No. 867,893. PATENTED OCT. 8, 1907.

W. B. METCALF.

CORN HARVESTING AND HUSKING MACHINE.

APPLICATION FILED APR. 26, 1905.

3 SHEETS—SHEET 1.

Fig. 13.

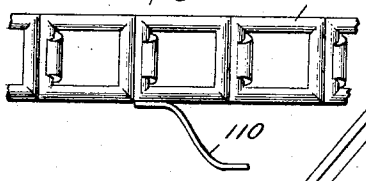

Fig. 1.

Fig. 4.

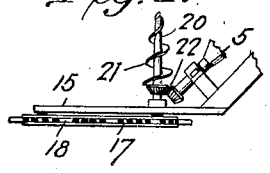

Fig. 2.

Witnesses

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3 SHEETS—SHEET 2.

Fig. 5.

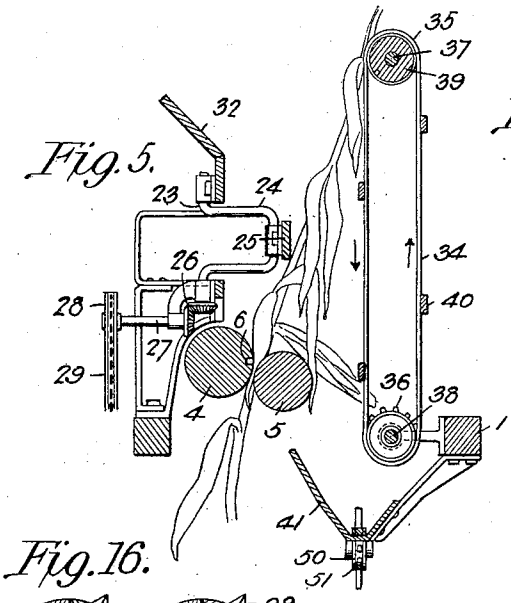

Fig. 6.

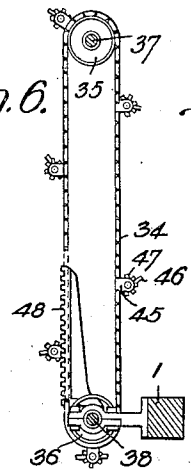

Fig. 7.

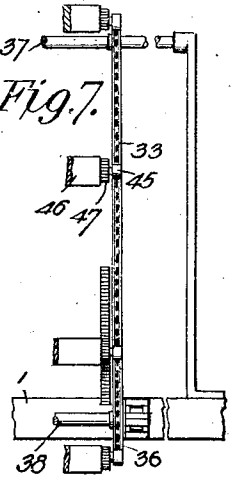

Fig. 16.

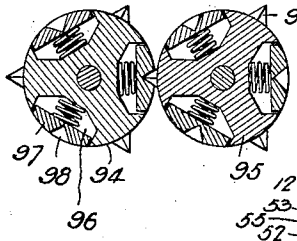

Fig. 3

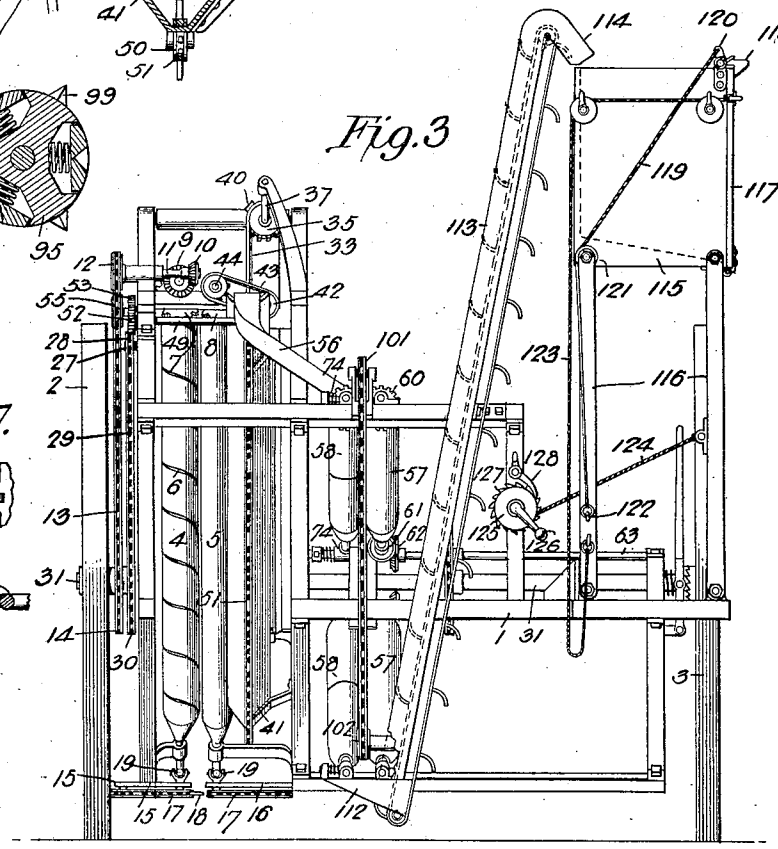

Fig. 17.

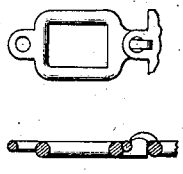

Fig. 18.

Witnesses

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No. 867,893. PATENTED OCT. 8, 1907.

W. B. METCALF.

CORN HARVESTING AND HUSKING MACHINE.

APPLICATION FILED APR. 26, 1905.

3 SHEETS—SHEET 3.

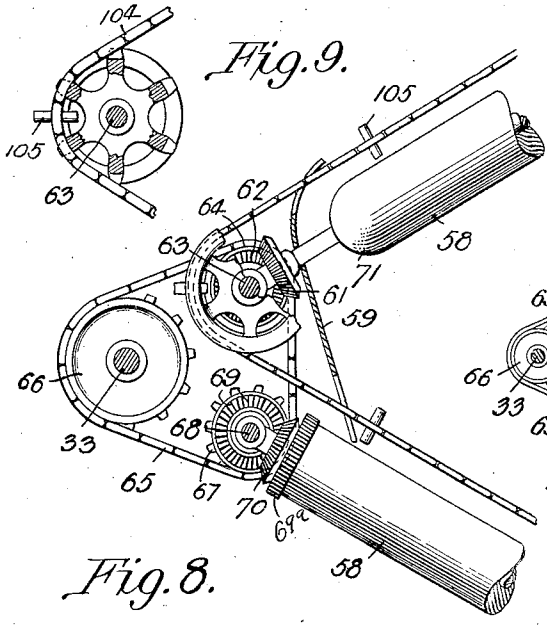

Fig. 9.

Fig. 8.

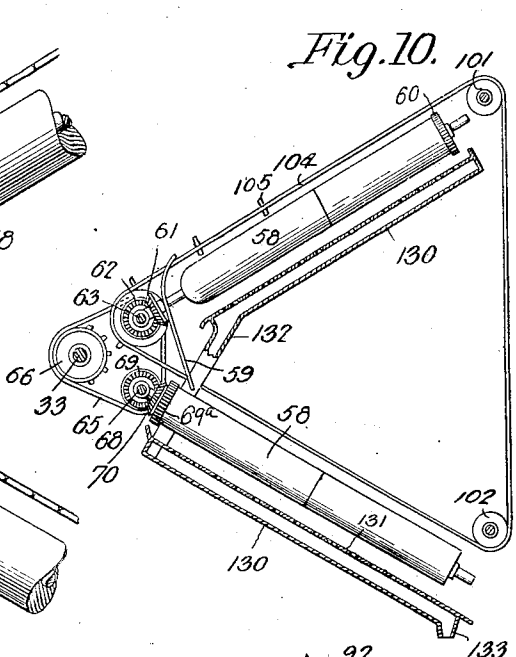

Fig. 10.

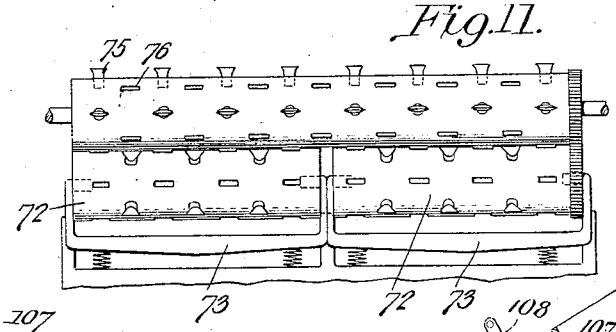

Fig. 11.

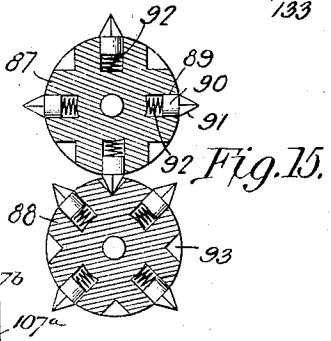

Fig. 15.

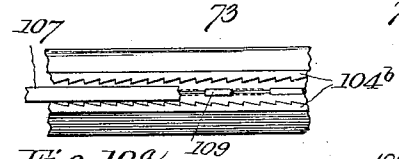

Fig. 12a.

Fig. 12.

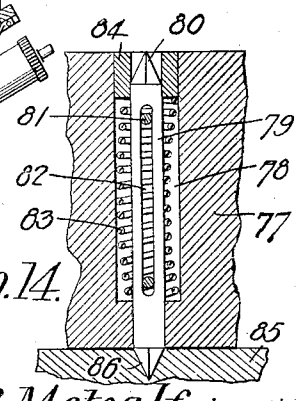

Fig. 14.

Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM B. METCALF, OF AUBURN, NEBRASKA.

CORN HARVESTING AND HUSKING MACHINE.

No. 867,893. Specification of Letters Patent. Patented Oct. 8, 1907.

Application filed April 26, 1905. Serial No. 257,521.

To all whom it may concern:

Be it known that I, WILLIAM B. METCALF, a citizen of the United States, residing at Auburn, in the county of Nemaha and State of Nebraska, have invented a new and useful Corn Harvesting and Husking Machine, of which the following is a specification.

This invention relates to corn harvesters.

The invention has for its object to simplify and improve the construction and operation of this class of devices; and with these and other ends in view, which will be hereinafter referred to and which will readily appear as the nature of the invention is better understood, the same consists in the improved construction and novel arrangement and combination of parts, which will be hereinafter fully described and particularly pointed out in the claims.

In the accompanying drawings has been illustrated a simple and preferred form of embodiment of the invention; it being, however, understood that no limitation is necessarily made to the precise structural details therein exhibited, but that the right is reserved to any changes, alterations and modifications to which recourse may be had within the scope of the invention and without departing from the spirit or sacrificing the efficiency of the same.

In said drawings, Figure 1 is a top plan view illustrating a simple form of a machine constructed in accordance with the principles of the invention. Fig. 2 is a side elevation of the same. Fig. 3 is a rear elevation of the same. Fig. 4 is a detail side view illustrating a modified stalk and ear gathering means adapted to be used in conjunction with the snapping rolls. Fig. 5 is a sectional view taken transversely through the snapping rolls and adjacent parts, including the ear detaching device. Figs. 6 and 7 are detail views illustrating a modified form of the ear detaching device. Fig. 8 is a detail view showing, in elevation, a set of husking roll illustrating a preferred arrangement of the same, but not entering into the detailed construction of said rolls. Fig. 9 is a sectional elevation of the sprocket wheel driving a form of conveyer chain for carrying the ears over the husking rolls. Fig. 10 is a sectional elevation showing a set of husking rolls in connection with sieves and conveyers for saving corn accidentally shelled or removed from the ears. Fig. 11 is a plan view of a pair of husking rolls. Fig. 12 is a detail view illustrating modified means for conveying the ears over the husking rolls. Fig. 12^a is a detail view of another modification. Fig. 13 is a detail view illustrating another modified form of said ear conveying means. Figs. 14, 15 and 16 are sectional views illustrating various modifications in the construction of the husking rolls. Figs. 17 and 18 are detail views illustrating a preferred form of chain link used in connection with endless conveyers of the device.

Corresponding parts in the several figures are indicated throughout by similar characters of reference.

The frame 1 of the improved machine may be of any desired form or mode of construction whereby it will be enabled to support the operating mechanism entering into the organization of the machine. Said frame, as well as all the parts of the machine, may be constructed of wood, iron, steel, or any other material or combination of materials that shall be deemed suitable for the purpose, and whereby a light, simple, durable, and in every respect efficient structure shall be provided. This frame is to be supported upon wheels, of which any desired number may be used, said wheels being disposed in any convenient manner; in the drawings only two wheels have been shown, viz., the left or inner, and the right or outer, supporting wheels, which are designated, respectively, 2 and 3.

Supported upon the frame for rotation are a pair of snapping rolls 4, 5, the same being supported in the usual manner in an inclined position. These rolls, which are adjacent to the inner, or grain side, and to the outer, or discharge side, will be referred to as the "inner" and "outer" rolls, respectively. The roll 4, which is preferably of larger diameter than the roll 5, has been illustrated as provided with a spiral groove 6 for the purpose of more readily engaging the stalks to buckle them down between the rolls; the roll 5 may, if desired, be similarly grooved. Said rolls are geared together by intermeshing pinions 7—8, as best seen in Fig. 1, and the shaft of the roller 4 has been shown as provided with a bevel gear 9 meshing with a bevel pinion 10 upon a suitably supported shaft 11 carrying a sprocket wheel 12, receiving motion by means of a chain 13 from a sprocket wheel 14, which is suitably connected with the transporting wheel 2.

The frame is provided with gathering boards 15—15 having bearings for shafts, as 16, carrying chain wheels over which the gathering chains 17 are arranged to move; said gathering chains being provided with fingers 18 of ordinary construction. Motive power for said gathering chains may be provided in the shape of knuckle joints 19 at the lower ends of the shafts of the snapping rolls, but said chains may be driven in any other convenient manner.

In Fig. 4 of the drawings has been illustrated a modification which at times may be profitably adopted, especially when only one set of gathering chains is employed, although said modification is not limited in its use in this respect. In this modification one of the shafts carrying the gathering chain is provided with an upward extension 20 having a tapering spiral flange 21, the shaft having said upward extension being driven by means of bevel gearing 22 from the lower end of the snapping roll adjacent to which said shaft is located and which, in Fig. 4, has been indicated as being the outer snapping roll 5.

Suitably supported upon the frame of the machine

near the upper and lower ends of the inner snapping roll are a pair of crank shafts 23—23, the cranks 24 of which are disposed above the plane of the snapping rolls. Said cranks are connected by means of a beater which consists of a slat or bar 25 of any suitable length, but preferably of sufficient length to extend downwardly in the path of the corn about to enter between the snapping rolls so as to assist in elevating and guiding said corn. The crank shaft 23, which is nearest the upper end of the snapping rolls, is connected by bevel gearing 26 with a suitably supported shaft 27 having a sprocket wheel 28 which is driven by means of a chain 29 from a sprocket wheel 30 connected with the transporting wheel 2 or with the axle of the machine, which is designated 31 and which is supported for rotation in the frame. The beater bar 25 may be relied upon to transmit motion between the cranks 24. By this mechanism it will be seen that the beater bar has an orbital movement, so that said beater bar will serve to push or bend the stalks over the outer snapping roll 5, as will be clearly seen in Fig. 5 of the drawings.

A transverse roller 32^a is supported near the upper ends of the snapping rolls, to assist in buckling long stalks downward between said snapping rolls.

A suitably supported guard 32 is provided for the purpose of preventing ears from being lost in case of their becoming detached from the stalks, by any cause, prior to coming into engagement with the ear detaching mechanism.

The ear detaching mechanism comprises mainly the snapping rolls 4 and 5, the former of which, as hereinbefore stated, is preferably of larger diameter than the roll 5. The action of these rolls upon the stalks is well known in machines of this class, and it consists in so engaging the stalks as to force or buckle them in a downward direction until the ears are encountered, said ears being snapped off the stalks by the squeezing action of the rolls. By making the roll 5 of smaller diameter, and also by supporting it in a plane slightly below the plane in which the roll 4 is supported, the natural tendency will be for the ear, as it becomes detached, to drop over the said roll 5; especially in view of the fact that the stalks are previously beaten or bent in the direction of said roller 5 by the mechanism provided for the purpose. In order to assist and to facilitate the operation of the snapping rolls, additional mechanism is provided, including a pair of endless chains, belts, or bands, as 33—34, mounted upon pulleys 35—36 upon a pair of suitably supported shafts 37—38, arranged the one a suitable distance above the other, and preferably parallel to the axes of the snapping rolls. The upper shaft 37 may be equipped with a spirally grooved or ridged roll 39, but this may be dispensed with, when desired. The belts or bands 33—34 are, under the construction illustrated in Figs. 1, 3 and 5, connected by means of slats 40 which, when the device is in operation, will move downwardly past the snapping roll 5, and said slats, contacting with the ears upon the stalks which are bent in the direction of the slats by means of the beater 25, will strike the said ears and effectively cooperate with the snapping rolls in detaching them from the stalks, and causing said ears to drop into a suitably supported conveyer trough 41 disposed underneath. The lower shaft 38 has been illustrated as provided with a rearward extension carrying a sprocket wheel 42 (see Fig. 1) said sprocket wheel being connected by a chain 43 with a sprocket wheel 44 upon the shaft of the snapping roll 5 whereby the mechanism will be operated, as will be readily understood.

Under the modification illustrated in Figs. 6 and 7, the endless members 33 and 34 are in the nature of chains, the links of which are provided at intervals with ears or lugs 45 in which are journaled the ends of cross bars or slats 46 each of which carries a pinion 47. 48 designates a suitably supported rack adapted to engage the pinions 47 when they approach the point at which the slats with which they are connected are about to engage the corn. At this point the slats will be subjected to a rotary motion which is effective in assisting to dislodge or detach the ears from the stalks.

Within the scope of the invention, pinions 47 and racks 48 may be provided at both ends of the slats 46; other means than those herein described may also be employed for the purpose of imparting to the said slats the rotary motion to which reference has been made.

The conveyer trough 41 supports, at the upper and lower ends thereof, shafts 49—50 supporting the endless conveyer 51. The shaft 49 has a pinion 52 meshing with a pinion 53 upon a suitably supported shaft 54 having a sprocket wheel 55 which is driven by means of the driving chain 13 hereinbefore referred to and which also serves to transmit motion direct to the snapping rolls. By this mechanism motion is transmitted in the proper direction to the endless conveyer 51 which discharges at its upper end into a chute 56, whereby the snapped ears are conveyed to the husking mechanism. This chute has, in the drawings, been illustrated as being in the nature of an ordinary inclined spout, and this construction will in many cases be employed.

Coming now to the husking mechanism it may be stated that said mechanism in its broad sense is composed of a pair or pairs of rolls which may be specially constructed and equipped to pinch or take hold of the husk of ears passing over said rolls and to forcibly tear the husk from the ear which, thus denuded, is conveyed to a place of deposit.

In the principal views, Figs. 1, 2 and 3 of the drawings, the machine has been illustrated as provided with two pairs constituting one complete set of husking rolls. Generally speaking it may be stated that the rolls of the upper and lower pairs are of like construction. Each pair consists of rolls 57—58, suitably supported for rotation in an inclined plane, the upper pair of rolls being inclined oppositely to the lower pair, and so disposed that ears passing from the upper pair of rolls shall be discharged upon the lower pair of rolls, guiding means being preferably provided in the nature of a shield or guard 59. Under the construction illustrated, the rolls of each pair are geared together by means of pinions 60, it being understood that, when desired, such intermeshing pinions may be arranged at either or both ends of the rolls; one roll, 57, of the upper pair is driven positively by means of a bevel pinion 61 meshing with a bevel gear 62 upon a shaft 63 having a sprocket wheel 64 connected by a chain 65 with a

sprocket wheel 66 upon the axle 31 of the machne; the chain 65 also engages a sprocket wheel 67 upon a shaft 68 supported below and parallel to the shaft 63, and carrying a bevel pinion 69 meshing with the bevel pinion 70 upon the lower pair of rolls which are provided with intermeshing pinions, as 69ª, and are thereby positively driven in the direction of each other.

The rolls may be provided with truncated conical ends or points at their delivery ends, as shown at 70ª in Fig. 1, the points may be rounded, as shown at 71 in Fig. 8, or they may be given any other suitable shape which shall be considered most efficient for the purpose of properly handling and delivering the ears. It is also to be understood that means for driving the said rolls, other than those herein set forth may be employed, if desired. Again, the said rolls may be supported for rotation in any suitable manner that may be deemed convenient and effective.

With regard to the mounting of the rolls, it has already been stated that the upper and lower rolls are both supported in an inclined position and at a suitable angle with relation to each other to enable the ears passing over the upper rolls to be presently dumped upon and thus transferred to the upper ends of the lower rolls, the shield or guide 59 serving to guide the ears in the passage from one pair of rolls to the other. It will be noticed that in being thus transferred, the position of the ear is naturally reversed, so that the side which was uppermost in the passage over the upper rolls becomes the under side when the car is pasing over the lower rolls. This is an important feature of the invention, inasmuch as husks or portions of husks not seized upon and removed by the upper rolls will almost certainly be engaged and removed by the lower rolls.

Two pair of rolls will usually be considered sufficient to constitute a set, but no limitation is made to the use of two or any particular number of pairs, as under some circumstances three or more pairs might profitably be employed.

With regard to the construction of the husking rolls, the said rolls may be of plain cylindrical shape with tapering or rounded points, as herein described. Preferably, one roll of each pair will be constructed in two or more sections and, in the event of such construction, independent supporting means may be provided for each section of such roll, as indicated in Fig. 11 of the drawings where one roll has been shown as composed of sections 72—72, each supported for rotation upon a suitably supported spring pressed yoke 73; generally one of the rolls, preferably the inner roll, is supported in slidable spring pressed boxes, as clearly shown at 74 in Fig. 1 of the drawings; this is obviously in order to enable said roll to yield to the pressure of material passing between the rolls; in some cases, however, as will be hereinafter described, this feature of construction is not essential and I do not wish to be understood as limiting myself thereto.

In Fig. 11, the opposite rolls have been shown as provided with projecting chisel shaped teeth 75, and with recesses 76; the teeth of one roll being adapted to engage the recesses in its mate. Each roll may be provided with such teeth and recesses, or one may be provided with teeth only and the other with recesses only, as will be readily understood. In Fig. 1, the roll 57 has been illustrated as being spirally grooved; other forms of grooves might be mentioned, but this is not considered necessary.

Under the construction illustrated in Fig. 14, a husking roll, specially designated 77, has been illustrated as provided with a socketed transverse perforation 78 in which is seated a diametrically slidable pin 79 having pointed ends 80, the pin being of such a length that only one of the points 80 may fully protrude at one time and the movement of the pin being limited by means of stops 81 extending transversely through a slot 82 in said pin; the latter is engaged by a coiled spring 83 seated in the socketed recess 78, frictionally engaging the pin and retained in position by means of a plug 84. The opposing roller, indicated at 85, will be provided with recesses 86 adapted for the accommodation of points 80 of the pins 79 of its mate. Each of a pair of opposing rollers may be provided with any desired number of slidable pins, or the pins may be mounted in one of the rolls and the opposing roll may be provided with recesses 86 for engagement with the points of said pins. It is obvious that these pins, as the rolls are rotated against each other, will operate to seize upon husks of ears passing over said rolls and to remove the husks.

Under the construction illustrated in Fig. 15, each of a pair of opposing rolls, here designated 87—88, is provided with a plurality of recesses 89 in which are seated plugs 90 having points 91, said plugs being forced outwardly by means of springs 92 in the inner ends of the recesses; each of said rolls is also provided with notches or recesses 93 for the accommodation of points 91 of the plugs 90 in the mating roll. The operation will be substantially like the operation of the pins 79 previously described.

Under the modification illustrated in Fig. 16, a pair of rolls 94, 95 have been shown, each of which is provided with recesses 96 in which are seated spring pressed plugs 97 having recesses 98 adapted for the reception of sharp points 99 firmly connected with the opposing roll. When this construction is resorted to, it will probably be found unnecessary to support either of the roll carrying shafts in slidable, spring pressed boxes, inasmuch as the spring pressed plugs 97 may be found to yield sufficiently to admit of the passage of the husks between the rolls.

For the purpose of assisting in conveying the ears of corn over the husking rolls, I may avail myself of an endless conveyer which, as shown in Fig. 2 and in Fig. 10, may be supported upon suitably disposed wheels or pulleys 100, 101 and 102, the first of which is mounted upon the shaft 63 and is thereby driven. As illustrated in Fig. 9, the endless conveyer 104 may be provided with fingers 105 adapted to engage the ears and to move them in a downward direction over the husking rolls, the circuit of the endless conveyer being such that it will equally operate upon ears passing over the upper and lower pair of husking rolls.

A modified ear carrying mechanism has been illustrated in Fig. 12, the same including a bar 107 supported for vibration by means of links 108 above a pair of husking rolls, and provided upon its under side with pushers, such as springs 109, whereby the ears will be worked gradually in a downward direction over the surfaces of the rolls, each spring or pusher being yieldable to permit the passage under it of an ear operated

upon by another pusher, as will be readily seen in the illustration. This bar may be provided at its upper end with a slot 107^a, surrounded by a box or flange 107^b through which corn may be fed to the husking rolls. Said box or flange may be provided with interiorly disposed pushing members 107^c to assist in feeding the corn. The pushing members 109, as well as the pushing members 107^c, may be arranged to have a lateral, or side pressure, if desired.

When the vibratory feed bar is employed in connection with rolls that are nearly level, ratchet bars, as 104^b supported in stationary positions adjacent said feed bar, (see Fig. 12^a) may be used to prevent backward movement of the ears. The shield or guide 59, to which reference has previously been made, may also when desired be connected with the bar 107, as shown in Fig. 12.

Another modification of an ear carrying mechanism has been shown in Fig. 13, the same consisting of a chain adapted to be supported upon shafts at right angles to the axes of the husking rolls in such a manner that one lead of the chain will de disposed above the inter-space between the rolls. The links of this chain will be provided at suitable intervals with springs 110 adapted to engage the ears for the purpose set forth. The chain links, only a few of which have been shown, are designated 111.

The ears, as they pass from the husking mechanism, are delivered into an inclined trough 112 at the lower end of a suitable conveyer or elevator, the casing of which, 113, is supported by the frame of the machine and terminates at its upper end in a spout 114 disposed to deliver into a box or receptacle 115, which is supported upon the upper ends of suitably arranged pivoted parallel bars 116 supported upon the frame of the machine. The receptacle 115 has a hinged side 117 which is normally held closed by means of a latch 118, the latter being operable by means of a flexible element 119 connected with an upwardly extending arm 120 of the latch member and guided over a pulley 121 to a point of attachment 122 upon one of the bars 116. A suitably guided flexible element 123 is also provided, the same being connected with the hinged side or door 117 for the purpose of closing the latter. A flexible element, such as a cable 124, is connected with one of the outer uprights 116 leading from thence to a drum or roll 125 having an operating crank 126 and a ratchet wheel 127 engaged by a pawl 128 whereby it may be held against rotation. When a sufficient quantity of corn has accumulated in the box 115, the pawl 128 may be disengaged from the ratchet 127, and the box or receptacle may then be permitted to swing in an outward direction over a receptacle, such as the box of a wagon driven alongside the machine. The latch 118 is released by pulling upon the rope 119, thus permitting the door 117 to open and the contents of the box 115 to drop into the receptacle, after which the parts may be restored to operative position by winding the rope 124 upon the drum 125 and pulling the rope 119 to restore the door 117 to latch engaging position.

In conjunction with the husking mechanism of the improved machine, I prefer to use means whereby waste of corn shall be avoided. Practical experience has proven that in the act of stripping the husks from the ears, a no inconsiderable quantity of corn will become shelled or detached from the ears, and corn thus accidentally shelled usually is a total loss, especially in the case of machinery which, like the device of the present invention, is operated in the field. In order to avoid such loss, there is arranged beneath the husking rolls, inclined pans, as 130, which are preferably disposed parallel to the axes of the rolls in the manner clearly seen in Fig. 10 of the drawings; supporting means for these pans have not been shown, but it will be understood that they may be supported in any suitable manner upon the frame of the machine. The pans 130 are provided with tops or covers 131 of perforated sheet metal, wire gauze, or other reticulated or foraminous material, and the lower end of the upper pan terminates in a spout 132 discharging into the lower pan, which latter is provided at its lower end with a spout 133 adapted to discharge into a receptacle provided for the purpose, or into a conveyer whereby the shelled corn may be conveyed to a place of deposit. In operation, the shelled corn will pass through the sieve tops 131 into the pans where it is disposed of in the manner described, while the husks will slide off the sieve tops and be deposited upon the ground or, if it be desired to collect them, in some suitable receptacle.

From the foregoing description, taken in connection with the drawings hereto annexed, the operation and advantages of this invention will be readily understood by those skilled in the art to which is appertains.

When a machine progresses over the field, the corn stalks will be guided between the gathering devices, which serve to pick up the down corn and to guide the stalks between the snapping rolls, whereby the stalks will be buckled downwardly, while the upper ends of the stalks will be subjected to the action of the beating mechanism whereby the ears will be caused to project over the outer snapping roll and to be subjected to the action of the ear detaching mechanism, which coöperates with the snapping rolls in the manner herein described to detach the ears which drop into the conveyer whereby they are carried to the husking mechanism. By the rolls which constitute the husking mechanism, the husks will be speedily and effectively stripped from the ears, which latter are conveyed to the receptacle 115, while the husks are dropped upon the drum or deposited in some suitable receptacle provided for the purpose. When a sufficient quantity of husked ears has accumulated in the box 115, the contents of the latter is discharged in the manner described and the machine is then ready to pursue its course. If the corn crib is located within a convenient distance, the entire machine may be driven to the crib and the contents of the box 115 may be discharged directly into the latter.

Clutch means will obviously be provided, whereby the driving mechanism may be thrown out of gear when the machine is being transported from one place to another.

Any desired connections other than those herein described may be employed to cause the parts of the machine to operate.

Having thus described the invention, what is claimed is:—

1. In a machine of the class described, ear snapping mechanism and gathering mechanism including vertically disposed shafts having continuous convolute flanges which

are broadest transversely at their lower ends and decrease in breadth toward their upper end.

2. Ear snapping rolls and an endless slatted device moving continuously and transversely of the rolls and cooperating with the same for detaching ears from stalks.

3. Rearwardly and upwardly inclined ear snapping rolls, laterally operating stalk bending means and transversely operating ear detaching means coöperating with the rolls for detaching ears from stalks.

4. In a machine of the class described, an ear detaching device including endless traveling means, and slats pivotally connected therewith.

5. In a machine of the class described, an ear detaching device including endless traveling means, slats pivotally connected therewith, and means for rotating said slats.

6. Ear snapping rolls, means operating upon the tops of stalks passing between the rolls to bend said stalks over one of the rolls, and ear detaching means coöperating with said bending means and snapping rolls.

7. Ear snapping rolls, stalk bending means, and ear detaching means coöperating therewith and including an endless movable slatted device.

8. Ear snapping rolls, stalk bending means, and ear detaching means coöperating therewith and including endless traveling means and slats pivotally supported thereby.

9. Ear snapping rolls, stalk bending means, and ear detaching means coöperating therewith and including endless traveling means, slats pivotally supported thereby, and means for rotating said slats.

10. In a machine of the class described, ear detaching means including endless traveling means, slats supported for rotation by said traveling means, pinions connected with said slats, and racks supported in the path of said pinions.

11. Ear snapping rolls, ear detaching means coöperating therewith and including endless slatted traveling means supported adjacent to one of the rolls, and a conveyer disposed beneath and between said snapping rolls and detaching means.

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

WILLIAM B. METCALF.

Witnesses:
FRANK CLINE,
J. A. MASTIN.