

1,019,148.

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METHOD OF CLEANING GRAIN.

1,019,148.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE HALLIDAY, a citizen of the United States, residing at Tacoma, in the county of Pierce and State of Washington, have invented a new and useful Method of Cleaning Grain, of which the following is a specification.

This invention has reference to improvements in the method of cleaning grain and it consists in subjecting the grain to be cleaned to the action of ground or pulverized grain, preferably of the same character as the grain to be cleaned, the fineness of the ground or pulverized grain depending on the conditions present.

While the invention is not confined to the cleaning of wheat, the following description will, for convenience, be limited to the application of the invention to the cleaning of wheat, with the understanding, however, that the use of the word "wheat" in the description and claims is not a limitation of the invention to this specific cereal.

Wheat is frequently contaminated by fungus growths, such as smut, mold or must, and sometimes by other deleterious matters which it is necessary to remove before the wheat is ground into flour, and in the case of smut, which is one of the most prevalent of wheat diseases, the market value of the wheat is largely reduced by its presence. By the removal of the smut from the wheat its market value is largely increased and it may be either ground into flour or by suitable treatment prepared for storage. It has been proposed to employ sand for the purpose of removing such deleterious matters, but there is a liability of some sand reaching the grinding burs, and being carried into the flour in the form of grit. It has been proposed to use lime for coating the wheat grains to remove the deleterious matters by the strong adherence of such matters to the lime and the removal thereof from the wheat when the lime is separated from the wheat grains. There is a liability, however, of more or less of the lime lodging in the crease of the wheat and resisting displacement, so that this lime is carried to the burs and ultimately into the flour, thereby contaminating the latter. It has also been proposed to mix coarse bran with wheat and pass the mixture through a scouring machine, but in practice it has

been found that the cleansing is not a perfect cleansing, and the scouring operation is but indifferently performed due to the cushioning action of the bran, while the load upon the scouring machine is largely increased. Furthermore, it has been proposed to use the soft and porous products of milling and particularly bran, because of the large, rough, soft surfaces it presents and because of its leaflike shape enabling it to penetrate with its cutting edges into the split and groove of the wheat berries to remove impurities therefrom. Coarse bran, however, has no more affinity for smut spores than the wheat berries themselves and in instances where bran is employed the rubbing or scouring action of the bran particles is relied upon rather than any superior attractiveness for such minute particles as smut spores. These and other like processes of cleaning wheat have objectionable features, in that there is either a likelihood of some of the foreign matters used for cleaning the wheat ultimately reaching and contaminating the flour or the cleaning processes fail to wholly remove the deleterious matters, and this is particularly noticeable in the case of such contaminating matters as smut.

By the present invention the cleansing material may be of the same character as the material to be cleaned and consequently should any of the cleansing material remain with the wheat it will of itself have no contaminating effect upon the ultimate product.

Finely ground or pulverized wheat employed in the present process is the result of grinding the whole wheat until even the bran portions are reduced to the requisite fineness, the bran particles being practically invisible to the eye as separate particles. This finely ground or comminuted wheat is of such a character that all its particles are small enough to have a strong affinity for the spores of smut and for other such minute particles as may contaminate the wheat. The bran is finely pulverized and together with the other finely pulverized portions of the wheat produces a cleansing medium of a fine, sharp, free-flowing consistency, and experience has shown that such comminuted wheat is so strongly adherent to the spores of smut as to entirely remove the smut from the wheat, thus cleansing the

wheat so effectively that it may be sent to the grinding burs and ground into high grade flour, or it may be further treated for storage.

5 The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming a part of this specification, with the understanding, however, that the showing of the drawings being in the main diagrammatic is not to be taken as illustrating the only arrangement of apparatus which may be used in the practice of the invention, nor is the invention to be considered as confined to the steps in the exact order set forth.

10 The drawing is a vertical section of an assemblage of apparatus which may be utilized in the practice of the invention, the showing, while in part structural, being in the main diagrammatic.

Referring to the drawings there is shown a bin 1 designed to contain a supply of the wheat to be cleaned, and there is shown another bin 2, designed to contain a supply of ground or pulverized wheat of a fineness determined by the character and condition of the wheat to be cleaned, some grain requiring finely ground grain to perfectly clean it, while other grain requires a much coarser granulation of the cleansing grain to produce the desired results. Again, the quantity of the ground grain required for the cleansing of a certain quantity of the contaminated grain will depend upon the conditions present and must be determined thereby. Since any desired degree of fineness of the ground grain is readily producible, and since the quantity of the cleansing grain is readily controllable, the process is consequently very elastic and applicable to all conditions and circumstances.

25 The bin 2 discharges through a funnel 3 into a compartment 4, provided with a sloping bottom 5 in operative relation to which at an appropriate point is a feed roll 6, while the quantity of ground grain, discharged by the feed roll is readily controllable by a gate 7 in sliding relation to the roller 6, a threaded rod 8 carrying the gate, and a wing nut 9 applied to said rod and working against a bracket 10 on one side of the compartment 4 providing a convenient means for controlling the gate. The compartment 4 discharges by the roller 6 and gate 7 into a conduit 11 merging into the discharge end of a hopper 12 coming from the lower end of the bin 1, and the conduit and hopper discharge together into a casing 13 constituting the casing of a mixer. Within the casing 13 there is a shaft 14 axial to the casing and carrying a series of radial blades 15, while exterior to these blades is a circular series of other blades 16 which may be tangential to a circle interior to their inner ends and con-

centric with the axis of rotation of the shaft 14.

The series of blades 16 may be rotated by any suitable power and the shaft 14 with its blades 15 may, also, be rotated by any suitable power, ordinarily the blades 15 rotating more rapidly than the blades 16 so that material entering the mixer will be elevated by the blades 16 and deposited on the blades 15 to be thrown out of the latter and again elevated by the blades 16, and so on so long as the material remains within the mixer. The material entering the mixer consists of the grain to be cleaned, coming from the bin 1, and an appropriate quantity of ground or pulverized grain coming from the bin 2, and the action of the mixer is to freely and thoroughly intermingle and agitate the two materials, so that each individual grain of wheat is subjected to the action of the ground grain and any deleterious matters clinging to the surface of the wheat grains become adherent to the finely ground particles, leaving the wheat grains clean and free from spores of smut, or must or mold, or particles of other materials of a contaminating nature.

After the mixture has been agitated in the mixer for a sufficient length of time to bring about the desired result, the mixture reaches a chute 17 discharging into a screen cylinder 18 mounted in a suitable casing 19, the screen being supported by a shaft 20 extending to the exterior of the casing, and there provided with a pulley 21 to which a belt may be applied for causing the rotation of the shaft and the screen with it. This screen may be tilted so that material discharged thereinto will have a slow progressive movement toward the end remote from that receiving the material, and such remote end discharges into a chute 22, while the passages or interstices of the screen discharge into another chute 23.

The screen 18 serves as a separator for the cleansed wheat, and the cleaning fine material with the captured contaminating material previously on the wheat, the cleaned wheat escaping into the chute 22 by which it may be conveyed to any suitable point for further treatment, and the chute 23 serves to convey the cleaning material and the wheat contaminating material carried thereby to a suitable point of disposal.

By the present invention the wheat to be cleaned is first mixed with ground or pulverized wheat which will adhere more strongly to the matters to be removed from the wheat than these latter adhere to the wheat grains, the result being that after an agitation of the wheat grains with the ground wheat, the wheat grains are thoroughly cleansed from all deleterious materials, which become strongly adherent to the finely ground wheat, and when the mixture

is passed through a suitable screening apparatus, a separation is readily effected, the cleaned wheat passing to one point of disposal, and the finely ground wheat with the matters removed from the wheat grains being directed to a separate point of disposal.

It is to be understood that the finely ground or comminuted wheat is the result of a fine grinding of the whole wheat berries, so that not only is the body of the wheat berry reduced to a fine powder, but the bran coatings are, also, reduced to a fine powder. In this respect the pulverized or comminuted wheat constituting the cleansing material of the present invention differs from any of the ordinary products of milling, in that all parts of the wheat berry or kernel are reduced to a pulverulent condition, instead of the wheat berry being subjected to a method of grinding, whereby the bran coating is separated from the body of the wheat in comparatively large flakes and the starch is allowed to escape from the starch cells to ultimately form the product known as flour.

Should it occur that any of the finely ground wheat adheres to the cleansed wheat, the amount so adhering is in no manner harmful to the ultimate product of the wheat, since it is of the same character and may be of the same quality, but even if of inferior quality, the amount which might possibly be carried by the wheat through the grinding process is not sufficient to sensibly affect the final product.

What is claimed is:—

1. The method of cleaning whole wheat which consists in freely agitating the whole wheat grains in the presence of a comminuted whole cereal of which latter all parts of the grains or berries thereof have been reduced to a pulverulent condition.

2. The method of cleaning whole wheat which consists in mixing together the whole wheat and comminuted whole wheat, of which latter all parts of the grains or berries have been reduced to a pulverulent condition, and freely agitating the mixture.

3. The method of cleaning whole wheat which consists in freely agitating the whole wheat in the presence of comminuted whole wheat, of which latter all parts of the grains or berries have been reduced to a pulverulent condition, and then separating the cleaned whole wheat from the comminuted wheat and impurities captured by the latter.

4. The method of cleaning whole wheat which consists in freely agitating a mixture of the whole wheat grains and comminuted whole wheat grains, all parts of the latter being reduced to a pulverulent condition in fineness and quantity agreeable to the condition of the wheat to be cleaned.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

GEORGE HALLIDAY.

Witnesses:

WILLIAM SCHLARB, Jr.,
J. W. ARMSTRONG.