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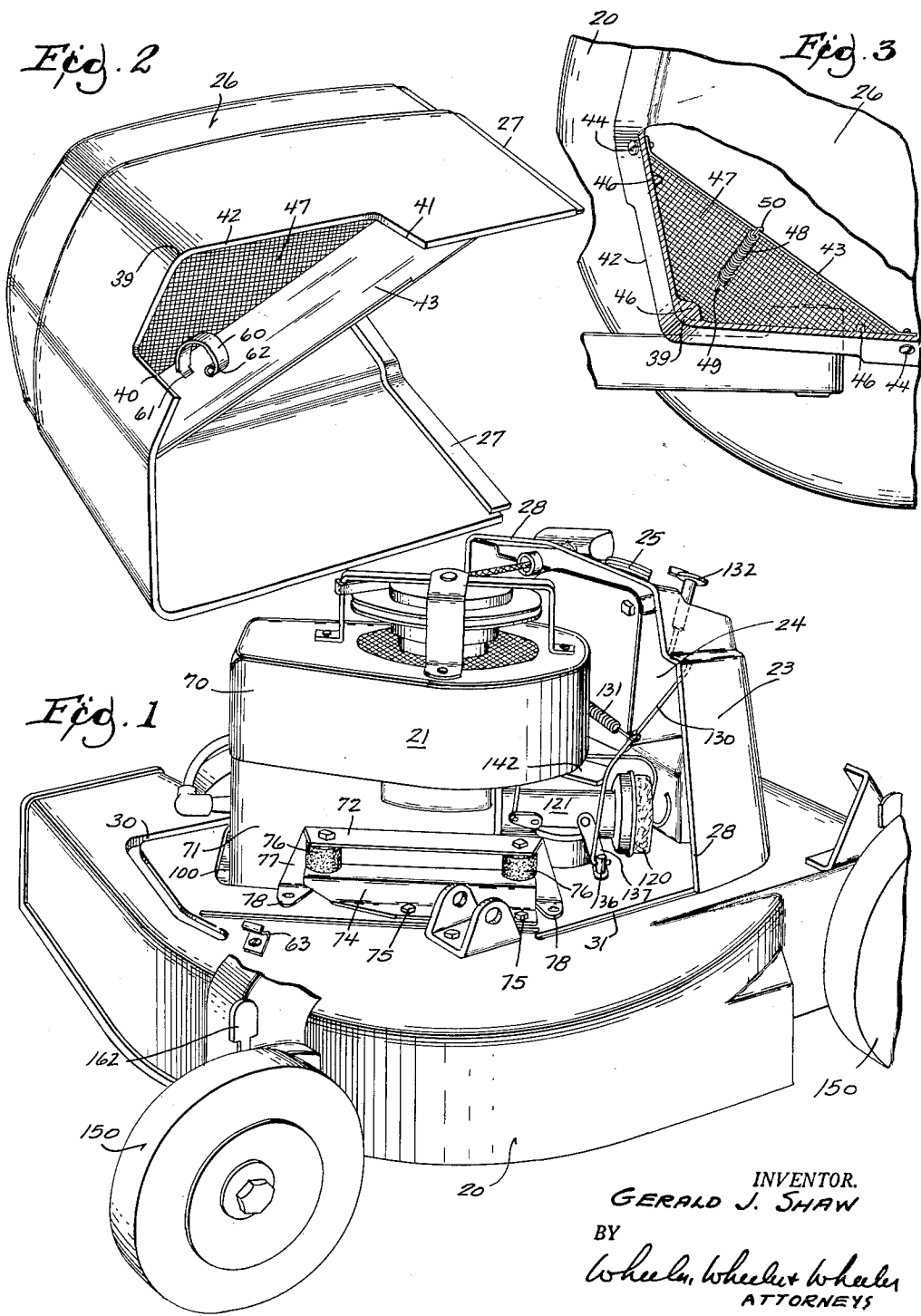
G. J. SHAW

3,056,249

MOWER WITH RESILIENTLY MOUNTED ENGINE

Filed Nov. 2, 1959

4 Sheets-Sheet 1



INVENTOR.
GERALD J. SHAW
BY
Wheeler, Wheeler & Wheeler
ATTORNEYS

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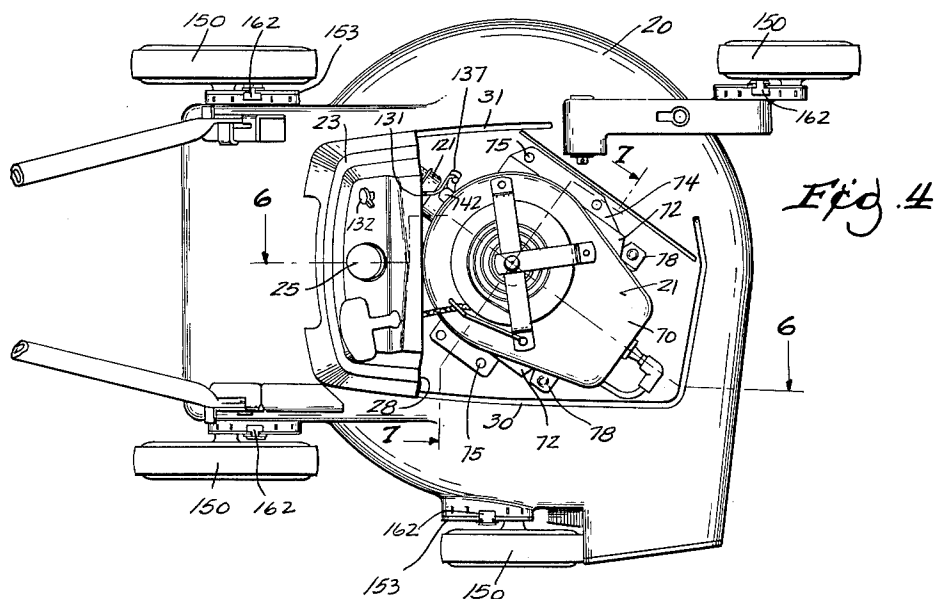
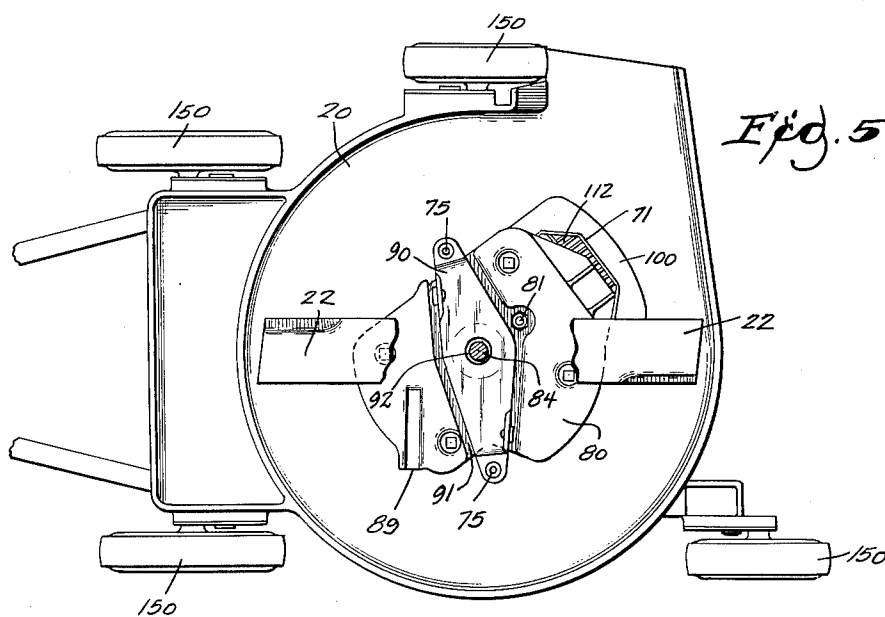
G. J. SHAW

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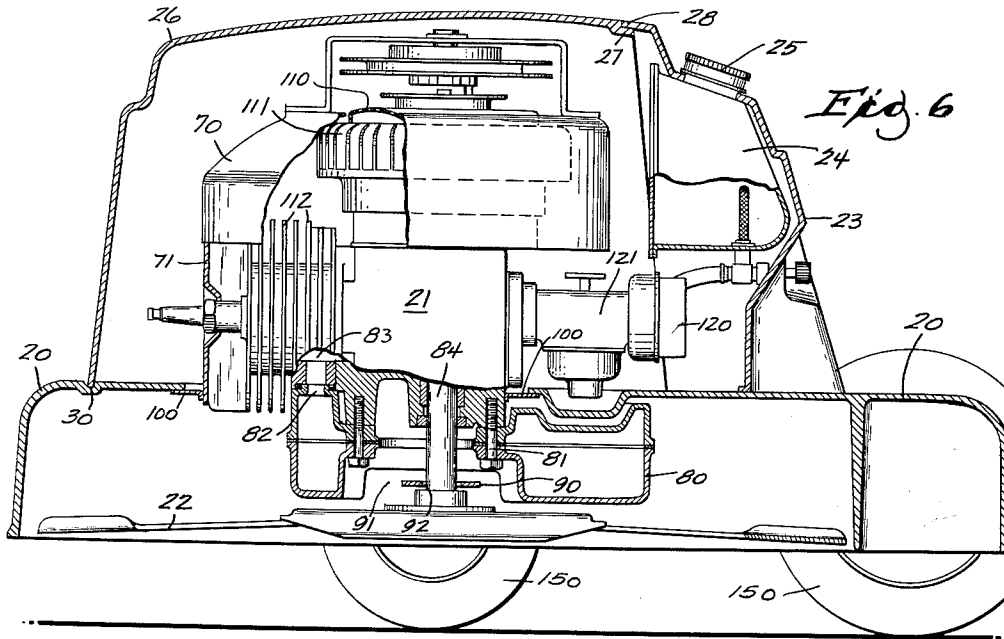


Fig. 6

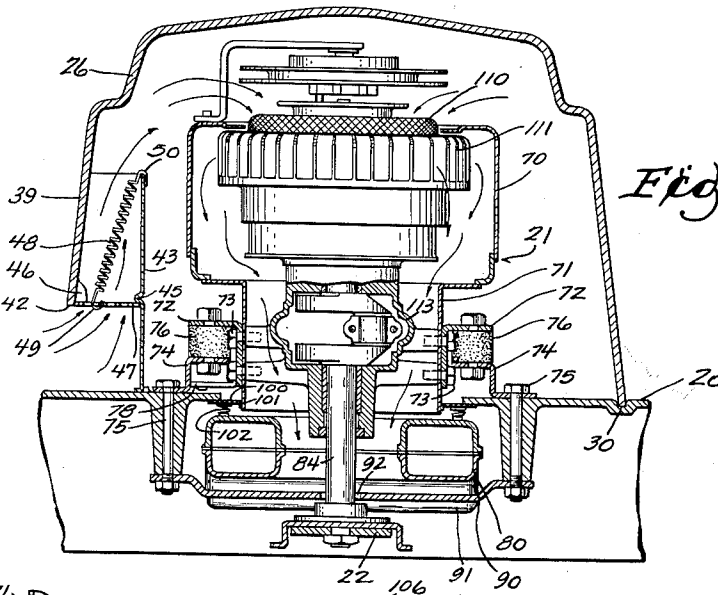


Fig. 7

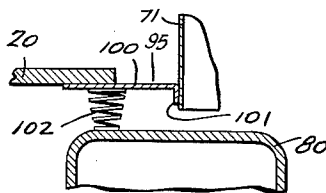


Fig. 8

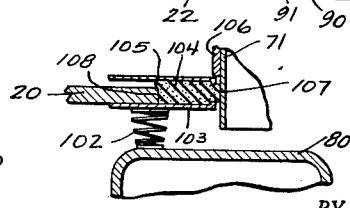


Fig. 9

INVENTOR.
GERALD J. SHAW
BY
Wheeler, Wheeler & Wheeler
ATTORNEYS

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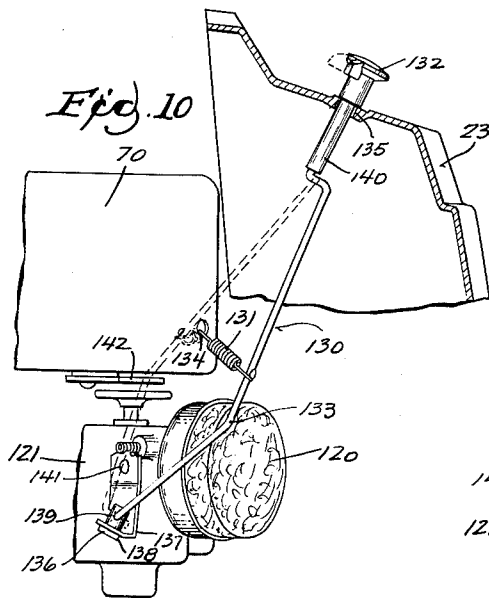
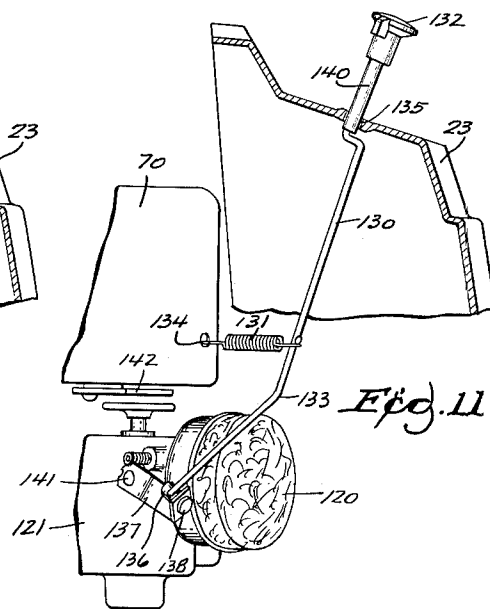
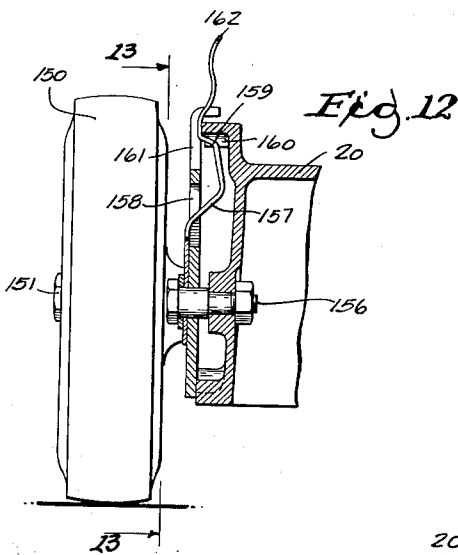
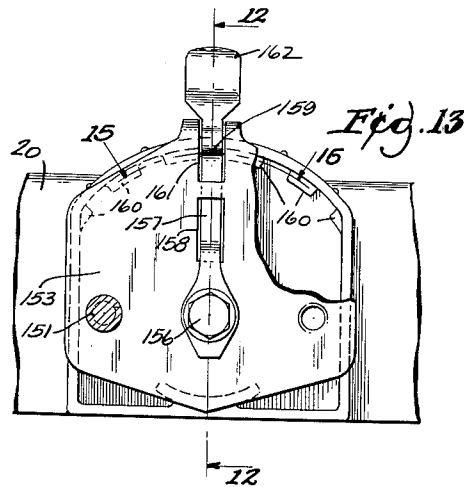
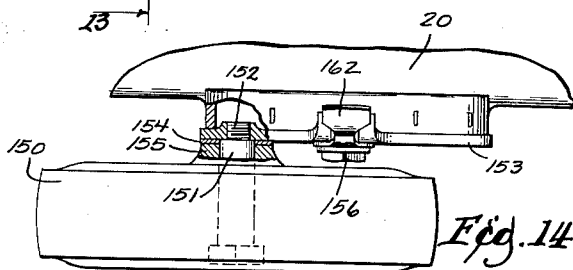
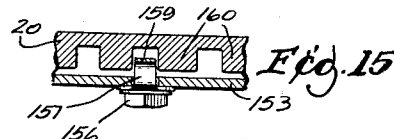
G. J. SHAW

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MOWER WITH RESILIENTLY MOUNTED ENGINE

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4 Sheets-Sheet 4



INVENTOR.
GERALD J. SHAW

BY

Wheeler, Wheeler & Wheeler
ATTORNEYS

1

3,056,249

MOWER WITH RESILIENTLY MOUNTED ENGINE
Gerald J. Shaw, Lamar, Mo., assignor to Outboard Marine Corporation, Wilmington, Del., a corporation of Delaware

Filed Nov. 2, 1959, Ser. No. 850,442

9 Claims. (Cl. 56-25.4)

This invention relates to a silencing system for a rotary lawnmower.

The objectives of the invention are to muffle the sound output of the engine of a rotary lawnmower without destroying efficiency of the engine. A further objective of the invention is to provide a mounting for the internal combustion engine of a rotary lawnmower which effectively isolates the vibration of the engine from the housing upon which it is mounted, and at the same time to provide means for absorbing the shocks to which the blade of such a mower is subjected without damaging the isolation mountings. A further objective of the invention is to prevent the entry of dirt and other foreign matter from the enclosure in which the internal combustion engine operates and to prevent the sound produced by said engine from escaping from said enclosure, while permitting ingress of an adequate supply of air for the operation of the engine and for carrying away the heat which the engine produces. A further objective of the invention is to provide such a system which is readily disassembled for servicing the internal combustion engine.

FIG. 1 is a front left perspective view of the rotary lawnmower of my invention with the main motor cover removed, and with a portion of the supporting arm for the front wheel broken away.

FIG. 2 is a bottom front perspective view of the removable motor cover.

FIG. 3 is a fragmentary top view of my rotary mower with the corner of the removable motor cover broken away to show the air inlet.

FIG. 4 is a top plan view of my mower with the cover removed.

FIG. 5 is a bottom plan view of my mower with the center portion of the blade broken away.

FIG. 6 is a vertical cross sectional view on line 6-6 of FIG. 4 with portions of the engine shown in full, parts being broken away.

FIG. 7 is a vertical cross sectional view of my mower on line 7-7 of FIG. 4 with portions of the engine shown in full.

FIG. 8 is an enlarged cross sectional view of a portion of FIG. 7 showing the seal between the engine compartment and the space below the blade housing.

FIG. 9 is a view similar to FIG. 8 showing a modification of the seal shown in FIG. 8.

FIG. 10 is an enlarged detail view of the combined on-off switch and choke control.

FIG. 11 is a view similar to FIG. 10 showing the position of said control in which the choke is closed.

FIG. 12 is an enlarged cross sectional view on line 12-12 of FIG. 13 showing the wheel adjustment means.

FIG. 13 is a view on line 13-13 of FIG. 12 with portions of the wheel adjustment means broken away.

FIG. 14 is a top view of the wheel adjustment means broken away to show the attachment of the wheel to the adjusting means, parts being shown in section.

FIG. 15 is a cross sectional view on line 15-15 of FIG. 13.

Applicant's invention consists of a conventional blade housing 20, which supports an internal combustion engine 21. A cutting blade 22 is fixed to the crank shaft of said engine to rotate within the blade housing 20.

2

A fixed portion 23 of the motor housing is secured to blade housing 20 rearwardly of internal combustion engine 21, and a gasoline tank 24 is secured within the fixed housing portion 23, with a filler opening 25 extending through housing portion 23, so that the gasoline tank can be filled without removing the removable portion 25 of the engine housing.

The removable portion 26 of the housing is provided with flange 27 offset inwardly from the housing wall along the entire rear margin of the housing to provide a secure seal with the forward margin 28 of fixed housing 23. Movable housing portion 26 rests in grooves 30 and 31 of blade housing 20 when housing portion 26 is in place, to seal the bottom margin of the housing portion.

The only portion of housing portion 26 which is open is the front corner 39 of the housing, which is cut away for a portion of its height along a plane which is diagonal with respect to the corner, to produce vertical edges 40, 41 and horizontal edge 42 defining an inlet for air to operate the engine and for cooling air. The rear wall of the air inlet is defined by diagonal baffle 43 which is secured by screws 44 to housing portion 26, and which extends well above horizontal edge 42 of the air inlet, as best shown in FIG. 7.

Baffle 43 is provided with a horizontal rib 45 at approximately the height of margin 42 of the air inlet, and housing portion 26 is provided with inwardly directed lugs 46 opposite rib 45 on baffle 43. A screen 47 is biased upwardly against rib 45 by spring 48, which is provided with a hook 49 engaged with the openings in the screen and a hook 50 which is engaged with the top margin of baffle 43. Screen 47 is roughly triangular in shape to fill the entire horizontal extent of the air opening, as best shown in FIG. 3.

The housing portion 26 is secured against accidental release by latch 60, which is pivoted to baffle 43 at 61 in a horizontal plane, and extends downwardly in a curve to a horizontally disposed bead 62. Bracket 63 on blade housing 20, best shown in FIG. 1 is S-shaped in side elevation so that when latch 60 is pulled downward against the resilient bias of the curved strip to engage bead 62 beneath the upper curve of bracket 63, the bias prevents accidental disengagement of latch 60 from bracket 63. To open latch 60, it is again deformed against its bias by finger pressure to move bead 62 downwardly and outwardly from the upper curve of bracket 63. The movable housing portion 26 may then be lifted to disengage it from grooves 30 and 31, and pulled forwardly to disengage flange 27 from the forward margin 28 of fixed housing portion 23, after which it may readily be removed to expose internal combustion engine 21.

As best shown in FIGS. 1 and 7, internal combustion engine 21 is mounted with its cylinder 83 in a horizontal plane. The motor is surrounded by upper cooling air shroud 70 and lower cooling air shroud 71. Lower shroud 71 bears right and left hand support brackets 72, which are secured to shroud 71 and motor 21 by bolts 73 (see FIG. 7). Brackets 74 are secured to blade housing 20 by bolts 75. Brackets 72 and 74 are provided with parallel horizontal surfaces between which are arranged resilient cylindrical support cushions 76, which operate to support the engine 21 without transmitting any substantial portion of its vibration to blade housing 20. Brackets 72 have depending feet 77 having horizontal stops 78 approximately $\frac{1}{16}$ inch above blade housing 20 to absorb any excessive vertical vibration, or shocks transmitted from blade 22 which tend to rock engine 21 on cushions 76.

Muffler 80 is secured by bolts 81 to the lower portion of engine 21, and has a direct connection at 82 with the

exhaust port of cylinder 83. As mentioned previously, blade 22 is secured to crankshaft 84 of engine 21 in the conventional manner. Because there is no positive support for engine 21 which would provide a rigid pathway to transmit shock from blade 22 to blade housing 20, guard 90 is secured to the lower ends of bolts 75. Guard 90 is disposed in recess 91 of muffler 80 and is provided with an opening 92 through which crankshaft 84 passes and which is normally concentric with crankshaft 84. When blade 22 strikes a rock, stump, or other solid object, all of the torque and inertia of engine 21 is applied to move engine 21 with respect to the point of contact between blade 22 and the rock. Since motor 21 is supported on resilient cushions 76, these cushions would normally be torn apart, but crankshaft 84 immediately comes in contact with the walls of opening 92 in guard 90, the guard thus constituting stop means so that the shock is transmitted from blade 22 through a very short segment of crankshaft 84 to guard 90 and thence to blade housing 20, protecting both the engine and the cushions.

A space 95 is provided between lower engine shroud 71 and blade housing 20 to allow engine 21 to vibrate horizontally without coming into contact with blade housing 20, to prevent transmission of vibration. However, it is desirable to seal this opening against dirt, since the blade housing is filled with grass clippings and dust by the action of blade 22. Since the space above the blade housing 20 and within engine housing portions 23 and 26 is substantially a dead air space (with the exception of cooling air drawn into the upper portion of the engine and air for combustion drawn into the carburetor) it is apparent that any dirt or clippings which enter this space will either accumulate on the engine parts or be drawn into the carburetor 121 and the cooling air fan 111. Accordingly, in one construction a plate 100 bridges the gap between blade housing 20 and lower shroud 71, the plate being provided with a flange 101 in face contact with shroud 71. Muffler 80 is attached to engine 21. Springs 102 support plate 100 on muffler 80 in order to hold it securely against housing 20, while preventing transmission of engine vibration and noise from the muffler to the blade housing. FIG. 8 shows the above structure in detail. FIG. 9 shows a modification of the above described structure in which springs 102 support a lower plate 103, a resilient gasket 104, and an upper plate 105 against a shoulder 106 on the lower shroud 71, plate 103 also being supported against blade housing 20. Gasket 104 is thus under sufficient compression so that it is forced to expand edge-wise at 107 to touch shroud 71 and to touch blade housing 20 at 108. This structure creates a very much tighter seal against dirt and noise than the structure of FIG. 8, which relies on metal to metal contact. In the structure of FIG. 9 all irregularities of housing 20 and shroud 71 are compensated by resilient gasket 104, without providing rigid contact between the motor and muffler structure and the engine housing 20, 26 at any point.

The air that is drawn into movable engine housing portion 26, as shown in FIG. 7, is drawn through screen 110, fan 111, and thence passes downwardly through upper shroud 70, which is sealed to lower shroud 71 so that air is directed over cooling fins 112 of cylinder 83 as shown in FIG. 6, and also past crank case 113, escaping above muffler 80 and below plates 100 or 103 or through the open center of muffler 80. The cooling air which passes through cooling fins 112 of cylinder 83 escapes beneath the blade housing through the lower margin of shroud 71, which is not covered by plate 100 or 103. Because centrifugal fan 111 maintains a positive pressure within the motor housing portions, there is no tendency for dirt and grass clippings to enter this space from beneath the blade housing. The remainder of the air which enters cover 26 is drawn through air filter 120 and carburetor 121, crank case 113, cylinder 83 and exhaust passage 82 into muffler 80, from which it is dis-

charged beneath blade housing 20 at an exhaust pipe 89. Thus the noise of the exhaust is attenuated by mingling with the turbulent air which is confined beneath the side walls of blade housing 20 and is further absorbed by the surface of the lawn, which is both resilient and highly irregular, to provide an excellent sound absorbing medium.

FIGS. 10 and 11 show the combination on-off and choke control 130 which is biased by spring 131 to either the "on" position shown in full lines in FIG. 10 or the "off" position shown in dotted lines. Over-center action is provided during rotation of rod 130, so that spring 131 is extended as knob 132 is rotated until it reaches a point midway between the position shown, at which point the rod begins to approach the attachment point 134 of the spring and hence spring 131 snaps the rod 130 over to its extreme position. The upper pivot point of the rod is a hole 135 in housing 23 which is sealed by sleeve 140 which is secured to rod 130 by knob 132. The lower pivot point of rod 130 is button 136 pivotally mounted in a hole in choke lever 137. Button 136 is restrained from being pulled upwardly out of the hole in choke lever 137 by shoulder 138 and is restrained from downward movement by rod 130, which passes horizontally through the body of the button at 139.

Because hole 139 through button 136 is in a horizontal plane, when knob 132 is pulled upward, sleeve 140 below the knob continues to seal hole 135 and rod 130 pulls choke lever 137 about its pivot point 131 to close the choke, rod 130 pivoting about point 139 in button 136. If it is desired to stop the engine, it is only necessary to rotate knob 132 so that rod 130 swings past the center of action of spring 131 and is brought to rest against plate 142 and against upper engine shroud 70. Plate 142 is connected to the magneto ignition system of the motor and accordingly this action grounds the magneto and prevents the spark plug from firing.

FIGS. 12 through 15 disclose applicant's simplified and improved wheel height adjustment means. As best shown in FIG. 14 the wheel 150 is supported on axle 151 which is threaded at 152 to secure it to plate 153. Washer 154 may be provided to take the axial thrust of hub 155 of wheel 150. The plate 153 is pivoted on bolt 156 to blade housing 20, bolt 156 being off-set laterally a substantial distance from axle 151. Spring finger 157, as best shown in FIG. 12 is secured at one end under the head of bolt 156, and then extends upwardly and inwardly through hole 158 in plate 153, where it is provided with a corner 159 which is normally lodged between any two of an arcuate series of shoulders 160. Lever 157 then extends upwardly and outwardly through opening 161 in plate 153 and terminates in a curved finger grip 162 which extends above the wheel 150. To change the height of a wheel 150 it is only necessary to grasp finger grip 162 and pull it outwardly to disengage portion 159 of lever 157 from whichever pair of shoulders 160 it then engages, and rotate it about bolt 156. Because lever 157 passes through openings 158 and 161 in plate 153, the plate must rotate with the lever, changing the elevation of axle 151. Because of the resiliency of lever 157, it has a natural tendency to engage shoulders 160 when it is released. Because plate 153 almost completely covers the space between it and housing 20, the entire adjacent structure is given a neat and simple appearance, and is kept from accumulating dirt.

It will be noted that applicant has provided a structure having an external housing of simple outline which is easy to clean, and has substantially sealed the interior of the engine from dirt. At the same time applicant has provided a housing for his internal combustion engine which affords no direct pathway for sound to escape to the outside, and has further isolated the physical vibration of the engine from those parts of the device which are exposed to the outside, such as blade housing 20 and motor housings 23 and 26. Furthermore, despite the resilient mounting of the engine on the blade housing, ap-

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plicant has provided means to prevent damage to the resilient mountings when the blade strikes a heavy or a fixed object.

I claim:

1. A silenced rotary mower comprising the combination with a wheeled blade housing and a blade rotatable therein, of an internal combustion engine subject to audible vibration and having a drive shaft extending through the housing and connected with the blade, resilient cushions having means for positioning them on the blade housing and constituting means for wholly supporting the engine from the blade housing, and an engine-enclosing housing surrounding the engine and connected with the blade housing and isolated from engine vibration by said resilient cushions.

2. The device of claim 1 in which said engine-enclosing housing is provided with air intake means and with a baffle intervening between the air intake means and the engine.

3. The device of claim 2 in which the engine-enclosing housing has side portions in angular relationship and the air intake means comprises a port between said side portions, the baffle extending from one of said portions to the other in spaced relation to the port.

4. The device of claim 3 in which said baffle is provided with a horizontal top margin below the top of said engine-enclosing housing, said baffle being provided with a horizontal rib at the level of the top of said port and projecting toward said port, the margins of said engine-enclosing housing at said port being provided with lugs extending toward said baffle and having a horizontal lower end, a screen extending across said port and abutting said rib and said lugs, and a spring having a lower end engaged with said screen and an upper end engaged with said horizontal upper margin of said baffle, said spring being in tension to support said screen against said rib and said lugs.

5. A mower according to claim 1 in which the engine

includes an extension downwardly through the blade housing, and sealing means between the extension and the blade housing.

6. A mower according to claim 5 in which the sealing means comprises an annular plate marginally fitting the extension and having a portion in face contact with the blade housing and a spring biasing said plate toward the blade housing.

7. A mower according to claim 5 in which the sealing means comprises a resilient gasket surrounding the extension and marginally abutting the blade housing and means for subjecting such gasket to sufficient compression to expand it edgewise into engagement with the extension and the blade housing.

8. A mower according to claim 1 in which the blade housing has confining surfaces spaced from the shaft and constituting means for limiting the oscillation of the shaft and engine upon the resilient mounting.

9. A mower according to claim 1 in which the blade housing and the engine are respectively provided with stop means relatively spaced vertically and engageable in the event of excessive vertical vibration or shock to transmit stress from the engine to the blade housing in the event of excessive displacement of the engine on said cushions.

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