Nov. 19, 1957 W. C. IRVINE 2,813,390

TOBACCO HARVESTING MACHINE

Filed Oct. 31, 1955 3 Sheets-Sheet 1

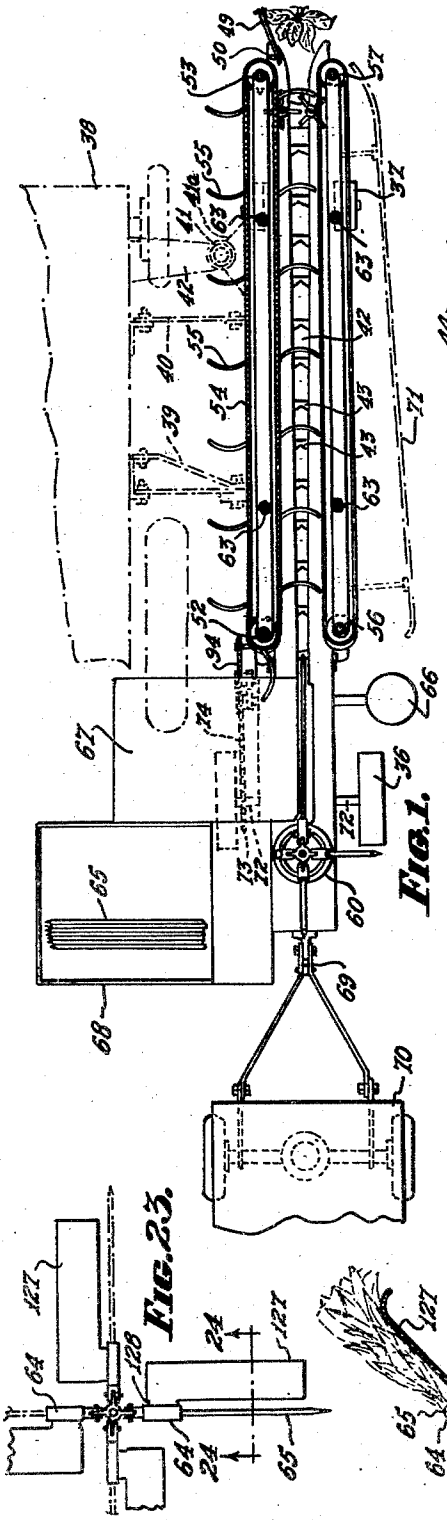


Fig. 1.

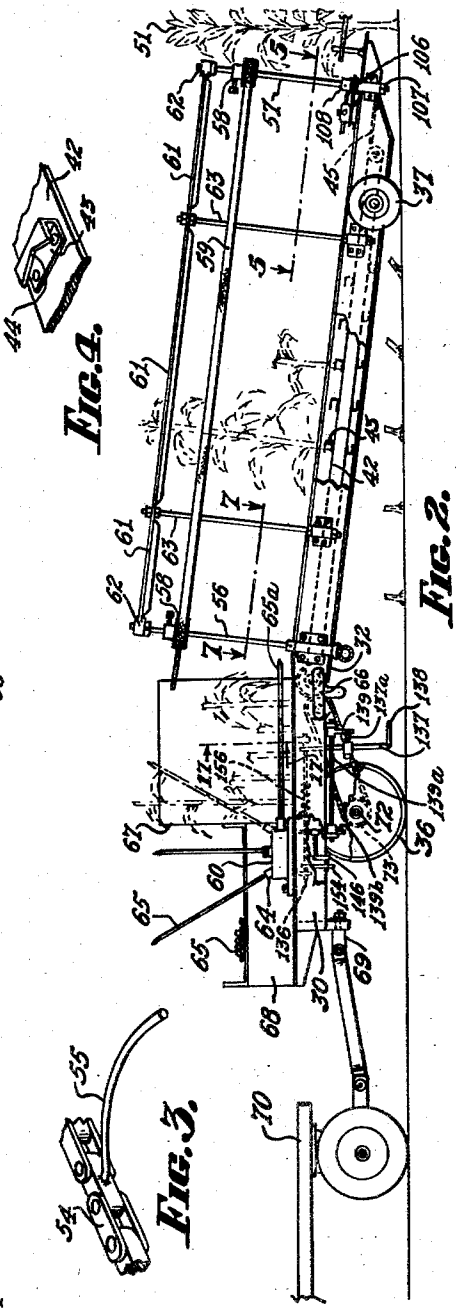


Fig. 2.

Fig. 4.

Fig. 3.

Fig. 23.

Fig. 24.

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FIG. 5.

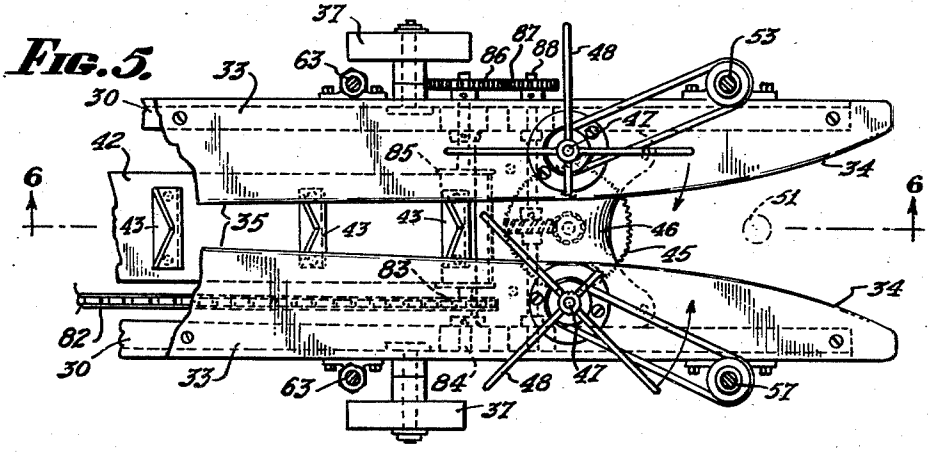


FIG. 6.

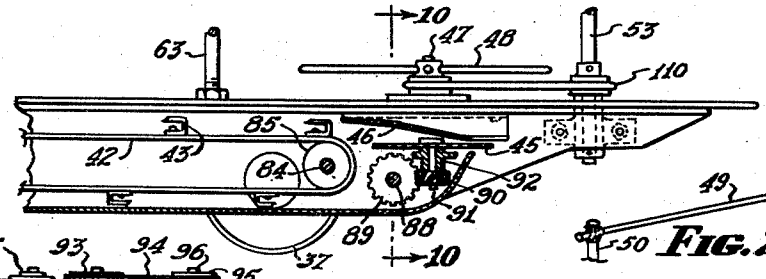


FIG. 25.

FIG. 7.

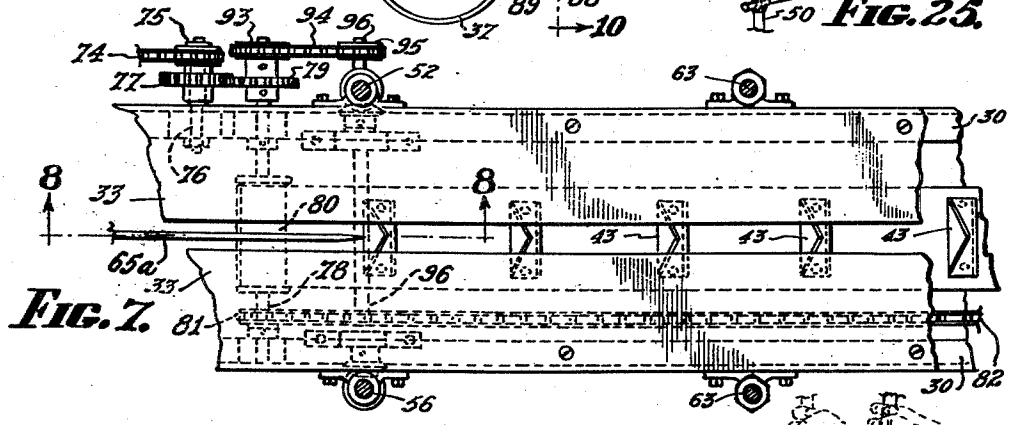


FIG. 8.

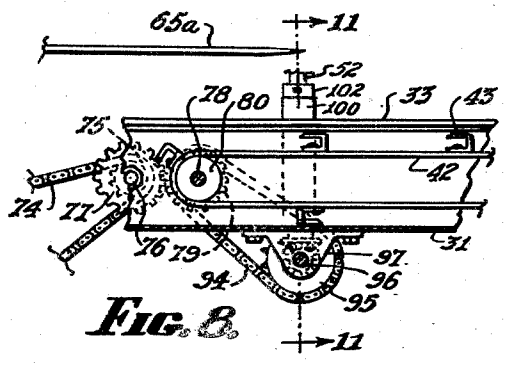
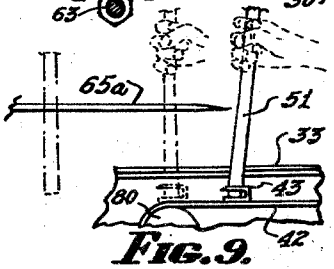


FIG. 9.



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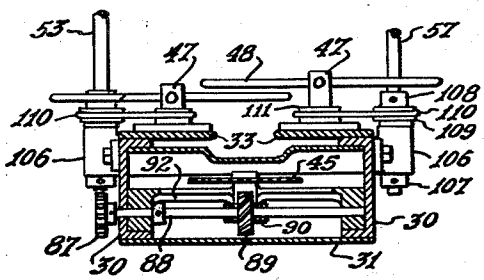


FIG. 10.

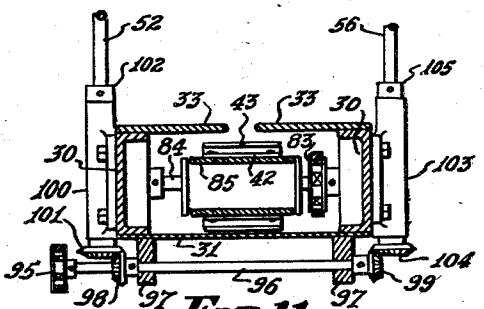


FIG. 11.

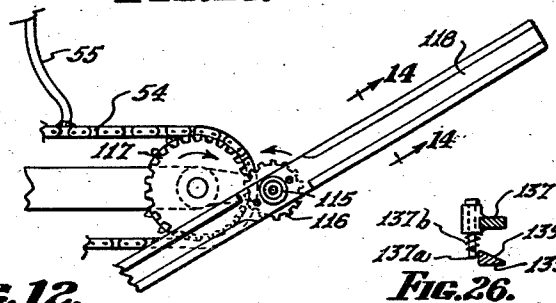


FIG. 12.

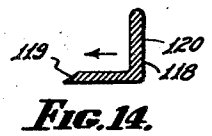


FIG. 14.

FIG. 26.

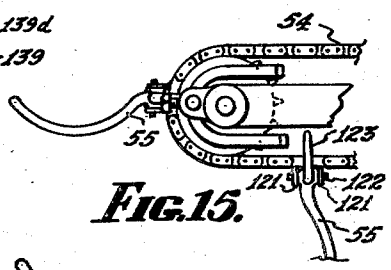


FIG. 15.

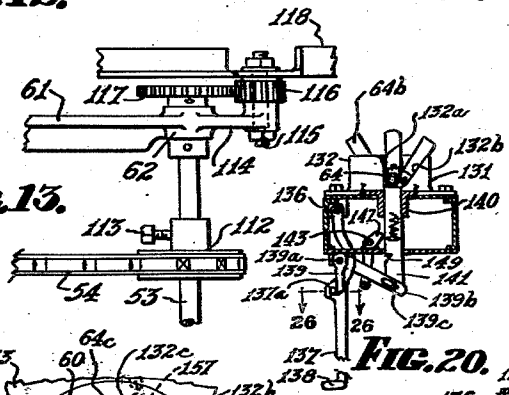


FIG. 13.

FIG. 20.

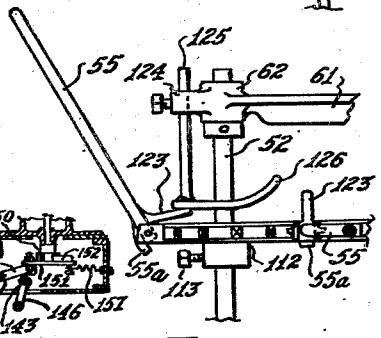


FIG. 16.

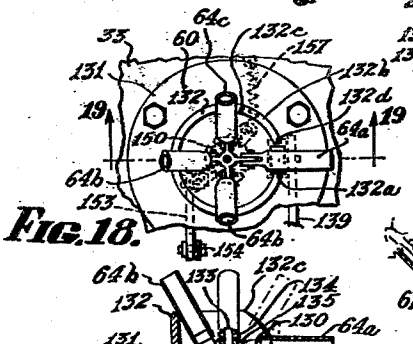


FIG. 18.

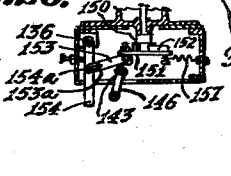


FIG. 21.

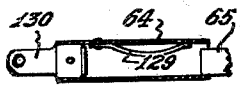


FIG. 22.

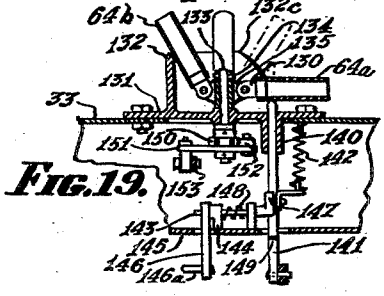


FIG. 19.

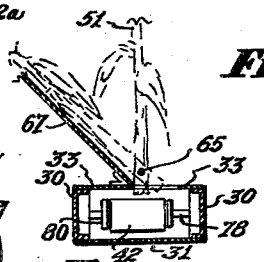


FIG. 17.

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United States Patent Office 2,813,390 Patented Nov. 19, 1957

2,813,390

TOBACCO HARVESTING MACHINE

William C. Irvine, Danville, Ky.

Application October 31, 1955, Serial No. 543,686

18 Claims. (Cl. 56—27.5)

My invention resides in the provision of a machine for harvesting tobacco rapidly with a minimum amount of damage to the tobacco leaves, including also a method which will insure a higher quality of tobacco while at the same time greatly decreasing the time consumed during the various stages involved in the complete harvesting of tobacco.

In the past it has been the practice to harvest tobacco in one of two major manners. Certain tobaccos are harvested by pulling the leaves from the stalk as it stands in the field, the lower leaves being pulled first as they ripen. This is known as "priming" tobacco and the instant invention is not primarily concerned with this type of tobacco culture and harvest.

The other way in which some tobacco is harvested involves cutting the stalk near the ground and eventually impaling the stalk on sticks which may be hung for further curing of the tobacco in a barn. There have been many suggestions in the past for ways and means to improve this kind of tobacco harvesting. To date, however, most tobacco which is harvested in this general manner is the subject of much hand work. Ordinarily groups of laborers will walk through the tobacco field each laborer taking a certain number of rows. The laborer will imbed a sharp stick in the ground, sever stalks of tobacco and then impale the severed stalks on the stick. Eventually these sticks with a number of severed stalks secured thereon will be gathered and taken from the field. It is possible that stalks thus harvested will remain exposed to the sun and elements for relatively long periods of time. There have been many machines proposed to do away with the just-described hand method of harvesting tobacco by cutting the stalk and placing it on a suitable stick. So far, however, little of this suggested machinery is being used, perhaps because of the high cost and complex nature and also perhaps because of the rough handling of the tender tobacco plants. At any rate the slow hand method still predominates.

In the harvesting of tobacco it has been the usual practice to include a topping operation. After the tobacco stalks have substantially reached their full height but prior to their maturity it has been the custom to top the stalks, or in other words simply to remove the very top portion. This, of course, involves a separate operation and an additional trip through the field either by laborers or by machinery as the case may be. It has been thought that this topping of tobacco will produce a wider leaf spread thus giving a heavier plant and more pounds to the acre. At the same time, however, such topping does produce suckers and it takes away some protection for the uppermost leaves.

I have found, however, that there are certain advantages to be gained by not topping the tobacco stalks until just prior to the very instant that the stalk is to be cut. Accordingly, I have incorporated in the machinery of my invention apparatus which will accomplish this job in conjunction with the complete harvesting of the tobacco.

There are certain advantages to be gained by not topping the tobacco until such time as it is to be cut. In the first place, untopped tobacco has practically no suckers. Secondly, the separate topping operation is eliminated thus appreciably reducing the time and money consumed in the overall culture of the tobacco. Thirdly, leaving the tops on the stalk provides additional protection for the uppermost tobacco leaves thus making usable a good portion of the stalk and leaves which has heretofore been wasted. Although there is a possibility that the total pounds of tobacco per acre will be reduced by leaving the tops on the plants until the final cutting operation, the total value of the tobacco per acre is greatly increased since the quality of the leaves is much higher. And tobacco, of course, is bought and sold on a quality basis, not by the weight alone.

My invention, therefore, includes the concept of topping the tobacco only at the time of the final cutting operation and then at a rather high level so as to leave enough of the highermost inferior leaves to protect the salable leaves and to provide a stalk and leaf portion which can be handled without fear of damage to the good leaves. This concept has also been embodied in the machinery of this invention wherein means are supplied in conjunction with the harvesting apparatus to effect topping as desired in the manner just explained. It should be clear that I do not intend to eliminate topping for there is no reason in permitting this portion of the stalk to remain during the curing operation nor is there any reason to go to the trouble of handling a stalk having this additional weight, but I do contemplate postponing this topping operation until the actual harvest time.

A very important object of my invention, therefore, is to provide machinery which may be moved through a tobacco field at a relatively high rate and which includes means for severing the stalk adjacent the ground, moving the severed stalk in an upright position toward the rear of the machine without damage to the leaves, providing means by which an operator may, with some mechanical help, guide and impale the severed stalks on a suitable stick or the like, and stack the stalk-bearing sticks in a suitable trailer as the machine progresses.

A further object of my invention is to provide machinery for harvesting tobacco which machinery is adapted for use in fields wherein the general height of the tobacco stalks may vary from year to year.

Yet another object of my invention is to provide tobacco harvesting machinery including novel means for severing the stalks.

A further object of my invention is to provide a machine having means for moving the stalk from the point of cutting to the point of impaling with a minimum of damage to the leaves.

Another important object of my invention is to provide a machine of the type described which can be manufactured economically, which is simple to use and maintain and which is rugged and durable under actual operating conditions in the field.

These and other advantages of my invention will become apparent to those skilled in the art during the course of the following description and with reference to the accompanying drawings. In these drawings like numerals are employed to designate like parts throughout and:

Figure 1 is a plan view, with parts broken away, of the machine of this invention,

Figure 2 is a side elevation of the machine shown in Figure 1,

Figure 3 is an enlarged perspective view of one of the sweeps used in this machine,

Figure 4 is an enlarged perspective view of a cup to engage the bottom of a stalk after it has been severed.

Figure 5 is an enlarged section on the line 5—5 of Figure 2,

Figure 6 is a section on the line 6—6 of Figure 5,

Figure 7 is an enlarged section on the line 7—7 of Figure 2,

Figure 8 is a section on the line 8—8 of Figure 7,

Figure 9 is a perspective view showing the stalk as it is about to be impaled on a suitable stick,

Figure 10 is a section on the line 10—10 of Figure 6,

Figure 11 is a section on the line 11—11 of Figure 8,

Figure 12 is a fragmentary plan view showing one facet of this invention,

Figure 13 is a side elevation of the machine portion shown in Figure 12,

Figure 14 is an enlarged section on the line 14—14 of Figure 12,

Figure 15 is a plan view of a portion of the sweep mechanism included in this machine,

Figure 16 is a side elevation of the apparatus shown in Figure 15,

Figure 17 is a section taken on the line 17—17 of Figure 2,

Figure 18 is a fragmentary plan view showing the turret mechanism employed in this machine,

Figure 19 is a section taken on the line 19—19 of Figure 18,

Figure 20 is a side elevation with parts broken away and shown in section, generally corresponding to that which would be seen from the right side of Figure 19,

Figure 21 is a side elevation with parts broken away and shown in section, showing a portion of the turret rotating mechanism,

Figure 22 is a side elevation with parts broken away and shown in section, showing a stick receiving socket carried by the turret,

Figure 23 is a fragmentary plan view of an alternative arrangement,

Figure 24 is an enlarged section on the line 24—24 of Figure 23, and

Figure 25 is a perspective view of a guard arm employed in this machine.

Figure 26 is a sectional view taken along the line 26—26 of Figure 20.

General arrangement

Referring now primarily to Figures 1 through 5 I shall describe the general arrangement of the machine of this invention. This particular machine is exemplary only; obviously modifications can be made without departing from the basic teachings of this invention. The main frame of my machine comprises a pair of U-shaped channel members 30 and a bottom plate 31 fixed thereto. Preferably the frame is bent as generally indicated at 32 so that the rear portion of the frame remains substantially horizontal while the forward end of the machine is brought rather close to the ground level. Perhaps these basic frame members are most clearly shown in Figure 10.

A pair of guide plates 33 is fastened to the upper portions of the members 30. As best seen in Figure 5 these plates 33 are cut as at 34 to provide a relatively large receiving mouth, such plates coming closer together as at 35 to aid in guiding the tobacco stalks as will become more apparent shortly.

The just described basic frame is supported on a pair of rear wheels 36 and smaller, forward wheels 37. It is contemplated that the machine will be propelled by a tractor such as indicated in dotted lines at 38 in Figure 1. To this end there are braces 39 and 40 extending between the tractor and the frame of my machine. These are pivotally mounted. Most tractors are provided with an hydraulic lift which includes a cylinder 41 mounted on a bracket 42. A member 41*a* connects the piston of this cylinder with the forward end of my machine so that such forward end may be raised as desired, for example, when it is desired to turn the machine upon reaching the end of a row.

Within the confines of the frame members 30, 31 and 33 I provide a driven, endless belt 42. On this belt are mounted a plurality of cups 43 to engage the lowermost portion of the tobacco stalk after it has been severed as will be described. I prefer that these cups 43 have a rather sharp edge, which is concaved in the direction of belt movement as indicated at 44. An annular saw-blade 45 comprising a buzz-saw cutter is provided adjacent the forward end of the machine near the regions of the cut-away portions 34 of the members 33. This blade 45 is adapted to lie close to the ground level when the machine is supported on the wheels 37. Means are provided to rotate this blade so that upon contact with a stalk it will cut it nicely. Supported in the framework just above the blade 45 is a plate 46 which slants from the blade 45 upwardly to bring the stalks into position to be engaged by the members 43 on the belt 42. This plate will also protect the drive gearing for the blade from being fouled up by loose leaves or other debris.

Supported on the plates 33 at either side and above the buzz-saw cutter 45 is a pair of shafts 47 each having a plurality of fingers 48 fixed thereto. These are rotated so that the fingers move in the direction of the arrows indicated in Figure 5. These fingers 48 are so positioned as to engage the stalk of the severed plant at a short distance above its base and right after its severance. These fingers aid in pushing the severed stalk up the plate 46 into position for engagement with the cups 43 on the belt 42.

In the preferred embodiment of my machine I employ a protruding support rod 49 extending from a suitable shaft or bracket 50, see also Figure 25, which may be fixed on one of the members 33. This rod 49 is mounted on that side of the machine which is adjacent that portion of the field in which the stalks have just been cut by a previous pass of the machine; this is commonly known as the "land" side of the machine. The purpose of this support rod is to prevent stalks from tipping over too much during and just preceding the cutting operation as might otherwise occur since there is no standing row of tobacco stalks to prevent tipping in this direction. This is about the only direction in which the stalks reasonably could be expected to tip since it is supported on its other side by adjacent, growing tobacco plants. An examplary tobacco plant is indicated at 51 in the various figures.

In conjunction with the belt 42 and cups 43 for moving the tobacco stalks between the plates 33 after the saw has severed the stalk, I provide a pair of shafts 52 and 53 which are mounted for rotation on one of the side members 30. A chain 54 engages sprockets 112 (see Figure 13) which are fixed near the upper ends of these shafts. A plurality of sweeps 55 are mounted at regular distances on this chain. These sweeps are designed to engage the uppermost portion of the tobacco plant 51 as it is cut by the buzzsaw 45. It should be remembered that these uppermost tobacco leaves are of little value and it is not harmful for the sweeps to engage such leaves. In addition the action of these sweeps is very gentle. To this end they may be formed of a somewhat flexible material.

An additional pair of upright shafts 56 and 57 is provided. These shafts are also rotatably mounted on one of the side frame members 30. Adjustably fixed on each of these shafts is a pulley member 58. A belt 59 engages these pulleys. It will be understood that the sprockets 112 for the chain 54 may be adjustably mounted on the shafts 52 and 53 in the same manner as are the pulleys 58 on the shafts 56 and 57.

The chain 54 moves in such a direction that the sweeps 55 will engage the tobacco plants 51 and, along with the belt 42 and cups 43, urge the plants toward the turret 60. The direction of movement of the belt 59 is also in the direction of this turret. The purpose of the belt 59 is to prevent the tobacco plants from being dragged along and unnecessarily roughed up should they tend to

fall from engagement with the chain **54** and sweeps **55**. I do not think it is necessary to provide the belt **59** with sweeps similar to those indicated at **55** although this could be done if desired.

As best seen in Figure 2 the shafts **56** and **57** are maintained in proper position by tie-rods **61** having bearings **62** for the shafts **56** and **57**. A similar arrangement is provided for the shafts **52** and **53**. A plurality of intermediate, upright brace rods **63** may also be employed to lend rigidity and strength to the machine.

The rotatable turret **60** includes a plurality of sockets **64** to receive sticks or spears **65** on which a number of tobacco plants will be impaled. A seat **66** for the operator is secured to the frame mechanism. As the tobacco plants are cut and then moved towards the turret **60** by the combined action of the belt-cup **42**, **43** and sweeps **55**, aided also by the belt **59**, an operator at the station **66** will take hold of the plant **51** and force it on one of the sticks **65**. The forward end of that stick **65***a* which is in position to pierce a plant **51**, see Figure 2, is so arranged that upon the plant **51** striking the point of this stick the base of such plant will still be engaged by one of the cups **43** on the belt **42**. In this manner the operator is aided in forcing the plant upon the stick. Shortly after the plant has been placed on the stick **65***a* and moved away from the point the cup **43** will move out of contact with the stalk base whereupon the operator will shove the plant along the stick depending on how many are already in place thereon.

A support plate **67**, or other means as will be described, is provided for those stalks which have been placed on one of the sticks in the manner described.

Also mounted on the frame structure in the vicinity of the turret **60** is a storage bin **68** for the sticks **65**. It is contemplated that an operator stationed in this position will be certain that the sockets **64** are always provided with sticks **65** when brought to position to receive the plants **51**.

A suitable hitch **69** is provided by means of which a trailer or the like **70** may be pulled along with my machine. Another operator will take sticks **65** having a plurality of plants **51** impaled thereon and stack them in this trailer.

As shown in dotted lines in Figure 1 I may also provide a side guard **71** to prevent plants of tobacco adjacent the row being cut from falling over and otherwise interfering with the operation of the machine.

From the foregoing it will be clear that the general arrangement of my invention includes a frame on which is rotatably mounted a conveyor belt **42** having a series of cups **43** to engage the stalks of tobacco after they are severed by the cutter **45** and brought into receiving position by the moving fingers **48**. The plants are also engaged by the sweeps **55** on the chain **54** which moves upon rotation of the shafts **52** and **53**. The relative height of this chain and these sweeps may be adjusted according to the size of the plant in the field, which will vary from year to year and even from field to field depending on soil and weather conditions. Continued movement of the cut stalks is aided by the traveling belt **59**. The plates **33** serve to bring the base of the stalk into alignment with a stick **65** supported in a socket **64** in the turret **60**. As the operator forces a plant **51** onto a stick **65***a* he is aided by the continued engagement for a short time of the cup **43** with the base of the stalk. Upon a suitable number of stalks being placed on the stick **65***a* this stick is removed and another brought into place. It is contemplated that operators will keep the turret supplied with sticks and will remove the filled sticks and neatly stack the cut tobacco in the trailer **70** as the machine progresses through the field. As stated it is contemplated that the machine be tractor driven in the manner described.

Driving mechanism

Having now described the general operation of my machine, including a description of the basic parts, I shall go into greater detail with respect to the manner in which the various moving mechanisms are driven. At the outset let it be stated that in this embodiment I have shown all the drives as operated from movement of the axle **72** supporting the wheels **36**. It is to be understood, however, that a power takeoff direct from the tractor may be employed if desired.

Describing first the drive for the belt **42** it will be observed that I have fixed a sprocket **73** to the shaft **72**. A chain **74** engages this sprocket with a sprocket **75** mounted on a stub-shaft **76** which is fixed in the machine frame. These drive mechanisms will be best seen in Figures 1, 2, 5 through 8, 10 and 11. As best seen in Figure 7 the sprocket **75** is fixed to a gear **77**. The combined sprocket and gear **75—77** are rotatable on the shaft **76**.

A shaft **78** extends across the frame members **30** and has a gear **79** fixed thereto, this gear meshing with the gear **77**. Also mounted on the shaft **78** is a large pulley **80** which engages the belt **42** thereby driving same. In order to make this drive for the belt **42** more positive I fix a sprocket **81** to the shaft **78** and engage this sprocket with a chain **82** which also engages a sprocket **83** on a shaft **84** located toward the front end of the machine. Also mounted on the rotatable shaft **84** is a pulley **85** similar to that indicated at **80** on the shaft **78**. The shaft **84** will also extend across the frame of the machine as indicated by the side members **30**.

From the foregoing it will be apparent that as the machine is moved through the field the wheels **36**, and consequently the axle or shaft **72**, will rotate in a clockwise direction. The chain **74** and sprocket **75** engaged thereby will also move in a clockwise direction as will the gear **77** which is fixed to the sprocket **75**, both of these latter members being mounted for rotation on the shaft **76**. Such movement of the gear **77** will impart counter-clockwise movement to the gear **79** as viewed in Figure 7. This in turn will cause counter-clockwise movement of the shaft **78** and, through the sprocket **81**, chain **82**, sprocket **83** and shaft **84**, counter-clockwise movement of the pulley **85** as well. The pulleys **80** and **85** thus being turned in a counter-clockwise movement as shown in Figures 5 and 7, the belt **42** will be moved so as to bring the cup-shaped members **43** on the upper flight thereof into engagement with stalks of the plant **51** so as to aid in moving them from the cutter **45** toward the turret **60**.

As best seen in Figures 5, 6 and 10 the drive for the sawblade or buzz-saw cutter **45** is obtained as follows. A gear **86** is mounted on one end of the shaft **84**. This gear meshes with another gear **87** fixed on a shaft **88** extending through and supported by the frame members. Centrally of the shaft **88** is mounted a spiral gear **89**. The spiral gear **89** meshes with another spiral gear **90** mounted on a shaft **91** supported in a suitable bracket **92** which is fixed at either end to the members **30**. The saw blade **45** is also mounted on the shaft **91**.

From the foregoing it will be observed that rotation of the shaft **84** as explained in conjunction with the means for driving the belt **42**, will result in rotation of the shaft **88** through meshing of the gears **86** and **87**. The spiral gear mounted on the shaft **89** will engage the spiral gear **90** on the shaft **91** thereby rotating same. It is to this last mentioned shaft that the saw blade **45** is fixed and in this manner it will be rotated. It will be further understood that the various gears are related to give the desired speed to the buzzsaw cutter.

Referring now particularly to Figures 7, 8 and 11 I shall describe the means for driving the chain **54** and the belt **59**. Also fixed on the shaft **78** heretofore described is a sprocket **93**. A chain **94** engages this sprocket with a sprocket **95** fixed on a shaft **96** extending through the machine frame. To this end the shaft **96** may be sup-

ported in bearing brackets 97 fixed to the lower plate 31.

Miter gears 98 and 99 are fixed on the shaft 96. A cylindrical bearing bracket 100 is fixed to the left-hand frame member 30 as viewed in Figure 11. The upright shaft 52 earlier mentioned is rotatably received in this bracket 100. To the lower end of the shaft 52 is fixed a miter gear 101 which meshes with the gear 98. A collar 102 on the shaft 52 maintains these gears in proper relationship while the hub of the gear 101 prevents upward movement of the shaft 52 upon the machine hitting bumps or other obstacles in the field. As before described, rotation of the shaft 52 in this manner will cause rotation of the chain 54 which engages a sprocket fixed to the shaft 52.

The earlier mentioned shaft 56 is received in a bearing 103 fixed to the right hand frame member 30 viewed in Figure 11. This shaft 56 has a miter gear fixed thereto as indicated at 104 to engage with the gear 99. A collar 105 properly positions the parts with respect to one another in the same manner as does the part 102 aforementioned. It will again be obvious that rotation of the shaft 96 will rotate the shaft 56 along with the shaft 52. Rotation of the shaft 56 will move the belt 59 since it engages a pulley 58 fixed to the shaft 56.

From the foregoing it will be apparent that the drive mechanism for the shafts 52 and 56 includes the sprocket and gear 75—77 which are rotatably mounted on the shaft 76 and which are chain-driven from the drive axle 72, the shaft 78 which is gear-driven through engagement of the gear 79 with the gear 77, and the shaft 96 which is chain-driven from the shaft 78 as indicated at 94, the gears 98 and 99 fixed to the shaft 96 engaging with the gears 101 and 104 respectively. It will be understood that the shafts 53 and 57 are also mounted for rotation. To this end they may be mounted in brackets 106, see Figure 2, which are fixed to the frame members, there being a collar 107 and 108 fixed to the shaft 57 on either side of such brackets. The shaft 53 may be similarly mounted, as also may be the auxiliary support shafts 63.

Referring now to Figures 5 and 10 I shall describe the manner in which the shafts 47 are rotated so as to bring the guide fingers into play. As just noted the shaft 57 is supported in a bearing 106. A pulley 109 is fixed to the shaft 57 between the collar 108 and the bracket 106. A belt 110 engages this pulley with a pulley 111 fixed on the shaft 47. The arrangement for the shaft 53 is identical so like reference numerals have here been employed. It will be apparent, therefore, that each of the shafts 47 which carry the guide fingers 48 will be rotated upon rotation of the shafts 53 and 57.

Topping means

Earlier I referred to the desirability of deferring the topping operation until such time as the stalk is to be severed. Accordingly I may provide means for use with the machine of this invention which will top the tobacco just prior to the time that it is cut by the buzz-saw cutter 45. This mechanism is best seen in Figures 12, 13 and 14.

In Figure 13 I have shown the top of the shaft 53 as having a sprocket 112 fixed thereto. As earlier mentioned this sprocket may be adjusted at the desired height by means of the setscrew 113. The chain 54, to which the sweeps 55 are mounted, engages this sprocket as well as a similar one on the shaft 52 which latter shaft may be driven as herein before described. 61 and 62 represent the tie rod and upper bearing for the shaft 53.

From the bearing 62 I extend a flange 114 in which I journal a stud shaft 115. Mounted on this shaft 115 is a gear 116. A gear 117 is fixed to the uppermost end of the shaft 53. The gears 117 and 116 mesh in driving engagement one with the other. Also fixed to the shaft 115 is a cutter blade 118 which may have a cutting edge 119 and an upstanding portion 120 to insure that the top or bloom is knocked off as the cutter blade rotates. As viewed in Figures 12 and 13 the shaft 53 and gear 117 will be rotating in a clockwise direction which means that the gear 116 and blade 118 will be rotated in a counter-clockwise direction. Such movement of the blade 118 will result in the top or bloom cut from the stalk being moved towards the land side of the machine as it is moved through the field of tobacco.

Sweep control

Referring now to Figures 15 and 16 I shall describe an arrangement which it may be desirable to employ with this invention. As the sweeps 55 push the top of the tobacco plant toward the turret 60 they will approach the shaft 52 and will thus have to move through 180 degrees as they turn about this shaft. During such turning movement the sweeps 55 will be moving at a much faster rate. It may be that this would result in the tobacco plant being thrown too hard against the support plate 67. The means now to be described provide a way in which the sweep 55 may be lifted from engagement with the tobacco plant so as not to handle it too roughly.

As shown in Figures 15 and 16 each of the sweeps 55 is pivotally mounted on the chain 54 by means of brackets 121 having a pin 122 therethrough. Such pin will also pass through the sweep 55 and it will be understood that abutment means, note 55*a*, are provided to keep the sweep 55 from rotating downwardly. Each sweep 55 is provided with a finger 123 fixed thereto and extending across the chain 54.

From the bearing 62 of the tie-rod 61 I provide a lug 124 in which I fix a shaft 125. To this shaft 125 I fix a cam member 126. It will be apparent that the shaft 125 may be held at different positions in the lug 124 so that the cam member 126 may be adjusted as desired.

As the sweep 55 approaches the shaft 52 the finger 123 will engage beneath the sloping forward portion of the cam member 126. Continued movement of the chain 54 and sweep 55 will cause the finger 123 to be depressed. When this finger is thus moved downwardly the sweep 55 will be moved upwardly and out of contact with the top of the tobacco plant. After the sweep has completed its turn about the shaft 52 the finger 123 will come out of engagement with the cam member 126 whereupon the sweep 55 will then be in its normal horizontal position ready to engage the top of another plant to be cut and moved according to the teachings of this invention.

Stalk rest

I have referred to means for supporting the stalk after it has been impaled on a stick 65. Such means are perhaps best seen in Figures 17, 23 and 24. In Figure 17 I have illustrated the member 67. This is simply a plate which is tilted at an angle of about 45 degrees with the plate member 33 to which it is fixed. Stalks which have been placed on the sticks 65 may lean against this plate 67 until such time as the stick 65 is removed as will be described.

In some instances it may be desirable to eliminate this plate 67. In Figures 23 and 24 I have illustrated another manner in which support may be given for these stalks while they are on the stick 65 and before such stick has been removed. It will thus be observed that to the socket 64 I fix a plate 127 by means of a bracket or other rigid connection 128. This plate will slant upwardly from the socket and will be elongated to extend a good portion of the length of the stick 65. The bracket 128 will maintain the plate 127 to one side of the socket 64 so that there is sufficient room to push the stalks of the plants 51 along the stick 65 all as clearly seen in Figure 23. In Figure 22 I have illustrated one manner of forming the sockets 64 herein discussed. Such a socket contains a spring 129 which will bear against the stick 65 when it is inserted whereby to keep this stick from being accidentally dislodged from the socket. The socket

64 has a rearward extension 130 by means of which it is mounted for pivotal movement in a vertical plane as will be next discussed.

Lift means for the stick sockets

In some instances and arrangements in the machine of this invention it may be desirable to so place the seat 66 with respect to the spear end of the stick 65*a* when in position to receive the stalks of tobacco plants, to provide means whereby the stalk-loaded stick will be certain to clear the operator without his having to go through unnecessary gymnastics. To this end I find it desirable to provide means for first raising the stick and then rotating the turret. The mechanism for accomplishing this is perhaps best seen in Figures 18, 19 and 20.

The turret mechanism generally indicated at 60 includes a circular plate 131 which is fixed to one of the upper plate members 33. This plate 131 has an upstanding flange of particular configuration. This upstanding flange 132 is slotted just sufficient to receive one of the sockets 64. That portion of the flange 132 which defines one side of this slot is indicated at 132*a*, see Figure 20. It will be observed that the flange portion 132*a* is vertical. The other side of the socket receiving slot is sloped as indicated at 132*b*. This slope may be rather gradual and is indicated in Figure 18 as starting at the point 132*c*. The sloped portion 132*b* terminates at 132*d*; the distance between the point of termination 132*d* and the vertical wall portion 132*a* is just sufficient to receive nicely a socket 64.

Located centrally within the flange 132 is a vertical shaft 133 to which a member 134 having outstanding lugs 135 is fastened. It is to these lugs 135 that the members 130 of the sockets 64 are pivoted. The height of the flange 132, the length of the socket 64 and the pivotal connection with the member 134 is sufficient to permit a socket to reach the position of the socket 64*b* shown in these figures.

The socket 64*a* is in that position which it would be made to assume when it contains a stick onto which a plurality, usually about six, tobacco plants are to be placed. After the preferred number of stalks have been impaled on the sticks contained in the socket 64*a* it is desired to raise this socket and stocks so that the socket may be brought to the position of the socket 64*b* wherein it will rest on the uppermost part of the upstanding flange 132.

Supported from the frame immediately adjacent one side of the seat 66 is a shaft 136, see Figure 2. To one end of this shaft is fixed a lever 137 having a foot pedal 138. This lever and pedal are so arranged as to be engaged easily by the operator who is stationed on the seat 66. The shaft 136 may be made to rock by movement of the lever 137.

Referring now to Figures 20 and 26 the lever 137 mounts a slidable latch member 137*a* resiliently urged to the position shown by means of a spring 137*b*. Thus upon counterclockwise movement of the lever 137 about the axis of the shaft 136 (Figure 20) the latch member 137*a* will strike a short lever arm 139 and impart rocking movement to a shaft 139*a* upon which the lever 139 is mounted.

As best seen in Figure 2 the shaft 139*a* also extends rearwardly of the machine to mount a second lever arm 139*b* which, referring again to Figure 20, is slotted to engage a pin 139*c* extending forwardly from a bar or push rod 141 which in turn is vertically slidable within a suitable bearing 140 provided in the member 131.

Thus it will be understood that upon actuation of the lever 137 the latch 137*a* will engage the lever 139 and impart rocking movement thereto and to the shaft 139*a* and lever 139*b* to move the push rod 141 upwardly from the position shown.

The various parts are so arranged that prior to actuation of the lever 137 by the operator the push rod 141 will be in the position of Figure 19 wherein its upper end, which lies under a socket 64*a*, is so positioned as to permit this socket to lie in a horizontal plane. A compression spring 142 assures proper return of the push rod 141 to the position shown in Figures 19 and 20.

As also seen in Figures 19 and 20 I have provided a short shaft 143 which is mounted in bracket members 144 fixed on a plate 145 which may be secured to the basic frame structure. A lever 146 having a stud 146*a* is fixed to one end of the shaft 143 and a dog or pawl 147 is fixed to the other end of the shaft. A torsion spring 148 engages the shaft 143 and one of the members 144 so as to urge the pawl 147 into engagement with the push rod 141 which has a notch 149 to receive the pawl whereby the push rod will be maintained in its uppermost elevated position after being lifted thereto. The pawl may be released from engagement within the notch 149 by pressure upon the stud 146*a* whereupon the spring 142 will return the rod 141 to its lowermost position.

With reference to Figure 20 it will be observed that while the lever 137 moves in an arc about the axis of the shaft 136 the lever 139 moves in a relatively shorter arc about the axis of the shaft 139*a*. Thus, depending on the proportions of the parts, the latch 137*a* will become disengaged from the lever 139 after predetermined movement of the members. As this occurs the push rod 141 will have been lifted sufficiently to permit the pawl 147 to engage the notch 149 and retain the rod in lifted position. Also, with the latch 137*a* now disengaged from the lever 139, the lever 137 may be moved farther through its arc of movement to effect actuation of other mechanism serving to rotate the turret as will presently be described.

The lift means for the stick sockets as just above described operates as follows. It will be understood that there is a stick in the socket 64*a* which is in the position shown in Figures 18 and 19. Upon a sufficient number of tobacco stalks being impaled upon this stick the operator will press upon the pedal 138 so as, through the latch 137*a*, lever 139, shaft 139*a* and lever 139*b*, to lift the rod 141. As the lever 137 is pushed to the right in Figure 20 the member 141 will be raised a distance sufficient to permit the pawl 147 to engage within the notch 149. As this position is attained the parts are so arranged that the latch 137*a* becomes disengaged from the lever 139, the pawl 147 serving to maintain the rod 141 in position. The latch 137*a* becomes disengaged from the lever 139 due to the different arcs of movement of the two members, the latch passing beneath the lower end of the lever as disengagement occurs. The lever 139 has an inclined side 139*d* (Figure 26) which coacts with the spring pressed latch member 137*a* to permit the parts to later return to position.

As the push rod 141 is lifted to its raised position as just above described the rod 141 will have moved the socket 64*a* about its pivoted connection 130—135 until it is in position to clear the top edge of the upstanding flange 132. With the socket and the stick carried therein in this position it is now desired to rotate the turret so as to move this socket to the position indicated at 64*b*. The mechanism for doing this is actuated by further movement of the lever 137 as will now be described.

Means to rotate the turret

Referring now particularly to Figures 2, 18, 19 and 21 I have shown a ratchet wheel 150 fixed near the lower end of the shaft 133 disposed centrally of the upstanding flange 132. Pivotally mounted on this shaft 133 beneath the ratchet wheel 150 is an arm 151. One end of this arm carries a ratchet member 152 designed to engage the ratchet wheel 150 in conventional manner so that movement of the arm 151 in a clockwise movement will result in a rotation of the shaft 133 while counter-clockwise movement of the arm 151 will result in no corresponding movement of this shaft.

A series of levers is provided to actuate this ratchet arm **151**. Accordingly I have shown a lever **153** engaged to the end of the arm **151**. This lever **153**, as best seen in Figure 21, is slotted as at **153***a* to slidably receive a stud **154***a* extending from a lever **154**.

The lever **154** is fixed on the shaft **136** and rocks therewith as the pedal **138**, mounted on the forward end of this shaft, is actuated by the operator. By reason of the slotted arrangement thereof no movement will be imparted to the member **153**, and consequently to the turret rotating mechanism, until the stud **154***a* has moved to the end of the slot **153***a*. This delayed action allows lifting of the sockets to their elevated positions as above described before rotation of the turret is initiated.

It will now be apparent that as the member **153** is actuated the ratchet arm **151** and its ratchet member **152** will be rotated in clockwise direction as seen in Figure 18, whereupon the member **152** will engage with a tooth of the ratchet wheel **150**, so as to rotate the shaft **133** and the socket members pivotally affixed thereto. I have shown four of these socket members although it will be understood that other numbers may be employed. The arrangement of these socket members, the shaft **133** and the ratchet mechanism is such that the shaft will be turned through 90 degrees upon actuation of the turn lever **154**. When the lever **154** is moved by actuation of the foot-operated lever **137** it will, during the course of this movement, strike the stud **146***a*. This will result in the dog **147** being moved out of engagement with the notch **149** so that the rod **141** may be spring-returned to its lower position.

It will thus be apparent that when the operator pushes on the pedal **138** a socket **64***a* will be raised a distance sufficient to clear the top edge of the slot **132***a*. Engagement of the dog **147** in the notch **149** will maintain this socket member in its elevated position. The operator will then press further on the foot pedal whereupon the shaft **133**, through the various levers and ratchet members described, will be turned 90 degrees. As this happens the member **154** will engage the stud **146***a* so as to release the dog **147** from the notch **149** after the socket **64***a* has been moved a sufficient distance that it will rest on the top edge of the flange **132**. The spring **142** will return the push rod **141** to its lower position.

As one socket in the position **64***a* is first raised and then moved by rotation of the shaft **133** another socket will move from the position of **64***c* to that formerly occupied by the socket at **64***a* In so moving the socket **64***c* will slide down the gradual slope **132***b*. No further registering mechanism is needed since the socket **64***c* will abut the cut-away vertical edge **132***b* upon reaching its lower position and contact with the upper end of the rod **141**. Upon release of the foot pedal a spring **157** will return the ratchet mechanism to starting position. A torsion spring **156** (Figure 2) may be provided to return the foot pedal to starting position.

Operation

It is believed that the operation of the machine of this invention has been set forth rather fully above. Accordingly only a brief review of the general operation will be set forth at this time.

As the machine is moved through a field of tobacco by a tractor **38** or the like power for the various rotating parts may be derived from suitable transmission means engaged with the wheel axle **72**. As earlier stated, however, it is possible to utilize a power take-off from the tractor if this is desired. As the machine thus moves through the field the buzz-saw cutter **45** will be rotating at a speed sufficient to sever the stalk of tobacco. At the same time the fingers **38** will be rotating toward one another so as to engage the lower part of the stalk and move it over the plate **46** between the members **33** until such time that it may drop by gravity onto the moving belt **42** to be engaged by the cup-shaped members **43**.

Simultaneous with the just described movement the sweeps **55** mounted on the chain **54** will engage the tops of the plants and gently urge them between the guide plates **33**. It will be apparent, therefore, that as the stalk is severed by the cutter **45** it is engaged by the fingers **48** and sweeps **55** to move it in a vertical position toward the moving belt **42**. Upon reaching the belt **42** the stalk is released by the fingers **48** and engaged by the cup members **43**. Continued movement of the stalk in a vertical plane is assured by the combined action of the members **43** and **55**.

Also, if desired, the mechanism of Figure 12 may be employed in connection with the shaft **53** so that the top or bloom of the tobacco is cut off just prior to its severance by the cutter **45**.

The parts are so arranged that as the stalk of tobacco is moved toward the turret **60** the operator stationed at the seat **66** may grasp the stalk near its base and guide it onto a spear **65***a*. As the operator forces the plant stalk **51** onto the spear **65***a* he is initially aided by continued engagement of the members **43** with the lowermost part of the stalk **51**. Right after the stalk has been placed on the stick, however, the belt **42** will begin its return flight so that the cup **43** will disengage. This is perhaps best illustrated in Figure 9.

As the stalk is impaled on the stick **65***a* it may be supported either by a plate such as shown at **67** or by the members **127** fastened to the socket **64** as indicated in Figures 23 and 24. Also, as the stalk is being impaled on the stick **65***a* and as the sweeps **55** reach the upstanding shaft **52**, these sweeps may, if desired, be raised clear of the tobacco plant by the mechanism shown in Figures 15 and 16 so that the fast movement of these sweeps as they start their return flight will not throw the tobacco plant with undue force against either the plate **67** or the member **127** as the case may be.

After a plurality of the tobacco plants have been impaled on a stick **65***a* I prefer that such loaded sticks be tilted or raised so that upon rotation of the turret **60** the end of the stick will easily clear the operator at the seat **66**. To this end the operator will depress the pedal **138** whereupon the push rod **141** will move the socket **64***a*, in which is secured the stick **65***a* by the means shown in Figure 22, so as to bring this socket in position to clear the slotted edge **132***a* of the upstanding flange **132** of the turret **60**. This socket member will be maintained in its raised position while the operator pushes the lever farther to cause rotation of the turret as described. As the turret is thus rotated the catch mechanism for maintaining the rod **141** in its upper position will be released whereupon the rod **141** will be returned to its initial position under influence of the spring **142**. Another stick **65** will have been placed in the empty socket **64** and such a socket and stick will slide down the sloped portion **132***b* of the flange **132** to the position formerly occupied by the socket **64***a* and its stick **65***a*.

It will be understood that in the preferred arrangement there will be an operator who will continually supply sticks **65** to the sockets **64**. Loaded sticks **65** will be taken from the sockets **64** and stacked in the trailer **70** by yet another operator.

It will be apparent to those skilled in the art that certain changes and modifications may be made in my invention without departing from its scope and spirit. It is to be understood that while I have shown this invention as embodied in certain particular structures and arrangements, I do not intend to be limited to such structures and arrangements except insofar as they are set forth in the subjoined claims.

Having thus described my invention, what I claim as new and what I desire to protect by United States Letters Patent is:

1. A machine for harvesting tobacco which includes an elongated frame, saw means on the forward end of said frame disposed to engage and sever tobacco plant

stalks adjacent the ground, a flat endless belt mounted on said frame and extending from adjacent said saw means and running lengthwise of said frame, means on said frame to move said belt, endless chain means mounted on said frame at a higher level than and parallel to said belt and running lengthwise of said frame, means on said frame to move said chain means, a plurality of sweeps on said chain means extending substantially horizontally therefrom and disposed to extend across said belt and engage the tops of tobacco plants severed by said saw means, substantially horizontally disposed rotating fingers mounted on said frame adjacent said saw means, said fingers being located between said belt and said sweeps and disposed to extend forwardly beyond said saw means to guide severed stalks to said belt, upstanding abutments on said belt to engage the lower ends of said stalks, said belt means and said sweeps cooperating to move said severed tobacco plants in an upright position rearwardly of said frame, and means on the rearward end of said frame in line with said belt to hold a tobacco stick in position to receive stalks of the severed plants as moved by said belt and sweeps from such saw means.

2. The machine of claim 1 in which said saw means comprises a buzz saw cutter.

3. The machine of claim 1 including a pair of guide plates disposed above said belt and defining a slot running centrally lengthwise of said belt, said slot being wide enough to receive the tobacco plant stalks.

4. The machine of claim 1 including an endless belt disposed adjacent said chain means, and means on said frame to move said last mentioned belt in the same direction and at the same speed as said chain means.

5. The machine of claim 1 in which said saw means is disposed beneath the upper run and ahead of the forward end of said flat belt, and a plate sloping from immediately adjacent said saw means to a position terminating just above the forward end of said belt, said rotating fingers serving to move a tobacco plant stalk from the saw means, up the plate and onto the belt.

6. The machine of claim 1 in which there are two sets of said rotating fingers, each set being located in a substantially horizontal plane, one set being lower than the other, and one set being located to either side of the saw means.

7. The machine of claim 1 including plant top cutting means mounting on the forward end of said frame and extending forwardly of said saw means.

8. The machine of claim 1 in which said upstanding abutments comprised a plurality of sharp-edged, cup-shaped members disposed at regular intervals on said belt so that the sharp edges will contact the tobacco plant stalks delivered to said belt.

9. The machine of claim 1 in which said sweeps are pivoted to said chain, means normally maintaining said sweeps in a substantially horizontal plane, and cam means operatively associated with said frame to raise said sweeps as they approach said stick holding means.

10. The machine of claim 1 including support means against which the tobacco plants may rest after being placed on a said tobacco stick.

11. The machine of claim 1 in which the said tobacco stick holding means comprises a rotatable turret, socket members on said turret to receive releasably said sticks, and means to rotate said turret.

12. The machine of claim 1 including a support arm projecting forwardly of said saw means to prevent undue displacement of tobacco plant stalks prior to their engagement by said finger.

13. The machine of claim 1 in which said upstanding abutments are disposed to release said stalks shortly after they have been forced on a said stick.

14. The machine of claim 10 in which said support means comprises a plate mounted on said frame longitudinally thereof, said plate being disposed adjacent said stick holding means and sloping from said frame away from said stick holding means.

15. The machine of claim 10 in which said stick holding means includes sockets to receive said sticks, said support means comprising elongated plates fixed to said sockets, said plates extending along said sticks and slanting upwardly away therefrom.

16. The machine of claim 11 in which said socket members are pivoted on said turret for movement in a vertical plane, inclined cam means for said sticks and push means to rock said sockets upwardly about their pivots, whereby said sticks ride on said cam means as said turret is rotated.

17. The machine of claim 16 in which said turret comprises a flat plate fixed to said frame and having an upstanding flange, said flange being slotted to provide a vertical wall and a sloping wall, said walls opposing one another and at their lower ends being spaced apart sufficient to receive a socket, said push means being disposed to rock a socket about its pivot a height sufficient to clear said vertical wall, and said rotating means moving said socket from said vertical wall onto said upstanding flange.

18. The machine of claim 1 including support means on said frame for the severed stalks located opposite said chain means parallel to said belt.

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