March 2, 1954 J. B. DANIELL 2,670,486

ROTARY BRUSH CONSTRUCTION AND MOUNTING THEREFOR

Filed Aug. 4, 1950

FIG. 1.

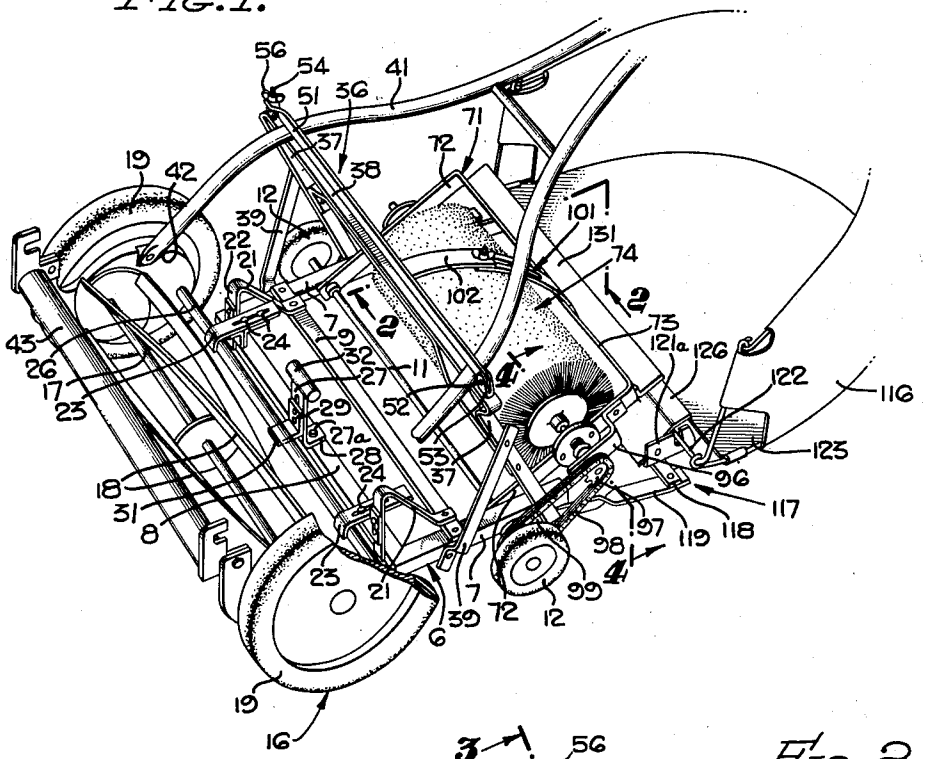


FIG. 3.

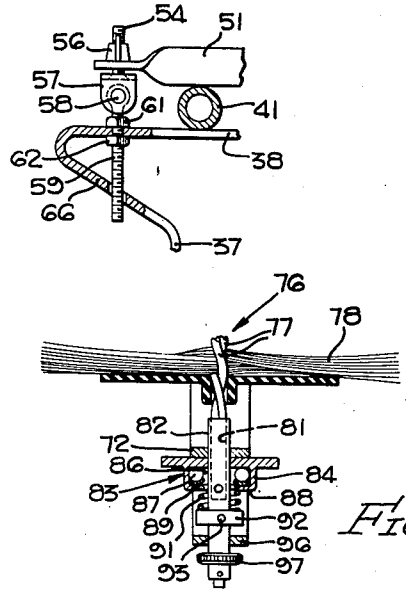
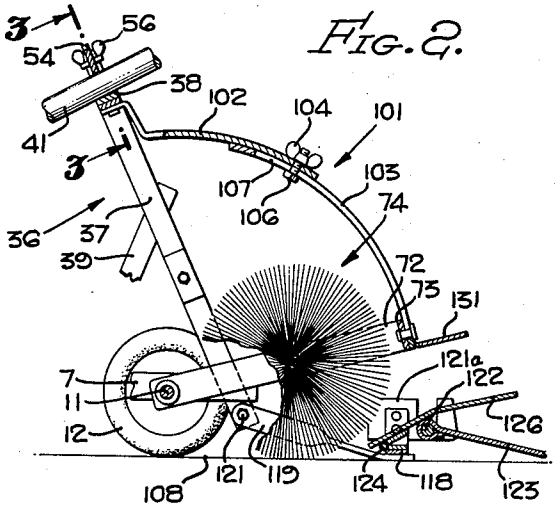


FIG. 2.



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FIG. 4.

BY

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Patented Mar. 2, 1954

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UNITED STATES PATENT OFFICE

2,670,486

ROTARY BRUSH CONSTRUCTION AND MOUNTING THEREFOR

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Application August 4, 1950, Serial No. 177,617

6 Claims. (Cl. 15—79)

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This invention relates to improvements in sweeping apparatus, and has for an object the provision of an improved construction of rotary brush of the type commonly employed in sweeping machines.

A more detailed object of the invention is to provide a rotary brush construction of the general character described which incorporates various details of refinement contributing to simplified and inexpensive construction. A more detailed object in this connection is to provide a rotary brush which, instead of being of the rigid core type commonly employed in mechanical sweepers, is a much less expensive type, wherein the radially extending bristles are engaged between two strands of twisted wire.

A further object in the same connection is to provide a novel type of mounting for the "wound-in-wire" type of brush hereinabove referred to, which holds the relatively flexible twisted wire core of the brush in sufficient tension to impart ample rigidity thereto, so that it can resist any tendency toward flexing fully as well as though it were of the more expensive rigid core type of rotary brush.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of my invention which is illustrated in the drawings accompanying and forming part of the specification. It is to be understood that I do not limit myself to the showing made by the said drawings and description, as I may adopt variations of the preferred form within the scope of my invention as set forth in the claims.

Referring to the drawings:

Figure 1 is a perspective view of a cylindrical brush and mounting therefor incorporating the principles of the present invention, showing the apparatus operatively installed in a sweeping device attached to a lawn mower. Portions of the Figure are broken away the better to reveal some of the constructional detail.

Figure 2 is a longitudinal vertical sectional view taken upon the line 2—2 of Figure 1 and the direction of view by the arrows.

Figure 3 is a detail view in enlarged transverse section, taken upon the line 3—3 of Figure 2.

Figure 4 is an enlarged detail view taken in transverse section upon the line 4—4 of Figure 1, with the direction of view as indicated.

Specifically describing a preferred embodiment of my invention, the rotary brush and

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mounting therefor which have been chosen for illustration and description herein, has been designed primarily for use in a sweeping device adapted to be releasably attached to a conventional lawn mower. It is to be understood, however, that brushes and mountings therefor incorporating the principles of my present invention are adapted to other types of sweeping or brushing apparatus, and that its installation as a portion of a sweeping attachment for a lawn mower is described and illustrated herein in an exemplary, rather than in a limiting sense.

A lawnmower sweeper attachment which advantageously incorporates my improved brush and mounting as an important operative feature thereof comprises a chassis indicated in its entirety at 6 in the form of a pair of spaced, parallel, longitudinally extending members 7 rigidly interconnected by a transversely extending front bar 8 which is welded or otherwise rigidly secured to the forward end of the members 7. Aft of the front bar 8 and preferably intermediate the ends of the longitudinal members 7, is a bracing strip 9 rigidly secured at each end to one of the longitudinal members 7.

An axle shaft 11 also extends transversely of the chassis 6, being revolubly journaled in the two longitudinal members so that it is free to rotate with respect thereto. Upon the end of the axle 11 outside the chassis 6 wheels 12 are secured to the shaft 11 so that the shaft and wheels 12 all rotate together as a unit. The two wheels 12 support the after end of the chassis 6; whereas, the forward end of the chassis is supported upon a suitable supporting and operating vehicle for which the sweeping attachment constitutes an accessory.

Preferably, the sweeping attachment is designed for use in connection with a conventional lawn mower 16, not for the purpose of sweeping up the grass cuttings as the lawn mower is used in cutting grass, but to perform a sweeping operation independently of the act of cutting which the lawn mower 16 is relied upon to perform when used in accordance with conventional practice. The accessory attaches with its forward or leading end attached to that end of the lawn mower which is usually considered its front end with the result that for the sweeping attachment to advance forwardly the lawn mower 16 shall be pushed in what is normally considered its backward direction of movement, or its "free wheeling" arrangement in which the rotor 17 carrying the cutter blades 18 remains motionless although the supporting wheels 19 of the lawn

mower rotate so as to provide the rolling support for the lawn mower as it advances. It is apparent, therefore, that the lawn mower 16 serves merely as a convenient support and means for propelling the sweeping attachment.

With this object in view, the means for attaching the sweeping attachment to the lawn mower comprises a pair of brackets 21, one of which is rigidly mounted upon the chassis 6 adjacent each side thereof and preferably with the vertical front piece 22 of each bracket 21 substantially in the plane of the forward edge of the front bar 8. Each bracket 21 carries a hook 23 adjustably secured thereto as by a pair of machine screws 24, and both hooks are adapted to engage over and around the bar 26 which constitutes a portion of the frame of the lawn mower 16, extending transversely thereacross at substantially the front of the lawn mower. Convenient, manually operable means are provided for locking the hooks 23 in their position of so engaging the front bar 26 of the lawn mower, the means here chosen for illustration comprising a bracket 27 extending vertically in front of the front bar 8 of the sweeper's chassis 6, to which it is pivotally secured by means of a machine screw or rivet 27*a* extending vertically through a horizontal flange or foot 28 extending horizontally from the lower end of the vertical bracket 27, and also through the front bar 8 of the chassis 6, with the result that the bracket 27 is pivotally mounted upon the front bar 8 for movement about a vertical axis. Consequently, a piece of angle iron 29 having one flange mounted for vertical adjustment upon the forward face of the bracket 27 provides, through the expedient of its other flange 31, a finger or detent which can be engaged below the front bar 26 of the lawn mower so as to prevent accidental displacement of the hooks 23 therefrom. A handle 32 on the upper end of the bracket 27 makes it convenient to shift the bracket and its locking detent 31 optionally to its locking position in which it is illustrated in Figure 1, or to its withdrawn position, swung about the axis of the pin 27*a*, in which position of the bracket 27 the hooks 23 can readily be lifted from their engagement with the bar 26 of the lawn mower. Hence, engagement and disengagement of the chassis of the sweeper attachment from the lawn mower can readily be effected without the use of any tools.

Thus it may be seen that since the means for attaching the chassis of the sweeper attachment are located at the front edge thereof, and since they are so designed that they are engageable with a transverse bar 26 at the front of the lawn mower, their design and arrangement are such that when the sweeping attachment is secured to the lawn mower, the front of the lawn mower engages the front of the sweeping attachment. Consequently, in order for the attachment to proceed forward the lawn mower is propelled backwards, thus making it possible to operate the sweeper with the latter partially supported on the lawn mower and with the lawn mower serving as the means for propelling the attachment. A portion of the importance of this feature lies in the fact that when the lawn mower is propelled backwards the wheels 19 rotate freely and without affecting any rotation of the rotor 17 which carries the cutting blades 18 and with a consequent reduction in the amount of frictional resistance which must be overcome when the lawn mower is moved across a supporting surface.

As a further means for securing the sweeping attachment to the lawn mower there is provided another bracket 36 comprising a pair of spaced legs 37 each of which inclines upwardly and forwardly from one of the longitudinal members 7 of the chassis adjacent the after end thereof, and a transverse bar 38 rigid, and preferably integral with the two legs 37 interconnecting their upper ends. Both legs 37 are preferably rigidly secured to the chassis, and upwardly and rearwardly inclined braces 39 are associated with the legs 37 in order to increase the strength and rigidity of the bracket 36. The handle 41 of the lawn mower is adapted to be brought to rest upon the upper surface of the transverse bar 38 of the bracket 36 when the handle 41 is swung to that position in which it can easily be used to push the lawn mower 16 in its "free wheeling" position, i. e., with the lawn mower running backward. In most conventional lawn mowers, a shoulder, pin or other suitable type of abutment 42 is provided upon the frame of the lawn mower adjacent the point of pivotal connection of the handle 41 thereto, so arranged that when the handle is swung to this so-called "free-wheeling" position the lawn mower is tipped in such a manner as to raise the idler roller 43 at the back of the lawn mower, thus lifting the idler roller 43 from its contact with the supporting surface and further decreasing the friction coincident to moving the lawn mower from place to place without actually operating the grass cutting portion thereof.

Above the rigid cross-bar 38 of the bracket 36, there is provided a transversely extending clamping bar 51, one end of which is pivoted to the rigid bar 38 adjacent the corresponding end thereof by being engaged between the two spaced flanges 52 of a clip 53 suitably mounted upon the upper face of the rigid bar 38. The other end of the clamping bar 51 is releasably attachable to the associated end of the rigid bar 38 through the expedient of a bolt 54 and nut 56 (preferably a wing nut), the former extending through a slot (not shown) in the end of the clamping bar 51. As best shown in Figure 3, the bolt 54 extends upwards from a clevis 57 pivotally mounted as by a pin 58 upon the upper end of an eye bolt 59 which extends downwards through the rigid bar 38 to which it is adjustably secured as by a pair of clamping nuts 61 and 62 which thus make it possible to adjust the height at which the bolt 59 supports the associated end of the clamping bar 51 when the wing nut 56 is tightened thereagainst. Preferably, the bolt which supports the clip 53 at the other end of the clamping bar 51 is similarly adjustably mounted, thus making it possible to adjust the height of the clamping bar 51 and still preserve its parallel relationship to the rigid bar 38.

In order to adapt the sweeping attachment for use in conjunction with a wide variety of different styles of lawn mowers, the handles 41 of which are of various widths at those portions thereof which the bracket 37 and the clamping bar 51 engage, the effective width of the rigid bar and the clamping bar 51 is increased by providing an outwardly flared portion 66 at the upper end of each of the rigid legs 37. This increases the distance between ends of the two outwardly flared portions 66 as compared with the distance between the straight portions of the legs 37. This makes it possible to provide the rigid bar 38 of the bracket 36 considerably longer and, similarly, to increase the thickness of the clamping bar 51.

A substantially U-shaped frame 71 is pivotally mounted upon the chassis 6, this frame 71 com-

prising two spaced parallel legs 72, each of which is pivoted adjacent an end thereof upon the axle shaft 11, and a transversely extending portion 73 rigid and preferably integral with the legs 72 interconnects them at their other ends. A rotary brush 74 is journaled for rotation upon a transverse axis, between the two legs 72 of the frame 71; and it is with the construction and mounting of this brush 74 that the present invention is concerned.

In its preferred form, this brush 74 comprises a core 76 of twisted wires 77, and bristles 78 secured to the core 76 by being engaged midway between the ends of the bristles between the wires 77. This type of brush known as the "wound in wire" type is considerably less expensive than one constructed with a wood or other rigid core; and I have made it feasible to employ a brush of this type with a relatively flexible core by providing a type of mounting therefor which imposes its core 76 to sufficent tension to keep the core perfectly straight under all circumstances of normal use. Each end of the core 76 is rigidly secured in a socket 81 in the inner end of a rod or tube 82 which extends through an anti-friction bearing 83 of the type commonly known as a combined radial and thrust bearing. This bearing comprises an annular housing 84 the inner edge of which bears against the outer face of one of the legs 72 of the frame 71 and contains a recess 86 within which a plurality of ball bearings 87 are mounted in position encircling the rod 82. The outer edge 88 of the housing 84 is inturned to embrace not only the ball bearings 87 but also a relatively small annular race 89 which engages the ball bearings 87 on those faces thereof which are remote from the associated legs 72 of the supporting frame 71. However, the inturned edge 88 of the housing 84 is so small that a spring 91 can extend through the central aperture thereof to engage against the outer face of the inner race 89 and thus impose outward pressure upon a collar 92 rigidly secured to the rod 82, as by a pin 93. There being such a bearing at each end of the spindle or core 76 of the brush 74 with their two springs 91 working in opposition to each other, the core 76 will be subjected to tension the magnitude of whic his determined by the design of the springs 91 and the adjustment of the collars 92 upon their respective rods 82.

Preferably, the outer end of one of the rods 82 is supported by an auxiliary bracket 96 mounted on the associated leg 72; and outside this bracket that same rod 82 is provided with a driven sprocket 97 engaged by a chain 98 which also engages a driving sprocket 99 rigid with one of the wheels 12 of the sweeping attachment. Since the preferred arrangement in this connection is to make both wheels 12 rigid with an axle shaft 11, the sprocket 99 may merely be attached to the axle shaft and the surety with which the brush 74 will be rotated is increased by the fact that both wheels 12 contribute to the force, causing the axle shaft 11 to rotate.

The weight of the frame 71 and the brush 74 and other parts carried thereby is supported by means of a telescopic bracket 101 consisting of a rigid portion 102 secured to the bracket 36 and extending aft therefrom and downwardly in an arc the center of which lies within the axis of the axle shaft 11. The other portion 103 of the supporting bracket 101 extends upwardly and forwardly in a similar arc from the transverse bar 73 of the pivotally mounted, brush carrying

frame 71. The two parts 102 and 103 of the bracket 101 slidably engage each other and are adapted to be locked in selected position of adjustment by means of a wing nut 104 threaded upon a bolt 106 extending through a hole in one of the parts, say the part 102, and through an elongated slot 107 in the other part 103. Hence, by loosening the wing nut 104, the effective height of the brush 74 with respect to the surface 108 over which the device is being moved, can be adjusted, thus making it possible to regulate the force with which the bristles 74 engage that surface or the distance whereby they clear the surface, as determined by the character of the surface 108 being swept and/or by the character of the material to be removed from that surface.

Means are provided for releasably mounting a conventional grass catcher 116 upon the sweeping attachment in position behind the brush 74 to receive sweepings therefrom, and also for mounting means for guiding the sweepings as they leave the brush and are thrown toward the catcher 116. These mounting and guiding means are carried by a bracket 117 comprising a transversely extending bar 118 rigid with and interconnecting the after ends of a pair of spaced longitudinally extending legs 119, the forward ends of which are pivoted as by pins 121 upon the chassis 6. Downward extension of the legs 37 of the upwardly and forwardly extending bracket 36 provides convenient means for attachment of the pivot pins 121, as best shown in Figure 2. Owing to the pivoted nature of the connection between the bracket 117 and the chassis, the bracket is adapted to rest of its own weight upon a supporting surface 108 and thus be dragged along behind the brush 74 as the sweeping attachment is advanced over the surface 108. A hook 121*a* is rigidly mounted upon the bar 118 of the bracket adjacent each end thereof; and since the two hooks 121*a* are in alignment with each other and since they open upwardly they are adapted to receive the exposed wire or rod 122 commonly provided at the forward edge of the bottom 123 of a conventional grass catcher 116 as best illustrated in Figure 1.

Also secure to the transverse bar 118 of the bracket 117 as by a piano hinge 124, is a guide plate 126. Since the axis of the hinge 124 is adjacent the forward edge of the transverse bar 118 and also adjacent the forward edge of the guide plate 126, the hinged mounting of the plate 126 permits its after edge to be lifted before the grass catcher 116 is engaged upon the hooks and thereafter to be lowered again so that the after edge of the guide plate rests on the upper surface of the grass catcher's bottom 123, thus providing ample assurance that all of the material swept toward the grass catcher 116 by the rotary brush 74 will enter the grass catcher rather than escape between the chassis and the forward edge of the grass catcher's bottom 123. As a further assistance in guiding the swept material into the catcher 116, there is provided a deflector plate 131 rigid with and extending aft from the transverse bar 73 of the pivotally mounted, brush carrying frame 71. As clearly shown in Figure 2, this deflector plate 131 is situated above the path traversed by material swept by the brush 74; and consequently it serves to intercept any such swept material from traversing a path so high that it would escape over the top of the back wall of the grass catcher 116. Consequently, it serves to protect the clothing and face of the operator from swept material

which otherwise might be the source of much inconvenience and discomfort.

I claim:

1. In a sweeping device, a chassis, a rotary brush comprising a flexible core and a plurality of bristles extending therefrom, and means for revolubly mounting said brush upon said chassis and for imposing tension upon said core comprising a rod affixed to an end of said flexible core, and extending through a portion of said chassis, a collar secured to said rod and spaced outwardly from the outer face of said portion of said chassis, anti-friction means encircling said rod adjacent said outer face of said portion of said chassis, and resilient means under compression between said collar and said anti-friction means.

2. In a sweeping device, a chassis, a rotary brush comprising a flexible core and a plurality of bristles extending therefrom, and means for revolubly mounting said brush upon said chassis and for imposing tension upon said core comprising a rod affixed to an end of said flexible core and extending through a portion of said chassis, a collar secured to said rod and spaced outwardly from the outer face of said portion of said chassis, and anti-friction means under compression between said collar and said outer face of said portion of said chassis.

3. In a sweeping device, a chassis, a rotary brush comprising a flexible core and a plurality of bristles extending therefrom, and means for revolubly mounting said brush upon said chassis and for imposing tension upon said core comprising a bearing housing engaging an outer face of a portion of said chassis, anti-friction means confined within said housing, a rod affixed to an end of said flexible core and extending through a clearance hole in said portion of said chassis, a collar carried by said rod beyond said anti-friction means from said chassis, a bearing race confined within said housing and in engagement with said anti-friction means, and a coil spring encircling said rod and under compression between said collar and said race.

4. In a sweeping device, a chassis, a rotary brush comprising a plurality of flexible wires twisted spirally together and a plurality of bristles extending therefrom, and means for revolubly mounting said brush upon said chassis and for imposing tension upon said wires comprising a bearing housing engaging an outer face of a portion of said chassis, anti-friction means confined within said housing, a rod affixed to an end of said wires and extending through a clearance hole in said portion of said chassis, a collar carried by said rod beyond said anti-friction means from said chassis, a bearing race confined within said housing and in engagement with said anti-friction means, and a coil spring encircling said rod and under compression between said collar and said race.

5. In a sweeping device, a chassis, a rotary brush comprising a flexible core and a plurality of bristles extending therefrom, and means for revolubly mounting said brush upon said chassis and for imposing tension upon said core comprising means providing an axle shaft affixed to an end of said flexible core and extending through a portion of said chassis, a collar secured to said axle-providing means and spaced outwardly from the outer face of said portion of said chassis, anti-friction means encircling said axle-providing means adjacent said outer face of said portion of said chassis, and resilient means under compression between said collar and said anti-friction means.

6. In a sweeping device, a chassis, a rotary brush comprising a plurality of flexible wires twisted spirally together and a plurality of bristles extending therefrom, and means for revolubly mounting said brush upon said chassis and for imposing tension upon said wires comprising a bearing housing engaging an outer face of a portion of said chassis, anti-friction means confined within said housing, means providing an axle-shaft affixed to an end of said wires and extending through a clearance hole in said portion of said chassis, a collar carried by said axle-providing means beyond said anti-friction means from said chassis, a bearing race confined within said housing and in engagement with said anti-friction means, and a spring under compression between said collar and said race.

JOHN B. DANIELL.

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