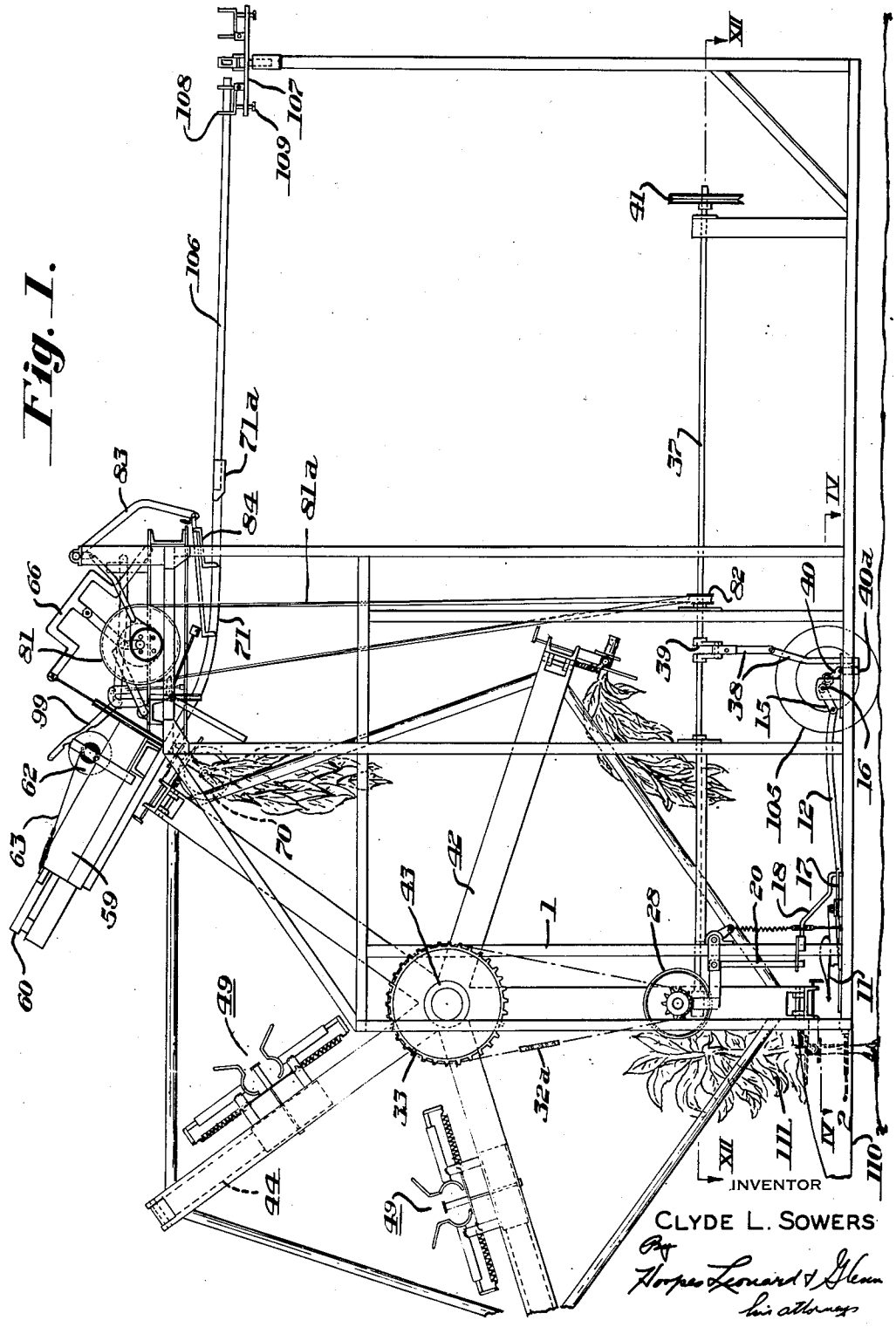
Aug. 14, 1951 C. L. SOWERS 2,564,614

HARVESTING MACHINE FOR TOBACCO PLANTS AND THE LIKE

Filed May 10, 1949 8 Sheets-Sheet 1

Fig. 1.




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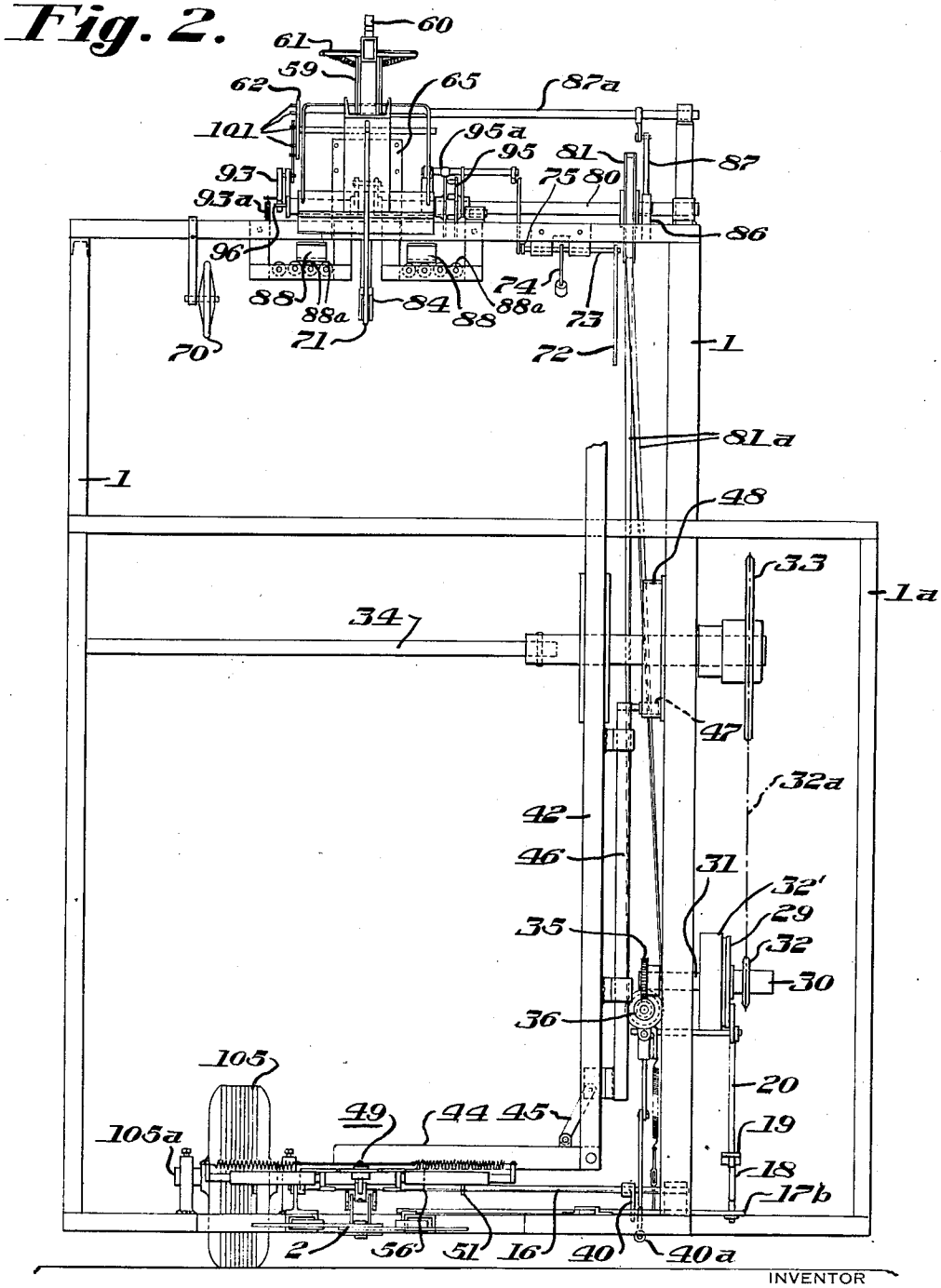
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HARVESTING MACHINE FOR TOBACCO PLANTS AND THE LIKE

Filed May 10, 1949 8 Sheets-Sheet 2

Fig. 2.




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HARVESTING MACHINE FOR TOBACCO PLANTS AND THE LIKE

Filed May 10, 1949 8 Sheets-Sheet 3

Fig. 3.

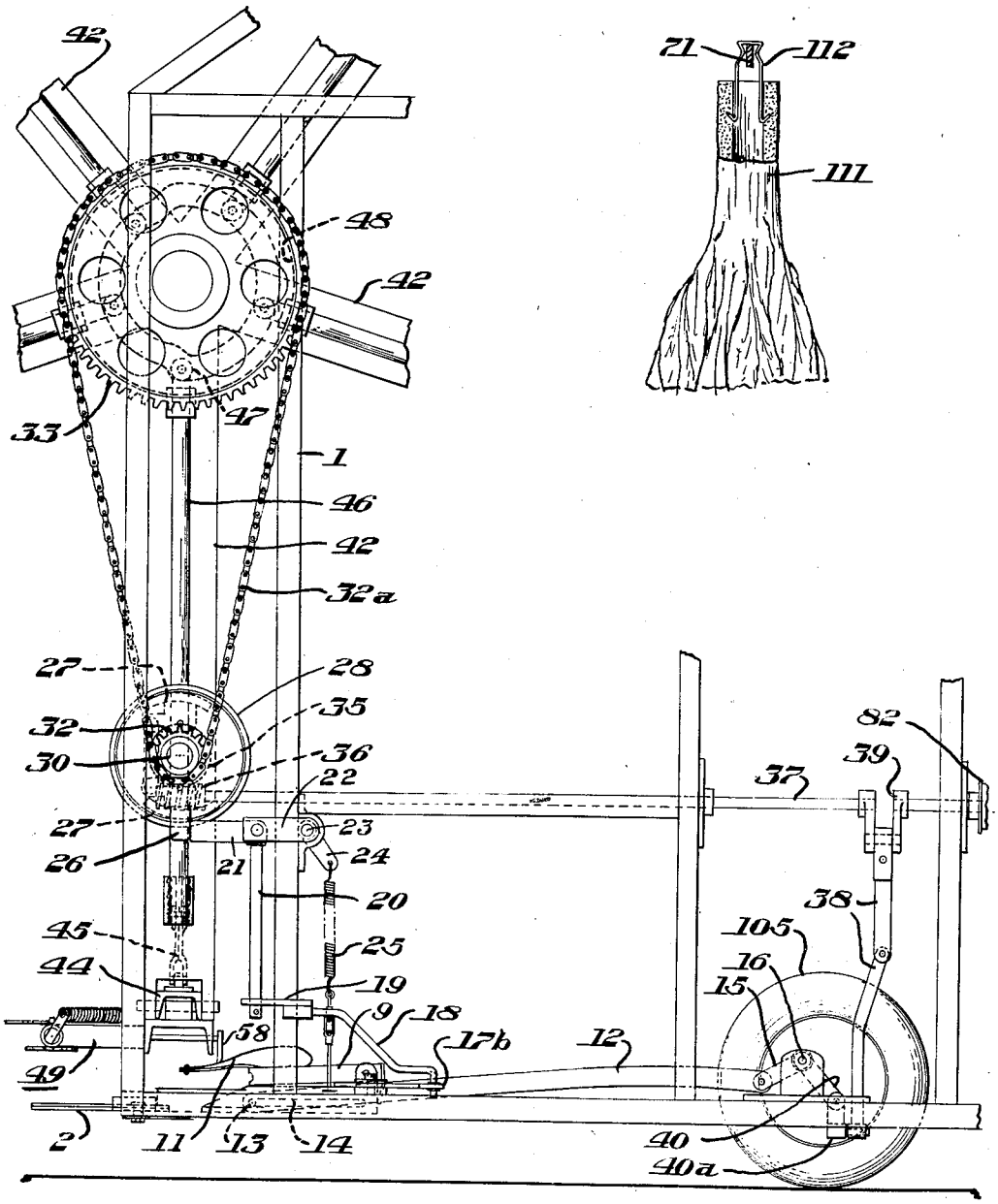



Fig. 11.



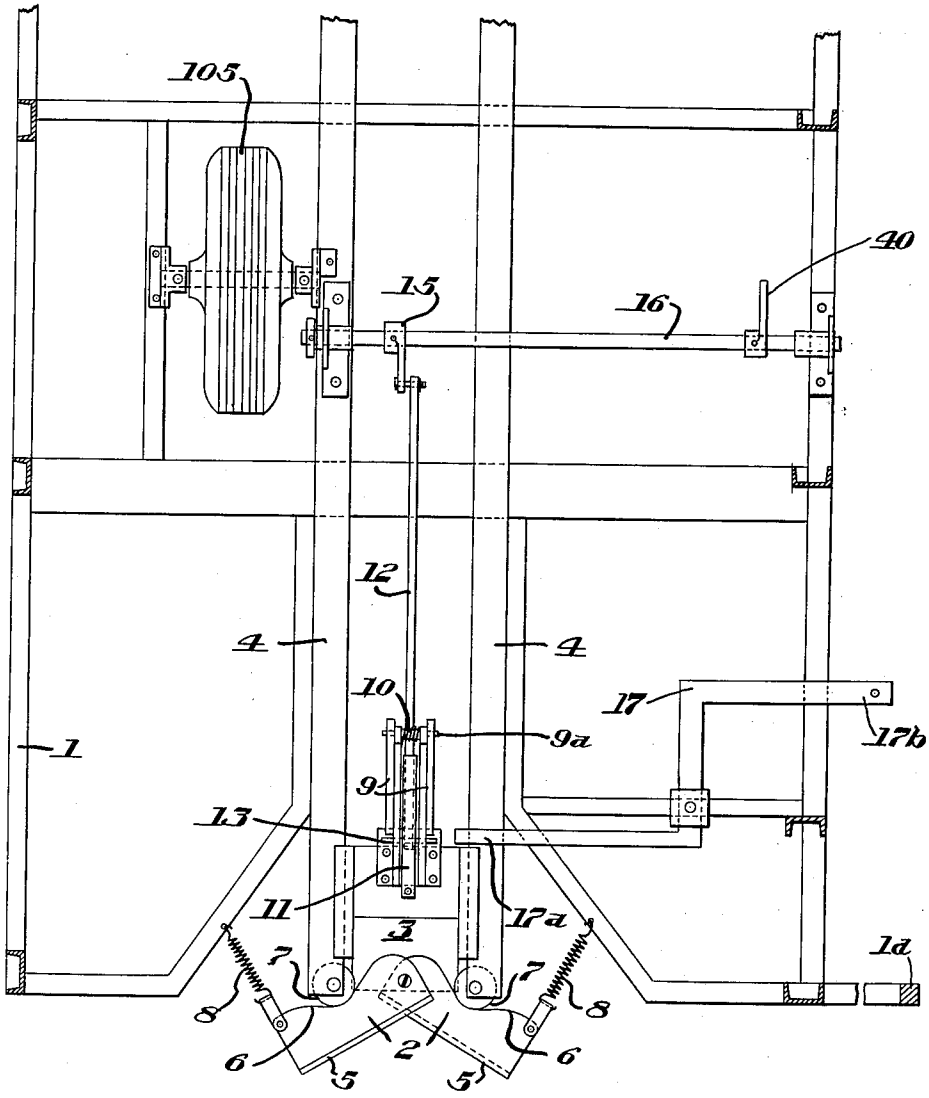

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HARVESTING MACHINE FOR TOBACCO PLANTS AND THE LIKE

Filed May 10, 1949 8 Sheets-Sheet 4

Fig. 4.




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HARVESTING MACHINE FOR TOBACCO PLANTS AND THE LIKE

Filed May 10, 1949 8 Sheets-Sheet 5

Fig. 6.

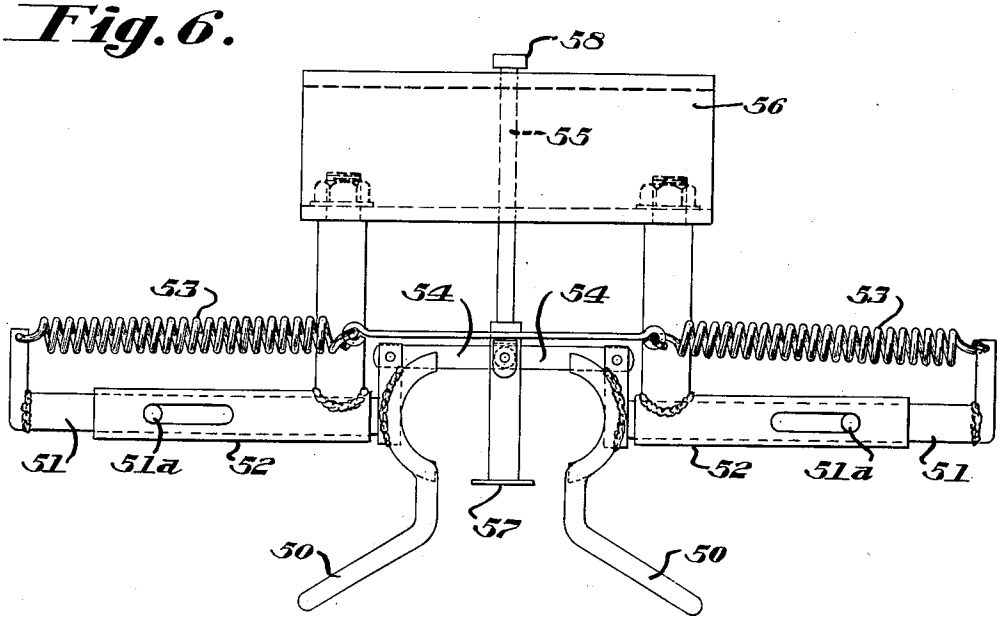
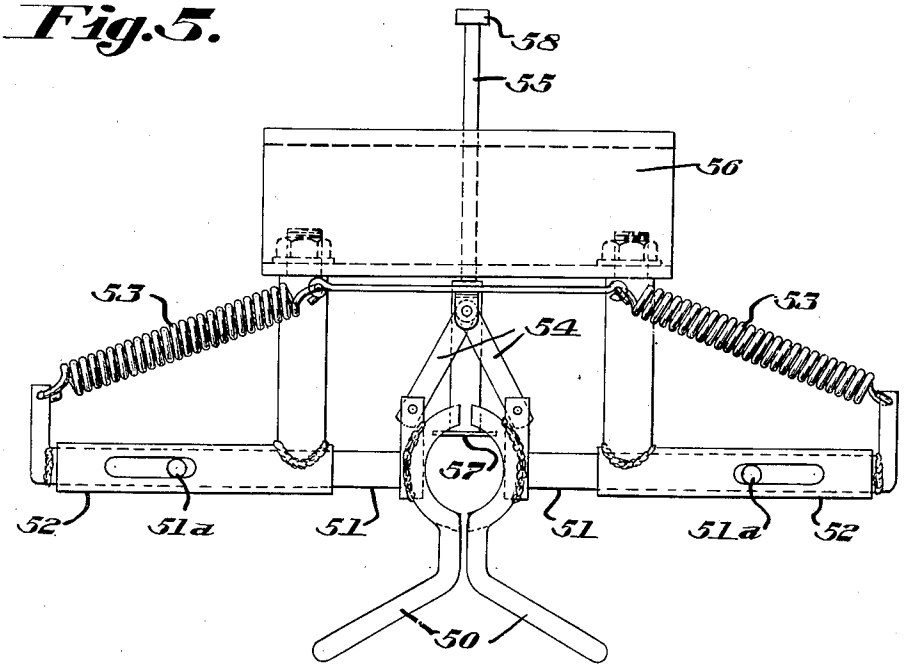



Fig. 5.



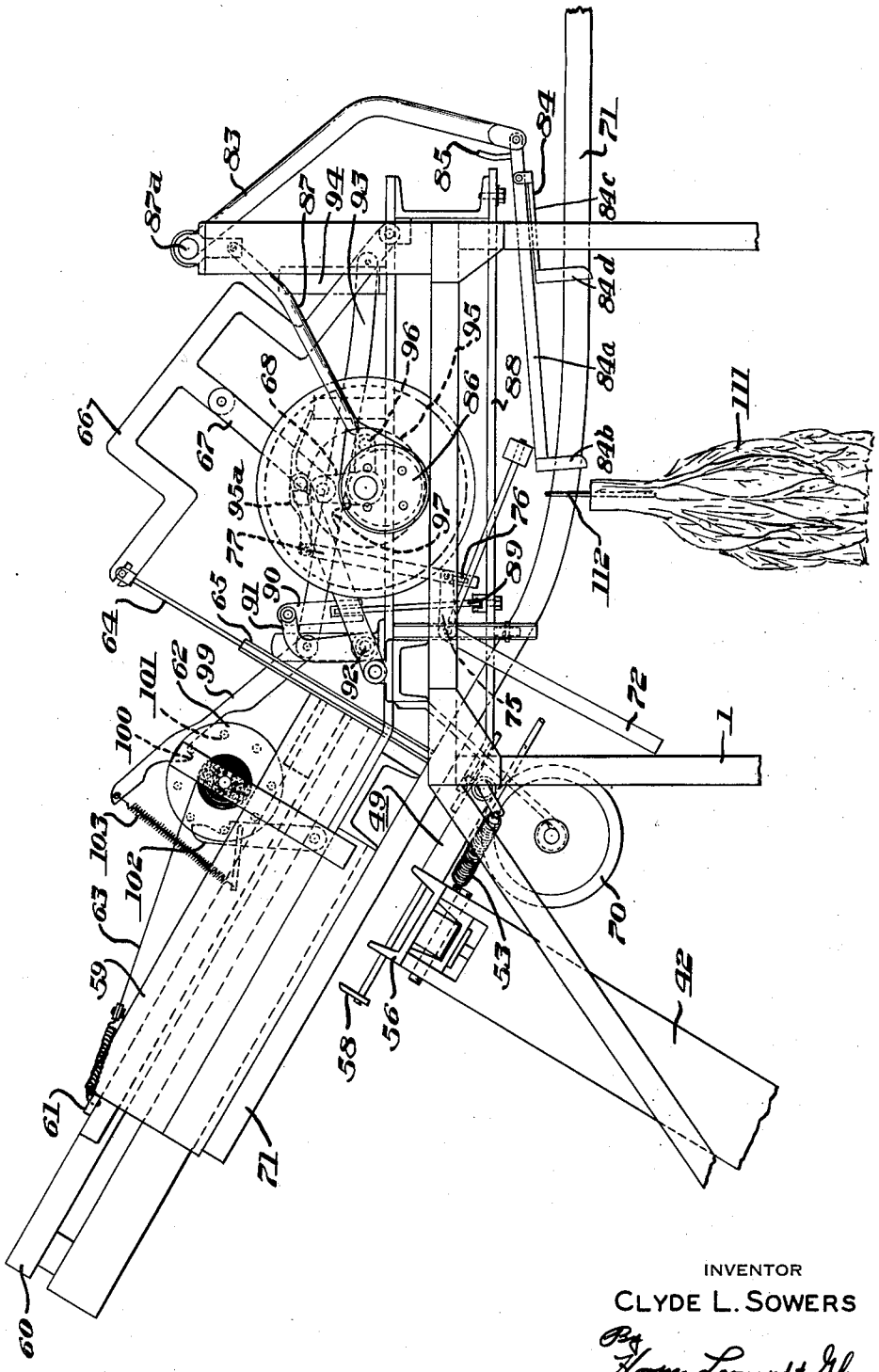

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HARVESTING MACHINE FOR TOBACCO PLANTS AND THE LIKE

Filed May 10, 1949 8 Sheets-Sheet 6

Fig. 7.




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Aug. 14, 1951 C. L. SOWERS 2,564,614

HARVESTING MACHINE FOR TOBACCO PLANTS AND THE LIKE

Filed May 10, 1949 8 Sheets-Sheet 7

Fig. 8.

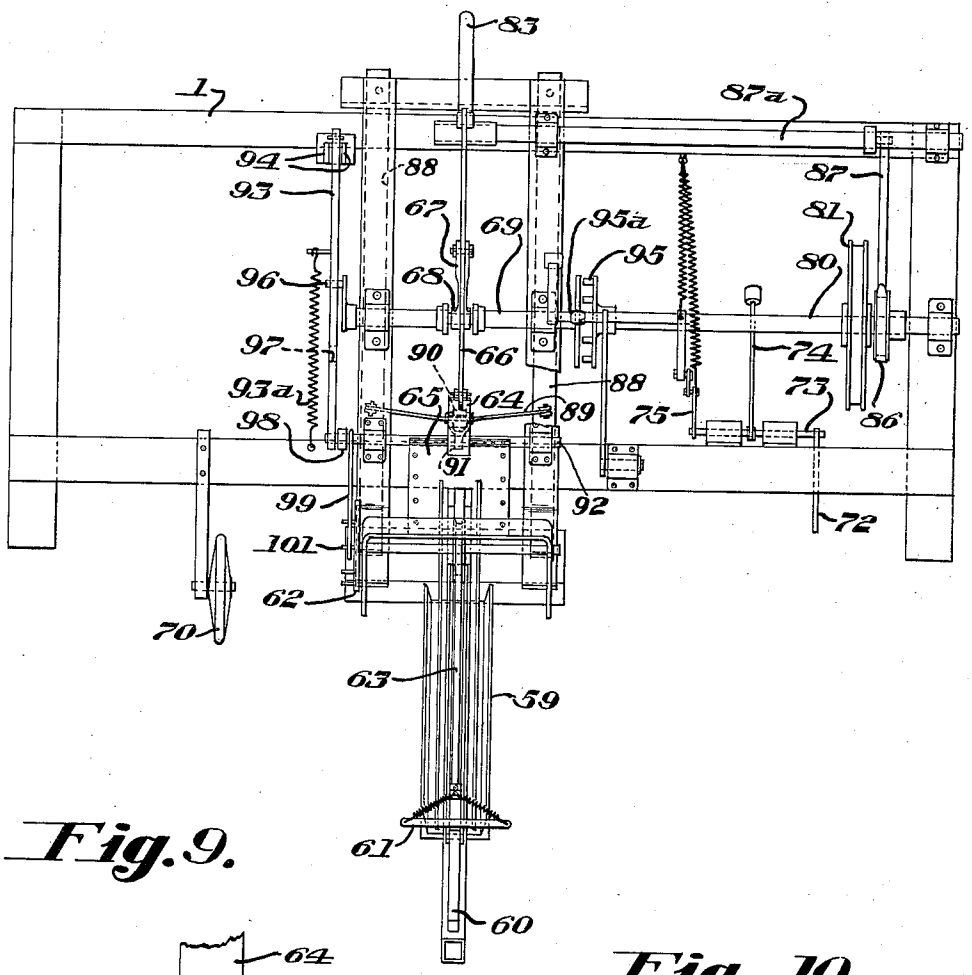



Fig. 9.

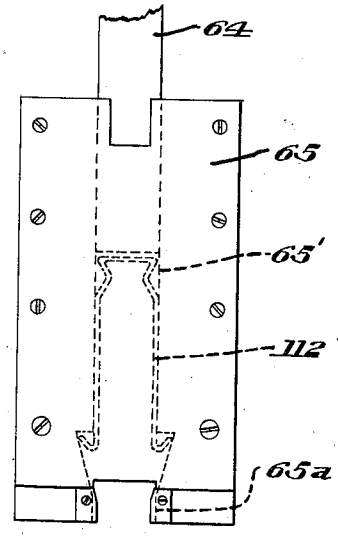
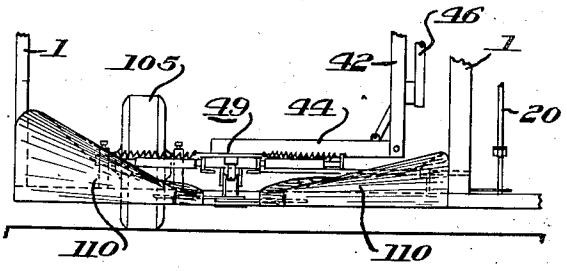



Fig. 10.




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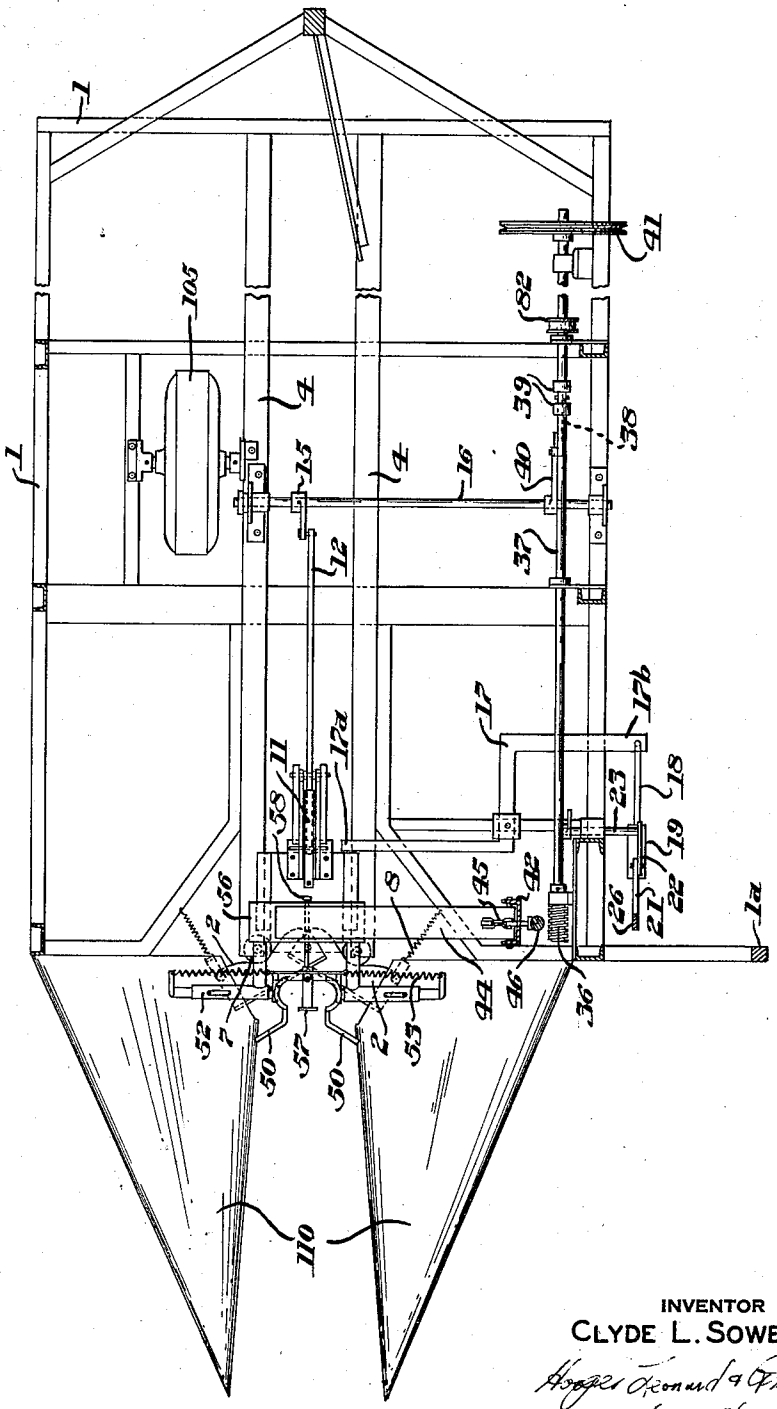
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HARVESTING MACHINE FOR TOBACCO PLANTS AND THE LIKE

Filed May 10, 1949 8 Sheets-Sheet 8

Fig. 12.




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2,564,614

# UNITED STATES PATENT OFFICE

2,564,614

## HARVESTING MACHINE FOR TOBACCO PLANTS AND THE LIKE

Clyde L. Sowers, Palmyra, Pa.

Application May 10, 1949, Serial No. 92,304

22 Claims. (Cl. 56—27.5)

1

This invention relates to a harvesting machine for tobacco plants and the like and more particularly to a harvesting machine for harvesting and hanging such plants without damaging the leaves or stalks. The harvesting of tobacco has in the past been a long, tedious and, consequently, expensive step in the growing of tobacco. In harvesting fine tobacco especially, it has been necessary to cut and hang the plants by hand in order to preserve the outer leaves and stalk from damage. Since the quality of tobacco is very closely related to the physical condition of the leaves as well as to the type of tobacco, it is essential that the leaves be preserved in the best possible condition. It is therefore necessary that any machine used for harvesting tobacco must not only cut and hang the plant but must do so without tearing or bruising the leaves.

It is well-known that tobacco and certain other types of plant stalks have, when mature, a somewhat pithy or soft center or even a hollow center surrounded by a harder shell of plant material which although it may be resilient is still strong enough to support the weight of the plant.

I have invented a harvesting machine for plants of this type, in which I take advantage of the characteristic stalk structure described above. My invention will cut and hang such plants without damage to the exterior leaves and, in the case of tobacco, in a manner comparable to the best hand-cut product. I shall describe the structure of my harvesting machine as particularly applied to the harvesting of tobacco but it may be used for harvesting any like plant where the problems of harvesting are similar.

The harvesting machine of my invention comprises, in general, a main frame having severing means adapted to cut the tobacco plant adjacent the ground and a rotary conveying means pivoted on the frame and passing adjacent the severing means to carry the tobacco plant upward to an inverted position where it is automatically removed onto a hanger. The frame may be mounted on the side of a tractor or it may be drawn along a row of plants by any other suitable source of motive power. Connections are provided through which the severing means and the conveying means may be operated each time a plant to be harvested enters the conveying means. Removing means and connections through which said means may be operated each time a plant comes adjacent the removing means are provided on the frame for

2

removing a plant delivered from the severing means by the conveying means.

Generally, the severing means may be in the form of a pair of blade members pivotally mounted on a base plate which is slidable in guide members on the frame, which base plate is adapted to draw the blades into the guide members to close them in shearing relation about a plant. The base plate may be actuated by a reciprocating arm which is slidably engaged thereon and which has a spring loaded depressible engaging member adapted when depressed to lock the arm and base plate in positive engagement. The conveying means is preferably made up of a plurality of radially disposed arms extending outwardly from a hub which is pivoted on the frame and is rotatable in a vertical plane. A lifting member is pivoted in the end of each of these arms and normally extends therefrom at an angle of about 90°. This lifting member is retractible to a position parallel with and adjacent the arm upon which it is pivoted. Cam means on the frame adjacent the hub act to retract and drop the lifting member at the proper time for lifting a plant. Gripping means may be provided on each of the lifting arms for gripping the plant adjacent the severing blades before completion of the severing operation. This gripping means may include a plurality of spring loaded fingers extending forward of the conveying means and lying above the severing means, said fingers being held apart by collapsible toggle arms which are connected together by a pivot pin and which are adapted to be collapsed by a trip member connected to the pivot pin and extending between the fingers where it is in position to strike a standing stalk. The trip means is also adapted to depress the engaging member on the reciprocating arm which causes the arm and base plate to engage drawing the knife blades back into the guide members in shearing engagement about the butt of a plant held in the fingers of the gripping means.

The removing means may include hanger means suspended from the frame and lying adjacent the circumference of a circle described by the rotating gripping means, stapling means securing the tobacco plant on the hanger means and release means for releasing the fingers of the gripping means from about the stalk of the plant.

The connections through which the various parts of the structure of this invention are made to operate may be connected to the power take-off of the tractor used to convey it, or from

a source of power mounted on the frame or from any other suitable and available source of power.

In the accompanying drawing I have illustrated a present preferred embodiment of my invention in which

Figure 1 is a side elevation of a tobacco harvester according to my invention;

Figure 2 is a front elevation of the same harvester with a portion of the rotating arms broken away;

Figure 3 is a partial side elevation of my tobacco harvester showing the severing means and a portion of the conveying means;

Figure 4 is a section on the line IV—IV of Figure 1;

Figure 5 is a plan view of the gripping means in closed position;

Figure 6 is a plan view of the gripping means in open position;

Figure 7 is a side elevation of the removing means of my invention including stapling means, hanger member and release means;

Figure 8 is a plan view of the removing means;

Figure 9 is an end elevation of the staple box;

Figure 10 is a partial front elevation showing deflector members mounted on the frame; and

Figure 11 is a partial section through a stapled tobacco plant.

Figure 12 is a section on the line XII—XII of Figure 1.

Referring first to Figure 1, I have illustrated a tobacco harvester having a main frame generally indicated at 1. A pair of severing blades 2 are pivotally mounted on a base plate 3 slidable in guide members 4 on the frame (see Figure 4). Each of the blades 2 has a cutting edge 5 and a rear cam surface 6 adapted to pass over a roller 7 rotatably mounted on the end of each guide member 4. A spring 8 connects the outer edge of the blade 2 with the frame 1 so as to maintain the blades in the open position when the base plate 3 is forward in the guide members. Spring loaded depressible engaging member 9 made up of two arms rotating on a pin 9a is mounted at the rear of the base plate 3. A spring 10 tends to keep the engaging member 9 in a generally horizontal position over the base plate. A ramp 11 is mounted on the front of the engaging member 9 where it cooperates with a trip member, later to be described, to force the engaging member 9 downwardly into the base plate. An arm 12, having in one end a pin 13 slidable in a slot 14 in the base plate 3, reciprocates between the guide members 4. The opposite end of the arm 12 is connected to a crank arm 15 on a transverse shaft 16 journaled on the frame.

A release arm 17 is pivoted intermediate its ends on a pin fixed to the frame. One end 17a of the arm 17 lies at the rear of the base plate 3 so that movement of the base plate causes the arm to pivot. The opposite end 17b of the arm 17 has an upwardly extending arm 18 pivoted thereon. The opposite end of the arm 18 carries a forked member 19 which engages the lower end of a toggle link 20 having a projecting arm 21 at right angles to its end. A second toggle link 22 is pivoted to the end of the toggle link 20 and the opposite end is mounted on a pin 23 journaled on the frame and connected to an arm 24 which cooperates with a spring 25 fastened to the frame to maintain the toggle arm 22 and the arm 21 in the generally horizontal direction. The arm 21 abuts a release member 26 which is connected to a pair of brake members 27 forming a part of a one-revolution clutch generally indicated at 28. The brake members 27 are mounted on a disk 29 which is firmly attached to a sleeve member 30 rotatable on a driven shaft 31. When the release arm 17 is actuated by the movement of the base plate 3 it moves the arm 18 forward along the frame causing the forked member 19 to engage the toggle link 20 which is drawn downwardly against the pressure of the spring 25. This frees the release member 26 from the arm 21 permitting the brake shoes 27 to spring outwardly against a drum 32' which is firmly attached to the drive shaft 31, this causes the disk 29 and sleeve 30 to rotate with the shaft 31. A sprocket wheel 32 mounted on the sleeve 30 transmits the motion of the sleeve 30 to a second sprocket 33 through a sprocket chain 32a. The sprocket wheel 33 is mounted on a shaft 34 which passes through the frame and is journaled therein. The shaft 31, which carries sprocket wheel 32, is driven by a worm gear 35 which engages a worm 36 on the end of a main drive shaft 37.

The shaft 16 which actuates the cutter arm is also driven by the main drive shaft 37 through toggle arms 38 connecting a crank 39 on the main drive shaft and a toggle link 40 and crank 40a on the shaft 16. The drive shaft 37 is adapted to be driven by a V-belt connection from the power take-off of the tractor through the pulley 41 on the end of the shaft.

A plurality of conveyor arms 42 are radially disposed about a hub 43 which is fixedly mounted on the shaft 34. A lifting arm 44 is pivoted to the outer end of each radially disposed arm and is adapted to be retracted to a position adjacent the radially disposed arm 42 upon which it is pivoted by means of a link 45 and sliding member 46 mounted on the radially disposed arm. The retraction is brought about by the sliding movement of the cam member 46 as a cam follower 47 on its inner end follows a cam track 48 mounted on the frame and surrounding the shaft 34. A gripping means 49 is mounted on the lifting arm 44 adjacent its outermost end. The gripping means is made up of a plurality of fingers 50 which are fastened to the ends of sliding arms 51 mounted in a tubular member 52 which forms a part of the gripper base. The arms 51 are under tension from a pair of springs 53 which tend to draw them together at the center. The fingers 50 and the sliding arms 51 are held apart by a pair of toggle links 54 which are pivoted on a trip member 55 slidably mounted in the base of the grip means 56. The trip member 55 has a forward projecting end 57 adapted to lie ahead of the cut of the severing blades and in the center of the open fingers 50. When a plant strikes the end 57 of the trip member, the toggle links 54 are forced backward releasing the fingers 50 and the sliding arms 51 causing the fingers 50 to grip the plant stalk. At the same time, the opposite end 58 of the trip member engages the ramp 11 on the engaging member 9 thereby depressing the engaging member and causing the severing blades 2 to be drawn back into the guide members by the reciprocating arm 12. This movement cuts the stalk and actuates release arm 17 thereby starting the conveyor.

A staple container 59 is mounted on the top of the frame. A staple track 60 extends down through the center of the container 59 and supports a load of staples in proper stapling position

in the box. A follower 61 is mounted on the staple track 60 and acts to move the staples forward in the container by reason of the tension exerted thereon by the ratchet wheel 62 and spring steel line 63. A driving head 64 is mounted in slots 65' at either side of the delivery end of the staple container. The slots have a restricted end 65a which compresses the barbs of a staple 112 as it leaves the container so that they spring out into the shell of the plant after the staple is driven (see Figure 9). The driving head is slidably attached to one end of an arm 66 pivoted on the frame. Movement of arm 66 about its pivot on the frame causes the driving head to reciprocate in the slots 65' thereby forcing a staple 112 into a stalk 111. A crank arm 67 mounted on an eccentric 68 intermediate the ends of the shaft 69 actuates the arm 66.

A supporting wheel 70 is mounted on the frame so that the end of the lifting arm 44 will rest thereon while the driving head 64 forces a staple from the staple container 59 through the guide slot 65 over the hanger member 71 into the butt of the plant.

A trip member 72 is mounted on a shaft 73 which is journaled on the frame. The trip member 72 is adapted to lie in the path of the rotating arms of the conveying means. When one of the rotating arms strikes the trip member 72, the trip member is raised upwardly until released by the arm. When released it drops downwardly and swings through its former position by virtue of the momentum caused by its own weight and the weight of a counterbalance 74 which is suspended from the shaft 73. A crank arm 75 on the opposite end of the shaft from the trip member 72 is forced upwardly in a slot 76 in a release arm 77. Continued movement of the crank arm 75 raises the release arm which releases a one-revolution clutch 95 connecting the shaft 80 with the shaft 69. The shaft 80 is continuously rotated through belt connection 81a between a pulley 81 mounted thereon and a pulley 82 on the main drive shaft 37.

After a plant is stapled by the action of the drive head 64, release members 88 move against pins 51a on the sliding arms 51 of the gripper means and open the gripper fingers. Each of the release members 88 is pivoted at one end to the frame. A pair of toggle links 89 are pivoted together at one end to a link 90, and the opposite end of each is pivoted on one of the release members 88. The link 90 is connected to the end of a bell crank 91 which is mounted on a rock shaft 92 journaled in the frame. The shaft 92 is caused to oscillate by a sliding arm 93 which slides backward and forward in the guide members 94. A crank arm 96 on the end of the shaft 69 engages a notch 97 in the bar 93 as the shaft rotates causing the bar to move backward in the guide members 94 drawing with it the crank arm 98 which is mounted on the end of the shaft 92. A return spring 93a returns the bar 93 to its original position after released by the crank arm 96. The movement of the crank arm 98 depresses the bell crank 91 thereby applying pressure on the upper ends of the toggle links 89 which press upon members 88 at an acute angle to the plane of their movement thereby causing them to move apart across the rollers 88a. As the members 88 move apart they contact the gripper means, forcing them apart and opening the gripper fingers and spreads the release members 88. At the same time, the ratchet arm 99 which is connected to the crank arm 98 draws the ratchet wheel 62 forward by means of a tooth 100 thereon which engages a pin 101 on the wheel. The ratchet wheel is moved forward the distance between two adjacent pins and is locked in position by means of the catch 102 which engages a pin on the ratchet wheel. The catch 102 and ratchet arm 99 are connected by a spring 103 so that the catch remains in positive engagement with the ratchet pins 101 at all times.

A continuously reciprocating arm 83 pivoted on the frame carries a raking member 84 which is adapted to draw the stapled plants along the hanger member. The raking member 84 is made up of a main arm 84a pivoted at one end on the free end of reciprocating arm 83 and terminating at the other end in a forked member 84b having fingers adapted to pass over and lie one on each side of the hanger member 71. An auxiliary raker arm 84c is hinged at one end to and depends from the main arm 84a adjacent its pivoted end. A second forked member 84d having fingers adapted to pass over and lie one on each side of the hanger member 71 is attached to the free end of the auxiliary raker arm. When the member 83 moves forward the raking member 84 is moved forward along the hanger member until a pin 85 projecting upwardly thereon strikes the back of the frame whereupon continued movement of the arm 83 raises the raking member 84 permitting the stapled plants to slide downwardly beneath the rake. Backward movement of the member 84 drops the raking member behind the stapled plant and draws the plant toward the rear of the frame. The reciprocating arm 83 is connected to an eccentric 86 on the shaft 69 by a connecting arm 87 and shaft 87a.

A pneumatic tired wheel 105 is journaled on a shaft 105a on the base of the frame 1 to aid in carrying the weight of the harvester when mounted on the side of a tractor. It is of course obvious that the number and position of such supporting wheels may be changed to suit the type of motive power. In operating the harvesting machine above described, the frame 1 is attached to a tractor, for example, by bolting the side member 1a of the frame 1 to the frame of the tractor and the pulley 41 on the main drive shaft 37 is connected through a belt to the power take-off of the tractor. If a source of motive power be used which does not have a power take-off, then a small gasoline motor may be mounted on the frame or any other drive means may be utilized. The frame is moved along a tobacco row in such a manner that the trip member 55 is in line with the row of plants. As the machine is moved forward along the row a pair of removable deflector members or snouts 110 mounted on the frame and extending forward thereof, one on either side of the severing blades 2, lift the lower leaves of a plant and support them above the severing blades. On continued forward movement the contact end 57 of the trip member 55 strikes a plant stalk 111, releasing the toggle links 54 causing the gripping fingers 50 to grip the plant stalk. At the same time, the opposite end 58 of the trip member engages the ramp 11 on the engaging member 9 thereby depressing the engaging member and causing the severing blades 2 to be drawn back into the guide members 4 by the reciprocating arm 12 which is continuously driven from the main drive shaft 37 by the transverse shaft 16 and crank arm 15. The movement of the severing blades as directed by the cam surfaces 6 and rollers 7 cuts the plant

stalk and leaves it free from the ground, supported only by the gripping fingers.

When the blades are drawn back the release arm 17 is pivoted on the frame and acts through the linkage made up of members whose action has previously been described to release the brake members 27 of the one-revolution clutch 28. These brake members spring outward against the drum 32 and connect the sleeve 30 with the continuously rotating shaft 31 which is driven by the main drive shaft 37 through the worm 36 and worm gear 35.

The sleeve 30, carrying sprocket wheel 32, rotates one revolution and is stopped by the release member 26 of the brake members striking the arm 21 thereby releasing the brake members from the drum.

The rotation of the sprocket wheel 32 is transmitted by a sprocket chain 32*a* to the sprocket wheel 33 which is mounted on a shaft 34 carrying the conveyor arms 42. The diameter of the sprocket wheel 33 is so related to the diameter of the sprocket wheel 32 that one revolution of sprocket wheel 32 will turn the conveyor arms 42 only the distance between two arms. In this way an arm carrying a tobacco stalk in its gripping fingers will be moved away and replaced by the next adjacent arm each time the sprocket 32 makes a single revolution.

As the conveyor arms 42 revolve they carry the plant stalks about a circle so that when the stalk comes adjacent a point about 145° from the point where it was cut it is in substantially inverted position. At this point, the end of lifting arm 44, which is pivoted on the conveyor arm and which carries the gripping means and stalk, rests upon the supporting wheel 70.

In rotating to this point, however, the conveyor arm must strike the trip member 72 which when released swings downwardly actuating the release arm 77 which lifts a stop 95*a* permitting the one-revolution clutch 95 to connect the continuously rotating shaft 80 with the shaft 69. The shaft 80 is connected through a pulley 81 and belt 81*a* to a pulley 41 on the main drive shaft 37. When the shaft 69 rotates through one revolution, the arm 66 is first drawn downwardly which forces the driving head 64 down the slots 65 in the delivery container carrying with it a staple 112. The staple passes down over the hanger member 71 into the cut end of the stalk which is held in inverted position by the gripping fingers. As the shaft 69 continues its rotation and starts to lift the arm 66, the crank arm 96 on the end of the shaft 69 engages the notch 97 in the sliding arm 92 and draws it back through the guide members 94. The sliding arm is connected to the crank arm 98 which rotates the shaft 92 for a part of a revolution when the sliding arm moves. This causes the bell crank 91 to spread the toggle links 89 and thereby spread the release members 88 which move against pins 51*a* on the sliding arms 51. This opens the gripping fingers 50 to a point where toggle links 54 lock them in the open position and releases the staple plant stalk which is suspended on the hanger member by the staple driven into its cut end.

When the crank arm 98 oscillates its also draws the ratchet arm 99 in the direction of oscillation. This causes the tooth 100 on the ratchet arm to engage a pin 101 on the ratchet wheel 62 and to rotate the ratchet wheel the distance between a pair of the pins on said ratchet wheel. This in turn draws the follower 61 along the staple track 60 forcing a new staple in position for stapling. As the crank arm 96 rotates the remainder of its revolution it releases the sliding arm which is drawn back to its original position by the spring 93*a*, bringing the release members 88 back to normal position and moving the ratchet arm back away from the pin 101. The ratchet catch 102 then holds the ratchet wheel in its new position by engaging one of the pins 101.

The stapled stalk 111, which is now suspended on the hanger member 71 by the staple 112, is drawn toward the rear of the frame by the raking member 84 whose movement has already been described. As the stapled stalks accumulate they are forced back from the hanger member 71 onto a secondary hanger member or "lath" 106 which is suspended on one end in a troughlike end 71*a* on the hanger member and on the other end by a rotating turntable 107 which is adapted to hold a plurality of such laths. The turntable has a plurality of slotted holders 108, each of which is adapted to hold a lath. Each of these holders is pivoted on the turntable so that the laths can be carried in the vertical direction and each has a leveling screw 109 below it to bear the weight of the lath and contents when lowered to the horizontal position. When a lath is filled with plants it is removed from its position between the hanger member 71 and the turntable 107 and is placed on a rack wagon for transfer to the drying barns. A new lath is then immediately moved into position for filling.

The lifting arm 44 moves away from the supporting wheel 70 when a new plant is contacted and is retracted into a position adjacent and parallel to the radially disposed conveyor arm 42 by the action of cam member 46, cam follower 47 and cam track 48. The lifting arm remains in this position until ready to drop into position over the severing means to receive the next plant in the row at which time the same cam mechanism drops it into place. This retracting mechanism is designed to prevent injury to succeeding plants in the row by the movement of the lifting arms.

While I have shown and described a present preferred embodiment of the invention, it is to be understood that the invention is not limited thereto but may be otherwise variously embodied within the scope of the following claims.

I claim:

1. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means including a plurality of radially disposed arms mounted on a hub pivoted on the frame and adapted to rotate in a vertical plane, a lifting member pivoted in the end of each arm and having gripping means mounted thereon for gripping the plant adjacent the severing means, trip means on the gripping means adapted to close said gripping means about the plant, connections actuated by said trip means and connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means are operated each time a standing plant strikes the trip means, and removing means mounted on the frame adjacent the circumference of the circle formed by the rotating conveying means and actuated thereby for removing the harvested plant from the gripping means.

2. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotary conveying means pivoted on the frame to pass adjacent the severing means,

connections between the severing means, the conveying means and a source of power whereby the severing means and conveying means are intermittently operated each time a standing plant to be harvested enters the conveying means, hanger means suspended from the frame, a portion of which extends substantially tangential to the circumference of the circle formed by the rotating conveying means, stapling means mounted on the frame adjacent the hanger means for securing the tobacco plant on the hanger means and connections actuated by the conveying means and connecting the source of power and the stapling means whereby the stapling means is operated intermittently each time a plant comes adjacent the hanger means.

3. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotary conveying means pivoted on the frame to pass adjacent the severing means, gripping means on the conveying means for gripping the butt of the plant adjacent the severing means, trip means on the gripping means, connections actuated by the trip means and connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means are intermittently operated each time a standing plant strikes the trip means, hanger means suspended from the frame so as to lie adjacent the circumference of the circle formed by the rotating conveying means, stapling means mounted on the frame adjacent the hanger means securing the tobacco plant on the hanger means and connections actuated by the conveying means and connecting the source of power and the stapling means whereby the stapling means is made to operate intermittently each time a plant comes adjacent the hanger means.

4. A harvesting machine for tobacco and the like plants comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means on the conveying means for gripping the butt of the plant adjacent the severing means, trip means on the gripping means, connections actuated by the trip means and connecting the severing means the conveying means and a source of power whereby the severing means and conveyings means may be operated each time a standing plant strikes the trip means, hanger means suspended from the frame so as to be in spaced apart relation to the circumference of the circle made by the rotating gripping means and extending in a generally horizontal direction, stapling means mounted on the frame adjacent the hanger means, for securing the plant on the hanger means, release means on the frame adjacent the stapling means for releasing the plant from the gripping means and connections actuated by the conveying means and connecting the source of power with the stapling means and the release means whereby the stapling means and release means may be made to operate successively each time a plant comes adjacent the hanger means.

5. A harvesting machine for tobacco and the like plant comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means on the conveying means for gripping the plant adjacent the severing means, trip means on the gripping means causing the gripping means to engage the plant before completion of the severing operation, connections actuated by the trip means and connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means are intermittently operated each time a standing plant strikes the trip means, hanger means suspended from the frame adjacent the circumference of a circle made by the rotating gripping means, stapling means on the frame on the opposite side of the hanger means from the conveying means inserting a staple over the hanger means and into the tobacco plant in the gripping means, release means on the frame adjacent the gripping means for releasing the plant from the gripping means and connections actuated by the conveying means and connecting the source of power with the stapling means and release means whereby the stapling means and release means may be made to operate successively and intermittently each time a plant butt comes adjacent the hanger means.



6. A harvesting machine for tobacco and the like plant comprising a main frame, a pair of severing members mounted on the frame in shearing relation, rotatable conveying means pivoted on the frame to rotate in a vertical plane to raise a severed plant to the inverted position, gripping means on the conveying means for gripping the plant adjacent the severing members, trip means on the gripping means, connections actuated by the trip means and connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means may be successively and intermittently operated each time a standing plant strikes the trip means, hanger means suspended from the frame adjacent the circumference of a circle made by the rotating gripping means, stapling means mounted on the frame adjacent the hanger means inserting a staple over the hanger means and into a plant butt thereby securing the tobacco plant on the hanger means, release means on the frame adjacent the stapling means for releasing the plant from the gripping means, and connections actuated by the conveying means and connecting the source of power with the stapling means and the release means whereby the stapling means and release means may be made to operate successively and intermittently each time a plant butt comes adjacent the hanger means.

7. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means including a plurality of radially disposed arms mounted on a hub pivoted on the frame and adapted to rotate in a vertical plane, a lifting member pivoted in the end of each arm and having gripping means mounted thereon for gripping a plant adjacent the severing means, trip means on the gripping means adapted to close the gripping means about the plant, connections actuated by the trip means and connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means may be successively and intermittently operated each time a standing plant strikes the trip means, hanger means suspended from the frame and lying adjacent the circumference of a circle described by the rotating gripping means, stapling means mounted on the frame on the side of the hanger means opposite the conveying means inserting a staple over the hanger means and into a plant butt thereby securing the tobacco plant on the hanger means, release means on the frame adjacent the stapling means re-

leasing the plant from the gripping means after the staple is inserted, and connections actuated by the conveying means and connecting the source of power with the stapling means and the release means whereby the stapling means and release means may be made to operate successively and intermittently each time a plant butt comes adjacent the hanger means.

8. A harvesting machine for tobacco plants and the like comprising a main frame, a pair of severing members mounted on the frame in shearing relation, rotatable conveying means including a plurality of radially disposed arms extending outwardly from a hub mounted on the frame and adapted to rotate in a vertical plane, a lifting member pivoted in the end of each arm, cam means on the hub raising and lowering the lifting members at predetermined points in the rotation of the arms, gripping means mounted on the lifting members for gripping a plant adjacent the severing members, trip means on the gripping means adapted to close the gripping means about the plant, connections actuated by the trip means and connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means may be successively operated each time a standing plant strikes the trip means, hanger means suspended from the frame and lying adjacent the circumference of a circle described by the rotating gripping means, stapling means on the frame adjacent the hanger means inserting a staple over the hanger means and into a plant butt thereby securing the tobacco plant on the hanger means, release means on the frame for releasing the plant from the gripping means, and connections actuated by the conveying means and connectig the source of power with the staplig means and release means whereby the stapling means and release means may be made to operate successively each time a plant butt comes adjacent the hanger means.

9. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means on the conveying means for gripping a plant adjacent the severing means, said gripping means including a plurality of spring loaded curved fingers extending forward of the conveying means and lying above the severing means, said fingers being held apart by collapsible toggle arms, a trip member connected to a pivot pin between the toggle arms to collapse the toggle arms and close the fingers about the plant each time a plant strikes the trip member, connections actuated by the trip means and connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means may be successively operated each time a standing plant strikes the trip means, hanger means suspended from the frame and lying adjacent the circumference of a circle described by the rotating gripping means, stapling means mounted on the frame on the side of the hanger means opposite the conveying means inserting a staple over the hanger means and into a plant butt thereby securing the tobacco plant on the hanger means, release means on the frame adjacent the circle described by the rotating gripping means for releasing the plant from the gripping means, and connections actuated by the conveying means and connecting the source of power with the stapling means and the release means whereby the stapling means and release means may be made to operate successively each time a plant butt comes adjacent the hanger means.

10. A harvesting machine for tobacco plants and the like comprising a main frame, a pair of severing blades pivoted on a base plate, said base plate being slidably mounted in guide members on the frame, a reciprocating arm slidably engaging the base plate, a spring loaded depressible engaging member on the reciprocating arm adapted when depressed to lock the arm and base plate into positive engagement, connections actuated by the movement of the base plate and connecting the reciprocating arm and a source of power whereby the reciprocating arm may be actuated, rotatable conveying means pivoted on the frame to rotate in a vertical plane and to raise a severed plant to the inverted position, gripping means on the conveying means for gripping a plant adjacent the severing blades before completion of the severing operation, trip means on the gripping means, said trip means causing the gripping means to close and the engaging member on the reciprocating arm to depress each time the trip means strikes a standing stalk, release means pivoted on the frame and actuated by the base plate to release the conveying means, connections between the source of power and the reciprocating arm connections operating the conveying means each time said conveying means is released by the base plate, hanger means suspended from the frame and lying adjacent the circumference of a circle described by the rotating gripping means, stapling means mounted on the frame on the side of the hanger means opposite the conveying means inserting a staple over the hanger means and into a plant butt thereby securing the plant on the hanger means, a second release means on the frame adjacent the circle described by the rotating gripping means and connections from the stapling means and the second release to the reciprocating arm connections whereby the stapling means and release means operate successively and intermittently each time a plant butt comes adjacent the hanger means.

11. A harvesting machine for tobacco plants and the like comprising a main frame, a pair of severing blades pivoted on a base plate, said base plate being slidably mounted in guide members on the frame to close the blades in shearing relation, a reciprocating arm slidably engaging the base plate, a spring loaded, depressible engaging member on the reciprocating arm adapted when depressed to lock the arm and base plate in positive engagement, connections between the reciprocating arm and a source of power whereby the reciprocating arm may be continuously actuated, rotatable conveying means including a plurality of radially disposed arms extending outwardly from a hub pivoted on the frame and rotatable in a vertical plane, a lifting member pivoted in the end of each arm and normally extending therefrom at an angle of about 90°, said lifting member being retractible to a position parallel with and adjacent the arm, cam means adjacent the hub for retracting the lifting member during a portion of the rotation of the conveying means, gripping means mounted on the lifting member for gripping a plant adjacent the severing blades, trip means on the gripping means closing the gripping means and depressing the engaging member on the reciprocating arm each time the trip means strikes a standing stalk, release means on the frame energized by the movement of the base plate to release the conveying means, con-

nections between the conveying means and the reciprocating arm connections through which the conveying means may be intermittently operated each time said conveying means is released by the base plate, hanger means suspended from the frame and lying adjacent the circumference of a circle described by the rotating gripping means, stapling means on the frame adjacent the hanger means inserting a staple over the hanger means and into a plant butt thereby securing the tobacco plant on the hanger means, a second release means adjacent the stapling means and a circle described by the rotating gripping means for releasing the plant from the gripping means, and connections with the reciprocating arm connections through which the stapling means and release means may be made to operate successively and intermittently each time a plant butt comes adjacent the hanger means.

12. A harvesting machine for tobacco plants and the like comprising a main frame, a pair of severing blades pivoted on a base plate, said base plate being slidably mounted in guide members on the frame with the severing blades in shearing engagement when the base plate moves in the guide members, a reciprocating arm slidably engaging the base plate, a spring loaded depressible engaging member on the reciprocating arm adapted when depressed to lock the arm and base plate in positive engagement, connections between the reciprocating arm and a source of power whereby the reciprocating arm may be actuated, rotatable conveying means pivoted on the frame to rotate in a vertical direction, gripping means on the conveying means for gripping a plant adjacent the severing blades, said gripping means including a plurality of spring loaded fingers extending forward of the conveying means and lying above the severing means, said fingers beings held apart by collapsible toggle arms, a trip member connected to a pivot pin between the toggle arms and adapted to collapse the toggle arms and close the fingers about the plant and to depress the engaging member on the reciprocating arm each time the trip member strikes a standing plant, release means pivoted on the frame and actuated by the movement of the base plate to release the conveying means, connections between the conveying means and the reciprocating arm connections through which the conveying means may be intermittently operated each time said conveying means is released by the base plate, hanger means suspended from the frame and lying adjacent the circumference of a circle described by the rotating gripping means, stapling means on the frame adjacent the hanger means inserting a staple over the hanger means and into a plant but thereby securing the tobacco plant on the hanger means, release means on the frame adjacent the stapling means for releasing the plant from the gripping means, and connections to the reciprocating arm connections operating the stapling means and release means successively and intermittently each time a plant butt comes adjacent the hanger means.

13. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means including a plurality of radially disposed arms extending outwardly from a hub pivoted on the frame and rotatable in a vertical plane, a lifting member pivoted in the end of each arm and normally extending therefrom at an angle of about 90°, said lifting member being retractible to a position parallel with and adjacent each arm, cam means adjacent the hub for retracting the lifting member during a portion of the rotation of the conveying means, gripping means on the lifting member for grasping a plant adjacent the severing means, said gripping means including a plurality of spring loaded fingers extending forward of the conveying means and lying above the severing means, said fingers being held apart by collapsible toggle arms, a trip member connected to a pivot pin between the toggle arms and adapted to collapse the toggle arms and close the fingers about the plant, connections actuated by the trip member and connecting the severing means, the conveying means and a source of power whereby the severing means and the conveying means may be successively and intermittently operated each time the trip member strikes a standing stalk, hanger means suspended from the frame and lying adjacent the circumference of a circle described by the rotating gripping means, stapling means mounted on the frame on the opposite side of the hanger means from the conveying means securing the tobacco plant on the hanger means, release means adjacent the stapling means releasing the plant from the gripping means after the plant is stapled, and connections from the source of power to the stapling means and release means whereby the stapling means and release means successively and intermittently operate each time a plant butt comes adjacent the hanger means.

14. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means mounted on the conveyor means for grasping a plant at a point adjacent the severing means, connections from a source of power whereby the severing means and conveying means are successively and intermittently operated each time a standing plant enters the gripping means, hanger means suspended from the frame in spaced apart relation to the circumference of the circle made by the rotating gripping means, stapling means on the frame for securing the plant on the hanger means, said stapling means including a staple container adapted to feed staples to a point adjacent the hanger means on the side opposite the conveying means, drive means on the end of the staple container for driving a staple from the container to pass over the hanger means and into a plant butt held in the gripping means, release means mounted on the frame adjacent the hanger means releasing the plant from the gripping means after the staple is inserted into the plant butt and connections from the source of power to the drive means and release means whereby the drive means and release means are successively and intermittently operated each time a plant comes adjacent the hanger means.

15. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means mounted on the conveyor means for gripping a plant at a point adjacent the severing means, connections to a source of power whereby the severing means and conveying means may be successively and intermittently operated each time a standing plant enters the gripping means, hanger means suspended from the frame at a point adjacent the circumference of a circle made by the conveying means and including a curved supporting member having a U-shaped

channel at one end thereof and a removable member having one end inserted in and supported by said channel and having the other end supported by a turntable pivoted on the rear of the frame and rotatable in a horizontal plane, stapling means on the frame inserting a staple over the hanger means and into a plant butt thereby securing the plant on the hanger means, release means mounted on the frame adjacent the hanger means releasing the plant from the gripping means and connections actuated by the conveying means and connecting the source of power to the drive means and release means whereby the drive means and release means are successively and intermittently operated each time a plant comes adjacent the hanger means.

16. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means mounted on the conveyor means for gripping a plant at a point adjacent the severing means, connections between the severing means and conveying means whereby they are successively and intermittently operated each time a standing plant enters the gripping means, hanger means suspended from the frame and including a curved supporting member having a U-shaped channel at one end thereof and a removable member having one end inserted in and supported by said channel and having the other end supported by a turntable pivoted on the rear of the frame and rotatable in a horizontal plane, stapling means on the frame securing the plant on the hanger means, said stapling means including a staple container adapted to deliver staples to a point adjacent the curved supporting member of the hanger means on the side opposite the conveying means, drive means on the end of the staple container for driving a staple from the container to pass over the hanger means and into a plant butt held in the gripping means, release means on the frame adjacent the hanger means releasing the plant from the gripping means after the staple is inserted into the plant butt and connections between the severing means and conveying means connections and the drive means and release means whereby the drive means and release means are successively and intermittently operated each time a plant comes adjacent the hanger means.

17. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means mounted on the conveyor means for gripping a plant at a point adjacent the severing means, connections to a source of power whereby the severing means and conveying means may be successively and intermittently operated each time a standing plant enters the gripping means, hanger means suspended from the frame and including a curved supporting member having a U-shaped channel at one end thereof and a removable member having one end inserted in and supported by said channel and having the other end supported by a turntable pivoted on the rear of the frame and rotatable in a horizontal plane, stapling means on the frame for securing the plant on the hanger means, said stapling means including a staple container delivering staples to a point adjacent the curved supporting member of the hanger means on the side opposite the conveying means, drive means on the end of the staple container driving a staple from the container to pass over the hanger means and into a plant butt held in the gripping means, release means for releasing the plant from the gripping means after the staple is inserted into the plant butt and connections actuated by the conveyor means and connecting the drive means and release means to the source of power whereby the drive means and release means are successively and intermittently operated each time a plant comes adjacent the hanger means, an arm pivoted on the frame above the hanger means and extending downwardly to a point adjacent the hanger means, downwardly extending fingers on the end of said arm opposite the pivot, a second arm pivoted on the end thereof adjacent the hanger means and having downwardly extending fingers thereon, said fingers of both arms fitting about the hanger means, stop means on the first arm preventing the second arm from assuming an obtuse angle with the first arm, cam means for reciprocating said first arm to cause the fingers of the both arms to draw the stapled plants along the hanger means and connections to the power source continuously driving said cam means.



18. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means mounted on the conveyor means for gripping a plant at a point adjacent the severing means, connections between the severing means and conveying means whereby they may be successively and intermittently operated each time a standing plant enters the gripping means, hanger means suspended from the frame in spaced apart relation to the circumference of the circle made by the rotating gripping means, stapling means on the frame adjacent the hanger means inserting a staple over the hanger means into a plant butt held in the gripping means thereby securing the plant on the hanger means, a pair of release members pivoted at one end on the frame and lying in normally parallel spaced apart relationship on either side of the hanger means, each of said releasing members adapted to engage a pin on each side of the gripping means when it comes adjacent the hanger means, toggle links connected to the releasing members, rotating crank means for alternately spreading the toggle links apart thereby spreading the unpivoted ends of the releasing members and opening the gripping means, and connections actuated by the conveying means and connecting the stapling means and the crank means to the connection between the severing means and conveying means whereby the stapling means and crank means are successively and intermittently operated each time a plant comes adjacent the hanger means.

19. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means mounted on the conveyor means for gripping a plant at a point adjacent the severing means, connections from a source of power to the severing means and conveying means whereby the severing means and conveying means may be successively and intermittently operated each time a standing plant enters the gripping means, hanger means suspended from the frame and including a curved supporting member having a U-shaped channel at one end thereof and a removable member having one end inserted in and supported by said channel and having the

other end supported by a turntable pivoted on the rear of the frame and rotatable in a horizontal plane, stapling means on the frame inserting a staple over the hanger means and into a plant butt held in the gripping means thereby securing the plant at one end on the frame and lying in normally parallel spaced apart relationship on either side of the hanger means, each of said release members adapted to engage a pin on each side of the gripping means when it comes adjacent the hanger means, toggle links connected to the releasing members, rotating crank means for alternately spreading the toggle links apart thereby spreading the unpivoted ends of the releasing members and opening the gripping means, and connections actuated by the conveying means from the source of power to the stapling means and crank means whereby the stapling means and the crank means are successively and intermittently operated each time a plant comes adjacent the hanger means.

20. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means mounted on the conveyor means for gripping a plant at a point adjacent the severing means, connections actuated by the entrance of a plant into the gripping means connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means may be successively and intermittently operated each time a standing plant enters the gripping means, hanger means suspended from the frame in spaced apart relation to the circumference of the circle made by the rotating gripping means, stapling means on the frame for securing the plant on the hanger means, said stapling means including a staple container, adapted to feed staples to a point adjacent the hanger means on the side opposite the conveying means, drive means on the end of the staple container for driving a staple from the container to pass over the hanger means and into a plant butt held in the gripping means, a pair of release members, pivoted at one end on the frame and lying in normally parallel spaced apart relationship on either side of the hanger means, each of said releasing members adapted to engage a pin on each side of the grasping means when it comes adjacent the hanger means, toggle links connected to the releasing members, rotating crank means for alternately spreading the toggle links apart thereby spreading the unpivoted ends of the releasing members and opening the gripping means, and connections actuated by the conveying means and connecting the stapling means and the crank means to the source of power whereby the stapling means and the crank means are successively and intermittently operated each time a plant comes adjacent the hanger means.

21. A harvesting machine for tobacco plants and the like comprising a main frame, severing means on the frame, rotatable conveying means pivoted on the frame to rotate in a vertical plane, gripping means mounted on the conveyor means for gripping a plant at a point adjacent the severing means, connections actuated by the entrance of a plant into the gripping means connecting the severing means, the conveying means and a source of power whereby the severing means and conveying means may be successively and intermittently operated each time a standing plant enters the gripping means, hanger means suspended from the frame and including a curved supporting member having a U-shaped channel at one end thereof and a removable member having one end inserted in and supported by said channel and having the other end supported by a turntable pivoted on the rear of the frame and rotatable in a horizontal plane, stapling means on the frame inserting a staple over the hanger means into a plant butt held in the gripping means securing the plant on the hanger means, a pair of release members, pivoted at one end on the frame and lying in normally parallel spaced apart relationship on either side of the hanger means, each of said releasing members adapted to engage a pin on each side of the gripping means when it comes adjacent the hanger means, toggle links connected to the releasing members, rotating crank means for alternately spreading the toggle links apart thereby spreading the unpivoted ends of the releasing members and opening the gripping means, and connections actuated by the conveying means and connecting the stapling means and the crank means to the source of power whereby the stapling means and the crank means are successively and intermittently operated each time a plant comes adjacent the hanger means.

22. A harvesting machine for tobacco plants and the like comprising a main frame adapted to be attached to a tractor or other source of motor power, a pair of severing blades pivoted in shearing relation on a base plate, said base plate being slidably mounted in guide members on the frame to draw the blades into the guide members, means on said guide members for closing the severing blades in shearing relation when drawn into the guide members, a reciprocating arm slidably engaging the base plate, said reciprocating arm being pivoted at its end opposite the base plate on a rotating crank arm, connections from the source of power whereby the crank arm may be rotated, a spring loaded depressible engaging member on the reciprocating arm adapted when depressed to lock the arm and base plate in positive engagement, rotatable conveying means including a plurality of radially disposed arms extending outwardly from a hub pivoted on the frame and rotatable in a vertical plane, a lifting member pivoted in the end of each arm and normally extending therefrom at an angle of about 90°, said lifting member being retractible to a position parallel with and adjacent the arm upon which it is pivoted, cam means on the hub for retracting the lifting member during a portion of the rotation of the conveying means, gripping means mounted on the lifting member, for gripping a plant adjacent the severing blades, trip means on the gripping means causing the gripping means to close and the engaging member on the reciprocating arm to depress each time the trip means strikes a standing stalk, release means on the frame actuated by the movement of the base plate releasing the conveying means, connections from the crank arm connection whefeby the conveying means may be intermittently operated each time said release means is actuated, hanger means suspended from the frame in spaced apart relation to the circumference of the circle made by the rotating gripping means, stapling means on the frame securing the plant on the hanger means, said stapling means including a staple container adapted to feed staples to a point adjacent the hanger means, drive means on the end of the staple container for driving a staple from the container to pass over the hanger means into a plant butt held in the gripping means, said drive means being connected

to an arm rotatable on a crank shaft journaled on the frame, a second release means on the frame adjacent the hanger means releasing the plant from the gripping means after the staple is inserted into the plant butt, said second release means being connected to an arm on the rotatable crank shaft at a position about 90° behind the drive means arm, trip means pivoted on the frame and lying in the path of the rotating conveying arms, clutch means actuated by the trip means to connect the crank shaft to a rotating drive shaft each time an arm strikes the trip means, said drive shaft being journaled on the frame in the line of the crank shaft and connections between



the power source and the crank arm connections of the reciprocating arm whereby the drive shaft may be rotated.

CLYDE L. SOWERS.

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The following references are of record in the file of this patent:

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## Certificate of Correction

Patent No. 2,564,614 August 14, 1951

CLYDE L. SOWERS

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 9, line 50, for "conveyings" read *conveying*; column 11, line 38, for "connectig" read *connecting*; line 39, for "staplig" read *stapling*; column 13, line 40, for "beings" read *being*; line 57, for "but" read *butt*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 20th day of November, A. D. 1951.

[SEAL]

THOMAS F. MURPHY,
*Assistant Commissioner of Patents.*