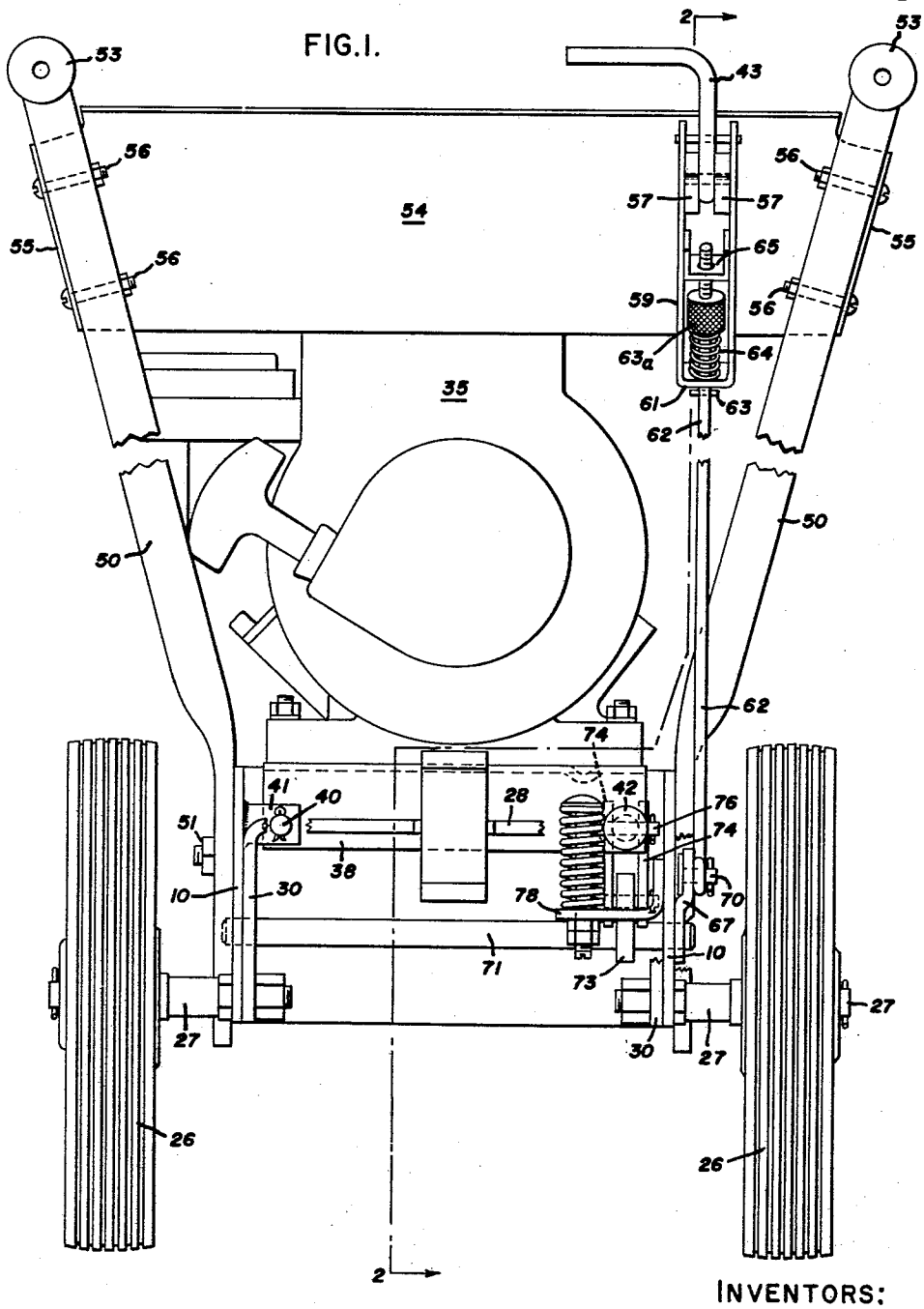
Feb. 25, 1964 J. C. GUNN ETAL 3,122,208

SOIL TILLER

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FIG. 1.




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SOIL TILLER

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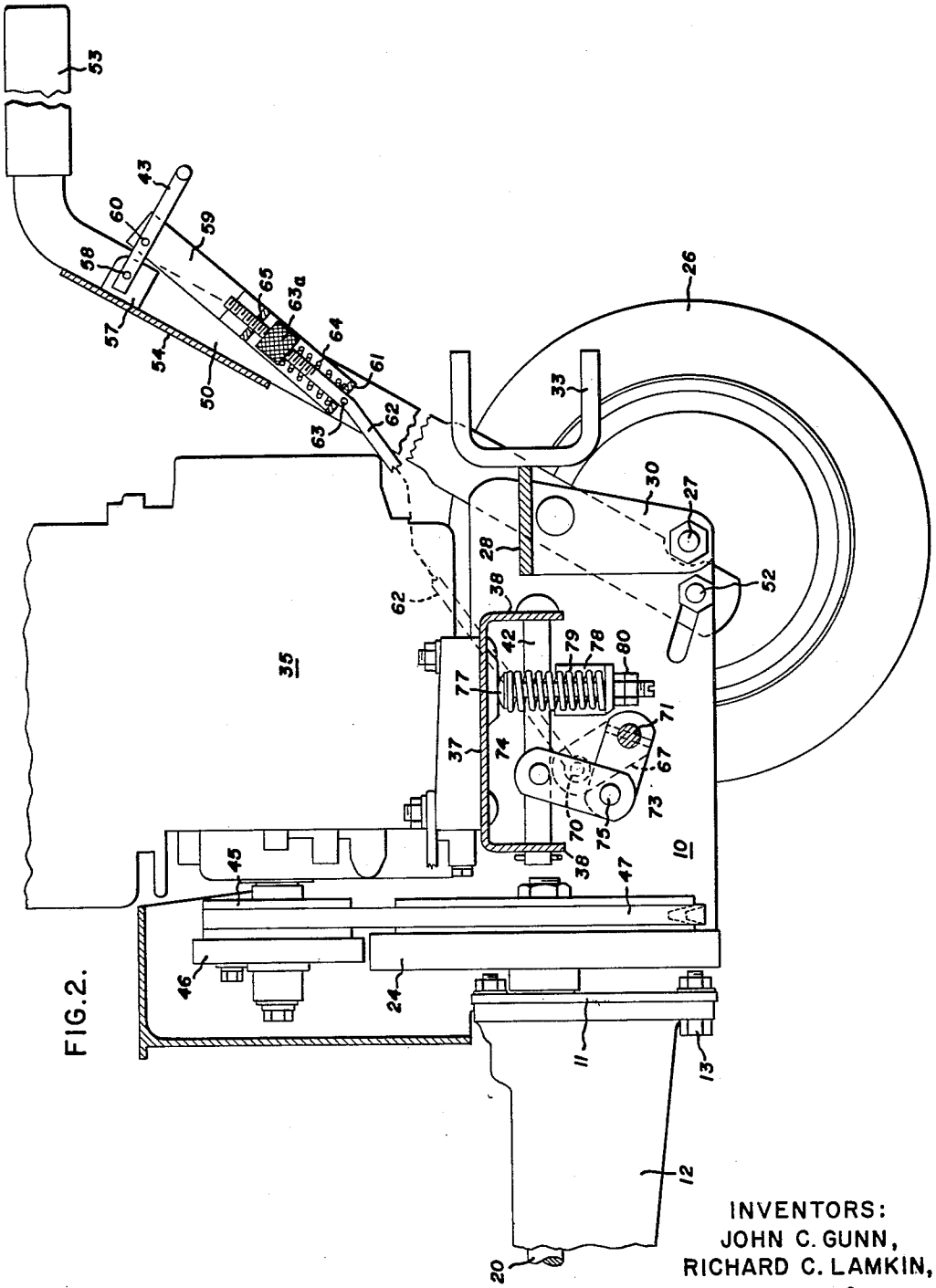



FIG. 2.

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SOIL TILLER

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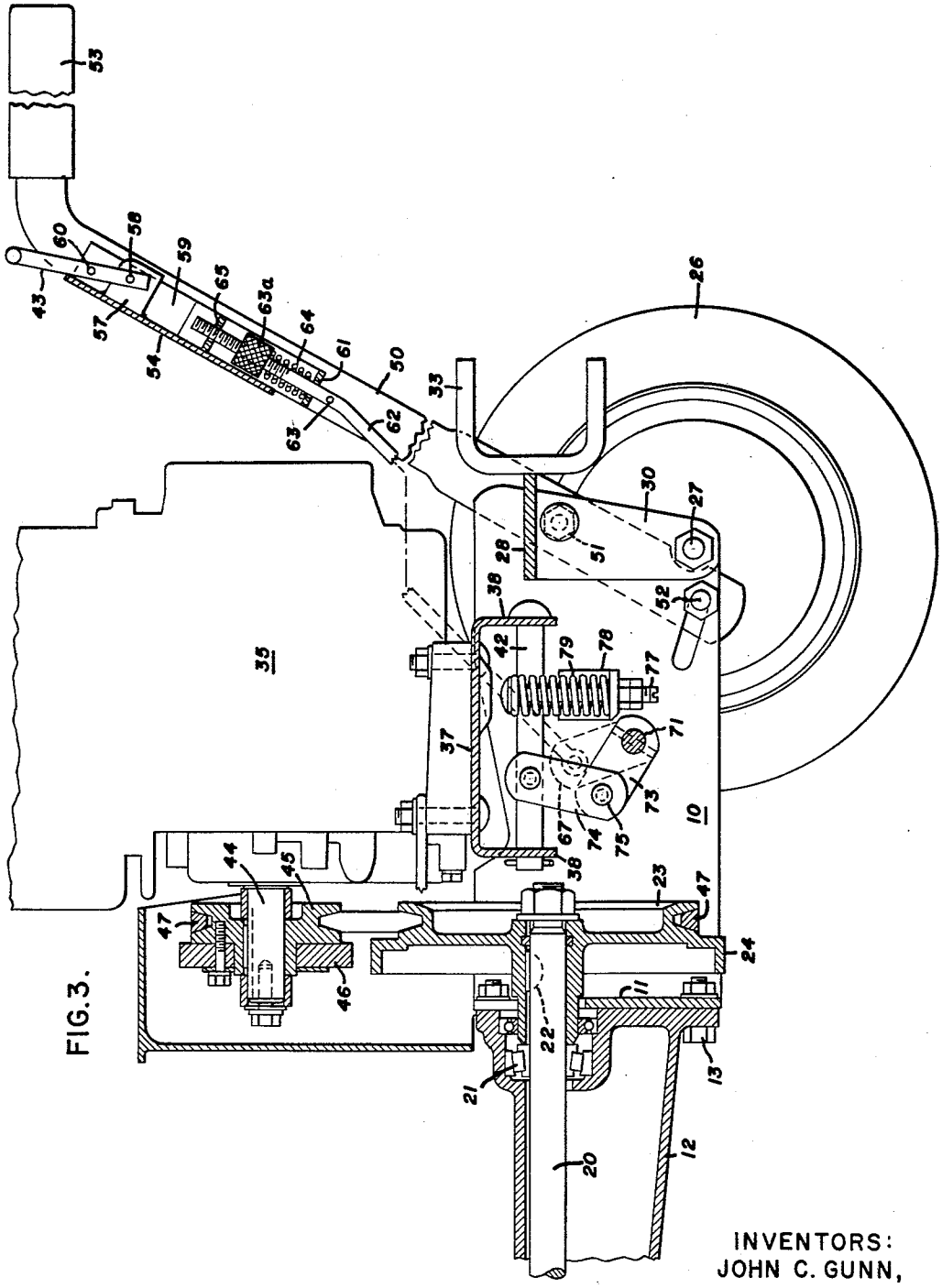



FIG. 3.

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Feb. 25, 1964 J. C. GUNN ETAL 3,122,208

SOIL TILLER

Filed July 3, 1961 4 Sheets-Sheet 4

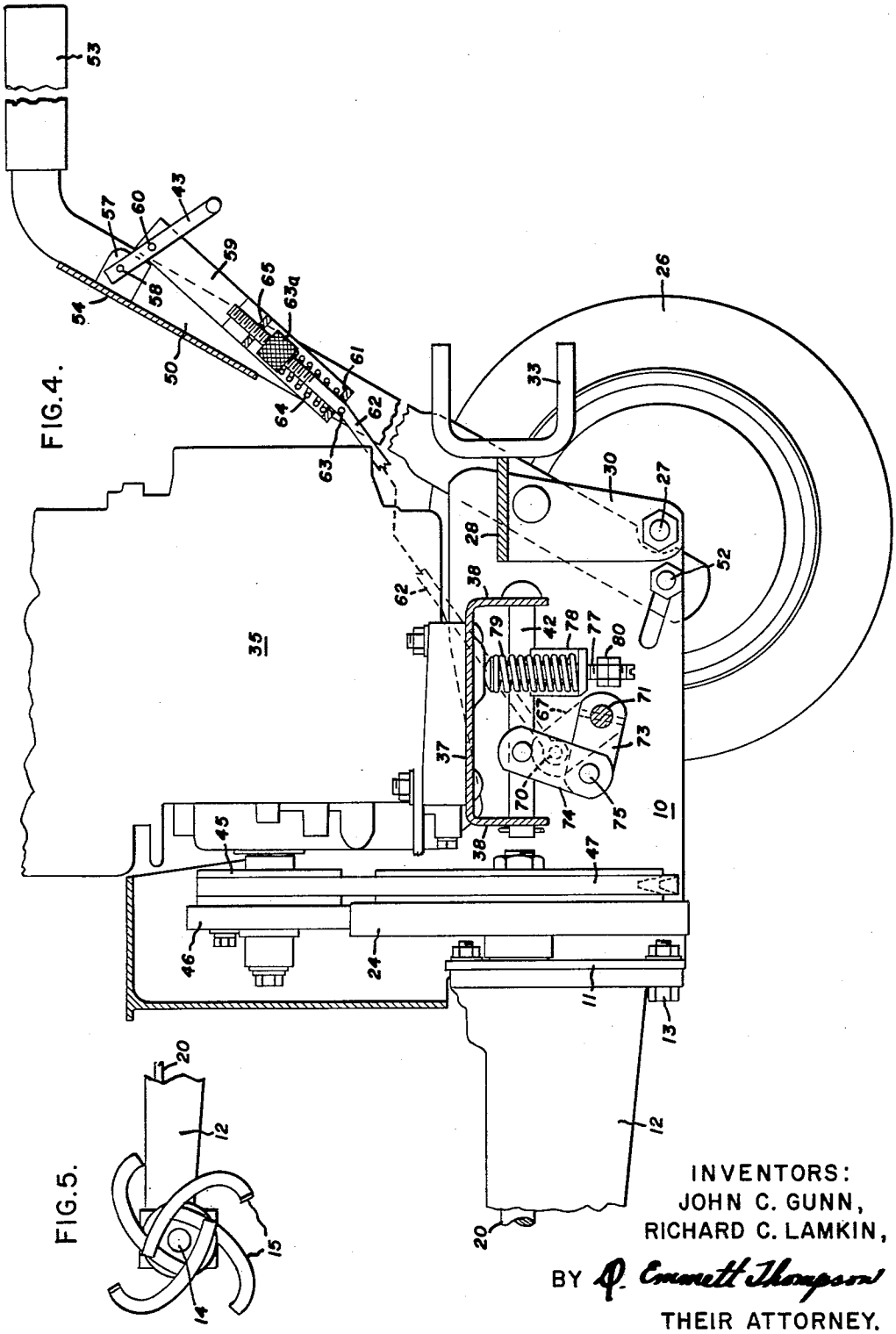


FIG. 4.



FIG. 5.

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United States Patent Office 3,122,208 Patented Feb. 25, 1964



3,122,208

# SOIL TILLER

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Filed July 3, 1961, Ser. No. 121,510
4 Claims. (Cl. 172—42)

This invention relates to power-operated, hand-manipulated, soil tilling machines. These machines are mounted on a pair of free-running, ground wheels and have a tined rotor operable upon rotation to till the soil and effect movement of the machine over the ground. The motor, usually in the form of a small gasoline engine, is employed to effect rotation of the tined rotor.

In one arrangement of the drive in tillers of this type, the motor is mounted for movement toward and from the tined rotor drive shaft. Friction drums are mounted on the motor shaft and the drive shaft and when the engine is moved toward the drive shaft, the friction drums are engaged to effect reverse drive for the machine. When the engine is moved in a direction from the rotor drive shaft, a drive belt is tensioned to effect forward drive.

This invention is directed particularly to the mounting and the control mechanism for shifting the position of the engine.

The invention has as an object a drive control for tillers of the type referred to and being operable by a single lever to shift the position of the motor to effect forward and reverse movements, the control arrangement embodying means to yieldingly restrain movement of the engine to effect reverse drive.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings in which like characters designate corresponding parts in all the views.

In the drawings:

FIGURE 1 is a rear end elevational view with a portion of the draw bar support broken away.

FIGURE 2 is a view taken on line 2—2, FIGURE 1, showing the control lever and the drive in neutral position.

FIGURE 3 is a view, similar to FIGURE 2, with the drive mechanism shown in vertical section, and showing the control lever and drive in forward position.

FIGURE 4 is a view, similar to FIGURE 3, of the control lever and drive in reverse position.

FIGURE 5 is a side elevational view, on a reduced scale, of the forward end of the device.

The tiller consists of a frame including a pair of side plates 10 connected at their forward ends by a transversely extending plate 11 to which is fixedly secured a housing 12, as by bolts 13. The housing 12 extends forwardly, and there is journaled transversely in the forward end of the housing a shaft 14, to the ends of which are secured tines 15. This assembly constitutes a soil tilling rotor.

A drive shaft 20 is journalled in the housing 12 and is operatively connected to the shaft 14, through worm gearing mounted in the forward end of the housing 12. The rear end of the drive shaft 20 is journalled in a roller bearing 21 and there is fixedly secured to the rearwardly



extending end portion of the shaft 20, as by key 22, a belt pulley 23 and a friction drum 24.

Ground wheels 26 are journalled on studs 27 secured to the rear ends of the side members 10. A U-shaped bracket 28 is positioned between the side members 10, and the vertically disposed legs 30 of the brackets are fixed to the side members, as by welding. The bracket 28 is provided with a yoke 33 to which the drag bar, not shown, is affixed. The ground wheels 26 are free-running and the machine is moved along the ground by rotation of the tine rotor 15. A motor 35 is mounted on the machine to provide power for effecting rotation of the rotor 15. The motor here shown is in the form of a gasoline engine. The motor is mounted on a U-shaped plate 37, the depending side flanges 38 of which extend transversely between the side plates and are apertured at like ends to receive a pivot pin 40 mounted in a pair of brackets 41 welded to the inner surface of one of the frame side members 10, see FIGURE 2. The side flanges 38 of the motor mounting plate are apertured adjacent their opposite ends to receive a pin 42 to which there is connected linkage extending from the control lever 43. The output shaft 44 of the motor 35 is arranged in spaced parallel relation to the rear end portion of the drive shaft 20, see FIGURE 4. A belt pulley 45 is fixed to the motor shaft 44 and arranged in alignment with the pulley 23 on the drive shaft. Also, a friction drum 46 is fixed to the motor shaft and arranged in alignment with the drum 24. A belt 47 is trained about the pulleys 23, 45.

The motor mount pivot pin 40 is arranged at one side of the motor shaft 44 and it will be apparent that as the motor is moved upwardly about the pivot pin 40, the belt 47 is tensioned, this belt providing for the forward rotation of the tine rotor 15 to effect forward movement of the machine along the ground. As the motor is moved downwardly about the pivot pin 40, the belt is slackened and the drum 46 moved into frictional engagement with the drum 24 to effect reverse drive for the machine. The general structural arrangement described, including the drive arrangement, is conventional in tillers of this type.

This invention is directed particularly to the actuating mechanism for moving the engine about the pivot 40, to effect forward and reverse movements of the machine.

A pair of tubular handle bars 50 are secured to the side plates 10 of the frame adjacent the rear ends thereof, as by bolts 51, 52. These handle bars 50 extend upwardly and incline rearwardly and are provided with suitable hand grips 53.

There is a plate 54 extending transversely between the upper ends of the handle bars 50, and having its end portions 55 extending around the handle bars and secured thereto, as by bolts 56 There is fixedly secured to the rear side of the plate 54, a pair of spaced apart ears 57, between which there is pivotally mounted the control lever 43, this mounting by way of a pin 58 extending through the ears 57 and one end of the lever 43. An elongated U-shaped yoke 59 is pivotally connected at its upper ends to the lever 43 intermediate the ends thereof, as by a pin 60, the side legs of the yoke 59 being arranged in straddle relation to the ears 57, see FIGURE 2. The bight portion 61 of the member 59 is apertured to slidably receive a rod 62 apertured to receive a pin 63 immediately below the bight portion 61. The upper end of the rod 62 extends intermediate the side legs of the yoke 59 and is threaded to receive an adjusting nut 63a.

A helical compression spring 64 is mounted on the rod and interposed between the adjusting nut 63a and the bight portion 61 of the member 59. A partition 65 is welded between the legs of the member 59 and apertured to slidably receive the upper end of the rod 62 to aid in guiding the rod in the member 59.

The rod 62 extends downwardly and at its lower end is pivotally connected to a link 67, by pin 70. The link 67 is fixedly secured to a cross shaft 71 journalled in apertures formed in the side plates 10. There is a link 73 fixedly secured to the shaft 71, and at its free end it is pivotally connected to one end of a pair of links 74, as by pin 75. The upper ends of the links 74 straddle the pin 42 and are pivotally connected to it by a pin 76.

With this arrangement, when the lever 43 is moved upwardly from the position shown in FIGURE 2, to the position shown in FIGURE 3, the rod 62 is pulled upwardly by the bight portion 61 of the yoke 59 acting against the compression spring 64 which, in turn, acts against the adjusting nut 63a. This effects a clockwise movement of the links 67, 73, FIGURES 3 and 4, effecting upward movement of the links 74 and the pin 42, thus moving the motor 35 upwardly about the pivotal pin 40 to a position tensioning the belt 47 for forward drive.

When the lever 43 is moved downwardly to the position shown in FIGURE 4, the bight portion 61 of the yoke 59 engages the pin 63, causing the rod 62 to move downwardly, thus effecting downward movement of the motor, as will be apparent, to move the friction drum 46 into engagement with the friction drum 24 to effect reverse drive.

When the control lever 43 is in the neutral position shown in FIGURE 2, the engine mounting plate 37 is supported by the head of a bolt 77 slidably mounted in a bracket 78 secured to the adjacent side plate 10 of the frame, see FIGURES 1 and 2. There is a helical compression spring 79 positioned on the bolt 77, intermediate the lower flange of the bracket 78 and the head of the bolt. The up position of the bolt is adjusted by jam nuts 80 threaded on the lower end of the bolt below the bracket 78. Thus, the engine is positioned in neutral—that is, intermediate the up belt tensioning position, and the down friction drum engaging position. It will accordingly be apparent that to move the motor downwardly about the pivot 40, it is necessary to exert and maintain downward pressure on the lever 43. If the lever is released, the spring 79 elevates the motor to neutral position. This is important as it prevents reverse movement of the tiller unless the operator intends such movement to take place.

The pivotal connection between the lever 43 and ears 57 and the yoke 59 is such as to provide a toggle arrangement. The pivot pin 58 is located rearwardly from the plate 54 a distance such that when the lever 43 is moved to the up-forward position, shown in FIGURE 3, the yoke 59 is positioned against the rear side of the plate 54. With the yoke in this position, the pivot pin 58 is spaced rearwardly of the pins 60, 70. In other words, the toggle arrangement has moved over center and accordingly becomes self-locking to hold the motor in up or belt tensioning position for forward drive of the device. This leaves both hands of the operator free for manipulation of the machine. During forward drive, the belt 47 is maintained under tension by spring 64. The magnitude of this tension can be varied by adjusting the nut 63a located on rod 62 convenient to the operator.

The arrangement described provides a single lever for the quick and convenient control of the drive to obtain forward and reverse movement of the machine. The yielding support for the motor in neutral position by way of the spring-pressed bolt 77 is also particularly advantageous in that it avoids reverse movement of the machine unless the control lever 43 is forcibly held in depressed position by the operator.



What we claims is:

1. A power-operated, manually-manipulated, soil tilling device comprising a frame mounted on a pair of ground wheels and having a handle bar for the manipulation of the device, a tined soil engaging rotor operable upon rotation to till the soil and propel the device along the ground, a drive shaft journalled in the frame and being operatively connected to said rotor to effect rotation thereof, a motor pivotally mounted on the frame and having a portion of its power shaft extending in spaced parallel relation to said drive shaft, a belt pulley mounted on said drive shaft, a belt pulley mounted on said power shaft, a belt trained over said pulleys and operable under tension to effect forward rotation of said drive shaft and rotor, a friction drum mounted on said drive shaft, a friction drum mounted on said power shaft, said drums being operable upon engagement to effect reverse rotation of said drive shaft and rotor, said motor being mounted for pivotal movement in a first direction away from said drive shaft to belt tensioning position and in a second direction toward said drive shaft to drum engaging position, spring means normally supporting said motor in a neutral position intermediate said belt tensioning position and said drum engaging position and yieldingly restraining pivotal movement of said motor toward said drum engaging position, a manual control lever mounted on said handle bar and being selectively movable from neutral position to forward and reverse positions, linkage connecting said lever to said motor and operable, upon movement of said lever from neutral position to reverse position, to pivotally move said motor into drum engaging position against the action of said spring means, said spring means being effective upon manual release of said lever to return said motor to said neutral position, said linkage being operable upon movement of said lever from neutral position to forward position, to move said engine into belt tensioning position, said linkage including a toggle connection movable over center to hold said engine in belt tensioning position when said lever is in forward position.

2. A tilling device as defined in claim 1, wherein said linkage also includes spring means operable when said lever is moved to forward position to exert a yielding force on said motor to urge the same in belt tensioning position.

3. A tilling device as set forth in claim 1, wherein said linkage provides a rigid connection between said lever and motor during movement of said lever from neutral to reverse position.

4. A power-operated, manually-manipulated, soil tilling device comprising a frame mounted on a pair of ground wheels and having a handle bar for the manipulation of the device, a tined soil engaging rotor operable upon rotation to till the soil and move the device along the ground, a drive shaft journalled in the frame and being operatively connected to said rotor to effect rotation thereof, a motor mounted on the frame and having a portion of its power shaft extending in spaced parallel relation to said drive shaft, a belt pulley mounted on said drive shaft, a belt pulley mounted on said motor shaft, a belt trained over said pulleys and operable under tension to effect forward rotation of said drive shaft and rotor, a friction drum mounted on said drive shaft, a friction drum mounted on said motor shaft, said drums being operable upon engagement to effect reverse rotation of said drive shaft and rotor, said motor being mounted for movement in a direction from said drive shaft to belt tensioning position and toward said drive shaft to drum engaging position, spring means for supporting said motor in neutral position intermediate said belt tensioning position and said drum engaging position and yieldingly restraining movement of said motor toward said drum engaging position, a lever mounted on said handle bar and being selectively movable from neutral position to forward and reverse positions, linkage including a U-shaped yoke

member, the free ends of the leg portions of said yoke member being pivotally connected to said lever, a rod terminating at one end in said yoke member and being slidable in the bight portion thereof, said rod having stop means engaging the outer surface of the bight portion of said yoke when said lever is moved toward reverse position, said end of said rod having a nut threaded thereon and a helical compression spring interposed between



said nut and the inner surface of the bight portion of said yoke, whereby said lever is yieldingly movable relative to said rod during movement of said lever toward forward position.

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