Dec. 31, 1963 L. ZIMMERMAN 3,115,654

BARN SWEEPER

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FIG. 1

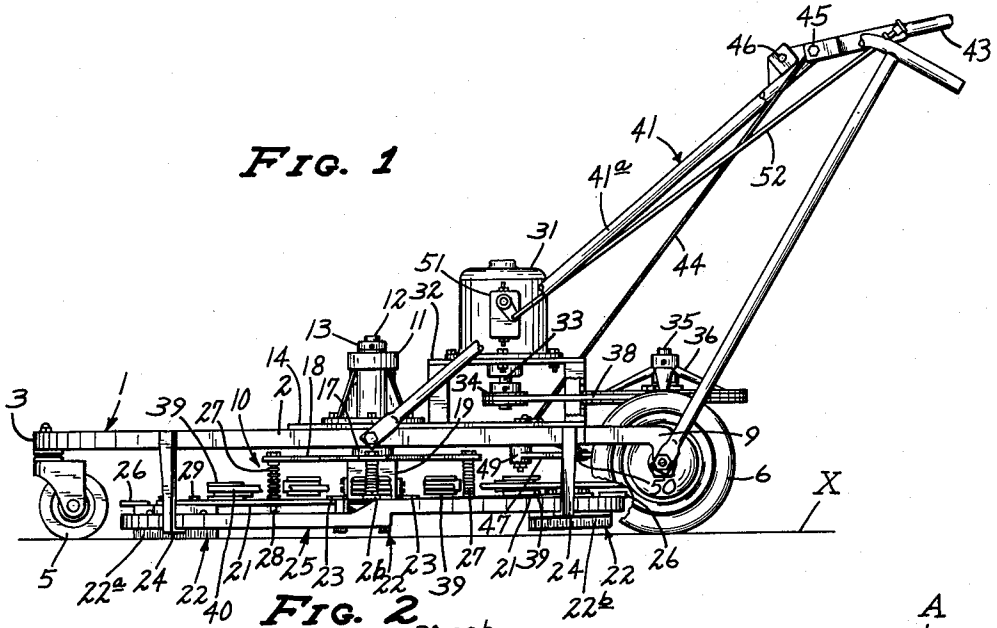
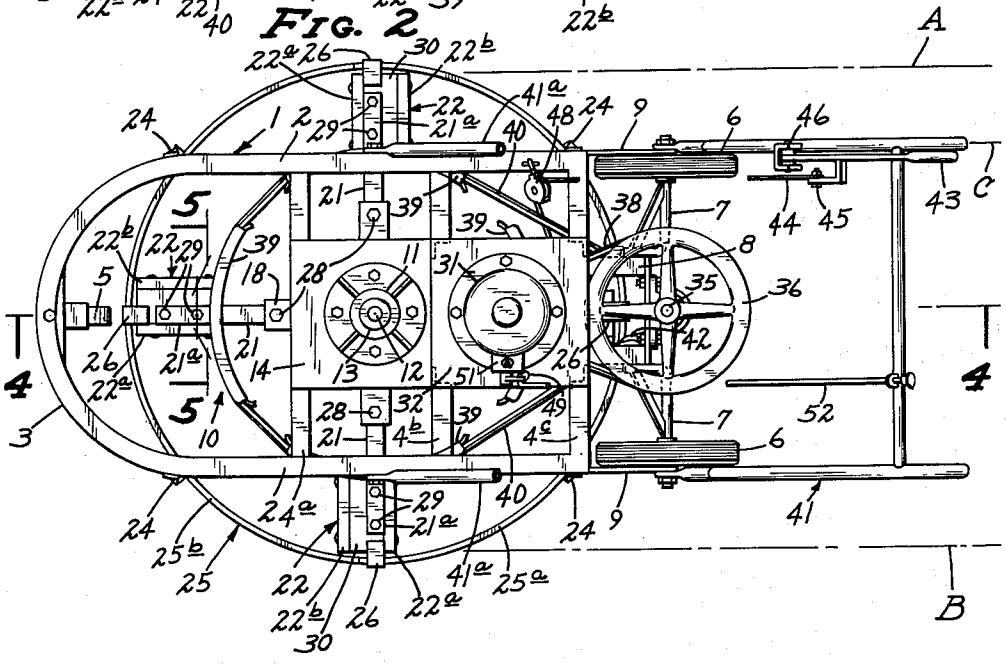


FIG. 2



INVENTOR.

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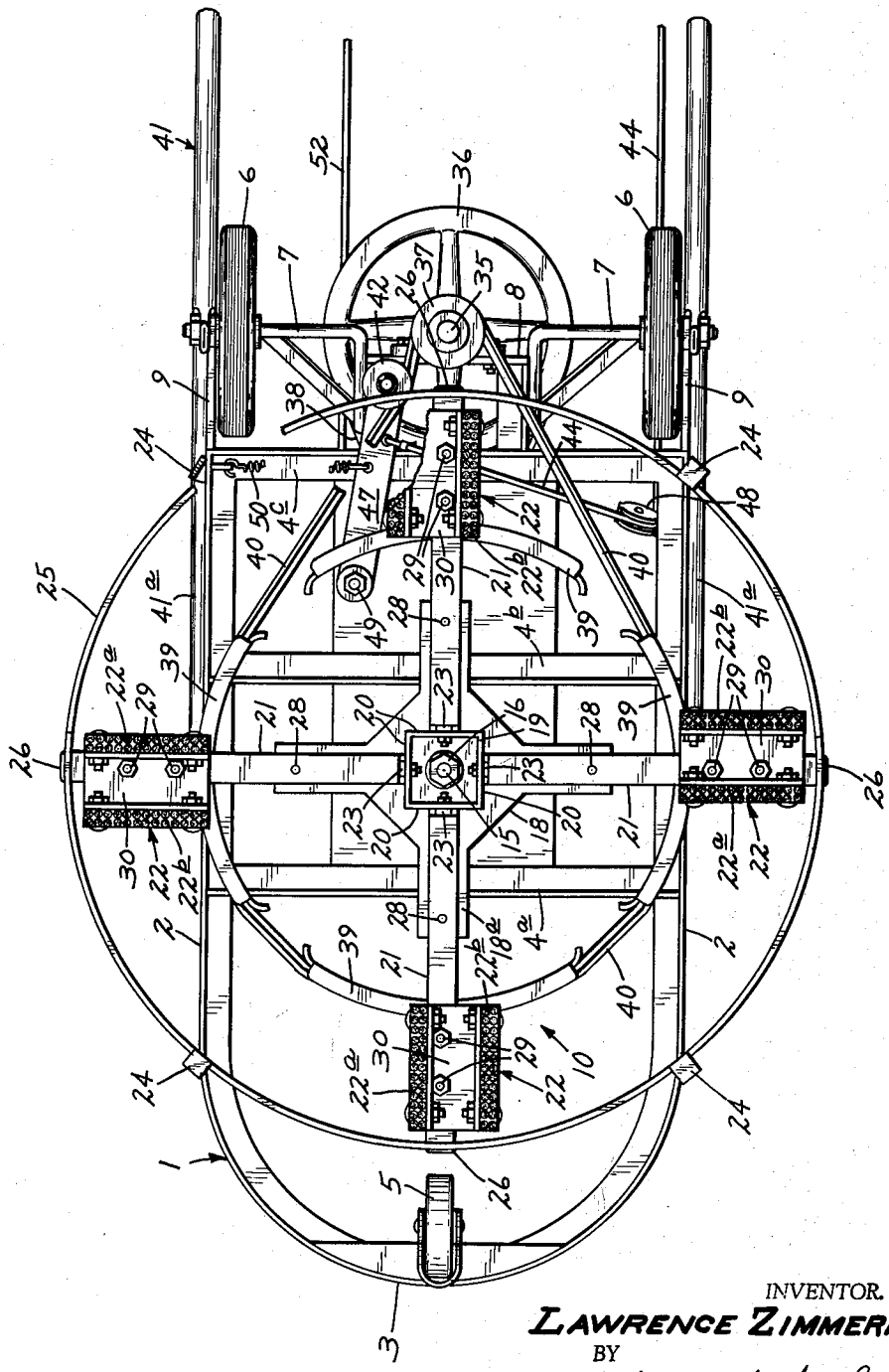
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FIG. 3



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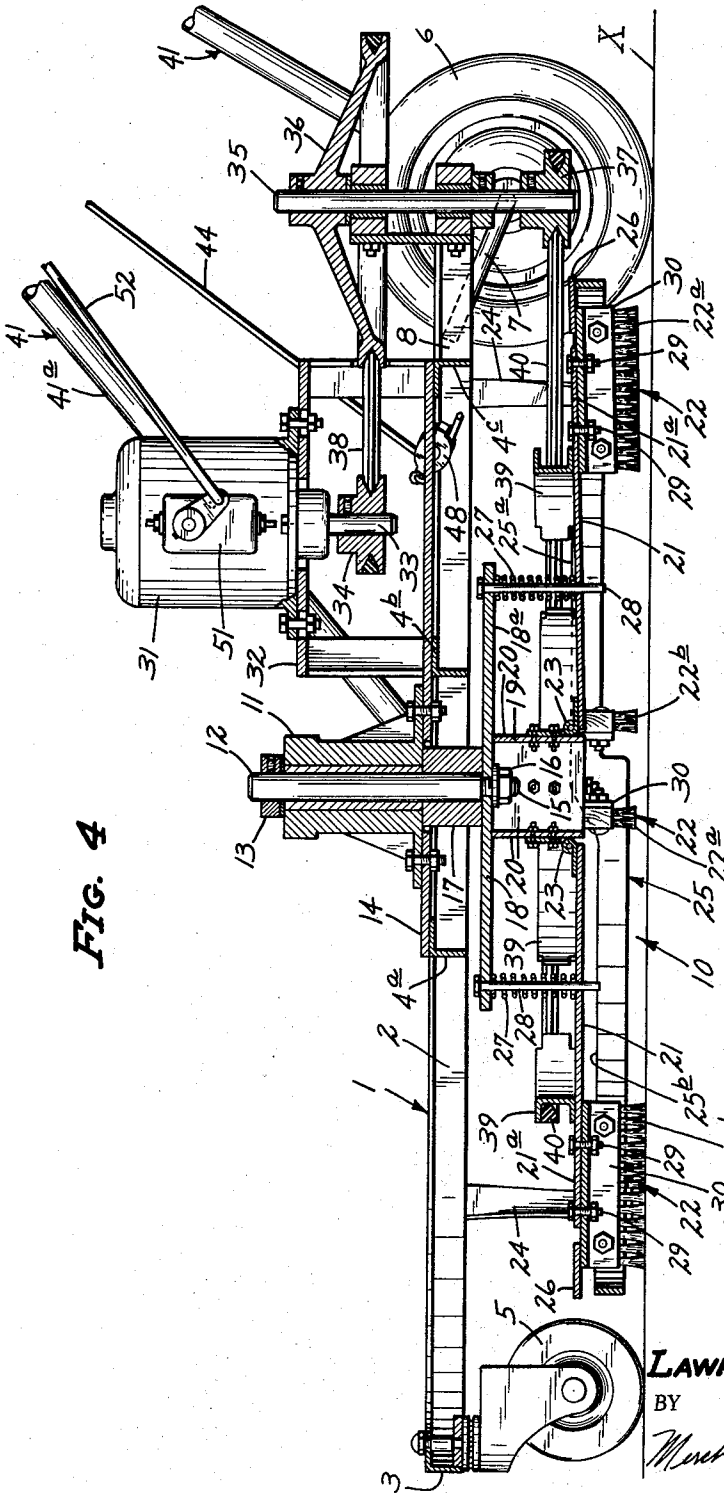


FIG. 4

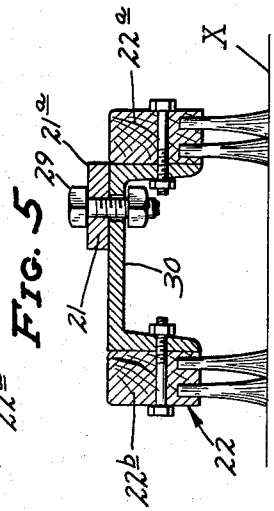


FIG. 5

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3,115,654

BARN SWEEPER

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Filed Feb. 18, 1963, Ser. No. 259,193
5 Claims. (Cl. 15—49)

My invention relates to sweepers and more particularly to power-operated sweepers of the type particularly adaptable for use in sweeping the aisles of barns between rows of stanchions.

The primary object of my invention is the provision of a power sweeper which operates with greater efficiency than any sweeper of this type heretofore produced.

An important object of my invention is the provision of a device of the class above described which deposits its sweepings in windrows.

A further and still highly important object of my invention is the provision of a device of the class above described which is relatively light in weight and extremely maneuverable.

Another object of my invention is the provision of a device of the class above described which incorporates a minimum of working parts and is highly efficient in its operation and extremely durable.

The above and still further objects of my invention will become apparent from the following detailed specification, appended claims and attached drawings.

Referring to the drawings, wherein like characters indicate like parts throughout the several views:

FIG. 1 is a view in side elevation of my novel sweeper, some parts being broken away;

FIG. 2 is a view in top plan of the structure of FIG. 1, some parts being broken away and shown in section;

FIG. 3 is an enlarged view in bottom plan, some parts being broken away and shown in section;

FIG. 4 is a longitudinal section as seen from the line 4—4 of FIG. 2 on an enlarged scale; and

FIG. 5 is an enlarged view in transverse section as seen from the line 5—5 of FIG. 2.

Referring with greater particularity to the drawings, the numeral 1 indicates in its entirety a generally horizontally disposed supporting frame which is formed preferably from angle irons and includes laterally spaced longitudinally extended side frame members 2, which are integrally connected by an arcuate front frame member 3 and longitudinally spaced transverse connecting members 4*a*, 4*b*, 4*c*. Wheel means for supporting the frame 1 in spaced relation to a surface to be swept includes a caster wheel 5 carried by the arcuate forward frame member 3 and laterally spaced rear wheels 6, one each journalled on an L-shaped axle section 7. Preferably, and as shown, the inner end portions of the axle sections 7 are rigidly secured to a relatively narrow mounting bracket 8 projecting rearwardly from the intermediate portion of the frame member 4*c*. The laterally outwardly projecting portions of the axle sections 7 extend through and are carried by bar-like rearward extensions 9 carried by the side frame members 2.

Carried by and journalled centrally of the frame 1 is a rotor identified in its entirety by 10. Specifically, the means mounting said rotor 10 for rotation comprises a bearing-equipped hub 11 having a shaft 12 journalled for rotation on a vertical axis therein. Shaft 12 is locked against lowering movements by a set-screw-equipped collar 13 at its upper end. As shown in FIG. 4, the shaft 12 projects through the hub 11, through a mounting plate 14 carried by the transverse frame members 4*a*, 4*b*, 4*c*, and terminates therebelow in a lock-nut-equipped reduced end portion 15. Fast on the reduced end 15 and interposed between the lock nut 16 and a spacer sleeve 17 is a horizontally disposed plate-like element 18 which forms the upper limits of the rotor 10. Rigidly secured to and

depending from the axial portion of the plate-like member 18 is a box-like mounting bracket 19, shown as being rectangular in cross section.

Pivotally secured to the angularly disposed side walls 20 of the mounting bracket 19 are circumferentially spaced radially outwardly projecting arms 21. The radially outer end portions of the arms 21 are provided with suitable brush elements 22. In order to allow raising and lowering movements of the outer end portions of the arms 21 and the brush elements 22 carried thereby, the inner ends of the arms 21 are connected to the side walls 20 of the box-like mounting bracket 19 by means of hinges 23.

Suspended from the frame 1 by means of depending strap-like hangers 24, is a cam ring 25 which is concentric with the rotor and which is closely spaced to the radially outer end portions of the arms 21. As shown particularly in FIGS. 1, 2 and 4, the cam ring 25 is provided with a relatively raised or elevated portion 25*a* which extends for at least 180 degrees of circular arc and a relatively depressed or lowered portion 25*b* which is of less than 180 degrees of circular arc. Referring particularly to FIGS. 1 and 2, the extreme outer ends of the arms 21 are provided with followers in the nature of finger-like extensions 26. Followers 26 at all times overlie the cam ring 25 and actually ride up upon same and elevate the brush elements 22 from a floor surface X being swept when positioned over the elevated portion 25*a* thereof. On the other hand, the followers 26 are suffiicently elevated from the cam ring 25 when overlying the relatively depressed portions 25*b* thereof as to permit engagement of the brush elements 22 with said surface X under normal conditions.

Yieldingly biasing the arms 21 in a downward swinging direction, whereby to increase the frictional engagement between the followers 26 with the relatively raised portion 25*a* of the cam ring 25 or, alternatively, to increase frictional engagement of the brush elements 22 with the floor X when the cam followers 26 are in overlying relation to the depressed portions 25*b*, are a plurality of circumferentially spaced coiled compression springs 27 which are interposed between the undersurface 18*a* of the plate-like member 18 and the intermediate portion one each on one of the arms 21. Maintaining the springs 27 in position during raising and lowering movements of the brush-equipped outer ends of the arms 21 are a plurality of depending guide rods 28 which extend through plate 18 and the coiled springs 27 and have their lower ends slidably received through suitable apertures in the respective arms 21.

As shown particularly in FIG. 5, the brush elements 22 are secured to the outer end portions 21*a* of the arms 21 by means of lock-nut-equipped bolts 29 which extend sufficiently loosely through inverted U-shaped brush mounting bracket members 30 to permit rocking movements of said brush elements 22 both transversely and longitudinally of the arms 21, to compensate for irregularities and roughness of the particular surface to be swept. Another important detail is brought out particularly in FIGS. 3 and 5, namely, that each of the brush elements 22 is made up of a cooperating pair of laterally spaced brushes 22*a*, 22*b*, the latter of which is so disposed with respect to the longitudinal axis of the arms 21 as to be forwardly spaced therefrom in the direction of rotation, a greater distance than the rearward spacing of the brush 22*a* with respect to said axis. With this arrangement, the torque action which normally would be imposed upon the arms 21 due to frictional engagement by the brush elements 22 with the surface being swept is reduced to a minimum.

For the purpose of imparting rotation to the rotor 10, I provide a suitable motor, preferably and as shown being

in the nature of a conventional electric motor 31, which may be either of the alternating or direct current type. The motor 31 is suitably mounted on a superstructure 32 carried by the frame 1, whereby its drive shaft 33 depends therefrom on a vertical axis laterally spaced from but parallel to the shaft 12 of the rotor 10. A sheave 34 is secured fast to the lower end of the drive shaft 33. Also mounted for rotation on a vertical axis laterally spaced from the drive shaft 33, is a driven shaft 35 having a relatively large sheave 36 fast on its upper end portion and a relatively small sheave 37 fast on its lower end portion. A suitable flexible connection such as a V-belt 38 is entrained over the sheaves 34 and 36.

Secured fast to the intermediate portions of the arms 21, intermediate the cam followers 26 and the springs 27, are segmental sheave-like sections 39 which have a common axis with the rotor 10. It will be observed that the sheave 37 and the segmental sheave sections 39 are in a substantially common plane and have entrained thereover a flexible drive connection in the form of a V-belt 40. This driving arrangement wherein power is exerted upon the arms 21 considerably radially outwardly from their hinge-equipped inner ends 23, enables the rotors to be constructed of considerably lighter materials than would be the case where the rotative force is applied near the axis thereof. Furthermore, the arrangement of segmental sheave sections 39, with only the flexible V-belt 40 extending therebetween, obviously permits individual raising and lowering movements of the arms 21 with a maximum of ease and a minimum of friction.

For the purpose of imparting guiding movements to the frame 1 and parts carried thereby, I provide a suitable handle means identified by the numeral 41 and which, as shown, is bifurcated, each fork being identified by 41*a*.

For the purpose of disengaging the rotor 10 from driving engagement with the motor 31, I provide a friction clutch in the form of an idler pulley 42 which is brought into and out of driving engagement with the V-belt 40 by means of an operating lever 43 carried by the handle 41 and having a flexible cable 44 connected to its intermediate portion as indicated at 45, which is rearwardly spaced from the pivotal connection 46 of said lever 43 to the handle 41. At its lower end, the flexible cable 44 is connected to the free end portion of a pivoted arm 47, after being entrained over a suitable pulley 48. The pivotal connection of the arm 47 to the frame 1 is identified at 49. A coiled tension spring 50 biases the idler pulley 42 away from driving engagement with the V-belt 40, and does just this when the connection 45 is moved beyond dead center with respect to the pivot 46.

The numeral 51 indicates a conventional off-and-on switch associated with the motor 31 and controllable remotely through the medium of suitable linkage 52.

At this point it should be stated that the relatively elevated and relatively depressed portions 25*a*, 25*b* of the cam ring 25 are so positioned with respect to the longitudinal axis of the frame 1 and its intended direction of movement as to cause the brush elements 22 to sweep an area, the width of which is indicated by the broken lines A, B, whereas the width of the windrow formed by the sweepings is indicated by broken lines A—C. Under this arrangement it will be noted that the windrow A—C is deposited laterally with respect to the rear porting wheels 6.

My invention has been thoroughly tested and found to be completely satisfactory for the accomplishment of the above objects, and while I have shown and described a preferred embodiment, I wish it to be specifically understood that the same is capable of modification without

departure from the spirit and scope of the appended claims.

What is claimed is:

1. In a device of the class described,
(*a*) a generally horizontally disposed supporting frame,
(*b*) wheel means supporting said frame in spaced relation to a surface to be swept,
(*c*) a rotor journalled in said frame on a vertical axis centrally thereof,
(*d*) said rotor including a plurality of circumferentially spaced radially outwardly projecting arms,
(*e*) brush elements carried by the outer end portions of said arms,
(*f*) means mounting the radially inner ends of said arms for pivotal raising and lowering movements of the brush-equipped outer ends thereof,
(*g*) means yieldingly biasing said arms in a downward direction,
(*h*) a cam ring concentric with said rotor,
(*i*) said cam ring having a relatively elevated portion which extends for at least 180 degrees of circular arc and a relatively depressed portion which extends for less than 180 degrees of circular arc,
(*j*) and cam follower means carried by said arms,
(*k*) said cam follower means raising said arms and the brushes carried thereby above the level of the sweeping surface during engagement with the relatively elevated portion of said cam ring and permitting sweeping engagement of said brush elements with said surface when overlying said relatively depressed portion of said cam ring.

2. The structure defined in claim 1 in further combination with power means carried on said frame, and drive connections between said power means and said rotor.

3. The structure defined in claim 1 in which said cam ring is in closely spaced relation to the outer ends of said arms and in which said cam follower means is in the nature of finger-like extensions of said arms.

4. The structure defined in claim 1 in which said rotor further includes a horizontally disposed plate-like element in overlying relationship to the radially inner end portions of said arms, and in which said means yieldingly biasing said arms in a downward direction comprises circumferentially spaced coiled compression springs interposed between the under surface of said plate element and the intermediate portions of each of said arms, and in further combination with depending guide rods carried by said plate-like member and projecting one each through one of said coiled springs, the lower end portions of said guide rods extending slidably through the intermediate portions of their respective arms.

5. The structure defined in claim 4 in which the drive connections between said power means and said rotor comprises a sheave-equipped drive shaft associated with said power means, a driven shaft journalled for rotation on a vertical axis in laterally spaced parallel relationship to said drive shaft and having upper and lower sheaves thereon, segmental sheave-like sections one each fast on one of said arms intermediate the guide rods and the radially outer ends thereof, a flexible connection between the sheave associated with said drive shaft and the upper sheave on said driven shaft, and a flexible drive element entrained over the sheave on the lower end of said driven shaft and said segmental sheave-like sections on said arms.

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