Oct. 6, 1931. P. TURUCZ 1,826,157

APPARATUS FOR MILLING WHEAT

Filed May 31, 1930.

Fig. 1.

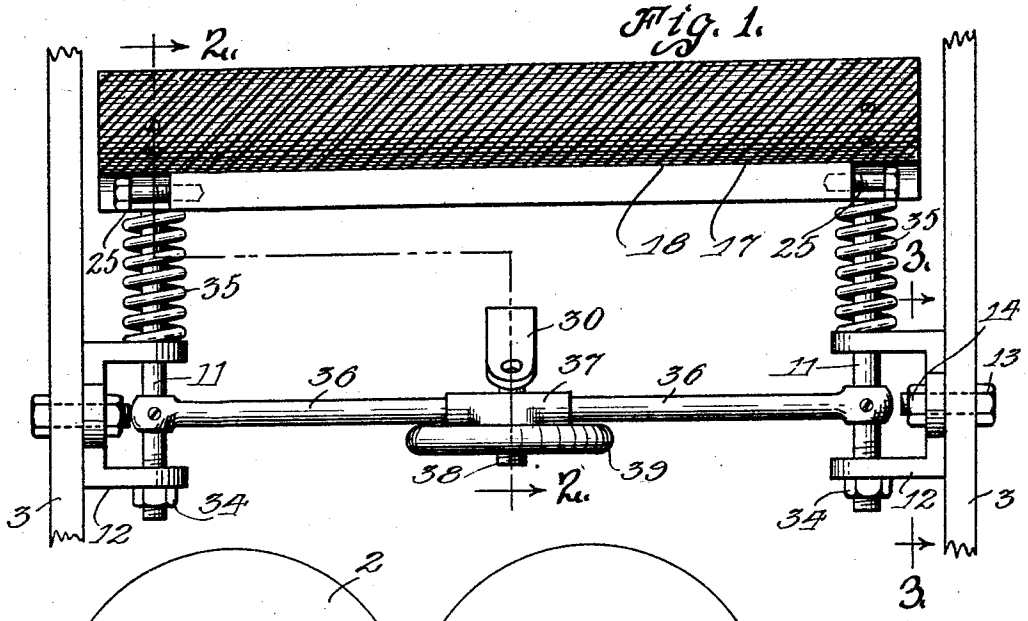


Fig. 2.

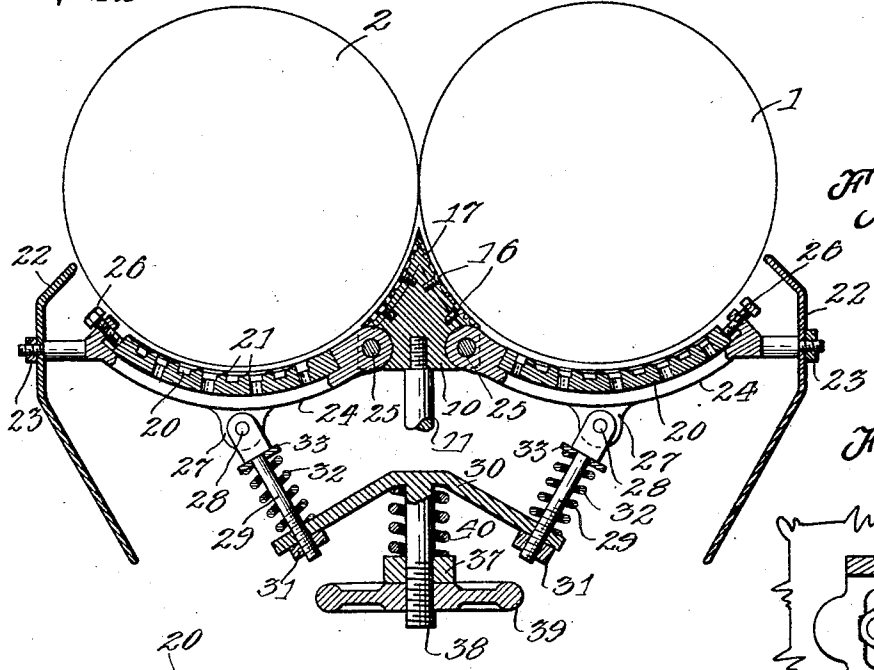


Fig. 3.

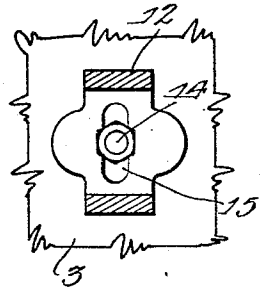
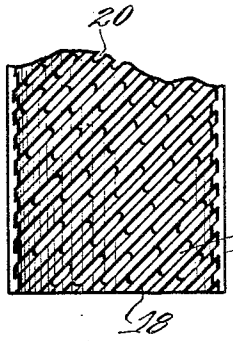


Fig. 4.



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Patented Oct. 6, 1931

1,826,157

UNITED STATES PATENT OFFICE

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APPARATUS FOR MILLING WHEAT

Application filed May 31, 1930. Serial No. 458,114.

This invention relates to an improved process of milling, and is particularly related to a process and apparatus for milling wheat, or other grain, in the production of flour.

Heretofore flour was made or manufactured by what is generally known as the gradual reduction process, which process contemplates the use of suitable break-rolls which act on the wheat berry in a manner to cause a separation of the grain hulls from the flour-containing portions, cause a loosening and shattering of the bran, and also a grinding of the middlings to produce the flour. Not only does this process necessitate a series of reductions on smooth rolls entailing complications and expense to produce a finished flour, but also this break method is, in effect, an indirect process of securing a finished flour through the medium of middlings.

The great expense and care required in carrying out the above process practically prohibits its use by small mill owners who are therefore, compelled to use what is known as "low milling" where the grain is subjected to a grinding action between stones or rolls, under great pressure, said rolls being rotated at different rates of speed, and the resulting flour is not only of an inferior quality, but there is also an appreciable loss of bran.

Still another method, and which is generally known as a "high milling" process for producing flour, requires a comparatively large number of break-rolls because of the fact that the flour-containing cells cannot be crushed at once, therefore necessitating a series of course grinding with intervening cleaning operations, whereby the hulls are freed from the flour-containing cells, which must later be ground to the desired degree of fineness.

It is the main object of this invention to overcome the defects present in the methods heretofore used by providing a device adapted for cooperation with the break-rolls whereby the grain berries will be acted upon by the break-rolls and their associated means over a longer period of time, and over a considerably increased surface whereby, instead of the grain berries being subjected to the breaking-up action only at the point of contact between the break-rolls, they will be subjected to a breaking up action over a substantial portion of the surface of the break-rolls, resulting in a larger volume of finished flour.

Another object of this invention is the provision of a device adapted for cooperation with the usual break-rolls for increasing the working surface for breaking up the flour-containing cells resulting in an increased volume of bran and a higher quality of finished flour, as well as reducing the power consumption for the break-rolls.

A further object of this invention is to provide, in an apparatus of the character described, an improved device adapted for cooperation with the break-rolls for increasing the surface of the break-rolls which will act upon the grain berries, said device being adapted for attachment to the break-rolls without altering or modifying the construction of the break-rolls, and without necessitating a stopping in the operation of the mill.

A further object of this invention is to provide an improved apparatus for milling wheat or the like, which eliminates the necessity for high pressure between the break-rolls, thereby obviating the danger of the rolls becoming heated, resulting in a considerable saving of power consumption as well as the production of a higher quality of flour and a greater yield of bran.

A still further object of this invention is the provision of a novel and improved attachment adapted for use with the usual break-rolls, said attachment being disposed adjacent to and in position to cooperate with a substantial portion of the circumference of said break-rolls for considerably increasing the working surface of the break-rolls thereby permitting the operation of said rolls without the necessity of high pressure between the rollers.

A still further object of this invention is the provision of an attachment adapted for use with the break-rolls for increasing the working surface of the same whereby a large

number of the relatively expensive break-rolls may be eliminated, resulting also in a considerable saving in space required for the operation of the milling apparatus.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention consists in certain novel and improved features of construction, arrangement and combination of parts hereinafter more fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, size and minor details of the construction may be made without departing from the spirit or sacrificing any of the advantages of the invention.

Stated generally, the invention comprises the provision of a pair of segments which are adapted for disposition adjacent to a portion of the circumference of the break-rolls, said segments being spaced from the break-rolls a predetermined distance and provided with suitably shaped working surfaces which cooperate with the break-rolls for breaking up and grinding the wheat particles. The working surfaces of said segments are provided with openings suitably arranged and adapted to permit the passage therethrough of the product.

In the embodiment illustrated, the segments are supported adjacent the break-rolls by adjustable means whereby the same may be adjusted to vary the clearance between either segment and the corresponding break-roll, and also for facilitating in the installation or attachment of the segments to the apparatus. The segments are also mounted in such a manner as to be held in their adjusted position by means of suitable springs whereby the same may give, in case of an overloading, to avoid breakage or destruction of the same.

Stated generally, the operation may be described as follows: The crushed wheat berries of the first roll will drop from the roll onto the segments and will be carried along by the cutting edges of the break-roll onto the working surface of the segments, producing a crushing and grinding of the product. During this crushing process the middlings will be freed from the bran and will pass through the openings provided in the segments to a suitable hopper or container provided for receiving the same. Since the bran is composed of considerably tougher hulls it will be forced out by the spirals of the break-roll and may be removed either separately or lead to the same container or hopper where they will be mixed with the middlings and then passed through the usual sieve.

For the purpose of facilitating an understanding of my invention, I have illustrated in the accompanying drawings, a preferred embodiment thereof, from an inspection of which, when considered in connection with the following description, its mode of construction and assembly, and many of its advantages, should be readily understood and appreciated.

Referring to the drawings in which the same characters of reference are employed to indicate corresponding or similar parts throughout the several figures of the drawings:

Figure 1 is a side elevational view of the device embodying the invention attached to a housing with the break-rolls removed;

Figure 2 is a vertical sectional view taken on line 2—2 of Figure 1 with the rolls in place;

Figure 3 is a view taken on line 3—3 of Figure 1; and

Figure 4 is a top plan view of the working surface of one of the segments.

Referring to the drawings more specifically by characters of reference, the numerals 1 and 2 designate generally the break-rolls which are of the usual and wellknown construction, and which are provided on their outer surfaces with spiral corrugations (not shown) for breaking or crushing the wheat berry, and also for shattering and loosening the bran. These break-rolls are mounted in the usual manner in a suitable housing 3, and as the construction so far described forms no part of the present invention, it is not thought necessary to describe the same in more detail.

As already explained, in the methods heretofore used, the breaking or crushing action takes place only at the point of contact between the two break-rolls, and for that reason it was necessary to pass the wheat successively between a series of corrugated rolls for gradually reducing the wheat to middlings which are then separated from the bran and whatever fine flour that was formed, and the middlings finally reduced to flour. In the present construction the working surfaces acting on the wheat berry and crushing the same is greatly increased thereby eliminating the necessity for a series of rollers for gradually breaking up the wheat berry in order to get the desired quality and quantity of flour.

In carrying out my idea I provide a main beam 10, which is adjustably secured to the housing 3 by means of the vertically disposed rods 11, the upper ends of which are adapted to support the main beam 10 in operative relation with respect to the rolls 1 and 2. The rods 11 are supported in suitable brackets 12 which brackets are in turn secured to the housing 3 by means of the bolts 13 and nuts 14, said bolts extending through vertically disposed elongated slots 15 provided in the brackets, whereby the said brackets 12 may be adjustable vertically on the housing 3. The main beam 10 is disposed in the position

shown in Figure 2 with respect to the break rolls and by adjusting the brackets 12 on the housing the distance or clearance between said main beam and the break-rolls may be fixed to any desired amount.

On the beam 10 is secured, in any suitable manner such for example as by the countersunk screws 16 or the like, a suitable steel screen 17, said screen being disposed in position to receive thereon the product coming from the rolls 1 and 2, the ends of said screen being held in place on the main beam by the screws 16.

The screen 17 may be constructed in any desirable form, but in the embodiment illustrated, the same is provided with inclined, ribbed portions or teeth 18, spaced from each other and having openings 19 provided in said spaces between the teeth for permitting the passage therethrough of the product. As already explained, the screen is supported at its ends only, and has the major longitudinal portion thereof intermediate its ends disposed so as to permit the passage therethrough of the product to a suitable hopper or container.

To further increase the working surfaces I provide the segments 20, there being one of said segments disposed adjacent the lower portion of each roller. Each of the segments 20 is provided with a working surface similar to that shown in Figure 4 and similar to the working surface of the screen 17, said segments having the inclined ribbed portions or teeth 18 spaced from each other, and the spaces between said teeth being provided with the openings 19. The teeth or ribbed portions 18 on the screen 17 and its adjacent segment are inclined in opposite directions to cause a more thorough crushing and breaking up of the wheat berries. The working surface of the segment 20 forms substantially a continuation of the screen 17 thus providing a relatively wide surface disposed adjacent the break-roll and adapted for cooperation therewith in its action on the products falling thereon from the break rolls 1 and 2.

As shown in the drawings, the teeth or ribbed portions 18 are beveled at their upper edges to form the relatively sharp cutting edges 21, which are adapted to cooperate with the spiral corrugations of the break rolls to more effectively break up and crush the wheat berries. The rotation of the rolls in their proper direction will carry the product along the working surfaces of the screen and segments causing a breaking-up and crushing of the same, the openings 19 provided in said screen and segments permitting the passage therethrough of the middlings formed from said crushing operation. The bran hulls which are considerably tougher and for that reason will not be so readily broken up and crushed, will be carried along by the rotary movement of the rolls to a point adjacent the end of the segment where it will strike against the guides 22 and will be directed by said guides into a suitable hopper or container provided for receiving the same.

The said guides 22 may be adjustably held in place adjacent the free end of the segments by means of the screws 23 or in some other suitable manner.

Suitably shaped frames 24 are provided for securely holding in operative position the segments 20, said frames being pivotally secured adjacent their inner ends by means of the pivots 25, said pivots being secured to the main beam 10. Screws 26 are threaded into the free ends of the said frames 24 for securely locking said segments 20 in place on the frames thereby permitting the ready removal of said segments for repair or replacement.

In order to move the frames 24 with their respective segments about their pivots 25, the following means may be provided: The frames 24 have formed intermediate their ends, integral bosses or ears 27, to which is pivotally secured, as at 28, one end of an inclined rod 29, the other end of which is threaded and extends through a suitable opening provided therefor in the ends of a substantially T-shaped casting 30, the free ends of said rods 29 receiving thereon in threaded relation, the nuts 31. The rods 29 have provided thereon and surrounding the same, a suitable coil spring 32, the ends of said spring bearing against the upper surface of the T-shaped casting 30, and a suitable washer 33 respectively. It will thus be noted that not only is the frame yieldably supported with respect to its corresponding break roll, but also that the clearance between said segment and its corresponding break-roll may be readily varied by merely adjusting the nut 31 on the end of the rod 29.

In a similar manner, the ends of the main beam 10 are adjustably and yieldably supported on its supporting rods 11, which rods are threaded at the lower ends, on which ends are received in threaded relation the nuts 34. A coil spring 35 is provided for each rod 11, said spring surrounding the upper portion of the rod and has its ends bearing against the under-surface of the main beam 10 and the bracket 12 respectively. By adjusting the nuts 34 the clearance between the rolls 1 and 2 and the screen 17 may be varied to the desired amount. Also, it will be noted that this clearance may be further adjusted by reason of the vertically disposed elongated slot 15 provided in the brackets 12 secured to the housing 3.

A still further adjustment is provided by the longitudinally disposed rods 36, one end of said rods being secured to its corresponding rod 11 and the other ends being secured in a casting or union 37, said union having a central opening through which is adapted to extend the stem portion 38 of the T-shaped

casting 30, said stem being threaded on its lower end, and adapted to receive in threaded relation thereon the hand wheel 39. A suitable coil spring 40 is provided on said stem 38, said spring surrounding the stem and having the ends thereof bearing against the under-surface of the T-shaped casting 30 and the upper surface of the union 37 respectively. By manipulating the hand wheel 39, it will be noted that a pull or push will be exerted on the T-shaped casting 30 which will, through the medium of the connecting rods 29, act on the frames 24 to move the same toward or away from the rolls 1 and 2, said frames swinging about their respective pivots 25.

By providing the springs 32, 35 and 40, the main beam 10 as well as the frames 24 with their respective segments, are substantially yieldably supported with respect to the rolls 1 and 2, thereby permitting the device to give or yield in case of an overloading or the presence of any foreign substance between the rolls and segments, avoiding the danger of the device or any part thereof being broken or otherwise damaged because of such excess pressure or overloading.

It will thus be noted that I have provided an improved milling apparatus which may be readily attached in place to be used in cooperation with the usual break-rolls without modifying or in any way altering the construction of said break rolls. It will also be noted that my improved attachment will give a relatively large working surface over which the product must pass, and which working surface will cooperate with the break-rolls for effectively acting on said product. It will further be noted that I have provided several means of adjustment whereby each of the segments may be adjusted independently with respect to its corresponding break-roll, as well as permitting the adjustment of both of said segments as a single unit by the actuation of the hand wheel 39.

Means have also been provided for permitting the ready removal of the segments, as well as the break-rolls, for the purpose of repairing or replacing the same, said means comprising a minimum of parts and being adapted to actuate both of said segments as a single unit.

The device is also adapted for rye milling, which, being tougher than wheat, necessitates the preliminary preparing of the rye berries. It is to be understood that I do not limit myself to the specific form of screen shown and described, as any type of screen suitable for this purpose may be used with highly satisfactory results.

It is believed that my invention, its mode of construction and operation and many of its advantages, should be readily understood and appreciated from the foregoing without further description, and should also be manifest that while the preferred embodiment of the invention has been shown and described for illustrative purposes, the structural details are, nevertheless, capable of wide variation within the purview of my invention as defined in the appended claims.

Having described my invention, what I claim and desire to secure by Letters Patent of the United States is:—

1. In a device of the character described, the combination of a pair of break-rolls, a substantially inverted V-shaped screen disposed between said break-rolls and immediately below their point of contact, said screen being adapted to cooperate with said break-rolls for increasing the working surface of said device, and means pivotally supported adjacent each end of said screen adapted for further increasing the working surface of said device, said last mentioned means comprising a segment having a plurality of inclined, spaced, ribbed portions and openings provided between said ribbed portions, and adjustable means for supporting said segments in operative position with respect to said break-rolls.

2. In a device of the character described, the combination of a pair of break-rolls, a substantially inverted V-shaped screen disposed between said break-rolls and immediately below their point of contact, said screen being adapted to cooperate with said break-rolls for increasing the working surface of said device, and means pivotally supported adjacent each end of said screen adapted for further increasing the working surface of said device, said last mentioned means comprising a segment having a plurality of inclined, spaced, ribbed portions and openings provided between said ribbed portions and adjustable and yieldable means for supporting said screen as well as said segments in operative position with respect to said break-rolls.

In witness whereof, I affix my signature.

PAUL TURUCZ.