June 1, 1926. 1,587,444

E. A. THOMAS

CARPET CLEANING AND DISINFECTING MACHINE

Filed March 31, 1924 3 Sheets-Sheet 1

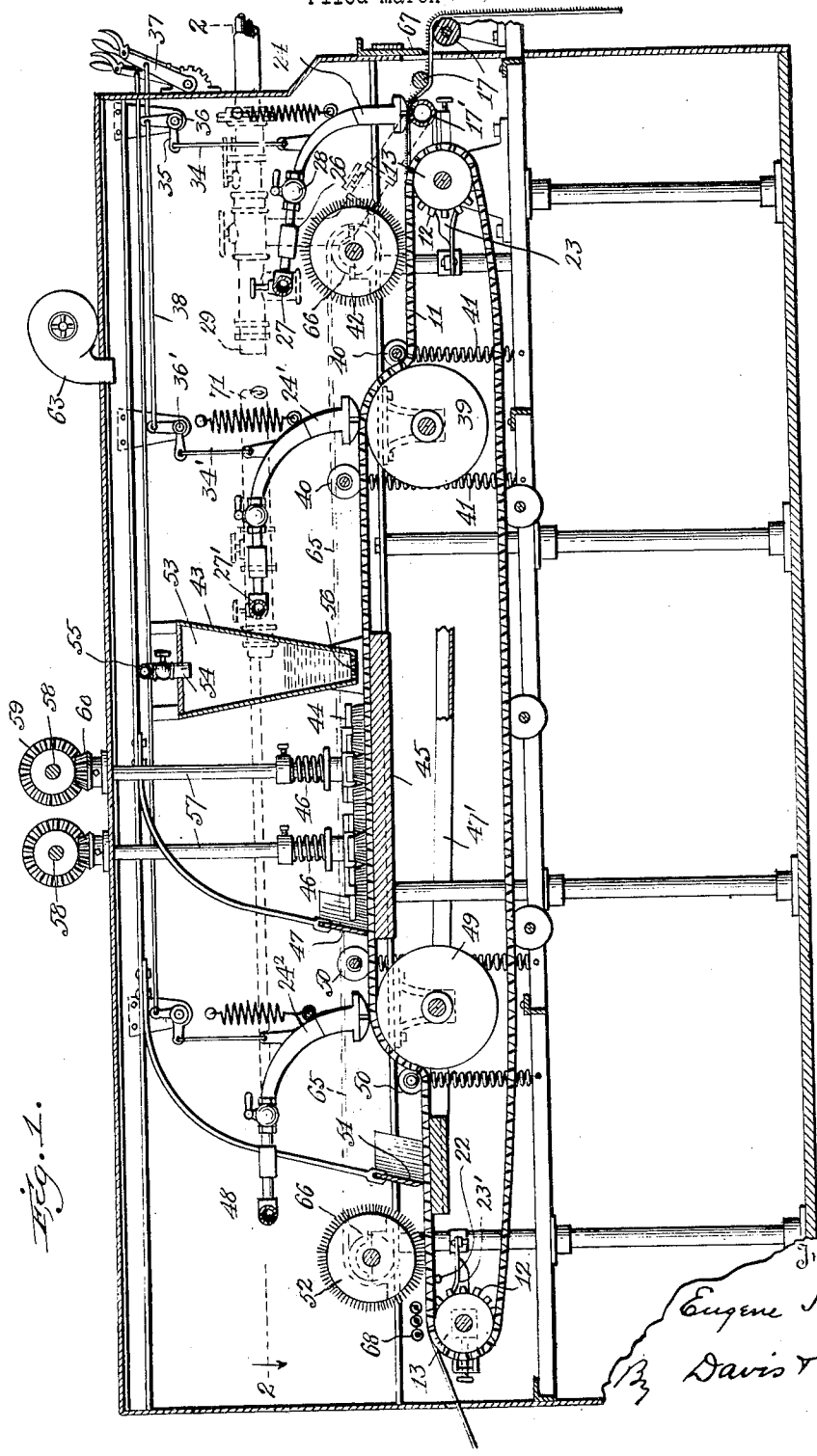


Fig. 1.

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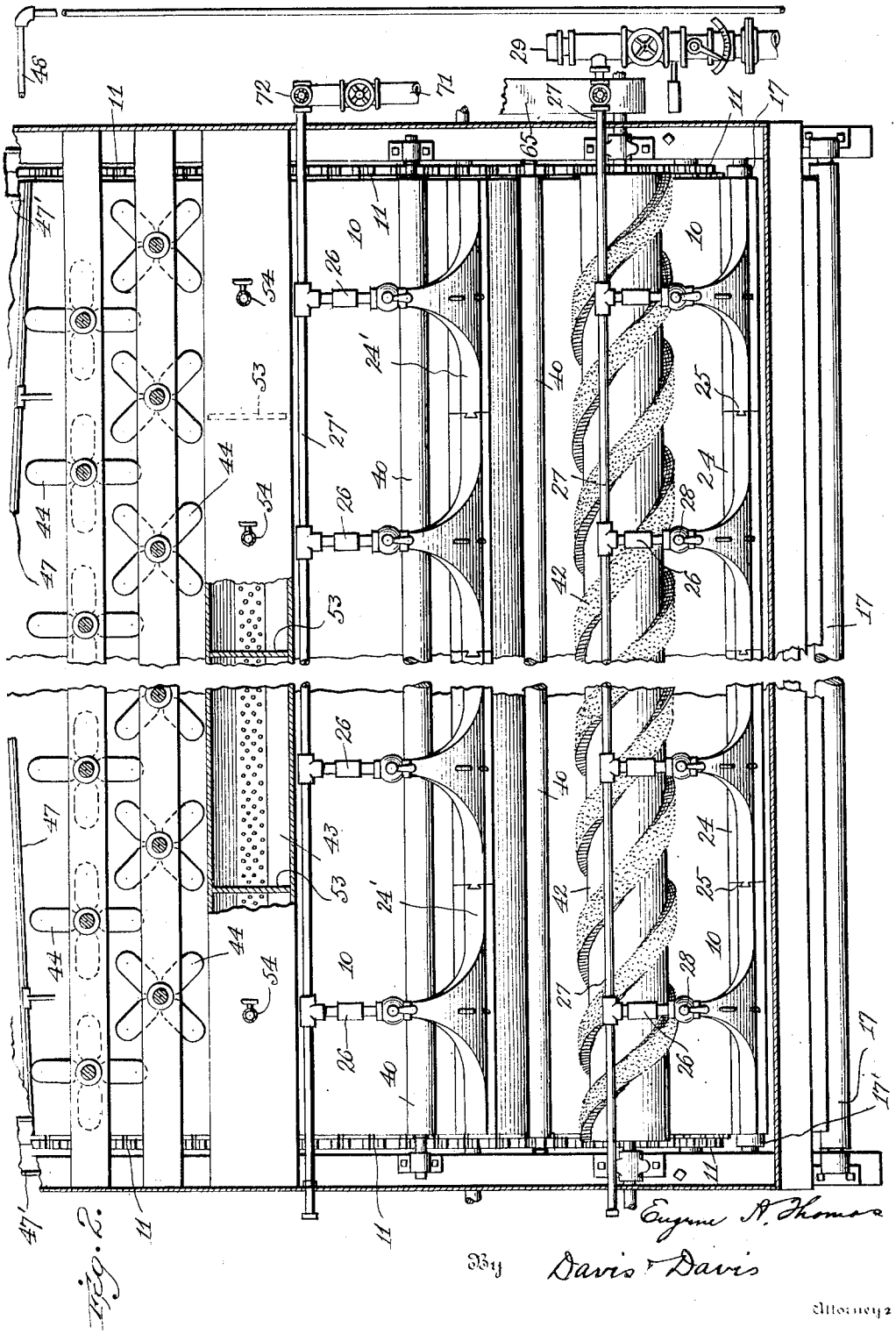


Fig. 2.

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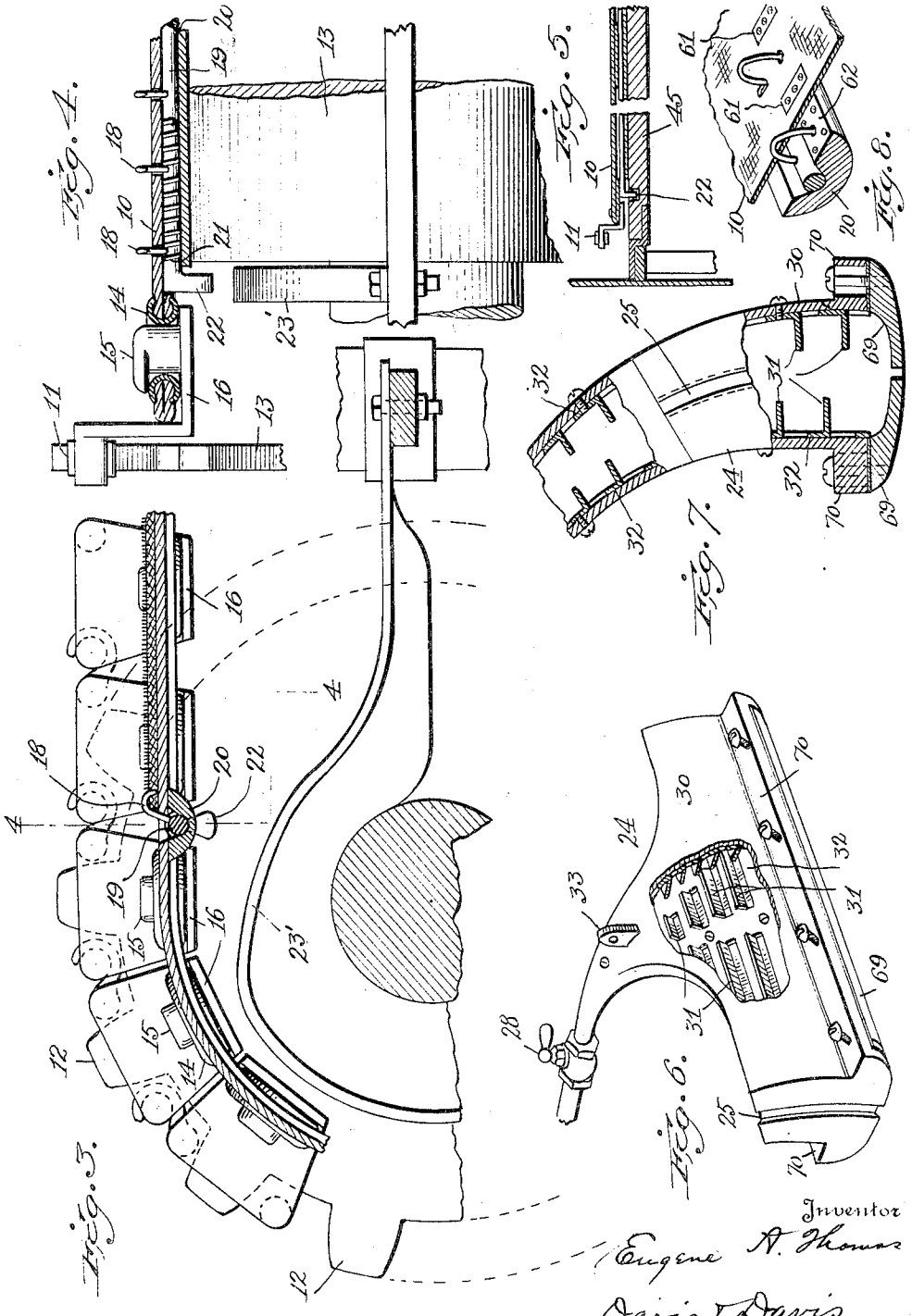


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

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UNITED STATES PATENT OFFICE.

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CARPET CLEANING AND DISINFECTING MACHINE.

Application filed March 31, 1924. Serial No. 703,171.

The object of the invention is to provide an apparatus for continuously cleaning and disinfecting carpets, rugs, etc., the apparatus being adapted to receive rugs and carpets of any length and any width within the range of the apparatus, as more fully hereinafter set forth.

In the drawing—

Fig. 1 is a vertical sectional view of an apparatus embodying my improvements;

Fig. 2 is a horizontal sectional view on the line 2—2 of Fig. 1;

Figs. 3, 4, 5, 6, 7 and 8 are views of details hereinafter described.

The fabrics are carried through the machine on an endless heavy canvas belt 10, carried by a pair of sprocket-chains 11 attached to the respective edges of the canvas belt, these sprocket-chains being driven by sprocket-wheels 12 affixed to the shafts carrying the two end-rollers 13. The canvas belt is attached to the sprocket-chains by means of eyelets 14 (Fig. 4) which are adapted to be engaged by hooks 15 carried by lugs 16 affixed to the chain-links.

A pair of feed-in rollers 17 is desirably employed at the entrance-end of the apparatus. The entering edge of the fabric is run into the machine from these rollers and its inner edge is attached to the top surface of the belt 10 and is thereby carried by the machine and subjected, during its passage, to the various cleaning and disinfecting operations hereinafter described. To fasten the fabric to the canvas, I provide a series of hooks 18 attached to a rock-shaft 19 journaled in a bracket 20 fastened to the under-side of the canvas belt, this rock-shaft being held in its normal position, i. e., with its hooks in engagement with the front edge of the fabric, as shown in Fig. 3, by a coil-spring 21. At each end, the rock-shaft is provided with a depending arm 22 which is adapted to be actuated by a cam 23 at the entrance-end of the machine and by a similar cam 23′ at the outlet-end of the machine, these cams being affixed to a suitable adjacent part of the frame. The cam 23 at the entrance end of the machine is shaped to swing the hooks upwardly to open position, so that the front edge of the fabric to be cleaned may be pushed forwardly under the hooks; then, when the arms 22 pass off the cam 23 and its coil-spring returns the rock-shaft 19 to normal position, the hooks will automatically enter the carpet and thus lock the front edge thereof to the belt. At the exit-end of the machine, the cam 23′ is shaped so as to open the hooks 18 and thus permit the cleaned fabric to fall away from the belt as the same turns around the exit-roller 13.

Immediately above the rear one of the entrance-rollers 17, I mount a series of nozzles 24 extending the whole width of the machine and detachably connected together at their adjacent edges by dovetail connections 25. Each of these nozzles is detachably connected by means of the coupling 26 to a common air-pipe 27 and each is provided with a valve 28. The common pipe 27 is connected to a supply-pipe 29, through which the air is adapted to be forced in any suitable manner, to thereby preliminarily remove from the fabric a part of the dust. For fabrics narrower than the full capacity of the machine, any one or more of the nozzles may be closed by means of the valves 28, and also by means of the couplings 26 any one of the nozzles may be disconnected and removed from the machine for cleaning and repairing without disturbing the remaining nozzles.

Each nozzle consists of a broadened head 30 having a series of baffle-plates 31 in its interior to insure a fairly even distribution of the air pressure throughout the length of the nozzle, these baffle-plates being desirably struck up from sheet-metal lining-plates 32. Each nozzle is provided with an upstanding ear 33 to which is connected a pendent yielding link or cable 34, these links being attached to arms 35 carried by the shaft 36. The shaft 36 is adapted to be rocked by means of a hand-lever 37 to thereby raise the nozzles temporarily off the fabric, a suitable rack and spring-bolt arrangement being employed to lock the lever 37 in its adjusted position. To permit the nozzles to be thus raised as a group, the pipe 27 is arranged to slightly rotate in its support, or the couplings 26 may be made slightly flexible for this purpose.

Another set of nozzles 24′ is employed at a point farther back in the apparatus. These nozzles are constructed in the same manner as the nozzles 24 and are connected in the same manner with a common suction-pipe 27′. This set of nozzles may be raised and lowered by means of links 34′, rock-shaft 36′ and link 38, the forward end of which

is connected to arms carried by the aforesaid rock-shaft 36. In this way, the set of nozzles 24′ may be raised simultaneously with the forward set 24. The nozzles 24′ engage the fabric just over a main supporting-roller 39, the fabric being bent over the top forward side of the roll by means of a pair of smaller loose rolls 40 held down by coil-springs 41. The object in bending the fabric as it passes over the roll under the nozzle 24′ is to open up the threads of the fabric at the point of suction, to thereby insure thorough cleaning.

A rotary brushing roller 42 for opening up the nap of the fabric may be employed at a point between the two sets of nozzles. At a point beyond the nozzles 24′, I subject the fabric to a washing operation. For this purpose, I provide a soap-box 43 having a perforated bottom arranged to deliver soap to the upper surface of the fabric being cleaned. At a point beyond the soap-box, I provide two transverse rows of scrubbing-brushes 44 which operate directly on the fabric, the fabric being supported at this point by a scrub-board 45. These rotary scrub-brushes are normally held down against the fabric by coil-springs 46 surrounding their respective shafts, and the shafts are suitably driven by overhead gearing.

Back of the scrub-brushes is arranged a transverse scraper 47 adapted to scrape the suds off the fabric in any suitable manner; preferably, the scraper is V-shaped so as to deflect the suds to the edges of the belt to be there received and conducted away in any suitable manner, preferably by side troughs 47′.

At a point behind the scraper, I mount another series of nozzles 24^2 which are constructed and arranged to be adjusted in the same manner as with the other set of nozzles. These nozzles, however, are supplied with a disinfectant, preferably formaldehyde. This disinfectant is desirably supplied to the nozzles in combination with steam through the medium of a steam-pipe 48. These disinfecting nozzles 24^2 are applied to the fabric at a point where they turn down over the rear side of the large roller 49, the fabric being forced to bend around the surface of this roller by means of a pair of spring-actuated rollers 50 similar to the pair of rollers 40. In this way, the fabric has its interstices opened up for the reception of the disinfectant carried by the steam. The nozzles 24^2 are adapted to be raised and lowered through the medium of mechanism similar to that provided for raising the other sets of nozzles. I desirably provide an additional scraper 51 at a point beyond the disinfecting nozzles and also desirably provide an additional brushing-roller 52 at the exit-end of the apparatus.

The soap-box 43 is divided by transverse partitions 53 into four compartments to accord with the number of nozzles in each group of nozzles; the object of this is to eliminate that portion of the soap-box that is not needed when narrower carpets and rugs are being treated. Vertical valve filling-pipes 54 are provided for the compartments and these pipes are connected to a common supply-pipe 55. If desired, the top of the soap-box may be closed, as shown, and air may be introduced through the pipes 55—54 or separate pipes (not shown) for the purpose of bringing a slight air-pressure to bear upon the surface of the suds or soapy water in the compartments, to thus insure a comparatively uniform supply of suds through the perforated bottom 56 of the suds-box.

It will be understood that the nozzles 24, 24′, 24^2 rest gravitatingly on the fabric being cleaned, so as to automatically adjust themselves to the varying thicknesses of the fabric. The lifting devices shown are for the purpose of throwing out and holding out of operation any set of nozzles desired. It will be understood that the gearing for driving the scrubbing-brushes 44 may be so arranged that any one or all of the scrubbing-brushes may be thrown out of operation by means of clutches or otherwise, if it be desired, when treating narrow goods, to stop the operation of some of the brushes. Any simple gearing may be employed for driving the vertical shafts 57 of the scrubbers; I show common transverse shafts 58 provided with bevel-gears 59 meshing with bevel-pinions 60 carried by said vertical shafts 57. It will be understood also that instead of scrapers 47 and 51, I may apply at these points suitable air-suction nozzles such for instance as 24 and 24′.

Referring to Fig. 8, it will be seen that bracket 20 is secured to the canvas belt 10 by suitable screws engaging through clamping plates 61 located on the outside of the canvas belt and apertured plates 62 secured to the top side of the bracket, the apertures in said plates 62 being located to receive the free ends of the hooks 18, thus providing a metal reenforcement to resist the strains of the pull of the carpet to be cleaned.

After the carpet passes under the rear idle roller 17, it then passes between nozzle 24 and a fixed pipe 17′ which is provided with apertures in its upper side preferably arranged in staggered relation to each other. This pipe 17′ is adapted to supply compressed air to the carpet, which is forced through the small apertures therein and through the carpet as it passes over the pipe. The purpose of the small idle roller 17 is to bend the carpet around the pipe to open the grain or nap thereof. Thus at this point is furnished a blast of air in opposite directions through the carpet from the nozzles 24 and pipe 17′, thereby practically

dislodging all of the loose dirt before the carpet reaches the canvas carrying belt. The carpet then passes into engagement with the brush-roller 42 which is a cylindrical spiral burnisher, preferably made of horse-hair, the bristles being approximately two and one-half inches long. This hair roller brushes and loosens the adhering dirt from the nap of the carpet, and the same is withdrawn through the suction-nozzle 24'. The floating dust in the cleaner is removed by the suction-fan 63 mounted at the top of the casing. It is understood that the suction means for the nozzle 24' must be more powerful than that of fan 63. All of the nozzles 24, 24' and 24^2 are supported by springs 64, so that, while making contact with the carpet, they will not bear too heavy and retard the movement thereof. Preferably the springs supporting nozzles 24' are much stronger than the other springs, as these nozzles are suction nozzles, and when the suction is being exerted will cling to the carpet unless counter-balancing means are provided such as the strong springs.

Brushes 42 and 52 are positively driven at the same speed, preferably by a belt 65 engaging pulleys 66 on the ends of the shafts outside of the casing.

The casing at the front end is provided with a vertically slidable door 67 which is used to cover the entrance slot after the rear edge of the carpet or rug has passed therethrough, and at the exit end of the casing is provided a heating coil 68 to assist in drying the carpet after it has passed the rear brush 52.

The nozzles are provided with separate lip-members 69 which are adjustably secured to flanges 70 formed on the broadened heads 30. These lips are preferably made of white metal and are adjustable to and from each other to vary the width of the nozzle discharge and suction slots.

To permit the group of nozzles 24' to be used as either suction or force nozzles, a suction-pipe 71 is also connected to the pipe 27', and a control valve 72 is located at a point in the line to either connect said suction pipe 71 or supply pipe 29 to said pipe 27'. By this means, it is possible to change the method in a short time from a vacuum to a force cleaning process, or also using both the vacuum and force in separate groups of nozzles.

What I claim is:

1. In an apparatus of the class described, an endless flexible conveyor approximately as wide as the apparatus for supporting the full width of the fabric to be cleaned and provided with means for attaching the advance edge of the fabric thereto, means for supporting and moving said conveyor, means in front of the conveyor for blowing a blast of air through a portion of the fabric before it reaches the conveyor, a brushing-roller mounted over the conveyor adjacent its front end, a series of suction-nozzles mounted to the rear of said brushing-roller for removing the dirt loosened by the brushing-roller, and separate means to the rear of said suction-nozzles for scrubbing, scraping and drying the fabric while on the conveyor.

2. In an apparatus of the class described, an endless flexible conveyor approximately as wide as the apparatus for supporting the full width of the fabric to be cleaned and provided with means for attaching the advance edge of the fabric thereto, transverse end-rollers for supporting the ends of the endless conveyor, a main supporting-roller located intermediate the said end-rollers, a spring-pressed loose roller mounted in front of said main supporting roller and in a lower horizontal plane to guide the fabric upward over the main supporting roller to open the nap of the fabric, a series of pivoted suction-nozzles adapted to engage the fabric above the main supporting roller where the nap of the fabric is open, a brushing-roller intermediate the main supporting roller and the front end roller, an air-blast means in front of the front end roller, and separate means to the rear of said suction-nozzles for scrubbing, scraping and drying the fabric while on the conveyor.

3. In an apparatus of the class described, an endless flexible conveyor approximately as wide as the apparatus for supporting the full width of the fabric to be cleaned and provided with means for attaching the advance edge of the fabric thereto, transverse end-rollers for supporting the ends of the endless conveyor, an intermediate roller and associated means between the said end-rollers to bend the fabric to open the nap thereof, a suction device operating on the fabric where the same is opened by said intermediate roller, a scrub-board located between said intermediate roller and the rear end-roller to support a portion of said endless conveyor and fabric in its passage through the apparatus, a washing mechanism including a soap-dispenser mounted above said scrub-board in position to operate on the top-side of the fabric, means for scraping the fabric located to the rear of the washing mechanism, and means in advance of the washing mechanism for removing dirt from the fabric while being borne by the endless conveyor.

4. In an apparatus of the class described, an endless flexible conveyor approximately wide as the apparatus for supporting the full width of the fabric to be cleaned and provided with means for attaching the advance edge of the fabric thereto, transverse end-rollers for supporting the ends of the endless conveyor, a front intermediate roller and a rear intermediate roller between

said end-rollers and means associated with each of said rollers to bend the fabric to open the nap thereof, a series of suction-nozzles to remove the dirt from the fabric mounted above said front intermediate roller where the carpet is bent to open the nap thereof, a series of nozzles above the said rear intermediate roller to inject a disinfectant to the fabric where it is bent and the nap of the fabric open, a washing mechanism between the disinfectant and suction nozzles, and a scrub-board located within the endless conveyor and beneath the washing mechanism to rigidly support the flexible conveyor and fabric while it is being washed.

5. In an apparatus of the class described, an endless flexible conveyor approximately as wide as the apparatus for supporting the full width of the fabric to be cleaned and provided with means for attaching the advance edge of the fabric thereto, transverse end-rollers for supporting the ends of the endless conveyor, a front intermediate roller and a rear intermediate roller between said end-rollers and means associated with each of said rollers to bend the fabric to open the nap thereof, a series of suction-nozzles to remove the dirt from the fabric mounted above said front intermediate roller where the carpet is bent to open the nap thereof, a series of nozzles above the said rear intermediate roller to inject a disinfectant to the fabric where it is bent and the nap of the fabric open, a washing mechanism between the disinfectant and suction nozzles, a scrub-board located within the endless conveyor and beneath the washing mechanism to rigidly support the flexible conveyor and fabric while it is being washed, and a brushing-roller mounted over the endless conveyor at the exit-end of the apparatus.

6. In an apparatus of the class described, an endless conveyor approximately as wide as the apparatus for supporting the full width of the fabric to be cleaned and provided with means for pulling the fabric therewith, two transverse series of pivoted nozzles for treating the fabric during its passage through the apparatus, each intermediate nozzle of each series being provided with means at its ends for detachably connecting it to adjacent nozzles, a washing mechanism including a soap-dispenser located between said two separate series of nozzles, said soap-dispenser being divided into a number of compartments corresponding to the number of nozzles contained in each series, and a scraping means to the rear of said washing mechanism, for removing the soap-suds.

7. In an apparatus of the class described, an endless conveyor approximately as wide as the apparatus for supporting the full width of the fabric to be cleaned and provided with means for pulling the fabric therewith, a plurality of transverse series of pivoted nozzles for treating the fabric during its passage through the apparatus, means for removably connecting the individual nozzles of each series together, and counter-balancing means connected to each series of nozzles to enable them to rest lightly upon the surface of the fabric to be cleaned and prevent them from bearing hard upon the fabric and impede the movement thereof.

8. In a carpet-cleaning apparatus, means for continuously moving the carpet, and pneumatic means for cleaning the same while so moving, embodying a gravitationally-contacting nozzle and means including a supporting link for raising and lowering it with respect to the carpet, and a suspension spring for the nozzle adapted to resiliently counter-balance the nozzle when lowered to its use position to thus insure a light resilient contact with the traveling fabric.

In testimony whereof I hereunto affix my signature.

EUGENE A. THOMAS.