

[54] **CLEANING APPARATUS FOR FLOOR COVERINGS**

[72] Inventor: **William Joel Reginald Edlin**, P. O. Box 1321, Palmerston North, New Zealand

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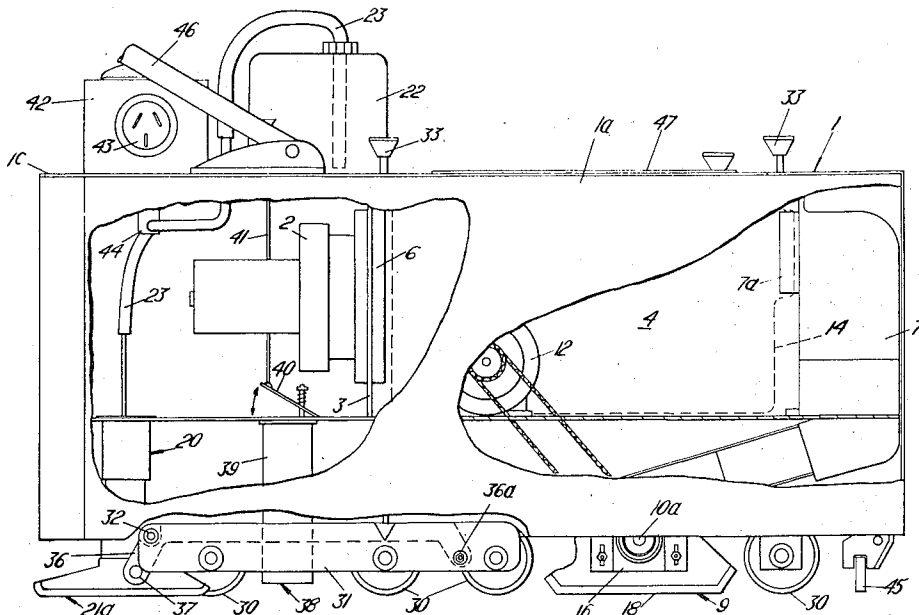
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Primary Examiner—Walter A. Scheel  
 Assistant Examiner—C. K. Moore  
 Attorney—Holman & Stern

[57] **ABSTRACT**

A cleaning apparatus for floor coverings such as carpets in which a suction creating means such as a fan or fans is supported by a casing and adapted to draw air through an intake orifice. A brush is provided in or within the vicinity of the orifice and is capable of contacting and brushing a floor covering. There is also a chamber adapted to receive cleaning fluid and a large volume of air under pressure, with the cleaning fluid and air forming foam within the chamber. The foam produced in the chamber is delivered through an outlet to the floor covering for cleaning purposes. The arrangement is such that when the apparatus is moved over the floor covering, the brush can be operated to remove unwanted matter from the floor covering, both cleaning fluid and air can be delivered to the chamber and a comparatively dry foam produced, with the foamed cleaning fluid delivered to and deposited on the floor covering, and the brush moved over the covering to brush the covering and simultaneously the suction means remove loosened dirt from the covering.

**6 Claims, 13 Drawing Figures**



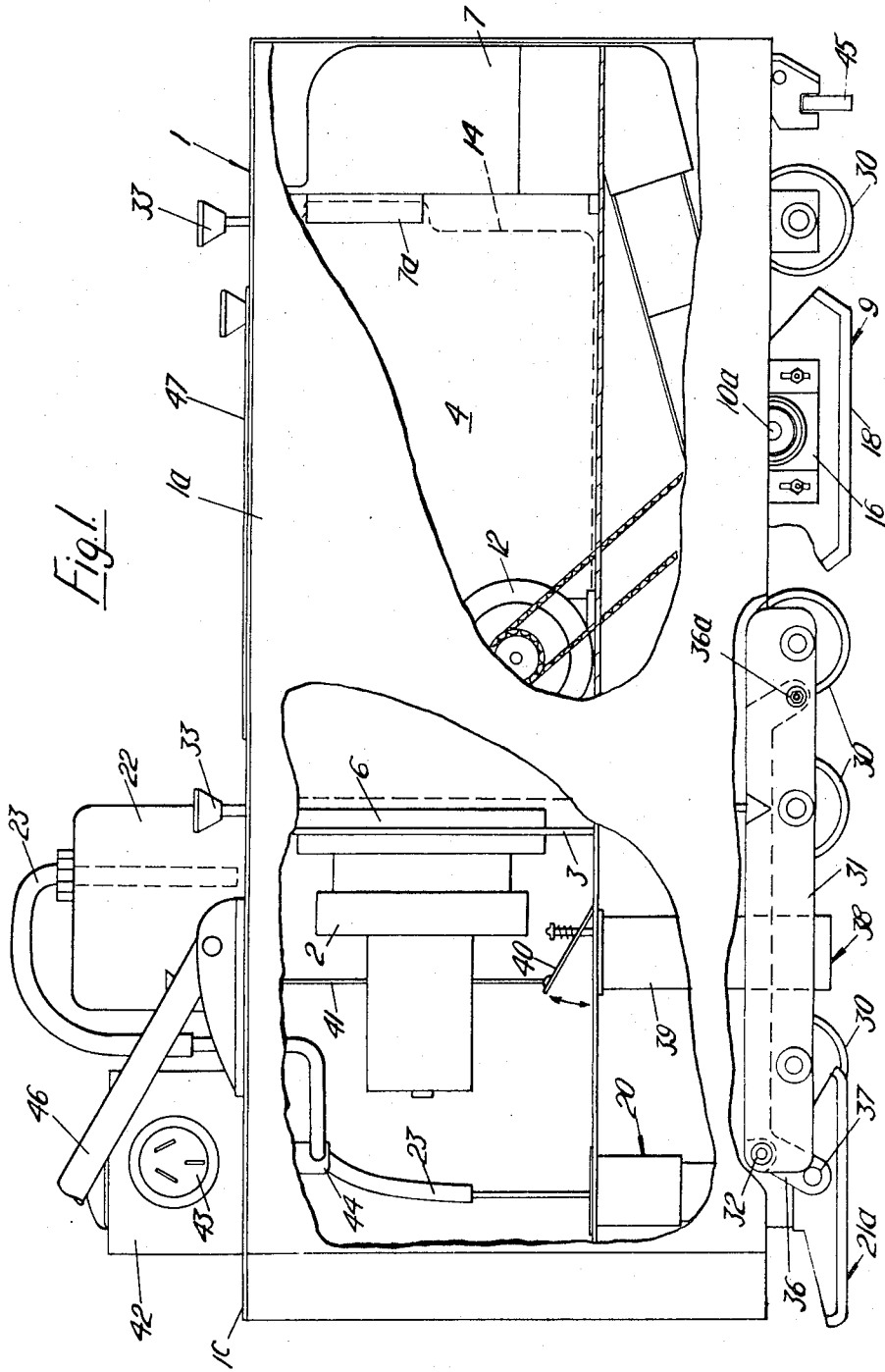
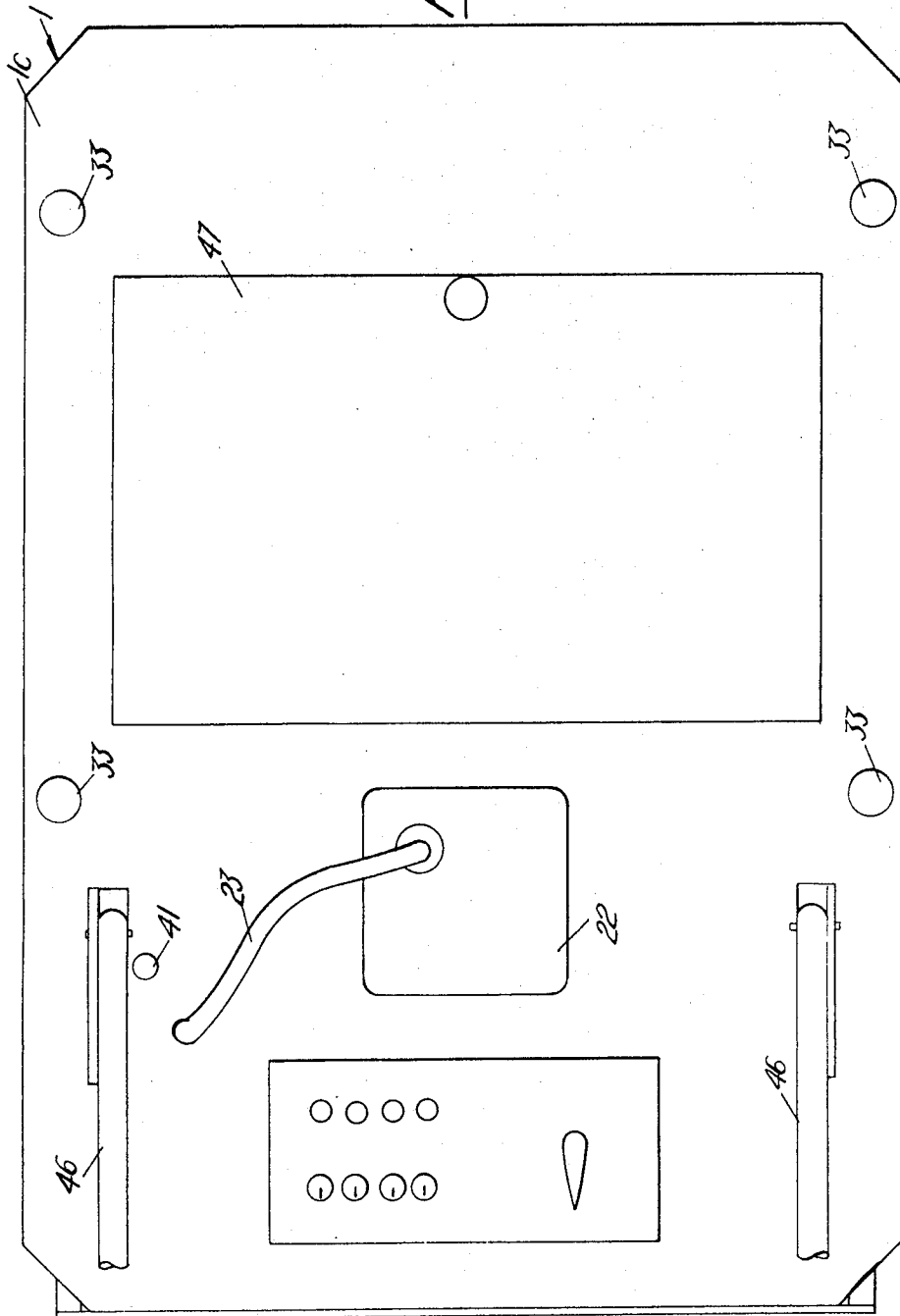
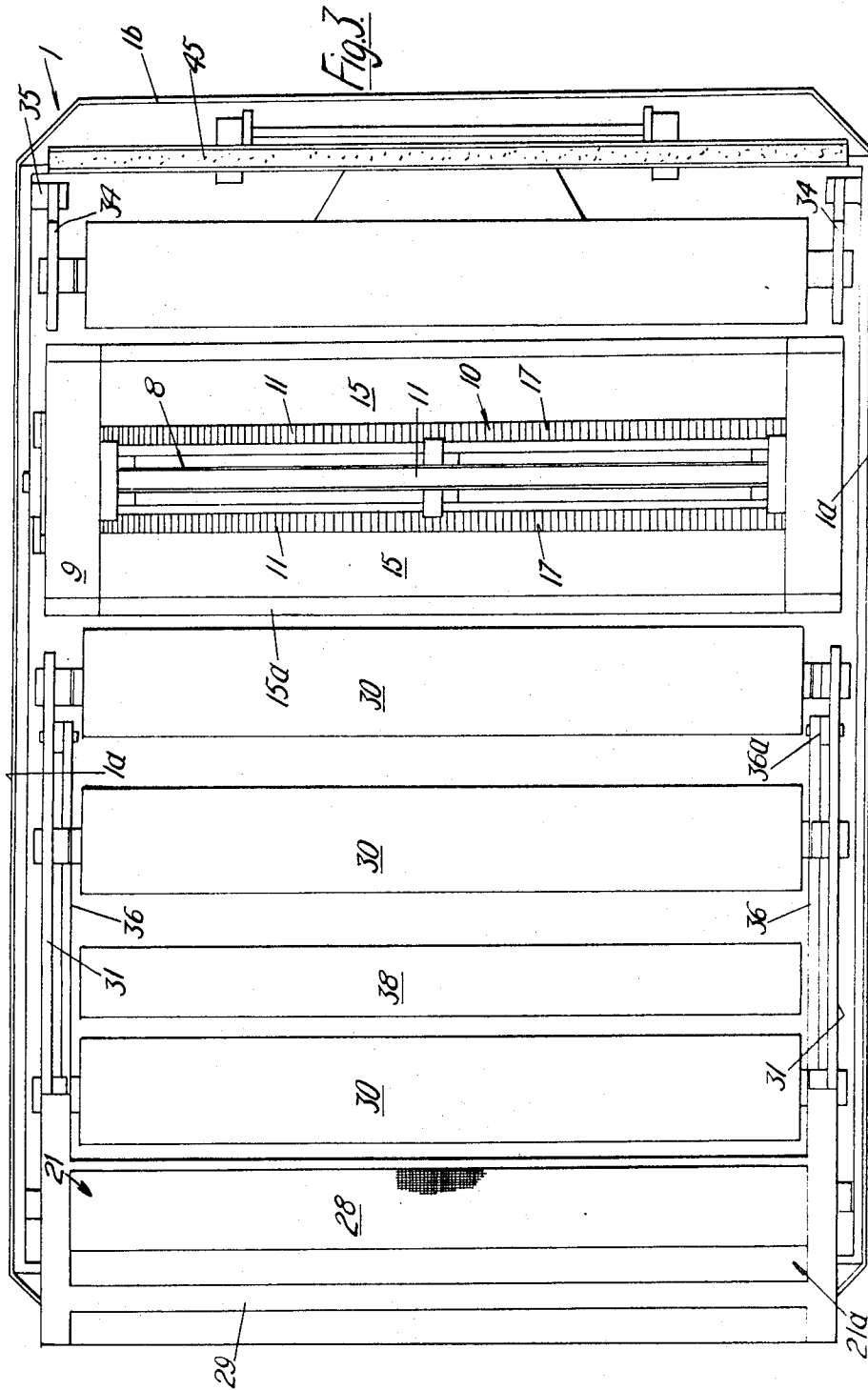
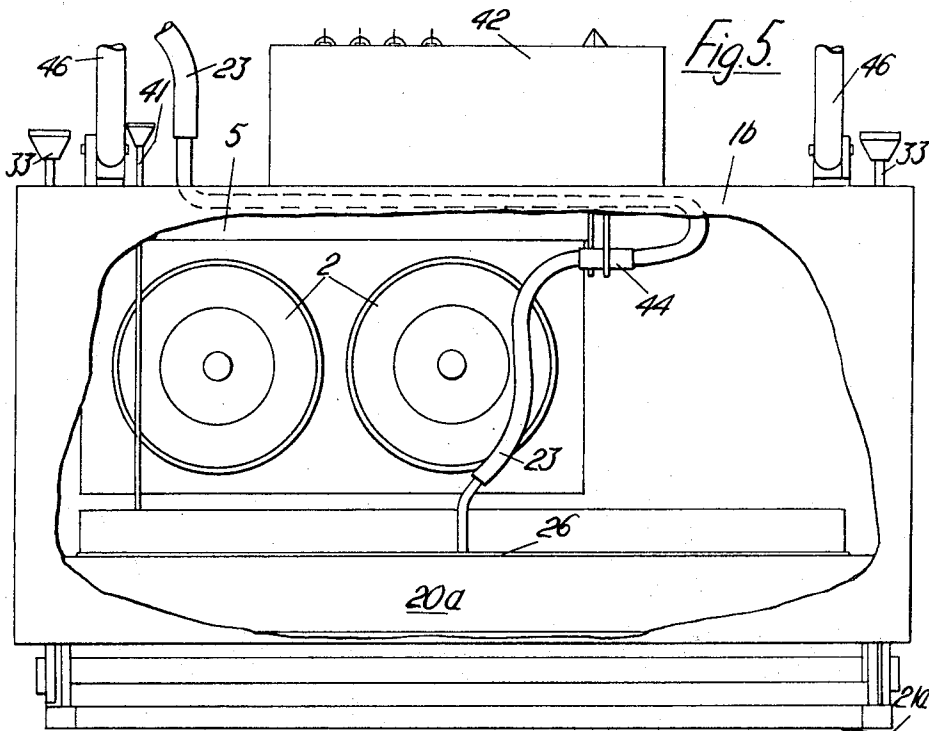
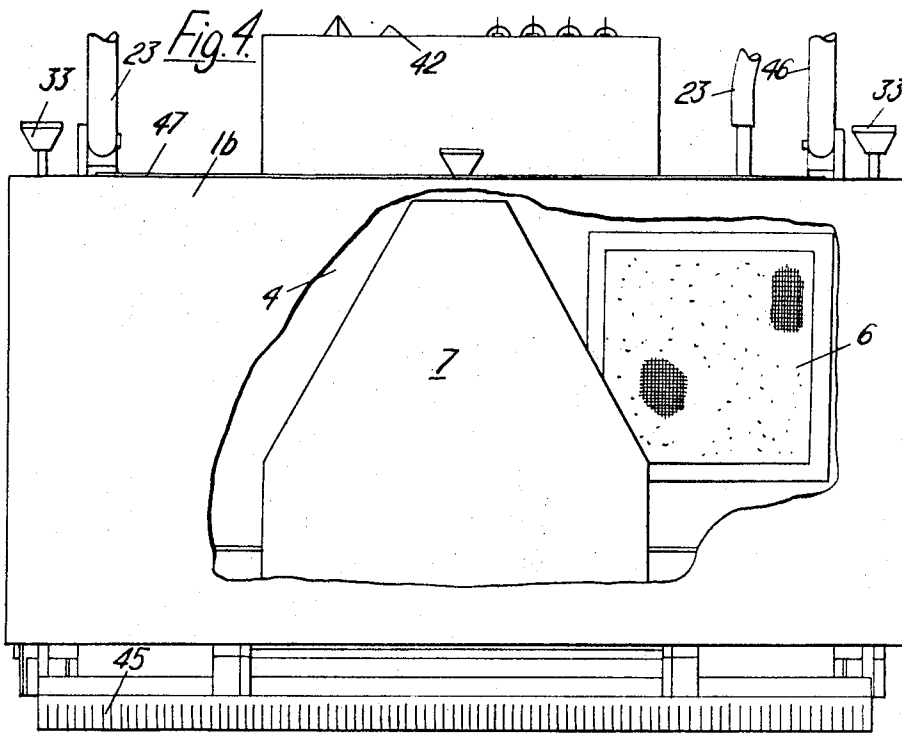
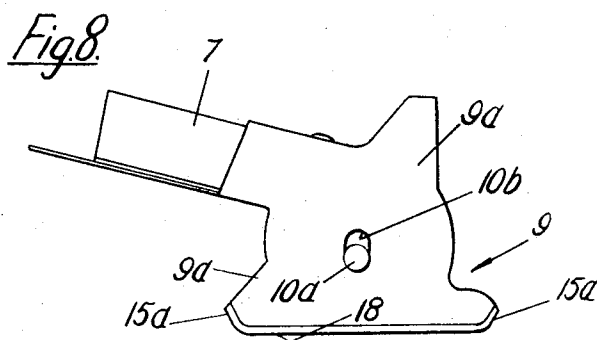
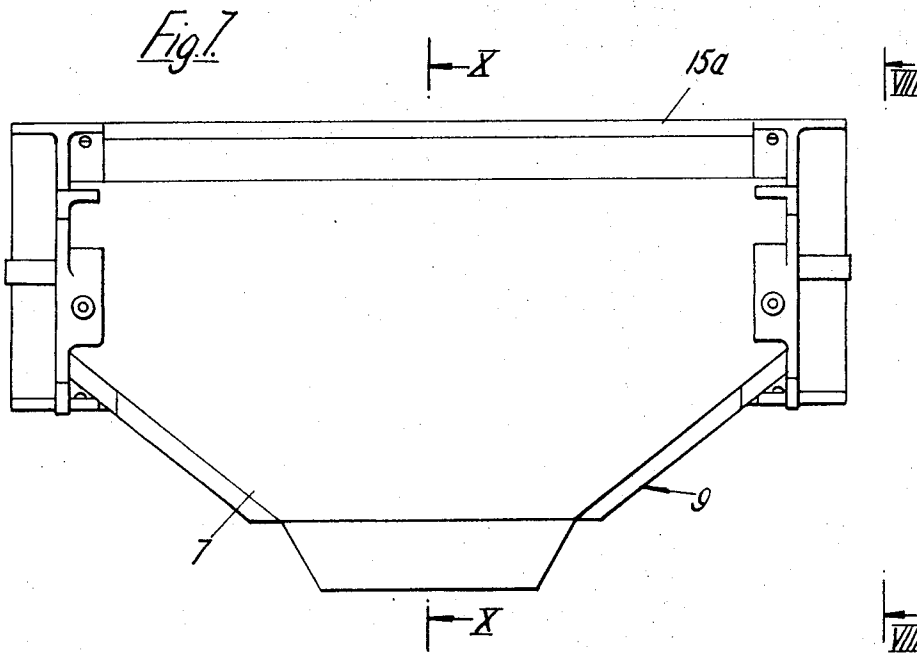
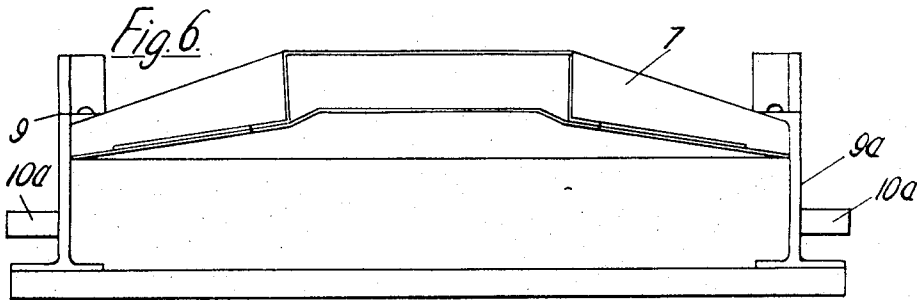


Fig 2

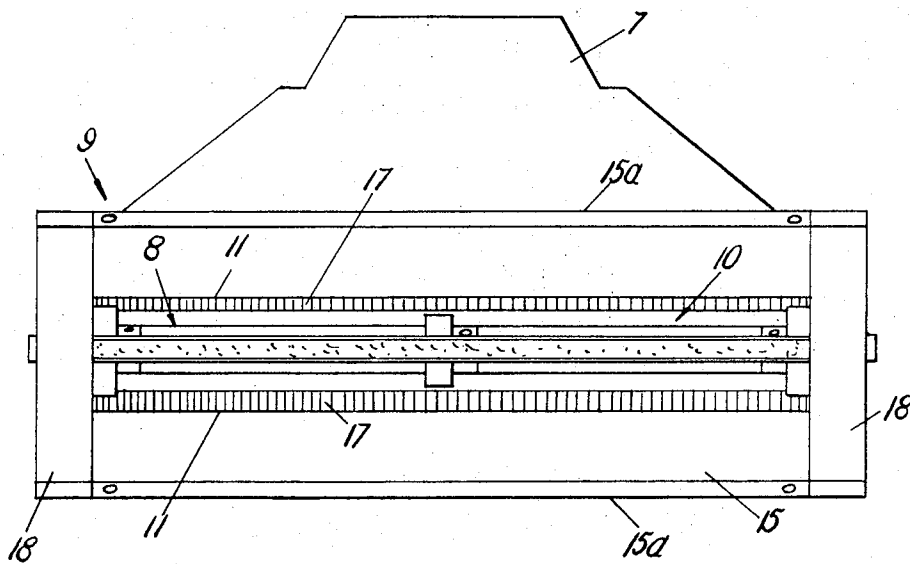




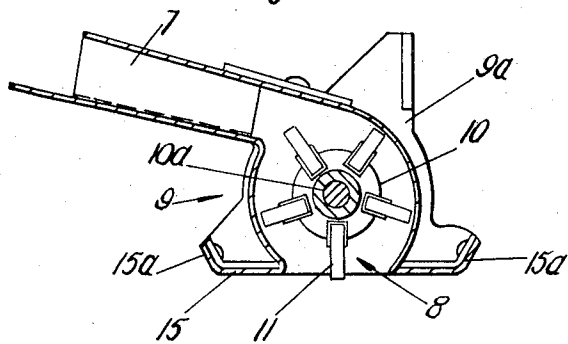


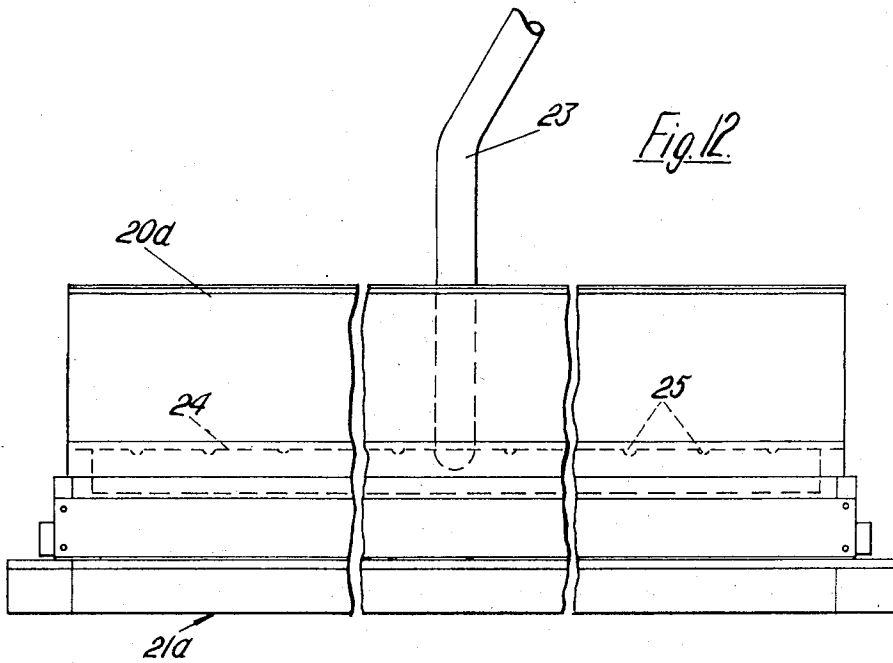
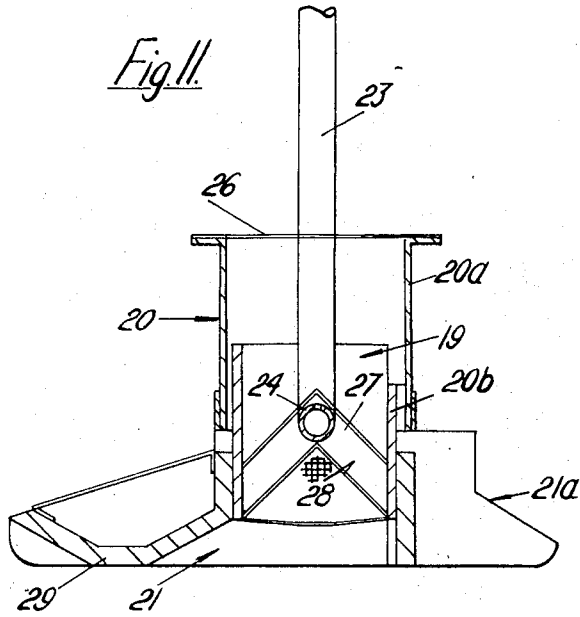


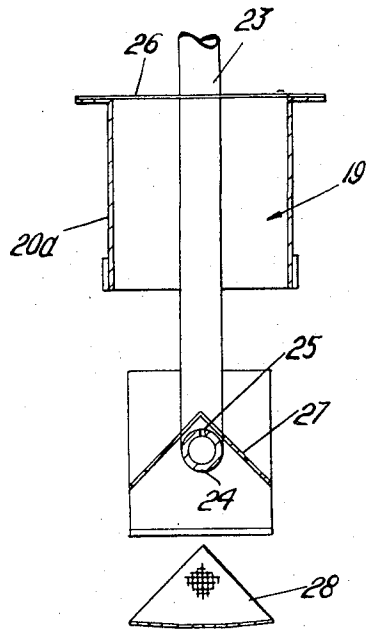
*Fig. 9*



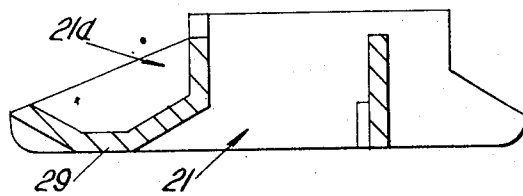
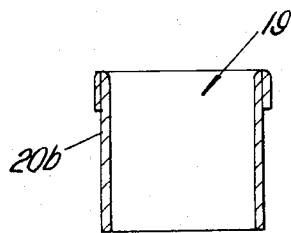
*Fig. 10*







*Fig. 13.*



## CLEANING APPARATUS FOR FLOOR COVERINGS

## BACKGROUND OF THE INVENTION

This invention relates to cleaning apparatus for floor coverings, and has particular relationship with apparatus which is constructed and adapted for use in cleaning floor coverings such as carpets or like coverings of textile material or synthetic materials by applying a cleaning fluid to the covering and brushing the covering to remove dirt and other particles therefrom.

It is an object of this invention to provide cleaning apparatus for floor coverings of the kind described, which apparatus in combination provides means for initially removing dirt and particles from the floor prior to applying a cleaning fluid, and then following through with a cleaning operation involving the use of a cleaning fluid and a brushing action and suction effect applied to the covering.

## SUMMARY OF THE INVENTION

Accordingly, by this invention there is provided cleaning apparatus for floor coverings of the kind described, comprising a casing supporting a suction creating means, a downwardly facing intake orifice in communication with the suction means, a brushing means located in or within the vicinity of the orifice and adapted to contact the floor covering to be cleaned, means for delivering a cleaning fluid including means for feeding cleaning fluid to a chamber associated with the casing, means whereby air under pressure can be delivered to said chamber and means whereby the casing can be moved over the floor covering, the arrangement being such that when the apparatus is moved over the floor covering, the suction means and the brushing means can be operated to remove unwanted matter from the floor covering, both said cleaning fluid and said air under pressure can be delivered to the chamber and foam produced, with the foamed cleaning fluid delivered to and deposited on the floor covering, and the brushing means moved over the covering to brush the covering and simultaneously the suction means removes loosened dirt from said covering.

According to another aspect of this invention, there is provided cleaning apparatus for floor coverings of the kind described, comprising a casing supporting a suction means in the form of at least one fan adapted to draw in air through an intake orifice, a rotatable brush mounted inwardly of the orifice and capable of contacting a floor covering to be cleaned, means for driving the brush, a reservoir for cleaning fluid supported by the casing, a conduit leading from the reservoir to a chamber capable of both receiving the cleaning liquid and receiving air when exhausting from the fan such that air is suspended in the liquid, means for controlling the delivery of said liquid and said air to the chamber, and an egress orifice through which a foam comprising the air suspended in the liquid can forcibly be egressed from the chamber onto a floor covering to be cleaned.

According to a still further aspect of this invention, there is provided cleaning apparatus for floor coverings of the kind described, comprising a casing in which is housed a suction means in the form of at least one electrically driven fan adapted to draw air through an air intake located at the lower side of the casing, a rotatable brush mounted within the air intake and capable of contacting a floor covering to be cleaned, means for rotating the brush, such that the contact with the floor covering is a beating contact, a reservoir for cleaning fluid which reservoir is in controlled communication with a mixing chamber capable of both receiving said liquid and receiving air exhausting from the fan such that a foam is produced within the chamber, an outlet from the chamber through which the foam when produced can forcibly be egressed onto a floor covering to be cleaned, and means whereby air exhausting from the fan can be caused to blow onto the floor covering.

In one form of the invention, the casing is formed as an open bottomed box-like structure, rectangular in shape, and of

dimensions sufficient to accommodate the components required to be or desirably accommodated within the interior of the casing. Additional access means to the interior of the casing may be provided for by means of access openings with or without closure means.

The suction creating means may be in the form of a fan or fans or like mechanical air moving devices preferably driven by an electric motor or motors mounted within the casing or on top of the casing as desired. In one embodiment, the fan creates a reduced pressure of air within a chamber from which leads one or more conduits which in turn lead to the intake orifice which is located preferably at the underside of the casing, although it will be appreciated that the orifice may be located outside the casing in an adjacent housing or nozzle. Preferably, the orifice is located in a nozzle section which is also adapted to accommodate the brush. The brush is rotatably mounted within the orifice in a manner such that the brush can be rotated so that its bristles sweep over the orifice and in so doing protrude from the orifice. The orifice as will be appreciated is preferably an elongate orifice extending transversely of the apparatus and the brush accommodated therein also extends transversely of the apparatus. The brush is driven by an electric motor, which motor may be the motor adapted for driving the suction means or alternatively a separate motor. The location of the axis of the rotatable brush in relation to the orifice within the nozzle is such that a clearance is provided between the tips of the bristles of the brush and the trailing lip of the orifice such that the possibility of a "cutterbar effect" as in lawn-mowers is eliminated. The foregoing arrangement is such that when the suction means is brought into operation and the brush is caused to rotate, the brush in contacting the floor covering loosens dirt and other matter, which dirt and matter is drawn through the intake orifice and into a suitable receptacle which may be located within the casing and more particularly the chamber. The receptacle may take the form of a bag or like container having its walls impervious to dust and the like, but pervious to air.

Preferably, the combination of intake orifice and brushing means is located at or near one end of the casing, preferably at that end of the casing which will be the forward end of the casing, and, the chamber receiving the cleaning fluid and the air under pressure is located at or near the rear end of the casing and is spaced from the brushing means. Preferably, the chamber adapted to receive cleaning fluid is within a housing of oblong dimensions transversely disposed within the casing and leading to an egress orifice through which the foamed cleaning fluid is delivered to and deposited on a floor covering. A reservoir for containing cleaning fluid is supported by the casing, and from the reservoir to the chamber there is lead a pipe or like conduit. A suitable valving means or like control for controlling passage of fluid from the reservoir to the chamber is incorporated in the apparatus.

Preferably, the conduit leading from the reservoir terminates in a pipe or like hollow member disposed lengthwise of the chamber, i.e. transversely of the casing, and preferably in an upper region of the chamber. The delivery conduit leads to a central portion of the transverse pipe and has access thereto. Preferably, the pipe along its length is provided with apertures spaced at intervals therealong, which the apertures providing egress means for cleaning fluid from the transverse pipe such that cleaning fluid may be distributed for substantially the full length of the chamber. Preferably, the apertures in the pipe face upwardly rather than downwardly such that when fluid leaves the pipe, the fluid will not tend to fall directly to the orifice leading from the chamber, but will eject upwardly from the pipe into the upper region of the chamber. Means for supplying air under pressure to the chamber is provided, and such means may take the form of a fan or like mechanical device for displacing air and/or compressing air, and preferably use is made of the air exhausting from the suction means when the apparatus is in use. During the operation of the machine, the air under pressure is delivered to the chamber and on reaching the chamber intermingles with the

cleaning fluid such that a suspension of air in a liquid is produced in the chamber. It is believed that barriers of gauze material located both above the transverse pipe in the chamber and also below said pipe will improve the foam making effect. The air under pressure passes downwardly through the upper gauze barrier, which barrier also serves to contain the foam within the chamber and prevents upward egress therefrom, which the foam when formed, then passing through the lower gauze barrier to the orifice from which it is deposited on a floor covering.

Preferably, the orifice through which the foam is egressed is provided either forwardly or rearwardly or both forwardly and rearwardly with a rim, each of which is upturned at its outer margin such that the nozzle in which the orifice is formed may pass smoothly over a floor covering. If desired, the forward and rearwardly extending rims of the orifice or nozzle may be swivelled in relation to the chamber such that the rims act as shoes which will follow closely the contours of the surface over which the apparatus is moved.

Preferably, the housing for the chamber is formed in two parts such that the lower part of the chamber housing can slide upwardly or downwardly in relation to the upper part of the chamber. This may be obtained by extending the walls of the lower part of the chamber housing such that they extend into the upper chamber, which a telescopic effect being thereby provided such that when the apparatus is moved over an undulating or other than a flat surface, the maintenance of close proximity of the nozzle or orifice to the floor covering is further improved. The upturned rims to the orifice or nozzle also serve to prevent the gathering of deposited foam from a floor covering such as a carpet when the machine is being moved thereover.

The suction nozzle and brush combination preferably comprises a nozzle having a hollow substantially cylindrical portion capable of being connected to a suction cleaning apparatus and positioned such that the longitudinal axis of the cylinder is parallel with a surface over which the apparatus is to be moved and transverse to the direction of movement of the apparatus, an elongate orifice in the lower side of the cylinder which orifice extends lengthwise of the cylinder and faces downwardly, two co-planar plate members, one extending rearwardly from the orifice such that the planes of the members are substantially parallel with a floor surface, with a brush member housed and rotatably mounted within the cylinder, the brush member supporting a plurality of series of bristles spaced circumferentially around the member such that when the member is rotated, each series of bristles in turn pass the orifice and impinge on the surface of a carpet over which the orifice passes when the apparatus is in use.

The hollow cylinder or housing portion of the nozzle is preferably made from some sheet material such as sheet metal, with the hollow cylinder being enclosed at each end. The upper part of the hollow cylinder is adapted for attachment to a suitable source of suction such as is supplied by a suction cleaning apparatus incorporating an electric motor and fan such that the fan is in communication with the interior of the cylinder or housing.

The orifice in the cylinder or housing is an elongate orifice of substantially oblong formation and preferably extends for the full length of the cylinder. Alternatively, the elongate orifice may stop short of each end of the cylinder.

The width of the orifice is predetermined, and may depend upon the spacing of the series of bristles supported by the brush member which is rotatably mounted within the confines of the cylinder or housing. The shaft for the brush may be provided at each end with a boss adapted to hold supports for the bristles which supports extend lengthwise of and in parallel with the rod or shaft and preferably extend for the full length of the interior of the cylinder or housing. The series of bristles are spaced at intervals around the circumference of the interior of the cylinder such that the tips of the bristles preferably are just clear of the interior surface of the cylinder or housing.

The plate members which may be considered as forming supplementary sealing means in addition to the rim of the orifice are mounted on the cylinder or housing such that one plate member extends forwardly of the cylinder or housing and the other member extends rearwardly of the cylinder or housing, such that the plate members flank the length of the orifice. If desired, the plate members may be joined at each end by portions thereof or by separate plate members and the additional portions or plate members may serve to form an attachment by means of brackets to the cylinder. The plate members flanking the orifice may be spaced a small distance from the rim of the orifice and the edge of each plate member adjacent the orifice may be provided with an upturned portion which lies in parallel with the surface of the cylinder. Likewise, each plate member at its outward edge may be formed with an inclined portion to facilitate the riding of the plate members over the surface of a carpet. The spacing between the plate members and the surface of the cylinder or housing is such that air may pass between the plate member and the outer surface of the cylinder or housing and to the orifice. An approximate gap as previously mentioned may be three-sixteenths of an inch. Alternatively, the plate members may be attached such that they meet the cylinder or housing and provide a complete seal.

The cylindrical housing further may be formed or provided with a plurality of holes leading into the interior of the housing and arranged in series, in rows along the length of the housing or arranged in clusters, in random pattern, with these holes providing for the intake of comparatively dry air into the housing which air will be additional to the moisture laden air entering by way of the orifice in the lower side. It is envisaged that said additional air drawn in through the above mentioned holes will serve to break up moisture droplets drawn through the orifice or serve to reduce the saturation point and thereby prevent or minimize precipitation and accumulation of moisture within the apparatus. It is preferred therefore that if said holes are provided then they are formed or provided in the upper parts of the housing such that they are clear of the floor covering over which the apparatus is moved and spaced from any moisture on or in the floor covering.

It is envisaged that when suction is applied, and the apparatus moved over a carpet, that area of the carpet in the way of the orifice into the suction nozzle is sucked inwardly of the orifice and into the outer confines of the cylinder or housing where said area is contacted by the rotating series of bristles. It is believed that as each series of bristles impinges on the carpet, the suction is momentarily broken permitting the carpet to return, with the action being such that as each series of bristles passes and impinges on the carpet a vibrating effect is set up i.e., the suction tends to raise the area of carpet in the way of the orifice and the bristles tend to force the carpet down again and the extra air intake tends to help break the force of suction so that in effect the carpet is vibrating rapidly. Where a brush rotation speed of 700 revolutions a minute is obtained and five series of bristles are spaced at regular intervals around the brush member, than a multiple of 3,500 is obtained thereby providing 3,500 vibrations a minute. In practice, it has been found that underfelt beneath the carpet looses its hardness and flatness and becomes thicker and softer, and this is believed to be caused by air being drawn through and repulsed by the vibrating of the carpet above it. It is preferred that the apparatus on which the nozzle and brush is mounted be supported by rollers such that the rim of the orifice and the plate members are spaced say three-eighths inch above the surface of the carpet. It is believed that the plate members serve to provide an efficient sealing means which may not be supplied by providing an orifice with a narrow rim such as would be provided by the orifice in the cylinder or housing.

The means whereby the apparatus can be moved over a floor surface, may take the form of rollers or like members rotatably mounted at the underside of the casing, and having their axes disposed transversely of the casing. It is preferred that rollers or wheels be used and mounted within the overall

dimensions of the casing so that the casing of the apparatus may be brought as close as possible to a wall or like object rising from the floor and thus ensuring that the maximum possible area of floor covering is subjected to the treatment by the cleaning components of the apparatus.

In a preferred arrangement, a pair of rollers is disposed approximately the medial length of the casing, which rollers extend across the interior of the casing and protrude from the lower side of the casing. Preferably, these rollers are mounted on a suspension capable of permitting upward and downward movement of the rollers in relation to the casing. A control for adjusting the height of the rollers may also be provided such that where desired, the casing may be lowered or raised in relation to the surface of the floor covering. Further rollers or wheels may be provided as required, for example, rollers may be disposed at the rear of the apparatus, and also at the front of the apparatus, and these rollers also may be mounted on a kind of suspension means enabling a limited amount of upward and downward movement in relation to the casing, the movement being controlled by a suitable control means.

A further feature of the invention resides in providing another orifice or nozzle leading to the under side of the casing, through which exhaust air from the suction means, or from other suitable air delivery means may be delivered to the under side of the casing and thence to the floor covering. The air so delivered may be used for assisting in drying a floor covering subsequent to the cleaning operation.

It is envisaged that the chamber and other components included in the foam making apparatus may be constructed such that the foam making apparatus may be removed from the casing if so desired and used independently of the remainder of the apparatus, with a separate means for providing air under pressure being arranged to be incorporated in the foam making apparatus.

As previously mentioned it has been found by experiment that when the present apparatus is moved over a carpet, the carpet is lifted a short distance from the floor and a vibratory effect is gained which assists in loosening the dirt and other particles in the pile of the carpet. This is gained by the particular arrangement of the brush situated within the air intake and the rim of the air intake being so constructed that it extends forwardly and rearwardly thereby presenting a substantial area to the surface of the carpet rather than just a thin rim. It is believed that the vibrations so applied restores new life to underfelt located beneath a carpet where the underfelt has been flattened.

If desired, the warm air exhausted from the suction means can be delivered to the surface of the carpet before the shampooing or cleaning operation commences such that the surface of the carpet is heated in readiness for receiving the hot shampoo in foam form. It will be appreciated that the foam is ejected at a velocity greater than that which would be caused by gravitation of the foam, and the foam thereby is blown into the carpet and efficient penetration is obtained.

The casing may be provided with a handle whereby the casing may be moved forwardly and rearwardly, and further, the casing is provided with controls for controlling each of the components so that a desired sequence of operation may be obtained i.e., controls for the suction means, the brushing means and an electric power supply leading from a source of power. Other controls for increasing the rate of suction, and also for controlling the speed of the rotating brush may be provided. It is envisaged that the suction means may be provided by more than one suction device and if so, then a control for each device may be provided. The casing may be provided with rubber or like resilient buffers and handles for lifting the casing when so desired.

At the front of the casing, there may be provided a fixed brush having its bristles extending downwardly toward and to contact the floor covering surface, with the brush being located in this position such that it combs the carpet as it passes thereover.

It will be appreciated that the locations of the components of this invention as before described, may be altered or adjusted as required and still come within the scope of the invention, for example, the positioning of the rollers, or like means for enabling the casing to be moved over a floor surface, may be altered or adjusted.

The invention will now further be described by way of example with reference to the accompanying drawings in which

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation view of the apparatus with parts of the casing thereof broken away to show the interior of the casing,

FIG. 2 is a plan view of FIG. 1,

FIG. 3 is a view of FIG. 1 from below,

FIG. 4 is a front view of the apparatus,

FIG. 5 is a rear view of the apparatus,

FIG. 6 shows in elevation a nozzle incorporating a rotatable brush,

FIG. 7 is a plan view of FIG. 6,

FIG. 8 is an end view of the nozzle shown in FIG. 6,

FIG. 9 is a view of the nozzle and brush looking from below,

FIG. 10 is a cross-sectional view of the nozzle shown in FIG. 6,

FIG. 11 shows in cross-section, components intended to receive the cleaning liquid,

FIG. 12 shows in elevation the housing for the chamber for receiving cleaning fluid, and,

FIG. 13 is an exploded view of the components shown in FIG. 11.

#### DETAILED DESCRIPTION OF THE DRAWINGS

In the drawings, the casing is shown as an open bottomed box-like indicated generally 1 having side walls 1a, end walls 1b and an upper side 1c.

The suction creating means is provided for by a pair of electric fans 2 supported on a partition 3 which divides the interior of the casing into a suction chamber 4 and a pressure chamber 5, with the arrangement of fans 2 being such that the air inlet to the fan opens into chamber 4, and the air egressing from fans 2 enters chamber 5. Reference to FIG. 4 will show a perforated or gauze material covering air inlets 6 to the fans.

From chamber 4 there leads a conduit 7 which in turn lead to an intake orifice indicated 8 in FIG. 3. Orifice 8 is located in a nozzle member indicated 9 in the drawings, and which orifice 8 faces downwardly. Orifice 8 accommodates a rotatably mounted brush 10 having its axis disposed transversely of casing 1. The arrangement of brush 10 is such that bristles 11 thereof, when passing the opening into orifice 8 protrude from said orifice. Brush 10 is driven by an electric motor 12 conveniently housed within suction chamber 4, a drive means in the form of a belt 13 connecting motor 12 and the shaft of brush 10. As will be seen, orifice 8 is in communication with the interior of chamber 4 by means of conduit 7 which, at its upper end, is adapted at 7a to accommodate the neck or opening into a receptacle, which is in the form of a bag or like container, shown in broken lines and indicated 14 in FIG. 1, with said bag or like container having its walls impervious to dust and the like, but pervious to air. As will be seen, orifice 8 in nozzle 9 is located near one end of casing 1. More particularly, suction nozzle 9 comprises a hollow substantially cylindrical housing positioned with its longitudinal axis horizontal and having confined there within, brush 10. From two opposing sides of orifice 8, there extends sealing members 15. Nozzle 9 is movably attached in a mounting 16 on casing 1 such that said mounting is a floating one thereby enabling the nozzle to conform with any irregularities in a floor surface over which apparatus is moved. Furthermore, the shaft 10a of brush 10 is mounted in bearing holes 10b of elongate formation provided in end walls 9a of nozzle 9.

Sealing members 15 are either formed integrally with the cylindrical body of nozzle 9, or they may be separate plate

members fastened to the body of nozzle 9. These sealing members may be considered forming supplementary sealing means in addition to rim 17 of orifice 8. As will be seen, one sealing member 15 extends forwardly and the other sealing member 15 extends rearwardly such that they flank the length of orifice 8. Sealing members 15 are joined at each end by portions 18 which are attached to sides 9a of nozzle 9. Each member 15, at its outer edge, is formed with an inclined portion 15a to facilitate the riding of nozzle 9 over a floor surface when the apparatus is in use.

It will be noted that the bristles 11 of brush 10 are spaced at intervals circumferentially of shaft 10a, with the bristles extending lengthwise of brush 10 and in line with the axis thereof. This arrangement is preferred to one having the bristles in a spiralled formation because of the beating effect gained when brush 10 is rotating, which beating effect is put to good use when cleaning a carpet.

The means for distributing cleaning fluid to a floor surface such as a carpet, is located at the rear end of casing 1 and thereby spaced from nozzle 9. The means for delivering cleaning fluid include a chamber 19 located within a housing 20 of oblong dimensions transversely disposed within casing 1 and leading to an egress orifice 21 through which the foamed cleaning fluid can be delivered to and deposited on a floor covering. There is provided a reservoir 22 for containing cleaning fluid, which reservoir 22 is conveniently supported on the upper side of casing 1. Connecting reservoir 22 with chamber 19 is a pipe 23. As will be seen from Figures 11 and 12, pipe 23 at its lower end terminates in a further pipe 24 disposed lengthwise of chamber 19 i.e. transversely of casing 1. Delivery pipe 23 leads to a center portion of transverse pipe 24 and has access thereto. Pipe 24 along its length is provided with apertures spaced at intervals, with said apertures providing egress means for cleaning fluid from pipe 24 such that cleaning fluid so egressed can be distributed for substantially the full length of chamber 19. The apertures, shown in broken lines in FIG. 12 and indicated 25, face upwardly such that when fluid leaves pipe 24, said fluid will not tend to fall directly to orifice 21 leading from chamber 19, but will eject upwardly from pipe 24 into the upper region of chamber 19 before falling downwardly towards and to orifice 21. The means for supplying air under pressure to chamber 19 is provided for by utilizing air discharged by fans 2. Said air is delivered to chamber 19 by way of upper side 26 of housing 20, which upper side 26 is of perforated material or gauze material thereby permitting access of air under pressure into the confines of chamber 19. As will best be seen from FIG. 1, upper side 26 of housing 20 faces into the confines of chamber 5 receiving air from fans 2 such that said air can egress from chamber 5 into chamber 19 in which the air will intermingle with cleaning fluid when said fluid is delivered to chamber 19 by way of apertures 25 in pipe 24 such that a suspension of air in a liquid fluid obtains in chamber 19, which foam when formed passes outwardly through orifice 21 and is deposited on a surface to be cleaned. Barriers of gauze or perforated material are located above and below transverse pipe 24, such that air under pressure passes downwardly through upper barrier 27, which barrier also serves to contain foam within chamber 19 and prevent upward egress therefrom, with the foam when formed, then passing through lower barrier 28 to orifice 21.

Orifice 21 is provided with a shaped rim 29 which enables nozzle 21a, in which orifice 21 is formed to pass smoothly over a floor covering.

As will be seen from FIGS. 11 and 13, the housing for chamber 19 is formed in two parts, namely an upper part 20a and a lower part 20b such that lower part 20b can slide upwardly or downwardly in relation to upper part 20a. As will be seen, a telescopic arrangement is thereby provided, as part 20b is able to slide within the interior of part 20a, and this arrangement accommodates undulations in surfaces over which the apparatus is moved.

The means whereby the apparatus can be moved over a floor is in the form of rollers 30 rotatably mounted at the underside of casing 1 and having their axes disposed transversely of casing 1. As will be seen, in example shown in the drawings, a pair of rollers 30 is disposed approximately at medial length of casing 1, which rollers extend across the interior of casing 1 and protrude from the lower side of casing 1. Said pair of rollers 30 together with an additional roller 30 situated at the rear of the casing, are mounted on suspension members 31 pivotally attached at 32 to casing 1, which suspension permits upward and downward movement of said rollers 30 in relation to casing 1. Control 33 is provided for adjusting the position of rollers 30 and suspension 31 in relation to casing 1. Roller 30 located at the forward end of casing 1 also is mounted on pivotal suspension members 34 pivotally attached at 35 to casing 1. As will be seen from FIGS. 1 and 3, the nozzle 21a accommodating orifice 21 and lower portion 20b of housing 20 is pivotally attached at 37 to ancillary suspension members 36 pivotally attached at 36a to suspension members 31.

A further orifice or nozzle 38 is provided, which orifice is presented to a floor surface over which the apparatus is moved. As will be seen from FIG. 1, orifice 38 leads from a conduit 39 which, at its upper end, has a controlled communication with chamber 5. This communication is provided for by a hinged flap member 40 operated by control rod 41 having its upper end conveniently located above casing 1. When desired, flap member 40 may be hinged into an open position such that air under pressure when present in chamber 5 may be exhausted to orifice 38. It will be appreciated that when flap 40 is closed, then pressurized air in chamber 5 will be available for delivery to chamber 19, otherwise, the pressurized air present in chamber 5 is exhausted through conduit 39.

Conveniently, casing 1 is provided with a handle 40 whereby the apparatus may be moved forwardly and rearwardly. A control box 42 is mounted on the casing, and the control box has a connection 43 for connecting to a source of electric power. The control box accommodates controls for varying the speed of the brush and the electric fans, and furthermore accommodates a control 44 whereby the flow of liquid from reservoir 22 to chamber 19 is controlled.

At the front of casing 1, there is provided a fixed brush 45 having its bristles extending downwardly toward and to contact a floor covering surface being cleaned.

A lid 47 closes the access into chamber 5.

By this invention, there is provided an apparatus wherein the arrangement of the foam making components departs from known venturi systems whereby enabling a large volume of air to be delivered at low velocity to the chamber receiving the cleaning fluid such as a high expansion detergent, resulting in a continuous supply of a large volume of fine comparatively dry foam. Consequently, an excessive amount of moisture is not deposited on the carpet and this facilitates the collection of the foam and dirt from the floor covering. In the particular form of the invention described, the low velocity combined with large volume of air is essential as without a large volume of air, there would be obtained a small volume of foam which would have a wet form; with a high velocity of air, there is insufficient time for the cleaning fluid to absorb sufficient air to expand to its limit, say (approximately 160-1 by volume) 160 parts air, 1 part cleaning fluid — water mix.

What I do claim and desire to obtain by Letters Patent of the United States of America is:

1. A cleaning apparatus for floor coverings of the kind described, comprising a casing, a suction creating means supported by the casing, a downwardly facing intake orifice in communication with the suction means, a brushing means located in the intake orifice and adapted to contact the floor covering to be cleaned, a housing transversely disposed within the casing, means defining a chamber for receiving cleaning fluid within the housing, said chamber leading to an egress orifice, a reservoir for containing cleaning fluid supported by the casing, a hollow member disposed lengthwise of the chamber and in the upper interior of the chamber, a pipe for the reser-

voir leading to a central portion of the hollow member and having access thereto, the hollow member along its length being provided with apertures spaced at intervals such that cleaning fluid may be distributed for substantially the full length of the chamber, means whereby air under pressure can be delivered to the chamber, barriers of gauze material situated both above and below the hollow member in the chamber, and means whereby the casing can be moved over the floor covering, the arrangement being such that when the apparatus is moved over the floor covering, the suction creating means and the brushing means can be operated to remove unwanted matter from the floor covering, both said cleaning fluid and said air under pressure can be delivered to the chamber and foam produced, the foamed cleaning fluid delivered to and deposited on the floor covering, and the brushing means moved over the covering to brush the covering and simultaneously the suction creating means remove loosened dirt from said covering.

2. A cleaning apparatus for floor covering of the kind described, comprising a casing, a suction means in the form of at least one fan supported by the casing, said at least one fan being adapted to draw in air through an air intake orifice, a rotatable brush mounted inwardly of the orifice and capable of contacting a floor covering to be cleaned, means for driving the brush, a reservoir for cleaning fluid supported by the casing, a housing transversely disposed within the casing, means defining a chamber for receiving cleaning fluid and air when exhausted from said at least one fan such that air is suspended in the liquid within the housing, a pipe leading from the reservoir to said chamber, a hollow member disposed lengthwise of the chamber and in the upper interior of the chamber, said pipe terminating in and having access to a central portion of the hollow member, the hollow member along its length being provided with apertures spaced at intervals such that cleaning fluid may be distributed for substantially the full length of the chamber, barriers of gauze material situated both above and below the hollow member, means for controlling the delivery of said liquid and said air to the chamber, and an egress orifice through which a foam comprising the liquid and air can forcibly be egressed from the chamber onto a floor covering to be cleaned when the apparatus is being used.

3. A cleaning apparatus for floor coverings of the kind described comprising a casing, a suction means in the form of at least one electrically driven fan housed in said casing, said at least one fan being adapted to draw air through an air intake located at the lower side of the casing, a rotatable brush mounted within the air intake and capable of contacting a floor covering to be cleaned, means for rotating the brush such that said contact with the floor covering is a beating contact, a reservoir for cleaning fluid, a housing transversely disposed within the casing, means defining a mixing chamber within said housing, said reservoir being in controlled communication with said mixing chamber, said chamber being capable of both receiving said liquid and receiving air exhausting from said at least one fan such that a foam can be produced within the chamber, said controlled communication being defined by a pipe leading from the reservoir to a central portion of a hollow member disposed lengthwise of the chamber, said hollow member having along its length apertures spaced at intervals such that cleaning fluid may be distributed for substantially the full length of the chamber, barriers of gauze material situated both above and below the hollow member, an outlet from the chamber through which foam when produced can forcibly be egressed onto a floor covering to be cleaned, and means whereby exhaust air from said at least one fan can be caused to blow onto the floor covering when the apparatus is being used.

4. A cleaning apparatus for floor coverings of the kind described, comprising a casing, a suction creating means supported by the casing, a downwardly facing intake orifice in communication with the suction means, a brushing means located in the intake orifice and adapted to contact the floor covering to be cleaned, a housing transversely disposed within

the casing, the housing being formed in upper and lower parts, with the lower part being capable of movement upwardly or downwardly in relation to the upper part, means defining a chamber for receiving cleaning fluid within the housing, said chamber leading to an egress orifice, a reservoir for containing cleaning fluid supported by the casing, a hollow member disposed lengthwise of the chamber and in the upper part of the chamber, a pipe for the reservoir leading to a central portion of the hollow member and having access thereto, the hollow member along its length being provided with apertures spaced at intervals such that cleaning fluid may be distributed for substantially the full length of the chamber, means whereby air under pressure can be delivered to the chamber and means whereby the casing can be moved over the floor covering, the arrangement being such that when the apparatus is moved over the floor covering, the suction creating means and the brushing means can be operated to remove unwanted matter from the floor covering, both said cleaning fluid and said air under pressure can be delivered to the chamber and foam produced, the foamed cleaning fluid delivered to and deposited on the floor covering, and the brushing means moved over the covering to brush the covering and simultaneously the suction means remove loosened dirt from said covering.

5. A cleaning apparatus for floor coverings of the kind described, comprising a casing, a suction means in the form of at least one fan supported by the casing, said at least one fan being adapted to draw in air through an air intake orifice, a rotatable brush mounted inwardly of the orifice and capable of contacting a floor covering to be cleaned, means for driving the brush, a reservoir for cleaning fluid supported by the casing, a housing transversely disposed within the casing, the housing being formed in upper and lower parts, with the lower part being capable of movement upwardly or downwardly in relation to the upper part, means defining a chamber for receiving fluid within the housing, a hollow member disposed lengthwise of the chamber and in the upper part of the chamber, a pipe for the reservoir leading to a central portion of the hollow member along its length being provided with apertures spaced at intervals such that cleaning fluid may be distributed for substantially the full length of the chamber, means for controlling the delivery of said liquid and said air to the chamber and an egress orifice through which a foam comprising the liquid and air can forcibly be egressed from the chamber onto a floor covering to be cleaned when the apparatus is being used.

6. A cleaning apparatus for floor coverings of the kind described comprising a casing, a suction means in the form of at least one electrically driven fan housed in said casing, said at least one fan being adapted to draw air through an air intake located at the lower side of the casing, a rotatable brush mounted within the air intake and capable of contacting a floor covering to be cleaned, means for rotating the brush such that said contact with the floor covering is a beating contact, a reservoir for cleaning fluid, a housing transversely disposed within the casing, said housing being formed in upper and lower parts, with the lower part being capable of movement upwardly or downwardly in relation to the upper part, means defining a mixing chamber within said housing, said reservoir being in controlled communication with the mixing chamber, said chamber being capable of both receiving the liquid and receiving air exhausting from said at least one fan so that a foam can be produced within the chamber, said controlled communication being defined by a pipe leading from the reservoir to a central portion of a hollow member disposed lengthwise of the chamber and having along its length apertures spaced at intervals such that cleaning fluid may be distributed for substantially the full length of the chamber, an outlet from the chamber through which foam when produced can forcibly be egressed onto a floor covering to be cleaned, and means whereby exhaust air from the fan can be caused to blow onto the floor covering when the apparatus is being used.

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