



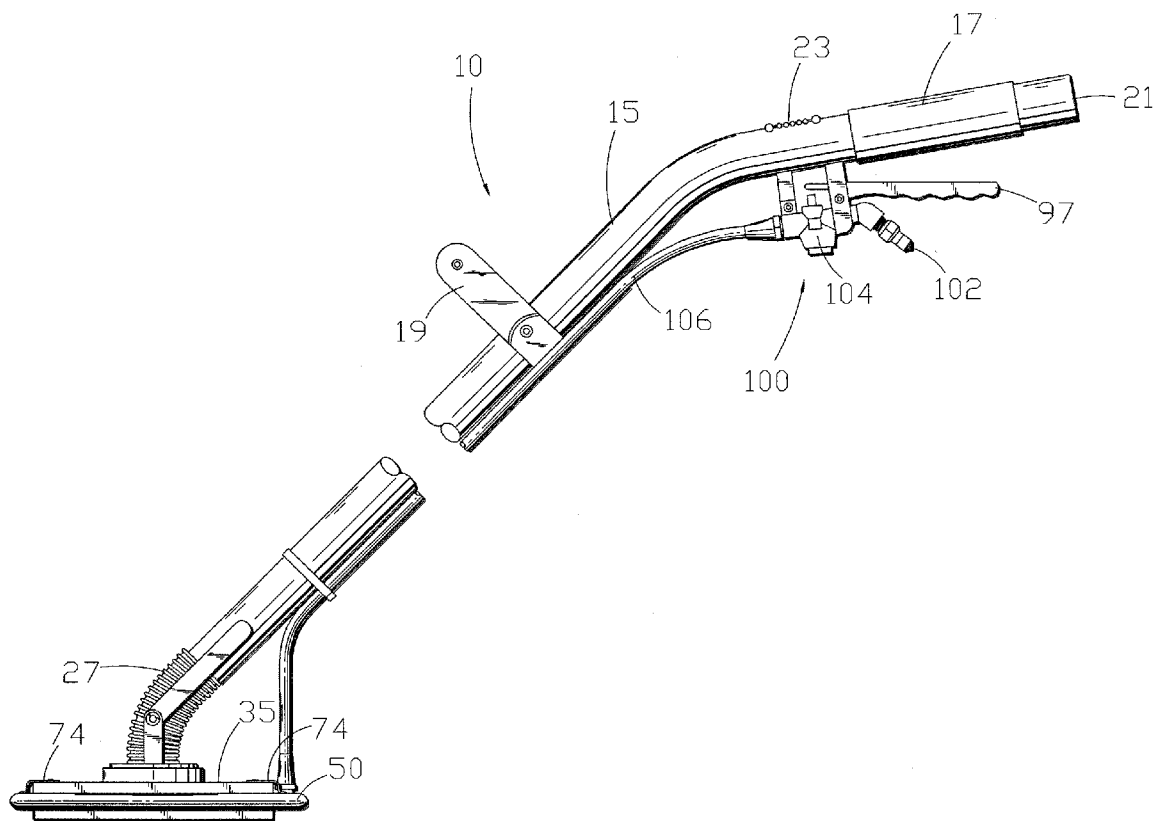
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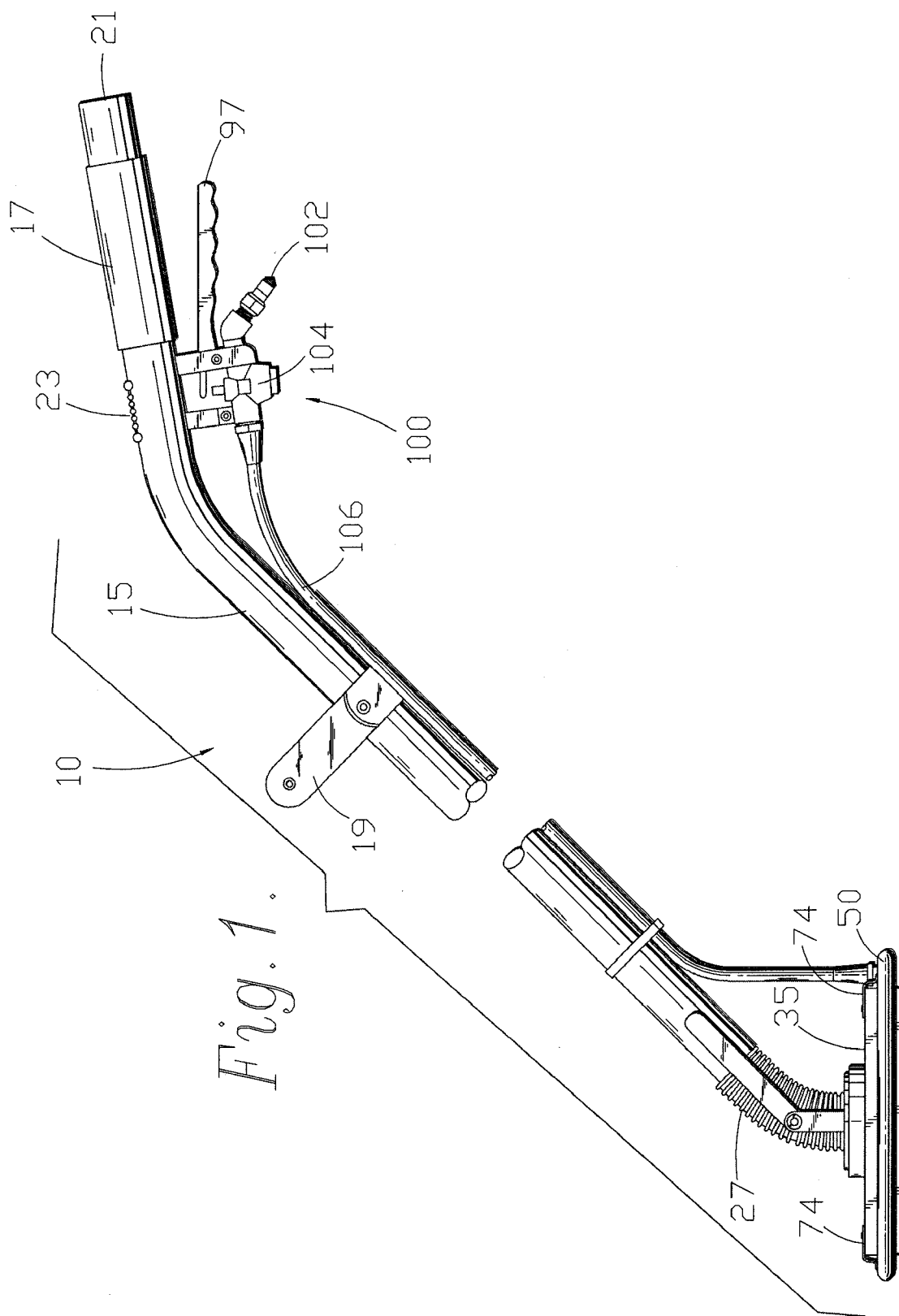
(19) **United States**(12) **Patent Application Publication**
McNulty(10) **Pub. No.: US 2010/0000043 A1**(43) **Pub. Date: Jan. 7, 2010**(54) **CARPET CLEANING FLUID INJECTION
APPARATUS****Publication Classification**(76) Inventor: **Don M. McNulty**, Blue Springs,
MO (US)(51) **Int. Cl.**
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LATHROP & GAGE LLP**2345 GRAND Boulevard, SUITE 2400****KANSAS CITY, MO 64108 (US)**(52) **U.S. Cl. 15/320**(21) Appl. No.: **12/496,994**(22) Filed: **Jul. 2, 2009****Related U.S. Application Data**(60) Provisional application No. 61/077,962, filed on Jul. 3,
2008.(57) **ABSTRACT**

A carpet cleaning fluid injection apparatus for adaptation to a vacuum nozzle. The injection apparatus configured to surround the vacuum nozzle for purposes of injecting the cleaning fluid into the carpet in proximity to the vacuum nozzle and the vacuum nozzle configured for extracting the cleaning fluid from the carpet.





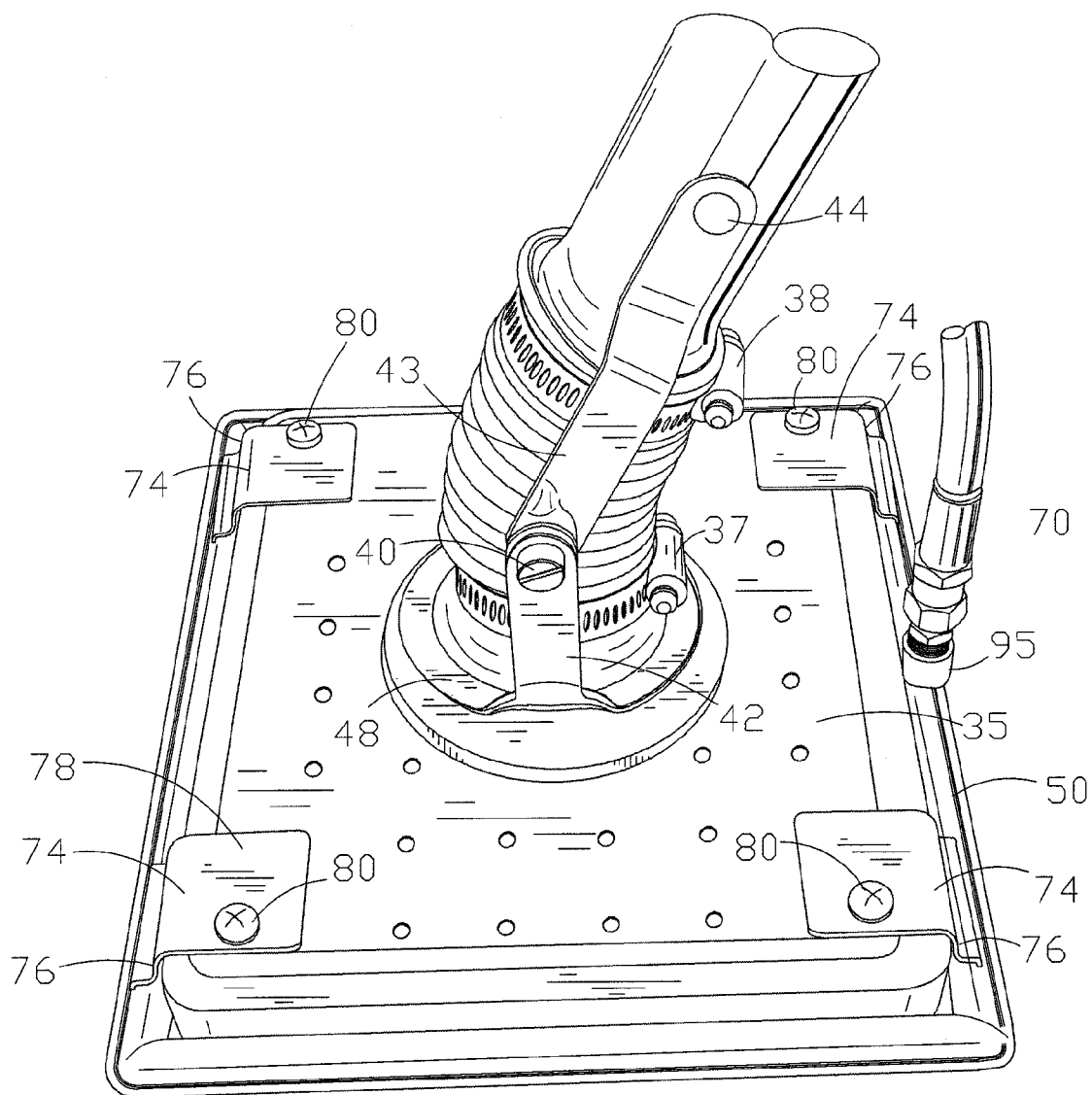
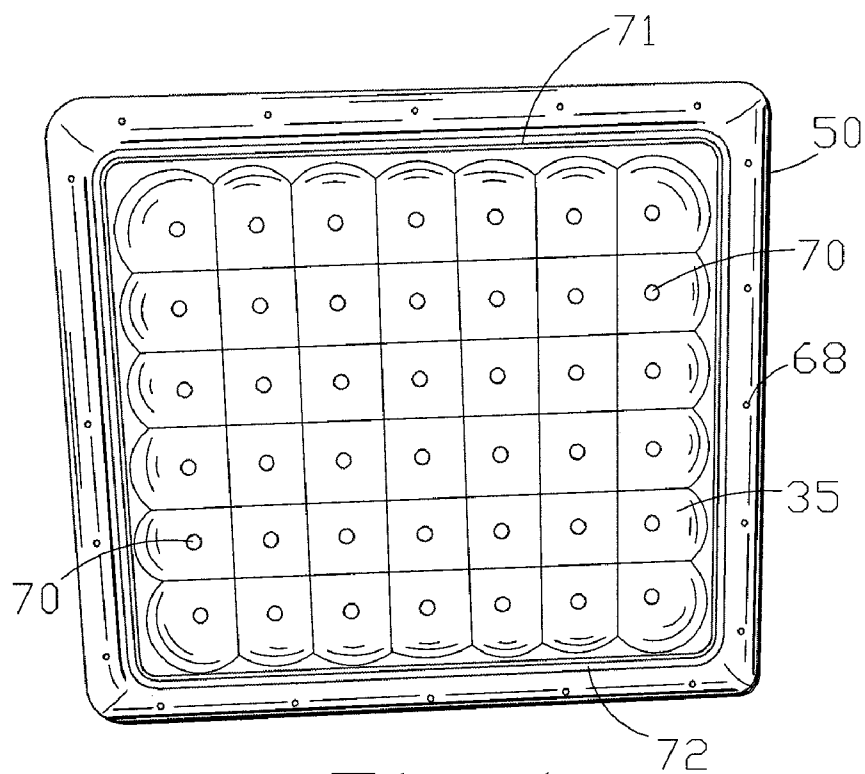
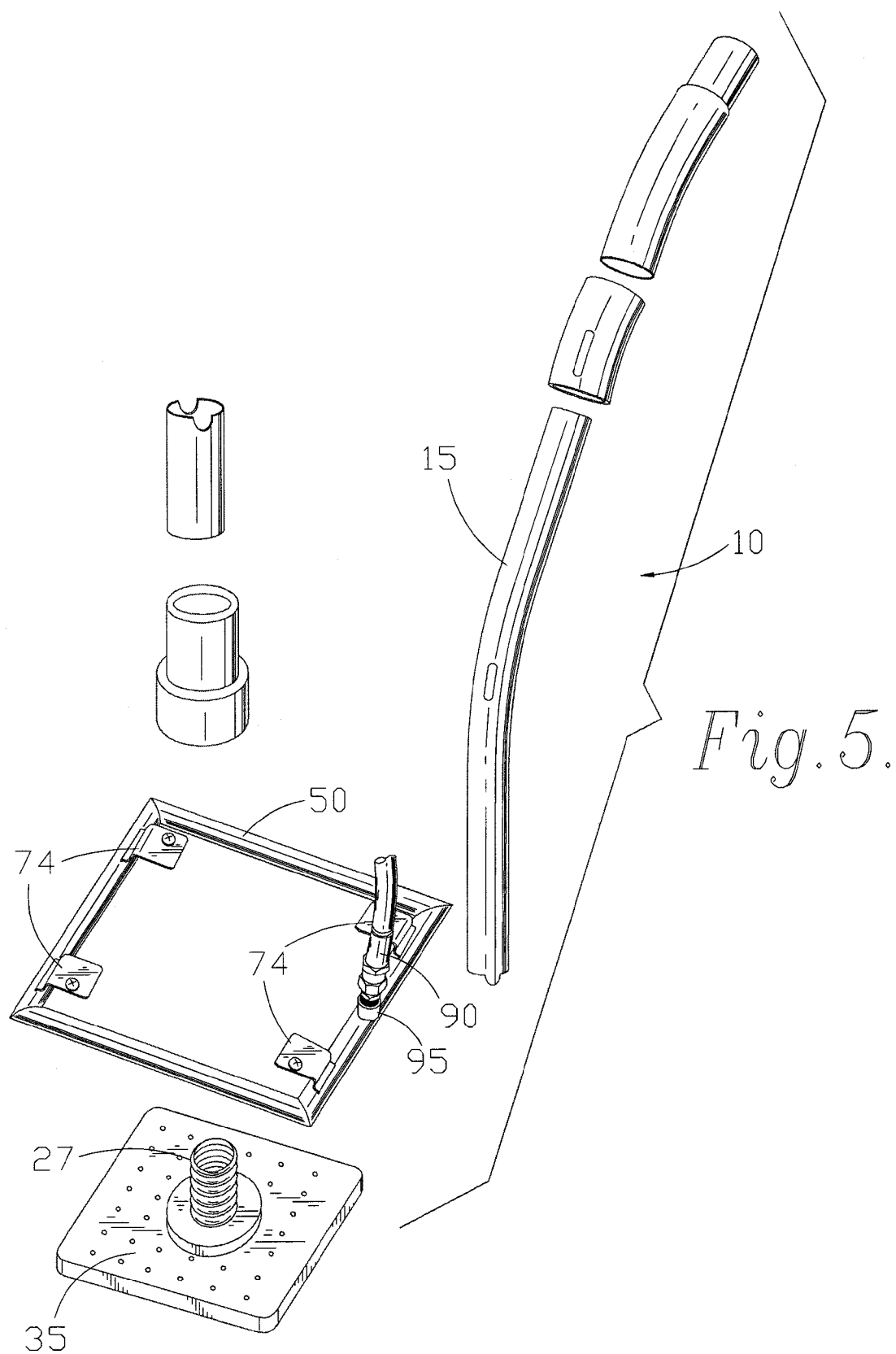


Fig. 2.





CARPET CLEANING FLUID INJECTION APPARATUS

[0001] This application claims the benefit of the filing date of a provisional application with Ser. No. 61/077,962 which was filed on Jul. 3, 2008, the disclosure of which is incorporated herein by reference.

BACKGROUND

[0002] The current invention relates to an apparatus for injecting a cleaning fluid into a carpet utilized in combination with a device for suctioning the fluid from the carpet.

SUMMARY

[0003] A Marketdata Enterprises, Inc., study estimates that the carpet cleaning industry in the United States in 2005-2006 was a \$5.3 billion industry. This service industry continues to grow and demand improvements to the technology associated with the cleaning process. There continue to be widespread efforts to improve the quality and the speed of cleaning of carpets including developments in chemical technology and equipment for cleaning the carpet.

[0004] The current technology is associated with deep cleaning of carpets, as opposed to standard carpet cleaning which applies only to the surface yarn of the carpet. The current technology is directed to the placement of a specially designed vacuum nozzle, also known as a subsurface extractor, over the stained area of the carpet. With the suction source in operation and connected to the vacuum nozzle the technician pours, by hand, a premixed solution from a container over the top of the vacuum nozzle allowing the solution to cascade over the top and down the sides of the vacuum nozzle. The solution enters into the carpet and the supporting pad in effect flooding the area in proximity to the stains that are to be removed. As the solution saturates the carpet and pad the goal is to have it suctioned out of the carpet through the vacuum nozzle, thus flushing the staining debris up and out of the carpet.

[0005] Several problems can result from pouring of the cleaning agent onto the vacuum nozzle. First, the technician often times must be on her knees pouring the solution onto the carpet to properly control the disbursement of the fluid. Second, this pouring technique often results in an uncontrolled rate of solution flow which is wasteful and it is common for the solution to migrate further than anticipated. An inexperienced technician can pour more fluid onto the carpet than is necessary to properly saturate the soiled area thereby causing the fluid to seep beyond the carpet, pad and flooring and in poorly monitored situations ultimately into the ceiling structure that may reside immediately beneath the floor being cleaned. This often times unfortunately results in serious sheet rock or ceiling tile damage. Third, the technician is limited by his solution source, such that when her container of cleaning solution is empty she will have to stop the cleaning process, mix additional solution and then return to the task of pouring and suctioning the carpet fluid.

[0006] The technology proposed herein eliminates the various pitfalls described above by providing a device that allows the technician to precisely control the amount of fluid being delivered to the stained carpet, reducing the amount of time that the technician may need to spend on her knees and also by providing the technician with an ample supply of cleaning

solution so that repeated mixing of small batches becomes unnecessary. The proposed technology also greatly reduces the potential for over saturation of the carpet leading to seepage through the flooring possibly resulting in damage to the ceiling beneath the carpet being cleaned.

[0007] In order to remove stubborn stains from carpet there are four principle components that enter into the cleaning. First, the chemistry of the cleaning fluid and particularly the pH of the fluid is important. Most soils register on the acid side of the pH scale and consequently in order to neutralize the soils deposited in the carpet most cleaning agents are on the alkaline side. The highest quality of cleaning takes place when the cleaning is performed with the opposite or at least with a lesser degree of pH. Additionally, emulsifiers are also a part of the chemical make up, which creates a suspension of the soils within the solution and surfactants which are wetting agents that break surface tension, allowing the solution to penetrate deeper into the fiber base.

[0008] Second, heat makes molecules active and it also breaks down adhesions between the molecular structures in the soils. Heat also reduces surface tension allowing soil to be more easily removed. Also this very action helps promote the reaction between the chemistry and the soils.

[0009] The third critical component in the arsenal of tools to clean carpets is the agitation of the carpet fibers. Agitation by the technician moving the cleaning device over the carpet or through some sort of powered agitation helps in physically breaking soils away from the fibers so the soils are easily suspended in the chemical and flushed away.

[0010] Fourth, time is used for several aspects of the cleaning process. The first being what is called "dwell" time, that being the amount of time needed for the chemical pre-spray or pre-conditioner that is applied first to breakdown the soils, and start the emulsification process. Time is also a requirement in performing the work. Some situations require more time to accomplish the end result. Soils that have been allowed time to bond with the fiber takes time to break that bond. Time that is allowed to have soils bond and build up in conjunction with sugar or starch type soils takes time to remove, since the build up happens in layers it has to come off in layers.

[0011] A carpet cleaning apparatus that in combination with the disclosed technology optimizes these carpet cleaning principles and comprises a vacuum nozzle such as that disclosed by U.S. Pat. No. 6,513,192. The vacuum nozzle is placed in communication with a vacuum source that is typically vehicle mounted, however, stand-alone sources of vacuum may also be utilized. The vacuum nozzle of the '192 patent, as discussed above, relies upon the manual application of the carpet cleaning fluid by either pouring the cleaning solution onto the carpeting from a container or utilizing a pressurized container that must be physically carried by the technician from one carpet stain location to the next. The movement of the supply of cleaning fluid is a cumbersome process for the carpet cleaning technician that can lead to over saturation of the carpet and pad, can produce a trip hazard for the technician as the container of solution can be inadvertently backed-into and depending upon the magnitude of staining it may require the technician to repeatedly mix cleaning solution thereby slowing the overall cleaning process. The repeated mixing can also lead to variations in the composition of the cleaning solution and ultimately to the cleaning power

of the solution resulting in differing stain removal capabilities and an uneven appearance for the carpet.

BRIEF DESCRIPTION OF DRAWINGS

[0012] These and other features, aspects and advantages of the disclosed technology will become better understood with reference to the following description, appended claims, and accompanying drawings where

[0013] FIG. 1 is a perspective view of the injection rig in combination with other elements of the carpet cleaning apparatus;

[0014] FIG. 2 is a perspective view of the injection rig in combination with the vacuum nozzle;

[0015] FIG. 3 is a bottom view of the injection rig;

[0016] FIG. 4 is a bottom view of the injection rig in combination with the vacuum nozzle; and

[0017] FIG. 5 is an exploded view of the injection rig in combination with the vacuum nozzle and stand pipe.

DETAILED DESCRIPTION

[0018] The disclosed technology is directed to a carpet cleaning fluid injection rig for use in combination with a vacuum nozzle that is well known by those skilled in the art. FIG. 1 reveals the disclosed technology in combination with the existing technology. The stand pipe 15 includes grips 17, 19 for placement of the hands to provide maximum control over the stand pipe 15 and to allow the technician to apply a downward pressure to the standpipe as needed to facilitate stain removal. A vacuum source (not shown) is connected to the stand pipe 15 at the end point 21. Variable control of the vacuum pressure drop provided by the vacuum source to the carpet is provided by an adjustable plate 23 that can be incrementally opened and closed as necessary to increase or decrease the magnitude of the vacuum that is supplied at the carpeting. The stand pipe 15 also utilizes a flexible coupling 27 that provides a significant range of motion for the technician to position the stand pipe 15 at an angle that is comfortable for the height of the technician.

[0019] The standpipe 15 flexible coupling 27 terminates at the vacuum nozzle 35 as seen in FIGS. 1 and 2 and is secured in position by a pair of standard radiator type clamps 37, 38 or other appropriate attachment means. To provide a measure of rigidity to the connection between the standpipe 15 and the vacuum nozzle 35, a pair of rotatable pivot joints 40 are employed with one on two sides of the vacuum nozzle 35. A nozzle flange 42 extends upwardly from a securement ring 48 to the pivot joint 40. A standpipe flange 43 extends downwardly from a standpipe connection point 44 to the rotatable pivot joint 40. These various flanges and pivot points allow the technician considerable flexibility in manipulating the orientation of the vacuum nozzle and yet also providing for a secure vacuum supply line.

[0020] FIG. 2 further discloses the vacuum nozzle 35 disclosed at U.S. Pat. No. 6,513,192. Further disclosed at FIG. 2 is the technology for injecting in a highly controllable manner carpet cleaning fluid in proximity to the vacuum nozzle, wherein the injection rig 50 discharges the cleaning fluid into the carpet at a pre-designated flow rate with the vacuum nozzle 35 extracting the cleaning fluid from the carpet. The carpet cleaning technician can exert exacting control over the volume of cleaning fluid delivered to the carpeting and has an ample supply to draw upon without having to prepare another batch of manually applied cleaning fluid. Importantly, the

cleaning fluid being injected through the injection rig 50 will retain heat longer than that supplied by manually pouring the solution from a small container moved periodically by the technician.

[0021] As can be seen in FIG. 3, the injection rig 50 is comprised of four hollow members 52, 54, 56 and 58. The hollow members are preferably comprised of aluminum or stainless steel and welded together at endpoints 60, 62, 64 and 66, however, other corrosion and impact resistant materials, such as PVC, that can be effectively joined at the endpoints with a fluid tight seal may also be employed. Hollow members 52, 54, 56 and 58 are preferably round with an outside diameter of between 1.5 inches and 0.75 inches and an interior diameter of between 0.50 inches and 1.25 inches, however, a wide range of dimensions will suffice for delivery of the carpet cleaning fluid. The hollow members 52, 54, 56 and 58 may be cut to numerous lengths to accommodate the varying dimensions of the vacuum nozzles 35 to which they are attached.

[0022] As is seen in FIGS. 3 and 4, the hollow members 52, 54, 56 and 58 also include a plurality of apertures 68 on the downward, or carpet facing, portion of each member. The apertures 68 are for injecting the heated carpet cleaning fluid downwardly into the carpet. The apertures 68 are also preferably angled slightly inward to the vacuum nozzle 35 so that the fluid can permeate the carpet and migrate to the vacuum nozzle extraction holes 70 as seen in FIG. 4, by the suction force. Apertures 68 are preferably separated by approximately 0.25 inch to no more than one inch. Additionally, the apertures 68 are preferably angled inwardly toward the vacuum nozzle 35 at an angle ranging from 10 to 45 degrees from horizontal with aperture openings ranging preferably from $\frac{1}{32}$ to $\frac{5}{32}$ inch in diameter.

[0023] As seen in FIG. 4, the injection rig 50 is preferably spaced apart from the outer walls 71 of the vacuum nozzle 35 by a gap 72 of between 0.25 and 0.5 inches on all sides 52, 54, 56 and 58. This gap 72 facilitates placement of the injection rig 50 over the vacuum nozzle 35 without interference between the two components. In addition, the over sizing of the injection rig member lengths so that there is no friction fit between the vacuum nozzle 35 and the injection rig 50 reduces stress loading on the joints 60, 62, 64 and 66 that could result in their failure causing subsequent and undesirable leakage of the carpet cleaning fluid.

[0024] As seen in FIG. 2, the injection rig 50 employs four attachment brackets 74 that are preferably secured by welding to the injection rig 50 during manufacture of the rig 50. The attachment brackets 74 include a step-up 76 that provides the elevation necessary for the attachment bracket landing 78 to rise to the level of the upper surface of the vacuum nozzle 35. With the bracket landing 78 setting atop the vacuum nozzle 35 the four attachment brackets 74 may be secured to the upper surface of the vacuum nozzle 35 with the aid of attachment means 80 such as screws or rivets.

[0025] Once the injection rig 50 is secured to the vacuum nozzle 35 the carpet cleaning supply line 90, as seen in FIG. 2, is secured to the inlet port 95 of the hollow member 52. The heated carpet cleaning fluid is supplied to the injection rig 50 as required by the carpet cleaning technician through the use of a hand controlled lever 97 as seen in FIG. 1. The inlet control valve 100 includes a quick disconnect feature 102 and a valve assembly 104. Exiting from the control valve 100 is

the supply line **106** that extends down the length of the standpipe **15** to the injection rig **50**.

Operation of the Injection Rig Kit

[0026] In operation, the injection rig **50** is secured to the vacuum nozzle utilizing the attachment brackets **74** and attachment screws **80**. The injection rig **50** is positioned so that the lower edge of the hollow members **52**, **54**, **56** and **58** are elevated slightly above the lower surface of the vacuum nozzle **35**. This elevation is facilitated by the step-up feature **76** provided by the attachment brackets **74**. Additionally, a slight gap between the injection rig **50** and the vacuum nozzle **35** minimizes the stress loading on the injection rig and decreases the prospects for rupture of one of the joints **60**, **62**, **64** and **66**.

[0027] Once secured to the vacuum nozzle **35**, the supply line **90** extending downwardly from the control valve **100** is secured to the inlet port **95**. The stand pipe **15** is secured to the vacuum nozzle **35** with the flexible coupling **27** and is rigidly yet rotatably coupled through the pivot joints **40**. The pivot joints **40** serve to connect the nozzle flange **42** and the standpipe flange **43** with the flexible coupling secured in position by clamps **37**, **38**. The vacuum source is also connected to the standpipe at the endpoint **21** thereby completing the connection between the vacuum source (not shown) and the carpeting. The cleaning technician can manipulate the pressure drop to the carpet by opening and closing the adjustable plate **23** on the standpipe **15**. An increase in vacuum at the carpeting may be needed to address particularly stubborn stains and soiling.

[0028] The carpet cleaning technician connects the heated cleaning fluid supply line to the quick disconnect **102** on the standpipe **15**. The fluid is then ready for delivery to the injection rig as needed by the technician to facilitate rapid and thorough stain removal. When the valve assembly **104** is opened by the technician rotating the lever **97**, carpet cleaning fluid flows from the supply tank (not shown) past the valve assembly, down the supply line **106**, into the injection rig **50** through the various hollow members **52**, **54**, **56** and **58** and is ejected from the plurality of apertures **68** into the carpet. Since the apertures are angled slightly inwardly toward the vacuum nozzle **35** the carpet cleaning fluid is pulled beneath the vacuum nozzle where the heat and agitation of the fluid cause the soils and stains to be extracted from the carpet.

[0029] As cleaning fluid is applied to the carpet through the injection rig a downward pressure is applied to the standpipe **15** at the handgrips **17**, **19** by the technician. This handgrip **17**, **19** directed pressure serves to seal the area beneath the vacuum nozzle **35** allowing the vacuum to draw the soil and staining from the carpet. Once the technician is confident that the cleaning fluid has been extracted from the designated area of the carpet, the positioning of the adjustable plate **23** can be modified to reduce the vacuum applied against the carpet

thereby releasing the vacuum nozzle from the carpet. The technician then moves to the next stained area of the carpet and begins the process again to deliver cleaning fluid to the carpet and the process of extracting it.

[0030] Those skilled in the art appreciate that variations from the specified embodiments disclosed above are contemplated herein and that the described embodiments are not limiting. The description should not be restricted to the above embodiments, but should be measured by the following claims.

We claim:

1. A kit for attachment to a carpet cleaning fluid vacuum nozzle, the kit comprising: a plurality of hollow members configured to deliver pressurized carpet cleaning fluid, the members extending around the outer perimeter of the vacuum nozzle, wherein the hollow members include a plurality of apertures for controlled release of the pressurized carpet cleaning fluid into the carpet.

2. The kit of claim 1, wherein the hollow members surrounding the outer perimeter of the vacuum nozzle are disposed substantially parallel to the surface of the carpet and are disposed above a bottom surface of the vacuum nozzle.

3. The kit of claim 1, wherein the apertures are disposed within the members for injecting fluid downwardly into the carpet and inwardly toward the vacuum nozzle.

4. The kit of claim 1, wherein the flow rate of the cleaning fluid through the hollow members is in the range of 0.2 to 2 gallons per minute.

5. A carpet cleaning fluid injection device for outfitting a carpet cleaning fluid vacuum nozzle for injecting carpet cleaning fluid into carpeting, the device comprising: a fluid injection rig, the injection rig comprising a plurality of hollow members circumscribing the vacuum nozzle for delivery of the cleaning fluid, a plurality of downwardly and inwardly facing apertures within the circumscribing members for dispersing the cleaning fluid into the carpet, and a fluid delivery control apparatus for regulating the volume of cleaning fluid delivered to the carpet.

6. The injection device of claim 5, wherein the hollow members are comprised of tubular construction and the diameter of the apertures is in the range of $\frac{1}{32}$ to $\frac{5}{32}$ inches.

7. A carpet cleaning fluid injection apparatus comprising: an injection rig for delivery of carpet cleaning fluid to the carpet, the injection rig circumscribing a vacuum nozzle, the injection rig further comprising a plurality of hollow members for delivery of cleaning fluid each with a plurality of downwardly facing apertures for delivery of the cleaning fluid to the carpet; and a fluid delivery control device for controlling the rate of delivery of the fluid to the injection rig.

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