

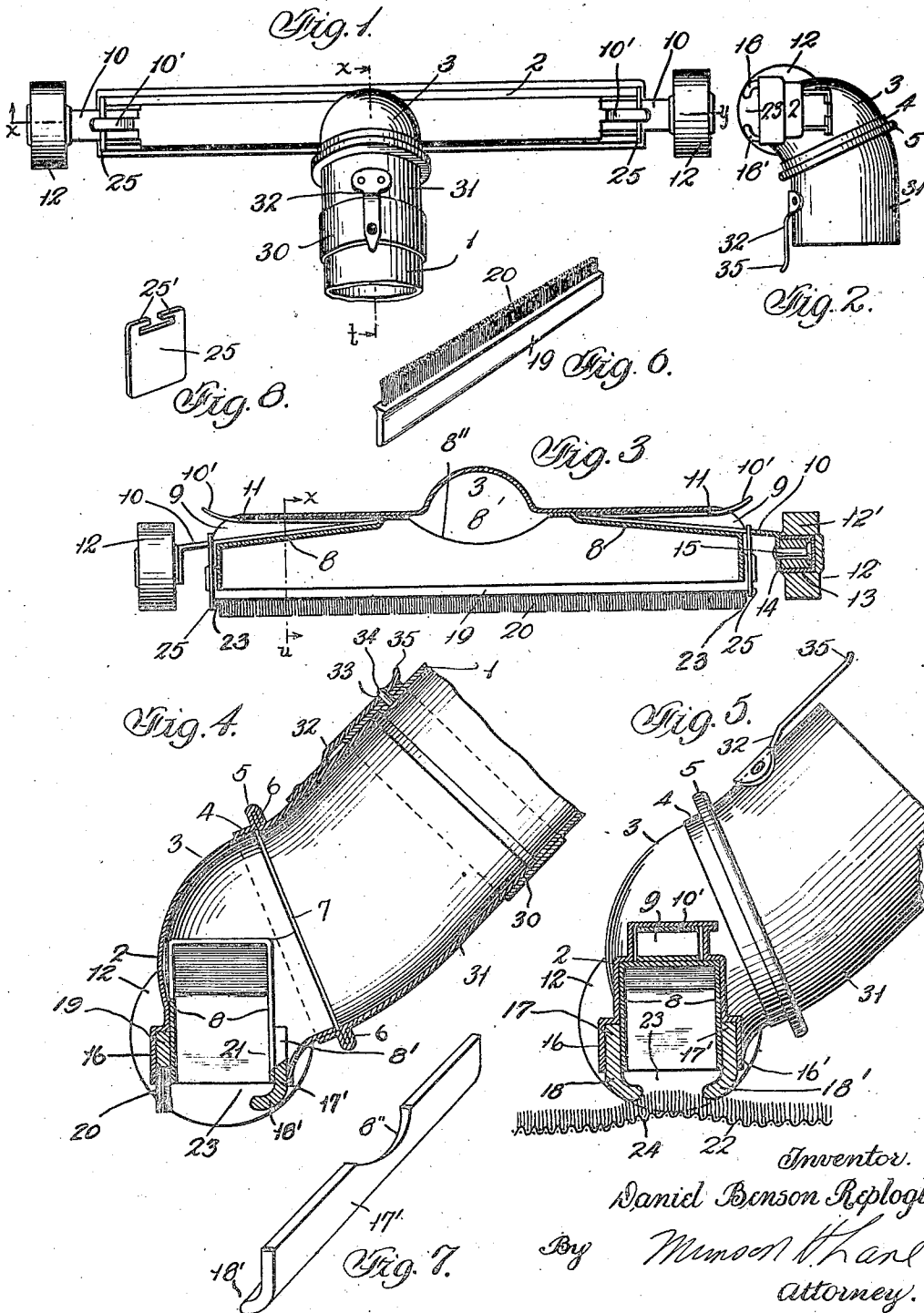
March 19, 1935.

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1,994,868

AIR METHOD CLEANING TOOL

Filed March 14, 1925



UNITED STATES PATENT OFFICE

1,994,868

AIR-METHOD CLEANING TOOL

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Application March 14, 1925, Serial No. 15,529

42 Claims. (Cl. 15—155)

The herein-described invention relates to floor tools employed for suction cleaning purposes, and is designed as an improvement over forms of cleaning tools heretofore used in stationary as well as portable cleaning systems. Many tools heretofore constructed have possessed the disadvantage that when in use a sealing contact with the surface to be cleaned is effected, due to the fact that air is prevented from entering the tool. According to my invention, the parts of the tool are so designed and cooperate with each other in such a manner that a free flow of air into the mouth of the tool is insured at all times, and particular attention is directed to providing air-ways which permit the air to enter the tool laterally without obstruction, so that the cleaning of a carpet or other surface is assisted by the inrushing action of swiftly moving dust-laden air. I also assure a free flow of air through the tool toward the source of suction by so shaping the application head and the connections secured thereto as to avoid abrupt turns or angles.

According to the preferred embodiment of my invention, I insure the free flow of air into the application head of the tool by mounting a pair of non-collapsing flexible strokers or surface-engaging members, one at the front and the other at the rear of an elongated opening in the application head, the two strokers extending downwardly below the lower limits of the application head proper, and providing between them passages or ways through which the air flows laterally into the cleaner. It is important that the strokers be flexible in order to avoid injury to the surface to be cleaned. On the other hand, they should be non-collapsing in order to avoid shutting off the end openings and causing sealing contact with the surface to be cleaned. Desirably also, the application head is yieldingly supported on rollers which extend laterally beyond the end openings in order to avoid any interference with the laterally entering air. The supports serve to normally hold the floor tool a slight distance from the surface to be cleaned, or at least to reduce the scraping pressure of the strokers. The supports are made detachable to permit removal of either end roller to allow the open end of the tool to be applied to a crack or corner on the level of the floor.

The application head of the floor tool is preferably composed of thin flexible and resilient sheet metal, which is absolutely air-tight and which may be easily worked. Pockets may be formed in the cross-head in which the strokers may be held in place by the resiliency of the side walls of the pockets without the use of additional fastening means. A shank is formed integrally with the application head, likewise composed of thin metal, to which is rotatably connected a

conduction pipe, through the medium of a specially designed air-tight metallic joint.

This application contains matter disclosed in other of my applications and patents as follows:

(1) Application Serial No. 101,695 filed June 5, 1916, now Patent No. 1,345,550, granted July 6, 1920.

(2) Application Serial No. 279,467 filed Feb. 26, 1919, now Patent No. 1,533,271 granted Apr. 14, 1925.

(3) Application Serial No. 427,088 filed Nov. 29, 1920, now abandoned.

(4) Application Serial No. 428,159 filed Dec. 3, 1920, now abandoned.

(5) Reissue application Serial No. 509,710 filed Oct. 22, 1921, now Reissue Patent No. 16,224 granted Dec. 15, 1925.

(6) Application Serial No. 729,418 filed Aug. 1, 1924, now Patent No. 1,541,280 granted June 9, 1925.

(7) Application Serial No. 729,759 filed August 2, 1924, now Patent No. 1,836,336, granted December 15, 1931.

The principal objects therefore, of the present invention are to fully utilize the erosive-like sweeping effect of in-rushing air, with such cleaning tools, to render such tools lighter in construction, to adapt them to be made from sheet metal, to provide them with self-adjusting roller supports, to provide them with removable and replaceable parts, so that worn out parts may be replaced as well as versatility secured to accord with the work to be accomplished.

A further object of the invention is to provide an "Air-Way" suction tool which may be readily attached to any convenient suction pipe or handle, and which may be as readily removed from said suction pipe or other source of vacuum. Portable cleaners of this general type are known commercially under the registered trade-mark "Air-Way".

These objects are attained by means of the construction, arrangement and combination of parts herein set forth and illustrated in the accompanying drawing, in which

Fig. 1 is a top view of one of my cleaning tools complete, shown as attached to a suction pipe or handle, which, as herein shown, is brought substantially parallel to the floor.

Fig. 2 is an end elevation of the tool, shown equipped with smooth surfaced floor-engaging strokers, the suction pipe being removed;

Fig. 3 is a cross section on line $x-y$ of Fig. 1, a brush being employed as a stroker in place of one of the smooth surfaced strokers shown in Fig. 2;

Fig. 4 is a cross section on line $x-t$ of Fig. 1, showing the brush employed as the forward stroker;

Fig. 5 is a view partly in section on line $x-u$ of Fig. 3 and partly in elevation, showing the

operation of the device on a section of carpet, the tool being equipped with smooth surfaced strokers.

Fig. 6 is a view of a brush attachment substitute, which may replace the forward lip or stroker piece of the cleaning tool.

Fig. 7 is a view of a removed rear lip or stroker piece.

Fig. 8 is a detail view of a movable shutter or end cover of the strokers.

Similar characters of reference denote like and corresponding parts throughout the views.

Referring to the drawing:—

The reference numeral 1 denotes a fragmentary portion of any suitable suction pipe or source of vacuum, which may be stationary or portable, and of any convenient and well known construction, to which an "Air-Way" cleaning tool is adapted to be removably attached. As shown, a ring 30 is secured adjacent the end of the pipe 1 and extends a short distance beyond the end to form a receiving socket into which a tubular stub portion or extension 31 of the "Air-Way" cleaning tool may be fitted, as shown in Figs. 1 and 4. In order to detachably secure the tool to the suction pipe a resilient tongue 32 is secured to the stub-portion of the tool, and is apertured as at 33 in order to yieldingly engage a stud 34 on the pipe 1. The end 35 of the tongue 32 is preferably bent upwardly to facilitate the removal of the tool from the suction pipe or handle.

The stub portion 31 is connected to the cross head outer shell 2 of the tool, which is provided with a shank 3, on which is mounted an annular ring 4, carrying an inwardly-turning annular flange 5 which hooks over an outwardly turning flange 6 of the stub portion 31, so as to loosely engage the same and allow the parts to turn freely on the plane or joint 7. The interior of the tool is constructed with a lining inner shell member 8 cut out at 8' so as to allow a passage-way for the inward rushing air. Between the top of said lining and the exterior of the tool on either end, are pockets 9, 9 adapted to receive spring roller supports 10, 10 having the recurved ends 10', 10', adapted to engage with hooking projections 11, 11 of the exterior, normally holding the same in place. Rubber covered rollers 12, 12 are journaled to the outer end of these supports and are adapted to hold the floor tool normally a slight distance above the floor to be cleaned; or at least to reduce the scraping pressure of the strokers which would otherwise be exerted upon fabrics or floor coverings.

The rollers mounted on these supports are of a special construction. They each consist of a rubber cap-shaped encasing tire 12' which is molded with a metallic thimble insert 13 fitting securely over a hub 14 made of anti-friction material. Before assembling, a flat-headed spindle 15 is slipped through the hub and secured to the outer downwardly-bent part of the spring support. The cap-shaped tires completely cover the spindle head and hub, so that no air may be drawn through the journal bearing part of the roller, and so as also to protect the same from fouling or scratching base boards, furniture and the like in service, or during any handling of the device. Either roller is also readily removable so as to permit the then open end of the cross-head to be applied to a crack or corner on the level of the floor. It is removed by depressing the spring of the roller shank and pulling outward. This removes the lid covering the end of the tool as well as the roller. It is replaced by simply pressing

it back until the shoulders 10', 10' snap into engagement with the lugs 11, 11.

Extending throughout the length of the body of the floor tool cross head are a front stroker 17 and a rear stroker 17', the latter being cut out at 8'' to accommodate air passage. These strokers are preferably made from non-metallic substance, such as raw-hide or hard fibre. They are intended for replacement after wear, and to this end the pockets 16 and 16' are preferably constructed of thin flexible downward extending edges of the exterior and interior shells 2 and 8 respectively. These edges are made to press inwardly so as to grasp the shank portions 18 of the strokers. The lip portions 18', by being turned inward in curves corresponding to the rims of the rollers 12, are designed to permit greater latitude in the angularity with the surface to be swept, of the handle 1, as the sweeping cross-head tilts about the axes determined by the self-adjusting roller supports. Between the adjacent ends of these lips are the open end spaces 23, 23.

The invention contemplates however that alternative removable strokers from those shown may be substituted. As for example, strokers may be used having bristles 20 secured to a shank 19, adapted to fit into the forward pocket 16 of the crosshead. The contact lips may be of rubber or other material and of various patterns to accomplish the particular service required.

A particular feature is the variable open spaces 23, 23 at the two ends of the cross-head. Short cross pockets which result from the double wall construction may have inserts placed in them to restrict these openings, or sliding covers may be suspended from the roller supports 10, 10 which will automatically vary these openings as pressure is applied to the tool. The purpose of these openings is to permit a thin sheet of swiftly moving air, from either end of the tool, to act effectively among the fibers of a floor covering 22, where the general uplifting force of the air lifts a section of the covering away from the floor, as suggested at 24 in Fig. 5. It is designed to get the advantage of a lateral blast of air among the diverging tips of the nap of a velvet carpet, when my device is being applied as shown.

End covers 25, 25 are secured to and append from the roller shanks 10, 10, and are adapted to automatically vary the end openings as downward pressure is applied to the cross-head of the tool, which normally stands, supported by the springs, above the floor on which the rollers travel. In this position the ends are closed by the lids, but pressure on the cross-head compresses the springs and presses the ends downwards below the lower edge of the lids permitting a flat sheet of swiftly moving air to enter from either end of the tool. Then in case of relief of the pressure on the cross-head, as the ends tend to close, the carpet or other floor covering tends to be lifted up away from the floor to the position in which the ends are sealed by the lids.

By reason of this peculiar construction efficiency for clean, bare floors and linoleums is provided for, since the air cannot be shut out by the tool fitting down flat; and efficiency for cleaning carpets is enhanced, because being lifted away as suggested at 24, Fig. 5, an upward blast is brought through the fabric from the floor beneath. Where a velvet carpet 22 is thus raised up, its fibres diverge as the tool is passed over with the maximum cleaning effect, instead of

flattening them down where the air cannot act upon the dust held among them.

In using this form of floor tool, the working pressure of the air which is kept up by any suitable displacement means to which the pipe 1 is operatively connected, may be kept practically constant. Efficiency in such tools does not accord with the degree of vacuum attained, as heretofore supposed, for vacuum is greatest when the sealing of the mouth of the tool is nearest complete. Efficiency does accord with the product of the quantity and swiftness of the blast of air, effectively applied to the surface or interstices of the fabric to be cleaned. High atmospheric pressure which completely seals the tool mouth, temporarily gets no dust at all, but fitfully, as the seal is partially broken, does, with much manipulation and hard labor of the user, get the dust. In doing so, however, injurious force is likely to have been applied to the fabric.

With this explanation, the means for regulating the constant and most efficient admission of air into the floor tool will be seen in their true importance.

To get the full benefit of this construction, the user also in guiding the tool across the floor, finds the joint 7 a very material contributing factor in keeping the highest degree of efficiency nearly constant. The angularity of this joint with respect to the axis of the pipe, permits the user to guide the tool by merely a twist of the handle, thus preventing a necessity of changing his own position, or the most effective position of the tool with respect to its contacts at the floor, while taking the various different horizontal positions.

The flat annular surfaces of the joint 7 are of such disposition that the suction, or atmospheric pressure tends, in use, to seal against leaking of air, when direct pressure is applied. The joint, however, is not designed to be lubricated, and to prevent "seizeing" it is preferable that the ring 5 be of a temper different from that of the flange 6, and that they fit loosely enough, so that in slightly cramped positions the seal is sufficiently broken to permit the air leakage to clear the sliding parts from grit and dirt.

It will be noted that the lips 18, 18' or portions of the stokers 17, 17' extending below the pockets formed in the crosshead or nozzle of the cleaning tool provide end openings 23, 23 through which air enters the tool in a flat stream, and passes inwardly toward the source of suction, entering the shank 3 of the tool through the cut-away portion 8'' of the rear stoker 17'. The effectiveness of these end openings 23, 23 is made possible by having the supporting rollers 12 mounted on shanks extending laterally from side pockets formed in the upper portion of the body of the tool so that the entire area of the suction nozzle is efficiently utilized, the cleaning area extending even beyond the limits of the crosshead clear to the end rollers. These slots or end openings are particularly effective for thread-picking purposes, which may be accomplished by sliding the tool endwise over the thread so that the rollers rub the thread up while the strong draft of dust-laden air between the rollers and the end of the floor tool captures the thread or particles of lint and ravellings thus rolled up. Thus the end openings 23, 23 will be seen to cooperate with the end rollers in providing unobstructed air-ways through which dust-laden air sweeps inwardly over the surface to be cleaned, such dust-laden air by its erosive-

like action producing the desired cleaning effect.

It will be further noted that the lower lip of the rear stoker 17' is inclined inwardly into the main opening of the nozzle. Thus, this rear stoker serves as an inclined plane over which dust, sand and heavier particles are conveyed by the force of the air passing toward the source of suction, it being obviously much easier to roll particles over such a surface than to lift them vertically without the aid of the inclined surface. It will be noted that the line of the upper edge of the rear stoker is above the lower limit of the outlet opening 8', and is cut away centrally at 8'', the purpose being to extend the stoker as far upwardly as possible to assist this rolling or conveying action and to insure the passage of all dust particles through the exit toward the source of suction.

When the brush 19 is employed in conjunction with the rear stoker or lip 17', the two cooperate somewhat in the manner of a brush and dust pan, the brush 19 serving to loosen the dust particles, while the inclined lip 17' guides the dust particles to the nozzle exit and prevents such particles from passing out on the other side of the cleaner, as would be the case if a brush were employed at the rear edge of the nozzle.

A further cooperative relation between the form of suction nozzle or crosshead herein employed and the laterally supported end rollers is particularly apparent by reference to Figs. 4 and 5, from which it will be noted that the body of the crosshead is narrower than the diameter of the rollers, and that the lips 18, 18' of the stokers are normally held slightly above the level of the surface to be cleaned by the spring rollers. The result is that the shells or side walls of the crosshead and the lips of the mouth thereof are positioned normally within the circumferential boundaries of the end rollers. Thus, the crosshead may be tilted laterally through an arc greater than that occupied by the inlet slot, and the body of the crosshead is rocked wholly within the limits of a cylinder, whose ends are the supporting rollers. The advantage of this construction is that, instead of one edge of the tool becoming a fulcrum on the floor and causing a break in the seal, the mouth of the floor tool is maintained within close proximity to the carpet or surface to be cleaned, and no edge of the tool causes tilting of the other edgeway by becoming a fulcrum, the fulcrum remaining at the center of the rollers instead of forming a new fulcrum on the edge of the tool.

Having thus described my invention and the manner of its use, it is apparent that the details are not to be taken as exhaustive, but may be greatly varied without departing from the spirit of the invention.

What I particularly claim and desire to secure by Letters Patent is:—

1. A floor tool for suction cleaners, having end openings and having resilient supporting means comprising resilient and yielding rollers mounted at the ends of the tool on laterally extending detachable shanks with supplementing spring elements.

2. In combination with the cross-head of a suction cleaning tool having end openings, spring roller supports detachably mounted at the ends of the cross-head and extending laterally beyond said openings, and rollers carried by said supports.

3. A cleaning tool comprising an application head having a tubular extension adapted to be

connected to a source of suction, pockets formed at opposite ends of the tool, spring roller supports detachably connected in said end pockets and extending laterally therefrom, and rollers

5 carried by said supports.

4. A cleaning tool comprising an application head adapted to be connected to a source of suction, pockets formed at opposite ends of the tool, spring roller supports detachably connected in

10 said pockets and extending laterally therefrom, and rollers carried by said supports.

5. In a suction cleaner, a floor tool having end rollers mounted on shanks supporting said tool, yielding floor engaging means carried by said

15 floor tool, and air-ways through the floor engaging means to prevent sealing contact with the surface to be cleaned when downward pressure is applied to the cleaner.

6. In a suction cleaner, a floor tool comprising a cross-head open at its ends, end supports for the crosshead, and rollers carried by said supports, said supports being removable to permit

20 the then open end to be applied to a crack or corner on the level of the floor.

7. In a cleaning tool of the kind described, a cross-head comprising an outer and an inner shell suitably secured together, and spaced apart adjacent their ends forming pockets, yielding roller supports removably mounted in said pockets, and rollers carried by said supports.

8. In a suction cleaner of the character described, an open-mouthed application head, a pocket in the walls of said application head, said walls being resilient and constraining inwardly

35 when forced apart, and an application member forced into said pocket and detachably held by the resilience of said walls.

9. In a cleaning apparatus of the character described, a stroker comprising an elongated, non-collapsing, non-metallic strip of substantially rectangular configuration, the lower portion of the stroker being permanently curved inwardly to provide a floor-engaging lip.

10. For use in connection with a suction nozzle formed with an elongated downwardly opening socket, an elongated non-metallic floor-engaging stroker element having a portion receivable in said socket, and a tip portion formed as a floor-engaging member permanently bent with reference to the portion fitting in said socket, so that the tip will extend beneath the inner wall of said socket when the stroker is in place.

11. In a suction cleaner, an elongated suction nozzle having an inlet mouth, a pair of downwardly opening pockets formed in the nozzle at the sides of the mouth, and a pair of non-metallic stroker members, one mounted in each of the pockets and each having a permanently curved tip portion extending beneath the inner wall of its respective pocket.

12. In a suction cleaner, an elongated suction nozzle having an outlet conduit intermediate its ends, adapted for attachment to a suction pipe, an inlet mouth extending lengthwise of the nozzle, a pocket formed in the nozzle adjacent the mouth and opening downwardly, and a non-metallic stroker mounted in the pocket, said stroker having a permanently curved portion extending beneath the inner wall of said pocket.

13. A stroker element as set forth in claim 10, which is composed of hard fiber.

14. In a suction cleaner of the character described, non-collapsing floor engaging stokers,

75 each comprising an elongated strip of hard fiber

having a permanently curved lip at the lower portion thereof.

15. In a suction cleaner of the character described, a floor engaging stroker comprising an elongated non-collapsing strip substantially rectangular in form, but having a cut-away portion along the upper edge thereof to permit passage of dust-laden air to an outlet and having a permanently curved lip at the lower portion thereof.

16. In a cleaning apparatus of the character described, a stroker comprising an elongated rawhide strip of substantially rectangular configuration, the lower portion of the stroker being curved inwardly to provide a floor engaging lip.

17. In a suction cleaning tool, a cross-head having a surface cleaning mouth connected to a source of suction, supporting rollers, mounted on spring shanks individually connected at each end of the cross-head and extending laterally beyond the cross head, said rollers jointly supporting the cross-head at an operative distance from the surface to be cleaned, the distance being variable within limits according to the pressure applied to the cross-head, said rollers being beyond the lateral limits of the cross-head and offering minimum obstruction to lateral streams of air entering said mouth.

18. A suction cleaning tool comprising a tubular extension, a cross-head having front and rear walls forming a transverse mouth connected to said tubular extension, the walls of said cross-head being double, resilient, and when expanded pressing inwardly, making longitudinal pockets, adapted to releasably retain replaceable stokers between them by the inward pressure exerted by the resilient walls of the pockets, stokers mounted in said pockets and having downwardly extending lips for contact with the surface to be cleaned, together with spring roller supports removably connected to the ends of said cross-head between the inner and outer walls of the cross-head and arranged to adjustably modify the scraping pressure of the stokers in operating the tool.

19. A cleaning tool of the kind described constructed with an outer shell secured to an inner lining shell, at least one of the shells being of resilient material, and the said shells having their lower edges aligned and separated and when moved apart pressing toward each other so as to form front and rear retaining pockets serving to hold the floor scraping stokers of the tool without additional fastening means, and stokers in said pockets.

20. A cleaning tool of the kind described comprising an outer shell secured to an inner shell composed of thin resilient material, said shells having their lower edges aligned, and separated so as to form front and rear elongated retaining pockets, the opposite walls of said pockets pressing toward each other when moved apart, and stokers forced into and secured in said pockets by the inward pressure exerted by the resilient walls of said pockets.

21. A suction cleaning tool comprising a tubular extension, a cross-head having front and rear walls forming a transverse mouth operatively connected to the tubular extension, said cross-head comprising an outer shell and an inner lining shell secured thereto, both shells being of thin resilient material, said shells being spaced apart adjacent their ends forming pockets, and the front and rear walls of the cross-head mouth being likewise spaced apart to form

pockets, spring roller supports removably secured in the end pockets of said cross-head, and removable stokers operatively secured in the pockets in the walls of the cross-head and retained in place by the resilience of the flexible shells.

22. In a cleaning tool of the kind described, a suction pipe, a cross-head connected therewith, front and rear walls of said cross-head having pockets with resilient sides pressing toward each other when moved apart, said pockets provided with stokers forced into said pockets and held by the resilience of said sides without additional fastening means, said stokers having lips defining the inlet mouth of the tool and extending in a plane below the plane of the limits of the body of the cross-head, said lips being sufficiently rigid to provide end openings outlined between adjacent ends of the stokers when the same are applied to the surface to be cleaned.

23. In a suction cleaning tool, a cross-head having end openings extending to the lower limits of the tool, and having a surface cleaning mouth connected to a source of suction, supporting rollers mounted on spring shanks individually and detachably connected at each end of the cross-head and extending laterally beyond the cross-head, said rollers jointly supporting the cross-head at an operative distance from the surface to be cleaned, the distance being variable within limits according to the pressure applied to the cross-head, said openings providing air-ways permitting flat streams of air to enter the cleaner endwise and preventing sealing of the cross-head against the surface to be cleaned when downward pressure is applied to the cleaner.

24. In combination with the cross-head of a suction cleaning tool having end openings extending to the lower limits of the tool, yielding spring roller supports extending laterally beyond the ends of said tool, and rollers carried by said supports, said openings providing air-ways permitting flat streams of air to enter the cleaner endwise and preventing sealing of the cross-head against the surface to be cleaned when downward pressure is applied to the cleaner.

25. A cleaning tool of the character described, comprising a tubular extension adapted to be connected to a source of suction, an application head with spring supports connected therewith, stiff surface engaging stokers detachably secured and outlining a mouth on the face of the head, but leaving open spaces between the ends of the stokers providing air-ways permitting flat streams of air to enter the cleaner endwise and preventing sealing of the cross-head against the surface to be cleaned when downward pressure is applied to the tool.

26. A cleaning tool comprising an application head adapted to be connected to a source of suction, surface engaging side pieces extending downwardly from the application head to provide a mouth for the tool, but having end openings, pockets formed at the ends of said application head, spring supports detachably mounted within said end pockets, and rollers carried by said supports, said end openings providing air-ways permitting air to enter the cleaner endwise and preventing sealing of the application head against the surface to be cleaned when downward pressure is applied to the tool.

27. A suction cleaning tool comprising a tubular extension, a cross-head having front and

rear walls, pockets in said walls, hard fiber stokers mounted within said pockets, having yielding downwardly extending lips for contact with the surface to be cleaned without collapsing, spring roller supports detachably connected at the ends of the cross-head, and rollers carried by said supports, said roller supports serving to adjustably modify the scraping pressure of the stokers in operating the tool, but normally holding the lower extremities of the lips in light contact with said surface.

28. In a cleaning tool of the character described, a suction pipe, a cross-head connected therewith, front and rear walls of the cross-head having pockets, non-collapsing fiber stokers detachably mounted within the pockets, said stokers having lips defining the inlet mouth of the tool, and extending downwardly in a plane below the plane of the limits of the body of the cross-head, whereby end openings are outlined between adjacent ends of the stokers when the same are applied to the surface to be cleaned, pockets formed in the ends of the cross-head, spring roller supports detachably mounted within said pockets, and rollers carried by said spring supports, said spring supports normally holding the lower extremities of said lips in light contact with said surface.

29. A cleaning tool comprising a cross-head adapted to be connected to a source of suction, and having elongated parallel front and rear walls, a pair of separate pockets formed in said walls, front and rear stokers detachably mounted one within each of said pockets, said stokers having downwardly and inwardly extending flexible non-collapsing lips for light yielding contact with the surface to be cleaned, pockets at the ends of said cross-head, spring roller supports detachably mounted in said pockets, and rollers carried by said supports.

30. In a suction cleaner of the character described, an application head having elongated front and rear edges, a bristle brush detachably mounted in the forward edge, a floor engaging stoker detachably mounted in the rear edge and having a flexible lip, said brush and lip providing between them end air openings, yielding supports for said application head and rollers carried by said supports, whereby the scraping pressure of said brush and rear stoker may be varied in operating the cleaner according to the pressure applied to the cleaner, and whereby the said end air openings may be modified as desired.

31. In a suction cleaner, a floor tool, yielding spring shanks extending laterally from the ends of the tool, rollers for said tool supported upon said yielding shanks, said floor tool having floor engaging means carried by said tool, and end openings in said floor tool between said floor-engaging means, providing air-ways to permit a stream of air to enter the cleaner from the ends inwardly for cleaning purposes to prevent sealing contact between said floor engaging means and the surface to be cleaned when downward pressure is applied to the cleaner.

32. A suction cleaning tool comprising a nozzle having an exit arranged for connection to a suction-producing means, an elongated entrance passage having front and rear stiff stoker members adapted to engage the surface to be cleaned, and end openings between the front and rear stoker members extending to the lower limits of the said members, providing air-ways permitting passage of a flat stream of dust-laden air inwardly from the ends of the nozzle when the

stokers are in contact with the surface to be cleaned, and yielding supports for said cleaner normally holding the stokers slightly above the surface to be cleaned, but permitting the same to engage said surface on the application of downward pressure to said nozzle.

33. A suction cleaning tool comprising a tubular extension connected to a source of suction, an application head having an inlet slot, a pair of spaced, flexible surface-engaging stiff stokers extending lengthwise of said application head, forming a mouth for said application head, said mouth having end openings between said stokers, and supporting means for said tool, comprising end spring shanks and rollers carried by said shanks, said supporting means normally holding the application head with the stokers raised slightly above the surface to be cleaned, but permitting the application head to be lowered on the application of pressure thereto, so that the stokers engage the cleaning surface, said end openings providing air-ways permitting a flat stream of air to enter the cleaner for sweeping purposes when the application head is in lowered position, and when in such position preventing sealing of the application head.

34. A suction cleaning tool having an application head adapted to be operatively connected to a source of suction and having an inlet slot, a pair of spaced apart lips on the lower face of said application head extending lengthwise of said slot, spring shanks extending laterally from the ends of said cross-head, and end rollers carried by said spring shanks, said spring-carried rollers normally supporting the application head with the lips slightly above the surface to be cleaned, and the diameters of said rollers being greater than the distance between said lips.

35. A cleaning tool of the character described, including an application head adapted to be connected to a source of suction, front and rear walls of said cross-head having pockets formed therein, stiff stokers detachably secured in said pockets and outlining a mouth on the lower face of the head, but leaving open spaces between the ends of the stokers extending to the lower limits of said stokers, and spring supporting means for said application head normally holding said stokers slightly above the surface to be cleaned, but permitting the same to engage the surface when pressure is applied to the application head, said end openings then providing air-ways permitting a flat stream of dust-laden air to enter the tool endwise for cleaning purposes.

36. A suction cleaning tool comprising a nozzle having an exit arranged for connection to a suction-producing means, an elongated entrance having stiff hard fiber stoker members for engaging the surface to be cleaned, and end air openings extending to the lower limits of said members, providing air-ways permitting passage of flat streams of dust-laden air inwardly from the ends of the nozzle over the surface to be cleaned when said stokers are in contact with said surface.

37. A suction cleaning tool comprising a nozzle having an exit arranged for connection to a suction-producing means, an elongated entrance having stiff stoker members for engaging the surface to be cleaned, end air openings extending to the lower limits of said members, providing air-ways permitting passage of flat streams of dust-laden air inwardly from the ends of the nozzle over the surface to be cleaned when said

stokers are in contact with said surface, and yielding supports for said cleaner, normally holding the stokers slightly above the surface to be cleaned, but permitting the same to engage said surface on the application of downward pressure to said nozzle.

38. A suction cleaning tool comprising a tubular extension adapted to be operatively connected to a source of suction, a hollow head having an air outlet connected to said tubular extension, pockets formed in opposite sides of said head, front and rear floor-engaging stiff stokers mounted within said pockets and spaced apart to permit dust-laden air to pass from its ends inwardly for sweeping purposes, the front stroker operating to dislodge dust particles, and the rear one of said stokers having the line of its upper edge extending above the lower limit of said air outlet, and having a central portion cut away to permit air to pass therethrough, said rear stroker serving as a plane or surface over which dust particles are conveyed by the dust-laden air passing to the said air outlet.

39. A suction cleaning tool comprising a nozzle having an air exit arranged for connection to a suction-producing means and an elongated entrance passage or mouth, a bristle brush detachably mounted in front only of the entrance passage for loosening dust particles adhering to the surface to be cleaned, and a rear stroker member extending in rear only of the entrance passage and comprising an elongated non-metallic strip of substantially rectangular form having the line of its upper edge extending above the lower limit of said air exit, and having a central portion cut away to permit air to pass therethrough, said rear stroker serving as a plane or surface over which dust loosened by said brush is conveyed by the dust-laden air passing through the nozzle.

40. In a cleaning tool of the kind described, a suction pipe, a cross-head connected therewith, front and rear walls of said cross-head having pockets formed therein, fiber stokers within said pockets having non-collapsing lips defining an inlet mouth of the tool and extending in a plane below the plane of the limits of the body of the cross-head, said lips being sufficiently rigid to provide end openings outlined between adjacent ends of the stokers when the same are applied to the surface to be cleaned.

41. A suction cleaning tool comprising an open-mouthed metallic cross-head composed of thin resilient material, floor-engaging stokers detachably carried by said cross-head, a shank portion formed integral with the crosshead, a hollow stub portion rotatably and operatively connected to the shank portion, a hollow cylindrical pipe portion, and quick detachable means connecting said stub portion to said pipe portion.

42. In a suction cleaning tool, a cross-head composed of thin resilient metal, a shank formed integral therewith, a conduction pipe operatively connected to said shank by flat annular sliding and registering metallic flanges slidable in a plane cutting obliquely through the axis of the pipe, said flanges having means for securing the same together whereby increase in suction increases the sealing effect at the connection, the lower edge of said oblique joint extending below the upper limit of said cross-head.