

Jan. 6, 1931.

W. P. LEAHY

1,787,537

SUCTION CLEANER

Filed Nov. 2, 1927

4 Sheets-Sheet 1

Fig. 2

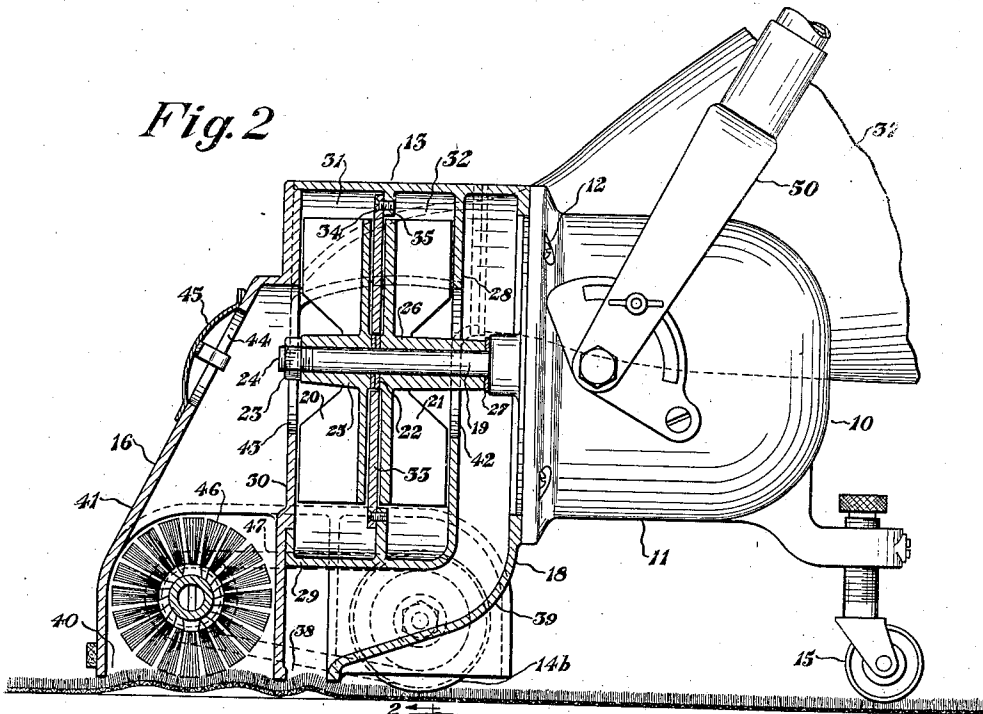
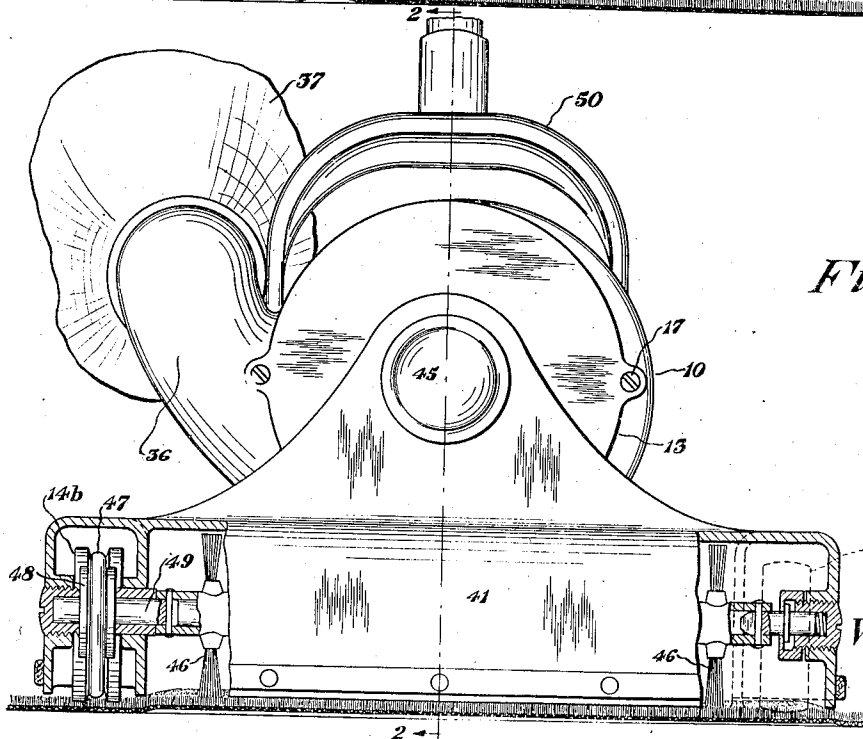


Fig. 1



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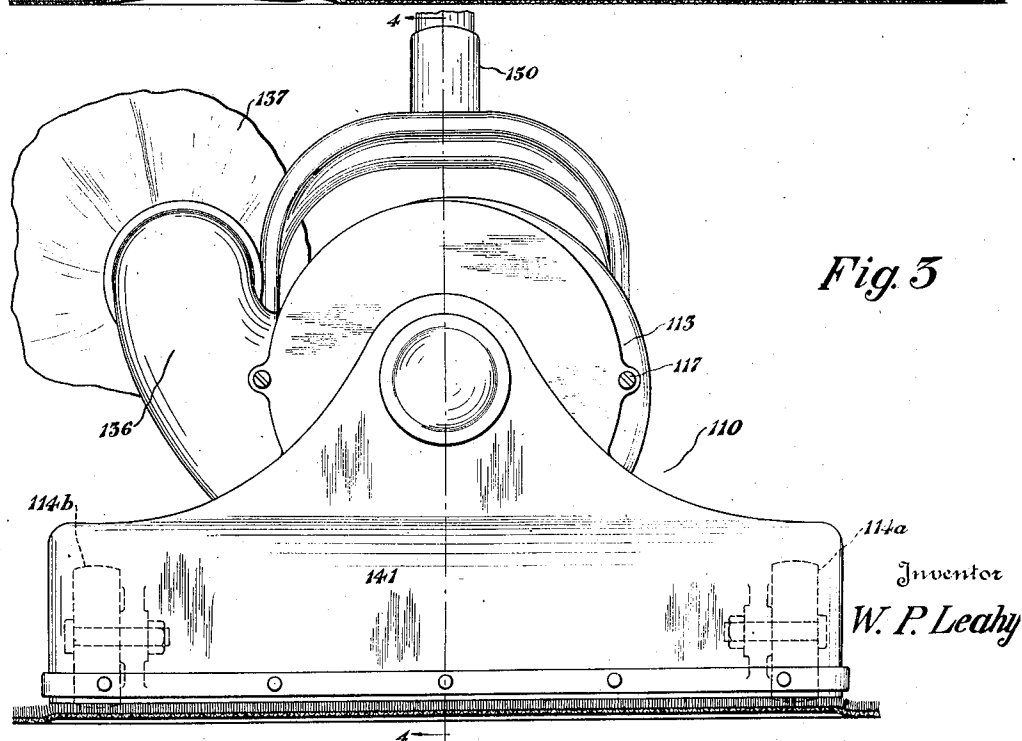
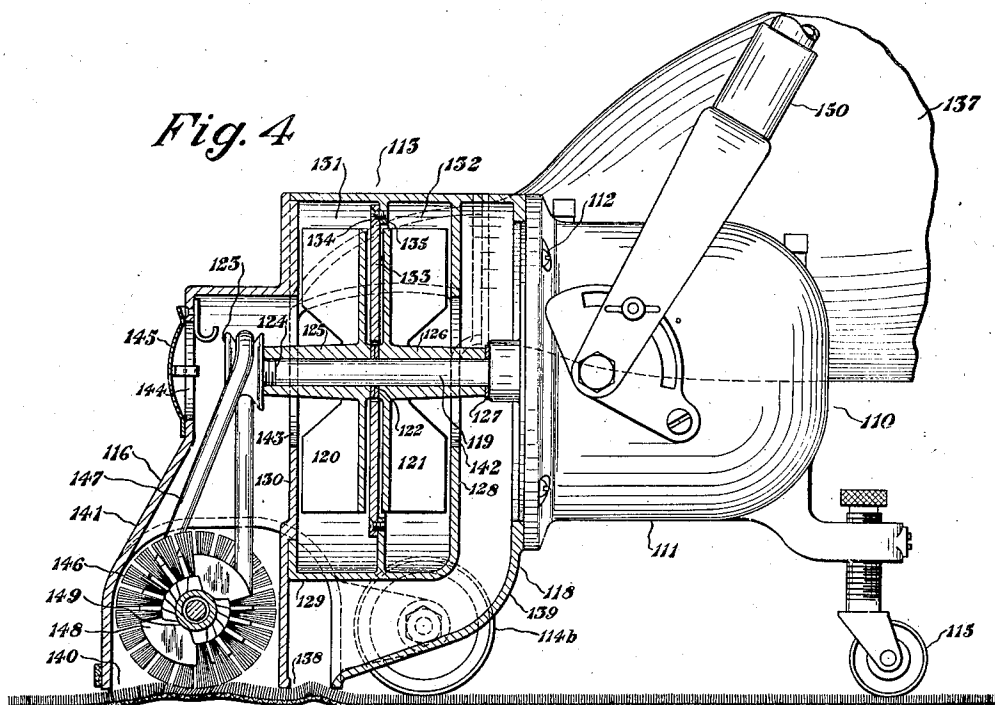
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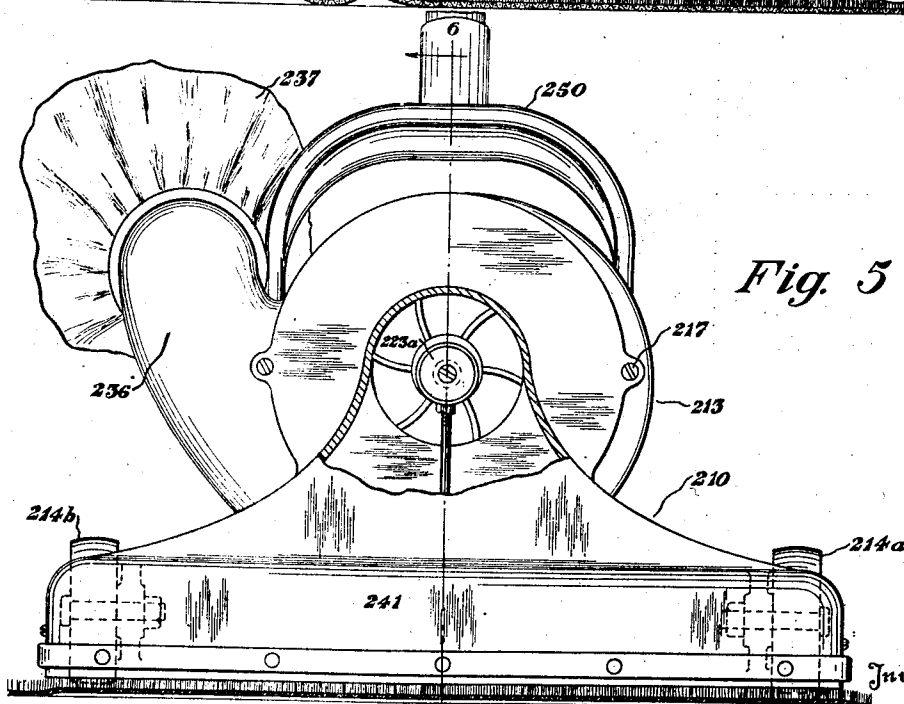
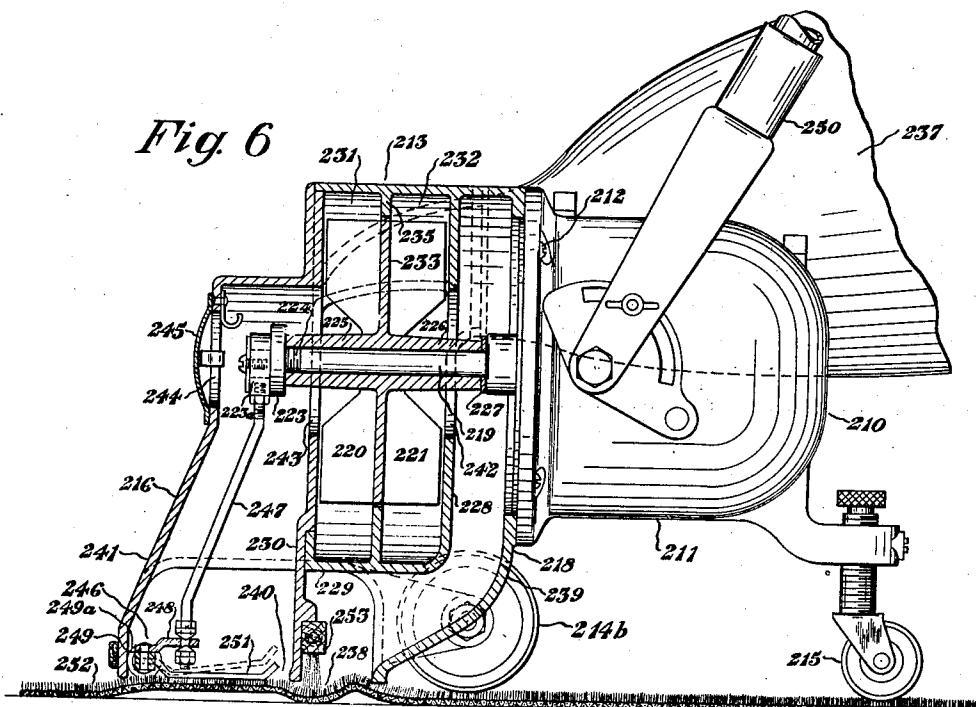


Fig. 5

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4 Sheets-Sheet 4

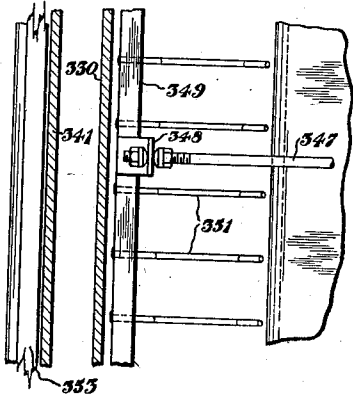


Fig. 9

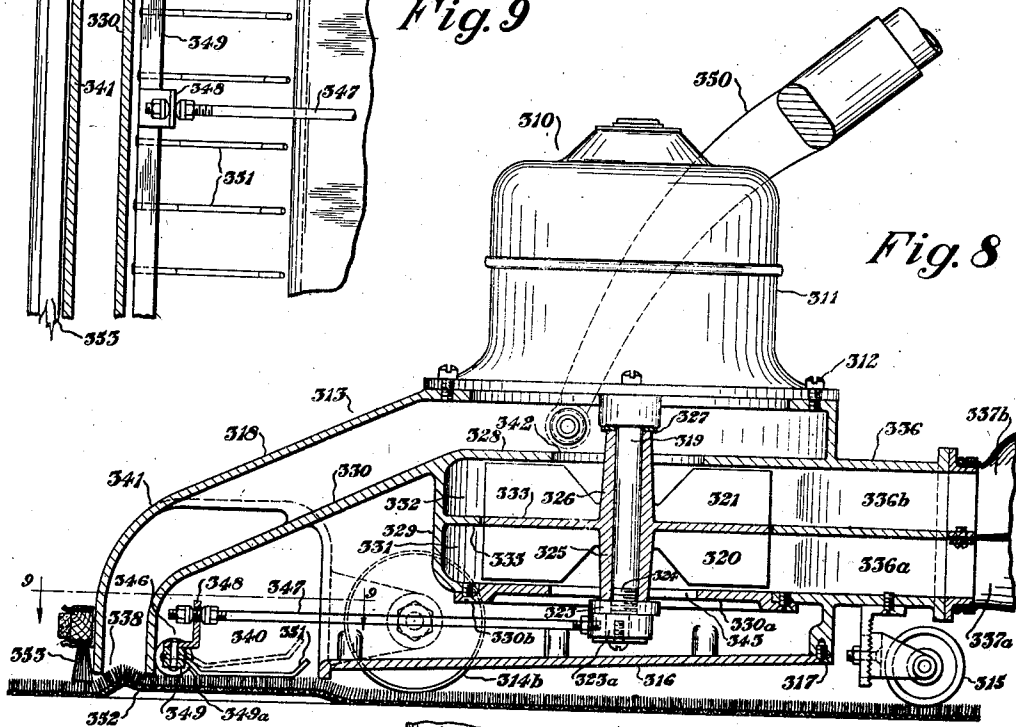


Fig. 8

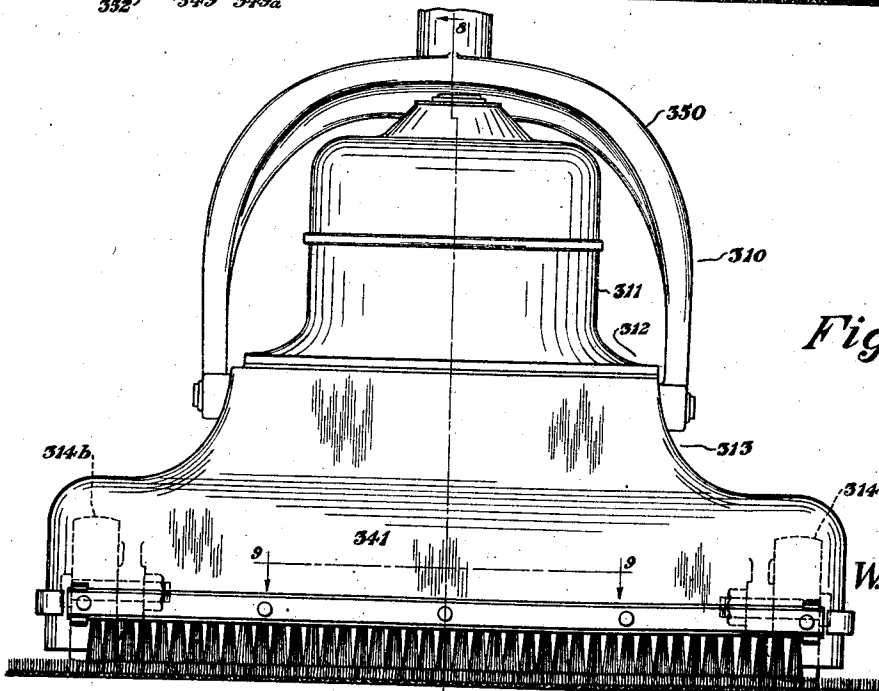


Fig. 7

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UNITED STATES PATENT OFFICE

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SUCTION CLEANER

Application filed November 2, 1927. Serial No. 230,514.

The invention relates to cleaners for carpets, rugs, floors and the like employing a suction draft of air through the carpet or rug and/or over the surface thereof and/or of the floor; and more particularly to portable suction cleaners including suction creating means associated with a portable nozzle and with a suitable dust collector.

Portable suction cleaners of this type may be classified according to the degree of suction or vacuum pressure set up in the nozzle, as high vacuum cleaners in which there is set up a relatively high vacuum per square inch of nozzle opening, and low vacuum cleaners in which there is set up a relatively low vacuum per square inch of nozzle opening.

A high vacuum cleaner as ordinarily constructed depends entirely on the suction blast through the nozzle thereof to dislodge and loosen dust and dirt particles and threads and the like from the carpet or rug or floor, as well as to convey the same away to a suitable dust collector. With a high vacuum cleaner it is sometimes found that threads, lint and other light fluffy articles are very difficult to pick up from certain surfaces to be cleaned.

On the other hand a low vacuum cleaner as ordinarily constructed depends largely upon some form of agitator for loosening dirt as well as threads, lint and the like from the material or surface to be cleaned, and the agitator may be a brush rotated by the traction of the cleaner over the floor, or by the motor driving the suction creating fan, or some other form of agitator.

After the agitator of a low vacuum cleaner has loosened the dirt and debris as aforesaid, the relatively low vacuum set up in the nozzle opening thereof carries the dirt and debris away to the dust collector.

In general it may be stated that high vacuum cleaners clean by a suction draft of air passing entirely through the fabric of the carpet or rug being cleaned; whereas a low vacuum cleaner cleans to a great degree by positively agitating the upper surface of the carpet or rug and by carrying the dirt and debris thus dislodged therefrom over and away therefrom, it being generally easier to

pick up threads, lint and other light fluffy articles with a low vacuum cleaner with a positive agitator than with a high vacuum cleaner without an agitator.

Accordingly the objects of the present improvements include the provision of a suction cleaner which employs both high vacuum and low vacuum nozzles and a positive agitator preferably in the low vacuum nozzle, whereby the advantages of both a high vacuum and low vacuum cleaner are attained in a single machine, with the further advantage when cleaning a carpet or rug of setting up ripples therein by reason of the high and low vacuum nozzles, in addition to the agitation thereof by the positive agitator.

These and ancillary objects are attained by the use of a construction and arrangement for the improved suction cleaner hereinafter set forth in detail; and which may be stated in general terms as including a pair of laterally extending suction nozzles preferably having a common wall between them, means setting up a high vacuum per square inch of nozzle opening in one of the nozzles, and means setting up a low vacuum per square inch of nozzle opening in the other nozzle, and a positive agitator preferably in the low vacuum nozzle, together with suitable dust collectors to receive the dust and debris picked up by the nozzles.

Preferred embodiments of the invention are illustrated in the accompanying drawings forming part hereof, in which

Figure 1 is a fragmentary front elevation view with portions broken away of one embodiment of the improved suction cleaner hereof, including a horizontal shaft motor for driving the suction creating means, and provided with a brush agitator in the low pressure nozzle, the brush being adapted for rotation by traction of the cleaner across the surface to be cleaned;

Fig. 2, a fragmentary sectional view thereof as on line 2-2, Fig. 1;

Fig. 3, a fragmentary front elevation of another embodiment of the improved suction cleaner hereof, including a horizontal shaft motor for driving the suction creating means, and provided with a motor driven

rotating brush agitator in the low pressure nozzle;

Fig. 4, a fragmentary sectional view thereof as on line 4—4, Fig. 3;

Fig. 5, a fragmentary front elevational view of another embodiment of the improved suction cleaner hereof, including a horizontal shaft motor for driving the suction creating means, and provided with a motor driven oscillating arm agitator in the low pressure nozzle;

Fig. 6, a fragmentary sectional view thereof as on line 6—6, Fig. 5;

Fig. 7, a fragmentary front elevation of another embodiment of the improved suction cleaner hereof, including a vertical shaft motor for driving the suction creating means, and provided with a motor driven oscillating arm agitator in the low pressure nozzle;

Fig. 8, a fragmentary sectional view thereof as on line 8—8, Fig. 7; and

Fig. 9, a fragmentary plan sectional view thereof as on line 9—9, Figs. 7 and 8.

Similar numerals refer to similar parts throughout the several views.

The embodiment of the improved suction cleaner hereof, indicated generally at 10 in Figs. 1 and 2, includes a motor 11, preferably an electric motor adapted to receive power from an ordinary house lighting circuit by means of a usual cable connector not shown. The forward end of the motor is secured as by screws 12 to the rear end of a combined fan case and nozzle housing indicated generally at 13, and the housing is provided at its lower end with laterally spaced wheels 14a and 14b, which with a caster 15 mounted at the rear end of the motor 11 and preferably adjustable vertically with respect thereto, provide rolling supports for maintaining the shaft of the motor substantially horizontal.

The combined fan case and nozzle housing 13 preferably comprises a forward low pressure nozzle section 16 secured at its rear end as by screws 17 to the forward end of a rear fan casing and high pressure nozzle section 18, the rear end of which is secured as aforesaid by the screws 12 to the forward end of the motor 11.

The forward end 19 of the horizontal motor shaft extends into the interior of the section 18 and a forward fan 20 and a rear fan 21 longitudinally spaced from each other as by washers 22 are removably secured upon the shaft end 19, as by means of a forward nut 23 screwed upon the threaded extremity 24 of the shaft end 19, and clamping the hubs 25 and 26 of the fans 20 and 21, respectively, with the washers 22 interposed therebetween, against a suitable thrust bearing 27 on the shaft end 19.

A vertical fan case partition 28 longitudinally spaced from the forward end of the

motor is provided within the housing section 18, and the section 18 includes a suitable fan casing peripheral wall 29 extending longitudinally forward from the outer edges of the partition 28. A double fan chamber for both of the fans 20 and 21 is formed by the vertical partition 28, the peripheral wall 29, and the rear end wall 30 of the forward section 16; and separate fan chambers 31 and 32 are formed, respectively, for each of the fans 20 and 21 by means of a vertical disc partition 33 located between the longitudinally spaced fans and removably secured at its outer edge as by means of screws 34 to a ring flange 35 projecting inwardly from the peripheral wall 29.

The section 18 of the housing 13 also includes a rearwardly extending outlet elbow 36 providing outlet communications between the fan chambers 31 and 32 and a dust bag 37 secured in a usual manner at the rear end of the outlet elbow.

A laterally extending high vacuum nozzle 38 is thus formed for the cleaner by lower portions of the rear end wall 30 of the forward section 16, and the peripheral wall 29, the partition 28, and the suitably curved rear end wall 39 of the section 18.

A laterally extending low pressure nozzle 40 is formed for the cleaner by the rear end wall 30 of the forward section 16 and the front end wall 41 thereof; and the wall 30 is thus a common wall for both nozzles.

The high pressure nozzle 38 communicates through a suitable aperture 42 in the partition 28 with the fan chamber 32, and the low pressure nozzle 40 communicates through a suitable aperture 43 in the rear end wall 30 of the forward section 16 with the fan chamber 31.

A hand hole 44 and a suitable snap closure 45 therefor may be provided in the front end wall 41 of the section 16 for permitting access to the interior of the low pressure nozzle 40 and the fan chambers.

A laterally extending rotary brush 46 is preferably removably mounted in a well known manner in the low pressure nozzle 40 and arranged to be rotated when the sweeper is pushed to and fro across the surface being cleaned, as by a belt 47 which connects the suitably grooved wheel 14b with a suitable pulley 48 on the drive shaft 49 for the rotary brush 46.

An upwardly extending handle 50 may be pivotally secured upon the motor 11 in a well known manner for pushing the sweeper to and fro as aforesaid.

The modified embodiment of the improved suction cleaner hereof, indicated generally at 110 in Figs. 3 and 4, includes a motor 111, preferably an electric motor adapted to receive power from an ordinary house lighting circuit by means of a usual cable connector not shown. The forward end of the motor

is secured as by screws 112 to the rear end of a combined fan case and nozzle housing indicated generally at 113, and the housing is provided at its lower end with laterally spaced wheels 114a and 114b, which with a 5 caster 115 mounted at the rear end of the motor 111 and preferably adjustable vertically with respect thereto, provide rolling supports for maintaining the shaft of the motor substantially horizontal.

The combined fan case and nozzle housing 113 preferably comprises a forward low pressure nozzle section 116 secured at its rear end as by screws 117 to the forward end of a 15 rear fan casing and high pressure nozzle section 118, the rear end of which is secured as aforesaid by the screws 112 to the forward end of the motor 111.

The forward end 119 of the horizontal 20 motor shaft extends into the interior of the section 118 and a forward fan 120 and a rear fan 121 longitudinally spaced from each other as by washers 122 are removably secured upon the shaft end 119, as by means of a forward pulley nut 123 screwed upon 25 the threaded extremity 124 of the shaft end 119, and clamping the hubs 125 and 126 of the fans 120, and 121, respectively, with the washers 122 interposed therebetween, against a suitable thrust bearing 127 on the shaft 30 end 119.

A vertical fan case partition 128 longitudinally spaced from the forward end of the motor is provided within the housing section 35 118, and the section 118 includes a suitable fan casing peripheral wall 129 extending longitudinally forward from the outer edges of the partition 128. A double fan chamber for both of the fans 120 and 121 is formed by 40 the vertical partition 128, the peripheral wall 129, and the rear end wall 130 of the forward section 116; and separate fan chambers 131 and 132 are formed, respectively, for each of the fans 120 and 121 by means of a vertical 45 disc partition 133 located between the longitudinally spaced fans and removably secured at its outer edge as by means of screws 134 to a ring flange 135 projecting inwardly from the peripheral wall 129.

The section 118 of the housing 113 also 50 includes a rearwardly extending outlet elbow 136 providing outlet communications between the fan chambers 131 and 132 and a dust bag 137 secured in a usual manner at the rear end of the outlet elbow.

A laterally extending high vacuum nozzle 138 is thus formed for the cleaner by lower 60 portions of the rear end wall 130 of the forward section 116, and the peripheral wall 129, the partition 128, and the suitably curved rear end wall 139 of the section 118.

A laterally extending low pressure nozzle 140 is formed for the cleaner by the rear 65 end wall 130 of the forward section 116 and the front end wall 141 thereof; and the wall

130 is thus a common wall for both nozzles.

The high pressure nozzle 138 communicates through a suitable aperture 142 in the partition 128 with the fan chamber 132, and the low pressure nozzle 140 communicates 70 through a suitable aperture 143 in the rear end wall 130 of the forward section 116 with the fan chamber 131.

A hand hole 144 and a suitable snap closure 145 therefor may be provided in the front 75 end wall 141 of the section 116 for permitting access to the interior of the low pressure nozzle 140 and the fan chambers.

An upwardly extending handle 150 may be pivotally secured upon the motor 111 in a 80 well known manner for pushing the sweeper to and fro across the surface to be cleaned.

A laterally extending rotary brush 146 is preferably removably mounted in a well 85 known manner in the low pressure nozzle 140 and arranged to be rotated by the motor shaft 119 as by means of a belt 147 connecting the pulley nut 123 on the end of the shaft with a suitable pulley 148 on the shaft 149 90 for the rotary brush 146.

Another modified embodiment of the improved suction cleaner hereof, and indicated generally at 210 in Figs. 5 and 6, includes a 95 motor 211, preferably an electric motor adapted to receive power from an ordinary house lighting circuit by means of a usual cable connector not shown. The forward end of the motor is secured as by screws 212 to the rear end of a combined fan case and nozzle housing indicated generally at 213, 100 and the housing is provided at its lower end with laterally spaced wheels 214a and 214b, which with a caster 215 mounted at the rear end of the motor 211 and preferably adjustable vertically with respect thereto, provide 105 rolling supports for maintaining the shaft of the motor substantially horizontal.

The combined fan case and nozzle housing 213 preferably comprises a forward low pressure 110 nozzle section 216 secured at its rear end as by screws 217 to the forward end of a rear fan casing and high pressure nozzle section 218, the rear end of which is secured as aforesaid by the screws 212 to the forward end of 115 the motor 211.

The forward end 219 of the horizontal motor shaft extends into the interior of the section 218 and a forward fan 220 and a rear fan 221 longitudinally spaced from each 120 other are removably secured upon the shaft end 219, as by means of a forward nut 223 screwed upon the threaded extremity 224 of the shaft end 219, and clamping the hubs 225 and 226 of the fans 220 and 221, respectively, against a suitable thrust bearing 227 on the shaft end 219.

A vertical fan case partition 228 longitudinally spaced from the forward end of the motor is provided within the housing 130

section 218, and the section 218 includes a suitable fan casing peripheral wall 229 extending longitudinally forward from the outer edges of the partition 228. A double fan chamber for both of the fans 220 and 221 is formed by the vertical partition 228, the peripheral wall 229, and the rear end wall 230 of the forward section 216; and separate fan chambers 231 and 232 are formed, respectively, for each of the fans 220 and 221 by means of a vertical disc partition 233 located between and preferably integral with the longitudinally spaced fans, the outer peripheral edge of the disc being rotatably fitted in the inner peripheral edge of a ring flange 235 projecting inwardly from the peripheral wall 229.

The section 218 of the housing 213 also includes a rearwardly extending outlet elbow 236 providing outlet communications between the fan chambers 231 and 232 and a dust bag 237 secured in a usual manner at the rear end of the outlet elbow.

A laterally extending high vacuum nozzle 238 is thus formed for the cleaner by lower portions of the rear end wall 230 of the forward section 216, and the peripheral wall 229, the partition 228, and the suitably curved rear end wall 239 of the section 218.

A laterally extending low pressure nozzle 240 is formed for the cleaner by the rear end wall 230 of the forward section 216 and the front end wall 241 thereof; and the wall 230 is thus a common wall for both nozzles.

The high pressure nozzle 238 communicates through a suitable aperture 242 in the partition 228 with the fan chamber 232, and the low pressure nozzle 240 communicates through a suitable aperture 243 in the rear end wall 230 of the forward section 216 with the fan chamber 231.

A hand hole 244 and a suitable snap closure 245 therefor may be provided in the front end wall 241 of the section 216 for permitting access to the interior of the low pressure nozzle 240 and the fan chambers.

An upwardly extending handle 250 may be pivotally secured upon the motor 211 in a well known manner for pushing the sweeper to and fro across the surface to be cleaned.

A laterally extending oscillating arm agitator indicated generally at 246 is mounted in the low pressure nozzle 240 and arranged to be driven by the motor shaft 219 as by means of a connecting rod 247 connecting an eccentric 223a on the nut 223 on the end of the shaft with a driving crank 248 extending inwardly from the agitator shaft 249 which is mounted for oscillation in a bearing 249a at each end thereof, each bearing being secured within the section 216.

One or more beater arms 251 extend from the shaft 249 across the opening of the nozzle 240; and the beater arms 251 are rapidly oscillated by the aforesaid crank and rod con-

nection with the motor drive shaft, whereby the surface of the rug 252 being cleaned is beaten and agitated, loosening the dirt particles therefrom.

A laterally extending stationary brush 253 may be mounted within the high pressure nozzle 238 for brushing the surface being cleaned after or before the same has been subject to the to and fro cleaning action of the low pressure nozzle and the agitator therein, and immediately before or after the high pressure nozzle continues the cleaning operation by drawing a blast of air through the rug 252, as distinguished from the action of the low pressure nozzle in drawing a blast of air over the rug 252 while the same is being agitated by the arms 251.

A further modified embodiment of the improved suction cleaner hereof, and indicated generally at 310 in Figs. 7, 8, and 9, includes a motor 311, preferably an electric motor adapted to receive power from an ordinary house lighting circuit by means of a usual cable connector not shown. The bottom end of the motor is secured as by means of screws 312 to the upper end of a combined fan case and nozzle housing indicated generally at 313, and the housing is provided at its lower end with laterally spaced wheels 314a and 314b, which with a caster 315 mounted at the rear end of the housing and preferably adjustable vertical with respect thereto, provide rolling supports for mounting the shaft of the motor substantially vertical.

The combined fan case and nozzle housing 313 preferably includes a low pressure nozzle bottom plate 316 secured at its edges as by screws 317 to the lower end of an upper fan casing and high and low pressure nozzle section 318, the upper end of which is secured as aforesaid by the screws 312 to the lower end of the motor 311.

The lower end 319 of the vertical motor shaft extends into the interior of the section 318 and a lower fan 320 and an upper fan 321 vertically spaced from each other are removably secured upon the shaft end 319 as by means of a lower nut 323 screwed upon the threaded extremity 324 of the shaft end 319, and clamping the hubs 325 and 326 of the fans 320 and 321, respectively, against a suitable thrust bearing 327 on the shaft end 319.

A horizontal fan case partition 328 spaced below the lower end of the motor is provided within the housing section 318, and the section 318 includes a suitable fan casing peripheral wall 329 extending downwardly from the outer edges of the partition 328. A double fan chamber for both of the fans 320 and 321 is formed by the horizontal partition 328, the peripheral wall 329, and a fan chamber bottom disc 330a removably secured at its periphery as by screws 330b to the lower edge of the peripheral wall 329; and sepa-

rate fan chambers 331 and 332 are formed, respectively, for the fans 320 and 321 by means of a vertical disc partition 333 located between and preferably integral with the vertically spaced fans, the outer peripheral edge of the disc being rotatably fitted in the inner peripheral edge of a ring flange 335 projecting inwardly from the peripheral wall 329.

The section 318 also includes a rearwardly extending outlet duct 336 providing separate outlet communications 336a and 336b between the fan chambers 331 and 332, respectively, and dust bags 337a and 337b secured in a usual manner at the rear end of the outlet duct.

A forward and upper laterally extending high vacuum nozzle 338 is thus formed for the cleaner by the suitably curved front end wall 341 of the section 318, the side walls thereof, and a suitably curved partition wall 330 extending within the section 318 from the side walls thereof and the forward edges of the disc 328.

A rear and lower laterally extending low pressure nozzle 340 is formed for the cleaner by the partition wall 330 of the section 318, the side walls thereof, and the plate 316; and the wall 330 is thus a common wall for both nozzles.

The high pressure nozzle 338 communicates through a suitable aperture 342 in the partition 328 with the fan chamber 332; and the low pressure nozzle 340 communicates through a suitable aperture 343 in the disc 330a with the fan chamber 331. An upwardly extending handle 350 may be pivotally secured upon the section 318 in a well known manner for pushing the sweeper to and fro across the surface to be cleaned.

A laterally extending oscillating arm agitator indicated generally at 346 is mounted in the low pressure nozzle 340 and arranged to be driven by the motor shaft 319 as by means of a connecting rod 347 connecting an eccentric 323a on the nut 323 on the end of the shaft with a driving crank 348 extending upwardly from the agitator shaft 349 which is mounted for oscillation in a bearing 349a at each end thereof, each bearing being secured in the section 318.

One or more beater arms 351 extend from the shaft 349 across the opening of the nozzle 340; and the beater arms 351 are rapidly oscillated by the aforesaid crank and rod connection with the motor drive shaft, whereby the surface of the rug 352 being cleaned is beaten and agitated, loosening the dirt particles therefrom.

A laterally extending stationary brush 353 may be mounted at the forward edge of the high pressure nozzle 348 for brushing the surface being cleaned before and after the same has been subject to the to and fro clean-

ing action of the high and low pressure nozzles.

Each of the aforesaid embodiments 10, 110, 210, and 310, of the improved suction cleaner hereof, includes a pair of laterally extending suction nozzles having a common wall between them. Each of the nozzles 38, 138, 238, and 338 has a suction draft opening whose area is less than the suction draft opening of the respective nozzle 40, 140, 240, and 340 associated therewith.

The fan for each nozzle of each embodiment as illustrated being the same size, and each pair of fans in each embodiment being mounted on the same drive shaft, the nozzles 38, 138, 238, and 338 are thus high vacuum nozzles and the nozzles 40, 140, 240, and 340 are thus low vacuum nozzles.

Any given area of a floor or rug being cleaned by any of the embodiments is thus subject successively during the to and fro movement of the sweeper thereover, to the cleaning action of the low pressure nozzle with the agitator therein, and to the different cleaning action of the high pressure nozzle.

In the case of a rug or a carpet being cleaned, a blast of air is drawn by the low pressure nozzle across the surface as the same is vibrated by the agitator, and before and after this cleaning action takes place, a blast of air is drawn through the rug or carpet by the high pressure nozzle.

This repetitive successive action of the high and low pressure nozzles causes a rippling of the rug or carpet independent of the vibration thereof by the agitator, which further facilitates efficient cleaning.

I claim:

1. A suction cleaner including adjacent suction nozzles, means for setting up a high vacuum in one of the nozzles, and separate means for setting up a low vacuum in the other nozzle.

2. A suction cleaner including adjacent suction nozzles, means for setting up a high vacuum in one of the nozzles and means for setting up a low vacuum in the other nozzle, and a dust collector for receiving the dust and debris picked up by each of the nozzles.

In testimony that I claim the above, I have hereunto subscribed my name.

WILLIAM P. LEAHY.