

Sept. 8, 1959

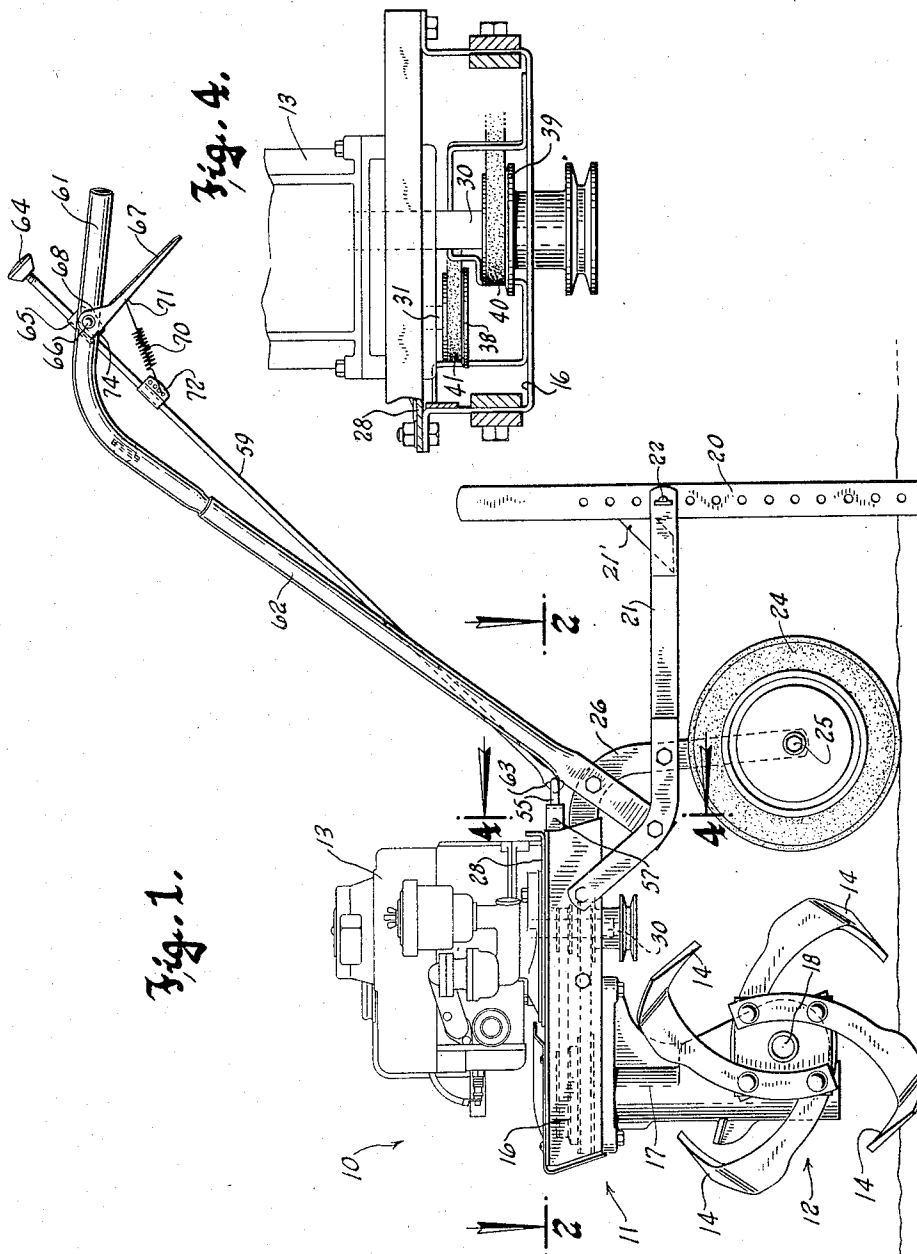
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2,903,077

SOIL TILLING DEVICE

Filed June 10, 1957

4 Sheets-Sheet 1



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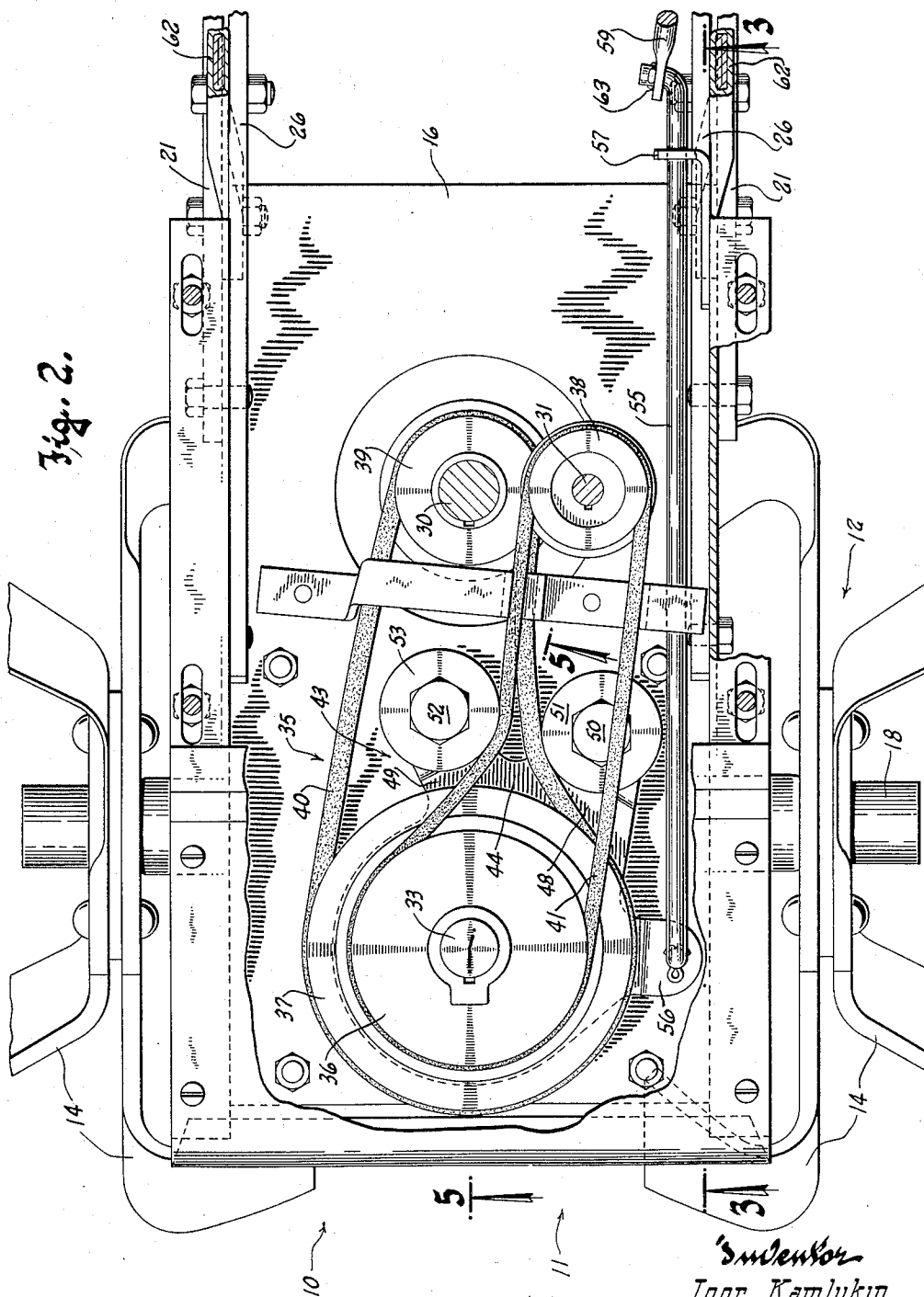


Fig. 2.

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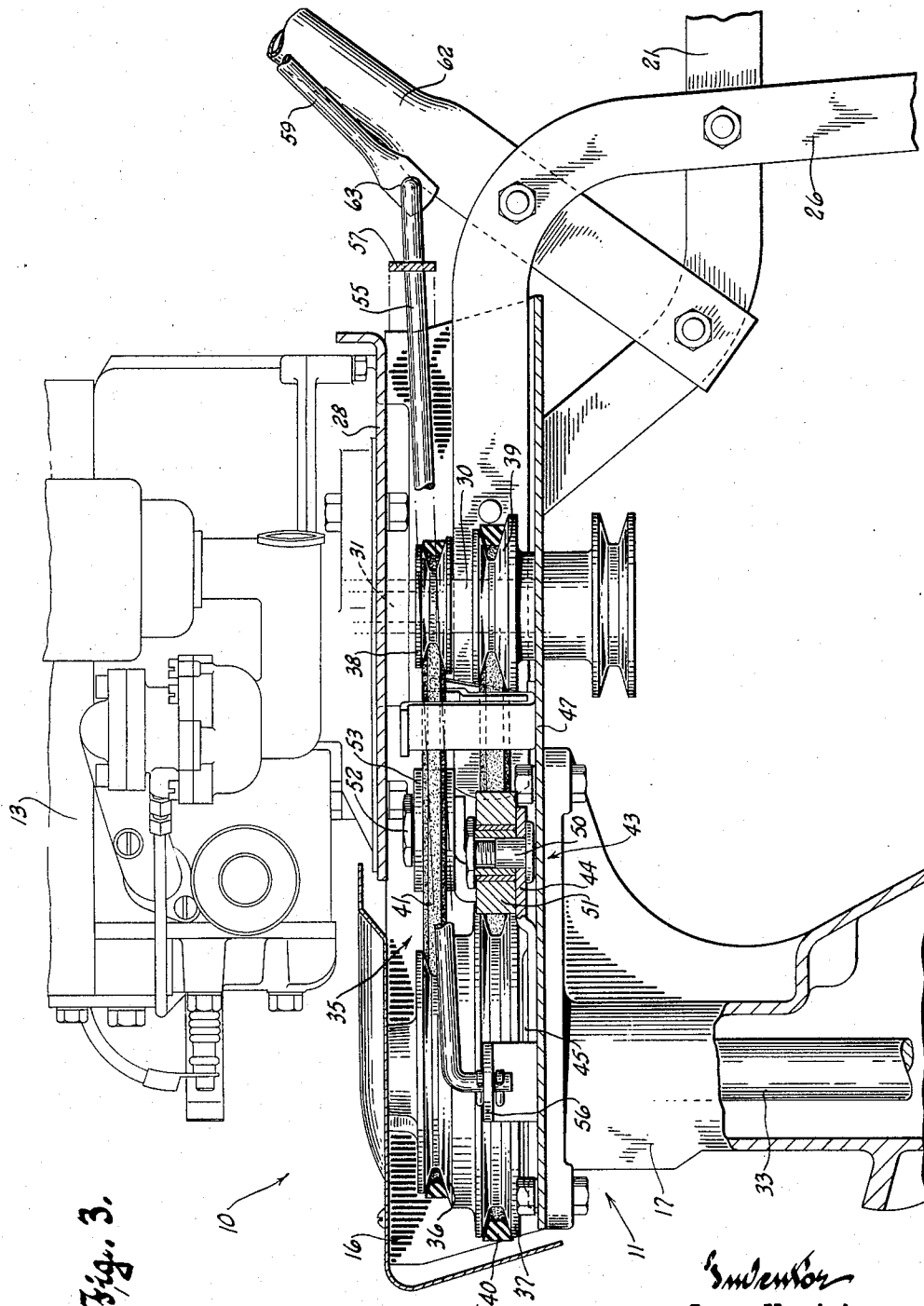


Fig. 3.

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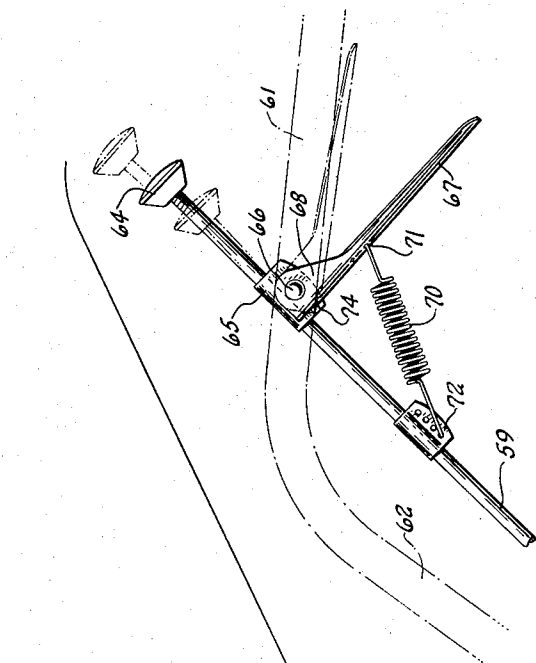
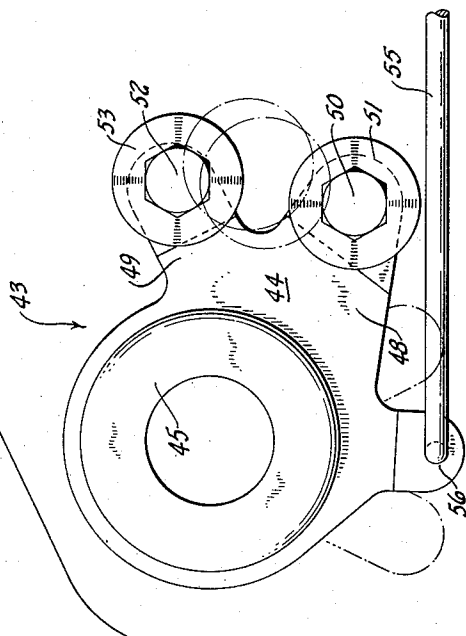
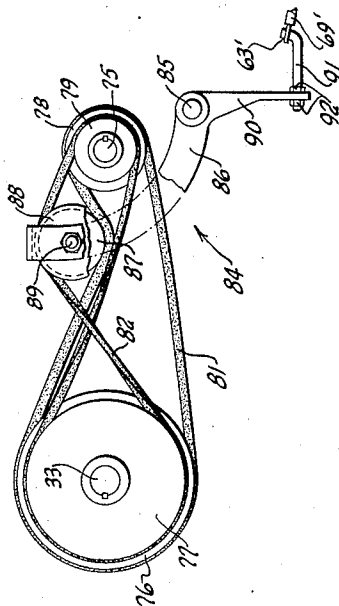


Fig. 5.

Fig. 6.

Fig. 7.



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2,903,077

SOIL TILLING DEVICE

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9 Claims. (Cl. 172—42)

This invention relates to soil tilling devices and has more particular reference to small gardening apparatus of the type having a power driven rotor which serves as the traction means by which the tilling device is propelled and has tines thereon to till the soil as the device travels along the ground.

In general, it is the object of this invention to provide improved means for transmitting driving torque from the internal combustion engine commonly used on soil tilling devices of the character described, to the rotor of the device.

More specifically, it is an object of this invention to provide reversing transmission means for a soil tilling device of the character described through which the rotor of the device may be readily driven either forwardly or in the reverse direction from the internal combustion engine so as to facilitate maneuvering of the device in close quarters.

Still another object of this invention resides in the provision of unusually simple and inexpensive but reliable transmission means featuring a reversing belt arrangement which is especially well suited for use on small power driven gardening implements such as soil tilling apparatus or the like.

A further object of this invention resides in the provision of a rotary soil tilling device of the character described having a power source which comprises a vertical shaft engine, and featuring an unusually compact and well protected belt type transmission for drivably connecting the engine with the rotor of the device.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate two complete examples of the physical embodiments of the invention constructed according to the best modes so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a side elevational view of a soil tilling device embodying the principles of this invention;

Figure 2 is an enlarged horizontal sectional view taken through Figure 1 along the plane of the line 2—2, and illustrating the reversing belt transmission of this invention;

Figure 3 is a vertical sectional view taken through Figure 2 along the line 3—3;

Figure 4 is a view partly in rear elevation and partly in section taken along the line 4—4 in Figure 1;

Figure 5 is a fragmentary sectional view of a portion of the transmission means taken along the line 5—5 in Figure 2;

Figure 6 is a more or less diagrammatic view illustrating the manual control means for shifting the transmis-

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sion out of neutral to either of its two operative positions; and

Figure 7 is a more or less diagrammatic view on the order of Figure 2 but illustrating a modified embodiment of the transmission.

Referring now more particularly to the accompanying drawings in which like reference characters have been applied to like parts throughout the several views, the numeral 10 generally designates a rotary soil tilling device of a small size, especially useful for gardening. The device is provided with a chassis 11 supported by a rotor 12 driven from an internal combustion engine 13 mounted on the chassis above and rearwardly of the rotor. The rotor revolves on a transverse axis and carries a number of tines terminating in hoe-like members 14 which are shaped and arranged to dig into and till the soil as the rotor revolves in the counterclockwise direction as seen in Figure 1. When the rotor revolves in the clockwise direction the hoe-like members act to lift the rotor up on to the tilled soil and propel the device rearward.

The main components of the chassis comprise a substantially shallow horizontal transmission housing 16 which is elongated in the longitudinal dimension of the device, and an elongated vertical bearing 17 secured to the underside of the transmission housing at its front. The rotor shaft 18 is rotatably journaled on the lower end portion of the vertical bearing 17. As will be appreciated, the tine-carrying rotor 12 not only effects tilling of the soil as the rotor revolves in said counterclockwise direction but it also serves as traction means to support the chassis and to propel the tilling device along the ground being worked.

A depth or drag bar 20 pivotally supported as at 22 between a pair of transversely opposite arms 21 secured to and projecting from the rear portion of the transmission housing controls the depth to which the tines 14 on the rotor work the soil and, of course, is adjustable up and down to enable the rotor to till the soil to different depths. In its operative position shown in Figure 1, this depth or drag bar is rigidly supported by an abutment 21' fixed to the arms 21 against rearward displacement of its lower end so that by dragging in the ground it resists forward propulsion of the soil tilling device by the rotor 12 and in so doing coacts with the rotor to effect the desired tilling. The depth to which the rotor digs itself into the ground and thus the depth to which the soil is tilled or cultivated depends upon the effectiveness with which the depth or drag bar resists forward propulsion of the device and this in turn depends upon the extent the bar projects down into the ground.

The mounting of the depth or drag bar upon the arms 21, though it prevents rearward displacement of its lower ground engaging end, is such that upon retraction, that is, rearward movement of the device, the bar is free to swing out of the ground and become ineffective to resist such rearward movement of the device. Accordingly, the depth of drag bar cooperates with the rotor 12 to effect tilling or cultivating of the soil as the device moves forward and by being free to have its lower end swing forward, it does not interfere with quick retraction of the device by reverse rotation of the rotor. Also, as will be readily understood the bar may be raised from its operative position shown in Figure 1 and secured in a higher position by removal and replacement of its pivot pin 22 to facilitate transportation of the tilling apparatus from place to place.

To further facilitate such transportation of the apparatus, it is provided with a pair of rubber tired wheels 24 supported from the rear of the transmission housing for rotation on a transverse axis 25 by means of a pair of transversely opposite arms 26 connected to the rear portion of the chassis. These arms mount the wheels 24

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substantially midway between the rotor 12 and the depth bar 20.

The transmission housing 16, which may be a sheet metal stamping, is formed with a cover 28 which also serves as a substantially horizontal engine supporting platform located on the rear portion of the transmission housing. The platform 28 thus mounts the internal combustion engine 13 above and rearwardly of the rotor 12, in a position which is desirable from the standpoint of weight distribution during tilling.

The engine 13 is of the vertical shaft single cylinder type, and its crankshaft 30 projects downwardly therefrom through a suitable aperture in the engine supporting platform 28 into the rear portion of the transmission housing. The engine also has a camshaft 31, however, which likewise projects downwardly from the engine through a suitable hole in the supporting platform 28 and into the rear portion of the transmission housing, in laterally spaced relation to the crankshaft. The crankshaft 30 and the camshaft 31, therefore, may be considered to provide two power driven shafts which rotate in opposite directions on transversely spaced vertical axes and have their outer or lower end portions disposed in the rear of the transmission housing.

The rotor 12 which is to be driven from the engine is provided with a drive shaft 33 journaled in the elongated bearing 17 for rotation on a vertical axis at the front of the chassis, and at its lower end having the usual worm and worm wheel driving connection with the rotor (not shown). The upper end of the drive shaft projects out of the bearing 17 and into the forward end portion of the transmission housing 16 so as to be spaced from but forwardly opposite the lower end portions of the crankshaft and camshaft of the engine.

The transmission means 35 of this invention features a reversing belt arrangement, and is adapted to drivingly connect the rotor 12 with the internal combustion engine for rotation in opposite directions. For this purpose, the upper end portion of the rotor drive shaft 33 which projects into the transmission housing has a pair of upper and lower V pulleys 36 and 37, respectively, secured thereto. The upper pulley 36 on the rotor drive shaft occupies a position which is substantially in horizontal alignment with a cooperating V pulley 38 fixed on the lower end of the camshaft, and the lower pulley 37 on the rotor drive shaft occupies a position substantially in horizontal alignment with a cooperating V pulley 39 on the lower end portion of the crankshaft.

A single loop forward belt 40 is trained around the cooperating pulleys 37 and 39 and normally loosely encircles these pulleys so as to preclude the transmission of driving torque from the crankshaft to the rotor drive shaft, except upon tightening of the belt. When tightened into driving engagement with the pulleys 37 and 39, the forward belt is adapted to transmit rotation from the engine to the rotor drive shaft for rotation of the rotor 12 in a forward direction, which is counterclockwise as seen in Figure 1, such that the tines 14 on the rotor operate to till the soil and to propel the tilling device forwardly along the ground being tilled.

A single loop reverse belt 41 is similarly loosely trained about the upper pulley 36 on the rotor drive shaft and its cooperating pulley 38 on the lower end portion of the camshaft, so as to normally preclude the transmission of driving torque from the cam shaft to the rotor drive shaft. When tightened into driving engagement with the pulleys 36 and 38, however, the reverse drive belt 41 transmits rotation from the camshaft to the rotor drive shaft in the opposite direction, namely clockwise as viewed in Figure 1, so as to thereby establish a reverse driving connection between the engine and the rotor operable to cause the tilling device to back up and thus facilitate maneuvering of the device in close quarters.

The reversing transmission 35 of this invention further includes a belt tightening device 43 by which the operator

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of the device may selectively tighten the forward and reverse belts 40—41 into driving engagement with the pulleys about which they are trained. In the present case the belt tightening device 43 is in the form of a lever 44 having its hub 45 journaled on a bearing 46 carried by the bottom wall 47 of the transmission housing, for rotation in opposite directions coaxially of the rotor drive shaft 33. As seen best in Figure 5, the hub 45 of the lever is located beneath the lower pulley 37 on the rotor drive shaft, and the lever is further provided with a pair of laterally spaced arms 48 and 49 which project rearwardly, one toward the camshaft and the other toward the crankshaft. At its outer end the arm 48 carries a vertical stud 50 upon which a roller 51 is freely rotatably mounted, substantially forwardly opposite the axis of the camshaft 31 and to one side of both stretches of the forward belt 40 but in position to engage the exterior surface of that stretch of the forward belt which is adjacent to the camshaft. In the neutral position of the belt tightening device shown in Figures 2 and 6, the roller 50 lightly engages the adjacent stretch of the forward driving belt and holds it deflected toward a plane containing the axes of the rotor drive shaft and the crankshaft but not tightly enough engaged with the pulleys 37 and 39 on said shafts as to establish a driving connection between them.

A vertical stud 52 fixed in the outer end of the arm 49 of the belt tightening device freely rotatably mounts a similar roller 53, substantially forwardly opposite the axis of the crankshaft and to one side of both stretches of the reverse belt 41 but in position to normally lightly engage the exterior of that stretch of the reverse drive belt 41 which is adjacent to the crankshaft. In the neutral position of the belt tightening device 43 shown in Figures 2 and 6, therefore, the rollers 51 and 53, which may be called freely rotatable idlers, engage their respective belts with substantially light force which is insufficient to establish a driving connection between either the crankshaft or the camshaft and the rotor drive shaft 33.

The transmission of driving torque from the crankshaft to the rotor drive shaft and consequently to the rotor for forward operation of the tilling device is effected by swinging the belt tightening device 43 on its bearing in a counterclockwise direction as seen in Figures 2 and 6, out of its neutral position therein shown. Such swinging motion of the belt tightening device further slackens the condition of the reverse drive belt 41 about pulleys 36 and 38 and tightens the forward drive belt 40 into driving engagement with its pulleys 37 and 39, so that the rotor drive shaft rotates with and in the same direction as the engine crankshaft. Inasmuch as the engine camshaft rotates in a direction opposite to that of the crankshaft, the drive to the rotor may be reversed, causing the tilling device to back up, merely by swinging the belt tightening device 43 in a clockwise direction out of its neutral position shown to a position such that the forward drive belt is further slackened and the reverse drive belt 41 is tightened by the idler 53 into driving engagement with its pulleys 36 and 38. This drivingly connects the rotor drive shaft with the camshaft of the engine.

Swinging motion may be manually imparted to the belt tightening device to shift it from its neutral position to either its forward or reverse drive positions by means of a link 55 in the form of a rod having one end connected to a lug as at 56 on one side of the hub of the belt tightening device. This link extends horizontally rearwardly through the transmission housing along one up-right side wall thereof, and its rear portion is slidably received in an apertured clip 57 secured to said side wall at the rear of the housing. The belt tightening device and the clip 57, therefore, serve to constrain the link to endwise fore and aft motion relative to the transmission housing. Rearward motion of the link 55, of course, swings the belt tightening device counterclockwise to its forward drive position, and forward motion of the link

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swings the belt tightening device clockwise to its reverse drive position.

Such endwise fore and aft motion is manually imparted to the link 55 through an elongated control rod 59 supported jointly by the rear end portion of the link and by the grip portion 61 on one of a pair of transversely opposite handle bars 62 joined to and extending upwardly and rearwardly from the rear of the chassis. The lower end of the control rod is pivotally connected to the rear of the link as at 63, and the rod extends upwardly and rearwardly alongside the adjacent handle bar 62 at a slightly divergent angle with respect thereto so that its upper end portion crosses the grip portion 61 on said handle bar. A shifter knob 64 on the upper end of the control rod, above the grip portion 61, facilitates the application of downward force on the rod and enables the operator to hold the rod in a downwardly shifted position at which the transmission is in reverse operation.

The upper end portion of the control rod is slidably and guidingly received in a clip 65 mounted on a cross pin 66 through the adjacent grip portion 61 of the handle bar for swiveling motion about a horizontal axis, the clip thus cooperating with the rear end portion of the link 55 to more or less constrain the control rod to endwise up and down motion relative to the handle bars out of the neutral position thereof shown in solid lines in Figures 1 and 6. The pivot pin 66 also serves to pivotally mount a control lever 67 on the grip portion 61, and for this purpose the hub portion 68 of the lever is bifurcated to straddle the grip portion and to receive the pin 66. The control lever is mounted on the grip portion with the arm of the lever beneath the grip portion of the handle bar and diverging with respect thereto toward the rear extremity of the grip portion.

The purpose of the control lever 67 is to enable the operator to readily impart upward endwise motion to the control rod so as to shift the transmission into forward drive position, and the operator must manually hold the control lever in an actuated position during all forward operation of the tilling device. The motion transmitting connection between the control lever 67 and the control rod comprises a tension spring 70 having one end connected to the control lever as at 71 intermediate the pivoted and free ends of the lever, and having its other end connected to a clip 72 on the control rod a distance beneath the pivot axis of the control lever.

The control lever is so located on the grip portion 61 of the handle bar that the operator may conveniently grasp both the grip portion and the control lever with the same hand, and swing the control lever 67 upwardly into lateral juxtaposition with the grip portion. When so actuated, the tension spring 70 is stretched by the lever and pulls the control rod upwardly in its guide clip 65 to actuate the link 55 to the rear, causing the reverse drive belt 41 to be further slackened and the forward drive belt 40 to be tightened into driving engagement with the crankshaft pulley 39 and the pulley 37 on the rotor drive shaft. If for any reason the operator releases his grip upon the control lever 67, the belt tightening device automatically returns to its neutral position disrupting the driving connection between the engine and the rotor under the combined influence of the weight of the control rod and the pressure exerted by the forward belt 40 on its idler 51.

If the operator desires to run the tilling device rearwardly, in reverse, it is only necessary for him to push downwardly upon the knob 64 on the upper end of the control rod to slide the link 55 forwardly and thus actuate the belt tightening device in a clockwise direction as viewed in Figure 2 to establish the driving connection between the engine camshaft and the rotor drive shaft. In this case also the operator of the device must hold the control rod in its downwardly actuated position as long as he wishes to maintain the reverse driving connection to the rotor 12. As soon as the operator releases the

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knob 64 on the upper end of the control rod the tension spring 70 lifts the rod upwardly and returns it to its neutral position, at the same time returning the belt tightening device to its neutral position. The spring 70 is aided in this latter instance by the force which the reverse belt 41 exerts upon its idler 53.

In this connection also, it should be observed that the control lever 67 is supported on the pivot pin 66 for swinging motion between defined limits. The limit of counterclockwise swinging motion is defined by the engagement of the arm of the lever with the underside of the grip portion 61 on the handle bar, and the limit of clockwise motion of the control lever is defined by the engagement between the grip portion 61 and a shoulder 74 on the hub end of the lever, at the junction of the arm with the bifurcated hub portion of the lever.

While the reversing transmission described depends upon the provision of a pair of oppositely driven power shafts, such as the crankshaft and the camshaft of an internal combustion engine preferably mounted with its shafts vertical to achieve the compactness which characterizes the tilling device of this invention, it is also possible to provide a simple and entirely satisfactory reversing belt transmission which can be used with an engine having only its crankshaft projecting to the exterior thereof to provide a single power shaft for connection to the rotor drive shaft. A reversing transmission of this type is more or less diagrammatically illustrated in Figure 7, which view substantially corresponds to Figure 2 of the previous embodiment of the invention.

As shown in Figure 7, the single power shaft 75, which may be provided by the crankshaft of an internal combustion engine, rotates on an axis which is spaced a fixed distance from and parallel to the axis of the rotor drive shaft 33. In this case also the rotor drive shaft has forward and reverse pulleys 76 and 77 respectively, fixed thereto with the reverse pulley uppermost, and each aligning with one of a pair of forward and reverse pulleys 78 and 79 fixed on the engine crankshaft.

A forward drive belt 81 is trained about the forward pulley 78 on the crankshaft and the lower pulley 76 on the rotor drive shaft, as a single loop encircling these pulleys and normally loosely trained thereover. A reverse drive belt 82 is trained about the reverse pulley 79 on the crankshaft and the upper pulley 77 on the rotor drive shaft, with its stretches crossing one another as illustrated, and defining a pair of loops each encircling one of the pulleys 77-79, and normally loosely trained thereover.

Thus it will be seen that when the forward drive belt 81 is tightened into driving engagement with its pulleys 76 and 78, it connects the rotor drive shaft with the crankshaft for rotation therewith in the same direction as the crankshaft rotates. However, when the crossed reverse drive belt 82 is tightened into driving engagement with its pulleys 77 and 79, it establishes a driving connection between the rotor drive shaft and the crankshaft by which the rotor drive shaft is constrained to rotate with the crankshaft but in a direction opposite to that in which the crankshaft rotates.

A belt tightening device or lever generally designated 84 is also provided for this embodiment of the invention, to enable selective tightening of the forward and reverse drive belts. The belt tightening lever is medially pivoted alongside the crankshaft, to swing on a stud 85, the axis of which is in fixed spaced apart relation to that of the crankshaft and parallel thereto. One arm 86 of the lever extends outwardly from the pivoted hub portion thereof, forwardly of the pulleys on the crankshaft. A pair of free running idlers, one in the form of a roller 87 and the other in the form of a V pulley 88 is freely rotatably journaled on a stud 89 fixed in the outer end portion of the arm 86, with the roller 87 located entirely to one side of both stretches of the forward drive belt 81 and normally lightly engaging the outer surface of the adjacent stretch thereof, and with the idler pulley 88 inside

that loop of the reverse drive belt 82 which encircles the pulley 79 on the crankshaft where it lightly bears upon the inner surface of the adjacent stretch of the loop.

Consequently if the belt tightening lever is swung in a counterclockwise direction about its pivot 85, out of the neutral position of the lever shown, it further slackens the reverse drive belt and at the same time tightens the forward drive belt 81 about the engine pulley 78 and the pulley 76 on the rotor drive shaft to establish a forward driving connection to the latter whereby the rotor shaft rotates in the same direction as the crankshaft. If the belt tightening lever is swung in a clockwise direction out of the neutral position shown, it further slackens the forward drive belt and tightens the reverse drive belt 82 about the engine pulley 79 and the pulley 77 on the rotor drive shaft to cause rotation of the rotor drive shaft in the opposite direction, or counter to the rotation of the crankshaft.

The other arm 90 of the belt tightening lever extends laterally outwardly from the hub portion of the lever, away from the crankshaft, and it has an apertured outer end to receive one end portion of a link 91 similar to the link 55 of the previous embodiment of the invention. The link 91 may be in the form of a rod having a threaded end portion to receive clamping nuts 92 thereon which may be tightened against the opposite sides of the outer end portion of the arm 90 of the belt tightening lever to securely connect the link thereto. The belt tightening lever 84 may be swung from its neutral position shown to either of its two operative positions in a manner similar to that described previously, namely by means of a control rod 69' having its lower end connected to the rear of the link 91 as at 63'.

From the foregoing description taken together with the accompanying drawings, it will be readily apparent to those skilled in the art that this invention provides a soil tilling device which features compactness and which by reason of its novel reversing transmission greatly facilitates maneuvering of the device in close quarters; and wherein the reversing belt transmission itself features simplicity and low cost without sacrificing reliability of the transmission.

What I claim as my invention is:

1. In a power driven hand guided soil tilling device, the combination of: a chassis frame having handle means by which the device may be guided by an attendant; a cultivating rotor journaled on the frame with its axis horizontal and transverse to the frame, said rotor having hoe-like tines, hoe means on the ends of said tines shaped to dig into and till the soil as a consequence of rotation of the rotor in a forward direction as long as the device does not move forwardly across the ground at the rate forward rotation of the rotor tends to move it, and to lift the rotor up onto the surface of the tilled soil as a consequence of retrograde rotation of the rotor, said rotor being the entire traction means for the device and at all times that it is driven tending to propel the device forwardly or rearwardly depending upon the direction in which the rotor is being driven; ground engaging means operable to resist forward propulsion of the device by the rotor and thus cause the rotor tines to dig into and effect tilling of the soil; means mounting said ground engaging means on the chassis frame in a manner holding the same effective to resist forward motion of the device but ineffective to resist rearward motion thereof so that the device is at all times unrestrictedly free to be propelled rearward by reverse rotation of the rotor; a prime mover carried by the chassis frame; a reversing drive transmission means carried by the frame to drive the rotor from the prime mover in one direction or the other and thereby provide for forward tilling propulsion of the device or rearward non-tilling propulsion thereof over the tilled soil, said reversing drive transmission means including shiftable control means mounted for motion from a neutral position, at which said control means renders the

transmission means ineffective to transmit torque to the rotor, selectively to either of two operating positions at one of which the control means activates the transmission means to drivingly connect the prime mover with the rotor to produce forward rotation of the rotor, and in the other of which said control means activates the transmission means to drivingly connect the prime mover with the rotor to produce retrograde rotation of the rotor; and manually operable means on the device, connected in motion transmitting relation with said control means, and readily accessible to an attendant of the device, for manually shifting said control means from one to another of said positions thereof, whereby either the forward or rearward propulsion of the device by the rotor may be substantially instantaneously halted and the device operated in the opposite direction at the will of the attendant.

2. In a power driven hand-guided soil tilling device, the combination set forth in claim 1, further characterized by the provision of: a shallow substantially horizontal housing which provides substantially the entire chassis frame and has the drive transmission means contained therein; and by the fact that the prime mover is an internal combustion engine mounted on top of said housing and having a power shaft projecting downwardly into the housing for cooperation with the transmission means.

3. In a power driven hand-guided soil tilling device, the combination set forth in claim 1 further characterized by the fact that the reversing drive transmission means comprises two spaced pairs of axially adjacent pulleys, one pair being drivingly connected with the rotor and the other pair being drivingly connected with the prime mover, belts normally loosely connecting one pulley of each pair with a pulley of the other pair, the stretches of one of said belts defining a single loop around its pulleys and the stretches of the other belt crossing one another and defining a pair of loops each encircling one of the pulleys about which said other belt is trained, and a pair of idlers, one for each belt, and means mounting the idlers for free rotation and for bodily movement together in opposite directions from a neutral position at which both belts are loose, to either of two operative positions at each of which one of said belts is tightened into driving relationship with the pulleys about which it is trained, and the other belt is inoperative.

4. In a power driven hand-guided soil tilling device, the combination set forth in claim 1, further characterized by the fact that: the prime mover is an internal combustion engine mounted on the chassis frame at a level above the rotor, said engine having a shaft, one end portion of which projects from the engine; and further characterized by the provision of a rotor drive shaft drivingly connected with the rotor and carried by the chassis frame for rotation on an axis spaced from and parallel to that of the engine shaft; and by the fact that the reversing drive transmission means comprises a pair of axially adjacent pulleys on the projecting end portion of the engine shaft, a pair of axially adjacent pulleys on the rotor drive shaft, each substantially opposite one of the pulleys on the engine shaft, a first belt loosely trained about one of the pulleys on the engine shaft and one of the pulleys on the rotor drive shaft with the stretches thereof substantially defining a single loop encircling both of its pulleys, said first belt being adapted to connect the rotor drive shaft with the engine shaft for rotation therewith in one direction when tightened into driving engagement with its pulleys, a second belt loosely trained about the remaining pulleys on said shafts but with its stretches crossing one another and forming a pair of loops each encircling one of its pulleys, said second belt being adapted to connect the rotor drive shaft with the engine shaft for rotation therewith in the opposite direction when tightened into driving engagement with its pulleys, and by the fact that said shift-

able control means comprises a belt tightening device mounted for movement by the manually operable means in opposite directions from a neutral position to each of two operative positions, said belt tightening device including free running idlers cooperable with said belts and movable bodily with the belt tightening device to tightened one or the other of said belts into driving engagement with its pulleys, depending upon the direction in which the belt tightening device is moved from its neutral position by the manually operable means.

5. In a power driven hand-guided soil tilling device, the combination set forth in claim 1, further characterized by: the fact that the prime mover is an internal combustion engine; by the fact that the reversing drive transmission means comprises a pair of drive pulleys driven in opposite directions by the internal combustion engine, a pair of driven pulleys drivingly connected with the rotor, a belt looped about one of said drive pulleys and one of the driven pulleys, a second belt looped about the other drive pulley and the other driven pulley, both of said belts being slack and incapable of transmitting torque when the transmission means is in neutral; and by the fact that said shiftable control means comprises belt-tightening means for selectively tightening one or the other of said belts to thereby activate the transmission means to effect forward or retrograde rotation of the rotor.

6. The power driven hand-guided soil tilling device of claim 5 wherein the internal combustion engine has a pair of power output shafts that rotate in opposite directions, each of which has one of said drive pulleys fixed thereto.

7. The power driven hand-guided soil tilling device of claim 6, wherein one of said shafts is the crankshaft of the engine, and the other is the cam shaft.

8. The power driven hand-guided soil tilling device of claim 7, wherein the drive pulley which provides the torque for forward rotation of the rotor is on the crankshaft.

9. The power driven hand-guided soil tilling device of claim 6, further characterized by: a shallow substantially horizontal housing which provides substantially the entire chassis frame; by the fact that the internal combustion engine is mounted on said housing with its power take-off shafts projecting vertically down into the housing with their respective drive pulleys inside said housing; and further characterized by a vertically disposed rotor drive shaft drivingly connected at its lower end with the rotor, and having its upper end portion projecting into the housing and the driven pulleys fixed thereon.

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