R. L. COOLEY.

VACUUM CLEANER.

APPLICATION FILED AUG. 15, 1912.

1,186,079.

Patented June 6, 1916.

3 SHEETS—SHEET 1.

Fig. 1.

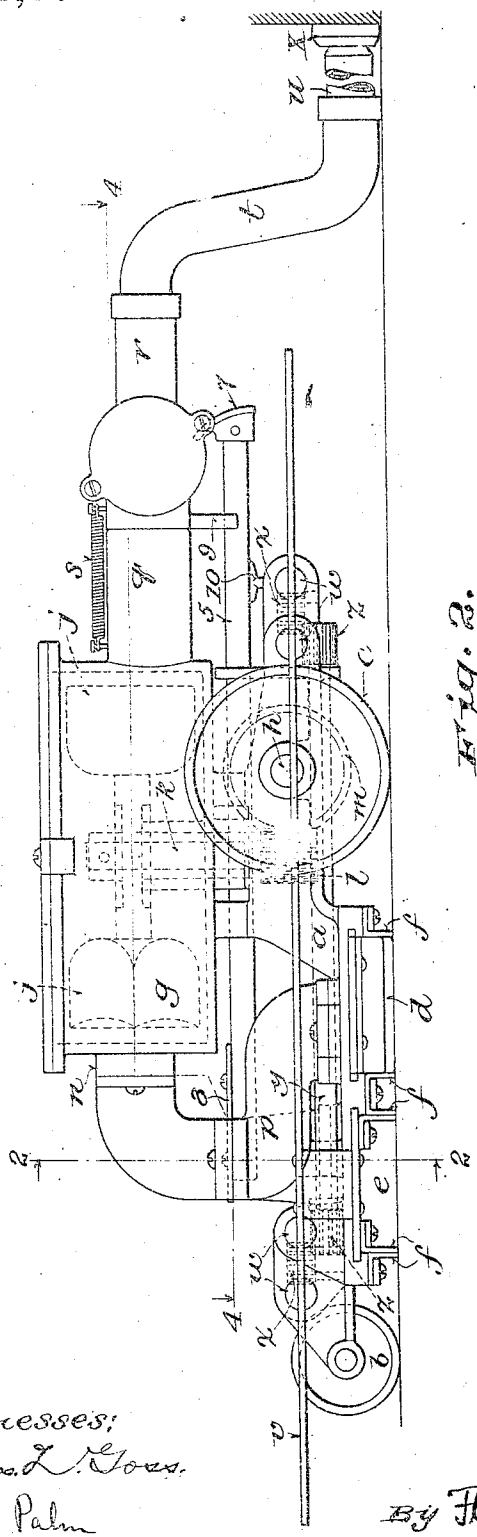
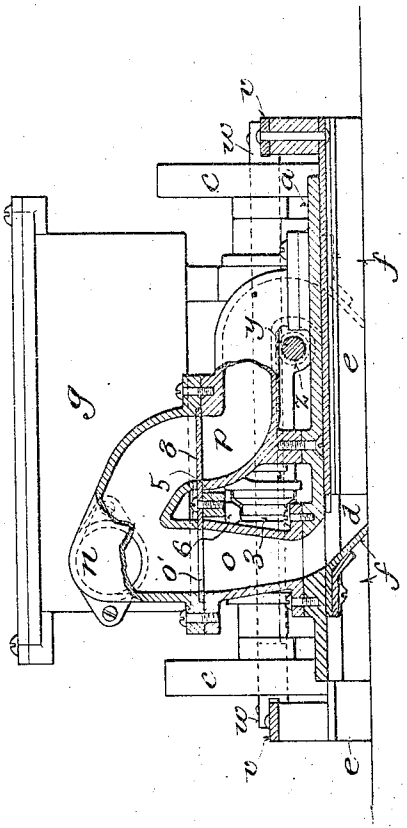


Fig. 2.



Witnesses:
Chas. L. Goss.
Fred Palm

Inventor:
Robert L. Cooley,
By Flanders Bothum Fawcett & Bothum
Attorneys.

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3 SHEETS—SHEET 2.

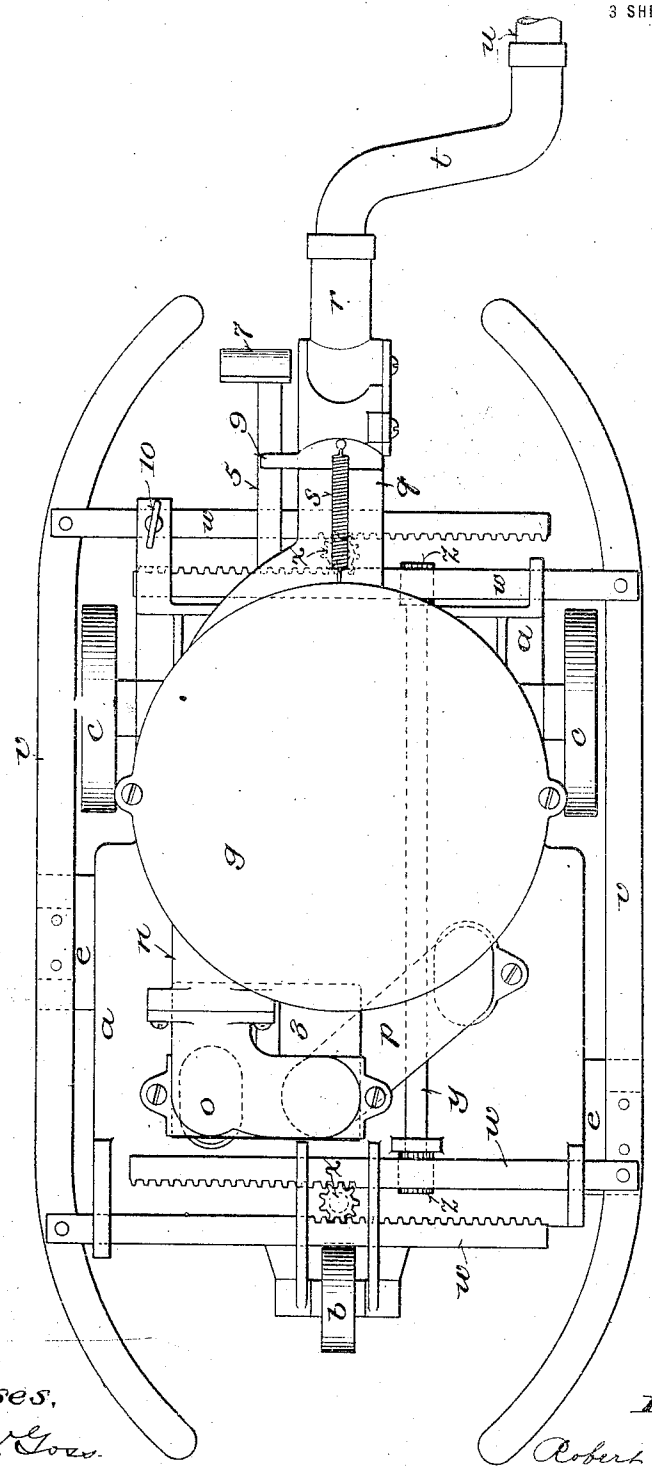


Fig. 3.

Witnesses,
Chas. L. Goss.
Fred Palm

Inventor:
Robert L. Cooley
By Flanders Bothum Fawcett & Bothum
Attorneys.

R. L. COOLEY.

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3 SHEETS—SHEET 3.

Fig. 5.

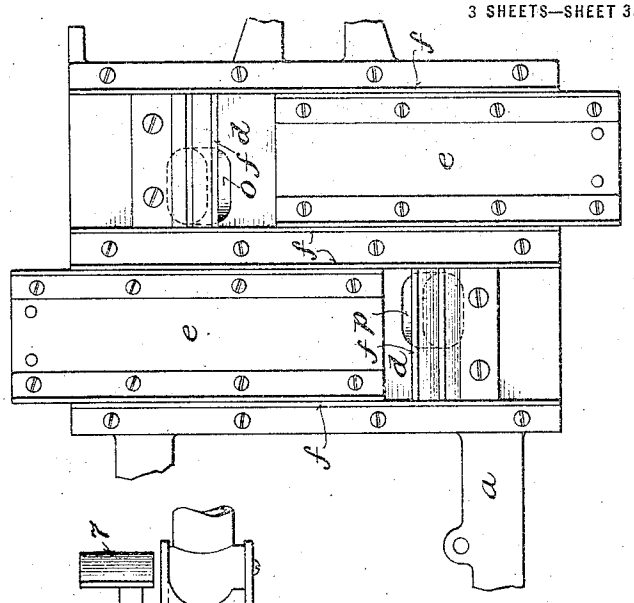
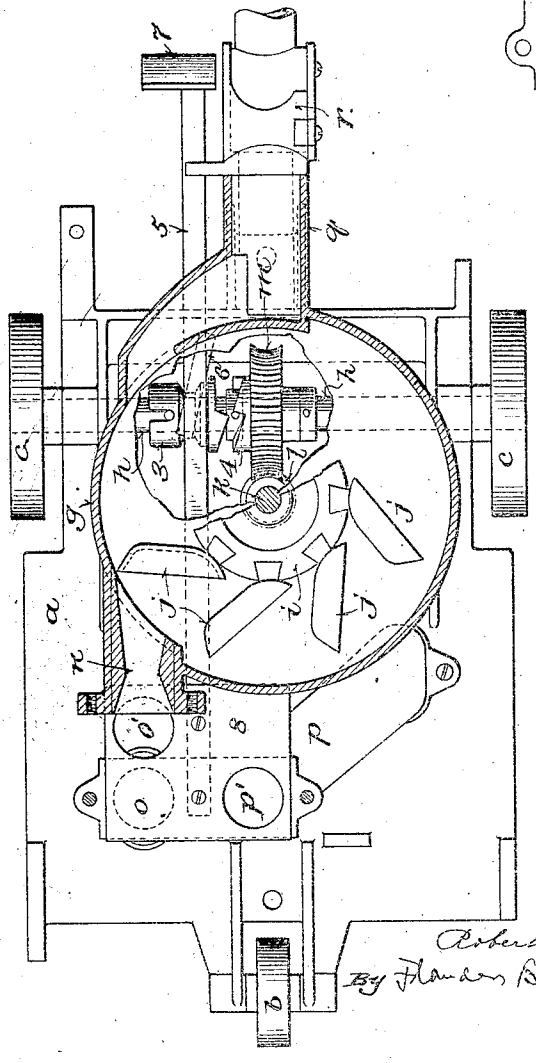


Fig. 4.



Witnesses:
Chas. L. Goss.
Fred Palm

Inventor:
Robert L. Cooley
By Flanders, Bolton, Fawcett & Bolton
Attorneys.

UNITED STATES PATENT OFFICE.

ROBERT L. COOLEY, OF MILWAUKEE, WISCONSIN.

VACUUM-CLEANER.

1,186,079. Specification of Letters Patent. Patented June 6, 1916.

Application filed August 15, 1912. Serial No. 715,184.

To all whom it may concern:

Be it known that I, ROBERT L. COOLEY, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Vacuum-Cleaners, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

The main object of this invention is to facilitate sweeping or cleaning stretches of floor space underneath furniture or fixtures such as rows of school desks.

It consists in the construction, arrangement and combination of parts as hereinafter particularly described and defined in the claims.

In the accompanying drawing like characters designate the same parts in the several figures.

Figure 1 is a side elevation of a cleaner embodying the invention; Fig. 2 is a vertical cross section of the same on the line 2—2, Fig. 1; Fig. 3 is a plan view of the machine; Fig. 4 is a horizontal section on the line 4—4, Fig. 1; and Fig. 5 is an inverted plan view of the air-draft and dust-collecting conduits on the under side of the machine.

The machine comprises a carriage frame *a*, mounted on a guiding wheel *b* and traction wheels *c* and provided on the under side with two transverse air-draft and dust-collecting conduits or suction cleaning nozzles, each consisting as shown in Figs. 2 and 5, of a relatively fixed section *d*, and an adjustable section *e*, having a longitudinally sliding connection with the fixed section, making each conduit or nozzle extensible in length. Each conduit is open at the bottom and the fixed section *d* is closed at or adjacent to one end thereof. The adjustable section of each conduit is open at both ends, the outer open ends of the two conduits being on opposite sides of the machine. The side and end walls of these conduits are formed of strips of rubber or other flexible or elastic material, which will readily conform to inequalities in the floor or other surface over and in contact with which they are moved for suction cleaning, in the operation of the cleaner.

The machine is provided with a propelling motor, which is mounted on the carriage and is adapted to be connected at will with one or more of the supporting wheels. A motor of any suitable kind may be used for this purpose, but the machine is preferably provided with an air current motor adapted to be operated by the same draft or current which does the sweeping or cleaning.

As shown by the drawing, a cylindrical motor case *g*, is mounted on the carriage frame, with its axis in an approximately vertical position between and adjacent to the wheels *c*, which are fixed on the ends of an axle *h*. Within the casing *g* a wheel *i*, provided with buckets *j* similar to those of a Pelton wheel, is fixed on a vertical shaft *k*. The shaft *k*, which extends below the motor case, is provided on its lower end with a worm *l*, meshing with a worm gear *m*, loosely mounted on the axle *h*.

The case *g* has a tangential inlet connection *n*, which communicates through branch passages *o* and *p* with the fixed sections *d* of the air draft conduits at their closed ends. The passages *o* and *p*, where they enter said conduits, are preferably curved or inclined, and the end walls *f* of said conduits are set at an inclination, as shown in Fig. 2, to avoid sharp angles or abrupt turns, which tend to impede or check the air draft or current. On the opposite side from the air inlet connection, the case *g* is formed or provided with an outlet connection *q*, having a longitudinally movable pipe section and hose coupling *r*, connected therewith by a spring *s*. The pipe section *r*, which telescopes with the outlet connection *q* of the motor, has a laterally and downwardly curved extension *t*, with which the suction hose *u* for operating the cleaner, is coupled close to the floor and to one side of the longitudinal center of the cleaner so as to exert a side draft thereon, for a purpose hereinafter explained. The spring *s* normally holds the pipe section *r*, as shown in Figs. 3 and 4, at the limit of its forward movement, with a shoulder or abutment thereon against the end of the connection *q*.

The cleaner is provided at the sides with longitudinal guides *v* having inwardly curved or inclined ends and attached to the outer ends of transverse racks *w*, which are adjustable lengthwise in bearings on the carriage frame *a*. These racks are arranged in pairs and are connected by interposed pinions *x*, which are mounted on vertical studs on the frame *a* so as to mesh on opposite sides with adjacent racks and compel them to move simultaneously in opposite direction. The two inner racks, which are

moved simultaneously by the pinions in the same direction, are connected with one guide, while the other racks are connected with the other guide, so that the two guides will be adjusted together in or out, toward or from the longitudinal center of the cleaner. To compel a like and simultaneous adjustment of both ends of the guides and prevent binding of the racks in their bearings, two of the racks supporting the same guide, are connected by a longitudinal shaft *y* having bearings on the frame *a* and provided with pinions *z*, which mesh with teeth formed in the under side of said racks at right angles to the teeth meshing with the pinions *x*, as shown in Fig. 3. The guides *v* are connected as shown in Fig. 2, with the outer ends of the adjustable sections *e* of the extensible air-draft and dust-collecting conduits, so that said conduits will be lengthened or shortened alike with the adjustment of the guides.

A sliding clutch member 3 mounted on the axle *h* of the driving wheels *c*, is arranged to coöperate with a corresponding clutch member 4, formed with or attached to the hub of the worm gear *m*, and to operatively connect said driving wheels with the motor. A longitudinally sliding bar 5, mounted on the carriage frame transversely to the axle *h*, is formed or provided with an incline 6, which engages a peripheral groove in the clutch member 3, and is adapted to shift said member into and out of engagement with the other clutch member 4 on the worm gear *m* when said bar is moved forward and backward. At its rear end the bar 5 is formed or provided with a foot piece 7 for thrusting it forward, and at its front end it is connected with a slide valve 8, which has two openings *o'* and *p'* arranged to register alternately one at a time, with the openings in the branch passages *o* and *p*, intersected by the valve. The rearwardly yielding pipe connection *r* is formed or provided with a lateral projection 9, which is arranged for engagement with the foot piece 7 to shift the valve 8 backward and disconnect the clutch members 3 and 4 when the pipe connection *r* is drawn backward against the tension of the spring *s* by a sudden or abnormal pull on the hose *u*. A thumb screw 10, threaded in a bearing of one of the racks *w*, is provide for locking and holding the guides *v* with the movable sections *e* of the air draft conduits, in adjusted position.

In the operation of the machine in sweeping or cleaning, for example, underneath the benches in a schoolroom, the pipe section *t* being connected by a section or sections of hose *u* to a suction main or tap X, and the cleaner being placed adjacent to one end of a row of benches and directed between the legs of the nearest bench, the operator pushing the foot piece 7 forward, shifts the valve 8 to open the branch *o* and close the branch *p* of the inlet passage to the motor, and at the same time shifts the clutch member 3 into engagement with the clutch member 4, thereby operatively connecting the motor wheel *i* with the traction wheels *c*. An air draft is thus created through the conduit *d e* opening on the left side of the cleaner and the cleaner is propelled forward, dragging the hose *u* behind it. The side draft of the hose tends to deflect the cleaner to the left, and causes the left guide *v* to hug the legs on the left side of the row of benches. Dust and dirt are thus taken up over a space corresponding in width with the length of the conduit *d e*, and passing through the motor case, are conducted off through the pipe *t* and hose *u*. During this advance movement, the cleaner works close to the left row of legs, the influence or effect of the air draft extending somewhat beyond the open end of the working conduit *d e*, and removing dust and dirt from the angles or corners next to the legs.

When the cleaner reaches the farther end of the row, the operator by a quick pull on the hose *u*, withdraws the coupling *r* on the outlet connection *q* of the motor against the tension of the spring *s*, thereby drawing the bar 5 backward by the engagement of the projection 9 with the foot piece 7, reversing the valve 8 and shifting the clutch member 3 out of engagement with the clutch member 4. The advance of the cleaner is thus arrested and the air current is shifted from the conduit opening on the left to the conduit opening on the right through the branch passage *p* of the inlet *n* to the motor case. The operator now pulls the cleaner back with the hose, the side draft of the hose shifting the cleaner to the right and carrying the right guide *v* against the right row of legs, which it hugs during the return movement of the cleaner, causing the cleaner to work close to the legs on that side of the row of benches.

In case the legs of all the benches in a row are not in alinement, as when a bench of a smaller size is placed in a row adjacent to benches of a larger size, which frequently or sometimes occurs, the guides *v* will direct the cleaner inwardly around the legs which are set inwardly out of alinement with the others, but as soon as such legs are passed, the cleaner will be immediately turned back to its original course against the legs of the larger benches by the side draft of the hose.

The cleaner is easily adjusted to cover a wider or narrower space underneath benches of larger or smaller sizes by loosening the thumb screw 10, drawing the guides *v* out and extending the air draft conduits, or thrusting them in and shortening such conduits, and finally tightening the thumb screw, thereby widening or narrowing the

cleaner so as to cover the desired space with a single advance and return movement of the cleaner. After sweeping underneath a row of benches, the machine is moved opposite another row and started forward, the above described operations being repeated till the work is completed.

Various modifications in the construction and arrangement of parts of the machine may be made without materially affecting its mode of operation and without departure from the principle of the invention.

I claim:

1. In a vacuum cleaner, in combination, a traveling motor carriage propelled by its motor, a suction cleaning nozzle mounted in the carriage and a flexible suction hose having one end in communication with said cleaning nozzle and connected with the carriage to be drawn thereby for serving the said cleaning nozzle from a stationary suction inlet during the travel of the carriage.

2. In a vacuum cleaner, in combination, a traveling motor carriage propelled by its motor in one direction only, a suction cleaning nozzle mounted in the carriage, and a flexible suction hose having one end in communication with said cleaning nozzle and connected with the carriage to be drawn thereby during the motor-propelled movement of the carriage and to act as a draft appliance for manually drawing the carriage in the opposite direction, the said hose serving the said cleaning nozzle from a stationary suction inlet during both of the said movements of the carriage.

3. In a vacuum cleaner, in combination, a traveling carriage having a traction wheel, a motor and a suction cleaning nozzle mounted in the carriage, a clutch operating when closed to connect the motor with the traction wheel of the carriage for propelling the carriage forwardly, a flexible suction hose having one end in communication with said cleaning nozzle and connected with the carriage to be drawn thereby during the said motor-propelled movement of the carriage and to act as a draft appliance for manually drawing the carriage backwardly, the hose serving the cleaning nozzle during both of said movements of the carriage, and means operated by draft upon the hose in the direction in which the carriage is manually drawn for opening the said clutch.

4. A vacuum cleaner mounted on a carriage provided with a motor and a traction wheel, means for connecting and disconnecting the motor and traction wheel at will, side guides, and a hose connection located at one side of the longitudinal center of the cleaner and adapted by its side draft to shift the cleaner laterally in one direction when it is moved forward by the motor and in the opposite direction when it is drawn backward by the hose connection.

5. A vacuum cleaner having on the under side thereof two downwardly opening transverse air-draft and dust-collecting conduits, each open at one end on the opposite side of the cleaner from the open end of the other conduit, a suction connection and means for alternately opening and closing communication between said connection and said conduits.

6. A vacuum cleaner having on the under side thereof two downwardly opening transverse extensible air-draft and dust-collecting conduits each open at one end on the opposite side of the cleaner from the open end of the other conduit, a suction connection, and means for alternately opening and closing communication between said connection and said conduits.

7. A vacuum cleaner having on the under side thereof two transverse extensible air-draft and dust-collecting conduits, laterally adjustable side guides, a suction connection and means for alternately opening and closing communication between said connection and said conduits.

8. In a vacuum cleaner the combination of a carriage having a traction wheel and provided with a downwardly opening transverse air-draft and dust-collecting conduit, an air current motor mounted on said carriage and having a suction connection and an air inlet connection with said conduit, and means for operatively connecting the motor with said traction wheel.

9. In a vacuum cleaner the combination of a carriage having a traction wheel and provided on the under side with a downwardly opening transverse air-draft and dust-collecting conduit, an air current motor mounted on said carriage and having a longitudinally yielding suction hose connection and an air inlet connection with said conduit, and a clutch for connecting the motor with said traction wheel adapted to be disengaged by a pull on said hose connection.

10. In a vacuum cleaner the combination of a carriage having a traction wheel and provided on the under side with two transverse downwardly opening air-draft and dust-collecting conduits each open at one end on the opposite side of the cleaner from the open end of the other conduit, an air motor mounted on said carriage and having a longitudinally yielding suction pipe connection, a clutch for connecting the motor with said traction wheel adapted to be disengaged by a pull on said pipe connection, and valve mechanism for shifting the air supply to the motor from one conduit to the other adapted to be operated by the movement of said pipe connection.

11. In a vacuum cleaner, the combination of a carriage provided with a traction wheel and on the under side with two downwardly opening transverse air-draft and dust col-

lecting conduits, each open at one end on the opposite side of the carriage from the open end of the other conduit, a motor mounted on said carriage, a clutch for connecting the motor with the traction wheel, a longitudinally yielding hose connection located at one side of the longitudinal center of the carriage, a movable valve for establishing communication between the hose connection and the two conduits in alternation, operative connection between the hose connection and the clutch and between the hose connection and the valve, and guides connected with the sides of the carriage and having inwardly inclined ends.

12. In a vacuum cleaner the combination of a carriage provided on the under side with two downwardly opening transverse extensible air-draft and dust-collecting conduits, each comprising a longitudinally adjustable section and a relatively fixed section, the adjustable sections being open at their outer ends on opposite sides of the cleaner, laterally adjustable side guides connected with said adjustable conduit sections and having inwardly inclined ends, and a suction connection leading from each of said conduits.

13. In a vacuum cleaner the combination of a carriage provided on the under side with two downwardly opening transverse extensible air-draft and dust-collecting conduits each having a longitudinally adjustable section, the adjustable sections being open at their outer ends on opposite sides of the cleaner, transverse parallel racks slidably mounted in said carriage and connected in pairs by pinions compelling their simultaneous movement in opposite directions, longitudinal guides attached to the outer ends of said racks and to the adjustable sections of said conduits at the sides of the cleaner, and a suction connection leading from each of said conduits.

14. In a vacuum cleaner the combination of a carriage provided on the under side with two downwardly opening transverse extensible air-draft and dust-collecting conduits each having a longitudinally adjustable section, the adjustable sections being open at their outer ends on opposite sides of the cleaner, transverse parallel racks slidably mounted in said carriage and connected in pairs by pinions compelling their simultaneous movement in opposite directions, a longitudinal shaft having bearings in said carriage and provided with pinions meshing with two of said racks and compelling like movement thereof in the same direction, longitudinal guides attached to the outer ends of said racks and to the adjustable sections of said conduits at the sides of the cleaner, and a suction connection leading from each of said conduits.

15. In a vacuum cleaner, in combination, a traveling motor carriage propelled by its motor and having a guiding wheel, a suction cleaning nozzle mounted in the carriage, and a flexible suction hose having one end in communication with said cleaning nozzle and connected with the carriage to be drawn thereby along the objective surface for serving the said cleaning nozzle during the travel of the carriage, the point of connection of the said hose with the carriage being offset from the plane of the guiding wheel.

16. In a vacuum cleaner, in combination, a traveling carriage having a traction wheel, a motor and suction cleaning nozzle mounted in the carriage, the motor being operable upon the traction wheel to propel the carriage in one direction only, a flexible suction hose having one end in communication with said cleaning nozzle and connected with the carriage to be drawn thereby during the said motor-propelled movement of the carriage and to act as a draft appliance for manually drawing the carriage in the opposite direction, the hose serving the cleaning nozzle during both of said movements of the carriage, and means operated by draft upon the hose in the direction in which the carriage is manually drawn for rendering the motor inoperative upon the traction wheel.

17. In a vacuum cleaner, in combination, a traveling carriage having a traction wheel, an air current motor and a suction cleaning nozzle mounted in the carriage, the motor being operable upon the traction wheel to propel the carriage, and a flexible suction hose having one end in communication with said cleaning nozzle and connected with the carriage to be drawn thereby for serving both the said cleaning nozzle and the motor from a stationary suction inlet during the travel of the carriage.

18. In a vacuum cleaner, in combination, a traveling carriage having a traction wheel, an air current motor and a suction cleaning nozzle mounted in the carriage, operative connection between the motor and the traction wheel including a clutch, and a flexible suction hose having one end in communication with said cleaning nozzle and connected with the carriage to be drawn thereby during movement of the carriage in one direction by the motor and to serve as a draft appliance for manually drawing the carriage in the reverse direction, the said hose serving both the said cleaning nozzle and the motor from a stationary suction inlet during both of said movements of the carriage, and means operated by draft upon the hose in the direction in which the carriage is manually drawn for opening the clutch.

19. A vacuum cleaner including a carriage having an air passage therein with a suction cleaning nozzle at one end of the passage and a suction tube at the other end thereof for an air current passing through

the nozzle and the passage, a traction wheel on the carriage, and an air motor wheel in the path of the air current and in operative connection with the traction wheel.

20. A vacuum cleaner including a carriage having an air passage therein with a suction cleaning nozzle at one end of the passage and a suction tube at the other end thereof for an air current passing through the nozzle and the passage, a traction wheel on the carriage, and means actuated by the air current for operating the traction wheel.

In witness whereof I hereto affix my signature in presence of two witnesses.

ROBERT L. COOLEY.

Witnesses:
CHAS. L. GOSS,
ALICE E. GOSS.