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(54) **BLOWER ATTACHMENT**

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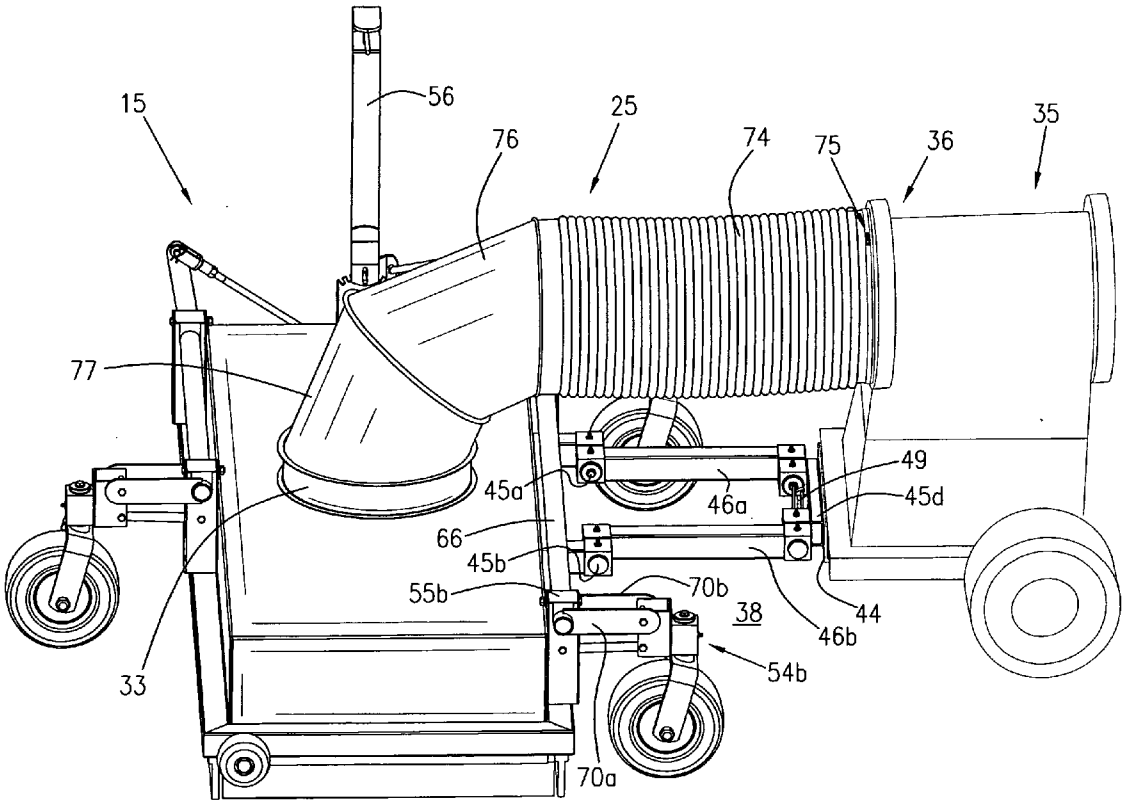
(57) **ABSTRACT**

A blower attachment (**15**) comprising a frame (**16**) having a connecting assembly (**18**) for releasably connecting to a blower (**35**), a housing (**19**) supported by the frame and enclosing a chamber (**20**), the housing having a top portion (**21**), a bottom portion (**22**) and side portions (**23***a-d*), an inlet (**24**) to the chamber in the top portion of the housing, the inlet having a maximum inlet width (**34**), a conduit (**25**) adapted to extend between the inlet and a blower outlet port (**36**), multiple baffles (**26***a-h*) in the chamber orientated vertically and extending from a first point (**27***a-d*) below the inlet to a second point (**28***a-d*) peripheral to the inlet, an outlet (**29**) from the chamber positioned below the inlet and having a maximum outlet width (**73**) greater than the maximum inlet width, an adjustment mechanism (**30**) adapted to adjust the height of the outlet relative to an underlying surface (**38**), the conduit, inlet, chamber, baffles and outlet adapted to direct flow (**79**) from the blower through the inlet into the chamber and out the outlet against the underlying surface.



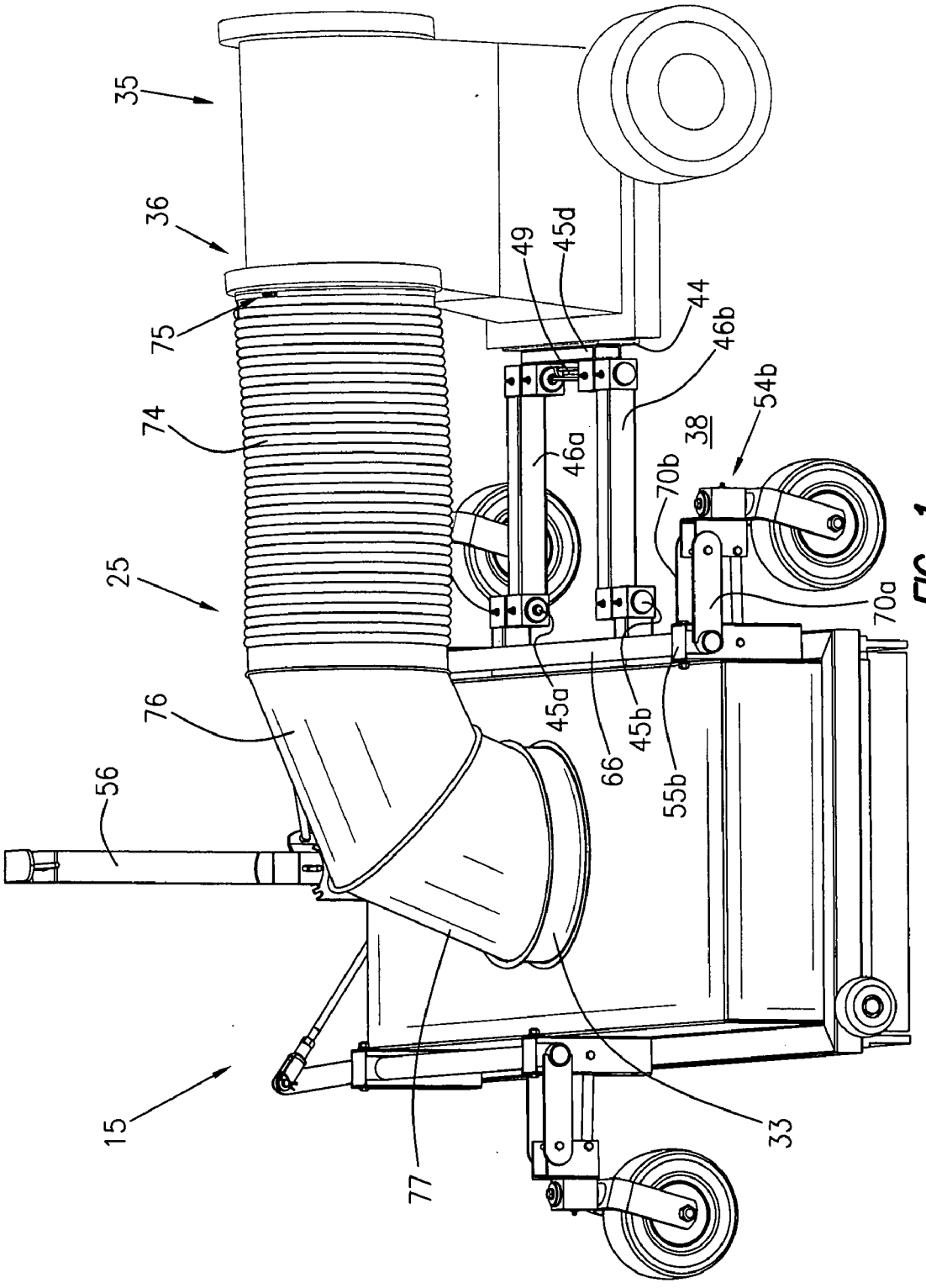

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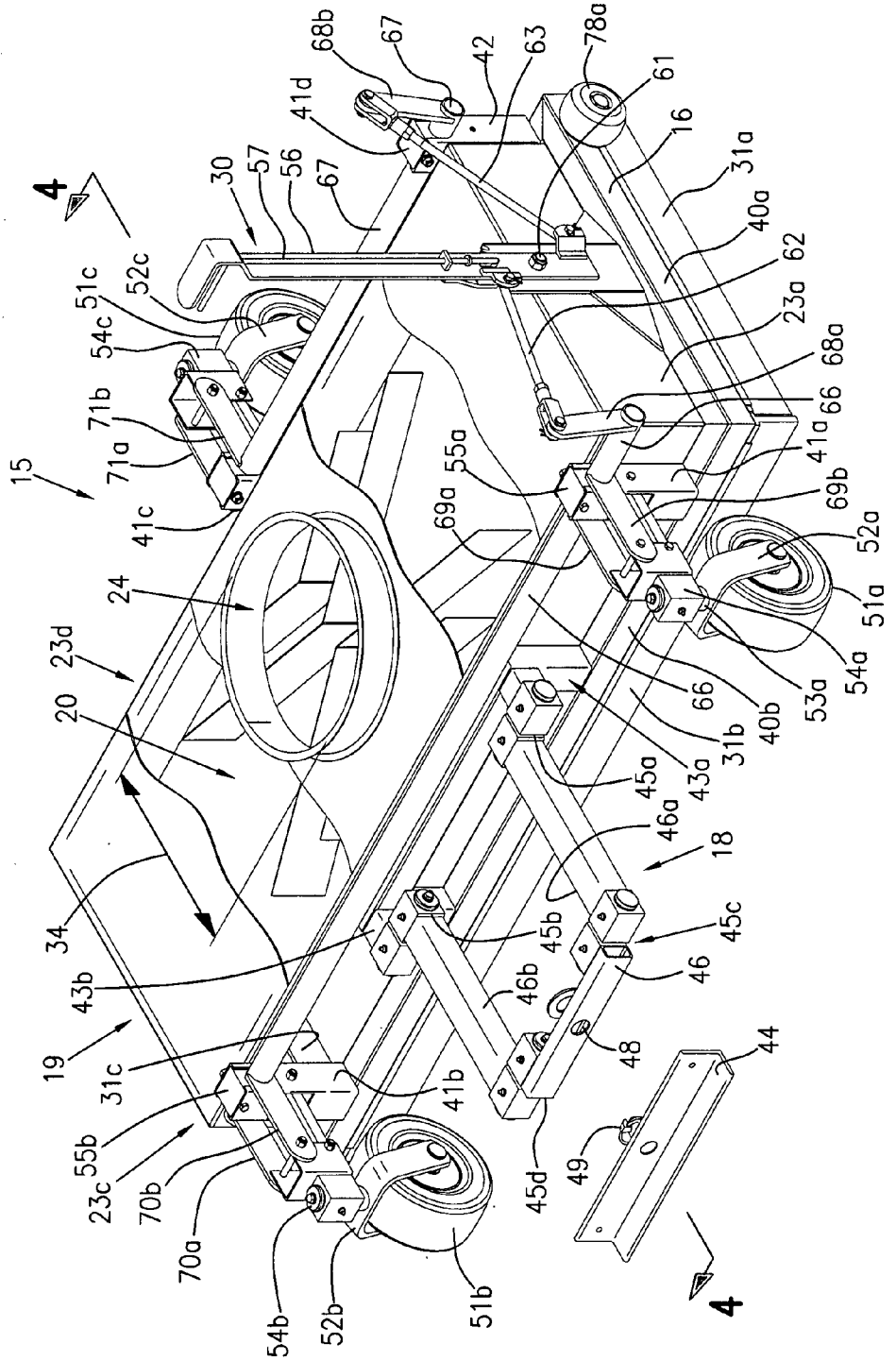
FIG. 1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23c
23d
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41b
41c
41d
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43a
43b
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68a
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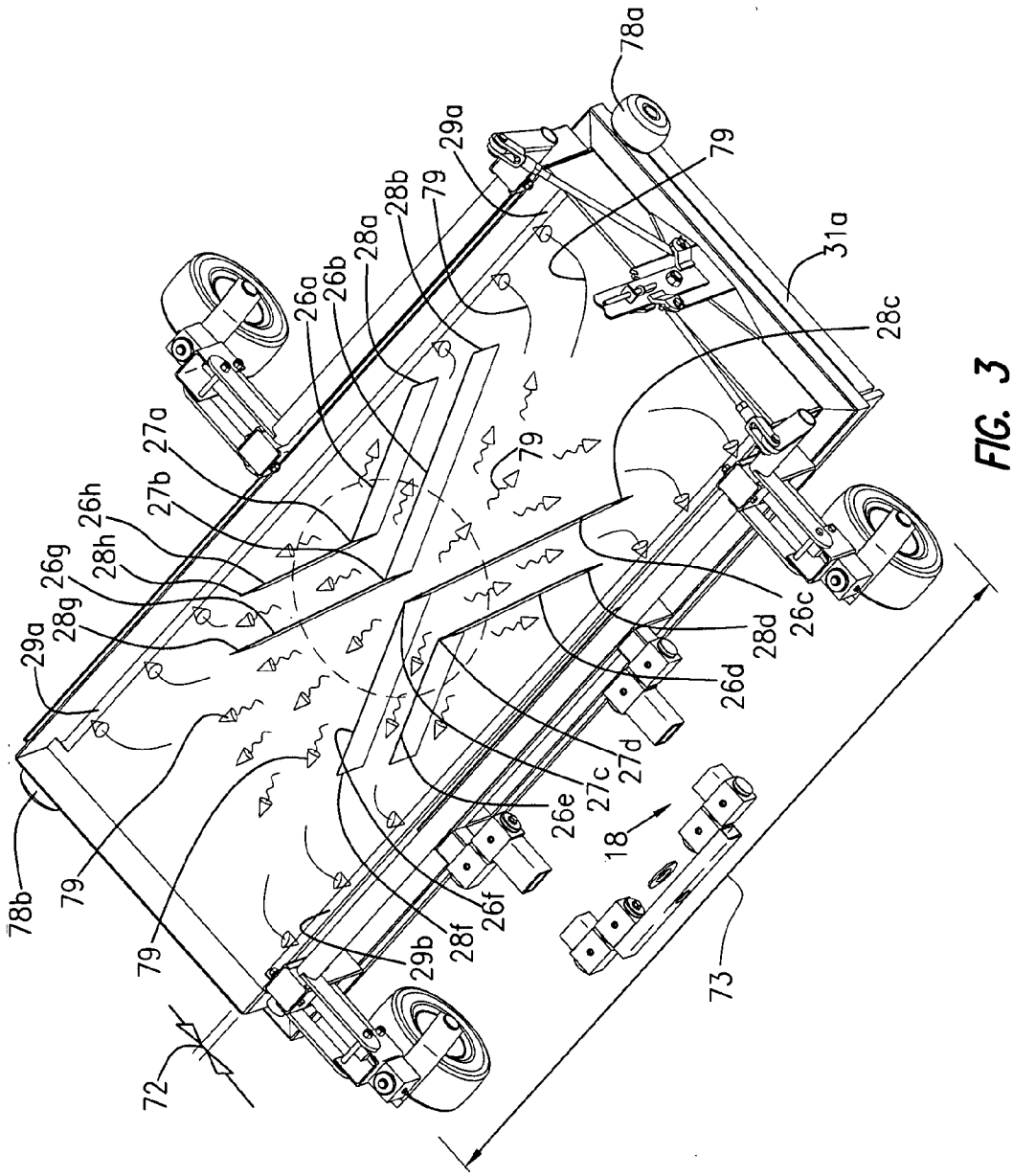
71a
71b
78a

FIG. 2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26a
31a
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27a
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29a
79
26c
28d
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78b
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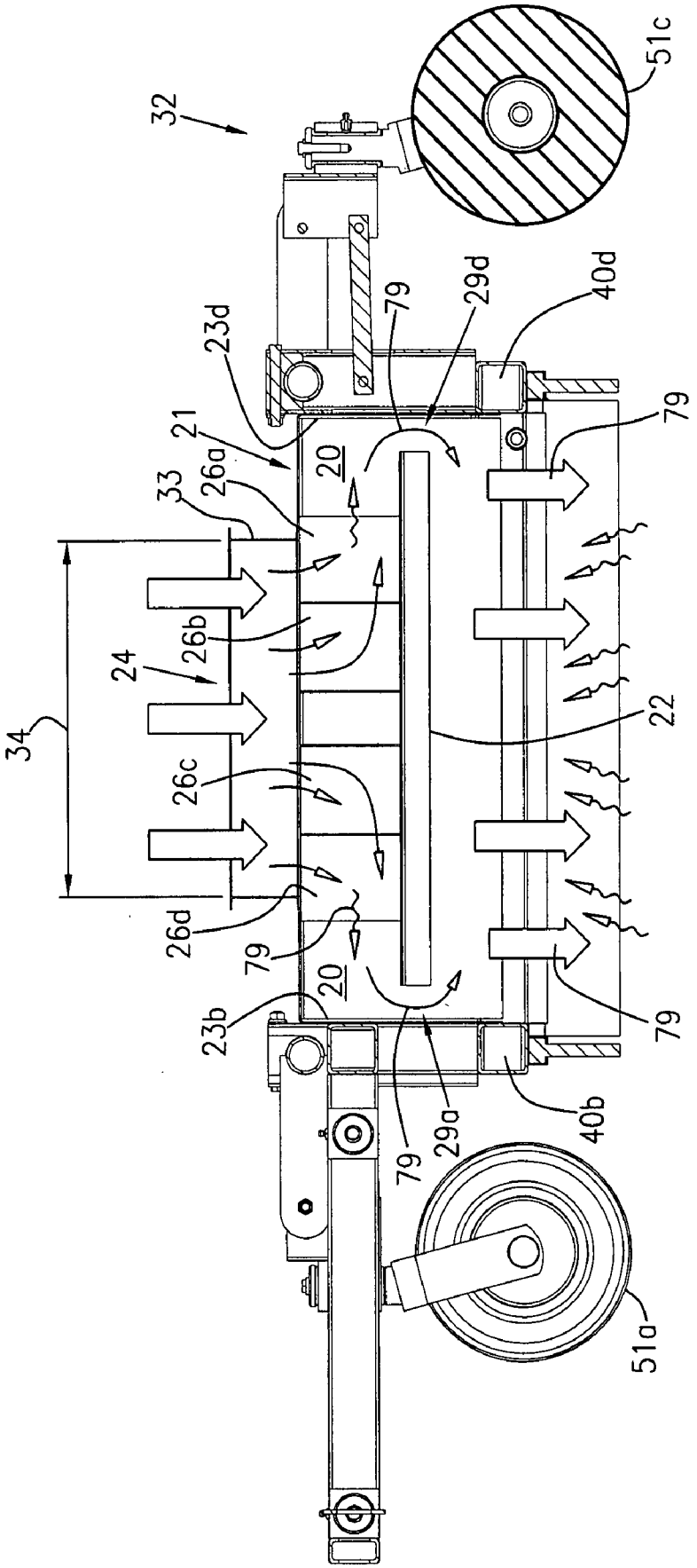
26f
28f
29b
79
72
73

FIG. 3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51c
79
29d
40d
23d
21
20
33
26a
79
26b
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34
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26c
26d
79
20
23b
79
29a
40b
79
51a

FIG. 4

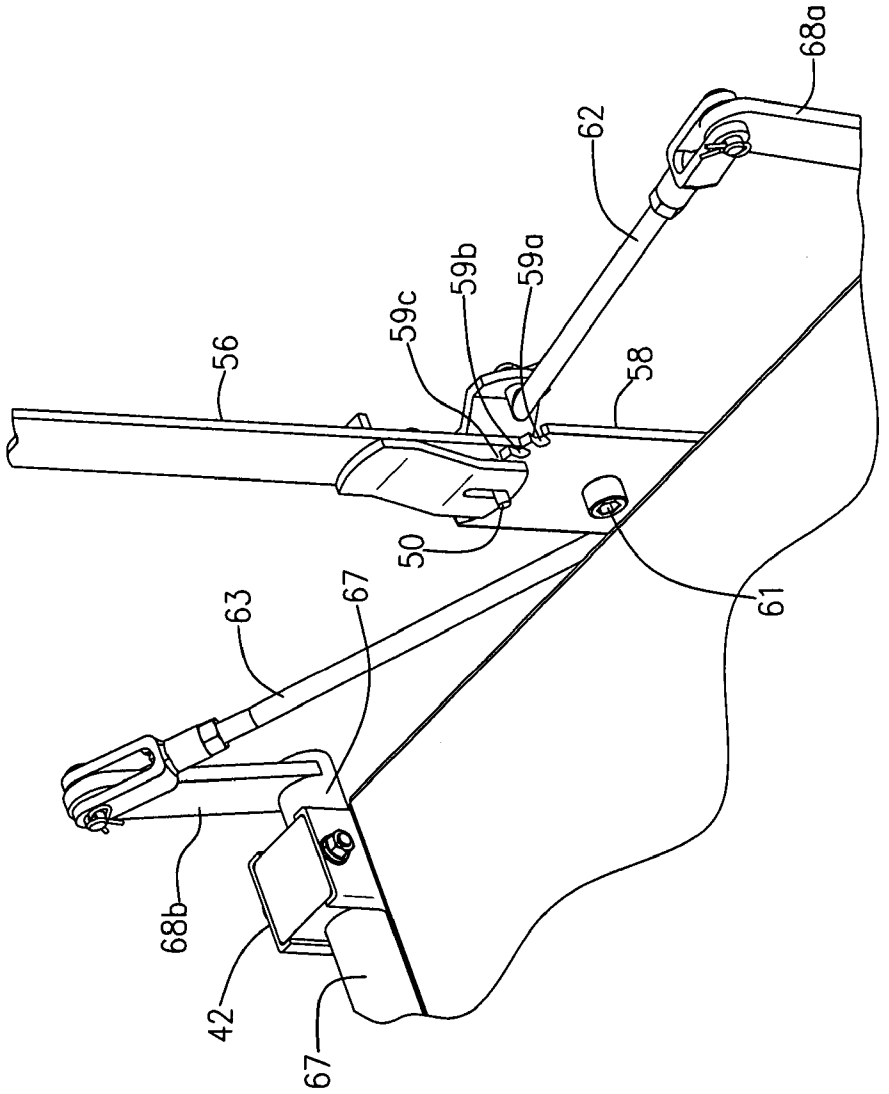
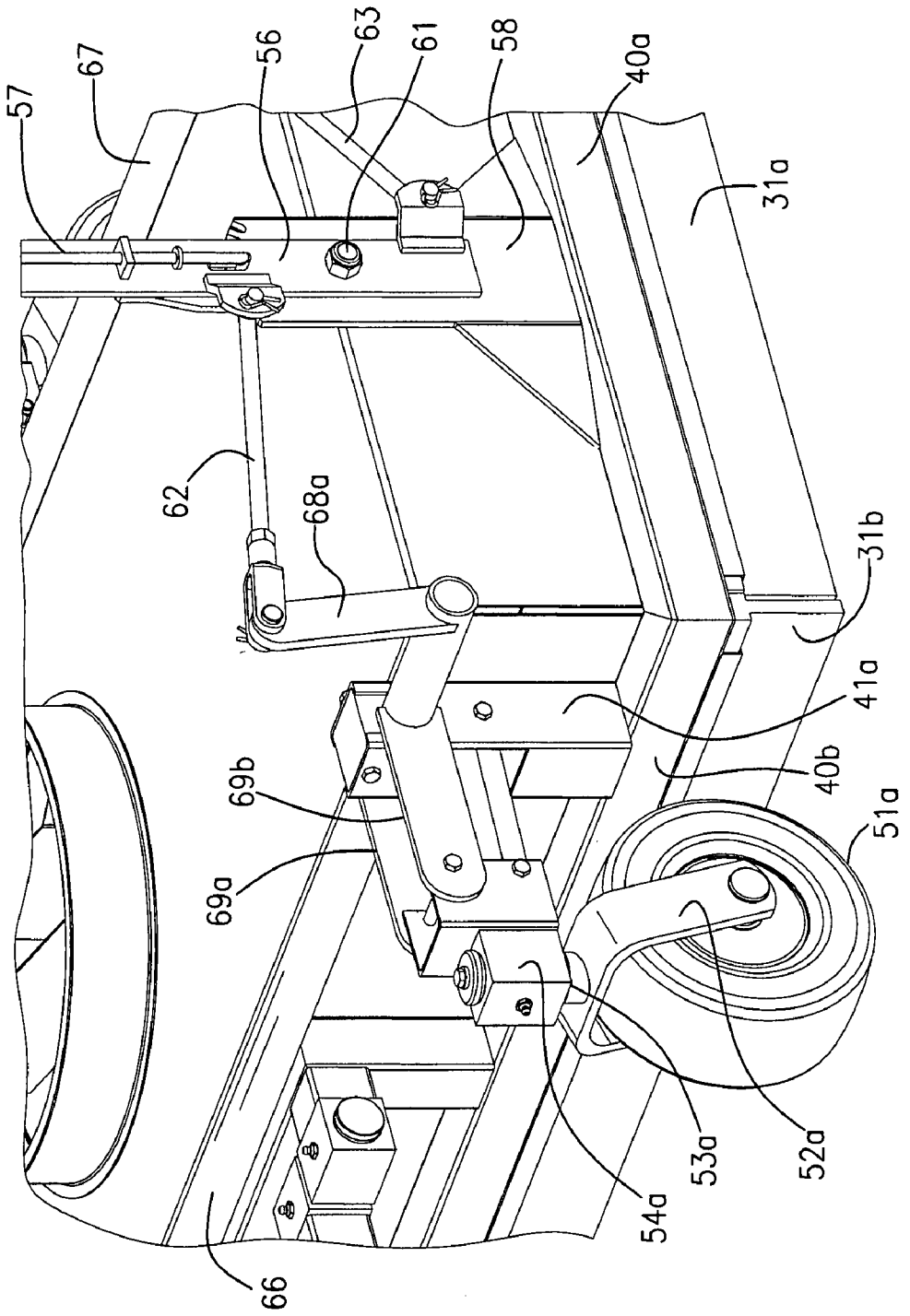


FIG. 5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67
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63
61
58
40a
31a
62
68a
31b
41a
40b
69b
51a
69a
53a
52a
54a
66

FIG. 6

BLOWER ATTACHMENT

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 60/765,232, filed Feb. 3, 2006. The entire content of such application is incorporated by reference herein.

TECHNICAL FIELD

[0002] The present invention relates generally to the field of blowers used to disperse debris from lawns, golf greens and other surfaces and, more particularly, to a blower attachment for directing the flow of air from a turbine blower to a playing surface.

BACKGROUND ART

[0003] Debris blowers are well-known in the prior art. For example, U.S. Pat. No. 6,073,305 discloses a debris blower for use in dispersing and collecting grass clipping, leaves and other debris from sidewalks, driveways, lawns, golf courses and other surfaces. Another example is the Model KB or Hurricane PTO driven debris blower manufactured by Buffalo Turbine of 180 Zoar Valley Road, Springville N.Y. 14141. Such blowers are know to use a rotating power-driven fan or turbine to create and output a fairly concentrated airflow within a given velocity range.

[0004] However, devices known in the prior art do not provide an attachment that can be detachably connected to the blower and that will direct the airflow from the blower so that it may be used to move a top dressing material, such as sand, into aeration holes, thatch, artificial turf or other surfaces. Hence, it would be useful to provide an attachment to a blower that directs the flow of the air stream from the blower onto a surface.

DISCLOSURE OF THE INVENTION

[0005] With parenthetical reference to the corresponding parts, portions or surfaces of the disclosed embodiment, merely for purposes of illustration and not by way of limitation, the present invention provides a blower attachment (**15**) comprising a frame (**16**) having a connecting assembly (**18**) for releasably connecting to a blower (**35**), a housing (**19**) supported by the frame and enclosing a chamber (**20**), the housing having a top portion (**21**), a bottom portion (**22**) and side portions (**23***a-d*), an inlet (**24**) to the chamber in the top portion of the housing, the inlet having a maximum inlet width (**34**), a conduit (**25**) adapted to extend between the inlet and a blower outlet port (**36**), multiple baffles (**26***a-h*) in the chamber orientated vertically and extending from a first point (**27***a-d*) below the inlet to a second point (**28***a-d*) peripheral to the inlet, an outlet (**29**) from the chamber positioned below the inlet and having a maximum outlet width (**73**) greater than the maximum inlet width, an adjustment mechanism (**30**) adapted to adjust the height of the outlet relative to an underlying surface (**38**), the conduit, inlet, chamber, baffles and outlet adapted to direct flow (**79**) from the blower through the inlet into the chamber and out the outlet against the underlying surface. The attachment may further comprise a containment skirt (**31**) extending below and around at least a portion of the peripheral edge of the outlet. The containment skirt may comprise flexible fibers adapted to brush the underlying surface.

[0006] Accordingly, the general object is to provide an attachment to a blower that directs airflow against a stretch of grass or artificial turf of a given width.

[0007] Another object is to provide an attachment to a blower that directs airflow so as to blow a top dressing material of sand or other particles into aeration holes in a grass surface.

[0008] Another object is to provide an attachment for a blower that may be adjusted in height so as to regulate the desired force of the airflow against the grass or artificial turf surface.

[0009] Another object is to provide an attachment for a blower which may be releasably connected to the blower.

[0010] Another object is to provide an attachment to a blower which connects to the outlet of the blower so as to allow for high velocity airflow.

[0011] Another object is to provide an attachment to a blower that directs airflow from a generally circular inlet to a generally rectangular outlet wider or longer than the circular inlet.

[0012] Another object is to provide an attachment to a blower that directs airflow across a wide swath of a grass or artificial turf surface.

[0013] Another object is to provide an attachment to a blower that directs a large volume of airflow from the blower against a grass or artificial turf surface.

[0014] Another object is to provide an attachment for a blower that is adapted to attach to and roll behind the blower.

[0015] Another object is to provide an attachment to a blower that is adapted to brush a grass or artificial turf surface near the contact point of a directed airflow to the surface.

[0016] Another object is to provide an attachment to a blower that may be used to fill aeration holes in a golf green in a way that does not unduly damage the golf green.

[0017] These and other objects and advantages will become apparent from the foregoing and ongoing written specification, the drawings and the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. **1** is a perspective view of the blower attachment connected to a conventional blower.

[0019] FIG. **2** is a partial perspective and transparent view of the blower attachment shown in FIG. **1**.

[0020] FIG. **3** is a partial perspective and transparent view of the blower attachment shown in FIG. **2** with arrows indicating the directed airflow from the inlet through the chamber and the outlet of the blower attachment.

[0021] FIG. **4** is partial vertical transverse sectional view of the blower attachment shown in FIG. **3**.

[0022] FIG. **5** is a left side enlarged view of the height adjustment mechanism shown in FIG. **2**.

[0023] FIG. **6** is a right side enlarged view of the height adjustment mechanism shown in FIG. **2**.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0024] At the outset, it should be clearly understood that like reference numerals are intended to identify the same structural elements, portions or surfaces, consistently throughout the several drawing figures, as such elements, portions or surfaces may be further described or explained by the entire written specification, of which this detailed description is an integral part. Unless otherwise indicated, the drawings are intended to be read (e.g., cross-hatching, arrangement of parts, proportion, degree, etc.) together with the specification, and are to be considered a portion of the entire written description of this invention. As used in the following description, the terms "horizontal", "vertical", "left", "right", "up" and "down", as well as adjectival and adverbial derivatives thereof (e.g., "horizontally", "rightwardly", "upwardly", etc.), simply refer to the orientation of the illustrated structure as the particular drawing figure faces the reader. Similarly, the terms "inwardly" and "outwardly" generally refer to the orientation of a surface relative to its axis of elongation, or axis of rotation, as appropriate.

[0025] Referring now to the drawings, and more particularly to FIG. **1** thereof, this invention provides a blower attachment, the presently preferred embodiment of which is generally indicated at **15**. As shown in FIGS. **1** and **2**, attachment **15** generally includes a frame **16**, a housing **19** supported by frame **16** and defining a chamber **20**, a conduit **25** adapted to communicate between a blower **35** and chamber **20**, a height adjustment mechanism **30**, a connecting assembly **18**, and a wheel assembly **32**.

[0026] As shown in FIG. **2**, frame **16** is generally a rectangular frame formed from four horizontally extending lengths of square tubing **40***a-d,* three vertically extending wheel posts **41***a-c,* a vertically extending corner post **42** and two vertically extending attachment posts **43***a* and **43***b.* As shown, frame **16** includes or is connected to a wheel assembly **32**, adapted to allow for attachment **15** to roll behind blower **35**, a blower connecting assembly **18**, adapted to releasably connect the front of attachment **15** to the rear of blower **35**, and a height adjustment mechanism **30**, adapted to allow for the height of outlet **29** above the surface over which attachment **15** rolls to be moved up and down.

[0027] As shown in FIGS. **1** and **2**, assembly **18** comprises two square tubular drag arms **46***a* and **46***b* that are pivotally connected at pivot connections **45***a* and **45***b* to attachment posts **43***a* and **43***b,* respectively, of frame **16**. The other ends of drag arms **46***a* and **46***b* are in turn pivotally connected at pivot connections **45***c* and **45***d* to cross-bar **46**. The connections employ a bronze type bushing with grease fittings, connecting pins, keeper bolts and washers. As shown in FIG. **1**, mounting plate **44** is bolted to the rear crosspiece of the frame of blower **35**. Mounting plate **44** includes a connecting bolt **49** welded to the center of mounting plate **44**. Cross-bar **46** contains a mounting through-bore **48** adapted to receive bolt **49**. Attachment **15** is connected to blower **35** by moving it so that bolt **49** extends through through-bore **48**. The end portion of bolt **49** extends through the other side of bore **48** and includes a hole. A lynch style pin and machined washer, the pin extending through the hole at the end of bolt **49**, holds cross-plate **48** of frame **16** to mounting plate **44** on blower **35**. With pivot connects **45***a-d* at both ends of drag arms **46***a* and **46***b,* attachment **15** can be pulled behind blower **35** such that it will not be lifted from the surface **38** over which is rolling. This pivoting connection allows for attachment **15** to roll behind blower **35** over undulating surfaces.

[0028] As shown in FIGS. **2-6**, frame **16** is connected to or includes a wheel assembly **32** and a height adjustment mechanism **30** that interacts with wheel assembly **32** to allow for housing **19** and chamber **20** to be held at different heights above the surface **38** over which attachment **15** rolls. As shown, wheel assembly **32** comprises three caster wheels **51***a-c* connected to tubes **66** and **67** adjacent wheel post **41***a-c,* respectively. Wheels **51***a-c* are rotationally connected to forks **52***a-c,* each of which has a shaft **53***a-c,* respectively, extending into blocks **54***a-c,* respectively. Blocks **54***a-c* each house a greased brass bushing and a washer and bolt are used to hold each of shafts **54***a-c* in place. As a result of this arrangement, wheels **51***a-c* can freely rotate about the vertical axis of shafts **53***a-c.* As shown, attachment **15** as two front wheels **51***a* and **51***b* positioned near the right and left edge, respectively, of frame **16**, and a single rear wheel **51***c* positioned at the center line of frame **16**. Blower attachment **15** is generally supported on three wheels **51***a-c* and is balanced between them. Two additional safety rollers **78***a* and **78***b* are attached on either side of frame **16** near the rear of frame elements **40***a* and **40***c,* respectively. These two rollers help prevent the scalping of the turf or surface when attachment **15** is used on undulating surfaces.

[0029] As shown in FIGS. **2**, **5** and **6**, adjustment mechanism **30** interacts with wheel assembly **32** to allow for the height adjustment of frame **16** and housing **19** with respect to the surface over which blower attachment **15** rolls. Adjustment mechanism **30** includes an adjustment arm **56** which extends vertically from the middle of the right side of frame **16**, namely element **40***a,* and which is connected to side panel **23***a* of housing **19**. As shown, adjustment arm **56** includes a spring loaded lift rod **57** which has a horizontally extending top portion, a vertically extending middle portion and a horizontally extending locking pin **60**. Locking pin **60** extends through a hole in adjustment arm **56**. As shown in FIGS. **5** and **6**, adjustment plate **58** includes seven location slots **59** orientated in a radial arc across the top of adjustment plate **58**. This orientation allows for a user to raise rod **57**, causing locking pin **60** to disengage from a location slot **59**, and thereby allow arm **56** to be moved forward or backwards about pivot **61**. When arm **56** is at the desired location, either forward or backward, bar **57** may be released such that locking pin **60** falls back into the corresponding location slot **59** in adjustment plate **58**, thereby locking arm **56** at the desired radial position relative to pivot point **61**.

[0030] As shown, two pivoting linkages **62** and **63** extend from either side of adjustment arm **56**. Linkage **62** extends from a point above pivot **61** to connect with transversely extending tube **66** at the front of housing **19**, and linkage **63** extends from a point below pivot **61** to connect with transversely extending tube **67** at the rear of housing **19**. Tube **66** in turn connects with both front wheel blocks **54***a* and **54***b,* and tube **67** connects with rear wheel block **54***c.* As shown, linkages **62** and **63** pivot freely at both their ends. Clevis plates **68***a-b* are fixed at right angles on one end to the

respective ends of tubes **66** and **67**, and are pivotally connected at the other end to linkages **62** and **63**, respectively. Tube **66** extends rotatably through both front wheel posts **41***a* and **41***b* and rotates in slot or rod support bracket **55***a* and **55***b* in wheel posts **41***a* and **41***b*, respectively. Similarly, rod **67** rotates in slot or rod support bracket **41***d* in the top of corner post **42** and a support bracket **41***c* in wheel post **41***c*. One end of two attachment plates **69***a* and **69***b* are fixably attached to tube **66** on either side of post **41***a*, and the other end of plates **69***a* and **69***b* are fixably attached to wheel block **54***a*. Similarly, wheel block **54***b* is fixably connected to one end of plates **70***a* and **70***b*. The other end of plates **70***a* and **70***b* are fixed to tube **66** on either side of wheel post **41***b*. Thus, any rotation of tube **66** about the longitudinal axis of tube **66** will cause a similar rotation of wheels **51***a* and **51***b*, thereby causing wheels **51***a* and **51***b* to simultaneously move up or down, depending on the direction of rotation of tube **66**, relative to frame **16**. Similarly, the ends of two plates **71***a* and **71***b* are fixed to tube **67** on each side of wheel tower **41***c* and are fixed at their other ends to wheel block **54***c*. Thus, rotation of tube **67** about its longitudinal axis will cause wheel **51***c* to either move up or down, depending on the direction of such rotation, relative to housing frame **16**. This mechanical assembly allows for the height of frame **16**, and therefore the height of outlet **29**, above the ground to be adjusted. By raising rod **57** and moving arm **56** forward and counterclockwise with respect to pivot point **61**, linkage **62**/**68***a* causes tube **66** to also rotate in a counterclockwise direction, and linkage **63**/**68***b* causes tube **67** to rotate in a clockwise direction, which in turn causes wheels **51***a* and **51***b* to move down relative to frame **16** and causes wheel **51***c* to move down relative to frame **16**, thereby raising frame **16** and housing **19** further above the ground. When housing **19** is at the desired height above the ground, rod **57** is released and locking pin **61** allowed to engage the desired slot **59**, thereby suspending the housing on wheels **51***a-c* at a greater height above the ground. To have housing **19** at the greatest height above the ground, locking pin **60** is adjusted to engage slot **59***a*. Alternatively, arm **56** may be rotated clockwise about pivot point **61** to raise wheels **51***a-c* relative to frame **16** and thereby lower chamber **20** relative to the ground over which it is rolling. To have housing **19** at its lowest height above the surface, locking pin **60** is adjusted to fit into the slot opposite of slot **59***a*. Thus, the height of blower attachment **15** over the ground may be manually adjusted independent of blower **35**. Height adjustment mechanism **30** allows for the user to regulate the amount of contact and compression brushes **31** will have on the turf surface, and to regulate the force of the air stream from outlet **29** on the turf surface.

[**0031**] As shown in FIGS. **1-4**, frame **16** supports housing **19**. Housing **19** comprises a horizontally extending planar top portion **21**, vertically extending side portions **23***a-d* and a horizontally extending planar bottom portion **22**. Top portion **21** is formed from sheet metal, the ends of which are folded over at right angles to form front side portion **23***b* and rear side portion **23***d*. Right side portion **23***a* and left side portion **23***c* are in turn welded to the respective edges of top portion **21**, front side portion **23***b* and rear side portion **23***d*. These portions thereby form the top and sides of housing **19**. Bottom portion **22** of housing **19** is generally a flat planar member recessed such that it extends between and is welded at one end to the inner surface of side portion **23***a* and at the other end to the inner surface of side portion **23***c*. Thus, as shown in FIG. **4**, side portions **23***a-c* extend below the bottom surface of bottom portion **22**. Top portion **21**, side portions **23***a-d* and bottom portion **22** define chamber **20**.

[**0032**] As also shown in FIG. **4**, bottom portion **22** is not as wide as the widths of side portions **23***a* and **23***c* or of top portion **21**. Thus, a narrow space **29***a* is formed at the front of attachment **15** that extends along almost the whole width of attachment **15** between the inner surface of front side portion **23***b* and the front edge of bottom portion **22**. Similarly, a narrow space **29***b* is formed at the rear of attachment **15** that extends almost the whole width of attachment **15** between the inner surface of rear side portion **23***d* and the rear edge of bottom portion **22**. These spaces form outlet **29** to chamber **20**. In the preferred embodiment, each of outlets **29***a-b* have a width **72** of about 1.5 inches and a length **73** of about 60 inches.

[**0033**] Inlet **24** is generally cut into the center of top portion **21** of housing **19**. As shown, a cylindrical lip **33** extends perpendicular to top portion **21** around the circumference of inlet **24**. In the preferred embodiment, inlet **24** is a circular inlet having a width or diameter **34** of about 14 inches. A number of baffles or vanes are welded to extend from below inlet **24** towards the peripheral edge of bottom member **22**. As shown, baffles **26***a-h* extend from a point **27***a-d* that is below inlet **24** to a point **28***a-h* that is outside the imaginary vertical projection of inlet **24** on bottom portion **22** of housing **19**. Thus baffles **26***a-h* extend on the inner surface of top portion **21** beyond the diameter **34** of inlet **24**. In the preferred embodiment, the baffles extend vertically and are generally V-shaped such that the bottom point of the V is below inlet **24** at locations **27***a-d*. The other ends of the baffles are directed out in a generally radial fashion to direct airflow **79** from below inlet **24** to the peripheral edges of housing **19** and particularly towards outlets **29***a* and **29***b*. Baffles **26** extend vertically between the inner surface of top portion **21** and the inner surface of bottom portion **22**. In this way, air blown through inlet **24** is directed throughout chamber **20** and towards outlets **29***a* and **29***b*. This allows for turbulation of the air and for changing an air stream that had a generally cylindrical diameter of **34** as it entered inlet **24** to be split and changed by the orientation of baffles **26** and chamber **20** into two separate air streams **79** that are generally rectangular having a width **72** and a length **73** that is subsequently greater than diameter **34**. In this way, the air stream from the blower may be directed and adapted to be felt along a surface of a greater width than the diameter of the outlet **36** of blower **35**. In addition, the flow is agitated so that it is better able to direct sand into aeration holes in a grass surface.

[**0034**] As shown in FIGS. **2**, **3**, **4** and **6**, a containment skirt **31** is provided along the underside of each of frame elements **40***a-d*. In the preferred embodiment, containment skirt **41** is made of three inch long flexible nylon fibers of a brush-like quality. The fibers are held in a plastic track and the bottom of each of frame elements **40***a-d* are provided with a welded channel into which the plastic track of skirts **31***a-d* are slid and held in place. Skirt **31** helps contain the airflow **79** from outlet **29***a* and **29***b* and direct it into the surface. Also, by using flexible nylon brushes, less damage and scouring occurs when the brush drags on the surface. The use of flexible fibers and airflow **79** from outlet **29***a* and **29***b* to direct sand into the aeration holes is less abrasive and

less damaging to the grass surface being treated. This helps accelerate recovery of the grass or green after treatment.

[0035] Attachment **15** is adapted to be used with powerful blowers. For example, it is contemplated that attachment **15** may be used with a blower having an output of 10,000 cubic feet of air at 175 miles per hour. Accordingly, conduit **25** between outlet **36** of blower **35** and inlet **24** of attachment **15** is designed to contain the larger forces associated with the strong air stream output from blower **35**. In the preferred embodiment, air conduit **35** includes a fourteen inch diameter cylindrical flexible reinforced tube **74**, an elbow segment **76** and an elbow segment **77**. One end of tube **74** is attached to outlet **36** of blower **35**. Outlet **36** includes an elbow base with a flange. Flexible tubing **74** slides over a ring with a mating flange. The mating flange on the end of tubing **74** and the flange on outlet **36** of blower **35** provide a face-to-face connection and abut each other. A connecting clamp **75** overlaps the two flanges and the band of the clamp is tightened to hold the joint together. The other end of flexible tubing **74** is connected to one end of elbow segment **76**. Again, this end of tubing **74** includes a mating flange which abuts a flange on elbow segment **76**. A connecting clamp overlaps the two flanges and the band of the clamp is tightened to hold the joint together. Similarly, the ends of elbow segments **76** and **77** are connected with a connecting belt clamp. The other end of elbow segment **77** is connected to lip **33** of inlet **24**. A flange around the end of elbow segment **77** is abutted to the flange or lip **33** of inlet **24**. These flanges are releasably attached with a clamp band which is tightened to hold the joint together. Elbow segments **76** and **77** allow for the horizontal airflow from blower **35** to be directed vertically into inlet **24**, thereby creating a 90 degree turn. Flexible tubing **74** permits some play in the air conduit **25** between blower **35** and attachment **15**. This prevents conduit **25** from detaching from blower **35** or attachment **15** when attachment **15** moves up or down relative to blower **35** when it is being pulled behind blower **35**.

[0036] Thus, airflow generated by blower **35** is directed through air conduit **25** and through inlet **24**. Baffles **26** direct the airflow **79** and disperse it in chamber **20** and then out through outlets **29***a* and **29***b* along the front bottom edge of chamber **20** and along the rear bottom edge of chamber **20**. Skirt **31** helps contain a good portion of the airflow as well as sand or other materials being applied to the surface. The amount of airflow that is generated is controlled by the blower. The blower may itself have a throttle control or the throttle control may be on the tractor used to propel the blower if it is a PTO driven model. The height of the blower attachment over the surface may also be adjusted to control the impact of the airflow on the surface.

[0037] Blower attachment **15** may be used for many purposes, including after aeration and the top dressing of a putting green. For such an application, attachment **15** is attached to a blower which is started and moved into position to begin filling the aeration holes. The height of attachment **15** and the throttle of blower **35** is adjusted to the conditions and size of the holes on the green. The towing vehicle or tractor pulling the blower and in turn attachment **15** is then driven over the prepared green. Multiple passes may be needed to fill the holes with a top dressing of sand or related material if desired. By using attachment **15**, a wide swath and more area may be covered. And by using airflow to direct the top dressing into aeration holes or into the surface, less damage may be done, which accelerates recovery of the green after aeration and treatment.

[0038] The present invention contemplates that many changes and modifications may be made. Therefore, while the presently-preferred form of the attachment has been shown and described, and several alternative modifications thereof discussed, persons skilled in this art will readily appreciate that various additional changes and modifications may be made without departing from the spirit of the invention, as defined and differentiated by the following claims.

What is claimed is:

1. A blower attachment comprising:

a frame having a connecting assembly for releasably connecting to a blower;

a housing supported by said frame and enclosing a chamber;

said housing having a top portion, a bottom portion and side portions;

an inlet to said chamber in said top portion of said housing;

said inlet having a maximum inlet width;

a conduit adapted to extend between said inlet and a blower outlet port;

multiple baffles in said chamber oriented substantially vertically and extending from a first point below said inlet to a second point peripheral to said inlet;

an outlet from said chamber having a maximum outlet width greater than the maximum inlet width;

said conduit, inlet, chamber, baffles and outlet adapted to direct airflow from an attached blower through said inlet into said chamber and out said outlet against an underlying surface.

2. The blower attachment set forth in claim 1, and further comprising an adjustment mechanism adapted to adjust the height of said outlet relative to said underlying surface.

3. The blower attachment set forth in claim 1, and further comprising a containment skirt extending below and around at least a portion of the peripheral edge of said outlet.

4. The blower attachment set forth in claim 3, wherein said containment skirt comprises flexible fibers adapted to brush said underlying surface.

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