

Nov. 30, 1965

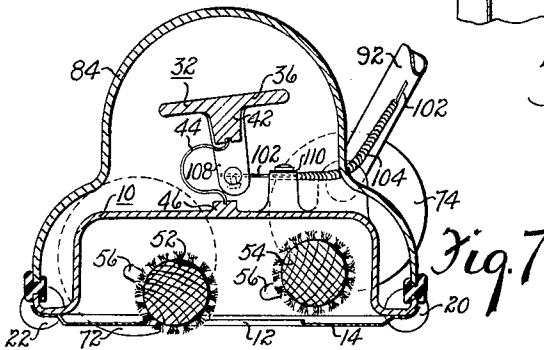
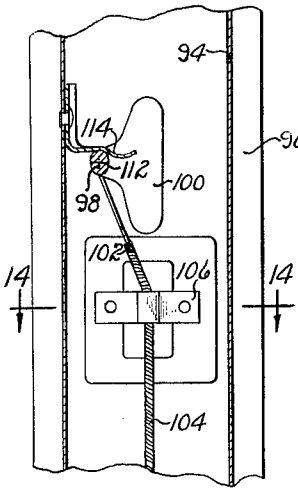
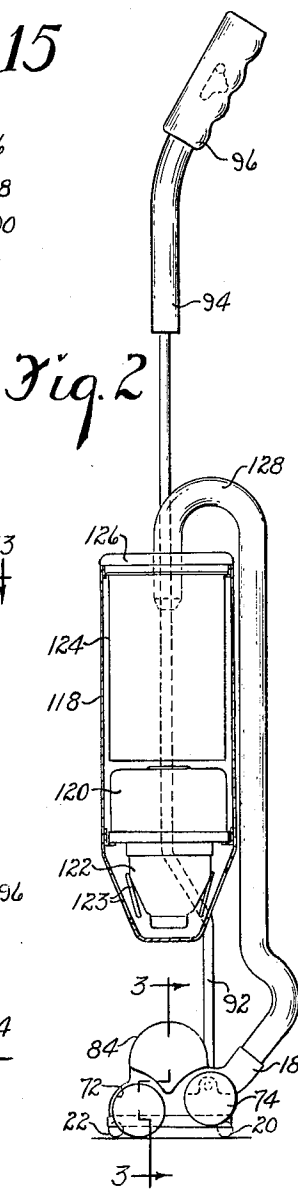
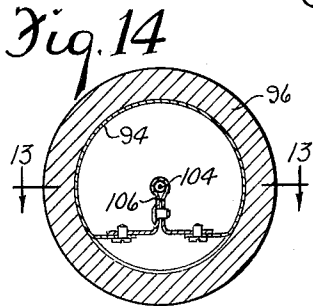
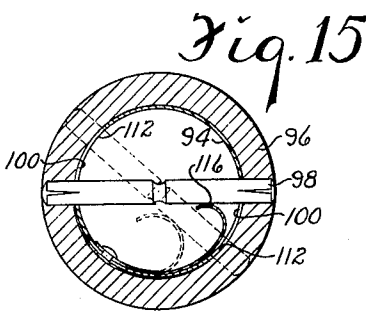
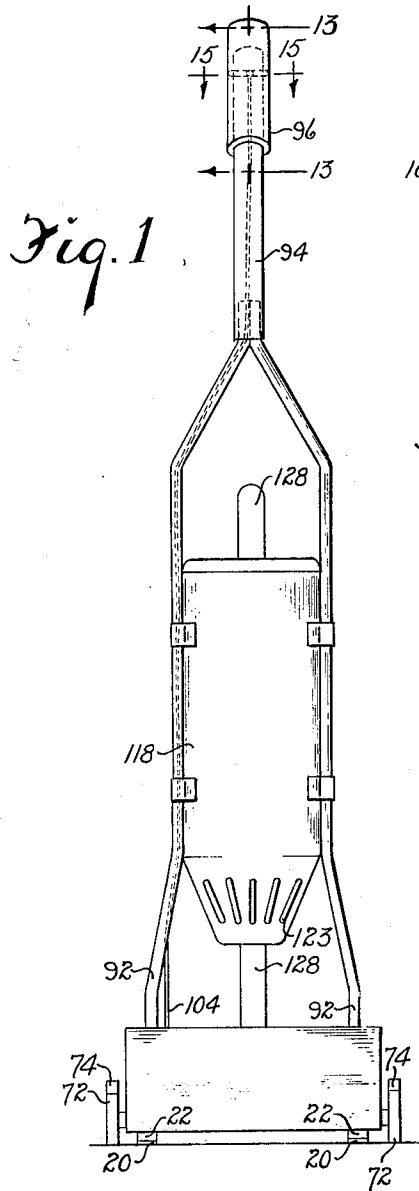
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3,220,043

SELF PROPELLED FLOOR TREATING MACHINE

Filed March 19, 1962

3 Sheets-Sheet 1



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SELF PROPELLED FLOOR TREATING MACHINE

Filed March 19, 1962

3 Sheets-Sheet 2

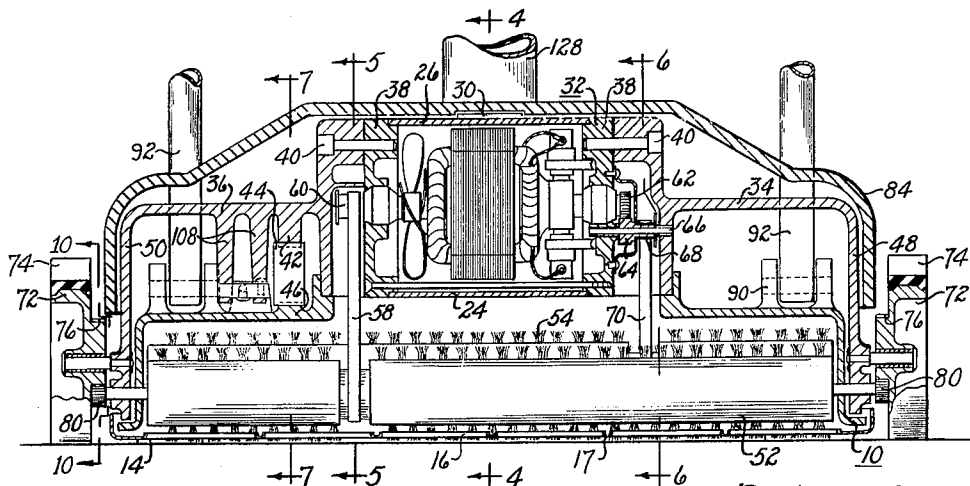


Fig. 3

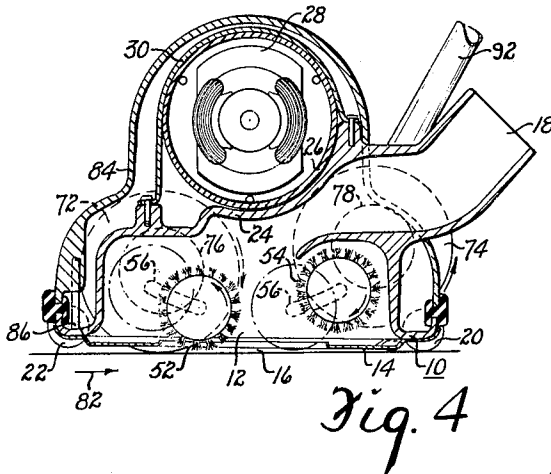


Fig. 4

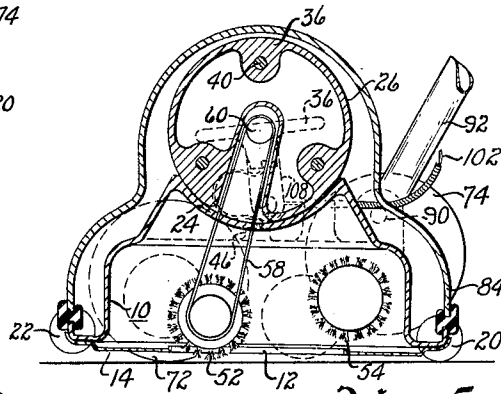


Fig. 5

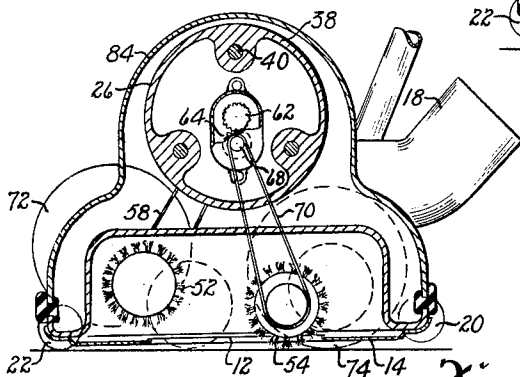


Fig. 6

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SELF PROPELLED FLOOR TREATING MACHINE

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3 Sheets-Sheet 3

Fig. 8

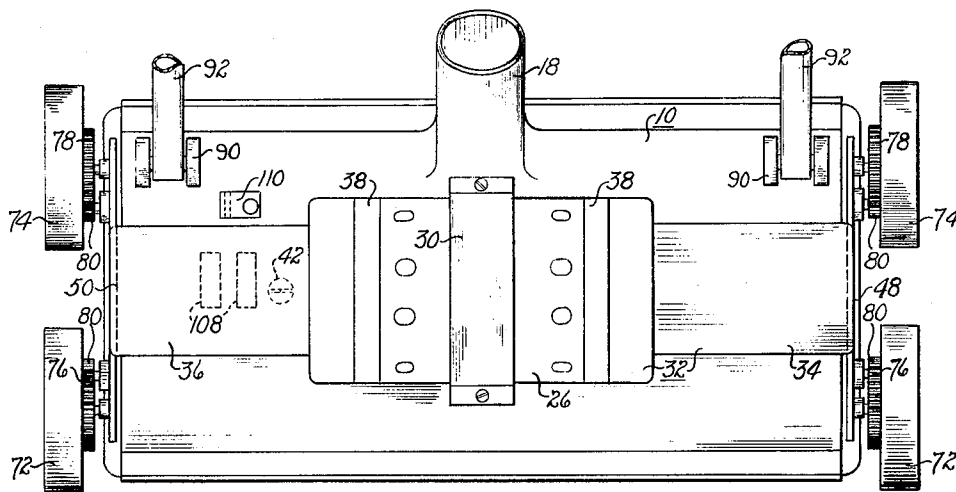
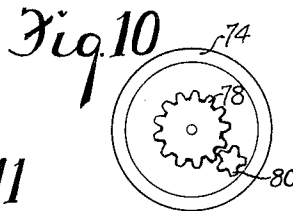
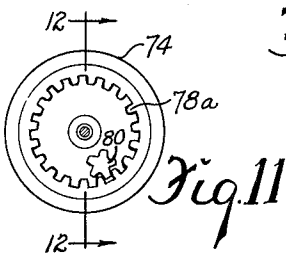
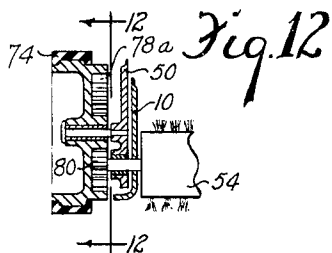
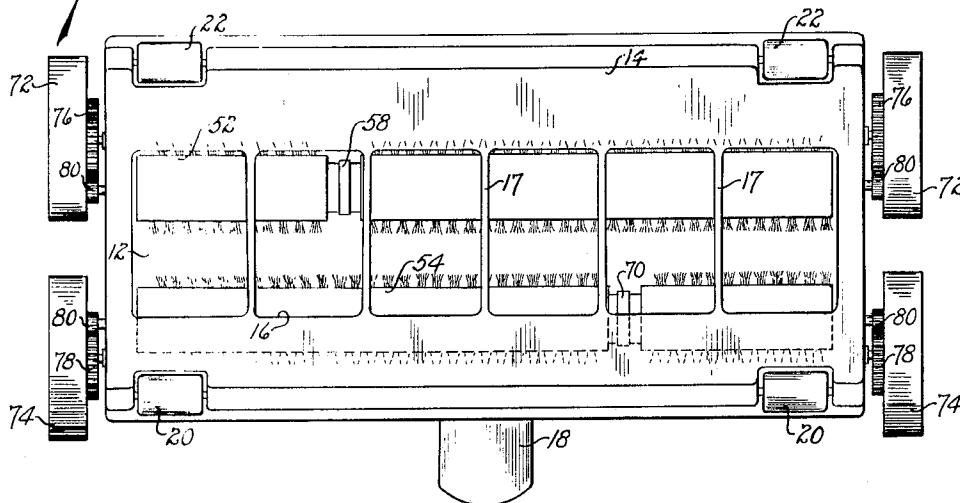


Fig. 9

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3,220,043

SELF PROPELLED FLOOR TREATING MACHINE
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of Delaware

Filed Mar. 19, 1962, Ser. No. 180,615
25 Claims. (Cl. 15—340)

My invention relates to a floor treating machine and more particularly to a machine of this type which is self-propelled. More especially my invention relates to a self-propelled vacuum cleaner which may also include rotary brush means.

Heretofore a vacuum cleaner of this general type has been proposed with an arrangement of clutches for reversing the direction of rotation of the driving wheels in order to move the vacuum cleaner back and forth in characteristic manner over the surface being cleaned. In accordance with my invention, on the other hand, two separate driving means are provided which are continuously rotated in opposite directions and which may be alternately brought into contact with the floor in order to impart the desired back and forth motion to the vacuum cleaner. Further, in accordance with a preferred embodiment of my invention, both of the driving wheels may be disengaged from the floor in order that the vacuum cleaner may remain stationary without stopping the driving motor.

Also, a pair of oppositely rotating brushes may be provided and arranged to be brought alternately into contact with the surface being cleaned as the direction of movement of the vacuum cleaner is reversed so that the active brush will always rotate in the same direction relative to the direction of movement of the cleaner.

Further objects and advantages of my invention will be apparent from the following description considered in connection with the accompanying drawings, on which:

FIG. 1 is a front view of a vacuum cleaner in accordance with my invention;

FIG. 2 is a side view of the vacuum cleaner shown in FIG. 1;

FIG. 3 is a cross-sectional view on an enlarged scale of a portion of the vacuum cleaner shown in the preceding figures and is taken on the line 3—3 of FIG. 2;

FIG. 4 is a cross-sectional view taken on the line 4—4 of FIG. 3;

FIG. 5 is a cross-sectional view taken on the line 5—5 of FIG. 3;

FIG. 6 is a cross-sectional view taken on the line 6—6 of FIG. 3 but with certain parts in a different position;

FIG. 7 is a cross-sectional view taken on the line 7—7 of FIG. 3;

FIG. 8 is a bottom view of the portion of the vacuum cleaner shown in FIGS. 3 through 7;

FIG. 9 is a top view of the portion of the vacuum cleaner shown in FIG. 8 with a cover member removed;

FIG. 10 is a cross-sectional view taken on the line 10—10 of FIG. 3;

FIG. 11 is a view similar to FIG. 10, but showing a modified form of gear train;

FIG. 12 is a cross-sectional view taken on the line 12—12 of FIG. 11;

FIG. 13 is a cross-sectional view on an enlarged scale taken on the line 13—13 of FIG. 1;

FIG. 14 is a cross-sectional view taken on the line 14—14 of FIG. 13; and

FIG. 15 is a cross-sectional view on an enlarged scale taken on the line 15—15 of FIG. 1.

Referring to the drawings, and more particularly to FIGS. 3 through 9, reference character 10 designates an elongated base member which is hollow and forms a suction nozzle plenum chamber 12. The bottom of cham-

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ber 12 is partially closed by means of a plate member 14 formed with a centrally located elongated suction opening 16 therein across which may extend bridge members 17. An outlet conduit 18 communicates with the upper central part of plenum chamber 12.

A pair of rear supporting rollers 20, constituting anti-friction support means, are rotatably carried at the rear edge of the base member 10, while a similar pair of front supporting rollers 22 are rotatably mounted on the base member at its forward edge. These rollers extend downwardly a short distance below the plate 14 and hence are capable of supporting the base member on the surface to be cleaned.

The upper central surface of base member 10 is formed as an arcuate seat 24, as is shown particularly in FIGS. 4 and 5. Turnably supported on this seat is the cylindrical housing 26 of an electric motor 28, a strap 30 being provided for retaining the housing 26 in place on the seat. The housing 26 constitutes a portion of a frame designated generally by reference character 32 which is tiltably mounted on the base 10. The remainder of the frame is made up of lateral extensions 34 and 36 which are secured to the end walls 38 of the motor by means of bolts 40. Extension 36 is formed with a projection 42 with which is engaged one end of a U-shaped over-center spring 44, the other end of which is engaged with a boss 46 on the base member 10, as is best seen in FIGS. 3 and 7. Spring 44 thus tends to maintain the frame 32 in either of two extreme tilted positions with respect to the base member.

The ends of extensions 34 and 36 are formed with downwardly extending skirts 48 and 50, respectively which extend downwardly outside of the ends of the base member 10, as is shown in FIG. 3. Rotatably mounted in the skirts 48 and 50 are the shafts of rotary brushes 52 and 54. The brushes themselves are disposed within the plenum chamber 12, the shafts extending through arcuate slots 56 formed in the end walls of base member 10. Brush member 52 is driven by motor 28 through a belt 58 which engages a pulley 60 secured to one end of the motor shaft. The other end of the motor shaft carries a pinion 62 which drives a pinion 64 mounted on a shaft 66 which also carries a pulley 68. A belt 70 engages pulley 68 and brush member 54. By virtue of the reversing gear comprising the pinions 62 and 64, the brushes 52 and 54 are rotated in opposite directions.

Rotatably carried by skirts 48 and 50 is a pair of front driving rollers 72 and a pair of rear driving rollers 74. The inner faces of rollers 72 are formed with gears 76 while rollers 74 have gears 78. The gears 76 are driven by pinions mounted on the ends of the shaft of front on the ends of the shaft of rear brush 54. One of the latter pinions is designated by reference character 80 and is shown in FIGS. 3 and 10.

It will be seen that the above described arrangement results in the brushes 52 and 54 being rotated in opposite directions from each other. At the same time, the front driving rollers 72 are driven in an opposite direction from the front brush 52, while the back driving rollers 74 are driven in an opposite direction from the back brush 54 and consequently the front and back driving rollers rotate in opposite directions with respect to each other. Inasmuch as it is desirable for the brushes 52 and 54 to rotate towards the center of the plenum chamber 12, the direction of rotation of the motor 28 is so selected that the front brush 52 will rotate in a counter-clockwise direction while the rear brush 54 will rotate in a clockwise direction as viewed in FIG. 4, as is indicated by the arrows on these brushes in FIG. 4. This means that the front driving rollers 72 will rotate in a clockwise direction, which tends to move the base member 10 backwardly, as indicated by the straight arrow

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82, while the back driving rollers 74 tend to drive the base member 10 in a forward direction.

It will thus be seen that the above arrangement results in each rotary brush being driven in a direction opposite to that of the corresponding associated driving rollers and consequently the active brush, that is the one which is in contact with the floor, tends to move the vacuum cleaner in a direction opposite to that in which it is being driven by the driving rollers. This results in a greater relative speed between the ends of the brush bristles and surface being cleaned, but it also requires more power from the motor, than would be the case if the brushes and corresponding driving rollers rotated in the same direction. If the latter is desired in order to reduce the size of the motor the gearing shown in FIGS. 11 and 12 may be employed, where the pinion 80 on the end of the brush shaft engages an internal gear 78a on the driving roller. This of course causes the driving roller to rotate in the same direction as the brush, but at a reduced speed and consequently, while the brush tends to move the vacuum cleaner in the same direction as it is driven by the rollers, there is still a substantial difference between the peripheral speed of the brush bristles and the speed of travel resulting from the driving rollers, so that the bristles will sweep the surface and not merely roll thereover.

A hood or cover 84 is mounted on the base member 10 by means of screws 86 and serves to conceal the frame 32, including the motor 28.

Pivotaly mounted at 90 near the rear edge of the base member 10 and extending through suitable openings in hood 84 are the lower ends 92 of a forked handle 94 which serves to guide the base member over the floor. A hand grip member 96 is movably mounted on the upper end of handle 94 and is provided with a pin 98 which extends diametrically therethrough and through a pair of slots 100 formed in opposite sides of the handle 94. Secured to the mid-point of the pin 98 is the upper end of a Bowden wire 102, the sheath 104 of which is fixed to the handle 94 by the clamp 106. This Bowden wire extends downwardly through one leg of the forked handle, as is shown in FIG. 1, and the lower end is secured to a downwardly extending arm 108 carried by the extension 36 of the tiltable frame 32, the lower end of the sheath 104 being fixed to the base member 10 by the clamp 110. As is well known, a Bowden wire is capable of transmitting linear motion in either direction imparted to one end of the wire and consequently when the hand grip 96 is moved upwardly with respect to the handle 94, tension is applied to the wire 102 which causes the tiltable frame 32 to tilt to the position shown in FIG. 7, where it is retained by the over-center spring 44. On the other hand, if the hand grip member 96 is moved downwardly with respect to the handle 94, it places the wire 102 under compression, thus moving it downwardly within the sheath 104 to tilt the frame 32 in a clockwise direction, as shown in FIG. 7, first against the force of over-center spring 44, the spring then tending to continue the movement of the frame and to retain it in its extreme position in this direction. Displacement of the hand grip member 96 relative to the handle 94 in a direction parallel to the handle is limited by the length of slots 100, which also limits the tilting movement of the frame 32.

Inasmuch as the driving rollers and the rotary brushes are carried by the tiltable frame, they will be raised and lowered with respect to the base member as the frame is tilted. Thus, with the parts in the position shown in FIG. 7 the front driving rollers 72 and the front brush 52 are lowered beneath the front supporting rollers 22, while the rear driving rollers 74 and the rear brush 56 are lifted above the rear supporting rollers 20. In this position the front driving rollers 72 will be effective to drive the base member over the floor, while the front brush 52 will be active in brushing the surface being

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cleaned. With the gearing shown in FIGS. 3 and 10 the base member will thus be driven backwardly by the front driving rollers 72, the rear of the base member being supported by the rollers 20. If the gearing shown in FIGS. 11 and 12 were employed, the front driving rollers would drive the base member forwardly.

As will be seen in FIG. 13, the slots 100 in the cylindrical handle 94 are formed with circumferential extensions 112 into which the ends of pin 98 may be moved by rotating the hand grip portion 96 with respect to the handle 94, thus positioning the pin 98 midway between the ends of the slot, as is shown in FIG. 13 and in dotted lines in FIG. 15. This causes the Bowden wire to move the tiltable frame 32 to a mid-point where both the front and back driving rollers and the front and back brushes are retracted to a position above the rollers 20 and 22. Inasmuch as the over-center spring 44 tends to move the frame to one or the other of its extreme positions, additional means are required to hold it in this mid-position, and consequently a resilient finger 114 is provided for engaging the pin 98 when the latter is in the circumferential portions 112 of the slots. The pin may be moved out of the portion 112 by applying sufficient twisting force to displace the end of the spring 114. In order to prevent the pin 98 from being accidentally moved into the portion 112 of the slot when it is merely desired to move it vertically from one end of the slot to the other, a light spring 116, shown in FIG. 15, may be provided which tends to hold the pin against the straight side of the slot.

Supported between the legs of the handle 94 is a cylindrical body 118 within the lower end of which is mounted a fan 120 driven by an electric motor 122. The body 118 is formed with openings 123 for exhausting air discharged from the fan to atmosphere. The space within body 118 above the fan constitutes a dust bag compartment within which may be removably positioned a dust bag 124. The upper end of the body 118 is closed by a removable cover 126 having an inlet opening to which is secured a flexible hose 128 which communicates with the outlet conduit 18 from the plenum chamber 12. The flexibility of the hose permits pivoting of the handle with respect to the base member and also removal of cover 126 for replacement of the dust bag 124.

The above described device operates as follows:

During the operation of the vacuum cleaner, electric current is supplied to both the motors 28 and 122 by suitable electric connections and consequently both of these motors operate continuously. Motor 122 causes fan 120 to produce flow of air in the usual manner through the suction opening 16 into the plenum chamber 12 and thence through the outlet conduit 18 and the conduit 128 into the dust bag 124. Dirt entrained with the air is separated in the dust bag, the clean air passing there-through and through the fan to be discharged to the atmosphere through exhaust openings 123.

The motor 28 drives the front brush 52 through the belt 58 and the brush in turn rotates the front driving rollers 72. At the same time, the motor 28 drives the rear brush 54 through the reversing gears 62 and 64 and the belt 70, the brush 54 in turn rotating the rear driving rollers 74. Thus, all the driving rollers and brushes are rotated continuously whenever motor 28 is running.

During use, the operator holds the handle 94 in an inclined position and hence the hand grip 96 extends substantially horizontally. If it is desired to move the vacuum cleaner forwardly, the operator applies a forward movement to the hand grip member 96 which causes it to move in this direction on the handle 94. This movement is transmitted through the Bowden wire 102 to the arm 108 of the tiltable frame 32, thus causing the latter to tilt in a clockwise direction, as viewed in FIG. 7, so as to lower the rear brush 54 and the rear driving rollers 74 to the position shown in FIG. 6, where they extend below the rear supporting rollers 20 and thus engage the surface

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to be cleaned. At the same time, the front driving rollers and the front brush are lifted above the front supporting rollers 22 and out of contact with the surface. Under these conditions the rear rollers 74 drive the vacuum cleaner forwardly while the rear brush 54 rotates in contact with the surface so as to dislodge dirt therefrom, the latter being picked up by the air stream passing through the suction inlet 16.

When the vacuum cleaner has been driven as far forwardly as the operator desires, he pulls backwardly on the hand grip member 96, thus causing the latter to move in this direction with respect to the handle 94 which causes the Bowden wire 102 to tilt the frame 32 to the position shown in FIG. 7, where the front driving rollers 72 and the front brush 52 are in contact with the surface of the floor, while at the same time the rear rollers 74 and the rear brush 54 are retracted above the rear rollers 20 and out of contact with the surface. Consequently, the front rollers 72 are effective to drive the vacuum cleaner backwardly, during which travel the front brush 52 rotates in contact with the surface.

It will thus be seen that the vacuum cleaner may be power driven backwardly and forwardly by merely pulling and pushing on the handle in the same manner as would be done if the cleaner were being moved manually, but with the expenditure of much less effort on the part of the operator.

If it is desired to stop the backward and forward movement of the cleaner without shutting off the driving motor 28, this may be done by rotating the hand grip portion 96 relatively to the handle 94 so as to bring the pin 98 into the circumferential portion 112 of the slot 100, where it is retained by the spring 114. As previously described, this serves to retain the tiltable frame 32 in a mid-position where both the forward brushes and driving wheels and the rear brushes and driving wheels are above the front and rear supporting rollers, and thus operate idly out of contact with the surface.

While I have shown a more or less specific embodiment of my invention, it is to be understood that this has been done for purposes of illustration only and that the scope of my invention is not to be limited thereby, but is to be determined from the appended claims.

What I claim is:

1. In a propelled floor treating machine, a base member, anti-friction support means for supporting at least a portion of the weight of said base member on the surface of a floor, means carried by said base member for treating said surface, a pair of driving wheel means spaced longitudinally of said base member with respect to the direction of movement thereof carried by said base member solely for driving said machine and capable of supporting at least another portion of the weight thereof, means for separately and continuously rotating the respective wheel means of said pair in opposite directions and at a slow speed suitable for propelling said machine over said surface without slippage of said wheel means relative to said surface when in contact therewith, and means for selectively lowering either of said driving wheel means relative to said base member into contact with said surface and simultaneously raising the other of said spaced driving wheel means relative to said base member out of contact with said surface.

2. In a propelled floor treating machine, a base member, anti-friction support means for supporting at least a portion of the weight of said base member on the surface of a floor, a frame pivotally mounted on said base member, a pair of driving wheel means spaced longitudinally of said base member with respect to the direction of movement thereof mounted on said frame solely for driving said machine and capable of supporting at least another portion of the weight thereof, a motor mounted on said frame, motion transmitting means between said motor and said pair of driving wheel means

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for rotating the respective driving wheel means in opposite directions and at a slow speed suitable for moving said machine over said surface without slippage of said wheel means relative to said surface when in contact therewith, and means for selectively tilting said frame relative to said base member for lowering either of said spaced driving wheel means into contact with said surface and simultaneously raising the other of said spaced driving wheel means out of contact with said surface.

3. In a propelled floor treating machine, a base member, anti-friction means for supporting at least a portion of the weight of said base member on the surface of a floor, means carried by said base member for treating said surface, a frame pivotally mounted on said base member, a pair of rotary driving wheel means spaced longitudinally of said base member with respect to the direction of movement thereof mounted on said frame solely for driving said machine and capable of supporting at least another portion of the weight thereof, a motor mounted on said frame, motion transmitting means between said motor and said driving means for rotating the respective spaced driving wheel means in opposite directions and at a slow speed suitable for moving said machine over said surface without slippage of said wheel means relative to said surface when in contact therewith, means for selectively tilting said frame relative to said base member for lowering either of said spaced driving wheel means into contact with said surface and simultaneously raising the other of said spaced driving wheel means out of contact with said surface, and means for retaining said frame in an intermediate position with both of said spaced driving wheel means out of contact with said surface, whereby said anti-friction means support the entire weight of said machine.

4. In a floor treating machine, a base member, anti-friction means for supporting at least a portion of the weight of said base member on the surface of a floor, elongated handle means secured to said base member for guiding the latter over said floor, means carried by said base member for treating said surface, a pair of driving wheel means spaced longitudinally of said base member with respect to the direction of movement thereof and carried by said base member solely for driving said machine and capable of supporting at least another portion of the weight thereof, means for continuously rotating the respective driving spaced wheel means in opposite directions and at a slow speed suitable for moving said machine over said surface without slippage of said wheel means relative to said surface when in contact therewith, a hand grip member movably mounted on said handle means, and means responsive solely to linear movement of said hand grip member relative to said handle means resulting from the application of force to the former in a direction tending to move said base member forwardly for lowering one of said spaced driving means relative to said base member into contact with said surface for driving said base member forwardly and simultaneously raising the other of said spaced driving wheel means out of contact with said surface and responsive solely to linear movement of said hand grip member relative to said handle resulting from the application of force to the former in a direction tending to move said base member rearwardly for lowering said other spaced driving wheel means into contact with said surface for driving said base member rearwardly and simultaneously raising said one spaced driving wheel means out of contact with said surface.

5. In a floor treating machine, a base member, anti-friction means for supporting at least a portion of the weight of said base structure on the surface of a floor, handle means secured to said base member for guiding the latter over said floor, means carried by said base member for treating said surface, a frame pivotally mounted on said base member, a pair of rotary driving wheel means mounted in longitudinally spaced relation

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on said frame with respect to the direction of movement thereof solely for driving said machine and capable of supporting at least another portion of the weight thereof, a motor mounted on said frame, motion transmitting means between said motor and said driving wheel means for rotating the respective spaced rotary driving wheel means in opposite directions and at a slow speed suitable for moving said machine over said surface without slippage of said wheel means relative to said surface when in contact therewith, a hand grip member movably mounted on said handle means, and means responsive solely to linear movement of said hand grip member relative to said handle resulting from the application of force to the former in a direction tending to move said base member forwardly for tilting said frame relative to said base member for lowering one of said spaced driving wheel means into contact with said surface for driving said base member forwardly and simultaneously raising the other of said spaced driving wheel means out of contact with said surface and responsive solely to linear movement of said hand grip member relative to said handle resulting from the application of force to the former in a direction tending to move said base member rearwardly for tilting said frame to lower said other spaced driving means into contact with said surface for driving said base member rearwardly and simultaneously raising said one spaced driving wheel means out of contact with said surface.

6. In a floor treating machine, a base member, anti-friction means for supporting at least a portion of the weight of said base member on the surface of a floor, elongated handle means secured to said base member for guiding the latter over said floor, means carried by said base member for treating said surface, a pair of rotary driving wheel means spaced longitudinally of said base member with respect to the movement thereof and mounted on said base member solely for driving said machine and supporting at least another portion of the weight thereof, means for continuously rotating the respective spaced driving wheel means in opposite directions and at a slow speed suitable for moving said machine over said surface without slippage of said wheel means relative to said surface when in contact therewith, a single hand grip member movably mounted on said handle means, and means responsive solely to linear movement of said hand grip member relative to said handle resulting from the application of force to the former in a direction tending to move said base member forwardly for lowering one of said driving wheel means relative to said base member into contact with said surface for driving said base member forwardly and simultaneously raising the other of said spaced driving wheel means out of contact with said surface and solely responsive to linear movement of said hand grip member relative to said handle resulting from the application of force to the former in a direction tending to move said base member rearwardly for lowering said other of said spaced driving wheel means into contact with said surface for driving said base member rearwardly and simultaneously raising said one driving wheel means out of contact with said surface and solely responsive to turning of said hand grip member relative to said handle for raising both of said spaced driving wheel means out of contact with said surface, whereby the weight of said machine is supported by said anti-friction wheel means.

7. In a floor treating machine, a base structure, means comprising spaced front and rear anti-friction rotary supporting members mounted on said base structure and capable of supporting said base structure on a floor, means carried by said base structure for treating the surface of the floor, front and rear rotary driving wheel means carried by said base structure solely for driving said machine and capable of supporting at least a portion of the weight thereof, means for continuously rotating the respective driving wheel means in opposite directions and at a slow

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speed suitable for moving said machine over said surface without slippage of said wheel means relative to said surface when in contact therewith, and means for selectively lowering either of said spaced driving wheel means below the corresponding rotary supporting members and into contact with said surface and simultaneously raising the other of said driving wheel means above the other rotary supporting members and out of contact with said surface.

8. In a floor treating machine, a base member, front and rear anti-friction supporting members mounted on and capable of supporting said base member on a floor, means carried by said base member for treating the surface of the floor, a frame pivotally mounted on said base member, front and rear rotary driving wheel means mounted on said frame solely for driving said machine and capable of supporting at least a portion of the weight thereof, a motor mounted on said frame, motion transmitting means between said motor and said front and rear driving wheel means for rotating the respective rotary driving wheel means in opposite directions and at a relatively slow speed suitable for moving said machine over the surface without slippage of said wheel means relative to said surface when in contact therewith, and means for selectively tilting said frame relative to said body for lowering either of said front and rear driving wheel means below the corresponding supporting members and into contact with said surface and simultaneously raising the other of said spaced rotary driving wheel means above the other supporting members and out of contact with said surface.

9. In a floor treating machine, a base member, front and rear anti-friction supporting members mounted on said base member and capable of supporting said base member on a floor, means carried by said base member of treating the surface of the floor, a frame pivotally mounted on said base member, front and rear rotary driving wheel means mounted on said frame solely for driving said machine and capable of supporting at least a portion of the weight thereof, a motor mounted on said frame, motion transmitting means extending directly and independently between said motor and said front and rear driving wheel means for rotating the respective front and rear driving wheel means in opposite directions and at a slow speed suitable for moving said machine over said floor surface without slippage of said respective driving wheel means relative to said floor surface when in contact therewith, means for selectively tilting said frame relative to said body for lowering either of said front and rear driving wheel means below the correspondingly positioned supporting members and into contact with said surface and simultaneously raising the other of said driving wheel means above the other supporting members and out of contact with said surface, and means for retaining said frame in an intermediate position with both of said driving wheel means disposed above both of said front and rear supporting members and out of contact with said surface.

10. In a floor treating machine, a base member, front and rear anti-friction members on said base member capable of supporting said base member on a floor surface, handle means secured to said base member for guiding the latter over the floor surface, means carried by said base member for treating the surface of the floor, front and rear rotary driving wheel means carried by said base member solely for driving said machine and capable of supporting at least a portion of the weight thereof, means for continuously rotating the respective front and rear driving wheel means in opposite directions and at a slow speed for moving said machine over said floor surface without slippage of said wheel means relative to said surface when in contact therewith, a hand grip member movably mounted on said handle means, and means responsive solely to linear movement of said hand grip member relative to said handle resulting from the application of force to the former in a direction tending to move said base member forwardly for lowering one of said driving wheel means relative to said base member into contact with said surface for driving said base member forwardly and simultaneously raising the other of said spaced driving wheel means out of contact with said surface and solely responsive to turning of said hand grip member relative to said handle for raising both of said spaced driving wheel means out of contact with said surface, whereby the weight of said machine is supported by said anti-friction wheel means.

the application of force to the former in a direction tending to move said base member forwardly for lowering the forwardly rotating driving wheel means below the corresponding rear supporting members and into contact with said surface and simultaneously raising the rearwardly rotating driving means above the other supporting members and out of contact with said surface and solely responsive to linear movement of said hand grip member relative to said handle means resulting from the application of a force to the former in a direction tending to move said base member rearwardly for lowering said rearwardly rotating driving wheel means below said other supporting member and into contact with said surface and simultaneously raising said forwardly rotating driving wheel means above said corresponding supporting member and out of contact with said surface.

11. In a floor treating machine, a base member, anti-friction support means mounted in spaced relation on said base member for supporting at least a portion of the weight of said base member on the surface of a floor, a suction nozzle carried by said base member for treating said surface, a pair of rotary driving wheel means mounted on and spaced longitudinally of said base member with respect to the direction of movement thereof solely for oppositely driving said machine and capable of supporting at least another portion of the weight thereof, means for continuously rotating the respective driving wheel means in opposite directions and at a slow speed suitable for moving said machine over said surface without slippage of said wheel means relative to said surface when in contact therewith, and means for selectively lowering either of said longitudinally spaced driving wheel means relative to said base member and suction nozzle into contact with said surface and simultaneously raising the other of said longitudinally spaced driving wheel means relative to said base member and suction nozzle out of contact with said surface.

12. In a propelled floor treating machine, a base member, anti-friction means for supporting at least a portion of the weight of said base member on the surface of a floor, a suction nozzle carried by said base member for treating said surface, a frame pivotally mounted on said base member, a pair of rotary driving wheel means spaced longitudinally of said base member with respect to the direction of movement thereof mounted on said frame and capable of supporting at least another portion of the weight thereof, a motor mounted on said frame, motion transmitting means between said motor and said driving wheel means for rotating the respective driving wheel means in opposite directions and at a slow speed suitable for moving said machine over said surface without slippage of said wheel means relative to said surface when in contact therewith, and means for selectively tilting said frame relative to said body for lowering either of said spaced driving wheel means into contact with said surface and simultaneously raising the other of said spaced driving wheel means out of contact with said surface.

13. In a floor treating machine, a base member, a pair of rotary brushes carried by said base member for treating the surface of a floor, a pair of rotary driving means mounted on said base member, means for continuously rotating the respective driving means in opposite directions and for rotating the respective brushes in opposite directions, and means for selectively lowering either of said driving means and the corresponding rotary brush into contact with said surface and simultaneously raising the other of said driving means and the other of said rotary brushes out of contact with said surface.

14. In a floor treating machine, a base member, a frame pivotally mounted on said base member, a pair of rotary driving means mounted on said frame, a pair of rotary brushes mounted on said frame for treating the surface of a floor, a motor mounted on said frame, motion transmitting means driven by said motor for rotating the re-

spective driving means in opposite directions and for rotating the respective brushes in opposite directions, and means for selectively tilting said frame relative to said body for lowering either of said driving means and the corresponding rotary brush into contact with said surface and simultaneously raising the other of said driving means and the other of said rotary brushes out of contact with said surface.

15. In a floor treating machine, a base member, a suction nozzle carried by said base member and having a suction opening, a pair of rotary brushes within said suction nozzle, a pair of rotary driving means carried by said base member, means for continuously rotating the respective driving means in opposite directions and for rotating the respective brushes in opposite directions, and means for selectively lowering either of said driving means into contact with the surface of the floor and for lowering the corresponding brush through said suction opening into contact with said surface and simultaneously raising the other of said driving means and the other of said rotary brushes out of contact with said surface.

16. In a floor treating machine, a base member, a suction nozzle carried by said base member and having a suction opening, a frame pivotally mounted on said base member, a pair of rotary driving means mounted on said frame, a pair of rotary brushes mounted on said frame and within said nozzle, a motor mounted on said frame, motion transmitting means driven by said motor for rotating the respective driving means in opposite directions and for rotating the respective brushes in opposite directions, and means for selectively tilting said frame relative to said body for lowering either of said driving means into contact with the surface of the floor and for lowering the corresponding brush through said suction opening into contact with said surface and simultaneously raising the other of said driving means and the other of said brushes out of contact with said surface.

17. In a floor treating machine, a base member, handle means secured to said base member for guiding the latter over a floor, a pair of rotary brushes carried by said base member for treating the surface of the floor, a pair of rotary driving means carried by said base member, means for continuously rotating the respective driving means in opposite directions and for rotating the respective brushes in opposite directions, a hand grip member movably mounted on said handle means, and means responsive to movement of said hand grip member relative to said handle resulting from the application of force to the former in a direction tending to move said base member forwardly for lowering one of said driving means relative to said base member into contact with said surface for driving said base member forwardly and for lowering one of said brushes into contact with said surface and simultaneously raising the other of said driving means and the other of said brushes out of contact with said surface and responsive to movement of said hand grip member relative to said handle resulting from the application of force to the former in a direction tending to move said base member rearwardly for lowering said other driving means into contact with said surface for driving said base member rearwardly and for lowering the other of said brushes into contact with said surface and simultaneously raising said one driving means and said one brush out of contact with said surface.

18. In a floor treating machine, a base member, handle means secured to said base member for guiding the latter over a floor, a frame pivotally mounted on said base member, a pair of rotary driving means mounted on said frame, a pair of rotary brushes mounted on said frame, a motor mounted on said frame, motion transmitting means driven by said motor for rotating the respective driving means in opposite directions and the respective brushes in opposite directions, a hand grip member movably mounted on said handle means, and

means responsive to movement of said hand grip member relative to said handle resulting from the application of force to the former in a direction tending to move said base member forwardly for tilting said frame relative to said base member for lowering one of said driving means into contact with said surface for driving said base member forwardly and for lowering one of said brushes into contact with said surface and simultaneously raising the other of said driving means and the other of said brushes out of contact with said surface and responsive to movement of said hand grip member relative to said handle resulting from the application of force to the former in a direction tending to move said base member rearwardly for tilting said frame to lower said other driving means into contact with said surface for driving said base member rearwardly and to lower said other brush into contact with said surface and simultaneously raising said one driving means and said one brush out of contact with said surface.

19. In a floor treating machine, a base member having a front and a back, a first rotary driving means carried by said base member adjacent to the front thereof, a second rotary driving means carried by said base member adjacent to the back thereof, means for continuously rotating said first driving means in a direction for driving said base member backwardly and for continuously rotating said second driving means in the opposite direction, a first rotary brush carried by said base member parallel and adjacent to said first driving means, a second rotary brush carried by said base member parallel and adjacent to said second driving means, means for continuously rotating each of said brushes in a direction opposite to that of the adjacent driving means, and means for selectively lowering either said first driving means and first brush or said second driving means and second brush into contact with the surface of the floor and simultaneously raising the other driving means and brush out of contact with said surface.

20. In a floor treating machine, a base member having a front and a back, a suction nozzle carried by said base member and having an elongated suction opening disposed between and parallel to said front and back, a first rotary brush within said nozzle adjacent to said front, a second rotary brush within said nozzle adjacent to said back, a first rotary driving means carried by said base member parallel and adjacent to said first brush, a second rotary driving means carried by said base member parallel and adjacent to said second brush, means for continuously rotating said first driving means in a direction for driving said base member backwardly and for continuously rotating said second driving means in the opposite direction and for continuously rotating each of said brushes in a direction opposite to that of the adjacent driving means, said brushes being movable downwardly through said suction opening into contact with the surface of the floor, and means for selectively lowering either said first driving means and said first brush or said second driving means and said second brush into contact with said surface and simultaneously raising the other driving means and brush out of contact with said surface.

21. In a floor treating machine, a base member having a front and a back, a first rotary driving means carried by said base member adjacent to the front thereof, a second rotary driving means carried by said base member adjacent to the back thereof, means for continuously rotating said first driving means in a direction for driving said base member forwardly and for continuously rotating said second driving means in the opposite direction, a first rotary brush carried by said base member parallel and adjacent to said first driving means, a second rotary brush carried by said base member parallel and adjacent to said second driving means, means for continuously rotating each of said brushes in the same direction as that of the adjacent driving means, and means for selectively lowering either said first driving means and first brush

or said second driving means and second brush into contact with the surface of the floor and simultaneously raising the other driving means and brush out of contact with said surface.

22. In a floor treating machine, a base member having a front and a back, a suction nozzle carried by said base member and having an elongated suction opening disposed between and parallel to said front and back, a first rotary brush within said nozzle adjacent to said front, a second rotary brush within said nozzle adjacent to said back, a first rotary driving means carried by said base member parallel and adjacent to said first brush, a second rotary driving means carried by said base member parallel and adjacent to said second brush, means for continuously rotating said first driving means in a direction for driving said base member forwardly and for continuously rotating said second driving means in the opposite direction and for continuously rotating each of said brushes in the same direction as that of the adjacent driving means, said brushes being movable downwardly through said suction opening into contact with the surface of the floor, and means for selectively lowering either said first driving means and said first brush or said second driving means and said second brush into contact with said surface and simultaneously raising the other driving means and brush out of contact with said surface.

23. In a propelled vacuum cleaner, a base member, anti-friction means for supporting at least a portion of the weight of said base member on the surface of a floor, handle means secured to said base member for guiding the latter over said floor, a suction nozzle carried by said base member for treating said surface, a pair of rotary driving wheel means carried by and spaced longitudinally of said base member with respect to the direction of movement thereof, means for continuously rotating the respective driving wheel means solely for driving said machine in opposite directions and capable of supporting at least another portion of the weight thereof and at a slow speed suitable for moving said machine over said surface without slippage of said wheel means relative to said surface when in contact therewith, a hand grip member movably mounted on said handle means, means responsive solely to linear movement of said hand grip member relative to said handle means resulting from the application of force to the former in a direction tending to move said base member forwardly for lowering one of said spaced driving wheel means relative to said base member into contact with said surface for driving said base member forwardly and simultaneously raising the other of said driving wheel means out of contact with said surface and responsive solely to linear movement of said hand grip member relative to said handle means resulting from the application of force to the former in a direction tending to move said base member rearwardly for lowering said other driving wheel means into contact with said surface for driving said base member rearwardly and simultaneously raising said one driving wheel means out of contact with said surface, a hollow body mounted on said handle means, a dust separating member removably contained within said body, conduit means connecting said nozzle with said hollow body, and a motor blower unit for producing flow of air through said nozzle, conduit means and dust separating member.

24. In a floor treating machine, a base member, handle means secured to said base member for guiding the latter over a floor, means carried by said base member for treating the surface of the floor, a frame pivotally mounted on said base member, an over-center spring tending to retain said frame in either of two extreme positions, a pair of rotary driving means mounted on said frame, a motor mounted on said frame, motion transmitting means between said motor and said driving means for rotating the respective driving means in opposite directions, a

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hand grip member movably mounted on said handle means, and a Bowden wire connected between said frame and said hand grip member and responsive to movement of said hand grip member relative to said handle resulting from the application of force to the former in a direction tending to move said base member forwardly for tilting said frame against the force of said spring relative to said base member to one of said extreme positions for lowering one of said driving means into contact with said surface for driving said base member forwardly and simultaneously raising the other of said driving means out of contact with said surface and responsive to movement of said hand grip member relative to said handle resulting from the application of force to the former in a direction tending to move said base member rearwardly for tilting said frame against the force of said spring to the other of said extreme positions to lower said other driving means into contact with said surface for driving said base member rearwardly and simultaneously raising said one driving means out of contact with said surface.

25. In a floor treating machine, a base member, handle means secured to said base member for guiding the latter over a floor, means carried by said base member for treating the surface of the floor, a frame pivotally mounted on said base member, an over-center spring tending to retain said frame in either of two extreme positions, a pair of rotary driving means mounted on said frame, a motor mounted on said frame, motion transmitting means between said motor and said driving means for continuously rotating the respective driving means in opposite directions, a hand grip member movably mounted on said handle means, a Bowden wire connected between said frame and said hand grip member and responsive to movement of said hand grip member relative to said handle resulting from the application of force to the former in a direction tending to move said base member

forwardly for tilting said frame against the force of said spring to one of said extreme positions for lowering one of said driving means into contact with said surface for driving said base member forwardly and simultaneously raising the other of said driving means out of contact with said surface and responsive to movement of said hand grip member relative to said handle resulting from the application of force to the former in a direction tending to move said base member rearwardly for tilting said frame against the force of said spring to the other of said extreme positions for lowering said other driving means into contact with said surface for driving said base member rearwardly and simultaneously raising said one driving means out of contact with said surface, and means responsive to turning of said hand grip member relative to said handle for securing said hand grip member in a mid-position so that said Bowden wire secures said frame midway between said extreme positions with both of said driving means raised out of contact with said surface.

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