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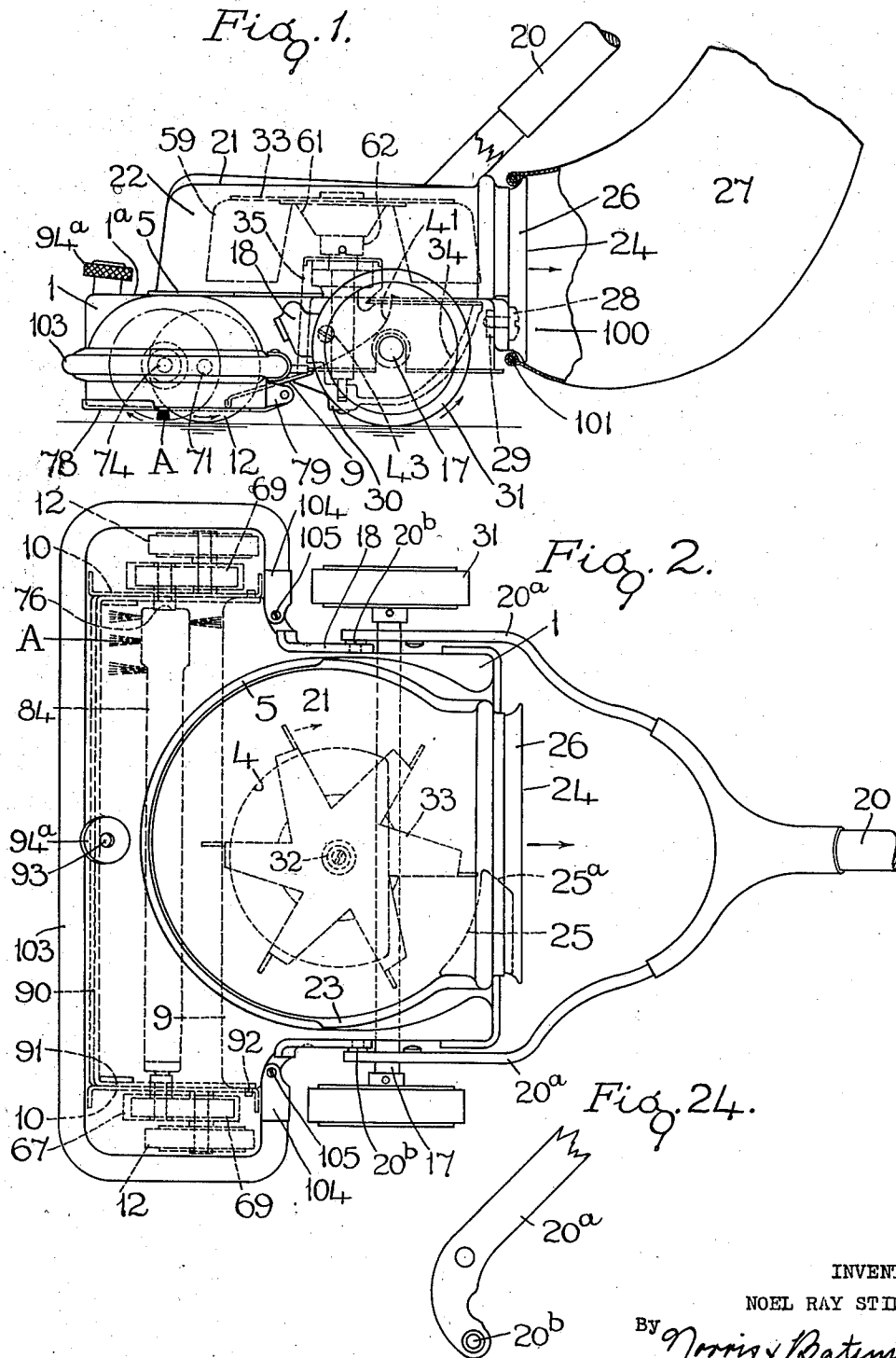
N. R. STILES

2,052,498

CONSTRUCTION OF VACUUM CARPET SWEEPERS.

Filed May 14, 1935

5 Sheets-Sheet 1



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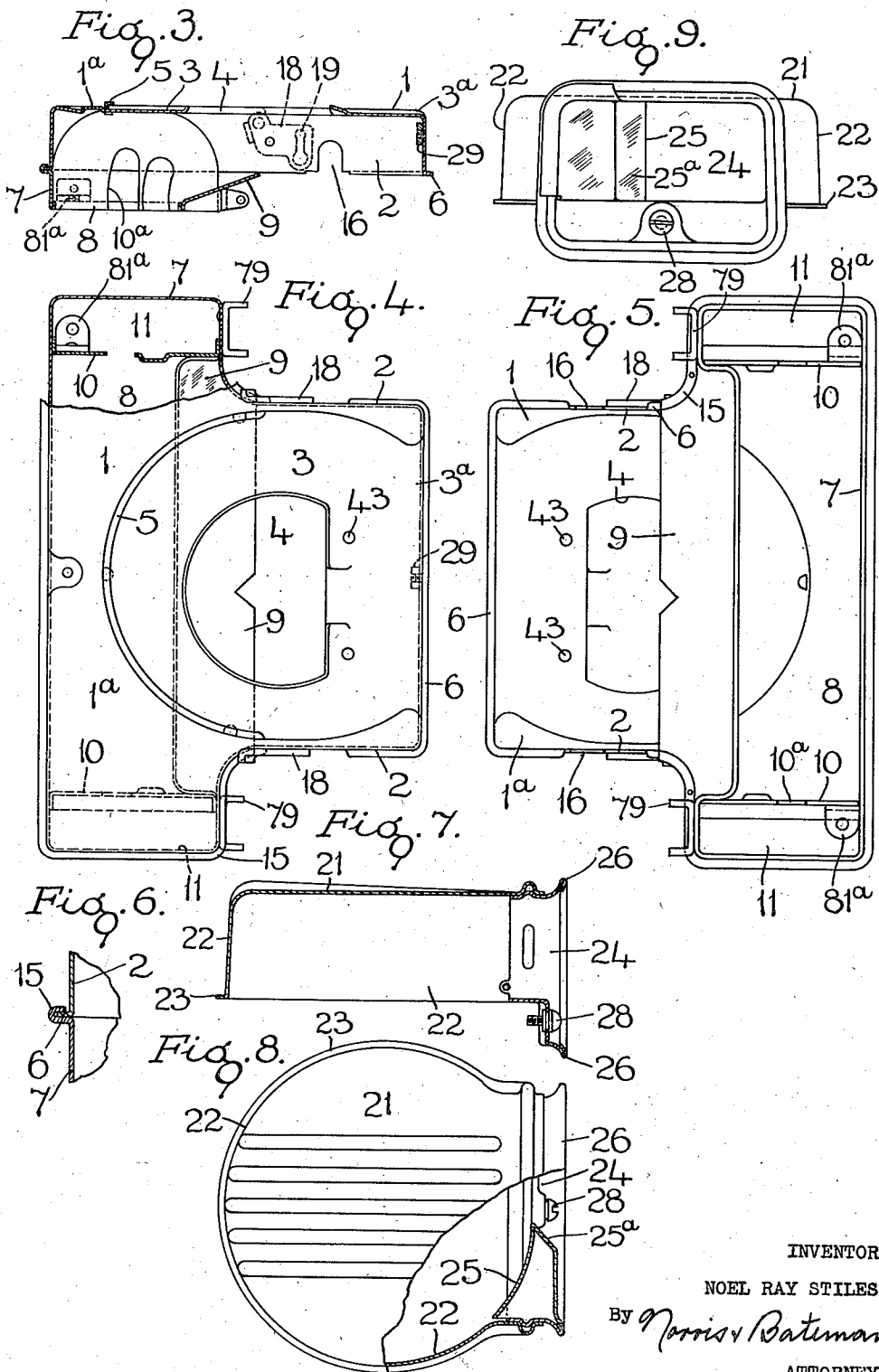
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Fig. 10.

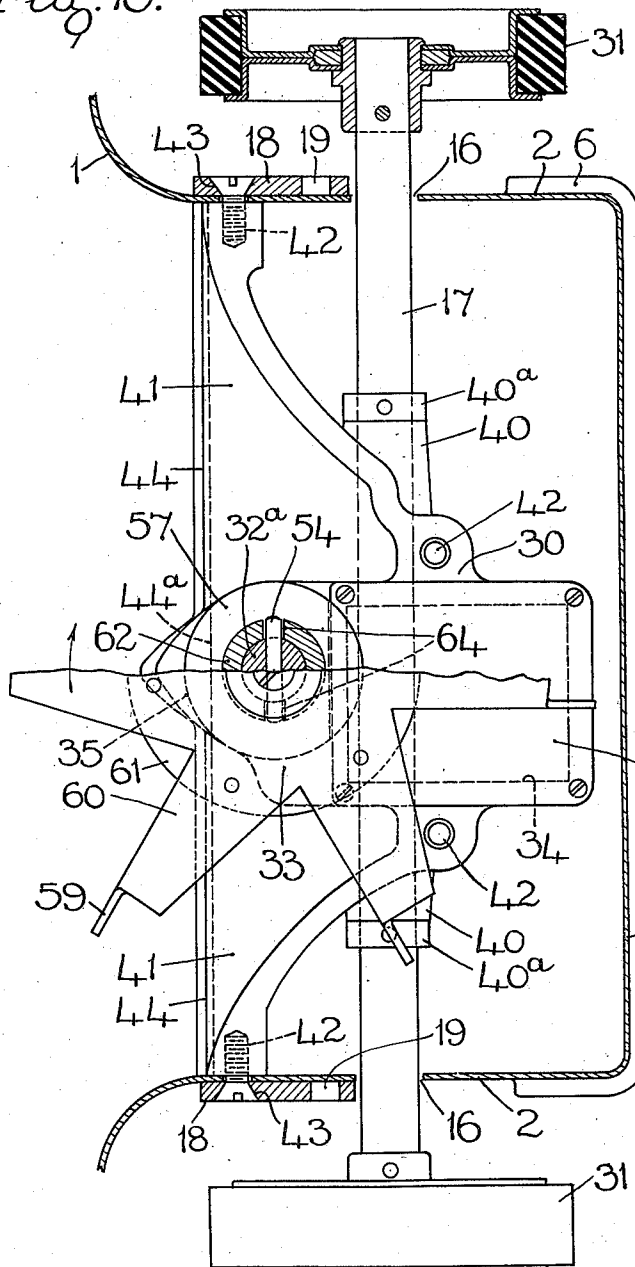


Fig. 22.

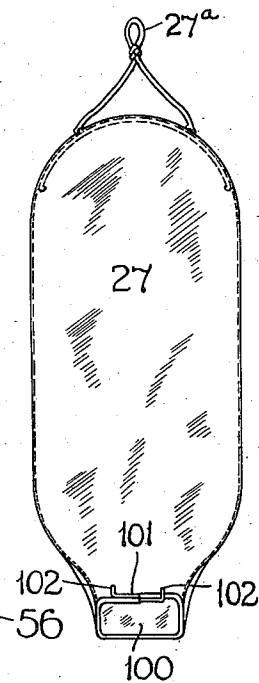
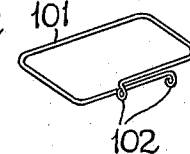


Fig. 23.



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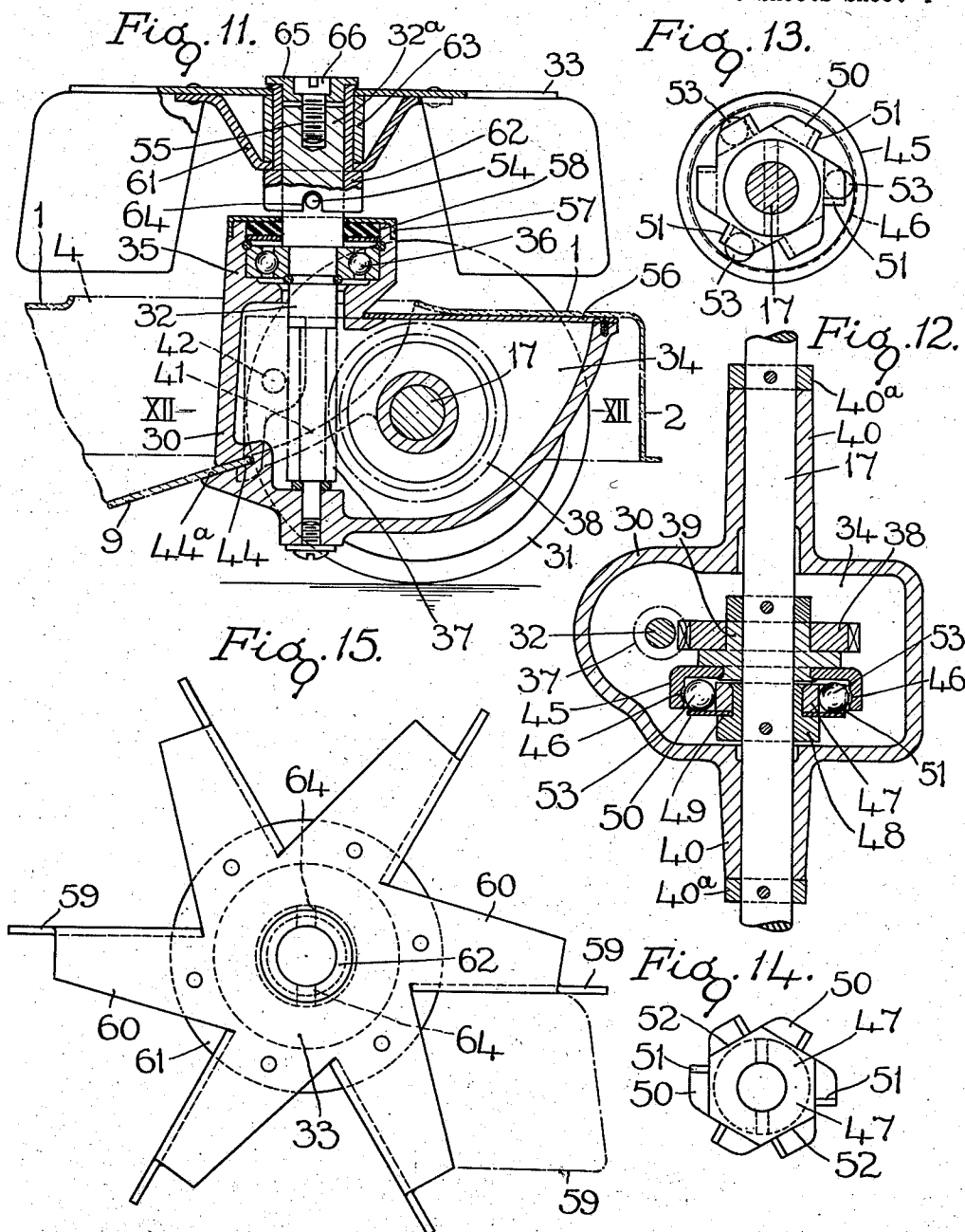
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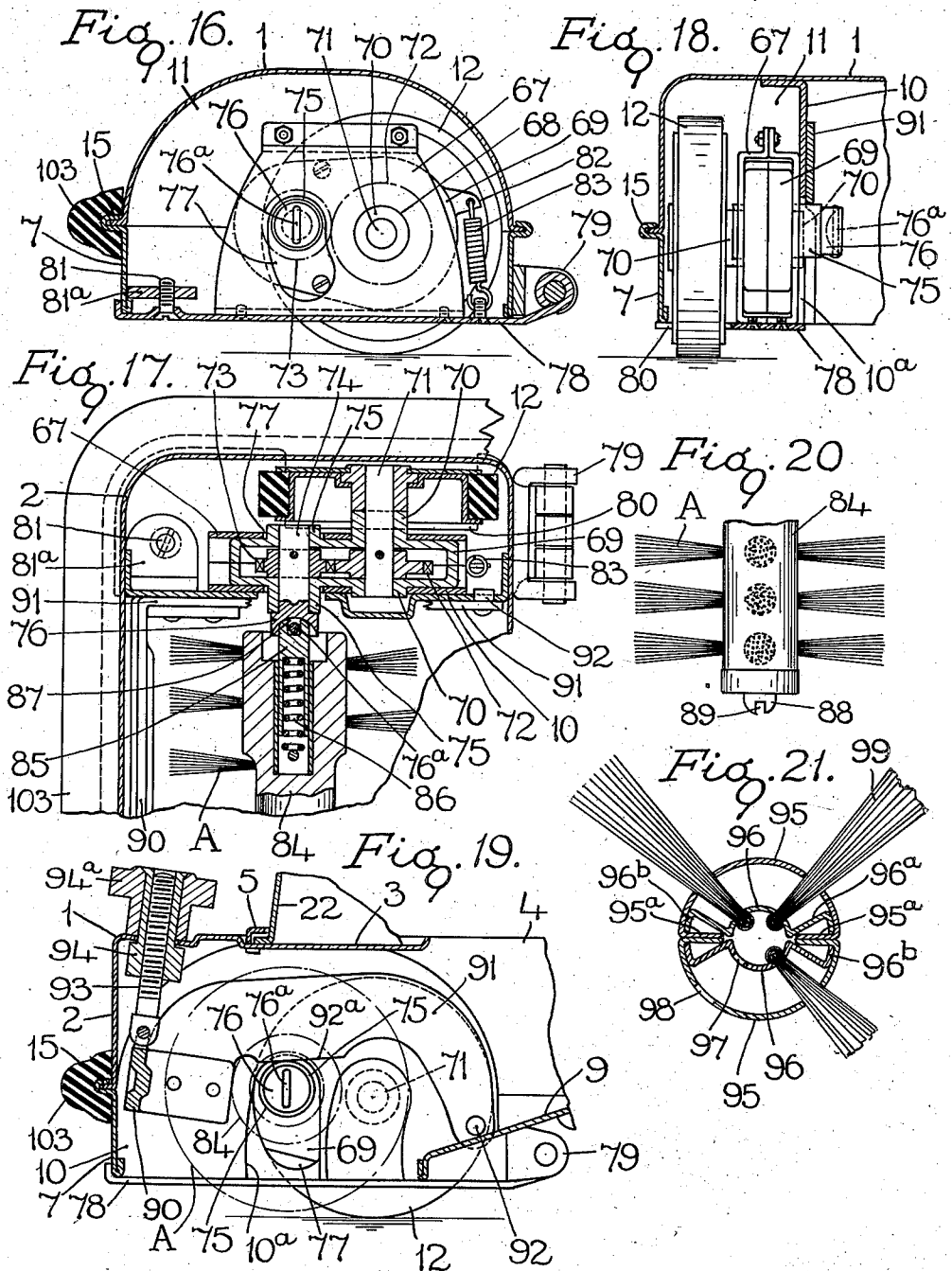
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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

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CONSTRUCTION OF VACUUM CARPET
SWEEPERS

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Application May 14, 1935, Serial No. 21,421
In Great Britain May 18, 1934

6 Claims. (Cl. 15—18)

The object of this invention is to construct a vacuum cleaner of the class employing a fan and working by the passage of the cleaner over a carpet or surface in an improved manner as to detail parts of construction, and which is capable of production at a low price and will operate efficiently.

My invention will be clearly ascertained by the following description aided by the annexed drawings in which:

Figure 1 is a side elevation of the carpet sweeper and showing only a part of the handle and collecting bag, which bag is also partly in section.

Figure 2 is a plan view of Figure 1, with the collecting bag removed.

Figure 3 is a side sectional view, Figure 4 a plan view partly in section, and Figure 5 an under plan view of the main casing or body and tray combined.

Figure 6 is a detail view of the method of securing the main casing or body to the tray.

Figure 7 is a side sectional view, Figure 8 a plan partly in section, and Figure 9 an end view of the fan housing or casing.

Figure 10 is a part sectional plan view of the fan driving mechanism frame, driving wheels and fan partly broken away, and showing a portion of the main casing or body in section.

Figure 11 is a side sectional view of the fan driving mechanism, with a portion of the main casing or body and tray shown in chain-dot lines.

Figure 12 is a sectional plan on the lines XII, XII of Figure 11, showing the free wheel device and gearing between the driving wheels shaft and fan shaft.

Figure 13 is a side view of the free wheel device.

Figure 14 is a side view of the inner member of the free wheel device.

Figure 15 is a plan view of the fan, the chain-dot lines showing one of the blades before bending.

Figure 16 is a side sectional view, Figure 17 a sectional plan view broken, and Figure 18 a sectional front view showing the driving wheels and mechanism connecting and operating the brush.

Figure 19 is a side sectional view through the main casing or body and tray and showing the mechanism for raising or lowering the brush.

Figure 20 is a detail view of one end of the brush.

Figure 21 is a sectional view through a brush showing the preferred method of constructing the stock carrying the bristles.

Figure 22 is a perspective view of the collecting bag and,

Figure 23 is a perspective view of the clip device secured to the mouth of the bag and by which it is attached to the machine.

Figure 24 is a detail view of one arm of the handle.

According to this invention, the casing is made in three main parts or sections formed principally and preferably from stamped metal, one the intermediate main casing or body 1, (see Figures 3, 4 and 5) is made somewhat T-shaped and comprising a platform 1^a having depending walls 2 all around, and this platform has a D shaped recessed portion 3 on its upper face, such recess being formed with a D shaped hole 4, the straight edges of the recess and hole being parallel with the free edge of the recess or part of the edge of the end of the platform 1.

The D shaped hole 4 is positioned slightly eccentric with regard to the recessed portion 3.

To the top of the platform and corresponding to the front or curved portion of the recess 3 is secured a curved angled strip 5, and the lower edges of the depending walls 2 are turned outwards to form flanges 6.

Secured to the underside of the main casing or body 1 at the arms portion or lateral extension of the T is an open bottomed trough like device forming the second part or lower casing section and constructed as a tray 7, see also Figures 3 to 5, formed with an oblong opening 8 along one wall and also the end walls, an angled shield 9 projecting into the opening 8 from the other wall, and leaving a space at each end of the angled shield, and at each end portion of the tray 7 at the ends of the angled shield is positioned a wall 10, 10 thus forming two compartments 11, 11 which are open at the lower part and these walls extend into the main casing 1 forming the compartments to accommodate the brush driving wheels 12, 12 and gearing connecting the brush A which is situated in the tray 7 between the walls 10, 10, the angled shield 9 at the back edge of the opening 8 extending upwardly and rearwardly from the opening 8. The walls of the tray 7 are preferably secured to the body 1 by forming the upper edges with outwardly and upwardly extending flanges 15 upon which is positioned the flanges 6 of the body and the flanges 15 are turned over to engage the flanges 6 to hold the body 1 and tray 7 together, see Figure 6. The body portion 1 is provided with slots 16, 16 in the side walls 2 for the accommodation of the fan driving wheels shaft 17, and

plates 18, 18 are also secured to the side walls and have slotted holes 19 for attachment of the handle 20.

To the top of the body 1 is secured the fan housing or upper casing section 21 forming the third main part, see Figures 7 to 9, having depending side walls 22 and circular in shape with a projecting open mouth at one portion and corresponding to the shape of the recessed portion 3 in the platform 1^a of the body 1, and the base of the depending wall 22 of this casing 21 is provided with a flange 23, which engages under the angled strips 5 on the platform 1.

The rear or narrow end of the fan housing casing 21 has connected to it a projecting open mouth 24 formed from a metal stamping, and this open mouth portion 24 is provided with a curved baffle plate 25 on one side having an angled portion 25^a at about central of the opening, the mouth portion 24 being also provided with an outwardly turned flange 26 all round for attachment of the collecting bag 27, and the casing at just below the mouth portion 25 is provided with a screw 28 which is engaged with a screwed nut or plate 29 secured to the rear depending wall 2 of the body 1, so that after the flanges 23 are engaged under the curved angle strip 5 on the body 1, the fan housing 21 can be secured in position on the platform 1^a of the body 1.

To the under side of the rear of the platform 1^a of the body 1 is secured a framework 30, see Figures 10 to 12, which is preferably a casting and carries the cross shaft 17 to which are secured driving wheels 31, 31 positioned on the outside of the narrow portion of the body 1, this framework 30 also carries the gearing connecting the cross shaft 17 with a vertically positioned shaft 32 carrying the fan 33 which is positioned in the fan housing casing 21.

This frame structure 30 is made with a hollow well portion 34 open at the top, and such well portion has a tubular extension 35 which extends centrally through the D opening 4 in the body 1, and in this tubular extension 35 and well portion 34 is mounted the vertical shaft 32 which is carried by a ball bearings 36 positioned in the tubular extension 35 and a bearing formed in the base of the well portion 34, and such shaft at within the well portion 34 is formed as a worm 37 which engages with a worm wheel 38 secured to a sleeve 39 which is freely mounted on the shaft 17, the shaft 17 being carried in bearings formed in bosses 40, 40 extending on either side of the well portion 34, and the worm wheel is positioned within the well portion 34. Collars 40^a, 40^a are secured to the shaft on each side of the bosses 40 to retain the shaft 17 in position.

Curved arms 41, 41 are provided on either side of the well portion 34, and such arms 41, 41 are provided with screw holes 42, so that by passing screws through holes 43 in the body 1 and engaging with the screw holes 42, the framework 30 can be secured to the body 1, the outer ends of the shaft 17 being positioned in the slots 16 in the side walls 2 of the body 1. The arms 41, 41 at their lower part are formed with angle recessed edges 44, 44, and the well portion is also provided with an angled recess 44^a for receiving the rear edge of the shield 9. The cross shaft 17 carries a free wheel clutch device, see Figures 12 to 14, the outer cup shaped member 45 of which has a circular groove 46 on its inner diameter and is secured to the sleeve 39 carrying the worm wheel 38, and the other or inner member comprises an hexagonal member 47 secured

to a sleeve 48 pinned to the cross shaft 17 and between the hexagonal member 47 and sleeve 48 is secured a plate 49 having portions 50 extending from each face of the hexagonal member 47, and these extended portions 50 of the plate are formed with turned in walls 51 extending across the faces 52 of the hexagonal member 47. The hexagonal member and turned in walls 51 are positioned within the cup member 45, and ball 53 preferably three, but more may be used, are positioned between the hexagonal faces 52 and the inside diameter of the cup member 45, so that when the hexagonal member 47 is revolved in one direction i. e. when the cleaner is moved in a forward direction, the balls 53 will be caused to pass from the walls 51 along the flat surfaces 52 of the hexagon and engage the circular groove 46 on the inside of the cup member 45, and so lock the two members together to drive the cup member 45 together with the sleeve 39 and worm wheel 38, which in turn drives the worm 37 to revolve the shaft 32 and fan 33, but when the hexagonal member 47 is revolved in the reverse direction, the balls 53 are retained against the walls 51 and free of the circular groove 46 and no movement is imparted to the freely mounted worm wheel 38.

The vertical shaft 32 at the portion 32^a which projects in the fan housing casing 21 is preferably of a somewhat larger diameter and carries a cross pin 54, and the top of the shaft 32 is formed with an internally screw threaded hole 55.

The open top of the well portion 34 is sealed by a cover plate 56, and the open top of the tubular extension 35 carrying the vertical shaft 32 and ball bearing 36 is also sealed by a dished cover 57 with a resilient packing washer 58 interposed between the ball bearing 36 and the cover 57, so that oil can be contained within the well portion 34 as an oil bath for the gears and free wheel clutch mechanism to run in.

The fan 33, see Figures 11, 15, is formed from one piece of metal and constructed somewhat star shape at the central portion having extensions 59 on one side of each arm 60 and over the end, and these extensions 59 which form the blades are bent or folded at right angles to form the fan blades, and these are positioned tangentially from the centre which is provided with a hole. To the underside of the top of the fan is secured a cone shaped member 61 having a central hole in line with the hole in the top of the fan and in these holes is positioned a two diameter socket 62, the larger diameter projecting below the bottom of the cone shaped member 61, the socket 62 being secured in position by burring over the edges protruding above the top of the fan 33, and a distancing bush 63 is provided between the inside bottom wall of the cone member 61 and the underside of the top of the fan to prevent the fan being distorted during the fixing of the bush 62. The end walls of the projecting portion of the socket 62 are formed with cross slots 64 which when the fan 33 is placed on extended end 32^a of the vertical shaft 32 engage with the cross pin 54 and a holed flanged collar 65 through which a screw 66 is passed to engage with the screwed hole 55 in the top of the shaft 32 and secure the fan 33 to the shaft 32.

The driving mechanism, see Figures 16, 17, 18, for the circular brush A is contained in the compartments 11 at each side of the body 1, and each of these mechanisms consists of a box like frame 67 open at its ends and preferably made in two halves secured together, and between the walls

of this frame 67 is pivotally mounted at 68 a gear box 69, the pivot points being formed by bosses 70 extending on either side of the gear box 69 engaging holes formed in the walls of the frame 67. The gear box 69 is preferably made as two half castings secured together by screws, and bearings are formed in the bosses 70 in which is mounted a shaft 71, and this shaft 71 within the gear box 69 carries a gear wheel 12, and the shaft 71 extends on one side of the gear box 69 where it carries the driving wheel 12 which is also positioned within the compartment 11 but projects below this compartment 11, so that the wheel 12 runs on the ground.

Meshing with the gear wheel 12 is another gear wheel 13 mounted on a shaft 74 carried in bearings formed in bosses 75 projecting on either side of the gear box, this shaft 74 having an extension 76 on one side. The bosses 75 ride in curved slots 77 formed in the walls of the frame 67 and with the inner boss projecting through a curved slot 10^a formed in the wall 10 of the compartment 11. The end of the extended portion 76 of the shaft 74 is formed with a recess and in this recess is positioned a cross pin 76^a.

The frame 67 is secured to a plate 78 and this plate 78 is pivoted to a U shaped member 79 secured to the wall of the tray 7 at the rear of the compartment 11, and the plate 78 forms a closure for the open bottom of the compartment 11.

A slot 80 is formed in the plate 78 to allow the wheel 12 to project below the compartment 11 and the plate 78 is retained in the closed position by a screw 81 engaging with a screwed plate 81^a secured within the compartment 11.

The gearbox 69 is formed with a holed lug 82 to which is secured one end of a spring 83, the other end of this spring being anchored to the plate 78 so that the gear box is normally moved on its pivotal point 68 under action of the spring for the shaft 74 to be positioned at the upper part of the slots 77, 77, 10^a in the frame 67 and wall 10.

The brush is constructed so that it can be readily applied or removed from the ends 76 of the carrier spindles 74 for cleaning or renewal, and the stock 84 of the brush A at one end has positioned therein a plunger 85 controlled by a spring 86 to normally urge the plunger 85 outwards, and the plunger 85 is formed with slotted end 87, see Figure 17, the other end of the brush stock 84 having a fixed projecting stem 88 also provided with a slotted end 89, see Figure 20, so that by engaging the slotted end 87 of the spring controlled plunger 85 with the cross pin 76^a in the recessed end 76 of one of the shafts 75 and pressing the brush A sideways, the slotted stem 88 can be engaged with the cross pin 76^a on the end 76 of the opposite shaft 75 and the spring 86 acts on the plunger to hold the brush firmly in place but capable of being driven by the shafts 75 when revolved.

To enable the brush A to be raised or lowered with relation to the floor or surface to be swept, I provide a cross bar 90 positioned within the body 1 of the casing and just in front of the brush A, this cross bar 90 is bent at each end at right angles to form side plates 91 and the free ends of these side plates 91 are pivotally mounted at 92 to the side walls 10 at near the back and bottom of the walls 10, with the bottom edges 92^a of these side plates 91 co-acting with bosses 75 of the gear box which project through the slots 10^a in the wall 10.

The cross bar 90 at about its centre hingedly carries a screwed rod 93 which is engaged by a screw sleeve 94 revolvably mounted in the platform 1^a of the casing 1, and such sleeve projects outside the casing 1 where it has secured to it a knurled member 94^a operable by hand, so that by revolving the member 94^a the cross bar 91 can be raised or lowered, and when the brush A is lowered the edges 92^a of the end plates 92 act on the bosses 75 to rock the gear boxes 69 on their pivots 68 to lower the shafts 74 carrying the brush A against the action of the springs 83, but when the brush is required to be raised the member 94^a is revolved and the gear boxes 69 are rocked on their pivots 68 for the shafts 75 to be urged upwards by action of the springs 83.

The brush stock 84 is preferably made from sheet metal and formed in two halves welded together and as will be understood from Figure 21 with the bristles positioned in holes formed in the inner and outer tubular portions.

In the construction shown, the brush stock is made from two lengths of semi-circular tubes 95 having inturned edges 95^a, and the centre portion for each half tube 96 is made from a length semi-circular with the edges bent as at 96^a and again bent as at 96^b, which edges 96^b coincide and lie next the edges 95^a, and the centre and outer semi-circular portion is provided with holes 97, 98 which are engaged by the bristles 99 and when the two semi-circular portions are positioned together as shown in Figure 21, they can be welded together.

The collecting bag 27, see Figures 22 and 23, is made from a textile material, and the open mouth 100 is provided with a clip device 101 comprising a rectangular shaped piece of spring wire, the free ends of which overlap and are formed with curled ends 102, so that pressing the curled ends 102 together the clip 101 can be passed over the flange 26 at the open mouth of the fan housing casing, and on release will be retained in position. The closed end of the bag is provided with a looped cord 27^a for attachment to the handle.

The handle 20 is formed with a forked end and each fork 20^a is provided with an inwardly projecting pin 20^b and by slightly springing the fork portions 20^a apart the pins can be engaged with the slotted holes 19 in the plates 18 on the side walls 2 of the casing 1.

A rubber buffer 103 is secured to the casing, such rubber buffer 103 being slotted on its inner edge and fits over the flange portions 6, 15 and extends around the front and sides to behind the compartment portions where it is provided with clips 104, which are held to the flange by screws or pins 105.

In use the cleaner is operated by the handle 20 to be moved forwards and backwards over the floor or floor covering, and the brush A through the gearing is revolved by the brush driving wheels 12, 12 to loosen and sweep up the debris and at the same time the fan 33 is revolved by the driving wheels 31, 31, and the suction created by the fan has action on the floor or covering to pass the debris into the body of the cleaner through the tray and over the shield and through the D shaped opening 4 into the fan housing casing 21 where the fan 33 causes it to be passed through the open mouth 24 directed by the baffles 25 to the collecting bag 27, and it will be understood that the fan 33 through the free wheel clutch mechanism only revolves in one direction during the forward and backward movement of

the cleaner, but the direction of rotation of the brush A is reversed during the forward and backward movement of the cleaner.

The fan housing casing 21 can be readily removed from the body 1 for cleaning purposes by simply undoing the screw 28 and disengaging the flanges 23 from the curved angle strips 5 and after removing the brush A either of the brush driving mechanisms can be moved clear of the compartments 11 for cleaning or renewal purposes by undoing the screw 81 holding the plate 78 in position.

What I do claim as my invention and desire to secure by Letters Patent is:—

1. A vacuum sweeper of the kind described having a main casing section provided with a wide forward portion and a narrow rear portion and open at the bottom, said section having an aperture in its upper surface, a lower casing section disposed beneath the wide forward portion of said main casing section and secured thereto, said lower casing being open at its top and bottom and providing a downwardly facing nozzle communicating with the interior of the wide forward portion of said main casing section, a pair of partitions mounted in the lower casing section spaced inwardly from the ends of said wide forward portion to provide a pair of downwardly facing open bottomed compartments, a brush in said lower casing section and journaled in said partitions, driving wheel means disposed in each compartment and projecting below the open bottom thereof, means extending through said partitions for transmitting power between the driving wheel means and said brush, a driving shaft journaled in the narrow rear portion of said main casing section and at each end extending exteriorly of the latter portion, a wheel on each end of said driving shaft and disposed rearwardly of the wide forward portion of said main casing section, an upright shaft journaled within the main casing section and extending through said aperture above the main casing section, a fan carried at the upper end of said upright shaft, an upper casing section through which the dust discharges, superposed on the main casing section and surrounding said fan, said upper section having an open bottom communicating with the aperture of said main casing section, and gearing for transmitting power from said driving shaft to said upright shaft.

2. The vacuum sweeper described in claim 1, wherein the lower edge of said main casing section and the upper edge of said lower casing section are disposed in abutting relationship, each of said edges providing an outwardly extending flange, and means for securing said flanges together to thereby maintain said sections in assembled relationship.

3. In a vacuum sweeper of the kind described, a main casing section having a wide forward por-

tion and a narrow rear portion, said main casing section being open at its bottom and having an aperture in its upper surface, a lower casing section disposed beneath the wide forward portion of said main casing section and secured thereto, said lower casing section being open at its top and bottom and providing a downwardly facing nozzle communicating with the interior of the wide forward portion of said main casing section, a pair of partitions mounted in said lower casing section and spaced inwardly from the ends of said wide forward portion to provide a pair of downwardly facing compartments, a brush disposed in said lower casing section and journaled in said partitions, a plate mounted at the bottom of each of said compartments, driving wheel means disposed in each of said compartments and journaled upon said plates and extending therebelow, means extending through said partitions for transmitting power between said driving wheel means and said brush, a framework mounted in said main casing section, a driving shaft journaled in said framework and extending exteriorly thereof, a wheel mounted on each end of said driving shaft and disposed rearwardly of the wide forward portion of said main casing section, an upright shaft journaled on said framework and projecting through said aperture in said main casing section and extending above the latter, a fan carried at the upper end of said upright shaft, an upper casing section, through which dust discharges, superposed on said main casing section and surrounding said fan, said upper section having an open bottom communicating with the aperture in said main casing section, and gearing for transmitting power from said driving shaft to said upright shaft.

4. The vacuum sweeper described in claim 1, wherein said main casing section is provided adjacent said aperture with a retaining strip overlying its upper surface and spaced therefrom to define an arcuately shaped space, and wherein the lower edge of said upper section is provided with an outwardly extending flange removably fitting in said arcuately shaped space, said upper casing section also having a discharge mouth portion overlapping the rear of said main casing section.

5. The vacuum sweeper described in claim 3, together with an inclined shield member engaged with said framework and projecting downwardly into said lower casing section adjacent said brush.

6. The vacuum sweeper described in claim 3, wherein said framework comprises a closed casing defining a lubricant chamber for said means for transmitting power from said driving shaft to said upright shaft and one wall thereof curves upwardly toward the aperture in said main casing section for deflecting dust and air therethrough.

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