such flakes or particles, if permitted to remain, would interfere with the effective crushing action of the rolls to which the meats are subjected. The meats, it has been found, may be most effectively treated, and the crushing of the oil cells may be most effectively attained, by crushing rolls operating at uniform speed, as distinguished from those that are operated at differential speed. The latter class of rolls might be efficient in exercising a grinding action upon the hulls and husks, but when applied to the pure meats, the operation of such rolls would be inefficient. I accordingly aim, by repetitions of this separating process, not only in the separating machines but also in the conveyers attached to such machines, to separate the greatest possible amount of absolutely or practically pure meats from the remaining stock. In order to obtain the very best results, in quality as well as in quantity of the eventual products, namely, oil and oil cake, an admixture of the hulls and husks, that is to say, of the portions which are particularly rich in ammonia and protein, is added to the pure meats. A further reason for such admixture lies in the fact that the oil product, as well as the oil cake product, thereby receives a stronger, brighter and more desirable color. On the other hand, it is well established that the product of separation, which consists partly of meats and partly of the fibrous portion of the hulls and husks, may be efficiently reduced by grinding the same, either in disk grinders or by means of grinding rolls, and I desire to be understood that where in the foregoing statement, I have referred to grinders, the same may be of any suitable and well known construction. By these grinders, the portions or particles of meats, with adhering particles of husk and hull, may be efficiently reduced to a consistency of a very fine meal, without interfering with the porosity and absorbent qualities of the fibrous portions, thus forming a final product which will readily mix and become thoroughly incorporated with the substantially pure meats that are discharged into the cookers. The mixed stock, thus subjected to the cooking and eventually to the pressing operation, has been found to submit itself very advantageously to said operations. The mixed product being substantially of a uniform fineness and free from particles requiring a different temperature or a different length of exposure to heat. When the product submitted to the cooking process is of an uneven quality, the result is apt to become overdone, thereby acquiring a burned and bitter taste, which seriously reduces the value of the final product. By the present process,

the temperature and the duration of the cooking process may be accurately determined, and the resulting product will be found to be of the very highest grade obtainable, as well as the highest in quantity.

It is desired to be understood that while I have, in the foregoing, described a simple and thoroughly efficient manner of carrying the improved process into practical operation, I do not limit myself to the details herein described. Some of the steps of the separating process might be omitted, and again, on the other hand, the separating process might be carried on to a greater extent, according to the nature and quality of the seed that is to be operated upon.

Having thus described the invention, what is claimed as new is:

1. The herein described process of milling cotton seed, consisting in hulling the seed, separating the same into two grades, subjecting one grade to a crushing action, subjecting the other grade to a grinding and separating action and mixing the resultant product of such other grade with the first mentioned grade beyond the crushing of the latter to provide a single material for final treatment.

2. The herein described process of milling cotton seed consisting in hulling the seed, separating the same into two grades, subjecting one grade to a crushing action, subjecting the other grade to a grinding and separating action and mixing the resultant product of such other grade with the first mentioned grade beyond the crushing of the latter to provide a single material for final treatment, the unground hulls being eliminated by the separation of the two grades, and ground hulls, husks, linty, fluffy and fibrous substance being eliminated by the final separation of the two grades.

3. A process of milling cotton seed, consisting of hulling the seed, separating the oil bearing part of the stock into two grades, one containing substantially pure meats and the other containing meats and some of the hulls, subjecting the substantially pure meats to an independent crushing process, and subjecting the second grade to independent hulling and separating processes, and afterward to independent grinding, prior to cooking.

4. The herein described process of milling cotton seed, consisting in hulling the seed, separating the same into two grades, and separately treating the two grades, one by crushing and the other by separation, elimination and grinding, and then mixing the resultant products of the two grades to provide a single material for final treatment.

5. The herein described process of milling cotton seed, consisting in hulling the seed, separating the same into two grades, with

the elimination of unground hulls, and separately treating the two grades, one by crushing and the other by separation, elimination and grinding, and then mixing the resultant products of the two grades to provide a single material for final treatment.

6. The herein described process of milling cotton seed, consisting in hulling the seed, separating the same into two grades, one of said grades containing substantially pure meats and the other containing meats and some of the hulls, subjecting the first grade to a crushing action, subjecting the other grade to a succession of grinding and separating actions, and mixing the resultant product of each successive separating action with the first mentioned grade beyond the crushing of the latter to provide a single material for final treatment.

7. A process of milling cotton seed consisting in initially hulling the material, subjecting the same to a separating action, subjecting one product of such separation to a further hulling and separating action, subjecting the other product from the first separating action and one product from the last mentioned separating action to a crushing action, subjecting the other product from the last mentioned separating action to a grinding and separating action, and mixing the product resulting from such grinding and separating with the product subjected to the crushing action after the crushing of such product, to provide material for final treatment.

8. A process of milling cotton seed consisting in initially hulling the seed, separating the same into two major grades, crushing one of said grades, hulling the other of said grades, separating the latter grade to provide two minor grades, grinding and separating one of said minor grades to provide a product for mixing with the first major grade after crushing the latter, hulling and separating said other minor grade to provide two distinct products, one of which is mixed with the first major grade after crushing the latter.

9. A process of milling cotton seed, consisting in hulling the material and dividing the same to provide two major grades, crushing one of said grades, hulling and separating the other of said grades to provide two minor grades, grinding and separating one of said minor grades to provide a product, mixing said product with the first major grade after the crushing of the latter, hulling and separating the second minor grade to provide two sub-minor grades, subjecting one of said sub-minor grades to the grinding and separating operation of the first minor grade to combine the first sub-minor grade with the first minor grade for mixing with the first major grade.

10. A process of milling cotton seed, con-

sisting of hulling the material and separating the same to provide two major grades, crushing one of said grades, dividing the other of said grades into two minor grades, grinding and separating one of the said minor grades to produce two distinct products, mixing one of said products with the first major grade after crushing of the latter, separating the other of said minor grades to produce two sub-minor grades, and subjecting one of said sub-minor grades to a portion of the operation to which the first minor grade is subjected to add a desirable material of the first sub-minor grade to that product of the first minor grade which is to be mixed with the first major grade.

11. The herein described process of milling cotton seed, consisting in dividing the product into two major grades, dividing one of said major grades into two minor grades, mixing the first minor grade with the first major grade, dividing the second minor grade into two sub-minor grades, and mixing the first sub-minor grade with the first minor grade, whereby to produce a product for final treatment including the first major grade, the first minor grade and the first sub-minor grade.

12. The herein described process of milling cotton seed, consisting in dividing the product into two major grades, the first substantially pure meats and the second meats and hulls, dividing the second major grade into two minor grades, the first containing practically pure meats and the second meats

and hulls, dividing the second minor grade into two sub-minor grades, the first containing meats and hulls and the second practically hulls, mixing the first minor grade and the first major grade and crushing the product, subjecting the second minor grade to the grinding and separating operation and mixing them with the first minor grade, and finally mixing the product of such grinding and separation of the second minor and the first sub-minor with the mixture of the first major and first minor grades after the crushing of such mixture to provide a product for final treatment.

13. A process of milling cotton seed, which consists essentially in subjecting the seed to a plurality of hulling and separating actions, whereby a part of the hulls are eliminated to form a first grade hulls product, separating from the remainder a product of practically pure meats and crushing the same, subjecting the remaining part hulls and part meats to a plurality of grinding and separating actions to finally eliminate the relatively undesirable second grade hulls, and mixing the prime product of the several separations and grindings with the pure meats subsequent to crushing the same to provide a single material for final treatment.

In testimony whereof I affix my signature in presence of two witnesses.

HALE E. HAWK.

Witnesses:

J. A. CRITTENDEN,
J. R. DENNIS.