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R. COVER

2,535,485

CORN HUSKING MACHINE

Filed Feb. 1, 1945

4 Sheets-Sheet 1

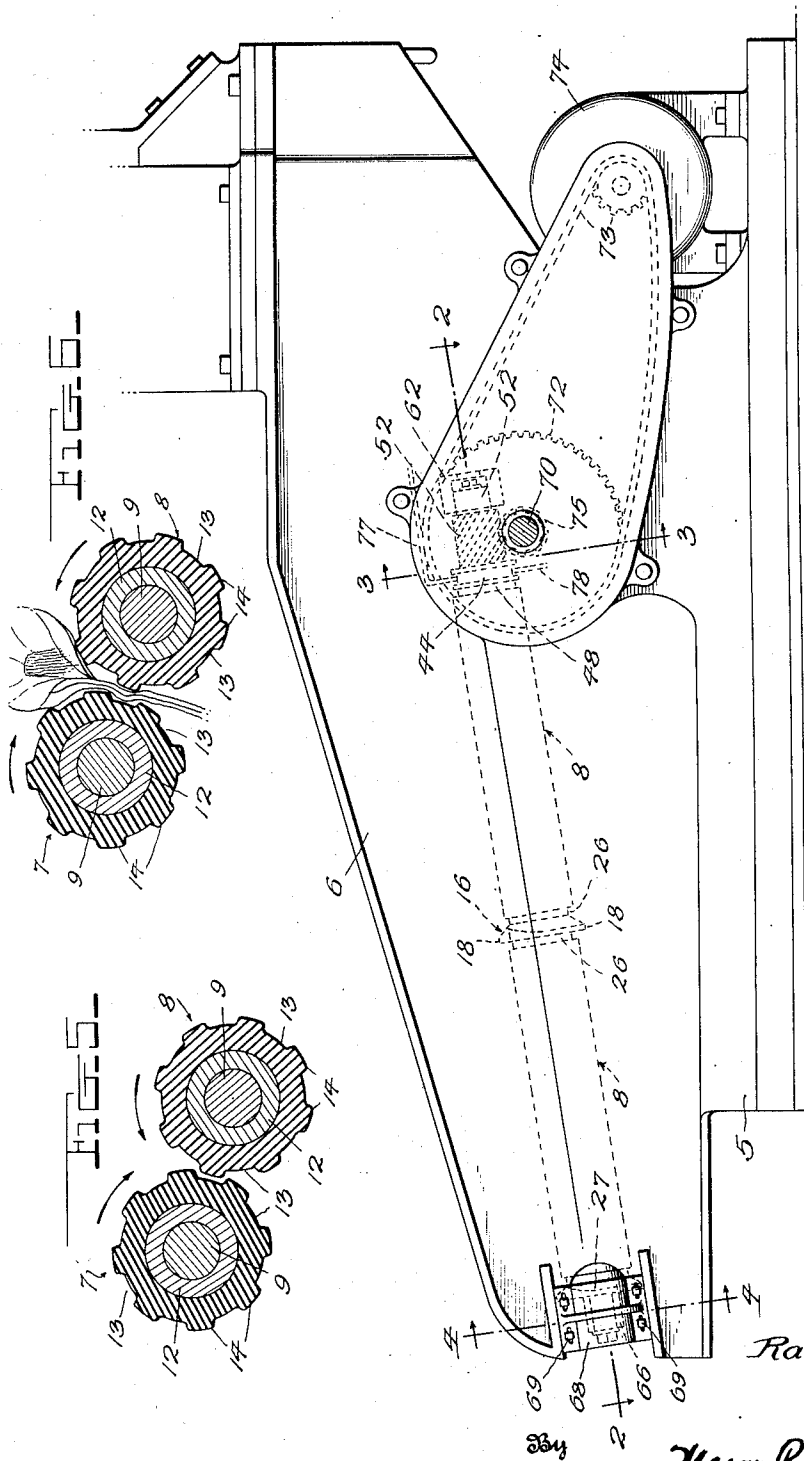


FIG. 1

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Dec. 26, 1950

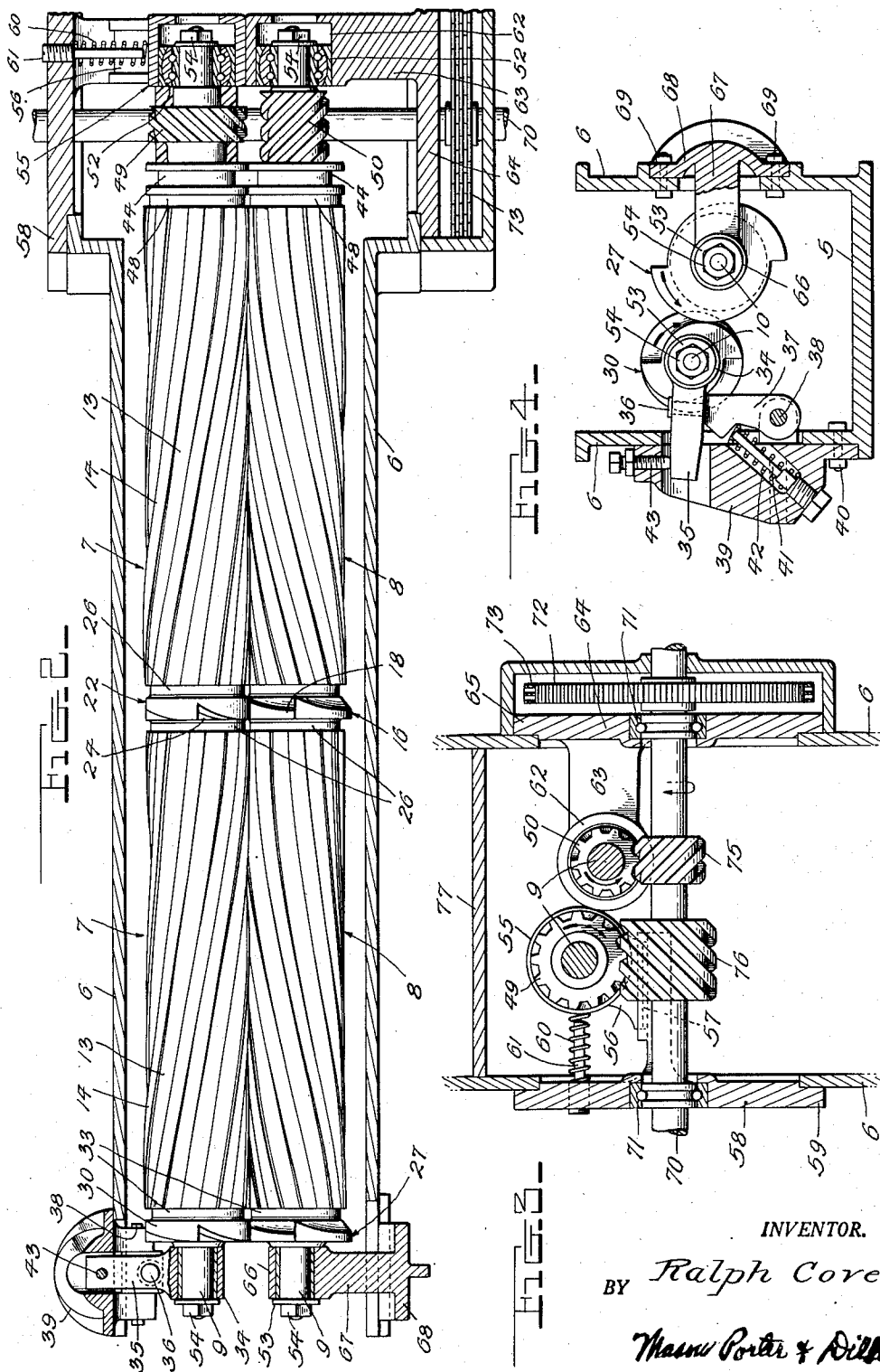
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4 Sheets-Sheet 2



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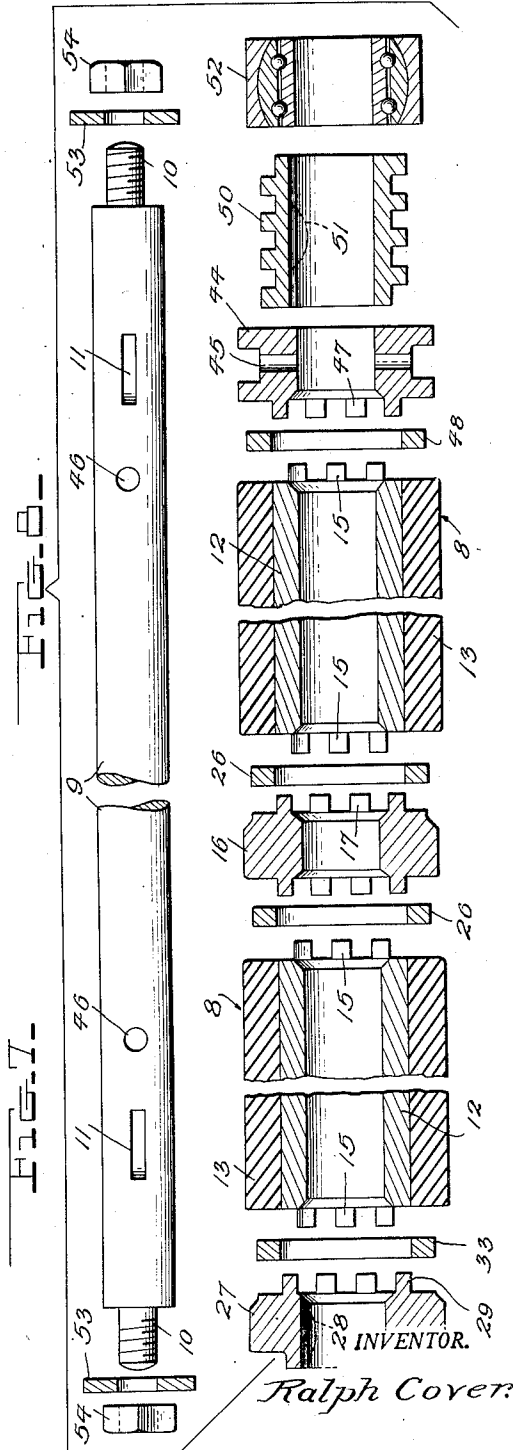
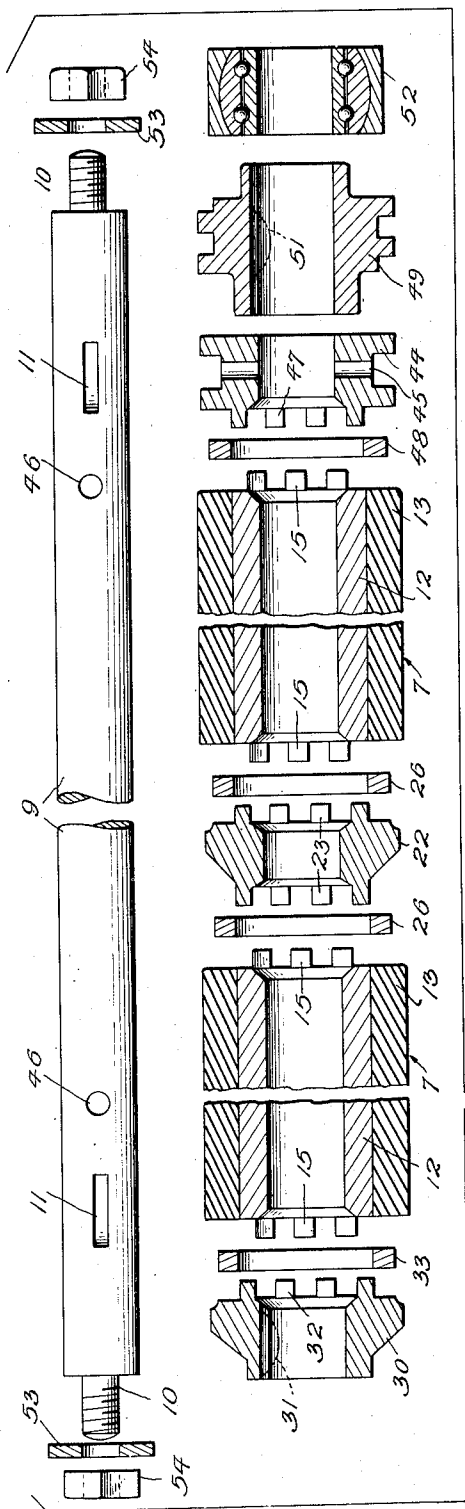
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4 Sheets-Sheet 3



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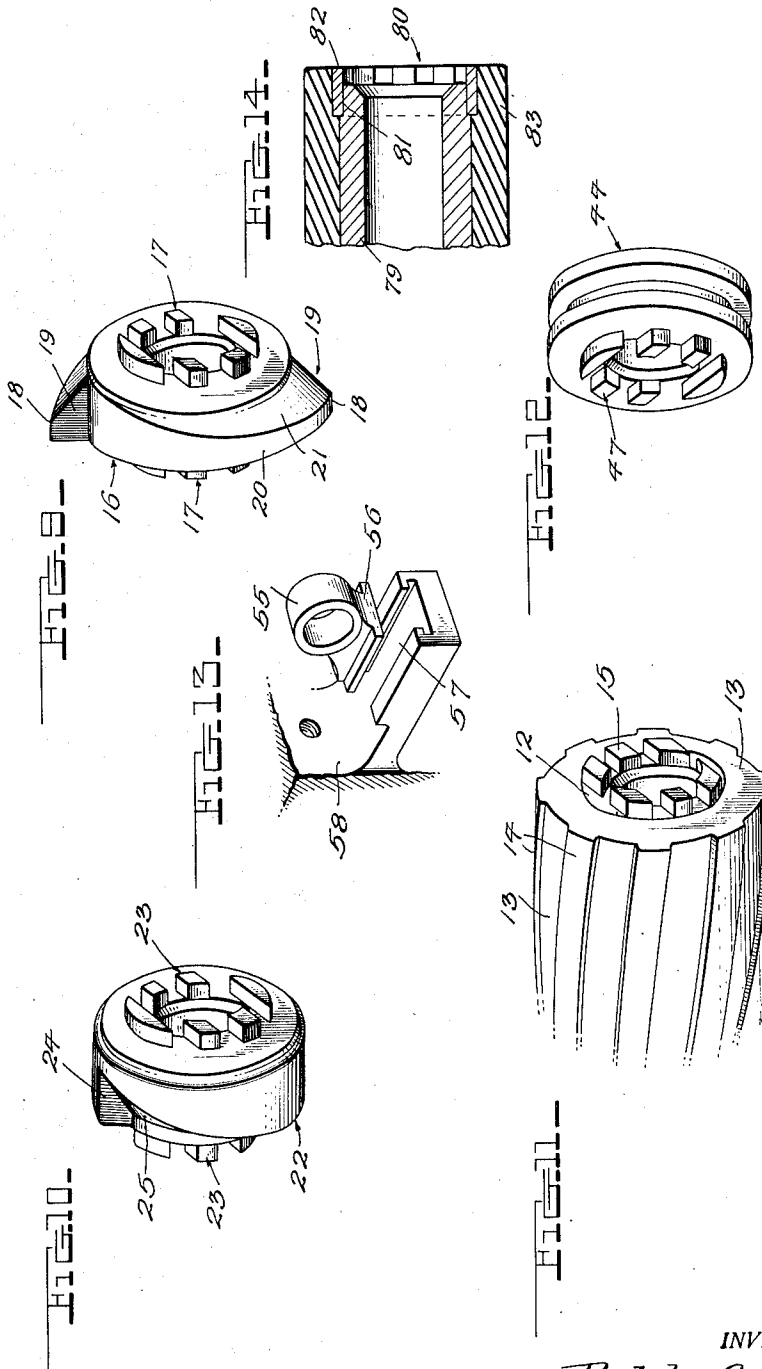
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R. COVER
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4 Sheets-Sheet 4



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CORN HUSKING MACHINE

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Application February 1, 1945, Serial No. 575,654

6 Claims. (Cl. 130—5)

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The invention relates to certain new and useful improvements in corn husking machines; especially those of the type shown in U. S. Letters Patent 2,358,961 issued to Ralph Cover and George Osburn on September 26, 1944.

In machines of the character stated there are provided means for feeding the corn ears in the direction of their length butt end rearmost, means for slitting the husks longitudinally, means for debutting the ears, and means for removing the longitudinally slit husks from the debudded ears. The present invention primarily seeks to provide certain new and useful improvements in the construction and the manner of cooperatively arranging and driving the husking rolls designed to increase the operating efficiency of the rolls, and to provide for individual driving of the rolls, adjustment of the cooperative relation of said rolls, and also for interchangeability of individual roll parts.

An object of the invention is to provide in apparatus of the character stated a pair of husking rolls and driving means therefor including an individual gear couple for driving each roll.

Another object of the invention is to provide a pair of rolls of the character stated mounted on a downward incline and each having a spiral gear adjacent its upper end, and a single driver shaft disposed transversely with relation to said rolls and having a spiral gear thereon meshing with each roll gear with the portion of each shaft gear which meshes with the respective roll gear moving toward the upper end of the respective roll in a manner for constantly tending to lift said roll in the direction of its length.

Another object of the invention is to provide a pair of rolls of the character stated which include yieldable surface portions, the surface portions on one roll being more yieldable than the opposing portions on the other roll so that the opposing surface portions on the cooperating rolls will yield differentially during the drawing of husks there-through and perform the husking function in a highly efficient manner.

Another object of the invention is to provide husking rolls of the character stated in which there are included smooth shaft cores, husking sleeves secured to metal core sleeves freely slidable over the shafts, and means for connecting the core sleeves in driving relation with the shafts without use of keys or comparable non-circular connecting devices likely to render removal of the sleeves difficult because of rust, corrosion or the like.

Another object of the invention is to provide

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husking rolls of the character stated each including two or more interchangeable husking sleeve and metal core sleeve units each having drive clutch equipments at the respective ends thereof through which driving connection with the core shaft on which the unit is mounted can be effected.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims, and the several views illustrated in the accompanying drawing.

In the drawings:

Figure 1 is a side elevation illustrating the invention.

Figure 2 is a horizontal section taken on the line 2—2 on Figure 1, the husking rolls being shown in elevation.

Figure 3 is a vertical cross section taken on the line 3—3 on Figure 1.

Figure 4 is a vertical cross section taken on the line 4—4 on Figure 1.

Figure 5 is an enlarged vertical cross section taken through the husking rolls.

Figure 6 is a view similar to Figure 5 and illustrating corn husks being drawn through the husking rolls.

Figure 7 is a view illustrating the parts comprising one husking roll assembly in separated relation, certain parts being illustrated in longitudinal section.

Figure 8 is a view similar to Figure 7 illustrating the parts of the other or cooperating husking roll.

Figure 9 is a detail perspective view of the tilter element which is disposed intermediately of the ends of one of the husking rolls.

Figure 10 is a detail perspective view illustrating a companion element which cooperates with the element shown in Figure 9.

Figure 11 is a detail perspective view illustrating one end of one of the roll units or sections.

Figure 12 is a detail perspective view illustrating one of the grooved collars.

Figure 13 is a fragmentary perspective view illustrating the upper slidable bearing for the laterally moving husking roll.

Figure 14 is a fragmentary sectional view illustrating a slightly modified end structure on a roll unit.

In the example of embodiment of the invention herein disclosed, only that portion of the husking machine in which the husking rolls are

mounted is illustrated and said portion includes a frame structure including a base portion 5 and side wall portions 6 extending upwardly from the base portion in parallel spaced relation in the manner illustrated in Figures 1, 3 and 4 of the drawings.

It will be apparent by reference to Figures 1 and 2 of the drawings that two husking rolls generally designated 7 and 8 are arranged side by side in cooperative relation and downwardly inclined as indicated in dotted lines in Figure 1. Each roll includes a core shaft 9 having reduced and threaded end extensions 10 and two keyways 11 which are spaced identical distances from the threaded end extremities as illustrated in Figures 7 and 8. A plurality of identical roll units is mounted on each shaft, and in this illustration two such units are illustrated as incorporated in each husking roll. The identical roll units have yieldable external surfaces and each comprises a core sleeve 12 and a cover sleeve 13 preferably formed of rubber or synthetic rubber but which may comprise any suitable yieldable material. It is to be understood that each yieldable sleeve is securely attached to the respective core sleeve 12, as by vulcanizing, and the external surface of each yieldable sleeve 13 is equipped with helical ribs 14. The ribs of the cooperating rolls are of opposite hand as illustrated in Figure 2 and are arranged to interfit without contacting in the manner clearly illustrated in Figure 5. It will also be apparent by reference to Figure 2 that when the rolls are rotated in the direction illustrated by the arrows on Figure 5 in a manner which will be described hereinafter, the cooperating roll surfaces will not only cooperate to grip husks between them in the manner illustrated in Figure 6 for thus removing husks from the corn ears dropped onto the rolls, but will also tend to feed the ears along the rolls toward the lower end thereof, or to the left as viewed in Figures 1 and 2.

Each end of the core sleeve 12 of each roll unit is provided with a clutch face 15 in the manner clearly illustrated in Figures 7, 8 and 11 of the drawings. These clutch faces preferably are formed by making straight through cuts transversely across the end extremities of the core sleeves so as to leave extended driving lugs with parallel grooves therebetween.

Between the opposed ends of the roll units comprising the husking roll generally designated 8 is mounted a tilter element generally designated 16 and illustrated in detail in Figure 9. This tilter element is provided with a clutch face 17 at each side or end thereof, and which is formed in the manner above described for providing driving lugs with parallel grooves therebetween disposed to interfit with or receive the driving lugs of the previously described core sleeve clutch face 15. When parts are assembled in the manner illustrated in Figure 2 with the tilter element 16 between the adjacent ends of the roll units and with the clutch faces 15 and 17 interfitting in driving relation, the roll units and said tilter element will be assembled as a rigid unit on the respective core shaft 9. It will be apparent by reference to Figures 2, 7, 8, 9 and 11 that said elements are not secured on the respective core shaft 9 by use of any keys or non-circular shaft portions which might become rusted or corroded in a manner rendering removal of the roll units or tilter elements difficult.

It will be apparent by reference to Figure 9 that the tilter element 16 is constructed to in-

clude two diametrically oppositely projecting tilter fingers 18 defined by abrupt shoulder portions 19 and intervening eccentric peripheral portions 20, the latter having bevelled side faces 21.

On the husking roll which cooperates with the roll having the tilter element 16, and intermediately of the ends thereof, there is mounted a companion element 22 having clutch faces 23 at the opposite sides or ends thereof as illustrated in Figures 8 and 10 of the drawings. This companion element is provided with two diametrically oppositely disposed peripheral clearances 24 disposed to receive the tilter fingers 18 projecting from the companion element 16 as the rolls rotate in cooperative relation as illustrated by the arrows in Figures 4 and 5 of the drawings. The companion element 22 also has beveled side wall portions 25 corresponding to or opposing the bevelled surfaces 21 of the tilter element 16 so that the companion elements 22 and 16 will rotate in cooperative relation in position for having the tilter fingers 18 engage and agitate or tilt corn ears moving longitudinally over the husking rolls, thereby to provide a corn ear tumbling action which will additionally assure that the husks will be engaged between the rolls and pulled from the ears thereby in the manner illustrated in Figure 6.

It will be apparent by reference to Figures 2, 7 and 8 of the drawings that ring members 26 are mounted over the interfitting clutch surfaces 15 and 17 so as to cover the cracks between the driving lugs of the clutch faces and provide a smooth exterior as illustrated in Figure 2.

At the lower end of the apparatus one of the rolls is provided with a second tilter member generally designated 27. It will be apparent by reference to Figure 8 that the tilter element is secured on the respective core shaft 9 by a key 28 fitted in a keyway in the tilter element and in the respective keyway 11 of the core shaft, and said tilter element is the same in general construction as the tilter element previously described and illustrated in Figure 9 except for the fact that it has a clutch face 29 only at that face thereof which opposes the lower end of the respective roll unit. The tilter element 27 cooperates with a companion element 30 which is keyed as at 31 on the other core shaft 9 and said companion element is constructed in the same general manner as the previously described element 22 illustrated in Figure 10 except for the fact that it has a clutch face 32 only at the face thereof which opposes the lower end of the respective roll unit. A ring 33 encircles the interfitting clutch faces 29, 15 and 32, 15 of the elements 27, 30 and the roll unit ends for covering the cracks provided by said interfitting clutch faces and providing a smooth external roll surface as illustrated in Figure 2.

The lower end of the core shaft 9 of the roll generally designated 7 is mounted in a bearing sleeve 34 carried at the inner end of a bearing arm 35 which is pivoted as at 36 on a carrier arm 37. See Figures 2 and 4. The carrier arm 37 is in turn pivoted as at 38 on the support member 39 which is secured as at 40 to the adjacent frame side wall 6. The stop pin 41 mounted on the support member 39 limits outward swinging movement of the bearing 34 about the center 38, and a spring 42 coiled about said stop pin engages the carrier arm 37 and constantly urges the bearing 34 and the roll supported therein toward its companion roll. An adjustable screw 43 carried

by the support member 39 engages the bearing arm 35 and limits movement of the bearing sleeve 34 and the roll supported therein in the direction toward the companion husking roll.

At its upper end each roll shaft 9 has a grooved collar 44 pinned thereon as at 45 by a pin extending through the collar and through a receiving hole 46 in said shaft. It will be observed that a hole 46 is provided in each end of each shaft 9, and that the keyways 11 and said holes 46 are so placed that the shafts 9 can be interchangeably mounted, or can be reversed end over end and mounted without upsetting the organization or mounting of the cooperating rolls. Each of the grooved collars 44 is provided with a clutch face 47 for engaging in driving relation with the adjacent clutch face 15 of the respective upper roll unit, and a ring 48 surrounds each set of interfitting clutch face lugs in order to provide a smooth external surface on the roll between the grooved collar and the adjacent rib end of the respective roll unit in the manner previously described and as clearly illustrated in Figures 2, 7 and 8.

A spiral gear 49 is mounted on the upper end of the shaft of the husking roll generally designated 7, and a spiral gear 50 is mounted on the upper end of the shaft of the companion husking roll generally designated 8. It will be observed by reference to Figure 2 of the drawings that the gear 49 is short and of large diameter and that the gear 50 is relatively long and of smaller diameter, and the reasons for this dimensioning of the gears 49 and 50 will become apparent as this description progresses. Each gear is keyed as at 51 in the respective core shaft keyway 11 as illustrated in Figures 7 and 8, and it will be apparent also by reference to these figures and to Figure 2 that the upper end extremity of each of the core shafts 9 has secured thereon a self-aligning anti-friction bearing 52. Washer and nut equipments 53 and 54 are mounted on the threaded end extremities of the shaft, and those at the upper end extremity serve to secure the self-aligning bearings 52 in position on said shafts.

It will be apparent by reference to Figures 2 and 3 of the drawings that the self-aligning bearing 52 of the husking roll generally designated 7 is mounted in a bearing sleeve 55, and that said sleeve is mounted on a slide member 56 which is laterally slidable in a slideway 57 projecting from a bearing member 58. The bearing member 58 is secured as at 59 to the respective frame side wall 6, and a compression spring 60 coiled about a stop screw 61 adjustably mounted on the member 58 constantly urges the slide member 56 and the upper end portion of the husking roll 7 toward the companion husking roll. The engagement of the bearing sleeve 55 with the companion sleeve 62 in which the other husking roll has bearing serves to limit movement of the husking roll 7 toward the husking roll 8, and the stop screw 61 limits the amount of separation of the cooperating husking rolls by contact with the bearing sleeve 55.

The self-aligning bearing 52 on the upper end extremity of the companion husking roll 8 is slidably mounted in the bearing sleeve 62, and said sleeve is carried on an arm 63 projecting inwardly from a bearing member 64 which is secured as at 65 to the respective frame side wall 6. See Figures 2 and 3.

The lower end of the core shaft of the husking roll 8 is rotatably mounted in a bearing sleeve 66 carried at the inner end of an arm 67 projecting

inwardly from the bearing member 68 which is longitudinally-adjustably secured as at 69 to the lower end of the respective frame side wall 6. See Figures 1 and 2.

A driver shaft 70 is rotatably mounted transversely of the framing and beneath the husking roll gears 49 and 50, and said shaft is mounted in bearings 71 provided therefor in the previously mentioned supporting members 64 and 58. A sprocket 72 is secured on one end of the shaft 70 and is driven by chain and sprocket connections 73 with a motor 74. A short, small diameter spiral gear 75 is mounted on the driver shaft in position for meshing with the previously mentioned long, small diameter roll gear 50, and a long, relatively large diameter spiral gear 76 is mounted on said shaft in position for meshing with the previously mentioned short relatively large diameter spiral gear 49. See Figures 2 and 3. It will be obvious that rotation imparted to the shaft 70 will be transmitted to the core shafts 9 through individual gear couples 75, 50 and 76, 49, and by reason of the keying of the gears 49 and 50 and the tilter elements 27 and 29 on said core shafts, the pinning of the collars 44 on said shafts, and the interengagement of the several clutch faces 29, 15, 15, 17, 17, 15, 15, 47, said shafts and all component husking roll parts illustrated in assembled relation in Figure 2 and in separated relation in Figures 7 and 8 will be caused to rotate in unison.

A shield plate 77 may be provided over the intermeshing gear couples, and when provided said plate preferably has a depending slotted skirt 78 for engaging the grooved collars in the manner illustrated in dotted lines in Figure 1 so as to make it impossible for husks or other debris to infiltrate between the intermeshing gears.

During operation of the husking apparatus the corn ears dropped onto the husking rolls 7 and 8 will be rotated and tumbled about thereby while being urged therealong toward the lower or discharge end by reason of the cooperative relation of the roll ribs 14 as illustrated in Figure 2. During the rolling about of the corn ears accentuated by the tilter elements 16 and 27, the corn husks are certain to be gripped between the downwardly rotating opposing surfaces of the rolls in a manner for being efficiently stripped from the ears in the manner illustrated in Figure 6. The intermeshing spiral gears in combination with the stop pin 43 and the limit contact of the bearing sleeves 55 and 62 maintain the cooperative relation of the rolls and the helical ribs thereof illustrated in Figure 5, that is the roll ribs are maintained in interfitting relation with the yieldable external surfaces of the rolls always slightly out of contact. In this manner all unnecessary wearing and self-destruction of contacting roll portions is avoided, and yet when the corn husks are gripped by the cooperating roll surfaces and drawn therebetween, the husking operation will be performed in a very efficient manner.

It will be observed by reference to Figure 3 that the husking roll generally designated 8 is mounted at a slightly lower level than is its companion roll 7. It has been found that this particular relative placement of the rolls tends to facilitate rolling about of the corn ears as they travel longitudinally over the husking rolls so that contact about the whole circumference of each ear will be assured and all possibility of the husks on any given ear not being en-

gaged between and drawn away by the husking rolls is avoided. Another outstanding feature of the invention is that of providing cooperating husking rolls having differential yielding qualities. In other words, the external sleeve portions 13 of the respective rolls are formed of rubber, synthetic rubber or other yieldable material so chosen that the external surface of one roll will yield more readily than the external surface of its companion roll, thereby to provide variation in yielding both radially and tangentially of said rolls. It is preferred that the external surface of the lowermost roll 8 be relatively harder and that the external surface of the uppermost roll 7 be relatively softer. By reason of the provision of this differential yielding feature, when husks are drawn between the rolls in the manner illustrated in Figure 6 and thus stripped from the ears, engagement of said husks between the rolls will differentially deform the engaging surfaces of the rolls, and the greater deformation of the softer roll surface will cause said roll surface to engage the husk over a relatively large area and greatly increase the frictional contact effective to strip husks from the ears. This differential yielding of the opposing roll surfaces, causing greater deformation of the softer roll surface and lesser deformation of the harder roll surfaces will cause these roll surfaces to engage the husks over a relatively large differential area and will greatly increase the effective husk stripping action of the rolls.

By mounting the driving spiral gears 75 and 76 beneath the driven spiral gears 53 and 49 secured on the upper ends of the husking rolls, the upward turning of the surface portions of the gears 75 and 76 which mesh with the roll gears 50 and 40 constantly tends to lift the husking rolls and thereby counteract the thrust of the weight of the rolls downwardly. The particular construction and arrangement of the meshing spiral gears and the individual drive provided for the respective husking rolls makes it possible for the rolls to be moved apart against the action of the springs 60 and 42 to any degree necessary without danger of disrupting the meshing contact of said gears. By reason of this arrangement of parts, it is also possible to adjust the husking roll generally designated 3 in the direction of its length by loosening the bearing securing devices 59 and moving the self-aligning bearing 52 in its sleeve 62 to any slight degree which may be necessary or desirable to properly time the rolls and establish the desired cooperative relation of the interfitting roll ribs 14.

The particular construction and mounting of the husking rolls herein disclosed solves a problem commonly encountered in husking machines, namely that of removing the rolls from their cores after extended periods of use. It is quite common for connected parts of these rolls to become so rusted or corroded during extended periods of use as to render difficult or impossible desired disassembly, and it frequently happened that roll parts which could be salvaged and re-used if properly disassembled have been necessarily discarded. In the construction and arrangement of parts herein disclosed, it is a simple matter to remove the nuts and washers 54, 53, the keys 28 and 51 and the pins which secure the collars 44, and thereafter the roll elements illustrated in separated relation in Figures 7 and 8 can be readily taken apart. It will also be apparent that by changing the tilters

and their companion elements, and the gears, the rolls as a whole can be interchanged or reversed, inasmuch as the core shafts are exactly the same at both ends. In other words, the rolls are reversible as a whole, end to end; the roll sections or units are reversible end to end; and the roll sections or units are reversible on the same roll in their two respective positions.

If desired, the clutch face covering rings 30 can be dispensed with and the yieldable husking surfaces of the rolls extended full length over the core sleeve clutch faces at the ends of the roll units. In this manner the yieldable husking surfaces of the rolls are extended so as to present no non-yielding surfaces intervening the roll units and the end abutments such as the tilter elements or the grooved collars 44. Such modified structure is shown in Figure 14 from which it will be apparent that each end of the core sleeve 79 is provided with a clutch face 80 and is reduced in diameter as at 81 to receive a metal ring 82 which may be welded or otherwise secured thereon in position for extending over the clutch face as shown. The rubber or other yieldable or deformable covering sleeve 83 is extended over the ring 82, and it will be apparent that during assembly of the roll the clutch faces projecting from the tilter elements or the grooved collar will be inserted into the end of the rings 82 to interfit with the clutch faces 80.

In the foregoing description there is disclosed a corn husking apparatus which presents outstanding advantages in the way of simplicity of construction, interchangeability of and facility in the mounting and dismounting of component parts, and which operates in a highly efficient manner in performing the desired corn husking operation. Said apparatus embodies novel individual roll structures that can be readily assembled and then taken apart after long periods of use without any difficulty due to rusting or corrosion of engaging parts, means for individually driving the rolls and maintaining the desired timing thereof by reason of the intermeshing of the spiral gear couples and the longitudinal adjustment of one roll, means for universally-floatably mounting one roll for movement of separation with relation to the other roll without disrupting the timed relation thereof or the drive couples thereof, and also means providing for differential yielding or husking surface deformation of said rolls. It is to be understood that when said one roll is adjusted longitudinally the limited amount necessary to correct any out of time relation of the rolls due to wear, careless mounting or abuse, clearance between the cooperating tilter elements always is sufficient to permit this adjustment.

While one form of the invention has been shown for purposes of illustration, it is to be clearly understood that various changes in the details of construction and arrangement of parts may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In a husking machine, cooperatively opposing longitudinally and helically ribbed husking rolls disposed side by side, means including a spiral gear drive couple for each roll for causing said rolls to rotate in unison with the ribs thereon interfitting but always in slightly spaced relation, and means for longitudinally-adjustably mounting one said roll.

2. In a husking machine, cooperatively opposing husking rolls disposed side by side, means for

yieldably mounting one said roll for movement laterally with relation to the other of said rolls during passage of husks between the rolls, means for longitudinally-adjustably mounting said other roll, and drive means for causing the rolls to rotate in unison and including an individual spiral driving gear couple for each roll.

3. In a husking machine, cooperatively opposing husking rolls disposed side by side on an incline, means for yieldably mounting one said roll for movement laterally with relation to the other of said rolls during passage of husks between the rolls, and drive means for causing the rolls to rotate in unison and including an individual spiral driving gear couple for each roll having the intermeshing faces of the driving spirals turning in a direction for constantly tending to move the rolls upwardly in the direction of their length.

4. A husking roll unit comprising a core sleeve having a clutch face at an end extremity thereof, a ring portion extending over said clutch face, and a yieldable husking surface covering over said core sleeve and extending over and to the end extremity of said ring portion.

5. A husking roll comprising, a cylindrical core shaft, a core sleeve freely slidable over and turnable end for end on the shaft and having a yieldable husking sleeve affixed thereon, abutment means secured on the shaft at one end thereof, and abutment means removably secured on the shaft at the other end thereof, said core sleeve having clutch faces at its end extremities, said abutment means at the respective shaft ends having clutch faces thereon disposed to interfit with the core sleeve clutch faces and connect the core sleeve for rotation with the shaft, and ring members encircling the interfitting clutch face

portions and presenting smooth surfaces externally of the roll.

6. A husking roll comprising, a cylindrical core shaft, abutment means secured on the shaft at one end thereof, abutment means secured on the shaft at the other end thereof, and a plurality of core sleeves freely slidable over the shaft intermediately of the abutment means at the respective shaft ends and turnable end for end on said shaft and each having a yieldable husking sleeve affixed thereon, at least one said abutment means having a clutch face in interfitting engagement with a clutch face on the end of the adjacent core sleeve for connecting the latter for rotation with the shaft, means including interfitting clutch faces between adjacent ends of the core sleeves for connecting them for rotation together, and a ring member encircling each set of interfitting clutch faces for presenting smooth surfaces externally of the roll.

RALPH COVER.

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