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(54) **Titre : EPANDEUSE DE MATERIAU MONTEE SUR UN PLATEAU DE CAMION A CABINE SEMI-AVANCEE**
(54) **Title: CAB-FORWARD TRUCK BED MOUNTED MATERIAL SPREADER**

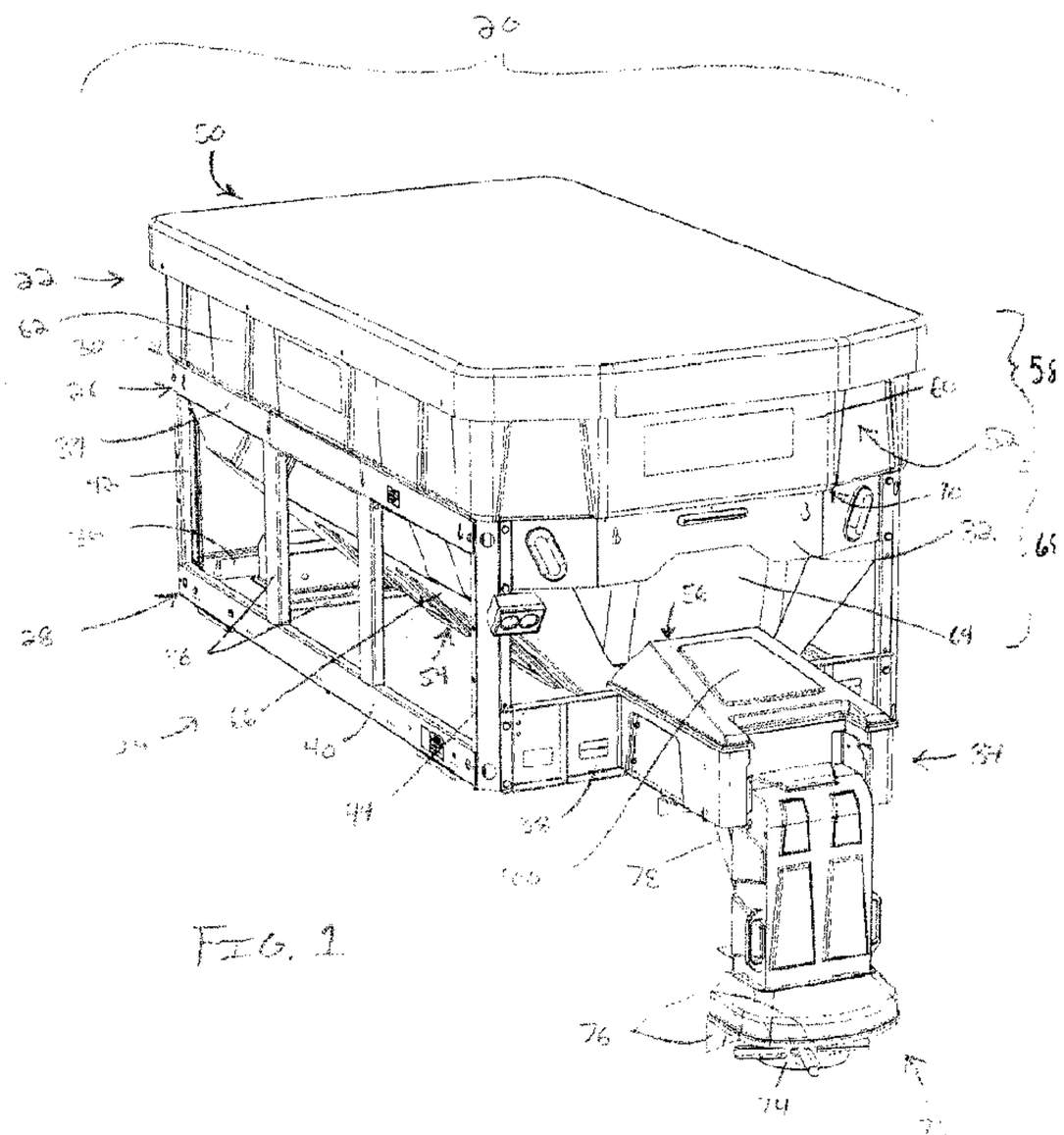


FIG. 1

(57) **Abrégé/Abstract:**
The subject invention provides an improved material spreader assembly for mounting in a truck bed of a vehicle. A hopper carrying a material to be dispersed is supported in the truck bed. An auger is disposed within the hopper to convey the material towards an outlet. A spinner assembly is longitudinally spaced from the outlet of the hopper. An extension assembly extends between the outlet of the hopper and the spinner assembly conveying the material therebetween. This allows for a cab-forward placement of the hopper and frame thereby moving the weight of the filled hopper and the frame forward towards the front of the vehicle resulting in improved weight distribution.

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(57) Abstract: The subject invention provides an improved material spreader assembly for mounting in a truck bed of a vehicle. A hopper carrying a material to be dispersed is supported in the truck bed. An auger is disposed within the hopper to convey the material towards an outlet. A spinner assembly is longitudinally spaced from the outlet of the hopper. An extension assembly extends between the outlet of the hopper and the spinner assembly conveying the material therebetween. This allows for a cab-forward placement of the hopper and frame thereby moving the weight of the filled hopper and the frame forward towards the front of the vehicle resulting in improved weight distribution.

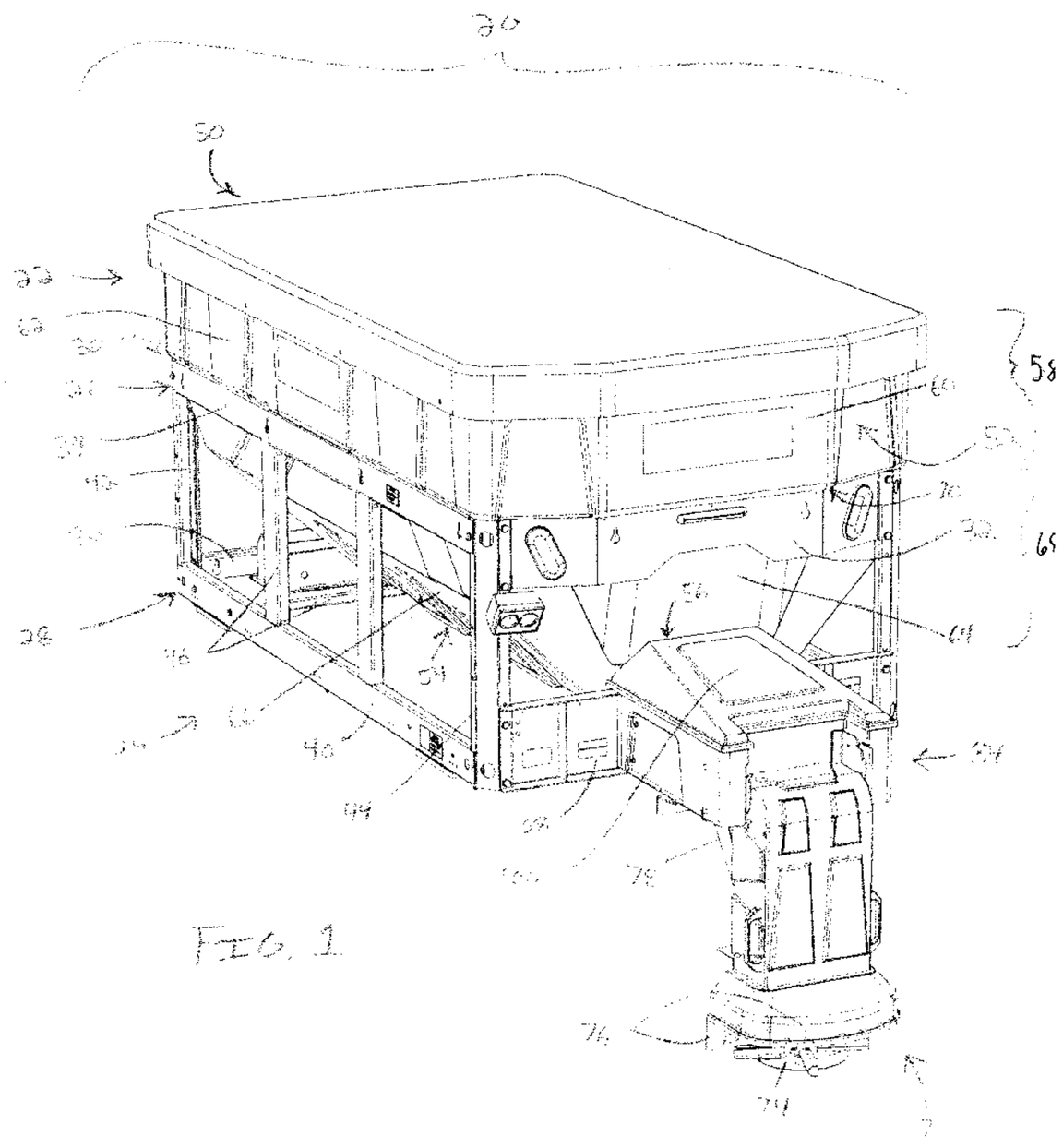


FIG. 1

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CAB-FORWARD TRUCK BED MOUNTED MATERIAL SPREADER

RELATED APPLICATIONS

[0001] This application claims the benefit of US Provisional Application No. 61/765,950 filed on February 18, 2013.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] This invention relates generally to material spreaders used for spreading a particulate, such as salt, sand, or salt and sand mixtures and, more particularly to a bed mounted spreader having an improved cab-forward design. It should be understood by those of ordinary skill in the art that the spreader of the present invention can be used to spread dry material as well as wet material.

2. Description of the Prior Art

[0003] Conventional truck bed mounted spreader assemblies typically have a large hopper that is placed in a truck bed of a vehicle. The hopper carries a material, such as bulk salt, to be distributed behind the vehicle. To maximize storage capacity, the hopper typically extends along the length of the truck bed between a front end and a rear end. The rear end of the hopper defines an outlet for discharging material from the hopper. An auger or similar device is disposed within the hopper to convey the material towards the outlet. A spinner assembly is typically mounted to the hopper adjacent the outlet for receiving the material as it exits the outlet and spreading it out on the roadway. To ensure that the material is evenly spread onto the roadway, the spinner is located just aft of the rear most portion of the truck bed such that the rear end of the hopper is substantially aligned with the rear most portion of the truck bed. One such related art spreader is shown in U.S. Patent Application No. 13/161,144 to Sandler et al., which shows a spreader assembly having a hopper having a rear end substantially aligned with the rear most portion of the truck bed and an auger

running the length of the truck bed delivering material to a hopper mounted spinner assembly.

[0004] Conventional truck bed mounted spreaders are typically heavy, formed of thick sheet metals that are able to withstand corrosive environments that can be encountered when spreading certain materials, such as bulk salt. In addition to the weight of the spreader assembly, many hundreds of pounds of material is typically loaded into the hopper for spreading. Thus a problem arises in that conventional truck bed mounted spreaders place a substantial amount of weight on the rear most portion of the truck bed, thereby severely upsetting the weight distribution of the vehicle. This creates poor vehicle handling characteristics and places the vehicle chassis and suspension under considerable stress. What is needed is a truck bed mounted spreader assembly that distributes the weight of the assembly towards the center of the vehicle.

SUMMARY OF THE INVENTION

[0005] The subject invention provides an improved spreader assembly for mounting in a truck bed of a vehicle. In accordance with one aspect of the subject invention, the spinner assembly is longitudinally spaced from the outlet of the hopper. To maintain communication of the material between the hopper and the longitudinally spaced spinner assembly, the spreader assembly includes an extension assembly extending between the outlet of the hopper and the spinner assembly. The extension assembly projects substantially horizontally from the frame such that all components of the extension assembly are even with, or above, the frame and therefore the truck bed. This allows for a cab-forward placement of the hopper and frame wherein the front end of the hopper abuts the cab of the vehicle and the rear end of the hopper is positioned forward of the rear most portion of the truck bed. The extension assembly extends longitudinally from the outlet of the hopper to a position adjacent the rear most portion of the truck bed where it connects to the spinner

assembly. In this manner, the extension assembly conveys or communicates the material exiting the outlet of the hopper to the spinner assembly. Accordingly, the cab-forward design of the spreader assembly, as provided by the extension assembly, moves the significant weight of the filled hopper forward towards the front of the vehicle. As a result, better front-to-rear weight distribution of the vehicle is achieved. The improvement in vehicle weight distribution over the prior art designs contributes to better vehicle handling characteristics and less stress on the vehicle chassis and suspension components.

[0006] Additionally, the extension assembly allows for a unique pre-wetting system to be used to pre-wet the material to be spread. The pre-wetting system includes a liquid injection nozzle that injects liquid onto the auger and the material being conveyed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Other advantages of the present invention will be readily appreciated, as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

[0008] Figure 1 is a perspective view of an exemplary truck bed mounted material spreader of the subject invention;

[0009] Figure 2 is a perspective view of the exemplary truck bed mounted material spreader of the subject invention;

[0010] Figure 3 is a perspective view of an exemplary extension assembly and spinner assembly of the subject invention;

[0011] Figure 4 is a perspective view of the exemplary extension assembly and spinner assembly of the subject invention;

[0012] Figure 5 is a perspective exploded view of the exemplary extension assembly and spinner assembly of the subject invention;

[0013] Figure 6 is a perspective exploded view of the exemplary extension assembly and spinner assembly of the subject invention; and

[0014] Figure 7 is a perspective view of the exemplary truck bed mounted material spreader of the subject invention showing the spinner assembly in a storage position.

[0015] Figure 8 is a side view of the exemplary truck bed material spreader mounted upon the bed of a vehicle.

DESCRIPTION OF THE ENABLING EMBODIMENT

[0016] Referring to the Figures, wherein like numerals indicate like or corresponding parts throughout the several views, a spreader assembly **20** for spreading a material and for mounting to a truck bed of a vehicle is shown generally. The spreader assembly **20** is ideally suited for spreading materials such as sand, salt, seed, fertilizer, and the like. It is to be understood that the spreader assembly **20**, being shown in figure 8 in the truck bed of a pick-up truck type vehicle, is adaptable for use with other vehicles, such as trailers, stake trucks, flat bed trucks, and the like. Where the vehicle is a pick-up truck or similar vehicle, the vehicle includes a cab positioned forward of the truck bed opposite a rear most portion of the truck bed.

[0017] The spreader assembly **20** as illustrated includes a hopper **22** and a frame **24** as shown in FIGS. 1 and 2. The frame **24** has an upper rail **26** for supporting the hopper **22** in the truck bed and a lower rail **28** for engaging the truck bed. The upper rail **26** includes a front crossbeam **30** and a rear crossbeam **32**, each extending transversely across the width of the truck bed. The upper rail **26** further includes a pair of upper longitudinal beams **34** extending longitudinally between the front and rear crossbeams **30, 32**. The lower rail **28** includes a front base member **36** and a rear base member **38**, each extending transversely across the width of the truck bed. The lower rail **28** further includes a pair of lower longitudinal beams **40** extending longitudinally between the front and rear base

members **36, 38**. The frame **24** also includes a pair of front posts **42** and a pair of rear posts **44** extending downwardly from the upper rail **26** to the lower rail **28**. The front crossbeam **30** and the front base member **36** are positioned adjacent the cab of the vehicle when the spreader assembly **20** is mounted into the truck bed. The frame **24** may further include a plurality of vertical supports **46** extending downwardly from the upper longitudinal beams **34** to the lower longitudinal beams **40**. The frame **24** distributes the weight of the spreader assembly **20** evenly across the truck bed and may be releasably mounted between the wheel wells of the truck bed. It should be appreciated that the frame **24**, or any combination of its components, could be formed of a continuous piece or individual pieces. In one embodiment, the frame **24** may be a single integral piece. Alternately, each component of the frame **24** may be an individual piece fastened together to form the frame **24** and may be fastened by any methods, such as welding, bolting, and the like. Additionally, the frame **24**, or any combination of its components, may be constructed of any material, such as plastic or metal, so long as the material is strong enough to support the weight of the spreader assembly **20** when it is fully loaded with a material to be dispersed on the ground beneath the vehicle, such as a roadway. For example, the material to be dispersed may be salt, sand, salt and sand mixtures, or any other particulate material.

[0018] Still further, the hopper **22** can have an integrally formed frame **24** or merely have an integrally formed support, such as legs or feet to support the hopper **22**. In the disclosed embodiment, the hopper **22** is generally loosely connected to the frame **24** to allow the hopper **22** to vibrate as the vehicle travels along the roadway. This also allows for quick removal of the hopper **22** when empty. Such a loose connection can be accomplished by securing the hopper **22** to the frame **24** using bolts or straps for example. The hopper **22** is a large capacity hopper **22** capable of containing a large quantity of material to be spread, which results in fewer stops to refill the hopper **22** with material. For example, the hopper **22**

may allow for a 1/4 of a cubic yard or more of material to be carried by the vehicle. Preferably, the hopper **22** is made of a thermoplastic material, but other materials, such as metal, may be utilized. The thermoplastic material is advantageous because it does not rust, the material does not stick to the sides, and it requires no painting. Also, thermoplastic material is very durable and can be easily removed without damage. The thermoplastic material is also very light such that the frame **24** and hopper **22** may weigh 500 lbs. less than other commercial systems. Preferably, the hopper **22** and frame **24** weigh less than 400 lbs., but this is not intended to limit the subject invention. The hopper **22** is preferably formed by rotational molding, or roto-molding. Roto-molding is known to those skilled in the art of molding parts.

[0019] The hopper **22** has a front end **50**, a rear end **52**, and a bottom **54**. Accordingly, when the spreader assembly **20** is mounted in the truck bed, the front end **50** of the hopper **22** faces the cab of the vehicle. The rear end **52** of the hopper **22** defines an outlet **56** for discharging the material contained within the hopper **22**. The bottom **54** of the hopper **22** may be horizontal wherein the bottom **54** of the hopper **22** is parallel with the truck bed. Alternatively, the bottom **54** of the hopper **22** may be downwardly sloping toward the rear end **52** of the hopper **22** to facilitate the flow of material towards the outlet **56**. The hopper **22** may include an upper portion **58** having four upper walls **60, 62** and a lower portion **68** including the bottom **54** and four lower walls **64, 66**. The four upper walls **60, 62** may include a pair of upper end walls **60** and a pair of upper side walls **62**. The four lower walls **64, 66** may include a pair of lower end walls **64** and a pair of lower side walls **66**. Accordingly, the lower end walls **64** and the upper end walls **60** may combine to form the front and rear ends **50, 52** of the hopper **22**. In the disclosed embodiment, at least the lower side walls **66** are slanted such that the width of the hopper **22** tappers inwardly towards the bottom **54** to promote the release of the material in a continual and even flow and to prevent clogging. The

intersection of the upper portion **58** and the lower portion **68** may define a flange **70**. The flange **70** engages the upper rail **26** when the hopper **22** is inserted into the frame **24**. Each of the upper walls **60, 62**, the bottom **54**, and the lower walls **64, 66** may have reinforced portions **58, 68** for strengthening the respective wall. The upper walls **60, 62** may define an open top through which material may be loaded into the hopper **22**. A cover may be supported by the upper walls **60, 62** to cover the top and prevent the elements from entering the hopper **22**. The cover may be a vinyl tarp or a metal or plastic cover.

[0020] As shown in FIGS. 3 and 4, a spinner assembly **72** is connected in communication with the outlet **56** of the hopper **22** wherein the material discharged from the outlet **56** of the hopper **22** is communicated to the spinner assembly **72**. The spinner assembly **72** includes a drive shaft (not shown) connected to a disc **74** for receiving material communicated to the spinner assembly **72** from the outlet **56** of the hopper **22**. The drive shaft is driven and rotates the disc **74**. As the material impacts the disc **74**, the material is thrown or spread over a large distribution area, such as the roadway, as is known in the art of material spreaders. A material deflector **76** may also be attached to the spinner assembly **72** to assist in directing the material away from the vehicle and towards the distribution area. The spinner assembly **72** may include a feed chute **78** extending downwardly for directing the material through the spinner assembly **72** and to the disc **74**. In the preferred embodiment, the drive shaft is positioned vertically and is driven by a motor and transmission assembly (not shown), which are mounted outside the hopper **22**. A cover is used to protect the motor and transmission from the elements. The motor, transmission, and cover may be mounted to the frame **24**, preferably by bolts for easy removal and maintenance. As is known in the art, the motor and transmission assembly may take many forms. For example, the motor and transmission assembly may include an electric motor or a hydraulic motor. Alternatively, the motor and transmission assembly may incorporate an engine and output shaft of the vehicle.

Where the motor is an electric motor, the motor includes a power cord to connect to the vehicle power supply, which is not shown. A support frame **24** of the spinner assembly **72** supports **46, 48** the feed chute **78**, material deflector **76**, drive shaft, and disc **74**. A housing may attach to the support frame **24** to cover these parts.

[0021] Referring to FIGS. 5 and 6, the spreader assembly **20** further includes material coveyor **80** longitudinally mounted in the lower portion **68** of the hopper **22**. In the disclosed embodiment, the material conveyor is an auger, but it should be appreciated by those of ordinary skill in the art that any material conveyor could be used, such as for example a belt conveyor, a mixing bowl, a combination of these, etc. The auger **80** extends toward the outlet **56** for facilitating the discharge of material from the hopper **22** through the outlet **56**. The spreader assembly **20** has an auger drive assembly (not shown) that powers the auger **80**. Alternatively, it should be appreciated that the auger **80** and the drive shaft of the spinner assembly **72** may be rotatably connected through a coupling or transmission wherein only a single drive motor is required. Such a transmission capable of driving both the auger **80** and the spinner assembly **72** is disclosed in U.S. Patent No. 8,025,245 to Truan et al., the entirety of which is incorporated herein by reference. It should also be appreciated by those of ordinary skill in the art that the driving motor could include, electric power, hydraulic power, gas power etc. or a combination of these if desired. In the disclosed embodiment, the auger **80** extends through the hopper **22** and out of the outlet **56** wherein a portion of the auger **80** protrudes from the outlet **56** of the hopper **22**. As will be appreciated by those of ordinary skill in the art, the auger drive rotates the auger **80** to communicate material from the hopper **22**, through the outlet **56**, and to the feed chute **78** of the spinner assembly **72**. Preferably, the auger **80** extends between a transmission assembly of the auger drive and a bearing **82** adjacent the spinner assembly **72**.

[0022] The sloped bottom **54** and slanted lower side walls **66** of the hopper **22** direct material toward the auger **80** as the auger **80** pushes material toward the outlet **56**. A flow facilitator (not shown) may be mounted in the hopper **22** adjacent the auger **80** to facilitate the flow of material to auger **80**. Such a flow facilitator is disclosed in U.S. Patent No. 6,953,163 to Truan et al. and U.S. Patent No. 7,540,436 to Truan et al., the entirety of which are incorporated herein by reference. The flow facilitator is preferably a V-shaped plate and formed at about a 45 degree angle. The plate may be differently shaped and still accomplish the subject invention. Further, different angles of the plate may be utilized to accomplish the subject invention, for example, a 30 degree angle or a 60 degree angle may be employed. The V-shape of the plate generally defines a knife edge. A mounting bracket extends from the plate to at least one wall of the hopper **22**. A vibrator may be operatively connected to the mounting bracket or to the V-shaped plate to create vibrations with the flow facilitator to improve material flow. In the preferred embodiment, connecting rods and mounting brackets connect the plate to the lower side walls **66** of the hopper **22**. The connecting rods allow material to be distributed and flow easily down to the bottom **54** of the hopper **22** without clogging the auger **80** or the outlet **56**. A screen may also be used to screen out larger materials thereby preventing clogging or the spreader.

[0023] The flow facilitator improves the flow of material in several ways. In the first way, flow facilitator restricts the flow of material from within the hopper **22** to the area immediately adjacent to the auger **80**. The flow facilitator functions like a shield to control the amount of material that reaches the auger **80**. The material is supported on the top of the flow facilitator and flows around the edges of the flow facilitator through the gap between the walls of the lower portion **68** of the hopper **22**. A further way is that the flow facilitator relieves weight upon the auger **80**. This allows the auger **80** to begin to rotate without having to rotate under the weight of the material in the hopper **22**. A still further

advantage is that the flow facilitator allows the material on the auger **80** to "burp" or heave upward when the auger **80** starts to rotate. This relieves some of the weight on the auger **80** allowing it to begin operation with less power and reducing the potential for the auger **80** to lock up. Another way is that the flow facilitator vibrates to agitate the material within the hopper **22** so that it continues to flow around the edges of the flow facilitator to the auger **80**. The flow facilitator also functions as a chisel when vibrated to cut through the material.

[0024] Referring again to FIGS. 1 and 2, the spinner assembly **72** of the subject invention is longitudinally spaced from the outlet **56** of the hopper **22**. To maintain the communication of the material between the hopper **22** and the longitudinally spaced spinner assembly **72**, the spreader assembly **20** includes an auger extension assembly **84** extending between the outlet **56** of the hopper **22** and the spinner assembly **72**. The auger extension assembly **84** projects substantially horizontally from the rear base member **38** of the frame **24** such that all components of the extension assembly **84** are even with, or above, the rear base member **38** and therefore the truck bed. This allows for a cab-forward placement of the hopper **22** and frame **24** wherein the front end **50** of the hopper **22** and the front base member **36** of the frame **24** abut the cab of the vehicle and the rear end **52** of the hopper **22** and the rear base member **38** are positioned forward of the rear most portion of the truck bed. For example, the rear end **52** of the hopper **22** may be spaced forward of the rearmost portion of the truck bed to better distribute the weight of the hopper as shown in figure 8. As can be seen in figure 8, the hopper 22 is placed forward on the truck bed 120 adjacent the front portion 124. The spinner assembly 72 is adjacent the rear portion 122 of the bed 120. The extension assembly 84 extends between the hopper 22 and spinner assembly 72. In some applications, the rear end 52 may be substantially vertically aligned with a rear axle of the vehicle or may be positioned forward of the rear axle. The extension assembly **84** extends longitudinally from the rear base member **38** to a position adjacent the rear most portion of

the truck bed where it connects to the spinner assembly **72**. In this manner, the extension assembly **84** conveys or communicates the material exiting the outlet **56** of the hopper **22** to the spinner assembly **72**, which is longitudinally spaced from the hopper **22** and is adjacent the rear most portion of the truck bed. Accordingly, the cab-forward design of the spreader assembly **20**, as provided by the extension assembly **84**, moves the significant weight of the filled hopper **22** and the frame **24** forward towards the cab (the front) of the vehicle. As a result, better front-to-rear weight distribution of the vehicle is achieved. The improvement in vehicle weight distribution over the prior art designs contributes to better vehicle handling characteristics and less stress on the vehicle chassis and suspension components.

[0025] More particularly, the extension assembly **84** extends rearward from the rear base member **38** of the frame **24**. It should be appreciated by those of ordinary skill in the art that the extension assembly 84 could be removably mounted to the rear base member 38, or integrally mounted to the base member 38, or removably mounted to the hopper 22, in the event the base member 38 is not used, or integrally formed to the hopper 22. As best seen in FIGS. 3 and 4, the rear base member **38** includes an opening **86** mating with the outlet **56** of the hopper **22**. In the disclosed embodiment, the auger **80** projects from the outlet **56** of the hopper **22**, through the opening **86** in the rear base member **38**, and extends longitudinally into the extension assembly **84**. It should be appreciated by those of ordinary skill in the art that the auger 80 may not extend into the extension assembly 84, in which example the extension assembly 84 would house a separate material conveyor that is fed material from the auger 80, or other suitable material conveyor.

[0026] The extension assembly **84** includes a feed tube **88** extending about and housing the portion of the auger **80** extending into the extension assembly **84**. Accordingly, the feed tube **88** extends longitudinally through the extension assembly **84**. Additionally, the feed tube **88** may mate with and extend through the opening **86** in the rear

base member **38** such that a portion of the feed tube **88** extends through the outlet **56** and into the hopper **22**. Preferably, the feed tube **88** is generally cylindrical in shape; however, feed tubes **88** of other shapes and cross-sections may be used.

[0027] The feed tube **88** houses a portion of the auger **80** and facilitates the communication of material from the hopper **22** to the spinner assembly **72**. In use, the auger **80** moves the material along its length and through the feed tube **88**. Preferably, the feed tube **88** has a smooth and continuous wall. As best seen in FIGS. 5 and 6, the wall of the feed tube **88** may include one or more alignment protrusions **90, 92** for aligning and securing the feed tube **88** within the opening **86** of the rear base member **38**. As shown in FIGS. 3 and 4, the opening **86** of the rear base member **38** may include a slot in a twelve o'clock position. The feed tube **88** may include a first alignment protrusion **90** extending longitudinally along the wall of the feed tube **88** in a twelve o'clock position for engaging the slot as the feed tube **88** is inserted into the opening **86** of the rear base member **38** during assembly. The feed tube **88** may further include second alignment protrusion **92** extending annularly about the wall of the feed tube **88** to abut the rear base member **38** and act as a stop when the feed tube **88** is inserted into the opening **86** during assembly. Accordingly, the first alignment protrusion **90** prevents rotation of the feed tube **88** relative to the opening **86** in the rear base member **38** and the second alignment protrusion **92** prevent the feed tube **88** from moving longitudinally with respect to the rear base member **38**.

[0028] Referring to FIGS. 5 and 6, the feed tube **88** includes a discharge window **94** positioned adjacent the feed chute **78** of the spinner assembly **72**. Thus, the discharge window **94** is located opposite the outlet **56** of the hopper **22** and is in a six o'clock position thereby allowing gravity to carry the material downwardly from the discharge window **94** and into the feed chute **78**. The extension box further includes a pair of longitudinal supports **48** and a back plate **96**. The pair of longitudinal supports **48** extend

longitudinally rearward from the rear base member **38**, each being parallel to one another and disposed on either side of the feed tube **88**. The longitudinal supports **48** of the extension assembly **84** may be spaced from the feed tube **88**, or alternatively, may abut the feed tube **88** to provide additional support. The back plate **96** is attached to the longitudinal supports **48** opposite the rear base member **38**. The spinner assembly **72** is connected to and supported by the back plate **96**. The back plate **96** may include a pair of mounting brackets **98** for connecting the spinner assembly **72** to the extension assembly **84**. Additionally, the bearing **80** supporting the auger **80** is attached to and supported by the back plate **96**. Accordingly, the auger **80** and the feed tube **88** extend longitudinally through the opening **86** in the rear base member **38** and to back plate **96** of the extension assembly **84**. Such an arrangement places the discharge window **94** of the feed tube **88** adjacent the back plate **96**. A shroud **100** may be included to cover one or more components of the extension assembly **84**.

[0029] The extension assembly **84** and feed tube **88** further provide an additional advantage in that the material communicated to the spinner assembly **72** can be precisely controlled or metered. In conventional truck bed mounted spreaders, the auger **80** is mounted entirely within the hopper **22** and functions to communicate the material contained therein towards outlet **56** of the hopper **22**. Accordingly, when the auger **80** is deactivated, material can still flow (leak) through the outlet **56** and into the feed chute **78** of the spinner assembly **72**. If the spinner assembly **72** is also deactivated, the material can accumulate in the spinner assembly **72** and fall to the ground in clumps. This commonly occurs where the vehicle is traveling over rough terrain, which can shake material out of the hopper **22** when the auger **80** and spinner assembly **72** are deactivated. The extension assembly **84** and feed tube **88** arrangement of the present invention prevent the unwanted leakage of material from the spreader assembly **20** because the auger **80** extends through the outlet **56** of the hopper **22** and into the feed tube **88** thereby blocking the free flow of material through the outlet **56**

when the auger **80** is deactivated. More precise metering of the material communicated to the spinner assembly **72** is also achieved. The only material that reaches the feed chute **78** of the spinner assembly **72** is that portion of material communicated to the discharge window **94** of the feed tube **88** by each turn (rotation) of the auger **80**.

[0030] Referring to FIGS. 3 and 4, the spinner assembly **72** may be rotatably connected to the extension assembly **84** such that the spinner assembly **72** is moveable between an operating position, shown in FIGS. 3 and 4, and a storage position, shown in FIG. 7. In the operating position, the spinner assembly **72** is substantially vertical with the disc **74** disposed generally below the feed chute **78**. In the storage position, the spinner assembly **72** is rotated upwards such that the disc **74** is generally above the feed chute **78**. A locking mechanism is utilized to engage the mounting brackets **98** of the back plate **96** for locking the spinner assembly **72** in the operating position and in the storage position. The locking mechanism includes a pivot **102** connected to the mounting brackets **98**, best seen in FIG. 4. The pivot **102** is preferably a bolt type connection between the mounting brackets **98** and the housing of the spinner assembly **72**. The locking mechanism further includes a first locking point **104** for locking the spinner assembly **72** in the operating position and a second locking point **106** for locking the spinner assembly **72** in the storage position. A pin or bolt may then be inserted into the first or second locking point **104, 106** to hold the spinner assembly **72** in the desired position. The housing of the spinner assembly **72** may also include one or more handles for facilitating the rotation of the spinner assembly **72** between the operating position and the storage position. The pivot **102** and locking mechanism of the disclosed embodiment further provides the added advantage of enabling easy removal and repair of the spinner assembly **72,** protecting the spinner assembly **72,**when not in use as well as making the overall length of the material spreader assembly shorter for parking the vehicle or storing the material spreader assembly. It should be appreciated by those of ordinary skill in the art that

the spinner assembly 72 could be designed to pivot further with respect to the extension assembly 84, such that it rests upon the extension assembly 84 when rotated and not in use.

[0031] As shown in FIGS. 3 and 4, the subject material spreader assembly may additionally include a liquid sprayer system for pre-wetting the material as it exits the hopper **22** and enters the spinner assembly **72**. Pre-wetting is the process of, for example, spraying salt or a salt mixture with water or a brine mixture before spreading the salt on a roadway. Pre-wetting the salt helps it work more effectively as a deicing agent for two reasons. First, wet salt clings to the road instead of bouncing off or being swept off by traffic. The result is that less salt is spread, saving money and minimizing the threat to the environment. Second, to be effective as a deicing agent, salt requires moisture. Moisture dissolves the salt, releasing heat and thereby melting the ice and snow, as well as breaking the ice-road bond. When temperatures drop below freezing there is no moisture on the road, and salt alone is ineffective. Pre-wetting the salt ensures that there will be enough moisture to facilitate the melting process. The liquid sprayer system may include spray nozzles **108** mounted to the feed tube **88** to supply liquid to the material as it passes through the feed tube **88**. The spray nozzles **108** are connected by hoses to a liquid pump **110** in fluid communication with a tank containing the liquid (not shown). Upon activation of the spray nozzles **108**, the liquid and the material being spread (e.g. salt) is mixed within the feed tube **88** before it is supplied to the spinner assembly **72**. This ensures complete mixing between the liquid, the salt, and other additives in the material (e.g. sand) before it is spread by the spinner assembly **72**. This provides an additional advantage because the material is pre-wet and premixed as it exits the feed tube **88**. It also ensures that the salt is energized by the liquid before spreading. Without adding the liquid to the material, the material tends to bounce around when it hits the distribution area (e.g. a roadway) and does not stay in the desired

location. Pre-wetting the material addresses this problem because the pre-wet material tends to stick to the distribution area and does not tend to drift or bounce around.

[0032] A controller (not shown) is capable of controlling both the motor of the auger **80** and the motor of the spinner assembly **72**. The controller has infinite control and typically operates the two motors. Preferably, the controller is housed within the vehicle. A spinner motor to spinner transmission reduction ratio of 8:1 and an auger motor to auger transmission reduction ratio of 20:1 may be used. Where the liquid spray system is employed, the controller controls the auger **80**, spinner assembly **72**, and the liquid pump **110** and the feed rate of each. One feature of the controller is the ability to monitor the auger feed rate and automatically adjust the amount of liquid supplied to the feed tube **88**. The controller will supply a certain amount of liquid for a given auger speed.

[0033] Referring to the Figures, wherein like numerals indicate corresponding parts throughout the several views, Obviously, many modifications and variations of the present invention are possible in light of the above teachings and may be practiced otherwise than as specifically described while within the scope of the appended claims. These antecedent recitations should be interpreted to cover any combination in which the inventive novelty exercises its utility. The use of the word "said" in the apparatus claims refers to an antecedent that is a positive recitation meant to be included in the coverage of the claims whereas the word "the" precedes a word not meant to be included in the coverage of the claims. In addition, the reference numerals in the claims are merely for convenience and are not to be read in any way as limiting.

CLAIMS

What is claimed is:

1. A material spreader adapted to be mounted to a vehicle, said vehicle having a bed portion with a laterally extending front and rear portion, said spreader comprising:

a hopper having spaced apart front and rear end walls, side walls and a base for receiving and containing material to be spread, said hopper having a hopper outlet positioned in said rear end wall for discharging material to be spread, said hopper being adapted to mount upon the bed portion with said hopper outlet being spaced from said rear portion of said vehicle bed; said front end wall of said hopper being positioned adjacent said front portion of said vehicle bed, wherein said hopper is positioned forward of the rear portion of said vehicle bed and adjacent the front portion of the vehicle bed;

a spinner assembly spaced from said hopper outlet and adjacent the rear portion of the vehicle bed;

a material conveyor extending from said hopper outlet to said spinner assembly, said material conveyor adapted to convey material from said hopper to said spinner assembly;

an extension assembly for extending the distance between said hopper and said spinner assembly, said extension assembly extending longitudinally between said hopper outlet and said spinner assembly, said material conveyor being housed within said extension assembly;

whereby, said hopper is adapted to be positioned upon the vehicle such that said front end wall is positioned forward adjacent the front portion of the vehicle bed, said rear end wall is positioned forward of said rear portion of said vehicle bed, such that the material within said hopper is substantially positioned forward of the rear portion of said vehicle bed, said

material conveyor being adapted to convey material to said spinner and said spinner distribute said material received from said material conveyor.

2. The material spreader of claim 1, wherein said material conveyor is an auger, said auger including a plurality of blades extending radially and outwardly from said auger in a helical configuration allowing the auger to move material from said hopper to said spinner.

3. The material spreader of claim 2, wherein said auger extends from adjacent said front wall of said hopper through said hopper outlet to said spinner.

4. The material spreader of claim 2, further including an elongated tube encircling said auger closely adjacent said blades; said elongated tube being mounted within said extension assembly and extending from said hopper outlet to said spinner, said elongated tube having an opening for discharging material to said spinner, said blades being adapted to close said opening when said auger stops.

5. The material spreader of claim 1, further including at least one liquid inlet for injecting liquid into said extension assembly and upon said conveyor.

6. The material spreader of claim 5, further including a pump for pumping fluid to said fluid inlet.

7. The material spreader of claim 1, further including a controller for controlling the operation of said auger and said spinner.

8. The material spreader of claim 6, further including a controller for controlling the operation of said auger, said spinner and said pump such that the injection of liquid is relative to the speed of the auger.

9. The material spreader of claim 1, wherein said spinner assembly is rotatably connected to said extension assembly, such that said spinner assembly can be rotated with respect to said extension assembly.

10. The material spreader of claim 9, wherein said spinner assembly is rotated with respect to said extension assembly to a storage position wherein said spinner assembly is substantially positioned forward of said rear portion of said vehicle.

11. A material spreader adapted to be mounted to a vehicle, said spreader comprising:

a hopper having spaced apart front and rear end walls, side walls and a base for receiving and containing material to be spread, said hopper having a hopper outlet positioned in said rear end wall for discharging material to be spread,

a spinner assembly spaced longitudinally apart from said hopper rear end wall and said outlet;

an extension assembly containing a material conveyor operably connecting said hopper outlet and said spinner assembly, said material conveyor being adapted to convey material from said hopper to said longitudinally spaced apart spinner assembly.

12. The material spreader of claim 11, further including at least one fluid inlet for injecting fluid into said extension assembly and upon said material conveyor.

13. The material spreader of claim 11, wherein said material conveyor is an auger, said auger includes a plurality of blades extending radially and outwardly from said auger in a helical configuration for allowing the auger to move material from said hopper to said spinner.

14. The material spreader of claim 13, further including an elongated tube encircling said auger closely adjacent said blades; said elongated tube being mounted within said extension assembly and extending from said hopper outlet to said spinner, said elongated tube having an opening for discharging material to said spinner, said blades being adapted to close said opening when said auger stops.

15. The material spreader of claim 11, wherein said auger extends from adjacent said front wall of said hopper through said hopper outlet to said spinner assembly.

16. The material spreader of claim 12, further including a pump for pumping liquid to said liquid inlet.

17. The material spreader of claim 11, further including a controller for controlling the operation of said material conveyor and said spinner.

18. The material spreader of claim 16, further including a controller for controlling the operation of said material conveyor, said spinner and said pump such that the injection of liquid is controlled relative to the speed of the auger.

19. The material spreader of claim 11, wherein said spinner assembly is rotatably connected to said extension assembly, such that said spinner assembly can be rotated with respect to said extension assembly.

20. A material spreader extension assembly for extending the distance between a hopper outlet of a material spreader and a spinner assembly, said material spreader extension comprising:

a material conveyor support housing, said support housing adapted to extend between said hopper outlet and said material spreader, said material conveyor support housing having a first opening in operable communication with said hopper outlet and a second opening in operable communication with said spinner;

a material conveyor extending from at least said first opening to said second opening adjacent said spinner, said material conveyor being adapted to convey material from said first opening to said second opening for deposit upon said spinner;

at least one fluid inlet for injecting fluid into said auger tube and upon said material being conveyed;

whereby said material can be pre-wet prior to discharge from said second opening and deposit upon said spinner.

21. The material spreader extension of claim 20, further including a spinner assembly mounted to said housing, whereby said material spreader extension and said spinner assembly are an integral unit.

22. The material spreader extension of claim 20, further including a hopper for containing a material to be spread, said hopper being operatively connected to said support housing.

23. The material spreader extension of claim 22, wherein said material conveyor extends through said hopper.

24. The material spreader extension of claim 20, wherein said material conveyor is an auger, said auger including a plurality of blades extending radially and outwardly from said auger in a helical configuration allowing the auger to move material from said hopper to said spinner.

25. The material spreader extension of claim 24, further including an elongated tube encircling said auger closely adjacent said blades; said elongated tube being mounted within said support housing and extending from said hopper outlet to said spinner, said elongated tube having an opening for discharging material to said spinner, said blades being adapted to close said opening when said auger stops.

26. The material spreader of claim 20, further including a controller for controlling the operation of said auger and said spinner.

27. The material spreader of claim 20, further including a pump for pumping liquid to said liquid inlet.

28. The material spreader of claim 27, further including a controller for controlling the operation of said auger, said spinner and said pump such that the injection of liquid is relative to the speed of the auger.

29. The material spreader of claim 20, wherein said spinner assembly is rotatably connected to said extension assembly, such that said spinner assembly can be rotated with respect to said extension assembly

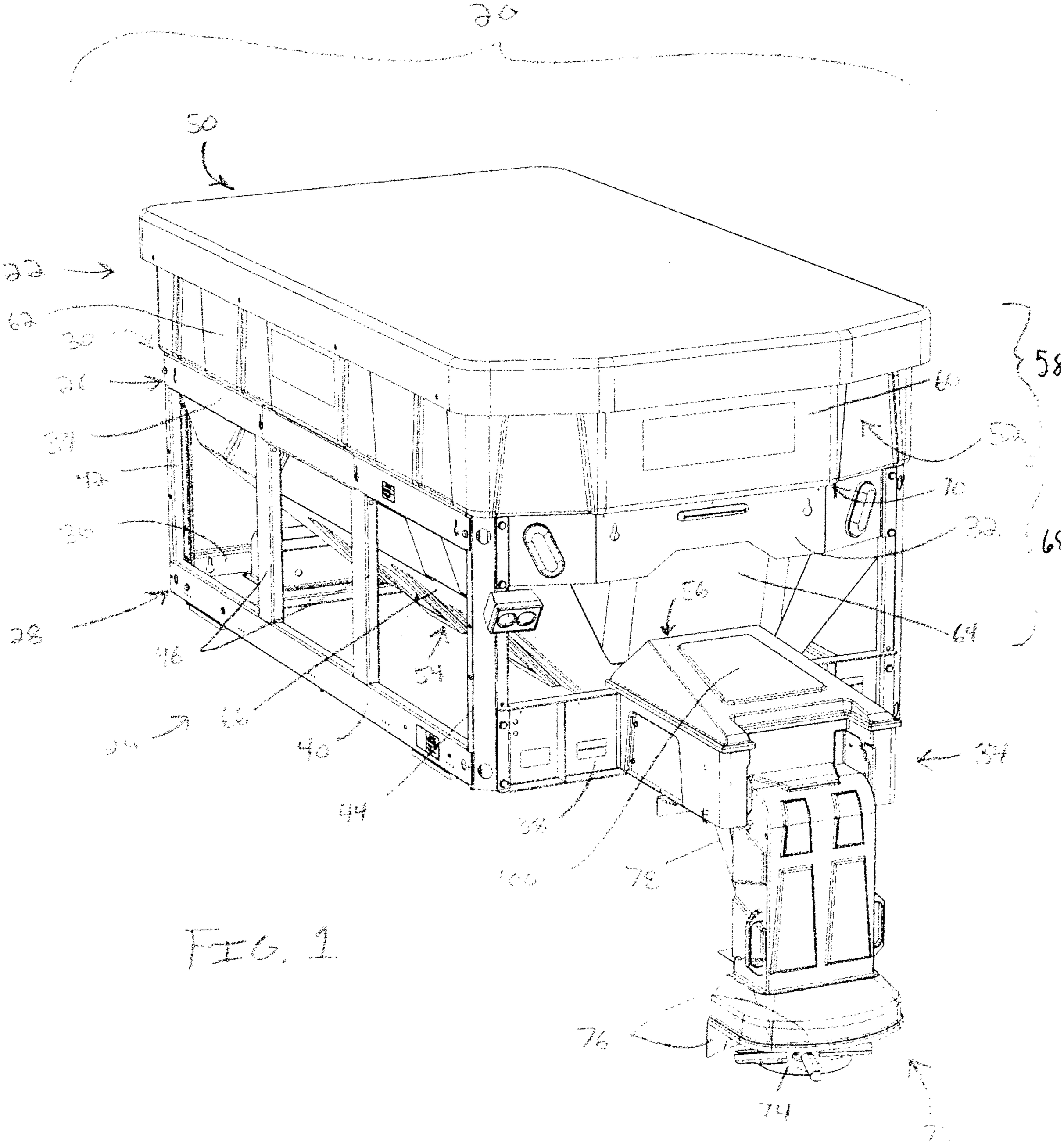

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FIG. 1

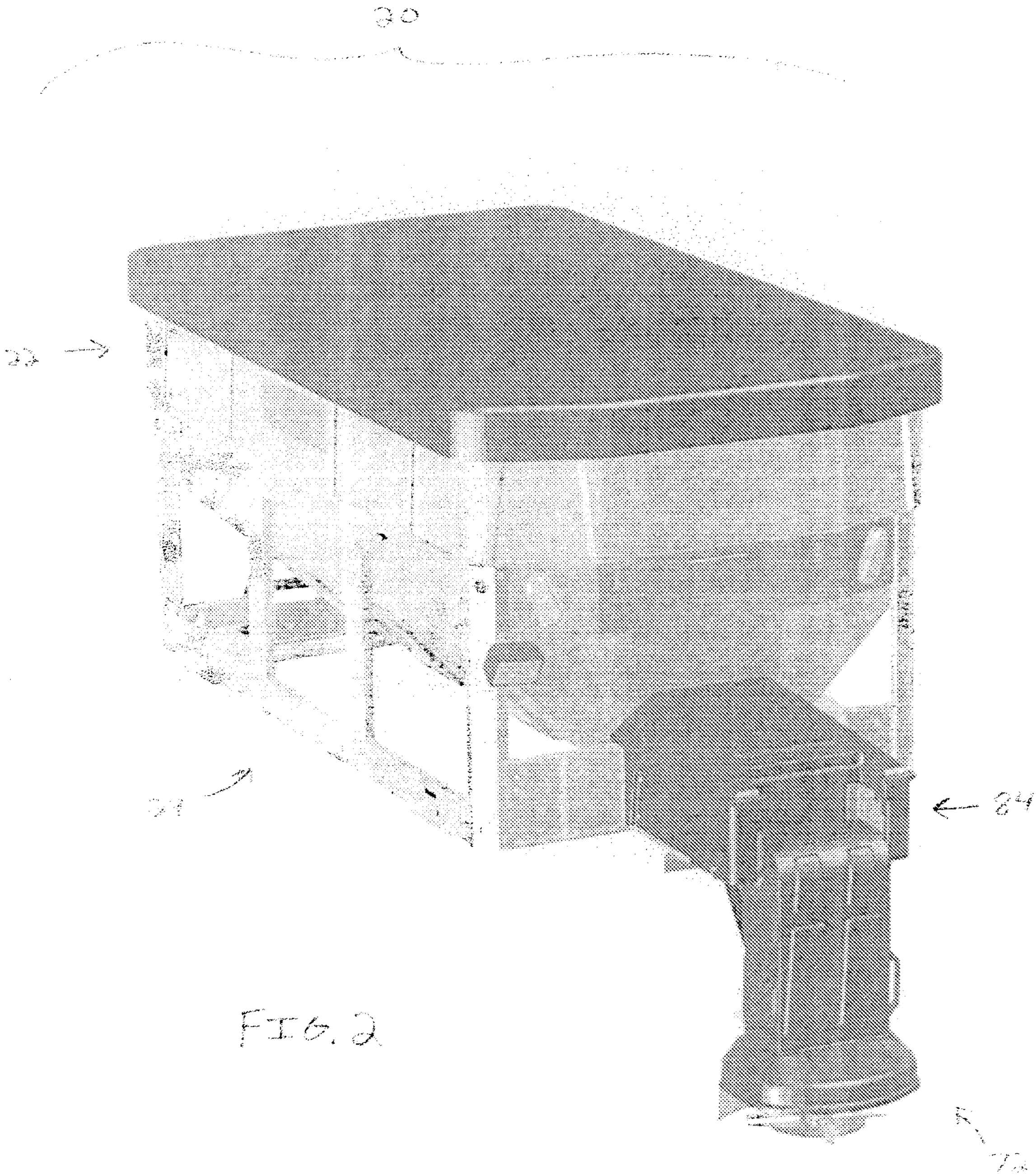


FIG. 2

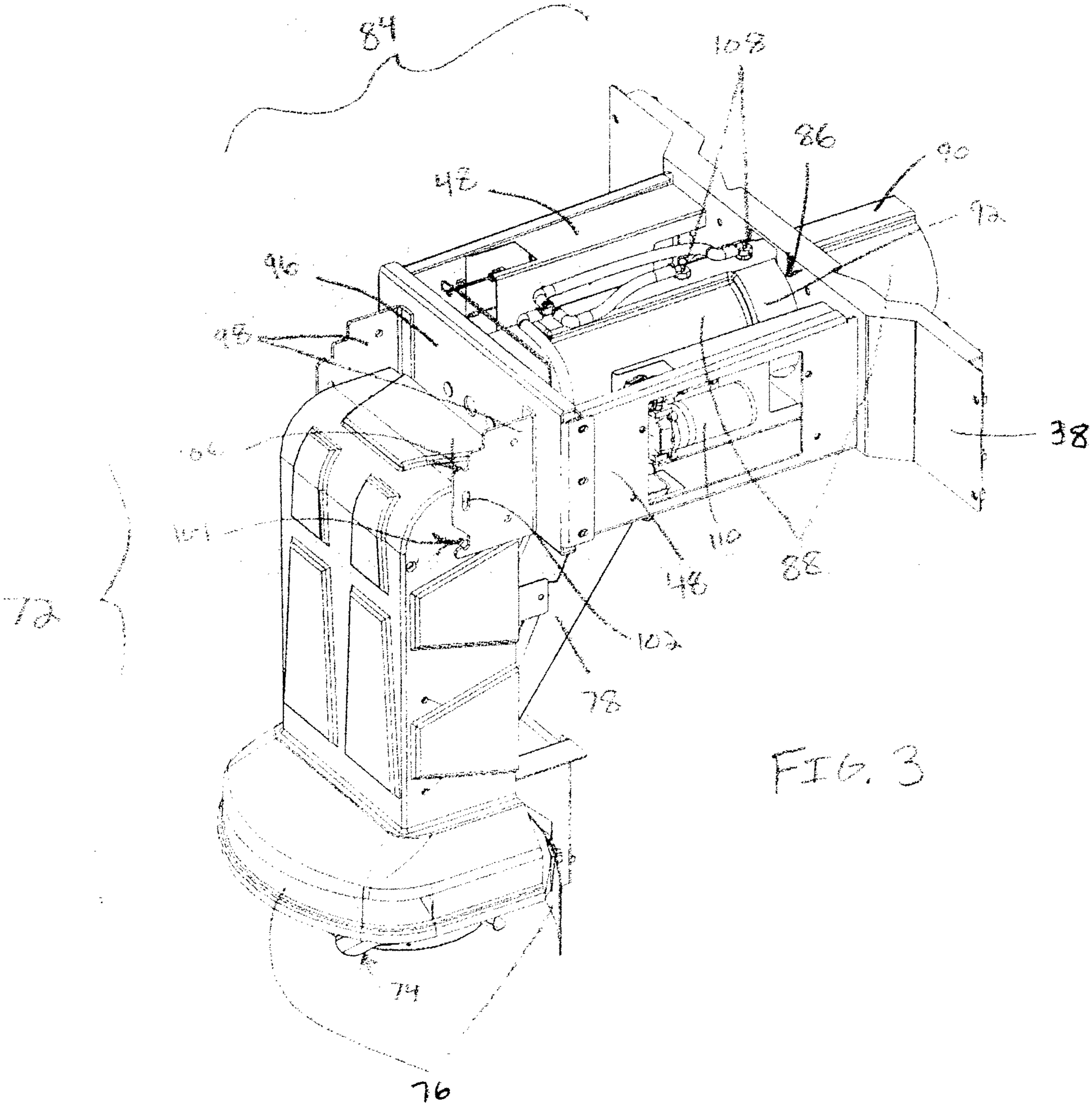


FIG. 3

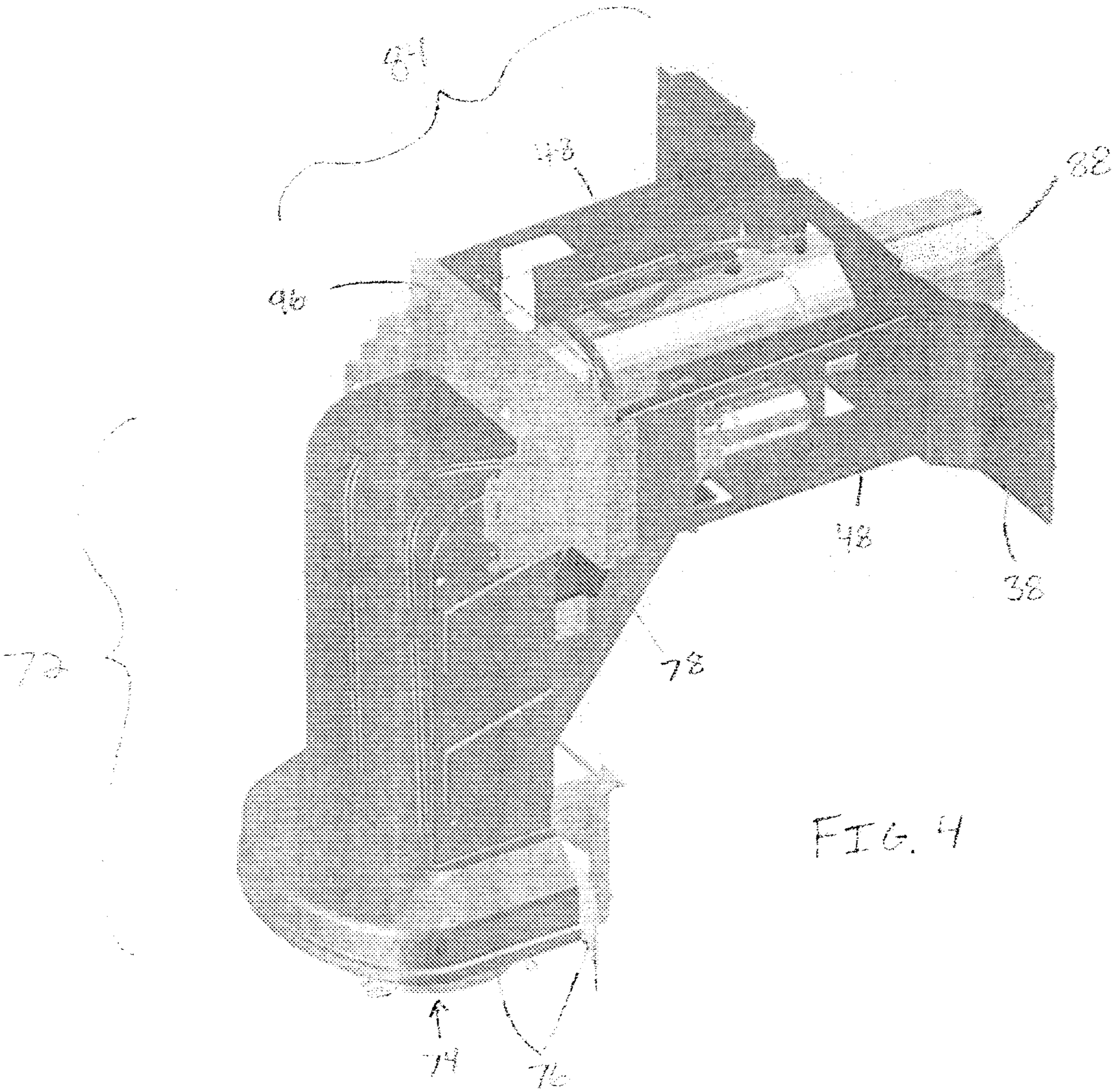


FIG. 4

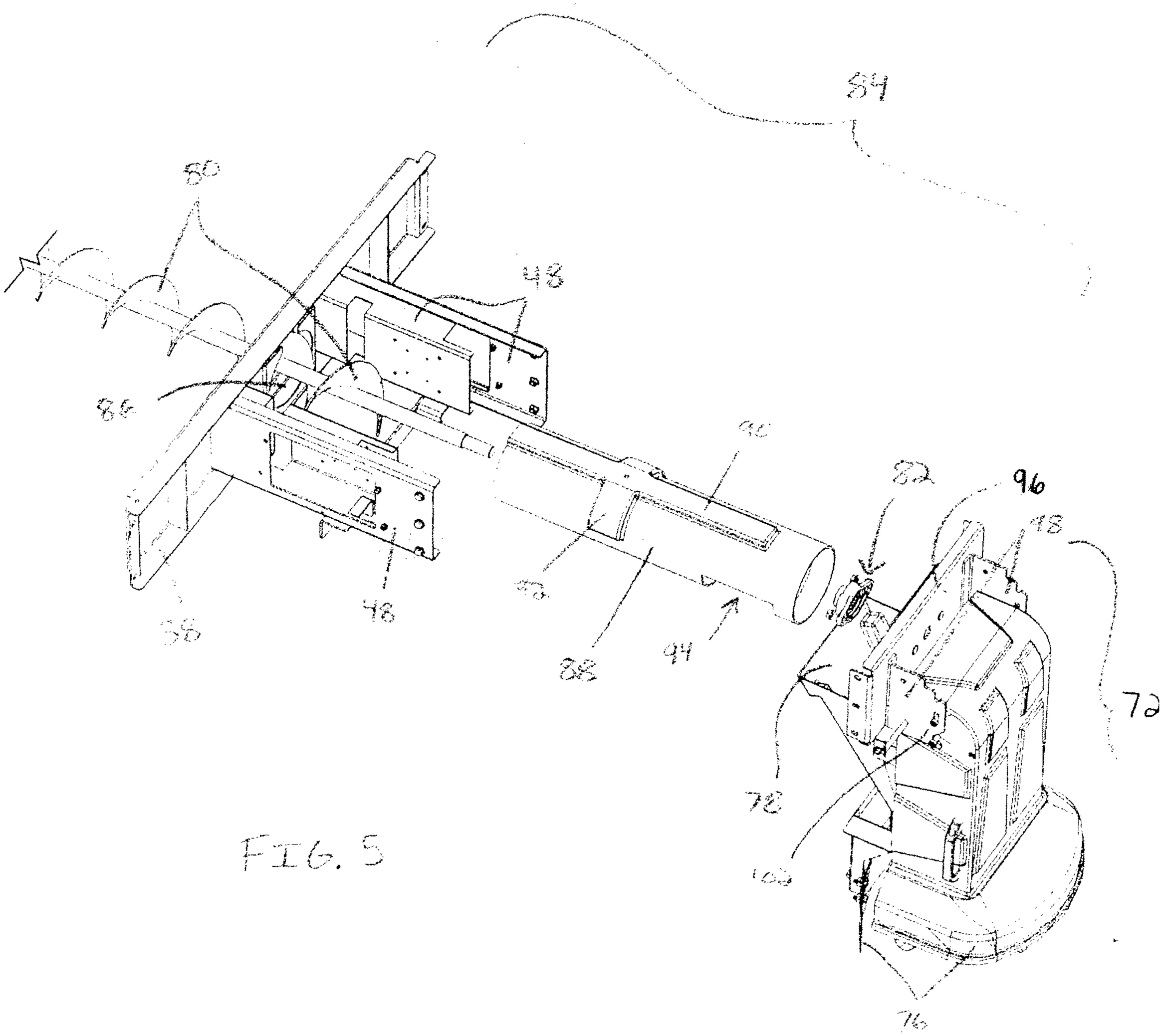


FIG. 5

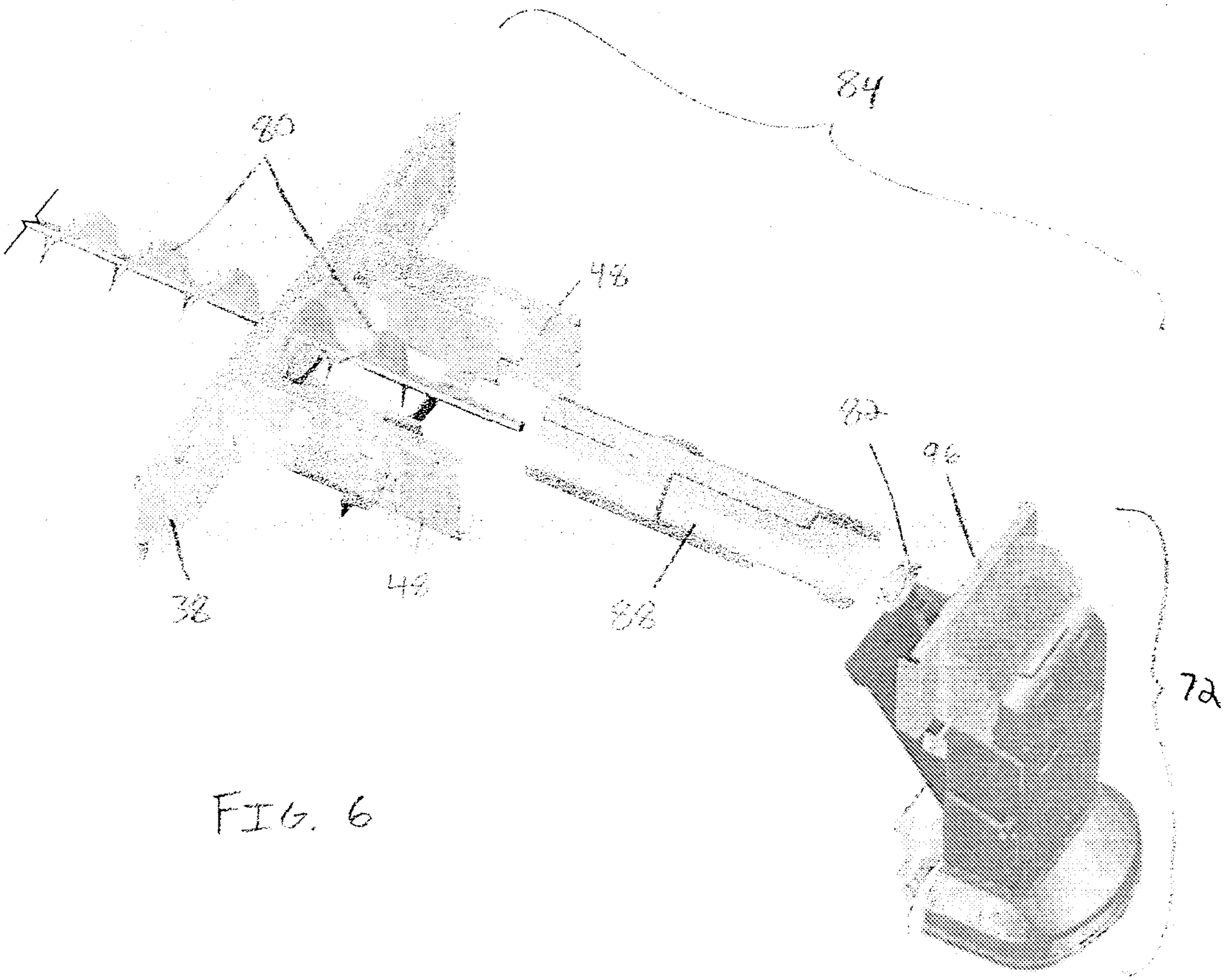


FIG. 6

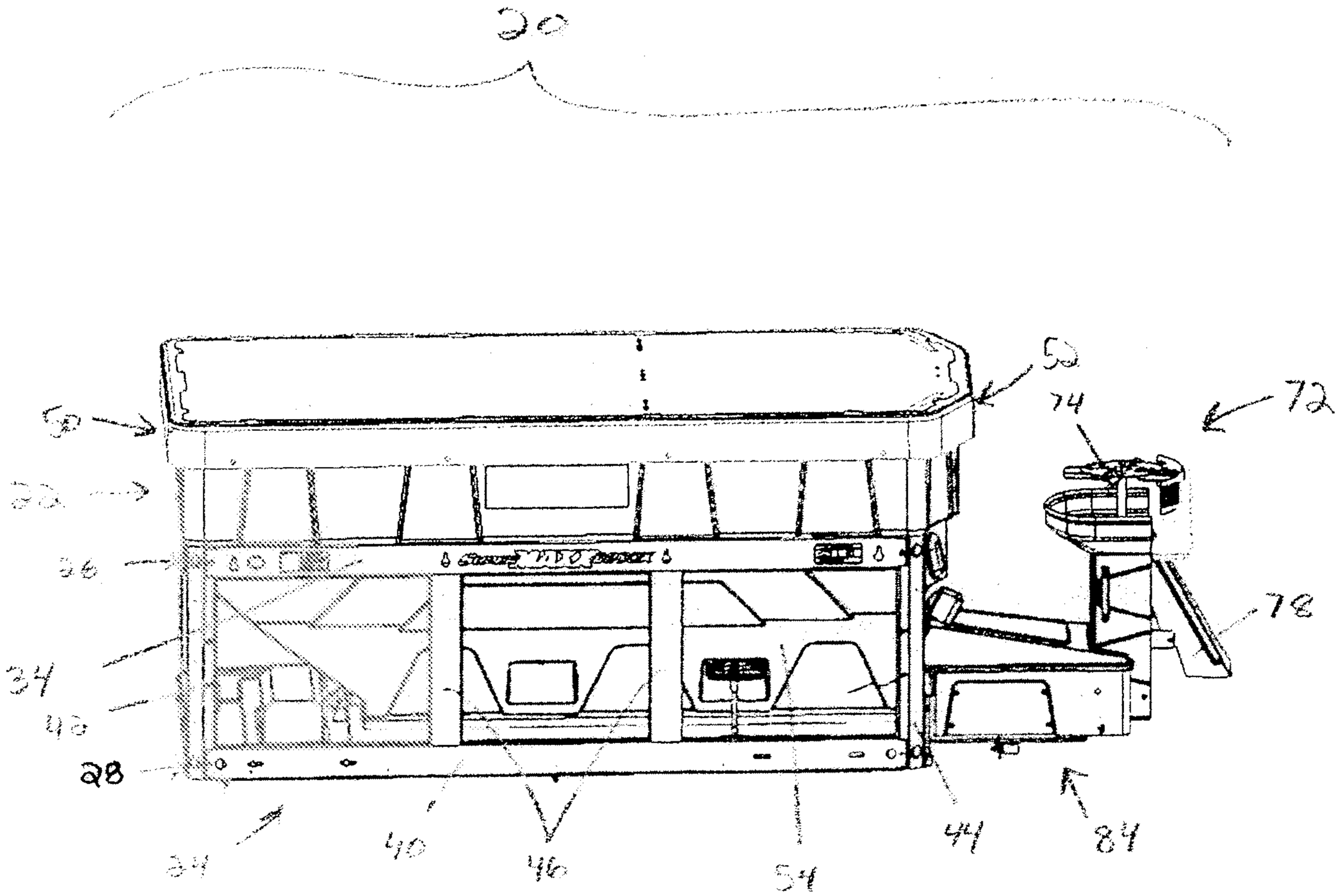


FIG. 7

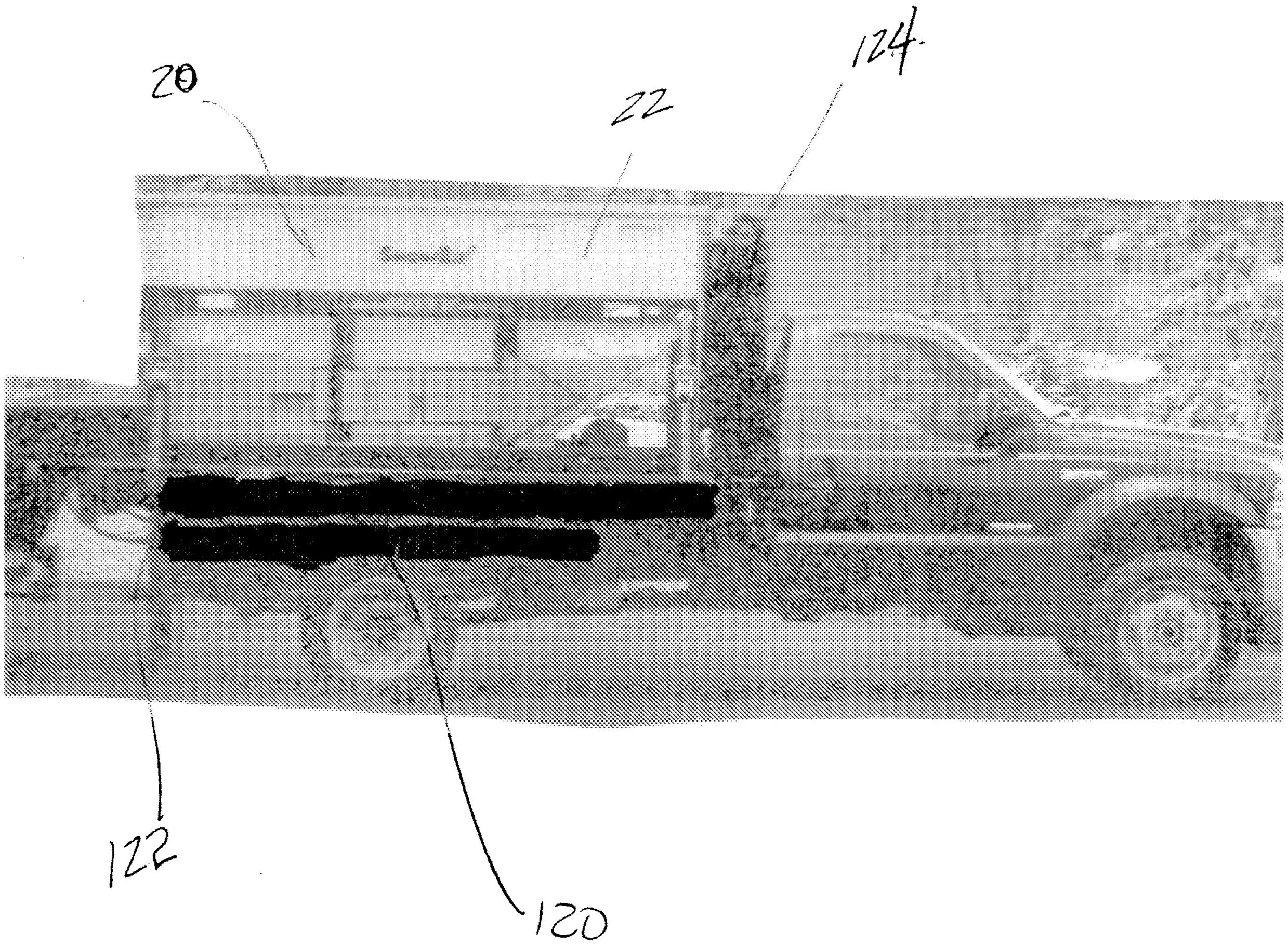


Fig 8

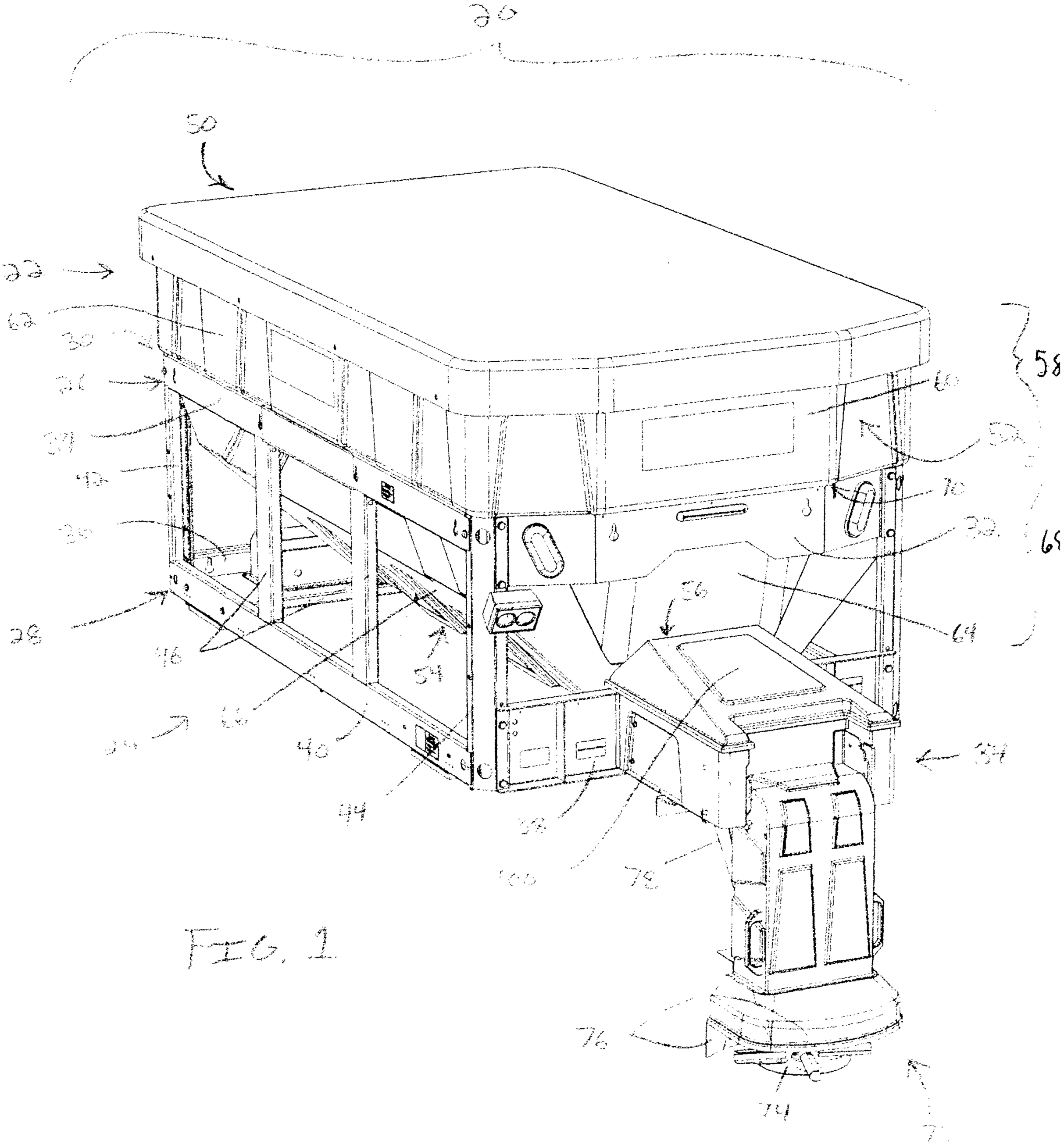

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FIG. 1