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EAR-HANDLING MEANS FOR CORNHUSKING MECHANISMS

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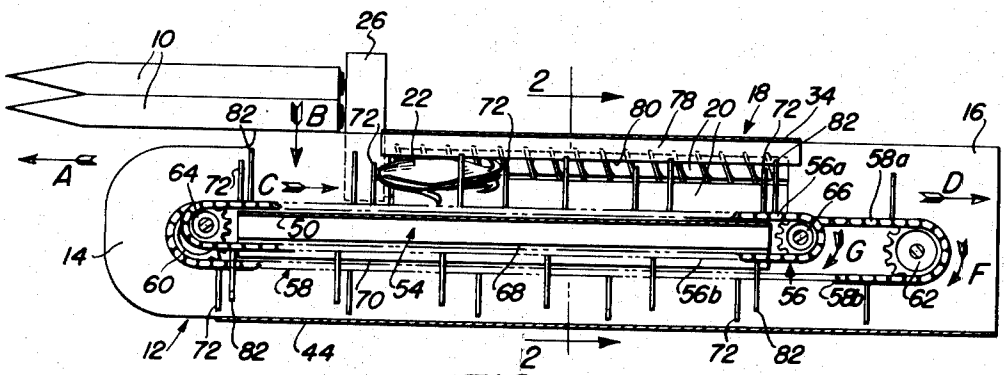


FIG. 1

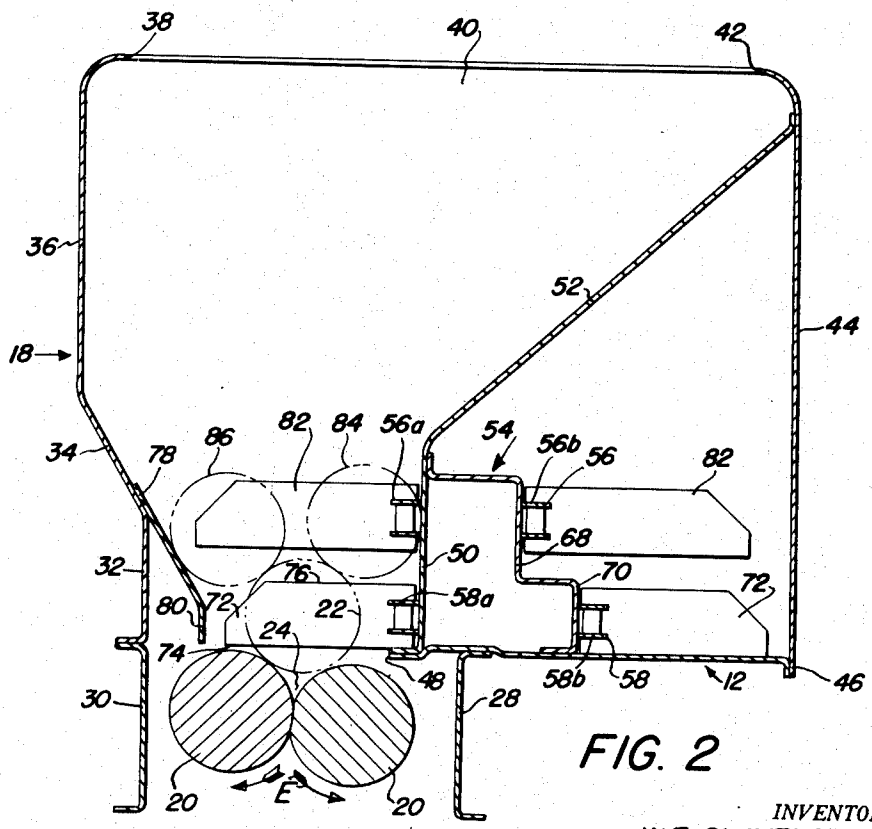


FIG. 2

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EAR-HANDLING MEANS FOR CORNHUSKING MECHANISMS

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This invention relates to a corn-husking mechanism and more particularly to improved means for handling ears of corn while they are traveling over the husking mechanism, whereby to increase the over-all operating efficiency of the husking mechanism.

The usual corn picker includes some form of mobile frame adapted to advance over a field of standing corn to snap ears therefrom by means of a pair of snapping rolls or the like. These snapped ears are transferred from the snapping rolls to a first elevator in the form of an endless conveyor which in turn transfers the ears to the husking rolls, normally located just rearwardly of the snapping rolls. The husking rolls operate in pairs and the rolls of each pair are arranged so that their upper surfaces move together, thus seizing the corn husks and stripping them from the ears as the ears continue to advance under the impetus of the first elevator. In many cases, additional means are provided to facilitate the advance of the ears over the husking rolls.

When operating a conventional husking mechanism in heavy trash conditions there is a tendency for the ears of corn, together with trash, to collect at the receiving end of the husking mechanism, causing at times ears to be conveyed over the husking mechanism, without coming into contact with the husking rolls, and at other times to build up at the receiving end so as to require the operator to stop the machine and remove the accumulation of material at this point. Various forms of auxiliary conveying means have been provided in the form of rotating star wheels, ear depressors, and the like, but the best these will do is cause the continuous movement of material over the rolls and will not effectively prevent ears from riding on top of trash or other ears, out of contact with the rolls. The principal object of this invention is to provide means for preventing building up of material at the receiving end of the husking mechanism and at the same time prevent the possibility of ears riding upon other ears or trash through the husking unit without coming into contact with the husking mechanism thereof.

According to the present invention, a husking mechanism or unit including conventionally arranged rolls is provided with improved means for securing the maximum efficiency of the unit. In its basic form, the invention includes means movable over and lengthwise of the husking rolls to move a series of longitudinally alined ears along the rolls at theoretically the optimum linear speed consistent with efficient husking. Another

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phase of the invention involves the provision of additional means for handling a layer or layers of ears above and in addition to the layer of ears being husked, so that ears from the additional layers are properly admitted to husking positions when ears in the first layer are husked. It is an important object of the invention to provide means of the character outlined in the form of a pair of ear-handling means, each of which has pocket-forming elements providing a plurality or series of pockets in which at least one layer of ears can be carried, each pocket-forming means in the lower handling means being sufficiently wide, long and deep to carry at least one ear lengthwise thereof, so that the ears lie lengthwise in a single row along the "bite" of the husking rolls, the pocket-forming means in the upper handling means overhanging the lower pockets and being sufficiently long, wide and deep preferably to carry a double row of ears in a second layer above the lower single row. In its simplest form, the invention has for an important object the provision of a pair of endless conveyors driven at different linear speeds, one above the other and being preferably adapted to handle different quantities of ears of corn.

The foregoing and other important objects and desirable features inherent in and encompassed by the invention will become apparent as a preferred embodiment of the invention is, by way of example, described in the following detailed description and illustrated in the accompanying sheet of drawings, in which

Figure 1 is a plan view, partly in section and to some extent schematic, showing the snapping and husking units of a conventional corn picker modified by the addition thereto of ear-handling means constructed according to the principles of the invention; and

Figure 2 is an enlarged transverse sectional view taken substantially on the line 2—2 of Figure 1.

Figure 1 represents one form of what is known as a row unit; that is, it includes a complete assembly containing mechanism for picking, husking and delivering corn. One or more of these units may be mounted on a mobile frame—either self-propelled or drawn behind a tractor—and associated with the necessary supporting structure, none of which is shown, since familiarity with conventional construction will be assumed on the basis of reference herein to U. S. Patent 2,496,514.

When mounted on a mobile frame, the assembly shown in Figure 1 extends longitudinally, or

in the direction of travel. The direction of travel is indicated by the arrow A. The unit includes snapping means comprising a pair of cooperative rotatable snapping rolls 10 operative to snap ears of corn from standing stalks as the picker advances. The snapped ears ultimately move toward the rear ends of the snapping rolls and move laterally in the direction of the arrow B to be received by appropriate mechanism for movement again longitudinally, or in the direction of the arrow C, for ultimate discharge at the rear end of the picker as designated by the arrow D. The mechanism onto which the ears are delivered at B from the snapping rolls 10 may include appropriate supporting structure having what may be termed a longitudinally extending shelf or table 12 having a forward portion 14 and a rearward portion 16. The shelf is interrupted intermediate its front and rear ends by a husking box 18 which contains a pair of cooperative husking rolls 20 rotatable in the direction of the arrows E (Figure 2) and arranged lengthwise with respect to the shelf 12 and further disposed so that their upper surfaces are generally in or somewhat below the plane of the upper surface of the shelf. In other words, the disposition of the rolls 20 is such that ears changing direction at B—C can be moved longitudinally onto the rolls so as to be received by the "bite" of the rolls, such ears lying lengthwise along the rolls in a single row, as illustrated by the diagrammatic representation of an ear at 22 in Figure 2, the bite being designated generally at 24. One ear of corn is likewise designated at 22 in Figure 1.

Part of the supporting structure with which the table 12 is associated may include driving means contained within a gear housing 26 from which the snapping rolls 10 project forwardly and from which the husking rolls 20 project rearwardly. However, the details of the particular drive are relatively unimportant and may be varied to suit individual desires. The arrangement shown is merely representative and forms no detailed part of the present invention.

The husking box 18 includes a pair of laterally spaced outer and inner side walls 28 and 30 disposed in upright planes and depending below the plane of the table 12. The inner side wall 30 includes an upper wall extension 32, which is vertical for a short distance and is then offset or inclined inwardly at 34 and then continued vertically upwardly at 36. The wall extension 36 has a longitudinal inner marginal edge 38 defining one side of an open top 40, the other marginal edge of which is defined at 42 by the upper portion of a vertical side sheet 44, the lower portion of which may be secured, as at 46, to the outer edge of the shelf 12.

The inner marginal edge of the shelf 12, as shown at 48 in Figure 2, slightly overlaps the proximate roll 20. A guide in the form of a vertical wall 50 has its lower edge flanged and mounted at 48. This wall or guide extends upwardly and then inclines outwardly at 52 to ultimately join the upper portion of the outer sheet 44. Secondary wall structure, designated generally by the numeral 54, is associated with the wall 50 to complete the guide means for a pair of ear-handling means preferably in the form of upper and lower endless conveyors 56 and 58. The lower conveyor is in the form of an endless chain or belt trained or looped at its front and rear ends respectively about front and rear sprockets or wheels 60 and 62 carried respectively at the front and rear end portions of the shelf 12

on upright shafts for rotation in a plane parallel to the plane of the shelf. The direction of movement of the conveyor 58 is designated by the arrow F in Figure 1.

The upper conveyor 56 is movable above the lower conveyor 58 and likewise comprises an endless chain or belt carried respectively at its front and rear ends on sprockets or wheels 64 and 66 which are appropriately mounted for rotation in a plane parallel to the plane in which the sprockets 60 and 62 rotate. The direction of movement of the conveyor 56 is indicated by the arrow G in Figure 1.

The sprockets 60 and 62 for the lower conveyor 58 are somewhat larger than the sprockets 64 and 66 for the upper conveyor. Likewise, the distance between the axes of the sprockets 60 and 62 is considerably greater than the distance between the axes of the sprockets 64 and 66. The lateral or transverse offset between the axes of the sprockets is such that the inner runs 56*a* and 58*a* of the conveyors are in vertical alinement, whereas the outer runs 56*b* and 58*b* are laterally offset. The secondary wall or guide structure 54 is accordingly stepped at 68 and 70 to correspond to the offset between the outer runs 56*b* and 58*b* of the conveyors. Thus, the conveyors are appropriately guided at both runs thereof by the guide structure 50—54.

The inner runs of the conveyors, in addition to being in vertical alinement, operate along the inner marginal edge 48 of the shelf 12 and therefore are just above or in overhanging relationship with the outer husking roll 20. These two conveyors cooperate as ear-advancing means and ear-leveling means in a manner to be presently described.

The lower conveyor 58 has thereon a plurality of ear-engaging portions in the form of flights 72 so arranged that the flights on the inner run 58*a* project inwardly over the husking rolls 20 as shown in Figure 2. Each flight has a lower edge 74 and an upper edge 76, giving the flight a height or vertical dimension somewhat less than one ear diameter above the bite 24 of the rolls 20. The length or lateral extent of the flights 72 is such that the free edge of each flight terminates just above the inner husking roll 20. The ear confining characteristics of the husk box 18 are accentuated by the provision of a longitudinal baffle 78 which is secured to the inner inclined wall extension 34 and projects downwardly and outwardly to a lower vertical marginal edge portion 80 just above the inner husking roll 20 and clearing the inner edges of the flights 72. Thus the distance between the inner run 58*a* of the lower conveyor 58 and the marginal edge 80 on the baffle is such that the ears of corn, of which the ear 22 is representative, must lie lengthwise in the bite 24 of the rolls 20 in a single row.

The flights 72 are spaced apart lengthwise of the conveyor 58 on the order of substantially one ear length between neighboring flights, as best illustrated in Figure 1. Thus, as the ears enter at B and change direction at C, they are individually received by the pockets or compartments formed by neighboring flights 72 and are straightened lengthwise as they enter the bite of the husking rolls 20. The depth of the pockets formed by the flights 72 is, as stated before, less than one ear diameter measured from the bite 24 of the rolls. Hence, the ears cannot pile up and be positively engaged by the flights 72 beyond a single layer; although, it is expected that additional ears of corn will pile up on the row of ears

at 22 and would be conveyed along with the ears 22 by frictional engagement between the ears, as is the case in prior constructions in which the handling means includes only a conveyor similar to the lower conveyor 58, apart from the dimensional characteristics heretofore described.

The upper conveyor 56 is likewise provided with a plurality of longitudinally spaced-apart flights 82, which are somewhat longer than the flights 72 of the lower conveyor 58. Because of the inclination of the baffle 78, the longer upper flights are accommodated, and, as will be seen from Figure 2, the transverse distance between the inner run 56a of the upper conveyor 56 and the baffle 78 is somewhat greater than two ear diameters. The flights 82 are spaced apart lengthwise of the conveyor 56 on the order of substantially one ear length between neighboring flights. Hence, the upper conveyor likewise provides a plurality of pockets for receiving ears. In this case, the dimensioning and relationship of these pockets to those provided by the lower flights 72 are such that a second quantity or layer of ears, designated at 84 and 86 in Figure 2, will be supported by the single lower row or layer at 22. The rows at 84 and 86 comprise two lengthwise rows of ears. As shown in Figure 2, the upper ears are tangent to the lower ears at a point above the upper edge 76 of the lower flights 72. Hence, the ears in the upper rows are not positively engaged by the lower flights 72. The vertical dimension of the upper flights is such that these flights do not positively engage ears in the lower row.

The ear-handling efficiency of the husking mechanism is further accentuated by the different linear speeds of the conveyors. For example, the lower conveyor may travel at approximately 175 feet per minute, while the upper conveyor travels at approximately 100 feet per minute. As the lower row of ears is being moved by the lower conveyor 58 over the husking rolls 20, the husks are being removed therefrom, and these husked ears are relatively rapidly delivered over the rear end 16 of the table 12 in the direction of the arrow D, this portion of the table comprising a discharge portion from which ears are discharged or transferred to any suitable receptacle, not shown, such as a wagon elevator as used in conventional corn pickers. Since the lower conveyor extends rearwardly beyond the upper conveyor, the husked ears from the lower row 22 are cleared out of the way. Further, since the upper conveyor travels at a slower linear speed, the upper rows of ears are not advanced as rapidly as the lower row. Hence, as ears in the lower row are husked and advance more rapidly, ears from the upper rows 84 and 86 may drop into place to have the husks removed therefrom by the rolls 20.

The pockets formed by the upper flights 82 of course open downwardly to the pockets formed by the lower flights 72, so that as ears are received from the snapping rolls at B, a considerable quantity of ears may be handled for ultimate leveling into the two layers described. Therefore, each layer of ears is separately handled by the conveyors 56 and 58. The primary function of the lower conveyor is to advance the ears, while that of the upper conveyor is to level or agitate the ears so that as lower ears are husked and moved more rapidly on their way, ears from the upper rows may move into place to be husked.

The guide structure comprising the parts 50 and 54, in addition to defining part of the zone

above the husking rolls 20, appropriately guides the two conveyors and insures continuous and efficient operation.

Other important features not specifically enumerated herein will undoubtedly occur to those versed in the art, as likewise will numerous modifications and alterations in the preferred embodiment of the invention illustrated, all of which may be achieved without departing from the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. Corn-husking mechanism, comprising: a pair of cooperative husking rolls arranged to receive ears of corn lengthwise in the bite thereof; means movable over and through a path substantially coextensive with the length of the rolls to advance ears therealong, said means including pocket-forming elements providing a plurality of upwardly opening pockets also opening downwardly to the bite of the rolls, each pocket being sufficiently long to receive at least one ear lengthwise therein and sufficiently deep to receive at least one ear resting in the bite of the rolls so that said advancing means is capacitated to contain a quantity of ears distributed in at least one layer of ears including a plurality of ears lying in a row lengthwise along the bite of the rolls; leveling means for handling a second quantity of ears superimposed on the first row, said leveling means including pocket-forming elements providing a plurality of pockets opening upwardly and also opening downwardly to the pockets in the ear-advancing means, certain of said pockets in the leveling means being sufficiently long to contain at least one ear lengthwise therein, sufficiently deep to contain at least one ear resting on certain of the ears in the first quantity and sufficiently wide to contain at least two ears side by side, whereby such second quantity of ears includes at least a pair of side-by-side rows of ears alined lengthwise of and resting on the ears in the first quantity, and means for confining the second quantity of ears against lateral escape from the pockets of said leveling means; and means for moving the ear-advancing means lengthwise of and relative to both the rolls and said leveling means.

2. Corn-husking mechanism, comprising: a pair of cooperative husking rolls arranged to receive ears of corn lengthwise in the bite thereof; means movable over and through a path substantially coextensive with the length of the rolls to advance ears therealong, said means including pocket-forming elements providing a plurality of upwardly opening pockets also opening downwardly to the bite of the rolls, each pocket being of such width, depth and length as to contain at least one ear lengthwise thereof and supported in the bite of the rolls, said pockets being alined lengthwise of the rolls so that at least certain of the ears contained thereby lie in a single row along the bite of the rolls; leveling means for handling a second quantity of ears superimposed directly on the first row, said leveling means including pocket-forming elements providing a plurality of pockets arranged lengthwise over the advancing means opening upwardly and also opening downwardly to the pockets in the ear-advancing means, certain of said pockets in the leveling means being of such width, length and depth to contain at least one ear lengthwise thereof and resting directly on the first row of ears, and means for confining the second quantity of ears against lateral escape from the

pockets of said leveling means; and means for moving the ear-advancing means lengthwise of and relative to both the rolls and the leveling means.

3. Corn-husking mechanism, comprising: a pair of cooperative husking rolls arranged to receive ears of corn lengthwise in the bite thereof; means movable over and through a path substantially coextensive with the length of the rolls to advance ears therealong, said means including pocket-forming elements providing a plurality of upwardly opening pockets also opening downwardly to the bite of the rolls, each pocket being of such width, depth and length as to contain at least one ear lengthwise thereof and supported in the bite of the rolls, said pockets being alined lengthwise of the rolls so that at least certain of the ears contained thereby lie in a single row along the bite of the rolls; leveling means for handling a second quantity of ears superimposed directly on the first row, said leveling means including pocket-forming elements providing a plurality of pockets opening upwardly and also opening downwardly to the pockets in the ear-advancing means, certain of said pockets in the leveling means being of such width, length and depth to contain at least one ear lengthwise thereof and resting directly on the first row of ears, and means for confining the second quantity of ears against lateral escape from the pockets of said leveling means; means for moving the ear-advancing means over the husking rolls at one linear speed; and means for moving the leveling means over the ear-advancing means at a different linear speed.

4. The invention defined in claim 3, further characterized in that: provision is made for moving the leveling means at a linear speed below that of the ear-advancing means.

5. Corn-husking mechanism, comprising: a pair of cooperative husking rolls arranged to receive ears of corn lengthwise in the bite thereof; an upright guide running lengthwise of and alongside one of the rolls; ear-advancing means for moving ears along the rolls, including an endless conveyor having opposite runs separated by said guide so that one run is an inner run traveling above the rolls and the other run is an outer run remote from the rolls, said conveyor having a plurality of flights projecting therefrom to extend over both rolls when carried by said inner run; means including a wall alongside the other of the rolls and spaced from said inner run a distance less than the added diameters of the rolls so that ears carried between the flights of said inner run are confined generally in a layer between said wall means and the guide; ear-handling means, including a second endless conveyor having an inner run traveling along the guide and an outer run remote from the guide, and having outwardly projecting flights overhanging and longer than the flights of the first conveyor; and second wall means offset outwardly beyond the first wall means to accommodate said longer flights and to provide a greater lateral space between said second wall means and the inner run of the second conveyor for confining a greater number of ears than in said first layer.

6. Corn-husking mechanism, comprising: elongated supporting structure having a receiving end and a discharge end spaced apart lengthwise thereof; a pair of elongated parallel, cooperative husking rolls extending lengthwise of the supporting structure and rotatable on parallel axes and disposed so that the upper surfaces of the rolls provide a bite for receiving ears of corn at the receiving end of the supporting structure; ear-advancing means including a conveyor having wheels at a level above and spaced lengthwise of the rolls respectively adjacent the receiving and discharge ends of the supporting structure and rotatable on substantially upright axes, an endless member trained about the wheels so that one run of said member travels proximate to the rolls, and ear-engaging flights on the member and projecting from said run crosswise of the rolls for engaging received ears and for moving such ears along the bite of rolls from said receiving end to said discharge end, said flights being spaced apart lengthwise of the member a distance such that an ear will lie lengthwise between neighboring flights and each of said flights having an upper edge disposed at a height above the bite of the rolls less than the diameter of an ear so that a single layer of ears will be moved by the conveyor over the rolls; first ear-confining means for preventing lateral escape of the ears from the rolls; leveling means carried by the supporting structure above the conveyor and extending between said receiving and discharge ends and movable lengthwise of and relative to the conveyor for receiving ears additional to those in said single layer, said leveling means including ear-engaging means therein closely spaced above the conveyor flights for engaging and moving said additional ears to the exclusion of ears in said single layer, said ear-engaging means opening downwardly so that the additional ears rest on the ears in said single layer; second ear-confining means for preventing lateral escape of the additional ears from the leveling means; and means for driving the conveyor and the leveling means so that the ears in said single layer are moved lengthwise of the rolls at a linear speed different from that of the additional ears.

7. The invention defined in claim 6, further including: the first ear-confining means is carried by the supporting structure generally parallel to said one run of the conveyor and spaced laterally therefrom at such distance as to confine said single layer of ears to a single line of ears lying in the bite of the rolls.

8. The invention defined in claim 1, further including: the second ear-confining means is positioned above and offset laterally from the first ear-confining means for cooperation with the ear-engaging means of the leveling means to maintain said additional ears generally in a second and higher layer substantially equal in width to two ear diameters.

9. The invention defined in claim 8, further characterized in that: the ear-engaging means of the leveling means provides a longitudinal series of ear-receiving pockets, each equal in length to substantially one ear length.

10. The invention defined in claim 6, further characterized in that: the leveling means comprises a second conveyor having wheels above and spaced lengthwise of the first conveyor and an endless member trained about said wheels with one run thereof arranged to travel closely above the level of the upper edges of the flights of the first conveyor.

11. The invention defined in claim 10, further characterized in that: the ear-engaging means of the leveling means comprise a plurality of ear-engaging flights spaced apart lengthwise of the second conveyor on the order of substantially one ear length between neighboring flights.

12. The invention defined in claim 11, further characterized in that: the wheels of said second conveyor are rotatable on upright axes, the endless member thereof is arranged so that the one run thereof travels just above said one run of the first conveyor, and the flights on said second conveyor extend above the flights of the first conveyor and have lower edge portions disposed above the bite of the rolls a distance greater than one ear diameter but less than two ear diameters.

13. Corn-husking mechanism, comprising: an elongated husking box for receiving a quantity of ears of corn; elongated husking members arranged in side-by-side relationship at the bottom of the box to form an elongated bite to which the lowermost ears gravitate and in which such lowermost ears become alined in end-to-end relationship, with additional ears in the box sustained by said alined ears; a first conveyor substantially coextensive in length with the husking members movable through the box lengthwise of said members and at a certain linear speed, said conveyor having means thereon engaging the aligned ears to the exclusion of additional ears in the box for advancing the aligned ears lengthwise of the bite and thereby providing space in the bite for the gravitation of additional ears in the box; and a second conveyor substantially co-

extensive in length with the husking members and movable through the box lengthwise of said members and having means thereon engaging ears in the box other than the alined ears, and said second conveyor being movable at such linear speed relative to that of the first conveyor as to retard the lengthwise movement of such additional ears so that certain of such additional ears gravitate into the space provided by the advance of the initially alined ears.

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