

Nov. 17, 1953

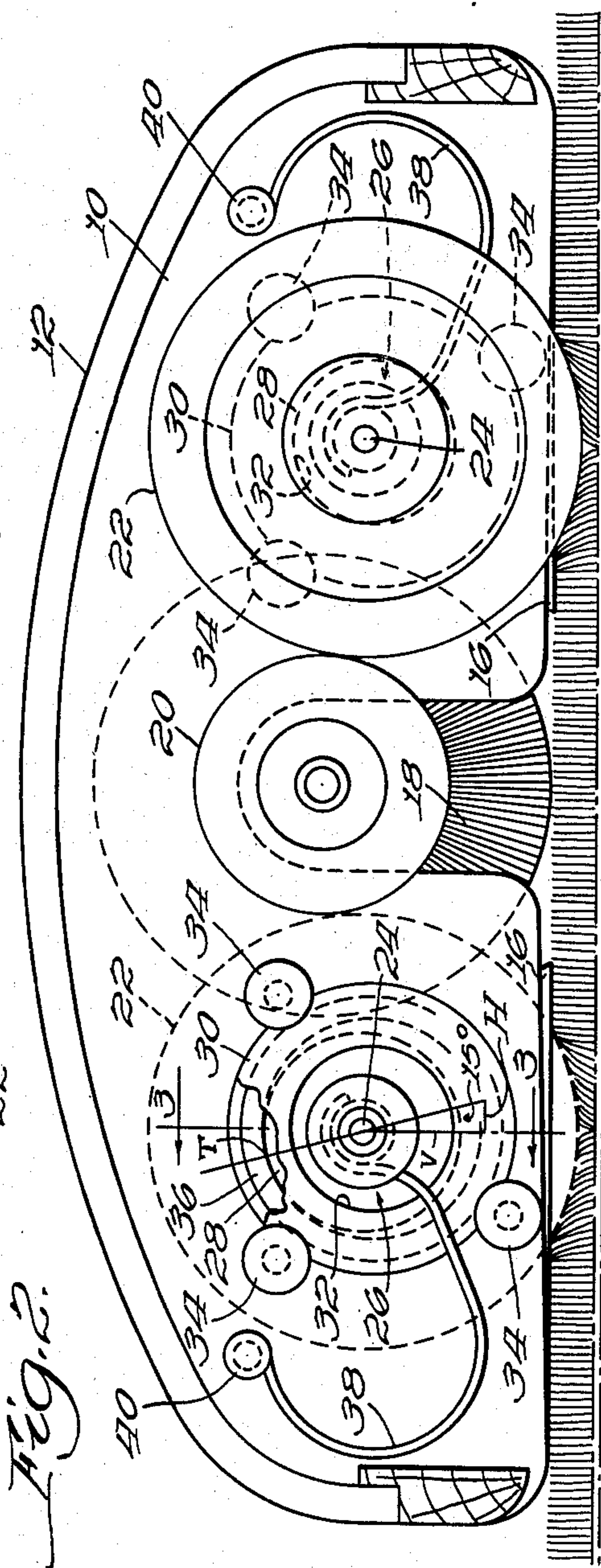
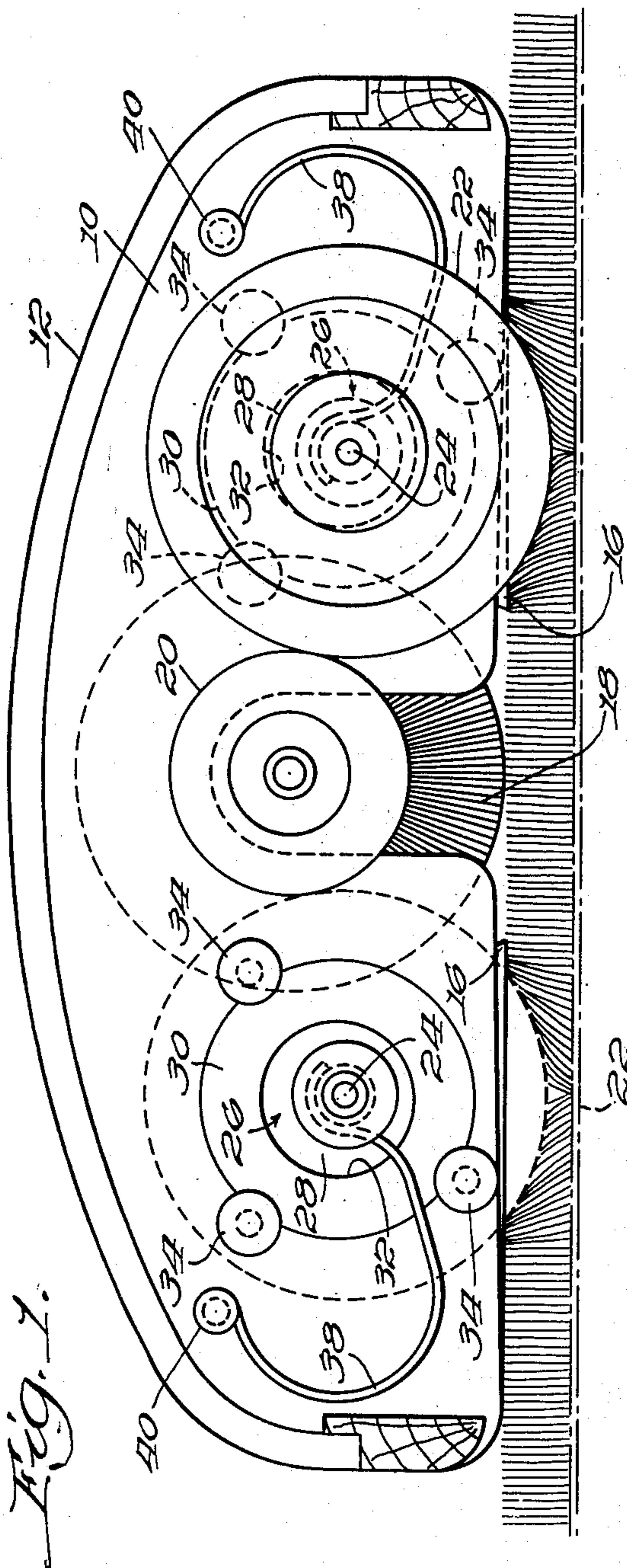
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2,659,095

PLANETARY WHEEL SUSPENSION FOR CARPET SWEEPERS

Filed Oct. 14, 1949

2 Sheets-Sheet 1



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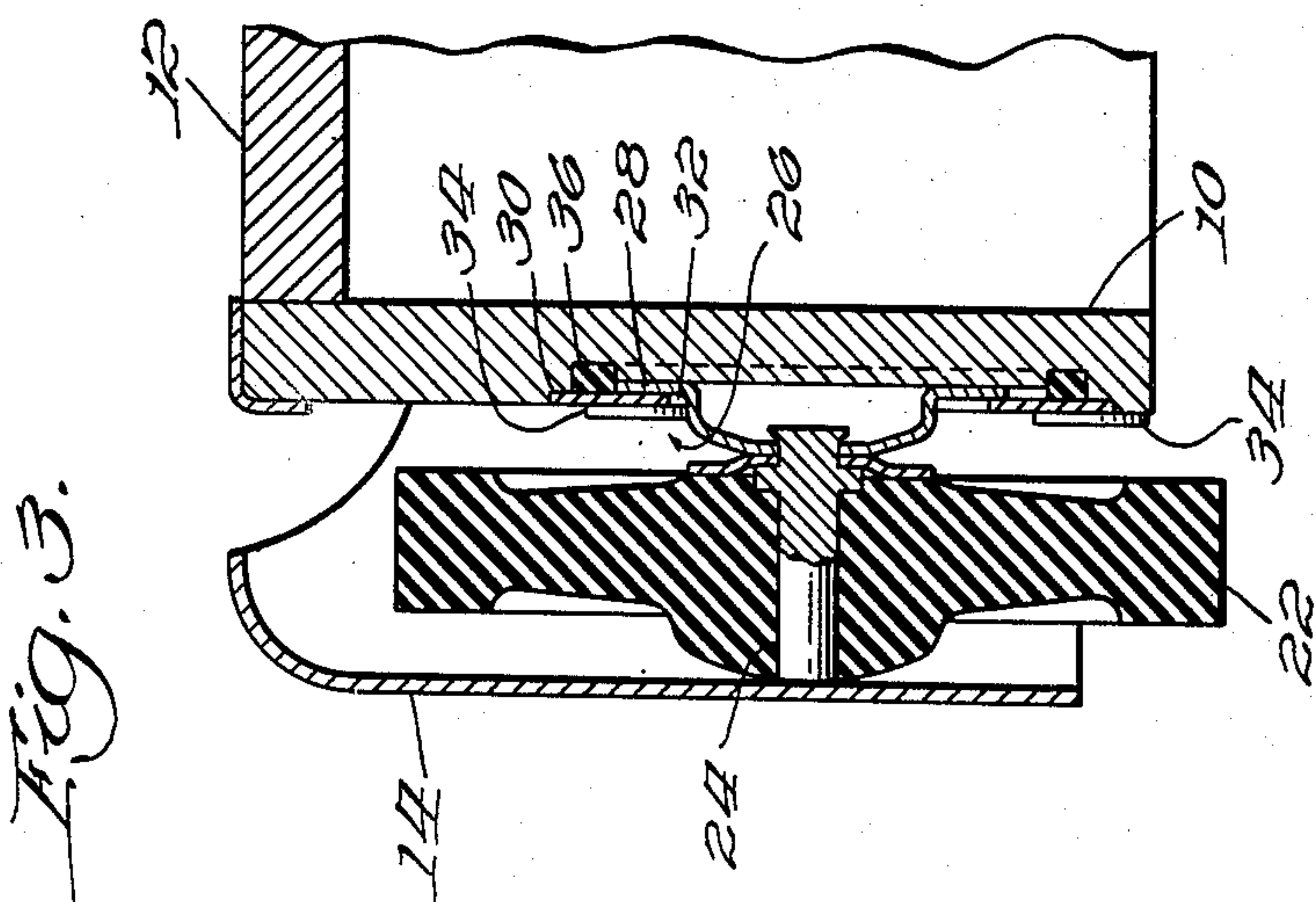
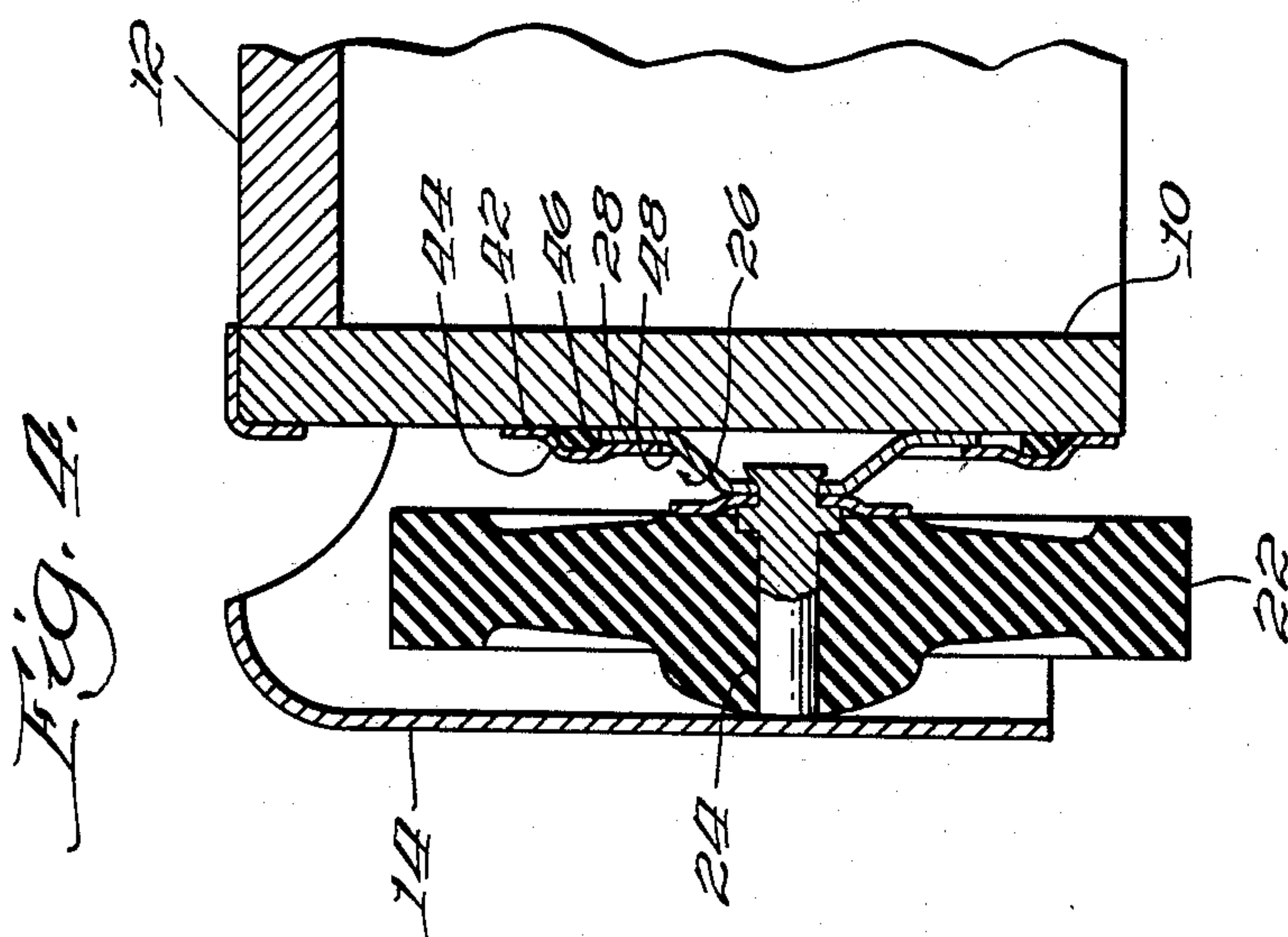
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PLANETARY WHEEL SUSPENSION FOR CARPET SWEEPERS

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2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

2,659,095

PLANETARY WHEEL SUSPENSION FOR  
CARPET SWEEPERSJohn M. Himes, Milwaukee, Wis., assignor to  
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7 Claims. (Cl. 15—41)

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This invention relates to improvements in carpet sweepers, particularly to the type which are self-adjusting to various thicknesses of nap and to the means for suspending the wheels of such sweepers.

A self-adjusting type of sweeper is described in the application for "Carpet Sweepers" of Robert S. Wagner, Albert J. Duwe, and John M. Himes, Ser. No. 59,792, filed November 13, 1948. However, the wheel suspension of such sweeper may be somewhat noisy in operation and in the manufacture thereof requires (a) fairly close tolerances to provide freedom of movement without sloppy alinement and (b) considerable skill in assembly for proper adjustment.

It is an object of this invention, therefore, to provide a self-adjusting carpet sweeper which will be less noisy in operation and have a long useful life.

Another object of the invention is to provide a self-adjusting carpet sweeper which may be manufactured without difficult close tolerances and have freedom of movement without destroying stability and proper alinement of the wheel axles.

Another object of the invention is to provide a self-adjusting carpet sweeper which is easily assembled and adjusted and may be manufactured by using simple and relatively inexpensive tools.

These objects are obtained by individually mounting each wheel on a stud axle rigidly secured to a mounting member having a circular peripheral portion the opposite surfaces of which are guided between two opposed surfaces to control lateral movement thereof and the circular edge of which contacts a ring of resilient noise-absorbing material to control and limit the planar movement thereof. The opposed surfaces may consist of the end plate of the sweeper and a cover plate having an aperture accommodating the stud axle. Because of the relatively large area of the guiding surfaces totally surrounding the stud axle the tolerances need not be close in order to provide freedom of movement while maintaining stability and proper alinement of the axle. By so limiting the planar movement of the mounting member the noise of constant contact between it and the control member is eliminated. The action of a simply formed spring in urging the wheel toward driving engagement with the brush pulley is easily supplemented by the horizontal component of force created as such ring engages the periphery of the mounting member at a point above and outwardly of the axis of rotation of the wheel.

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The novel features, which are considered characteristic of the invention, are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a view in elevation of one end of a carpet sweeper embodying the present invention, with the end bell removed and with the left hand wheel removed and its outline position shown in dotted line for the sake of clarity in illustration, such view showing the relative position of the casing, wheels, and brush when the sweeper is used on a carpet with a relatively thick nap;

Fig. 2 is a view similar to the view in Fig. 1 showing the relative position of the wheels, brush, and casing when the sweeper is used on a carpet with a relatively thin nap;

Fig. 3 is a fragmentary enlarged sectional view taken on line 3—3 of Fig. 2; and

Fig. 4 is a fragmentary sectional view of a modification of the wheel suspension embodying the present invention.

In the drawings there is shown only one end of the carpet sweeper and the description is limited to the construction and operation of an individual wheel suspension, sometimes referred to as planetary floating wheel action. Reference may be had to Patent No. 2,228,528, issued January 14, 1941, to Swift Miller, for the description and cooperative relationship of the standard parts of a complete carpet sweeper. Reference may also be had to the aforementioned application for a complete description of the self-adjusting of the carpet sweeper as it is used on thick or thin pile carpets. For the purposes of this description it is only necessary to know that the pulley-engaging force generated by the wheel spring is supplemented by a horizontal component of force created by the positive engagement between the curved periphery on the axle mounting member and the resilient ring on the sweeper casing.

Referring to the drawings by reference numerals, the carpet sweeper has an end plate 10 secured to a cover 12. The end plate may be covered by an end bell 14 (see Figs. 3 and 4) which partially encloses the floor wheels and their supporting mechanism. Dust pans 16 and rotatable brush 18, with its driving pulley 20, are incorporated in the sweeper in the usual manner. Each end of the sweeper is supported by floor wheels 22 rotatably mounted on stud axles 24.



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Each stud axle is secured to the central portion of a mounting member 26 in substantially the same way as the stud axle of said patent is secured to its stud axle supporting arm, such support including an annular groove in which the inner end of the wheel spring seats.

The mounting member 26 has a flat circular peripheral portion 28 offset from its central portion. The surfaces of such peripheral portion are guided between a surface on end plate 10 and the inner surface of a cover plate 30 to control the lateral movement of the member 26 and restrain it to substantially planar movement. The cover plate has a central opening 32 through which the central portion of the member 26 extends and in the confines of which it is freely movable. In the modification shown in Figs. 1 to 3, the outer surface of the end plate 10 is recessed as shown in Fig. 3 to accommodate both the peripheral portion 28 and the cover plate 30 so that when assembled the outer surface of such plate is substantially in the plane of the outer surface of the end plate 10. The cover plate 30 fits snugly within the edge of the recess to prevent planar movement thereof and is held against lateral displacement by rivets 34 secured to the end plate 10 with their heads overlapping and engaging the edges of the cover plate 30 at spaced places. It is desirable to have a smooth surface on the bottom of the recess to engage the surface of the peripheral portion 28. The depth of that part of the recess in which the cover plate 30 seats is proportioned to the depth of the recess which guides the portion 28 to provide sufficient clearance to allow the member 26 to have free planar movement. As the member 26 is guided by a relatively large surface surrounding and spaced from the central portion thereof, the tendency for it to cant or tilt and thus bind and let the axle become misaligned is effectively eliminated without holding a close tolerance.

The planar movement of the mounting member 26 is constrained in all directions by a ring 36 preferably made of oil-resistant, synthetic rubber, or other type of resilient, noise-absorbing material. The ring 36 is partly mounted in a recessed annular groove in the wall of the end plate 10 between the bottom of the groove and the cover plate 30 and is thicker than the peripheral portion 28. This assures a good surface contact between such ring and the edge of such portion. The internal diameter of the ring 36 is sufficiently larger than the external diameter of the peripheral portion 28 to provide enough planar motion to allow the member 26 to shift far enough with respect to the casing and brush to accommodate normal operation. The diameter of the central opening 32 is large enough so that its edge will not contact the central portion of the mounting member 26 as such member shifts in normal operation. Hence, all contacts limiting the planar movement of member 26 are made between such member and ring 36 and thus noise is avoided.

The center of the ring 36 is positioned inwardly of the arcuate path defined by the axis of the stud axles 24 as the wheels move up and down in contact with the pulley 20 from high to low position. Hence, when the casing is moved downwardly with respect to the wheels to the position shown in Fig. 2, the contact between the peripheral portion 28 and the inner surface of ring 36 is established substantially at the point marked T in Fig. 2. As shown in Fig. 2, if a

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vertical force of the magnitude indicated by the vector line V were exerted on the ring 36 at point T, it would produce on the peripheral portion 28 a horizontal force substantially equal to the magnitude indicated by the vector line H. This occurs because the line joining the point T and the center of the axle 24 slopes downwardly and inwardly to the vertical about an angle of approximately 15°. Thus the contact between the ring and the mounting member provides a pulley-engaging force supplemental to that of the wheel spring during operation of the sweeper. Relatively simple jigs may be used to form the groove for the ring 36 in the predetermined place for obtaining the foregoing relationship and no mistakes will thereafter result during assembly and the use of skill in assembly and adjustment is not required.

Each wheel 22 is urged in a downward and inward direction by a simplified curved spring 38 having one end resting in the annular groove on mounting member 26 and the other end secured by a pivot 40 to the end plate 10 at the place indicated in Figs. 1 and 2. Because of the planetary floating wheel movement and the supplemental pulley-engaging force, such spring may be relatively light and of the simplified design shown.

In the modification shown in Fig. 4, the cover plate 42 is formed with an annular groove 44 which accommodates the ring 46 in substantially the same way that ring 36 is accommodated in the groove in the end plate. The cover plate 42 like the cover plate 30 also has a central opening 48 which provides ample operating space for the central portion of the wheel mounting member 26. This type of construction eliminates the necessity of grooving and recessing the end plate 10. However, a jig must be provided to properly position the cover plate 42 at the time it is secured by suitable means to the end plate. The configuration of the cover plate 42 also predetermines and provides the necessary clearance to let the circular peripheral portions 48 have free planar movement.

Although only several embodiments of the invention are shown and described herein, it will be understood that this application is intended to cover such other changes or modifications as come within the spirit of the invention or scope of the following claims.

I claim:

1. In a carpet sweeper having an end plate, a brush pulley and a floor wheel in contact with said pulley, means for floatably mounting the floor wheel with respect to said plate and pulley comprising a stub axle on which said wheel is rotatably carried, a mounting member for said axle having a peripheral portion, the edge of said portion being circular, one side of said portion being guided by a surface on said end plate, the other side of said portion being guided by the surface on a cover plate, said surfaces cooperating to control the lateral movement of said mounting member to hold said axle in proper horizontal alinement, and a resilient circular ring surrounding said mounting member and in alinement with said circular edge of said portion to control and limit the planar movement of said member, the center of said ring being positioned inwardly of the axis of said stub axle when said axle is in the normal position assumed while the sweeper is in operation whereby said ring and said circular edge make contact at a point outside the axis of said axle to cause said member to be



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urged inwardly as said plate is lowered with respect to said member in the operation of said sweeper.

2. A carpet sweeper as claimed in claim 1 in which a spring pivoted to the end plate urges said wheel into driving contact with said brush pulley.

3. In a carpet sweeper, an end plate provided with a recess for accommodating a stud axle mounting member and a cover plate, a mounting member having a circular peripheral portion in sliding contact with a surface of said recess, a stud axle carried by said member, a cover plate held in said recess and in sliding contact with said peripheral portion to cooperate with said surface to control lateral movement of said mounting member, said cover plate having an opening for freely accommodating said stud axle, an annular groove recessed in said end plate within said recess, and a ring of resilient noise-absorbing material in said groove and extending within said recess to be in alinement with the edge of said peripheral portion whereby said ring contacts said mounting member to control the planar movement of said mounting member.

4. A carpet sweeper as claimed in claim 3 in which, said cover plate fits snugly within the edge of said recess to prevent planar movement thereof and engages said ring to hold said ring within said groove.

5. A carpet sweeper as claimed in claim 3 in which the center of said ring is positioned inwardly of the axis of said stud axle when said stud axle is in the normal position assumed while the sweeper is in operation whereby said ring and said member make contact at a point outside the axis of said axle to cause said member to be urged inwardly as said plate is lowered with respect to said member in the operation of said sweeper.

6. In a carpet sweeper, an end plate, a mount-

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ing member having a circular peripheral portion in sliding contact with the surface of said plate, a stud axle carried by said member, a cover plate secured to said end plate and having an offset portion in sliding contact with said peripheral portion to cooperate with said surface to control lateral movement of said mounting member, said cover plate having an opening freely accommodating said axle, said cover plate having an annular groove therein adjacent said offset portion for receiving and holding a ring, and a ring of resilient noise-absorbing material in said groove and projecting into alinement with the edge of said peripheral portion whereby said ring contacts said mounting member to control the planar movement of said mounting member.

7. A carpet sweeper as claimed in claim 6 in which the center of said ring is positioned inwardly of the axis of said stud axle when said stud axle is in the normal position assumed while the sweeper is in operation whereby said ring and said member make contact at a point outside the axis of said axle to cause said member to be urged inwardly as said plate is lowered with respect to said member in the operation of said sweeper.

JOHN M. HIMES.

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