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(54) **VACUUM BASED NAPKIN DISPENSER**

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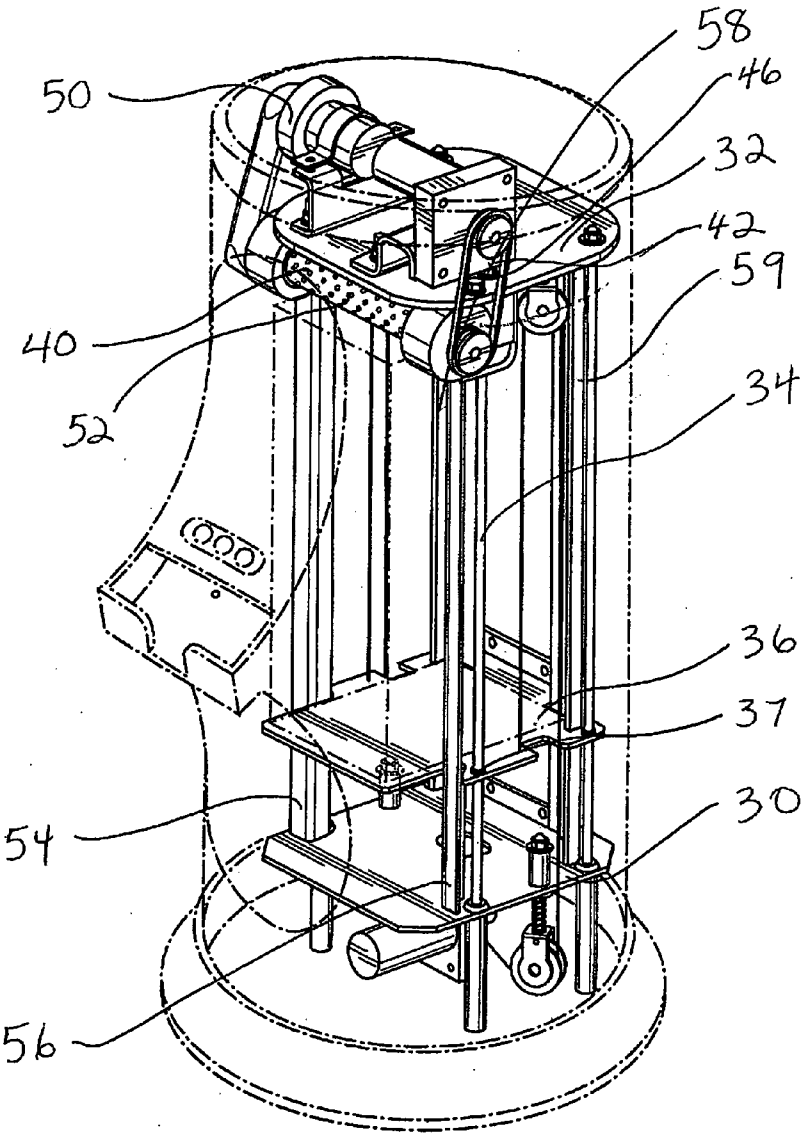
(57) **ABSTRACT**

The invention provides a novel system for dispensing paper products, particularly paper napkins. The system includes a moveable napkin carrier platform and a vacuum roller that picks up and dispenses a paper product.



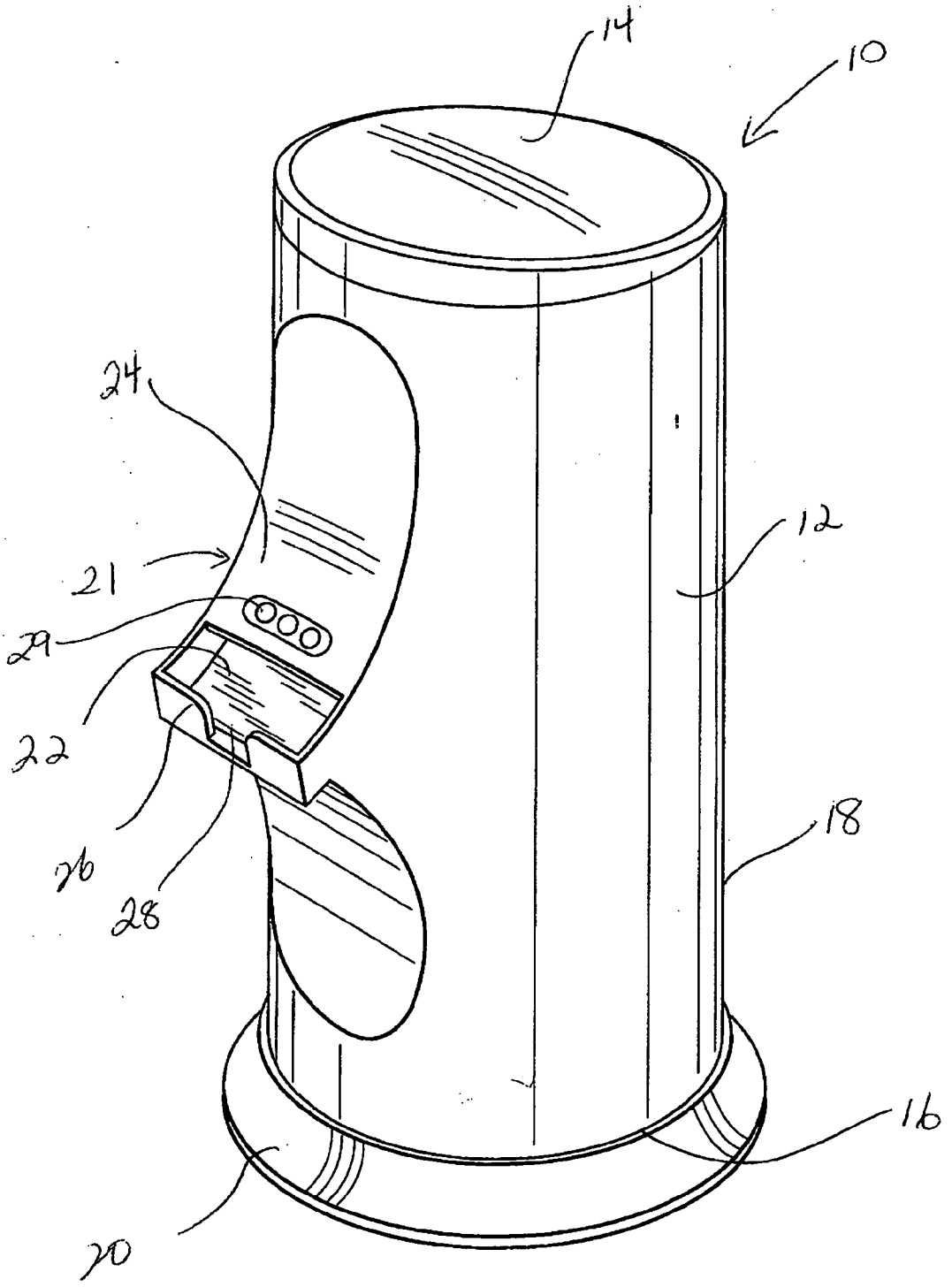



FIG. 1

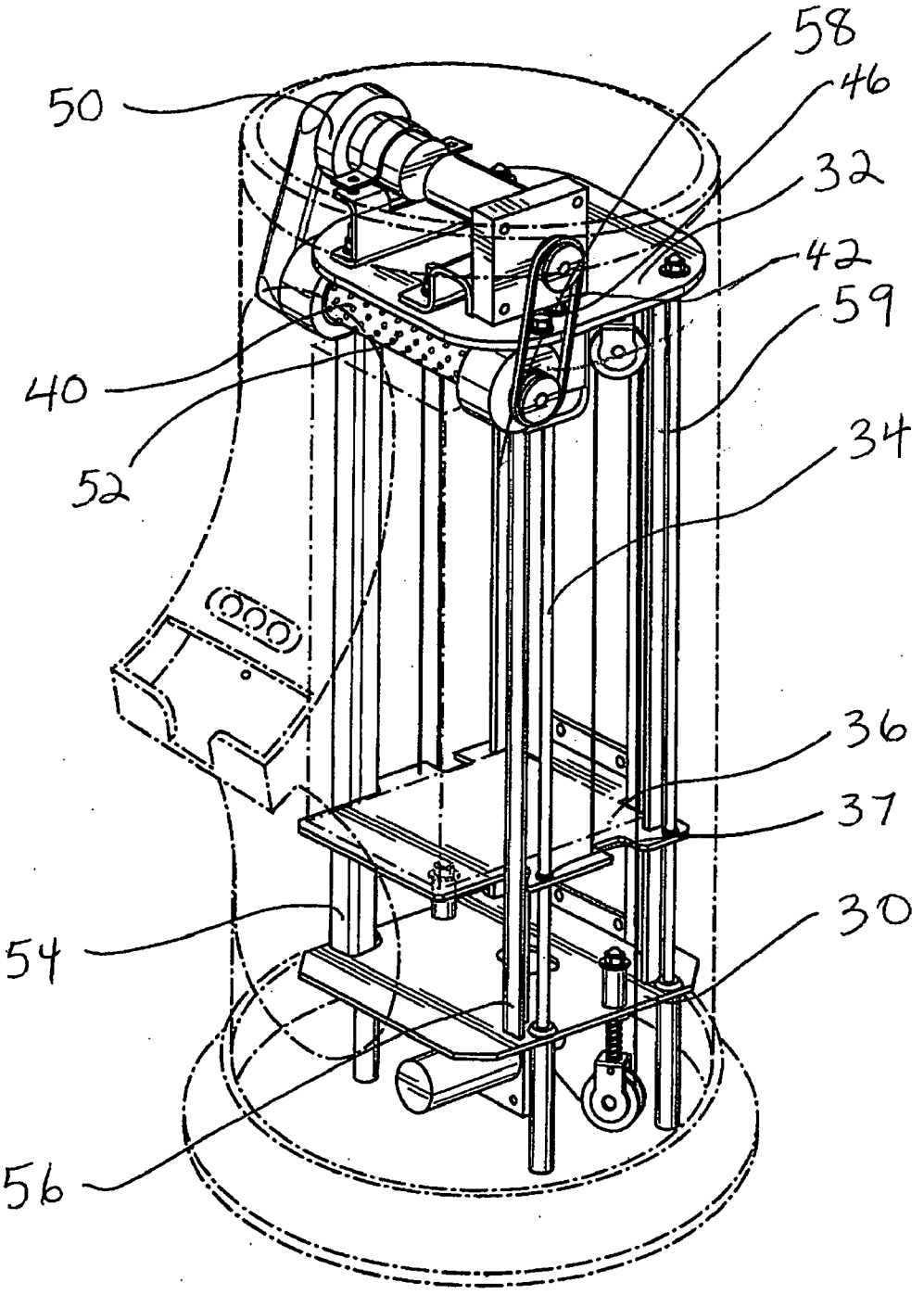



FIG. 2

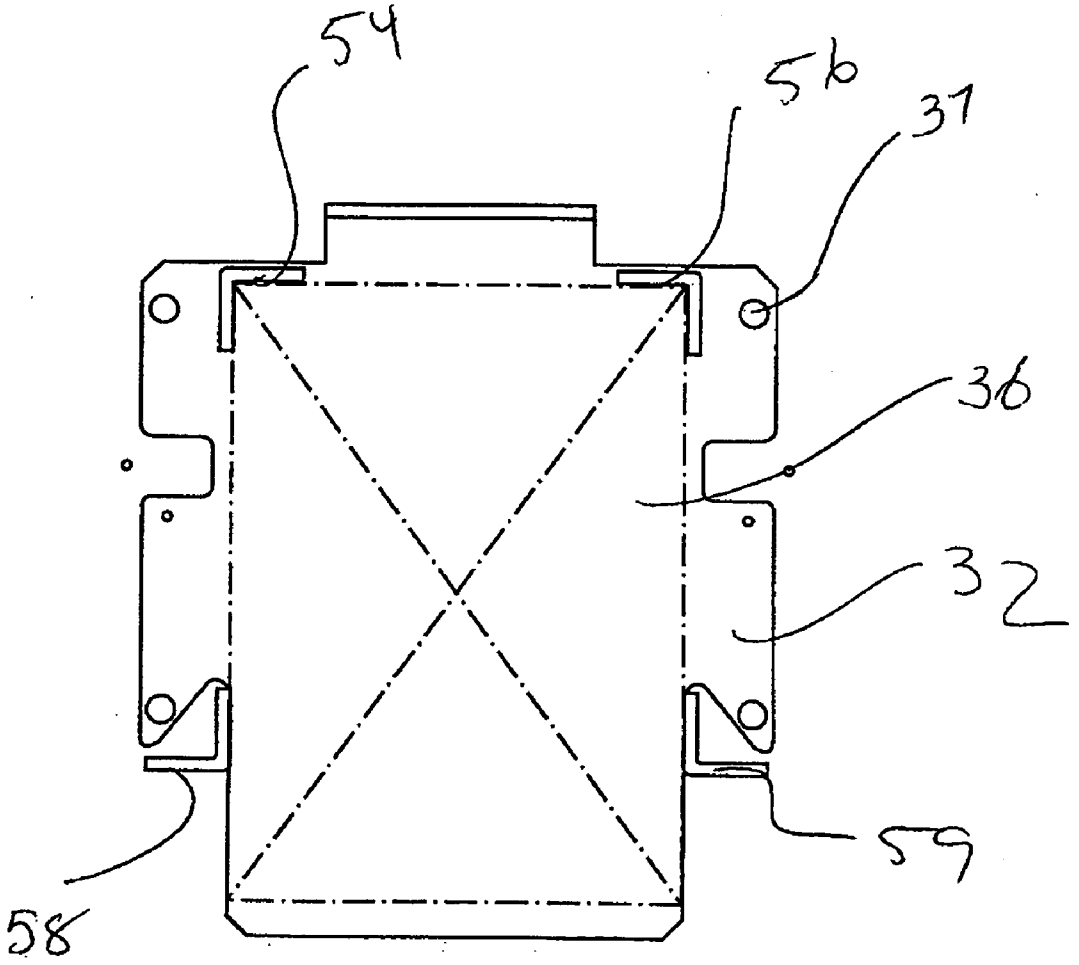



FIG. 3

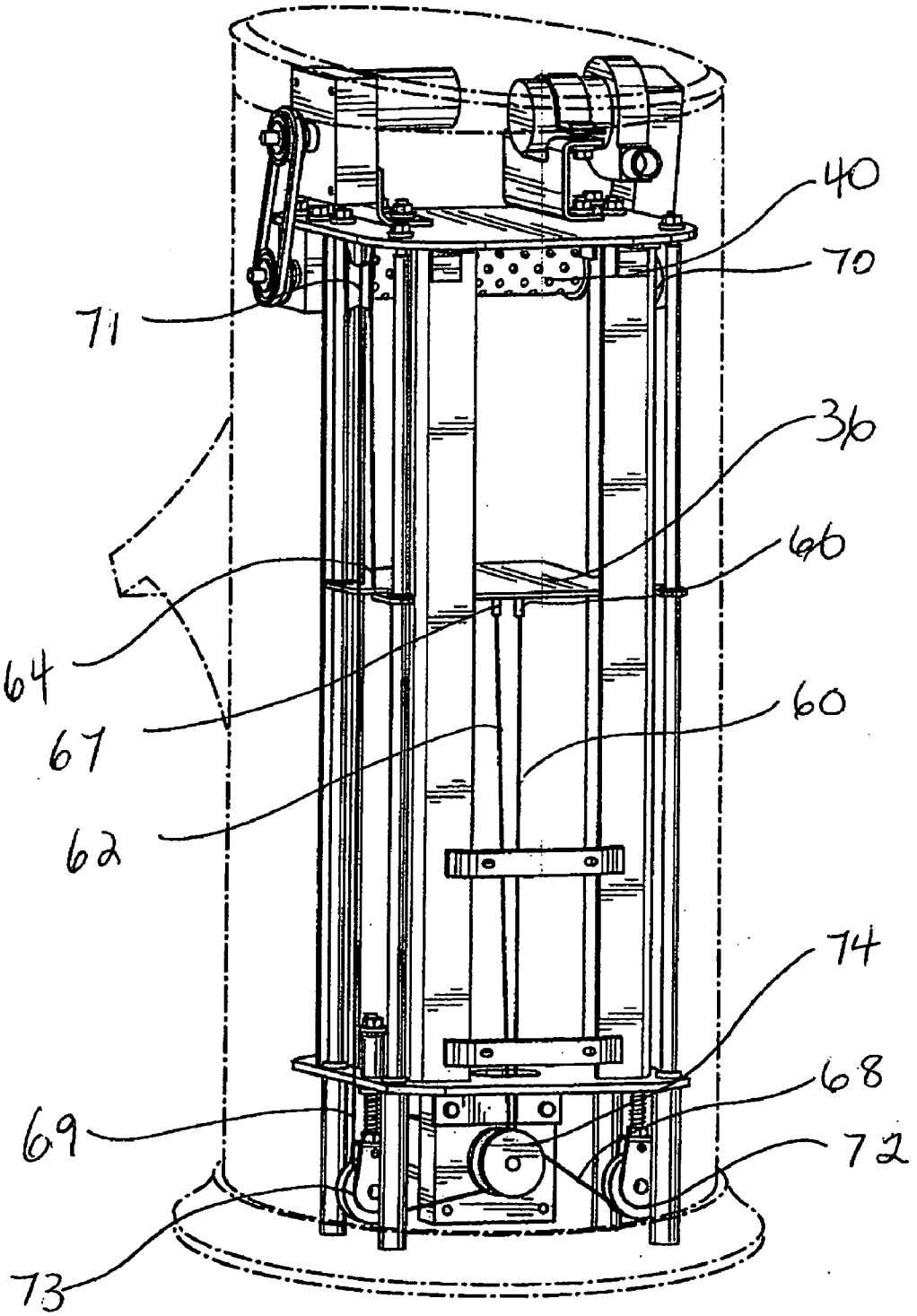



FIG. 4

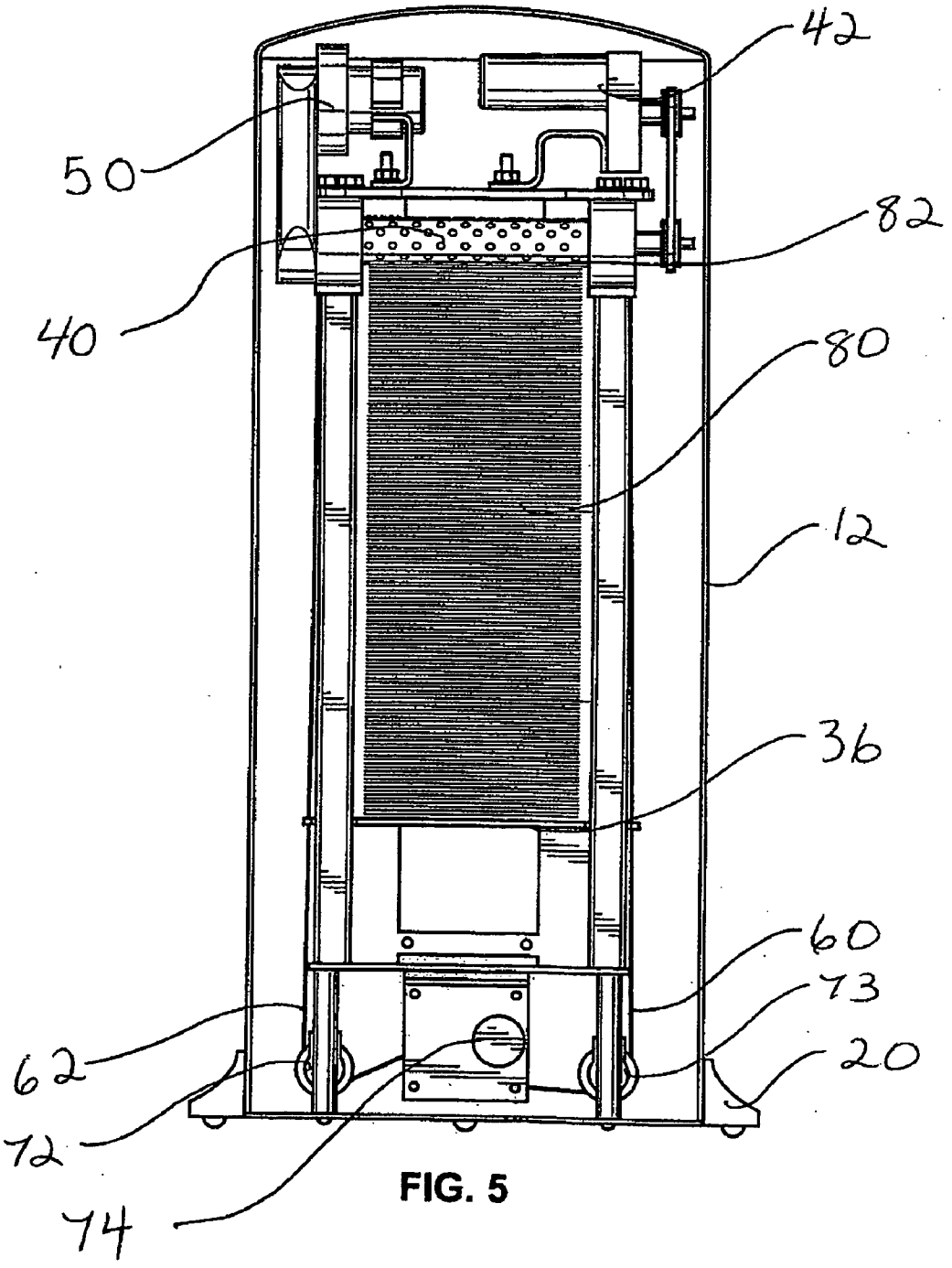



FIG. 5

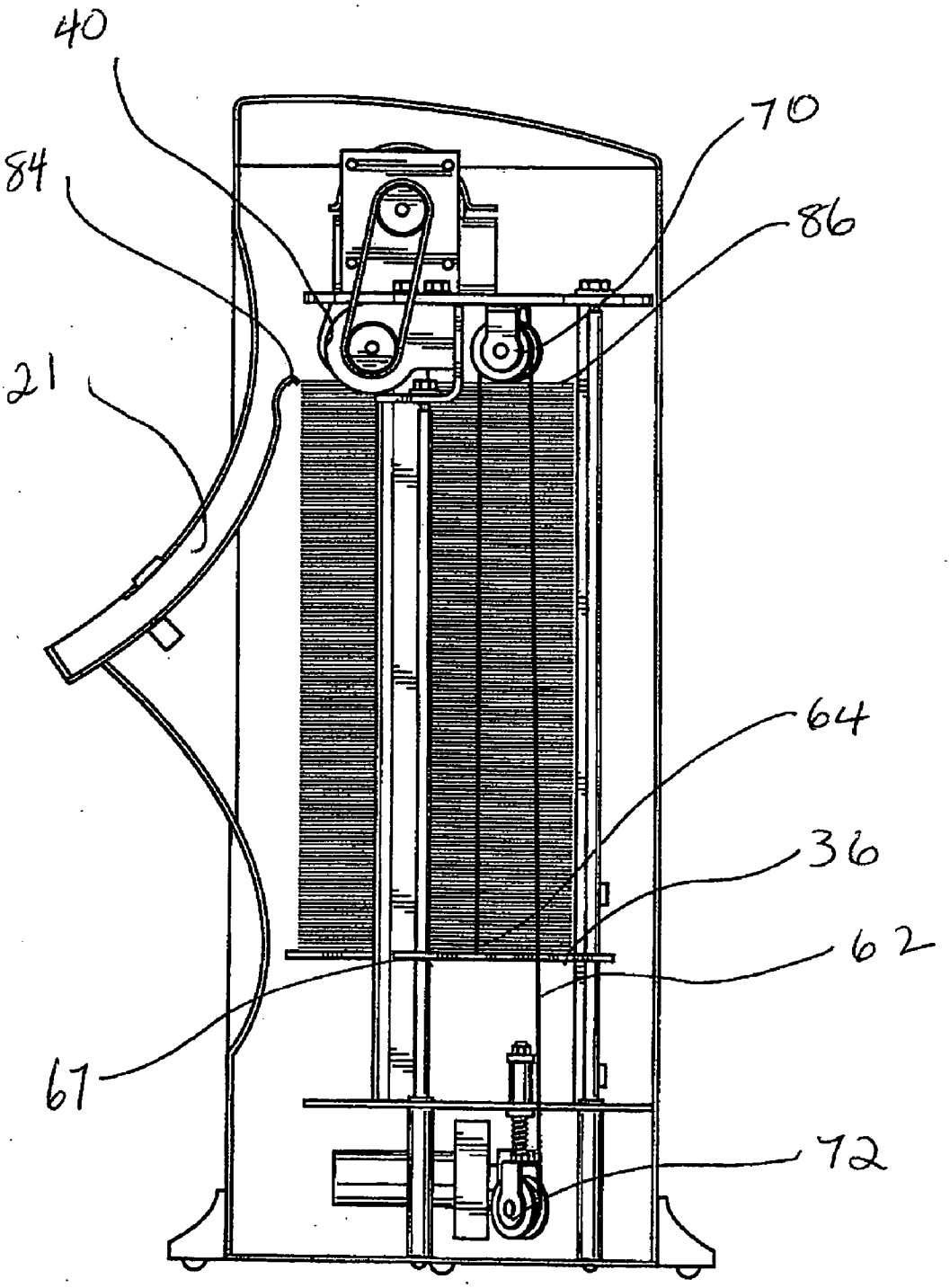



FIG. 6

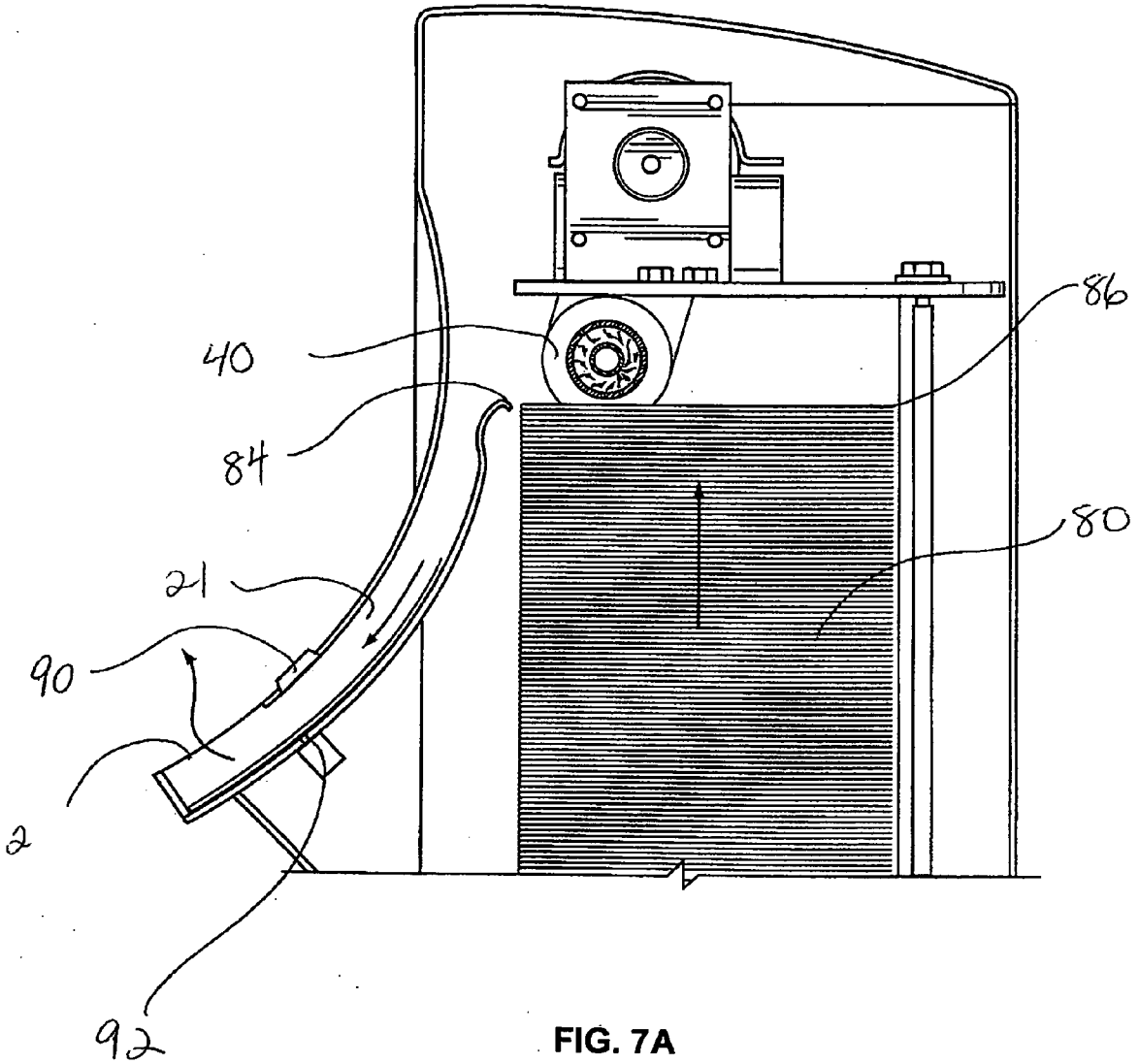



FIG. 7A

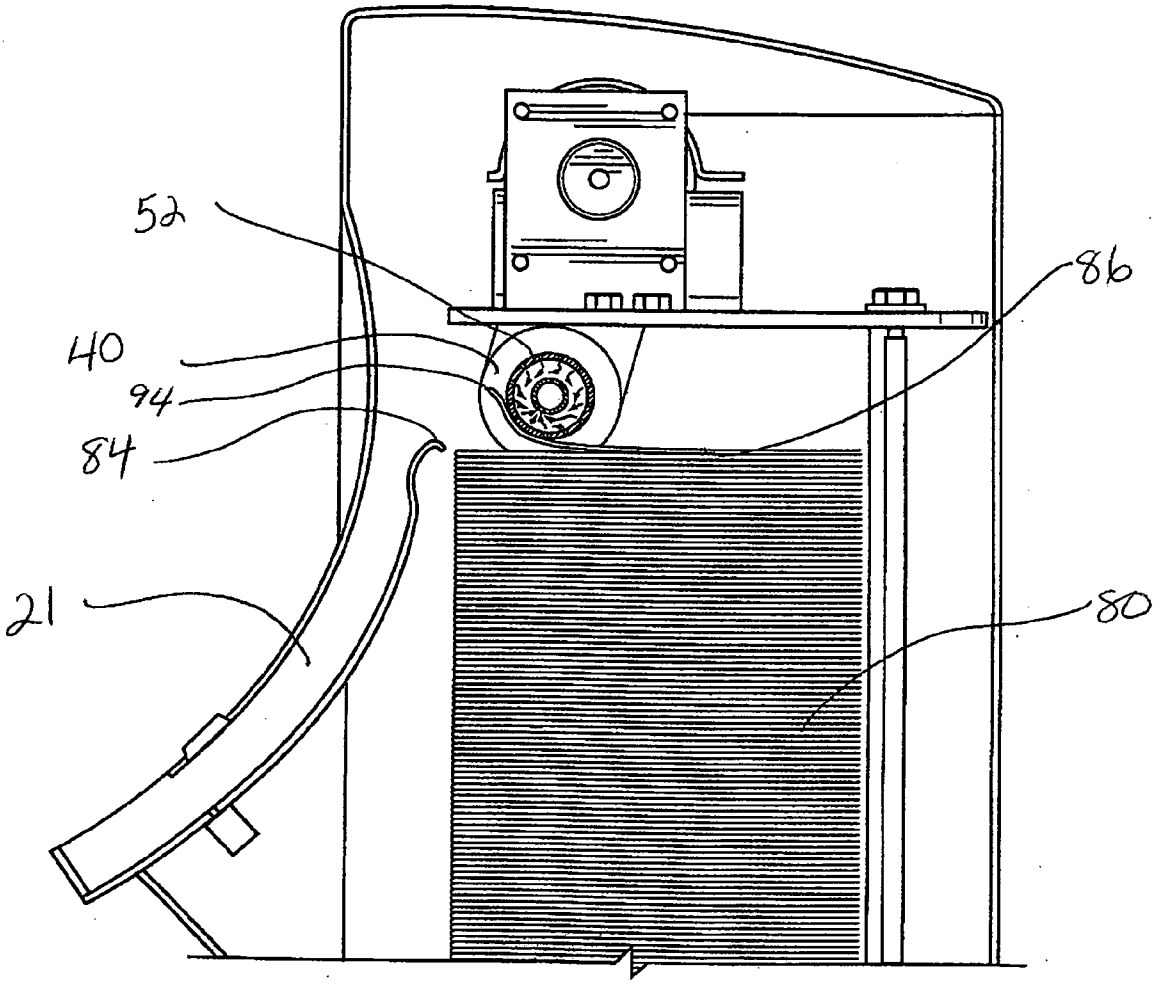



FIG. 7B

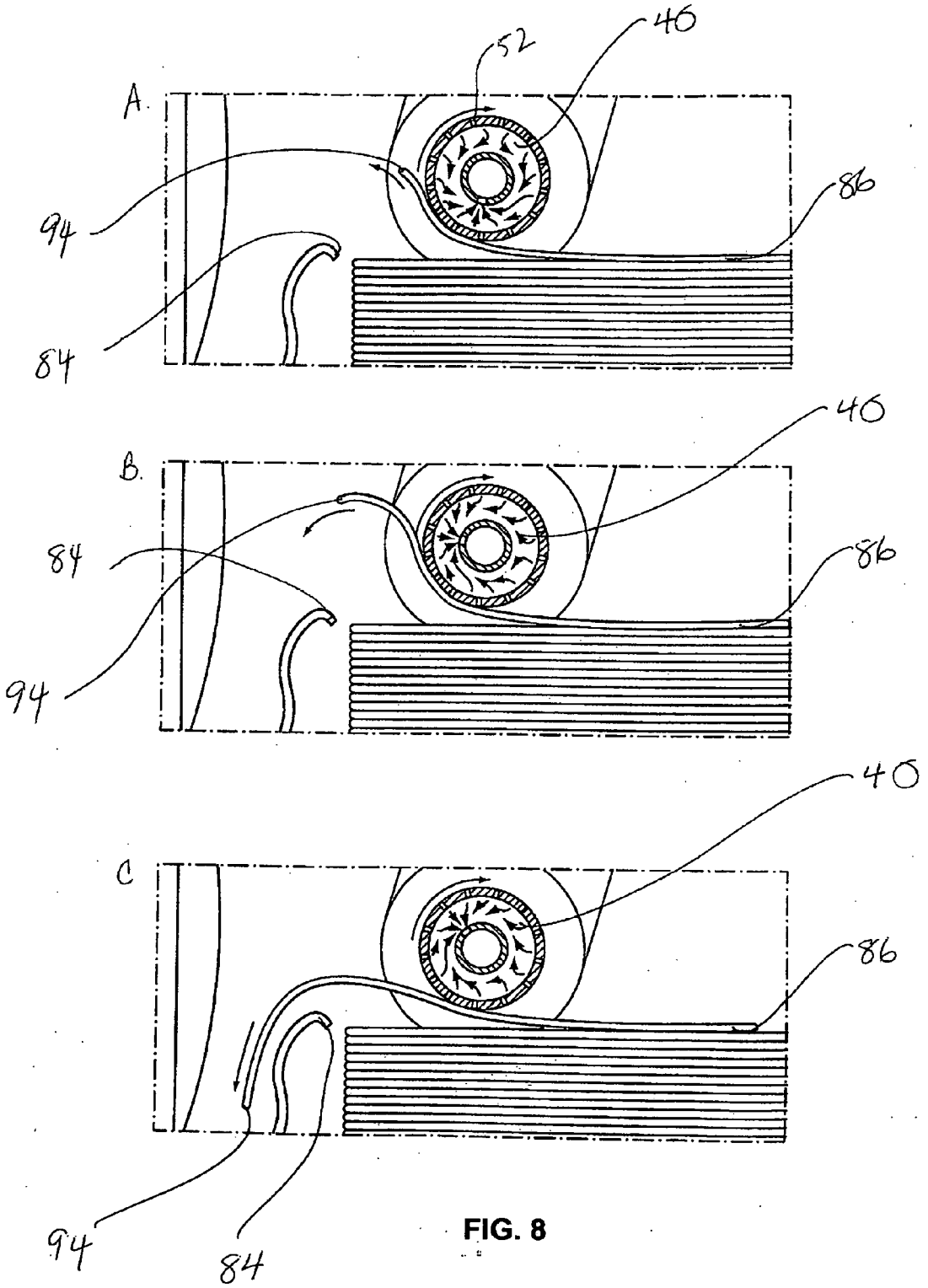



FIG. 8

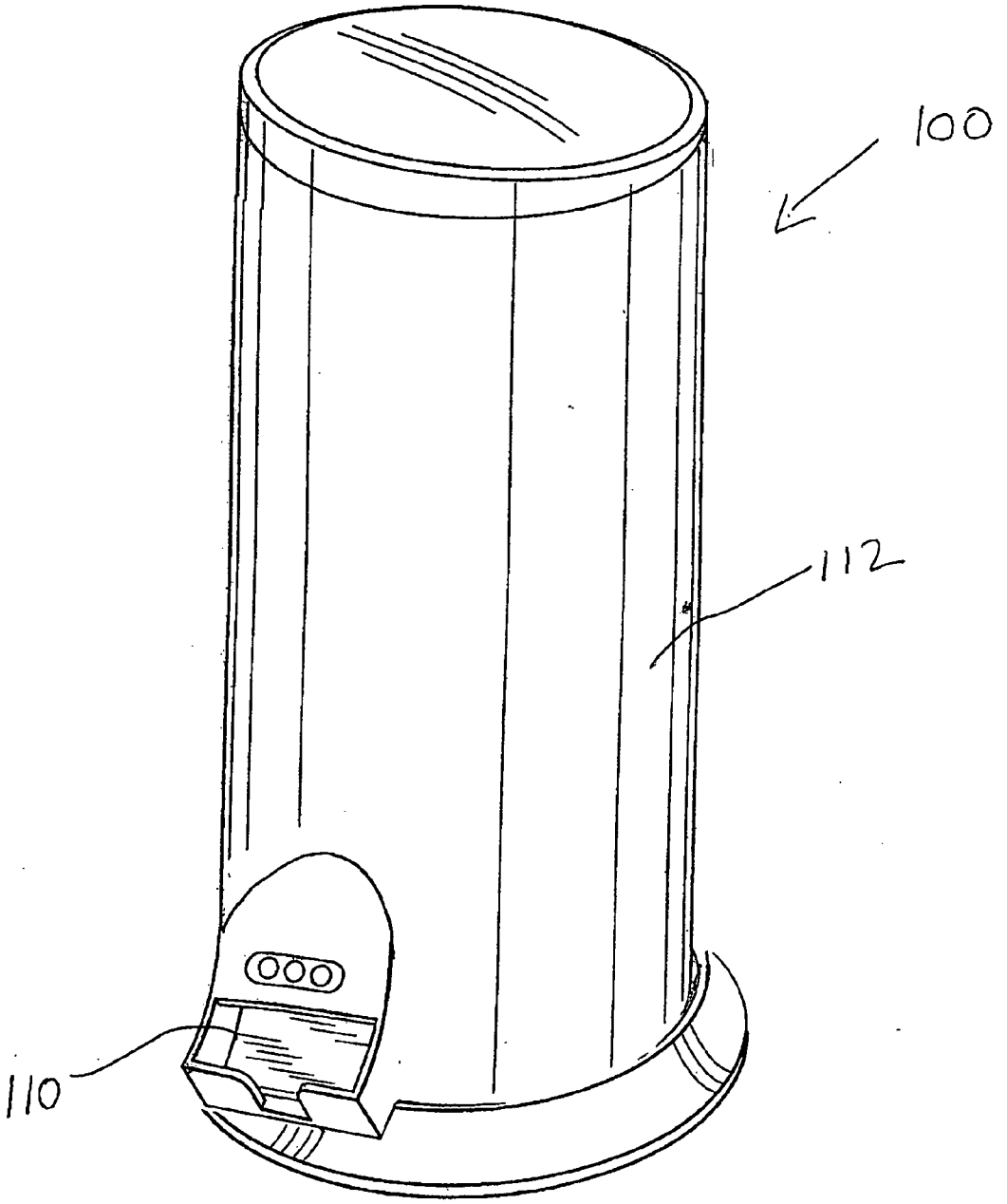



FIG. 9A

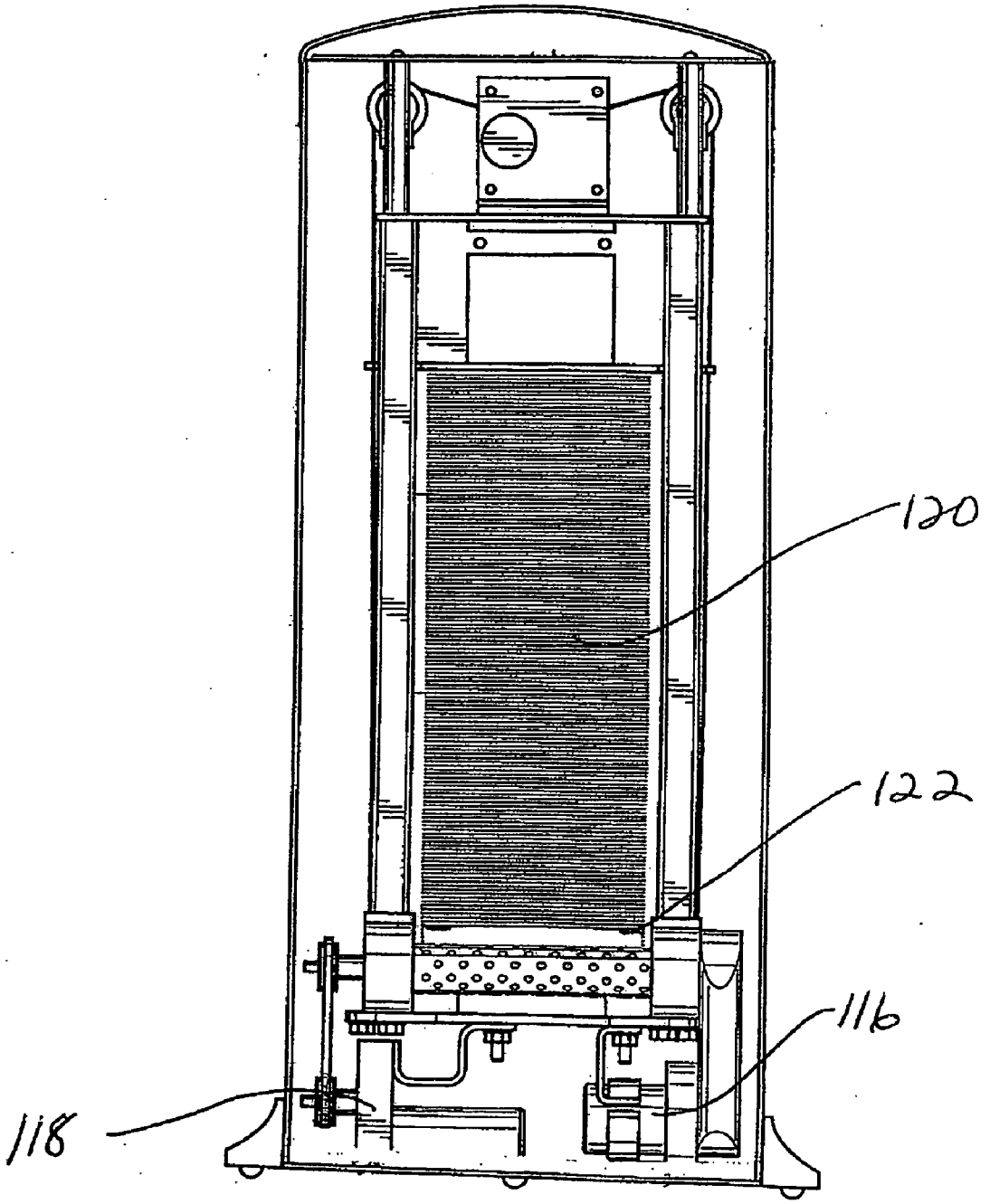



FIG. 9B

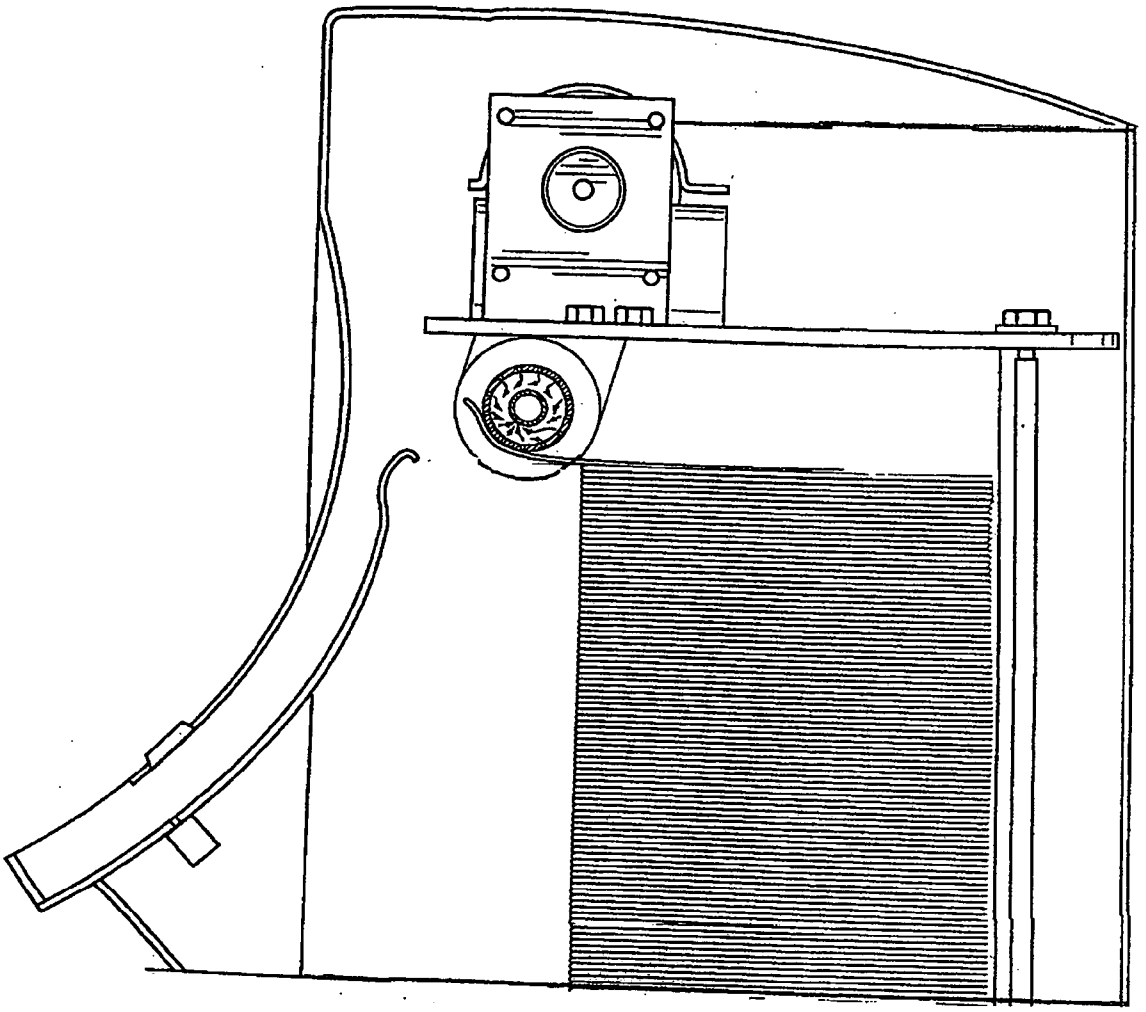


FIG. 10

# VACUUM BASED NAPKIN DISPENSER

## FIELD OF INVENTION

[0001] The present invention relates to the field of dispensing devices and systems. More specifically, the invention relates to an apparatus for dispensing sheet products, particularly paper napkins.

## BACKGROUND OF THE INVENTION

[0002] Various types of devices have been introduced that store and dispense paper products such as tissues or napkins. The present invention particularly relates to a device for dispensing folded paper napkin or paper towel.

[0003] Fast food restaurants usually provide self-service napkin dispensers. A common problem with dispensers in fast food restaurants is that they may permit removal of large bunches of napkins at one time. Users have a tendency to grab an excess of napkins and then discard the ones that are not used. This leads to many napkins being scattered about the eating place and also contributes to the volume of garbage that needs to be disposed. In addition, clumps of napkins may jam the dispensing device. This also occurs at Drive-thru windows where the server may grab a bunch of napkins and put them in the bag. Not only does this induce unnecessary costs, there is significant inconvenience to both users and suppliers when the napkin dispensers need to be refilled frequently.

[0004] Most of the conventional devices use mechanical means or frictional means for separating and limiting the number of folded paper articles that can be drawn at a time. There are various types of devices such as gravity feed devices or spring biased devices that are designed to prevent tearing or bunching of napkins.

[0005] Various attempts have been made to try and address the problem of clumping of large numbers of napkins. For example, U.S. Pat. No. 6,378,726 discloses a dispensing device that includes a dispensing throat that has a slot portion that is long enough to permit a paper napkin to be pulled through by a user, but at the same time has a very narrow width to prevent grabbing a bunch.

[0006] U.S. Pat. No. 6,457,605 describes a napkin dispenser that is designed to dispense napkins one at a time. The housing of the dispenser sits on a rotatable support platform. The dispenser assembly comprises principally a roller and a follower, the roller for engaging and ejecting the napkins, and the follower for urging napkins into engagement with the roller. The roller has a plurality of metal projections or protrusions on its exterior surface for engaging the paper of the napkins. The purpose of the spaced apart protrusions is to penetrate and remove one napkin at a time.

[0007] U.S. Pat. No. 6,585,129 describes a napkin dispenser for inter-folded napkins with a baffle-dispensing aperture. The dispensing aperture is an elongated narrow slit in the housing. The dispenser also includes biasing means that urges the napkin carrier and thus the stack of inter-folded napkins towards the dispensing wall. In a preferred embodiment, the narrow elongated slit has an opening width of only about ¼ inch to ⅜ inch. This narrow opening restricts the ability of a consumer from inserting fingers into the interior of the dispenser and grabbing a bunch of napkins.

[0008] U.S. Pat. No. 6,874,653 is directed to a metering napkin dispenser. The dispenser includes a metering member that penetrates the stack of napkins to segregate a predetermined number of napkins from the remainder of the stack. The napkin dispenser is preferably a gravity feed napkin dispenser.

[0009] U.S. Pat. No. 6,892,898 is a related application that is also directed to a metering napkin dispenser.

[0010] United States Patent Application No. US 2004/0050857 is directed to a device for dispensing folded sheets of material such as a paper napkin that provides a selected time interval between successive dispensing operations in order to limit the overall rate at which the product is dispensed. The device uses a reciprocal vacuum head for picking a napkin from a supply stack and delivering the napkin to a delivery chute. The vacuum head is driven by a swing arm linkage coupled to a crank turned by an electric gear motor once per delivery cycle.

[0011] In spite of the various attempts to provide a dispenser that efficiently metes out paper napkins, there remained a need for a device that could consistently deliver a preset number of napkins and that also prevents a user from contacting the stack of napkins and grabbing a bunch.

## SUMMARY OF THE INVENTION

[0012] The present invention relates to a dispenser for paper products. The dispenser of the invention addresses the problems of clumping and wastage of napkins by using a vacuum feed mechanism that picks up and delivers one napkin at a time.

[0013] While others may have considered using a vacuum source in a napkin dispenser, the present invention describes for the first time the use of a roller that can exert negative pressure to pick up a napkin.

[0014] The invention provides for any device or method whereby a vacuum roller is used to pick up and dispense a paper product. The size and configuration of the device may vary significantly.

[0015] A dispenser according to the present invention can be used to dispense any product that can be picked up by the vacuum roller. The amount of negative pressure exerted by the roller will depend on the size, shape and weight of the product to be dispensed.

[0016] The present invention is particularly useful to dispense paper napkins since it eliminates the problems of napkin clumping and the associated wastage.

[0017] In one aspect of the invention, there is provided a dispenser for paper products. The dispenser comprises a housing; a tubular vacuum roller positioned in the housing and controlled by a vacuum blower and a rotator motor; a carrier for holding a stack of paper products and; a mechanism for positioning the carrier to an outermost paper product in the stack to the vacuum at a predetermined distance from the longitudinal surface of the vacuum roller.

[0018] The mechanism may be a motor driven pulley system, a rack and pinion system, a hydraulic system, a gravity feed or any other mechanism that causes the stack to move when a napkin is removed.

[0019] In another preferred embodiment, the mechanism is automatically actuated by a sensor.

[0020] In another preferred embodiment, the mechanism is actuated by a start button.

[0021] In a further preferred embodiment, the sensor is situated in the chute and detects when a product is removed.

[0022] In another preferred embodiment, the sensor is situated to detect a gap between the outermost product and the vacuum roller.

[0023] In a preferred embodiment, the length of the vacuum roller is adapted to dispense a folded paper napkin.

[0024] In a preferred embodiment, the vacuum blower is time controlled and rotation of the vacuum roller is time controlled.

[0025] In one preferred embodiment, the vacuum roller is positioned above the stack of paper products.

[0026] In another embodiment, the vacuum roller is positioned below the stack of paper products.

[0027] In another embodiment, the vacuum roller is positioned beside the stack.

[0028] In yet another embodiment, the dispenser comprises at least one actuator on the housing that controls rotation of the roller and vacuum within the roller.

[0029] In another embodiment, the rotation of the roller and the vacuum pressure within the roller are controlled by a sensor in the dispensing chute.

[0030] The vacuum roller surface preferably comprises a plurality of apertures through which the vacuum is applied.

[0031] In a preferred embodiment, the vacuum roller surface comprises a web or a grid.

[0032] In one embodiment, the vacuum pressure is constant over the entire surface of the roller when the blower is activated. In another, the vacuum pressure on the surface of the roller varies.

[0033] In another aspect of the invention, a method of dispensing a paper product is provided. The method comprises placing a stack of paper products a predetermined distance from a vacuum roller; activating the vacuum roller for a predetermined time period whereby it rotates and has sufficient vacuum at its surface to pick up an edge of a paper product and pull the paper product over the circumference of the roller as it rotates and then release the product; and repositioning the stack to close the gap left by the dispensed product.

[0034] This summary of the invention does not necessarily describe all features of the invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0035] These and other features of the invention will become more apparent from the following description in which reference is made to the appended drawings wherein:

[0036] FIG. **1** is a perspective view of one embodiment of the dispenser of the present invention;

[0037] FIG. **2** is a cut away view of the same dispenser as shown in FIG. **1**;

[0038] FIG. **3** is a plan view of the dispenser;

[0039] FIG. **4** is a cut away view of the dispenser from the rear;

[0040] FIG. **5** illustrates the dispenser with a stack of paper napkins loaded on it;

[0041] FIG. **6** is a side view of the dispenser with the napkins loaded;

[0042] FIG. **7**A is an enlarged view of a stack of napkins positioned for dispensing in the dispenser;

[0043] FIG. **7**B illustrates a top napkin being picked up by a vacuum roller of the dispenser;

[0044] FIGS. **8**A-C demonstrates how a napkin is picked up and dispensed by the vacuum roller.

[0045] FIGS. **9**A and **9**B illustrate another embodiment of the invention; and

[0046] FIG. **10** illustrates yet another embodiment.

## DETAILED DESCRIPTION

[0047] The following description is of a preferred embodiment.

[0048] The present invention provides a dispenser for paper products that uses a roller that is capable of rotating and exerting negative pressure to pick up and then drop the paper product.

[0049] A method of dispensing a paper product is also provided. The method comprises placing a stack of paper products in proximity to a vacuum roller, and applying negative pressure and rotation to the roller for a time sufficient for the roller to pick up and dispense the product.

[0050] In a preferred aspect of the invention the device and method are directed to the supply of paper napkins. A napkin dispenser that addresses the problems of patrons or servers grabbing a clump of napkins is provided. In the dispenser of the invention, a napkin is picked up by a vacuum roller and dispensed. The length and diameter of the vacuum roller is adapted according to the size of the napkin to be dispensed. The device comprises a napkin magazine or carrier that holds a stack of paper napkins. The top of the stack of napkins is in close proximity to the vacuum roller. When the vacuum is activated, it picks up a folded edge of the napkin and rolls it around the roller and then dispenses it down a dispensing chute. The device also preferably includes sensing means that can detect the width of a gap between the top of the stack of napkins and the surface of the vacuum roller. The sensor is adapted to accept a certain range of gap width. If the gap width exceeds the accepted range (e.g. by removal of a napkin from the top of the stack), the sensor detects the unacceptable gap and triggers elevating means that move the platform up to close the gap. The device can be adjusted to dispense one napkin at a time or more than one at a time. Various types of elevating means can be used. While it is preferred that the elevating means is automatically triggered, it is clearly apparent that it could also be manually triggered. It is also clearly apparent that this type if dispenser can also be used to dispense other types of products. For example, the device can be used to dispense paper towels, tissues or wipes by adjusting the size and/or

power of the vacuum roller. As such, the term "napkin" as used herein, refers to all types of paper products.

[0051] The action of the vacuum roller can be triggered either manually or automatically. The rotator motor and vacuum blower may be manually activated by an actuator on the exterior of the housing. For example, one or more buttons may be located on the housing. The user pushes a selected button to dispense one, two or three napkins at a time.

[0052] Alternatively, the rotator motor and vacuum blower may be automatically activated. For example, a sensor may be located in the dispensing chute. The sensor detects the presence or absence of a napkin in the chute. In this embodiment, once a napkin is removed from the chute, the rotator motor and vacuum blower are triggered to activate the vacuum roller to dispense another napkin into the chute. Thus, there is always a napkin in the chute.

[0053] Whether the dispensing is triggered manually or automatically, a napkin should be in close proximity to the surface of the vacuum roller so that it is ready to be picked up and dispensed upon actuation of the vacuum rotator. Various mechanisms can be used to move the napkin carrier so that the top napkin is in position. For example, the napkin carrier platform can be lifted by a series of pulleys, by hydraulic means, by a rack and pinion system, a screw mechanism or by other known systems to raise a platform. The vacuum roller is typically an elongate roller that includes a plurality of openings through which the vacuum is applied. The dimensions of the roller are adapted according to the size and weight of the product to be dispensed. The vacuum pressure may be continuous over the whole surface or certain areas of the roller surface may exert a greater vacuum pressure than other parts. For example, the part of the roller that picks up the leading edge of the product may exert a stronger vacuum that the portion of the roller that contact the mid or tail part of the product. The rotation and vacuum are preferably timed so that a predetermined number of napkins are dispensed one at a time. For example, the vacuum roller may rotate once to dispense one napkin or it may rotate twice to pick up and dispense two napkins.

[0054] A dispenser according to the present invention typically comprises a housing that has a dispensing chute disposed therein. The dispensing chute typically comprises a base and a front cover that has an aperture therein to facilitate withdrawing of napkins. Within the housing, the vacuum roller is operatively attached to a drive motor and to a vacuum blower. In a preferred embodiment, the device also includes a sensor that can detect the distance between the surface of the vacuum roller and the top of a stack of napkins. A predetermined distance between the roller and the top of the stack defines an acceptable gap. The stack of napkins is carried in a napkin carrier or magazine. When the sensor detects a larger than acceptable gap between the surface of the vacuum roller and the top of the stack of napkins, it triggers a drive mechanism that is associated with elevating means. The elevating means will then elevate the napkin carrier magazine to close the gap between the surface of the vacuum roller and the top napkin in the rack. When all the napkins have been dispensed the carrier is automatically or manually lowered so that it can be refilled with another stack of napkins.

[0055] Preferred embodiments of the invention are shown in the attached figures. It is clearly apparent that specific features of the preferred embodiment can be replaced by equivalents without affecting the scope of the invention. The invention encompasses any dispenser comprising a vacuum roller and any method of dispensing a paper product by using a vacuum roller.

[0056] Referring now to the figures, FIG. **1** shows a perspective view of one preferred embodiment of a dispenser. The dispenser **10** includes a housing **12**. The housing has a top **14** and a bottom **16**. A wall **18** connects the top and the bottom. In the illustrated embodiment, a circular wall is provided between the top and the bottom of the housing to provide a canister type dispenser. It is clearly apparent that other types of inter-connected walls could be used to provide a dispenser having a square, rectangular, hexagonal, etc. shape. The device may optionally include a base **20** that is larger in circumference than the housing in order to provide greater stability. A product-receiving chute **21** is located on the housing. The chute comprises a curved base **22**, a front cover **24**, and a product-retaining member **26** at the end of the chute. The retaining member may comprise a solid wall or a pair of tabs separated by a space as shown in FIG. **1**. A dispensing aperture **28** is formed in the front cover to facilitate withdrawing a napkin. Actuator buttons **29** are optionally provided on the cover.

[0057] FIG. **2** illustrates a cut away view of the embodiment shown in FIG. **1**. Inside the device, there is a lower support plate **30** and an upper plate **32**. The lower support plate **30** and the upper support plate **32** are interconnected and supported by four support rods **34**. A napkin carrier platform **36** includes openings **37** that allow it to slide up and down the support rods. Four upright guides are also provided to hold the napkins in place and prevent them from sliding off the napkin carrier platform. The two front guides **54**, **56** are L-shaped brackets facing out from the napkin carrier platform and the two rear guides **58**, **59** face inward to hold a stack of napkins inside the L. A vacuum roller **40** is located at the upper support plate **32**. A rotator motor **42** is mounted on the upper support plate and includes a drive belt **46** that is connected to the vacuum roller. A vacuum blower **50** is also mounted on the upper support plate and is connected to the vacuum roller to provide a vacuum therein. Air is pulled into the interior of the vacuum roller through a series of small apertures **52** in the surface of the roller. In this illustrated embodiment, the elevating means for raising the napkin carrier is a series of pulleys attached to a drive means. The pulley system is described in further detail below.

[0058] FIG. **3** is a plan view of the interior of the device from the bottom. The napkin carrier includes openings **37** that allow it to travel up and down the support rods. The guides comprise two rear, inwardly open L-shaped brackets **54**, **56** and two forward, and outwardly open L-shaped brackets **58**, **59**.

[0059] FIG. **4** is a rear elevation perspective of the dispenser. While the carrier platform **32** can be positioned relative to the vacuum roller **40** using various types of elevating means, the elevating means for this embodiment is a pulley system that comprises a first cable **60** and a second cable **62**. Each cable has a first end **64**, **65** that is attached to the top of the napkin carrier and a second end **66**, **67** that is attached to the bottom of the napkin carrier. A length **68**, **69** of cable between the first end and the second end is fed over

a first or upper pulley **70**, **71**, a lower pulley **72**, **73** and a driving means **74**. As the driving means **74** rotates the platform **36** is raised to a dispensing position or lowered to a filling position.

[**0060**] FIG. **5** is a sectional view showing the interior of the device. Within the housing **12**, the rotator motor **42** and the vacuum blower **50** are located near the top. In this illustration, the napkin carrier **36** has been loaded with a stack of napkins **80**. The top **82** of the stack is positioned at a predetermined distance from the vacuum roller **40**. A pulley system comprising first and second cables **60**, **62** and a series of pulleys **70**, **71** (hidden) and **72**, **73** is controlled by a drive means **74** to adjust the position of the napkin carrier. The drive means may be manually or automatically activated.

[**0061**] FIG. **6** is a side view of the device with the napkin carrier **36** loaded with a stack of napkins **80**. The dispensing chute includes a pick-up lip **84** that is used to guide the top napkin **86** into the dispensing chute. As can be seen, the top napkin in the stack is located very dose to the vacuum roller. In one preferred embodiment, there is a sensor (not shown) that detects the distance of the gap between the top of the napkin stack and the surface of the vacuum roller. When one or more napkins are dispensed and the sensor detects an increase in the gap size, the pulley drive mechanism is activated to elevate the platform to dose the gap width.

[**0062**] The dispensing process can be further understood by referring to FIGS. **7** and **8**. In FIG. **7**A, the napkin carrier has been loaded with a stack of napkins **80** and the top napkin **86** is in position next to the vacuum roller. Dispensing can be initiated either by pushing an actuator button **90** on the outside of the housing or by a sensor **92** in the dispensing chute **21** that detects when a napkin has been removed from the chute through the dispensing aperture **28**. As shown in FIG. **7**B, once dispensing has been initiated, the vacuum blower applies a vacuum to the interior of the vacuum roller **40**. The vacuum pressure exerted through the apertures **52** in the vacuum roller cause the top napkin **86** to be picked up and adhered to the surface of the roller tube and the leading edge **94** is directed toward the chute.

[**0063**] The dispensing process can be seen in greater detail in FIG. **8**. FIG. **8**A illustrates how the leading edge **94** of the napkin adheres to the surface of the rotating vacuum roller **40** and is lifted from the surface of the stack. As the weight of the napkin on the roller becomes heavier due to a larger amount of napkin on the roller, the leading edge will be released from the vacuum and will fall over the dispensing chute guide lip **84** as shown in FIG. **8**B. The vacuum roller **40** continues to rotate and pull the entire surface of the napkin **86** off the top of the stack and through the guide **84** as shown in FIG. **8**C. The vacuum blower and the rotator motor are preferably automatically timed to provide vacuum and rotation for an amount of time sufficient to dispense a napkin. It is dearly apparent that the vacuum pressure and timing can be adjusted based on the size and weight of the napkin. The process may be repeated to dispense multiple napkins.

[**0064**] While the description thus far has focused on napkins being picked near the top of the device, it is clearly apparent that the invention relates generally to a method and device whereby a napkin or other paper product is picked up by a rotating vacuum roller and dispensed. The vacuum roller may be located anywhere in the device. FIGS. **9**A and **9**B illustrate a device where the vacuum roller is located in a lower region of the device. The stack of napkins is positioned in proximity to the vacuum roller. The stack is positioned by a feed device such as a pulley system or by a gravity feed. The stack may be held in position in the carrier by retaining members that maintain the outermost (in this case, the lowest) napkin a predetermined distance from the vacuum roller. For example, L-shaped brackets can hold the napkins in the carrier yet allow the vacuum roller to pick up the outermost one. Referring to FIG. **9**A, the dispensing device **100** comprises a dispensing chute **110** located in a lower region of a housing **112**. FIG. **9**B illustrates the interior of the embodiment of FIG. **9**A. In this embodiment, a vacuum roller **114** is located near the bottom of the device. The vacuum roller is operatively associated with a vacuum blower **116** and a rotator motor **118**. A stack of napkins **120** is held in close proximity to the vacuum roller by stop members **122**.

[**0065**] Embodiments have been described where the vacuum roller is positioned above or below the stack of product, however, it is apparent that the roller could also be positioned beside the stack. This can be envisioned by turning the embodiments of FIGS. **1** to **9** on their side. In a further embodiment, the stack may be beside the roller as illustrated in FIG. **10**.

[**0066**] In another aspect of the invention, a method of dispensing a paper napkin or other paper product is provided. The method comprises providing a stack of paper products positioned so that the top of the stack is in close proximity to vacuum roller. To dispense the napkin, negative pressure is applied within the roller by a vacuum blower and the roller is rotated. The roller picks up the lead edge of the product and continued rotation of the roller pulls the entire length of the product from the stack. The negative pressure applied to the roller is sufficient to lift the product from the stack, but then release the product as the weight of product on the roller increases.

[**0067**] All citations are hereby incorporated by reference.

[**0068**] The present invention has been described with regard to one or more embodiments. However, it will be apparent to persons skilled in the art that a number of variations and modifications can be made without departing from the scope of the invention as defined in the claims.

What is claimed is:

**1**. A dispenser for paper products, said dispenser comprising:

i. a housing;

ii. a tubular vacuum roller positioned in the housing and controlled by a vacuum blower and a rotator motor;

iii. a carrier for holding a stack of paper products and;

iv. a mechanism for positioning the carrier to an outermost paper product in the stack to the vacuum at a predetermined distance from the longitudinal surface of the vacuum roller.

**2**. A dispenser according to claim 1, wherein the mechanism is a motor driven pulley system.

**3**. A dispenser according to claim 1, wherein the mechanism is automatically actuated by a sensor.

**4**. A dispenser according to claim 1, wherein the mechanism is actuated by a start button.

**5**. A dispenser according to claim 3 wherein the sensor is situated in the chute and detects when a product is removed.

**6**. A dispenser according to claim 3, wherein the sensor is situated to detect a gap between the outermost product and the vacuum roller.

**7**. A dispenser according to claim 1, wherein the length of the vacuum roller is adapted to dispense a folded paper napkin.

**8**. A dispenser according to claim 1, wherein the vacuum blower is time controlled.

**9**. A dispenser according to claim 1, wherein rotation of the vacuum roller is time controlled.

**10**. A dispenser according to claim 1, wherein the vacuum roller is positioned above the stack of paper products.

**11**. A dispenser according to claim 1, wherein the vacuum roller is positioned below the stack of paper products.

**12**. A dispenser according to claim 1 wherein the vacuum roller is positioned beside the stack.

**13**. A dispenser according to claim 1, comprising at least one actuator on the housing that controls rotation of the roller and vacuum within the roller.

**14**. A dispenser according to claim 1, wherein rotation of the roller and vacuum within the roller are controlled by a sensor in the dispensing chute.

**15**. A dispenser according to claim 1, wherein the vacuum roller surface comprises a plurality of apertures through which the vacuum is applied.

**16**. A dispenser according to claim 1, wherein the vacuum roller surface comprises a web.

**17**. A dispenser according to claim 1 wherein the vacuum roller surface comprises a grid.

**18**. A dispenser according to claim 12, wherein the vacuum pressure is constant over the entire surface of the roller when the blower is activated.

**19**. A dispenser according to claim 1 wherein the vacuum pressure on the surface of the roller varies.

**20**. A dispenser according to claim 1 wherein the mechanism is a rack and pinion system.

**21**. A dispenser according to claim 1 wherein the mechanism is a gravity feed mechanism.

**22**. A dispenser according to claim 1, wherein the mechanism is a hydraulic mechanism.

**23**. A method of dispensing a paper product, said method comprising:

i. placing a stack of paper products a predetermined distance from a vacuum roller;

ii. activating the vacuum roller for a predetermined time period whereby it rotates and has sufficient vacuum at its surface to pick up an edge of a paper product and pull the paper product over the circumference of the roller as it rotates and then release the product; and

iii. repositioning the stack to close the gap left by the dispensed product.

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