

L. L. FERGUSON.
PNEUMATIC CLEANER.
APPLICATION FILED JUNE 13, 1912.

1,104,882.

Patented July 28, 1914.

4 SHEETS-SHEET 1.

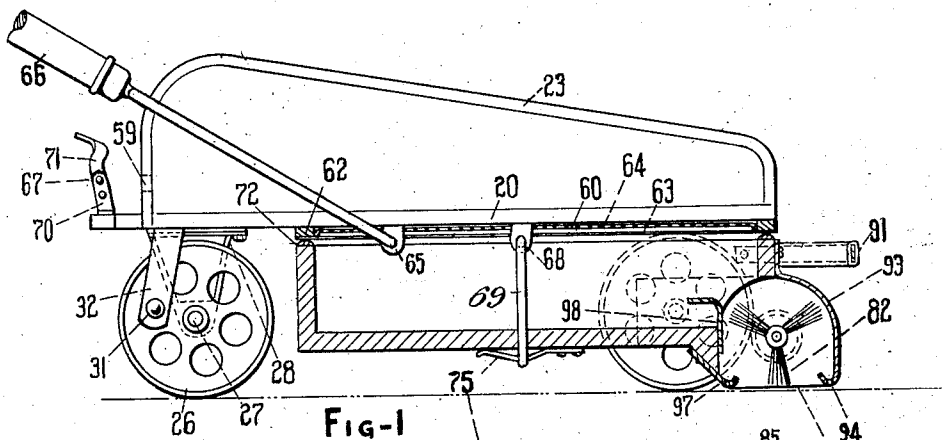


Fig-1

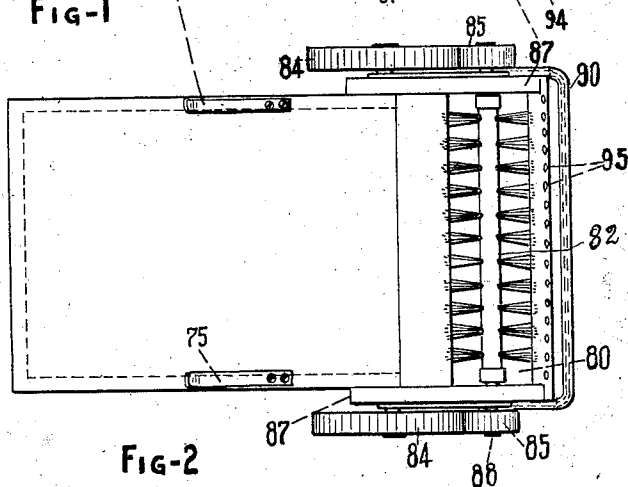


Fig-2

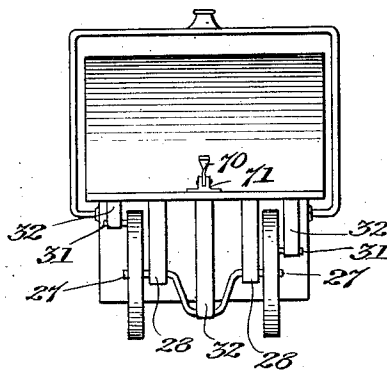


Fig-14

WITNESSES
William E. Hann.
Jimmi Burt

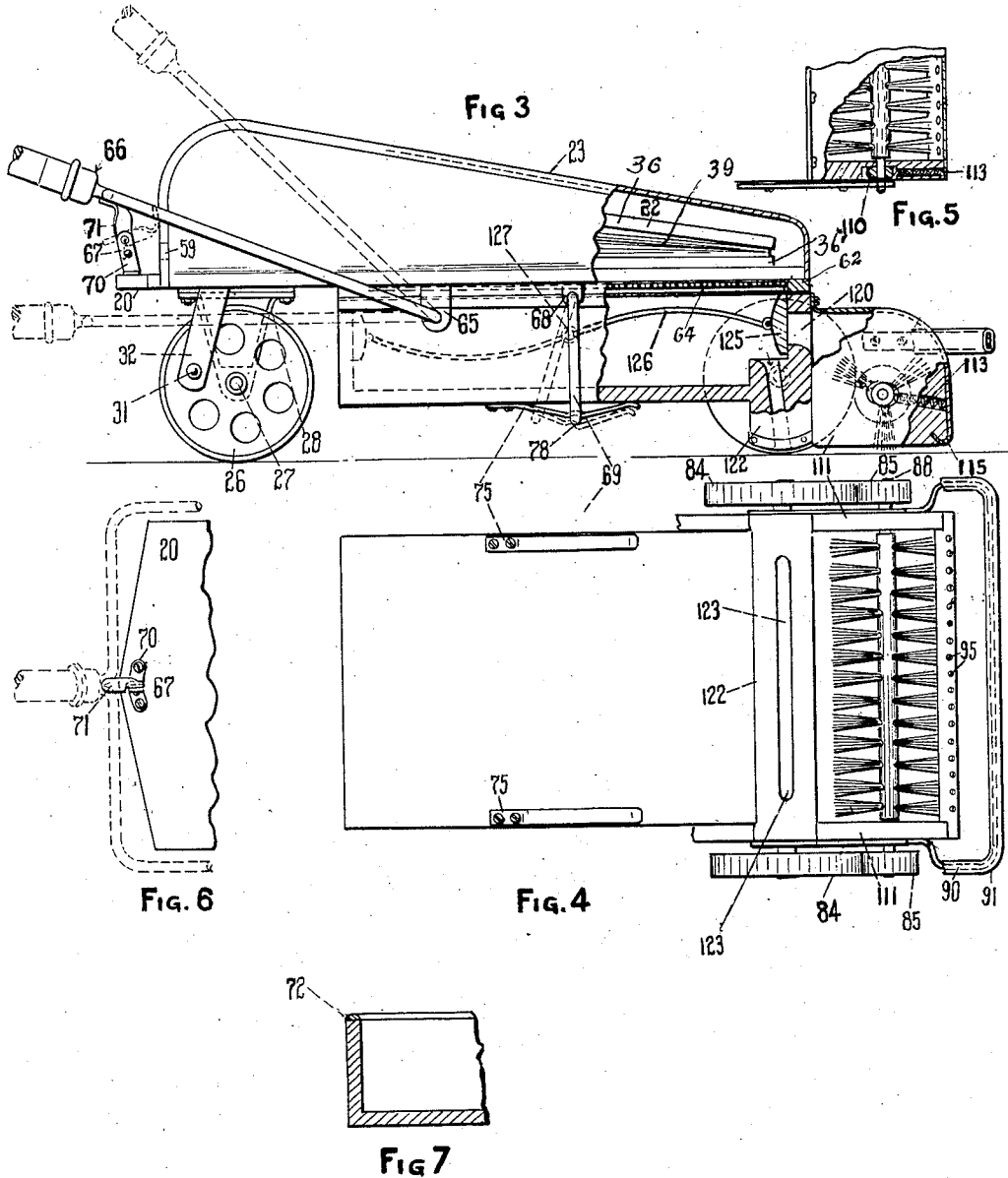
INVENTOR
LEONARD L. FERGUSON,
BY
Sumner & Sumner
ATTORNEYS.

L. L. FERGUSON.
PNEUMATIC CLEANER.
APPLICATION FILED JUNE 13, 1912.

1,104,882.

Patented July 28, 1914.

4 SHEETS-SHEET 2.



WITNESSES
William E. Hann.
Jennie Burt

INVENTOR
LEONARD L. FERGUSON.
BY
Sumner & Sumner
ATTORNEYS.

L. L. FERGUSON.
PNEUMATIC CLEANER.
APPLICATION FILED JUNE 13, 1912.

1,104,882.

Patented July 28, 1914.

4 SHEETS—SHEET 3.

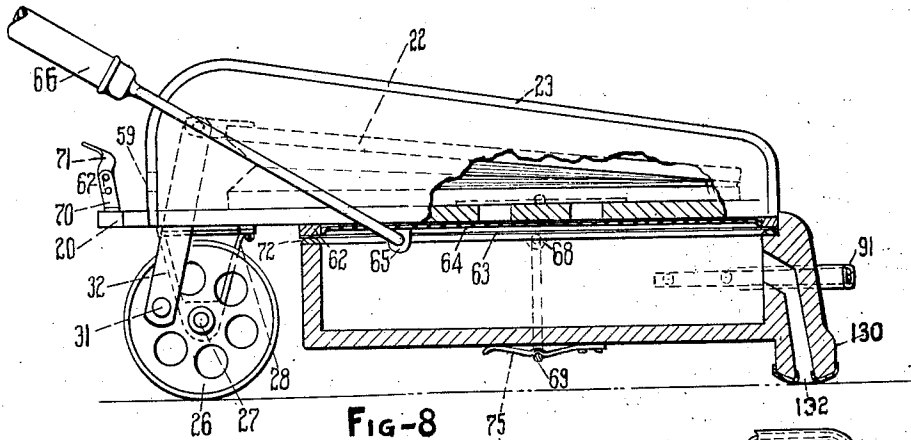


Fig-8

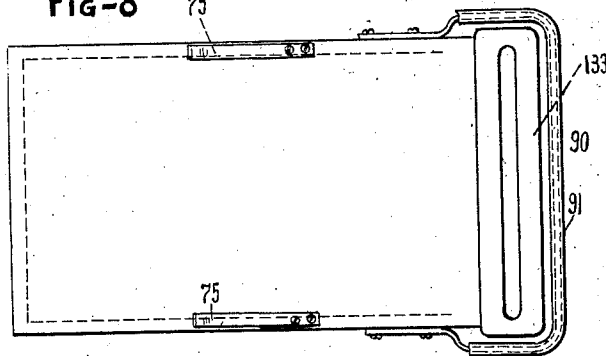


Fig-9

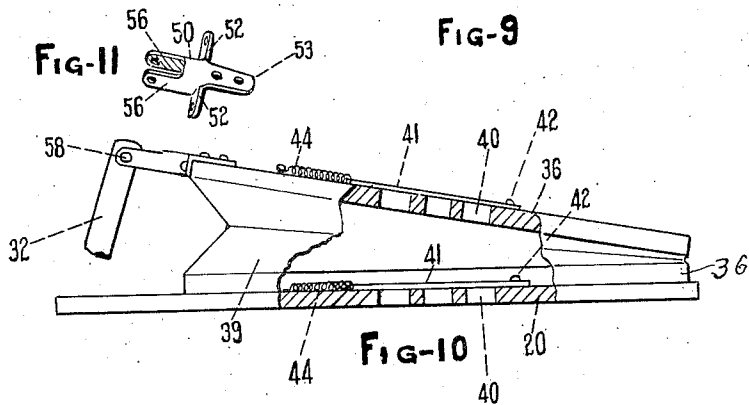
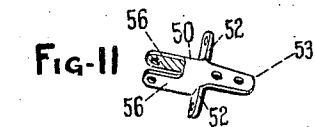


Fig-10

Fig-11



WITNESSES

William E. Hann,
Jimmie Burt

INVENTOR

LEONARD L. FERGUSON.

BY

Sumner & Sumner,
ATTORNEYS.

L. L. FERGUSON.
PNEUMATIC CLEANER.
APPLICATION FILED JUNE 13, 1912.

1,104,882.

Patented July 28, 1914

4 SHEETS—SHEET 4.

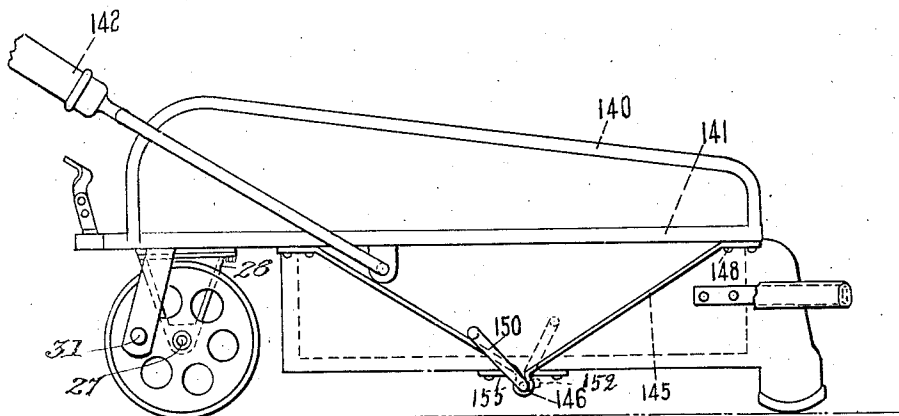


FIG-12

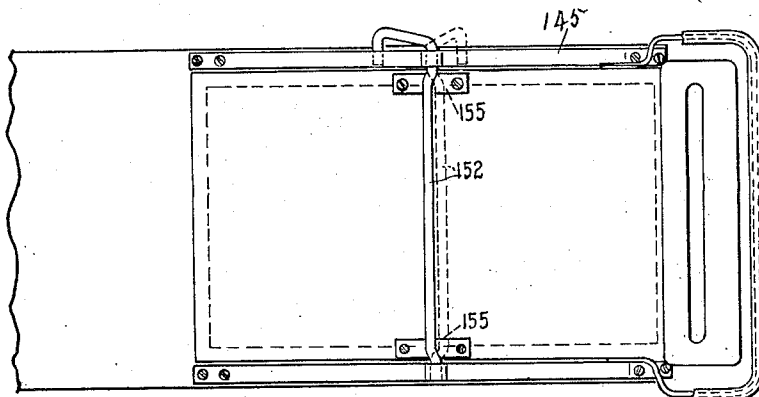


FIG-13

WITNESSES

William E. Harn.
Jennie Burt

INVENTOR

LEONARD L. FERGUSON.

BY

Sumner & Sumner
ATTORNEYS.

UNITED STATES PATENT OFFICE.

LEONARD L. FERGUSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO JOHN W. DUNTLEY, OF CHICAGO, ILLINOIS.

PNEUMATIC CLEANER.

1,104,882.

Specification of Letters Patent.

Patented July 28, 1914.

Application filed June 13, 1912. Serial No. 703,408.

To all whom it may concern:

Be it known that I, LEONARD L. FERGUSON, a citizen of the United States, residing at 7037 Wabash avenue, Chicago, Illinois, have invented new and useful Improvements in Pneumatic Cleaners, of which the following is a specification.

This invention relates to cleaning devices, and more especially to a pneumatic cleaner of the type comprising a suction device mounted on wheels and adapted to be pushed over the floor, being provided with suction creating devices actuated by the rotation of its wheels to create a substantially continuous suction for the purpose of displacing the dust from the carpet or other surface over which the device is used and depositing it in the interior of the device.

For this purpose the device comprises more particularly a suitable framing or housing for supporting and inclosing the suction creating devices, which framing is mounted at its rear part on wheels and carries in its interior suction creating devices conveniently taking the form of bellows which are actuated by the rotation of such wheels. Below such housing and forward of the wheels is arranged a dust box having at its forward end an opening through which the current of air passes, being drawn thereinto by the displacement of the air through the bellows above, and being screened by a suitable screening member interposed between the top of the dust box and the housing above to separate the dust from the moving current of air. It has been found however, that the form and arrangement of the parts of the device which come into immediate contact with the surface to be cleaned should be adapted to the particular requirements of the use for which intended, and therefore one of the objects of the present invention is to provide means for varying the form and arrangement of such parts and to provide means for supplying, in addition to the action of the air currents in withdrawing dust from such surfaces, the action of a rotative brush which is intended to assist in more effectually raising the dust from the nap of a carpet or similar fabric; and for also permitting, if desired, a second air current to supplement the operation of such brush.

To this end the device here shown com-

prises a suitable housing supporting and inclosing the suction creating devices, which housing is adapted for the engagement and use therewith of detachable and interchangeable dust boxes.

A device embodying the principles of the present invention is illustrated in the accompanying drawings in which:

Figure 1 is a view of the device in elevation and partly in longitudinal vertical section, showing one of the detachable and interchangeable dust boxes in place. Fig. 2 is a view of such detachable dust box in bottom plan view. Fig. 3 is a similar view showing a different form of dust box. Fig. 4 is a view of such second form of dust box in bottom plan view. Fig. 5 is a top plan view of a portion of the brush housing showing the latter broken away and a horizontal section through the brush bearing beneath. Fig. 6 is a top plan view of the rear portion of the supporting platform for the suction creating devices. Fig. 7 is a vertical section through the rear wall and a portion of the bottom of the last described dust box. Fig. 8 is a view similar to Fig. 3 but showing a third form of dust box used in connection with the device. Fig. 9 is a bottom plan view of the last described dust box. Fig. 10 is a view in side elevation of one of the bellows, with parts broken away. Fig. 11 is a view in perspective of one of the bellows brackets for engagement with the connecting rod for actuating such bellows. Fig. 12 is a view in side elevation of a modified form of the cleaning device and an additionally modified form of dust box used in connection therewith. Fig. 13 is a view of the same device in bottom plan view. Fig. 14 is a view in rear elevation of the complete device.

As shown in said drawings the permanent part of the device comprises a suitable framing or housing including a platform upon which are mounted the suction creating devices in the form of bellows, the latter being covered and protected by a cover having vertical side walls, and a sloping top which is curved at its ends to meet a high rear wall and a lower front wall, the said cover conforming to the general configuration of the bellows which it incloses; there being two or more of the latter arranged longitudinally side

by side with their hinged edges forward and their movable rear edges at the rear of such platform 20. Below such rear part of the platform 20 are wheels 26, one of which only is here shown, such wheels being mounted on the ends of a transverse horizontal shaft 27 mounted in brackets 28 extending downward from the platform 20. Each wheel carries a crank pin 31 engaging with a connecting rod 32 which extends upward through a slot in the platform 20 for the purpose of actuating one of the bellows. Each bellows as here shown comprises a pair of leaves in the form of a flat board 36 and an open frame 36', one of them 36, being a movable leaf and the other 36' being mounted on the platform 20 above described. Around the edges of the leaves 36 and 36' and to the stationary platform 20 is secured a piece of flexible fabric 39 which is folded to permit of the leaves being alternately separated and brought together to draw the air into the space between them and expel it therefrom. Through each of the boards are made air holes or openings 40, 40, and these are covered by inwardly and outwardly opening valves, each of which comprises a flat piece of flexible material such as leather 41, secured to the surface of the board at one edge as by means of tacks 42, and drawn smoothly over the openings by means of springs 44, which are attached to their opposite edges. It will be seen therefore that each strip of material will permit the air to pass through the openings in one direction but not in the reverse direction, and the two valves are arranged to draw the air into the bellows through the bottom leaf and expel it through the other.

To the rear end of each upper leaf is secured a bracket 50 comprising a flat piece of metal bent into channel section which is slotted through a portion of its length along its folded edges to separate the flange portions from their connecting web portion, such flange portions being then bent to extend laterally from the channel member in the form of ears 52, 52, which are nailed or screwed to the rear edge of the movable bellows leaf, the remaining part of the member from which the ears 52 are separated forming a flat plate 53, which is similarly secured to the top surface of such leaf. The opposite end of the member is similarly slotted and the center portion cut away to leave parallel side plates 56, 56, which are connected to the upper end of one of the connecting rods 32 by means of a pin 58 passing through such parts. Openings 59 in the rear wall of the cover 23 permit the escape of air expelled by the bellows.

Below the platform 20 and covering the openings 40 therethrough is a dust screen 60 comprising a rectangular frame 62 to which is secured one or more layers of dust

separating fabric, as here shown comprising a ply of cloth or similar material 63 and a suitable screen 64 above it; the topmost layer of fabric being placed slightly below the under surface of the platform 20 in order to afford an air space between such surfaces and permit the air to be drawn through all parts of the area of such dust separating device. At each of the side edges of the platform 20 are secured depending brackets 65 to which are attached the ends of a forked handle 66, and also smaller brackets 68 from which depend a U-shaped bail 69 for securing to such platform one of the dust boxes described below.

At the rear of the platform 20, which extends beyond the rear wall of the cover 23, is placed a handle rest 67 comprising a stationary bracket member 70 in which is pivoted a movable handle supporting member 71; the latter, when moved toward the cover 23 as indicated by its dotted position in Fig. 3, permitting the handle to be lowered past it and into a horizontal position, when it may be desired to push the device under low furniture.

Referring now more particularly to the detachable and interchangeable dust boxes which are used in connection with the permanent part of the device above described, one of them, shown in Figs. 1 and 2, comprises a rectangular box with vertical front, rear and side walls and a horizontal bottom but no top; the vertical walls being of the same outline as the screen frame 62 and adapted to make close contact therewith along their top edges, such edges being provided with a packing member in the form of a gasket 72 of rubber or other suitable material. To the bottom of the dust box are secured at each side downwardly arched flat springs 75, and the dust box is secured in place by slipping it through the bail 69 and then forcing the latter over the springs to compress them; each spring being reversely curved at the center of its bowed part to form a notch or depression 78 (Fig. 3) into which the bail snaps for securing the parts in place. The forward part of the bottom of the box and the lower part of the front wall are cut away to form a large rectangular opening 80 in which is placed a transversely arranged rotating brush 82 mounted on a horizontal axis and driven by wheels 84 which are journaled upon the forward part of the dust box and engage with friction wheels 85 secured to the ends of the brush shaft. Vertical reinforcing members or side plates 87 are secured to the forward part of the side walls of the dust box and extended forward to furnish supports for the wheels 84 and for the ends of the brush shaft 88 which is journaled in bearings fixed in such side plates, the particular construction of these parts being illustrated and described

in connection with the dust box shown in Fig. 3, which is provided with a similarly mounted brush. The side plates 87 are extended downward to meet the surface to be cleaned and form the end members of the brush housing. A curved bumper 90 comprising a flat strip of metal bent into rectangular U-shape and inclosed in a soft covering such as a rubber tube 91 is also secured to the side plates 87 and extends forward beyond the brush 82. The front part of the brush is covered by a cylindrically curved guard 93, having its bottom edge rolled inward to form a smooth surface for engagement with the surface to be cleaned and to also form a small trough or groove 94 for catching heavy objects such as nails and other objects too heavy to be drawn into the dust box; and in the bottom of such rolled edge are made a number of perforations 95, in order to prevent dust from settling and remaining in such groove. A small diagonally arranged plate or strip 97 with its bottom edge similarly curved completes the brush housing and confines the entering currents of air to the area between such two curled edges, which is the area swept by the rotating brush; it being noted that the bottom edge of the brush housing lies slightly above the plane of the lower horizontal tangent to the wheels, so that the device rests upon such wheels and proper traction is secured for the latter while unnecessary friction of such edge with the surface to be cleaned is avoided. When the device is used upon a carpet or similar yielding fabric, the wheels will sink into it and the fabric will be drawn upward sufficiently to prevent the leakage of air into the brush housing around its bottom edge. To the front edge of the bottom of the box is also fixed a vertical plate 98 which is bent horizontally inward at its top to form a smooth shelf over which the air current passes, such plate serving to prevent the dust which enters and is collected in the box from dropping out through the opening in its front part.

In Figs. 3 and 4 is illustrated another one of the detachable and interchangeable dust boxes, the same comprising vertical side, front, and back walls and a bottom similar to that above described and similarly provided with a rotating brush mounted forward of its front wall, said brush being journaled in bearings 110 which are seated in elongated openings in side members 111 fixed to the forward part of the dust box and similar to the side members 87 above described. Into each of such side members is also made an opening in which is placed a coiled spring 113, which springs bear at their ends against the bearing members in order to press the friction disk at the ends of the brush shaft into engagement with the driving wheels 84; the outer ends of such

openings being covered by a curved guard plate or brush housing 115 similar to the guard 93, against which the outer ends of the springs rest. An opening 120 through the upper part of the front wall of the dust box conducts the air current from within the brush housing into the dust box, and in place of the guard plate 97 above described the front wall of the box is downwardly extended to form a collecting nozzle or cleaning implement 122 which forms the rear wall of the brush housing, such nozzle being provided with a long, narrow, transverse slot 123, leading into the dust box. It is designed that in the operation of the device air shall be drawn into the dust box both through the brush housing and also through the slot 123 to the rear of it, in order that any dust which may escape the combined operation of the brush with the air current drawn through its housing may be collected by the nozzle 122. Means are provided however, for closing the opening 120 when it may be desired to use the nozzle 122 alone, such means comprising a valve in the form of a flat strip 125, attached to the ends of bowed rods 126 which are pivoted to the insides of the side walls of the dust box as indicated at 127. The valve 125 may therefore be placed flat against the inside of the front wall of the dust box covering the opening 120, as shown in Fig. 3, where it will be tightly retained by the spring of the bowed arms 126 pressing it against such front wall; or if desired it may be adjusted to uncover such opening and swung into the back part of the dust box where it will be maintained by its frictional engagement with the rear wall, as indicated by its dotted position in Fig. 3.

In Figs. 8 and 9 is illustrated a form of dust box similar to that last above described except that the rotating brush with its brush housing is omitted, the dust box comprising a bottom with side, front and back walls, and the front wall being made relatively thick and being extended downward in the form of a cleaning implement or nozzle 130 through which is made an elongated opening or slot 132 leading from its under edge into the dust box; such under edge being provided with a smooth contact plate 133 through which is cut the dust slot 132.

In Figs. 12 and 13 is shown a modified form of detachable dust box. The suction creating device or permanent part of the apparatus includes a suitable housing 140 mounted upon a platform 141 and is provided with a handle 142 similar to those above described, but the means for securing the dust box in place beneath the platform 141 comprises parts as follows: Bracket members depend downward from the under side of the platform 141 at each of its side

margins, each bracket member comprising a flat strip of metal 145 bent into V-form, but with its lowest part curved to form a loop 146, such brackets being attached at their upper ends to the under-side of the platform 141 as by screws 148. The two loop portions 146 form journals in which are mounted a rod or shaft bent at one end to form a crank arm 150, and at its portion between the two bearings 146 to form an eccentric part 152. It will be seen therefore that when the dust box is placed in position against the under-side of the platform 141 and over the horizontally extending rod, rotation of the latter will act to vary the distance between its eccentric part and the bottom of the dust box; and by placing the crank arm 150 in the position shown in the full lines the eccentric portion 152 may be made to tightly clamp the dust box against such platform; the pressure of the rod being received on small plates 153, 153, at each side of the bottom of the box.

I claim as my invention:

1. In a vacuum cleaner, the combination with a suction creating device and operating mechanism therefor, of a detachable sweepings receptacle in communication with said suction-creating device and having a brush adapted for engagement with the surface to be cleaned.

2. In a vacuum cleaner, the combination with a suction creating device and operating mechanism therefor, of a detachable sweepings collecting compartment in communication with said device, a rotary brush mounted in said compartment, and wheels on said

detachable compartment engaging with said brush to rotate the same.

3. In a vacuum cleaner, the combination of a suction creating device, and a detachable dust collecting device having a nozzle adapted for engagement with the surface to be cleaned, a rotating brush, wheels on said dust collecting device for rotating said brush, a brush housing having an opening in communication with said dust collecting device, and means for covering and uncovering said opening.

4. In a vacuum cleaner, a rotative brush, a brush housing including a guard plate bent at its bottom edge to form a trough, and provided with an opening through the bottom of such trough.

5. In a vacuum cleaner, the combination of a suction creating device, a detachable dust collecting device having a part adapted for engagement with the surface to be cleaned, and means for clamping such detachable dust collecting device to the suction creating device, such means comprising bracket members depending from such suction creating device and supporting a rotative shaft having an eccentric part adapted to engage with such dust collecting devices.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses this 8th day of June 1912.

LEONARD L. FERGUSON.

Witnesses:

E. C. GRIMES,
E. O. JOHNSTON.