

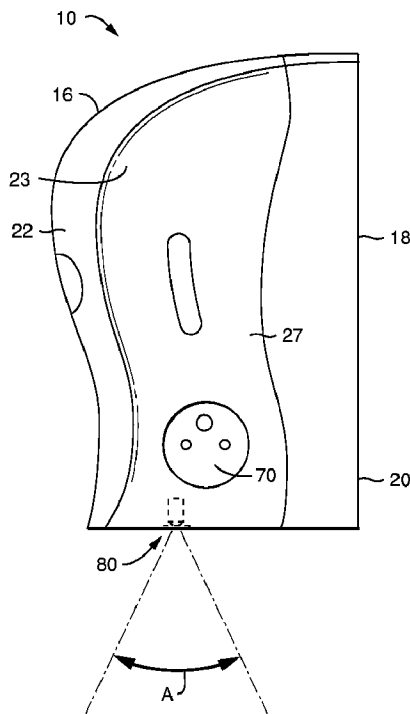


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(54) Titre : **DISTRIBUTEUR ELECTRONIQUE DE SERVIETTES PRESENTANT UN MODE ECONOMIE D'ENERGIE ADDITIONNEL**

(54) Title: **ELECTRONIC TOWEL DISPENSER WITH ADDITIONAL POWER SAVING MODE**



(57) **Abrégé/Abstract:**

A hands-free towel dispenser (10) includes a housing (16) having an internal volume that may contain at least one roll of towel material. Within the dispenser (10) a dispensing mechanism is in communication with a sensor system which scans for the

(57) **Abrégé(suite)/Abstract(continued):**

presence of a user at a first pulse rate and initiates a dispense cycle upon sensing a user. The sensor system has at least one sensor (80) and is in electrical communication with a control circuit which is configured to determine the time that has elapsed from the last dispense cycle and compare the elapsed time with a preset value. If the elapsed time is greater than the preset value, the control circuit configures the sensor system to scan for the presence of a user at a second pulse rate. Upon detecting a user, the control circuit initiates a dispense cycle and sets the sensor system to scan for the presence of a user at the first pulse rate.

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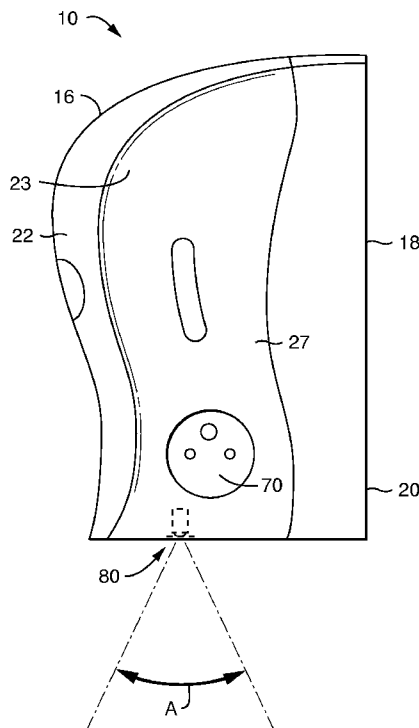


FIG. 4

(57) Abstract: A hands-free towel dispenser (10) includes a housing (16) having an internal volume that may contain at least one roll of towel material. Within the dispenser (10) a dispensing mechanism is in communication with a sensor system which scans for the presence of a user at a first pulse rate and initiates a dispense cycle upon sensing a user. The sensor system has at least one sensor (80) and is in electrical communication with a control circuit which is configured to determine the time that has elapsed from the last dispense cycle and compare the elapsed time with a preset value. If the elapsed time is greater than the preset value, the control circuit configures the sensor system to scan for the presence of a user at a second pulse rate. Upon detecting a user, the control circuit initiates a dispense cycle and sets the sensor system to scan for the presence of a user at the first pulse rate.

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**ELECTRONIC TOWEL DISPENSER
WITH ADDITIONAL POWER SAVING MODE**

FIELD OF THE INVENTION

The present invention relates generally to the field of “hands-free” electronic dispensers that automatically dispense a measured length of towel material.

BACKGROUND OF THE INVENTION

Electronic towel dispensers are well known in the art, including dispensers that automatically dispense a metered length of towel material upon sensing the presence of a user. This type of dispenser has become known in the art as a “hands-free” dispenser in that it is not necessary for the user to manually actuate or otherwise handle the dispenser to initiate a dispense cycle. The control systems and mechanical aspects of conventional hands-free dispensers are wide and varied.

Electronic dispensers are known that use an active detection systems, and generally include an active transmitter and receiver combination to detect the presence of a user within an active detection zone. Typical systems may include radio frequency (RF), infrared (IR) sensors, or the like. For example, U.S. Pat. No. 6,695,246 describes an electronic dispenser utilizing an active IR sensing system. Additionally, U.S. Patent No. 7,523,885 describes the use of active and passive detectors.

Many electronic towel dispensers rely on battery power as a primary power source. Accordingly, conservation of battery power is an important concern. While efforts have been made to reduce the consumption of battery power in dispensers utilizing active sensing systems, there remains an opportunity to reduce power consumption in dispensers. The present invention relates to an improvement in dispensers that may be used to improve battery life.

SUMMARY OF THE INVENTION

An electronic hands-free towel dispenser is provided for automatically dispensing a measured sheet of web material upon detection of an object placed within a defined detection zone. The dispenser may be battery powered, AC powered (with an appropriate transformer and adapter), or capable of being switched between battery power and AC power.

The dispenser includes a housing having an internal volume so as to retain at least one roll of towel material therein, and may include a main roll and a stub roll. The housing may take on any desirable configuration, and may include a back member and removable cover member. The cover member may be hinged relative to the back member to provide access to the interior volume and components of the dispenser.

The dispenser includes an electronically powered dispensing mechanism contained within the housing for automatically dispensing the measured sheet from the roll of towel material upon a valid detection of an object in the detection zone. Numerous configurations of electrically driven dispensing mechanisms are known in the art and may be configured for use with the present dispenser. The mechanism may include a drive roller and associated components, a pressure roll assembly, and a tear bar. The pressure roll assembly includes a pressure roll biased against the drive roller, the towel material passing between the pressure roll and drive roller. An opening for the towel material is defined in the module and aligns with a dispensing opening in the housing.

The dispensing mechanism dispenses a measured length or sheet of the web material, which may be accomplished by various means, such as a timing circuit that stops the drive roller after a predetermined time.

The drive mechanism may include a drive motor and gear assembly mounted in the module, the gear assembly transmitting motive force from the motor to the drive roller. The web material passes through the nip defined by the drive roller and pressure roller such that rotation of the drive roller causes the material to be advanced out through the dispensing throat of the housing. A tear bar is disposed in the throat so that a user can separate a sheet of the material by grasping and pulling the sheet across the tear bar. In an alternative embodiment,

an automatic cutting device may be provided to automatically cut the sheet of material.

The sensor may be any one or combination of well-known active sensing systems, such as an IR or RF system that actively transmits a signal into a detection zone and receives a return signal that indicates that an object is within the detection zone.

The dispenser housing may include a dispensing throat in a bottom portion thereof through which the web material is dispensed, with the sensor comprising at least one transmitter and a receiver oriented within the housing adjacent to the dispensing throat to transmit a signal in a transmission zone that defines the detection zone below the housing. The transmitter and receiver may be oriented with respect to the throat such that a sheet of the web material hanging out of the dispensing throat disrupts detection of an object within the detection zone. Thus, a sheet that is dispensed for one user but left hanging from the dispenser must be removed by a subsequent user before the system is enabled for a subsequent dispense sequence.

It should be appreciated that the dispenser is not limited to any particular style, configuration, or intended type of web material. For example, the dispenser may be a towel dispenser, toilet tissue dispenser, or any other sheet material dispenser.

Various methods for operation of an electronic dispenser incorporating such a sensor are also within the scope and spirit of the invention. The invention will be described in greater detail below by reference to particular embodiments illustrated in the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of an embodiment of an electronic dispenser according to the invention;

Figure 2 is a perspective view of the dispenser of Figure 1 with the front cover in its open position;

Figure 3 is a perspective view of a removable module unit that may be utilized with the dispenser of Figure 1;

Figure 4 is a side view of the dispenser of Figure 1; and

Figure 5 is a side diagrammatic view illustrating aspects of a sensor and associated detection zone under the dispenser housing.

DETAILED DESCRIPTION

Reference will now be made in detail to embodiments of the invention, one or more examples of which are illustrated in the drawings. Each example is provided by way of explanation of the invention, and not meant as a limitation of the invention. For example, features illustrated or described as part of one embodiment, may be used with another embodiment, to yield still a further embodiment. It is intended that the present invention include modifications and variations to the embodiments described herein.

Referring to Figures 1 through 5, an embodiment of a dispenser 10 according to the invention is illustrated. The dispenser 10 includes a housing 16 of any desired shape and configuration. The housing 16 shown in Figure 1 includes a base 18 and a cover 22 pivotally mounted on the base 18 so as to be movable from the closed position illustrated in Figure 1 to the open position illustrated in Figure 2. The cover 22 includes a front wall 23 and sidewalls 27 that align with sidewalls 20 of the base 18 to define an interior volume for housing the operational components of the dispenser 10. A roll or rolls of web material such as a main roll 12 and a stub roll 14 that are to be dispensed are also included in the interior volume of the housing. Any conventional locking mechanism 21 (Figure 2) may be provided to secure the cover 22 to the base 18. The housing 16 includes a bottom underside portion 25 with a throat 24 from which the material is dispensed.

The dispenser configuration 10 illustrated in Figures 1 and 2 is merely exemplary of any number of electronic dispenser configurations known to those skilled in the art that may incorporate the power saving features and method in accordance with the invention. As such, a detailed explanation of the structural and control features of the dispenser 10 are not necessary for purposes of explanation of the invention, and will only be discussed briefly below.

The operational components of the dispenser 10 may be mounted directly onto the base 18 within the interior volume of the housing 16. In an alternative embodiment, a dispensing module 28 (Figure 3) is received in the housing 16, as seen in Figure 2, and the operational components are mounted within the module 28. The module 28 may be readily removable from the base 18 for servicing and/or replacing components without the necessity of having to remove the entire dispenser 10 from its support surface (i.e., wall). The housing 16 may be considered as a shell into which the module 28 of Figure 3 is inserted and removed. The module 28 includes a frame or chassis 32 having left and right side plates 34. Within the module 28 between the side plates 34 are mounted the components of the dispensing mechanism 30, which may include, for example, a pressure roller assembly with a pressure roller 46, a transfer mechanism that may include a transfer bar 52, a throat assembly 50 that defines the throat 24 and includes a tear bar 44, a drive motor and gear assembly (not visible) that rotates drive roller 38, and control circuitry housed within a circuit housing 68.

Left and right main roll holders 60 are attached to the module side plates 34, as seen in Figure 3, and hold the main roll 12 of sheet material. Stub roll holders 62 are provided for rotatably supporting the stub roll 14 in the position within the module below and rearward of the main roll 12. It should be understood that a dispenser according to the invention need not be configured to dispense from a stub roll, and thus would not need a transfer mechanism. The dispenser may be configured for dispensing from a single roll of web material.

The pressure roller assembly with pressure roller 46 may be housed in the throat assembly 50 that is, in turn, mounted within the module 28. The throat assembly 50 includes a frame that may be fixed in position within the module, or pivotally mounted to the module 28 to facilitate loading of new rolls of web material. The cutting or "tear" bar 44 within the throat assembly 50 is disposed along the dispensing path of the web material upstream of the dispensing opening 24 and downstream of the nip between a drive roller 38 and pressure roller 46. To separate a sheet of the web material that has been dispensed from the dispenser 10, a user grasps the sheet hanging from beneath the bottom portion 25 of the

housing 16 and pulls the sheet against the tear bar 44 such that the sheet tears and separates along the line defined by the tear bar 44.

The pressure roller 46 is spring biased against the drive roller 38 such that the web material passing between the nip of the rollers is advanced along the dispensing path upon rotation of the drive roller 38. The throat assembly 50 defines a portion of the dispensing path and the forward portion of the dispensing throat 24.

The module 28 may include an automatic transfer mechanism to transfer dispensing of the web material from the stub roll 14 to a main roll 12 when the web material on the stub roll 14 is nearly fully depleted. From an operational standpoint, this transfer mechanism can operate substantially as described in U.S. Pat. No.6,079,305 issued on June 27, 2000. Referring to Figures 2 and 3, the transfer mechanism may include a transfer bar 52 with arms pivotally mounted to the module side plates 34 through gearing 56. The transfer bar 52 includes a "roller" section that may be defined by a central curved ribbed section 54. The section 54 includes a securing mechanism, such as a barb, so that the leading end of the web material from the main roll 12 passes over the roller section 54 and is held by the barb while material is feed from the stub roll 14. A stub roll sensing bar 58 is pivotally mounted to the module side plates 34 below stub roll holders 62, and is biased towards the axis of the stub roll holders 62 so as to track the decreasing diameter of the stub roll as it is depleted. The stub roll sensing bar 58 is configured with the gearing 56 that rotates upon pivotal movement of the sensing bar 58. As the stub roll is depleted, motion of the sensing bar 58 is transferred to the transfer bar 52 via the gearing 56. At a certain decreased diameter of the stub roll 14, the transfer bar 52 rotates to a position such that the leading end of the web material held by the bar 52 is brought by the roller section 54 into contact with the web material being dispensed from the stub roll causing the leading edge of the material from the main roll to be pulled from the bar 52 and conveyed with the material from the stub roll between the nip of the drive roller 38 and pressure roller 46. The "new" web material from the main roll 12 is dispensed simultaneously with the stub roll material until the stub roll is completely depleted.

If no stub roll is present in the dispenser, the transfer bar 52 and roller section 54 contact against the web material dispensed from the main roll 12.

A spring biased "fuel gauge" bar 64 may be pivotally affixed to the side plates 34 and biased towards the center of the main roll 12 such that it tracks with the decreasing diameter of the main roll 12 as the web material is depleted. This bar 64 may be biased against the front side (as depicted in the figures) or the rear side of the main roll 12. When the main roll 12 reaches a diameter suitable for moving the roll to the stub roll position, a pawl (not visible) on the end of one of the arms of the bar 64 causes a switch in the control circuitry to close and activate an LED on the indicator plate 70. In this way, maintenance personnel are alerted that the main roll 12 is depleted and should be replaced.

A drive motor and gear assembly includes components mounted in the module 28, for example in a space under and behind the drive roller 38. The motor includes a drive shaft and a drive gear attached thereto that engages the shaft of the drive roller 38. Thus, upon energizing the motor, the drive roller 38 is caused to rotate, which results in conveyance of the web material disposed in the nip between the pressure roller 46 and drive roller 38 along the conveying path and out of the dispensing throat 24.

The dispensing mechanism may be powered by batteries contained in battery compartment 66 that is rearward of the stub roll holders 62 (see Figure 3). Any suitable battery storage device or location may be used for this purpose. A conductor may be disposed below the battery compartment that mates with contacts on the underside of the battery compartment 66 for delivering power from the batteries to the circuitry and the drive motor. Alternatively, or in addition to battery power, the dispenser may also be powered by a building's AC distribution system. The control circuitry may include a mechanical or electrical switch that isolates the battery circuit upon connecting the AC adapter in order to protect and preserve the batteries.

The control circuitry also controls the length of web material dispensed. Any number of optical or mechanical devices may be used in this regard. In the illustrated embodiment of the dispenser 10, an optical encoder may be used to count the revolutions of the drive roller 38. The number of revolutions may be used

used by the control circuitry to meter the desired length of the sheet dispensed. Other systems may track the running time of the motor as the control variable, or detect perforations in the web material, and so forth.

A variety of sensor systems may be utilized with the present invention. Each such system must have at least one sensor which causes the control circuitry to dispense a length of web material when the sensor detects the presence of a user.

The sensor 80 is depicted in the illustrated embodiments as one or more transmitters and associated receiver that define a detection zone A. This active system may be any one or combination of well-known active sensing systems, such as an RF or IR sensing system. The transmitters emit an IR beam into the detection zone A, and the receiver detects IR light reflected from an object in the detection zone A. If the amount of reflected light is sufficient (above a detection threshold value), the circuitry controller initiates a dispense cycle wherein the motor drives the drive roller 38 until the correct length of material has been dispensed. The user then grasps the dispensed sheet and pulls it forward to tear the sheet against the tear bar 44.

The IR transmitters and receivers may be mounted on a sensor board (not shown) within the housing. Openings defined in the housing through which the transmitters may actively transmit. The transmitters and receiver are in electrical communication with the control circuitry within the housing, and the transmitters continuously transmit at a pulse rate that is dictated by the control circuitry. Preferably, the control circuitry is a microprocessor.

The dispenser of the present invention includes a sensor system that can scan for the presence of a user at varying rates. During times when usage of the dispenser is high, the sensor system may actively scan at a high rate to enable delivery of a towel without any perceived delay on the part of the user. During times when the dispenser usage is low, such as during night or other off-peak hours, the sensor system may actively scan at a lower rate to conserve power while still enabling a towel to be delivered in a timely manner to the user.

The control circuitry can be configured to enable the dispenser to vary the rate at which the sensor system scans for the presence of a user. Specifically, the control circuitry may be configured to determine the time that has elapsed from the

last dispense cycle and compare that elapsed time with a preset value. If the elapsed time is greater than the preset value, the control circuit may cause the sensor system to scan for the presence of a user at a second pulse rate. In some embodiments, the second pulse rate will be lower than the first pulse rate which will reduce the power consumed by the dispenser. In instances where the dispenser is used only during normal business hours, the power consumed could be reduced by 50%. In other embodiments, it may be desirable to set the second pulse rate higher than the first pulse rate. While scanning using the second pulse rate, the dispenser will initiate a dispense cycle when a user is detected. Additionally, the control circuit will reset the sensor system to scan for the presence of a user at the first pulse rate once a dispense cycle has been initiated.

While many sensor systems are suitable for use with the present invention, sensor systems which use infrared emitters and detectors are well-suited for use in the present invention. The rate at which the emitters emit can be adjusted by control circuitry to reduce the power consumed by the dispenser during times of low usage. For example, the sensor system may be configured so that the first pulse rate is set at six IR pulses per second, and the second pulse rate is three IR pulses per second. However, other pulse rates may be used to accommodate specific user and dispenser requirements.

Figures 4 and 5 illustrate possible locations and angular orientation of the IR transmitters 84 within the area of throat 24. In the embodiment of Figure 4, the sensor 80 and detection zone A are shown. In the embodiment depicted in Figure 5, the transmitters 84 are mounted adjacent to the front wall of the dispensing throat 24 and are angled towards the rear of the dispenser. The angle of the transmitters may vary widely, depending on the particular configuration of the dispenser and mounting configurations. In selected embodiments, this angle may be, for example, 15 degrees. With this configuration, a user must purposefully place their hand or other object below the housing 16 and towards the back of the housing in order to be "detected" and initiate a dispense cycle.

It may also be desirable to provide the dispenser 10 with the capability to prevent a subsequent dispensing cycle if a sheet of material has been dispensed but not removed. A separate "hanging sheet" detector may be provided and

integrated with the control circuitry for this purpose. However, in the illustrated embodiment, the IR detection sensor configuration also serves this purpose. Referring to Figure 5, a hanging sheet of material is represented by 86. This sheet 86 substantially blocks the transmission of the active IR signal from the transmitters into the detection zone A. The web material itself does not adequately reflect the IR signal to the receiver so that the hanging sheet does not generate a valid detection signal. Thus, an object placed into the detection zone A while a sheet is hanging is not likely to cause a dispensing cycle until the hanging sheet has been removed or is purposefully pushed out of the detection zone A.

Various control circuits and component arrays may be configured by those skilled in the art to accomplish the desired features of the system of the present invention. .

It should be appreciated by those skilled in the art that various modifications and variations may be made to features of the dispenser described herein, particularly to the mechanical and control circuitry aspects of the dispenser, without departing from the scope and spirit of the invention. It is intended that the invention include all such variations.

CLAIMS:

1. A hands-free towel dispenser (10) for dispensing a measured sheet from a roll of web material, the dispenser comprising:

a housing (16) having an internal volume so as to retain at least one roll of web material (12) therein;

an electronically powered dispensing mechanism contained within the housing (16) for dispensing a measured sheet from the roll of web material (12) in a dispense cycle upon actuation of the dispensing mechanism; and

a sensor system in communication with the dispensing mechanism, the sensor system adapted to scan for the presence of a user at a first pulse rate and to initiate a dispense cycle upon sensing the presence of the user, the sensor system having at least one sensor (80) in electrical communication with a control circuit,

wherein the control circuit is configured to determine the time that has elapsed from a last dispense cycle and compare such elapsed time with a preset value, wherein if the elapsed time is greater than the preset value, the control circuit is configured to scan for the presence of a user at a second pulse rate and, upon detecting the presence of the user, the control circuit initiates a dispense cycle and sets the sensor system to scan for the presence of a further user at the first pulse rate.

2. The dispenser (10) of claim 1, wherein the sensor system comprises an infrared emitter and detector that is capable of emitting at the first pulse rate and the second pulse rate.

3. The dispenser (10) of claim 1 or 2, wherein the first pulse rate is higher than the second pulse rate.

4. The dispenser (10) of claim 1 or 2, wherein the first pulse rate is lower than the second pulse rate.

5. The dispenser (10) of claim 1 or 2, wherein the first pulse rate is six times per second.

6. The dispenser (10) of claim 1 or 2, wherein the second pulse rate is three times per second.

7. The dispenser (10) of claim 1, wherein the preset value is one hour.
8. A method of operation for an electronic hands-free paper towel dispenser (10) to dispense a sheet of 25 web material, comprising
 - initiating a dispense cycle upon detection of a user and scanning for the presence of a user with a sensor (80) at a first pulse rate;
 - determining a last dispense cycle and comparing the elapsed time with a preset value;
 - and
 - setting the sensor (80) to scan at a second pulse 35 rate if the elapsed time is greater than the preset value.
9. The method of claim 8, wherein the sensor (80) is an infrared sensor having an emitter and detector.
10. The method of claim 8 or 9, wherein the preset value is one hour.
11. The method of claim 8, 9 or 10, wherein the first pulse rate is higher than the second pulse rate.
12. The method of claim 8, 9 or 10, wherein the first pulse rate is six times per second.
13. The method of claim 8, 9 or 10, wherein the second pulse rate is three times per second.

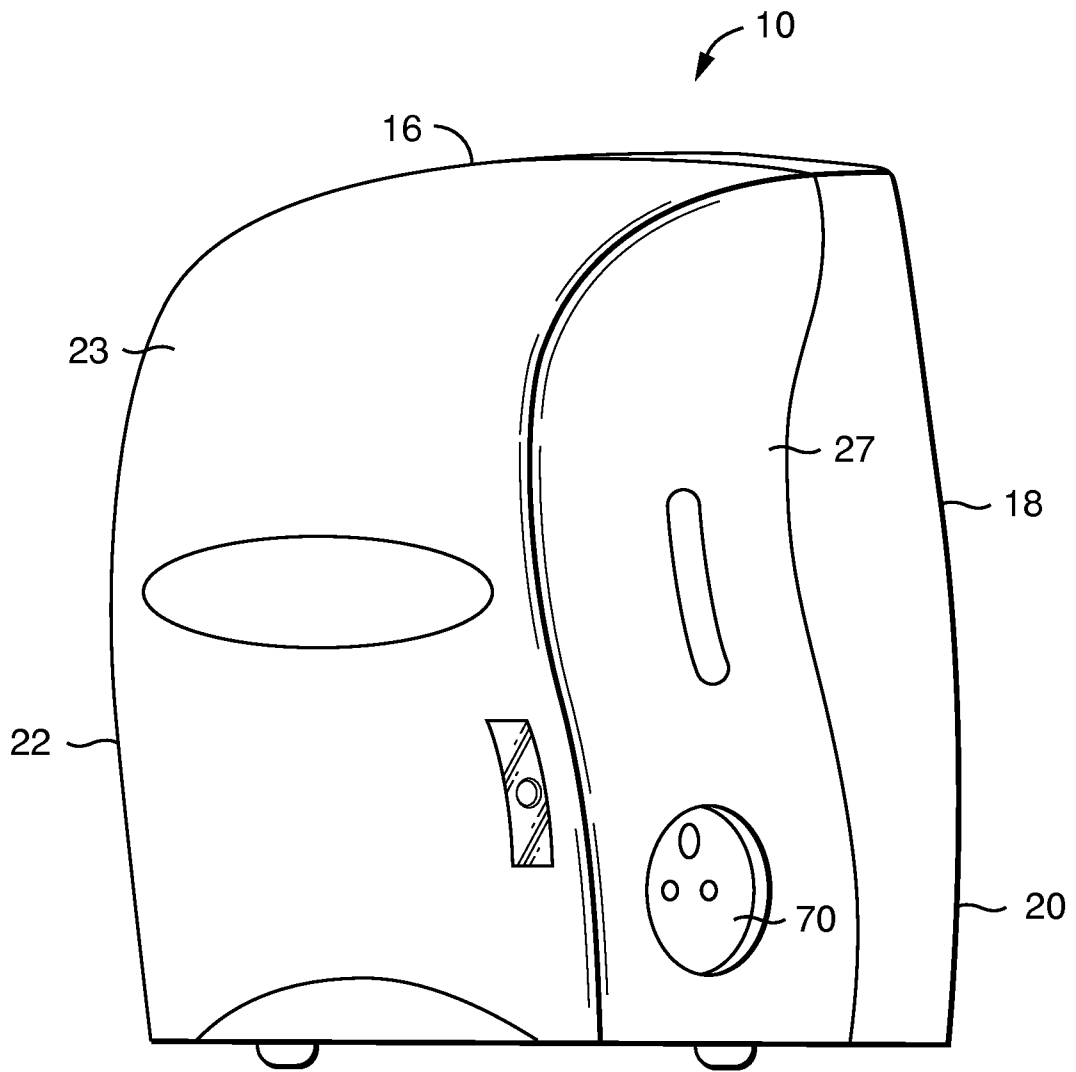


FIG. 1

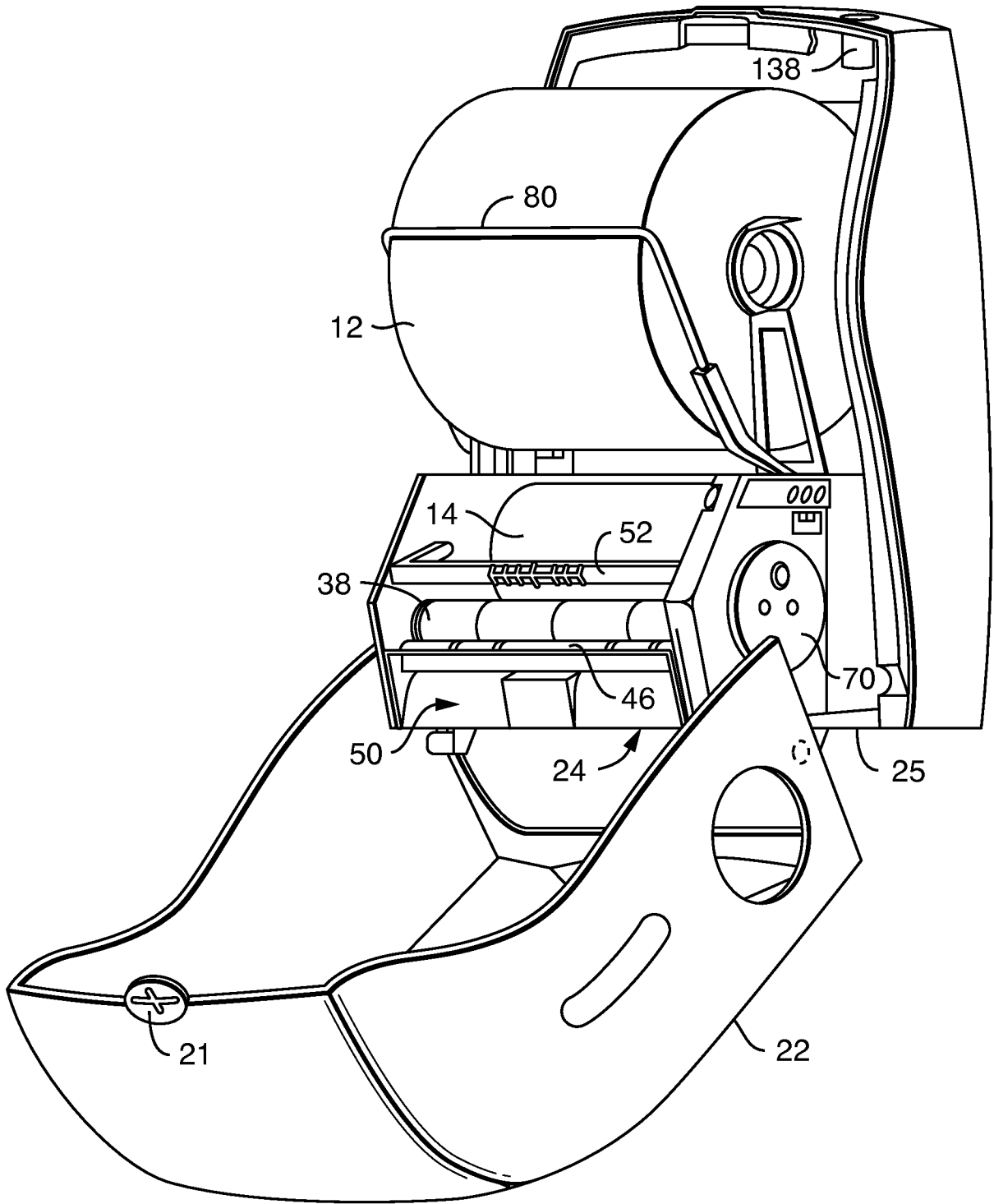


FIG. 2

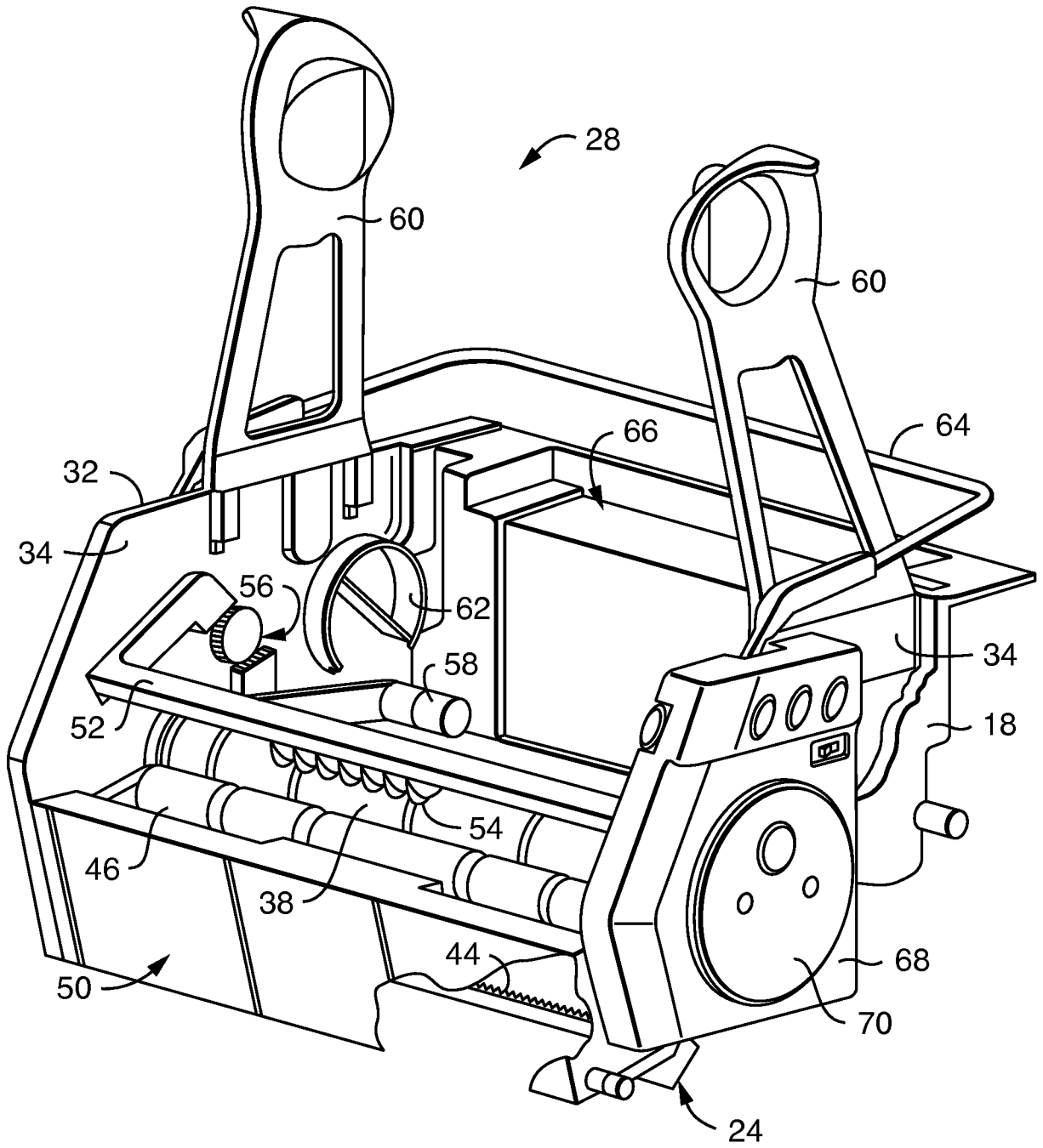


FIG. 3

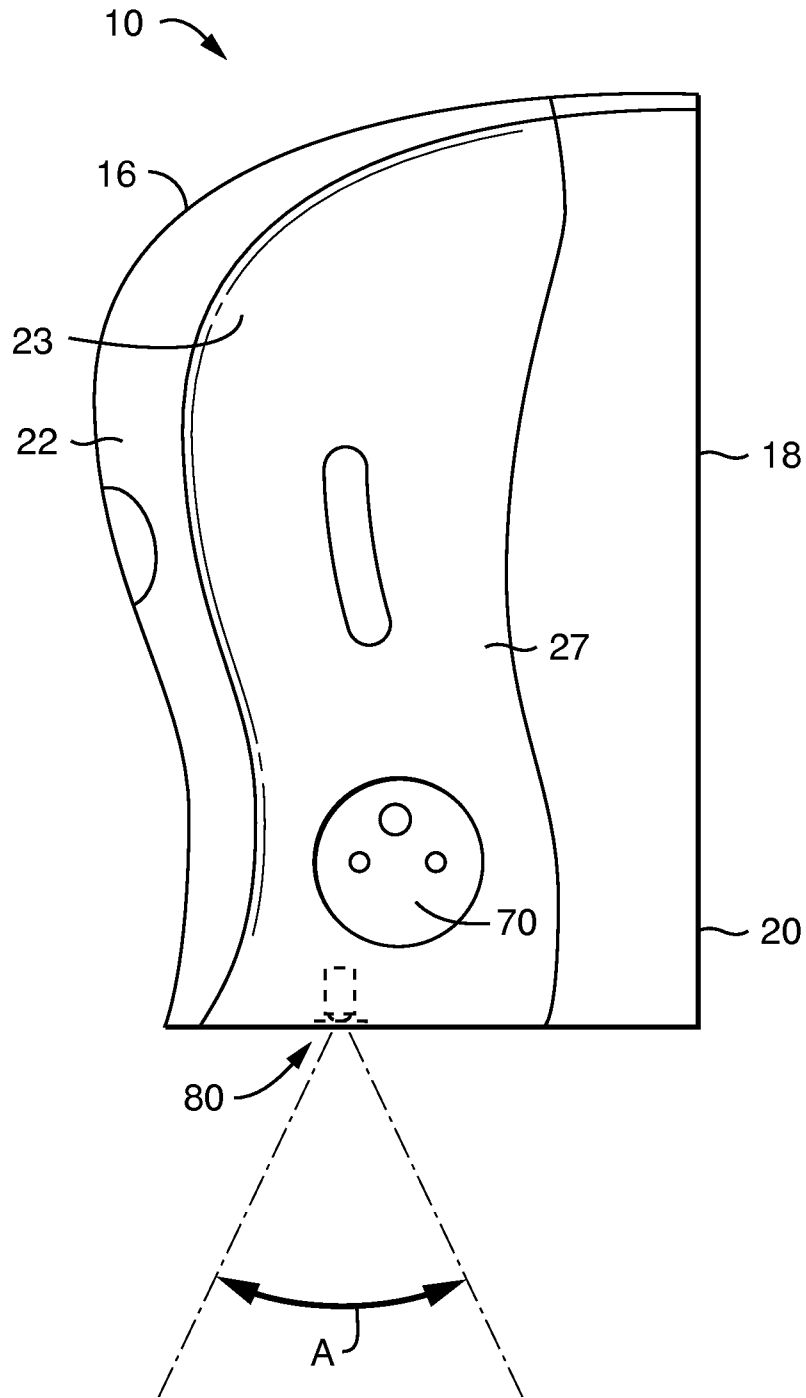


FIG. 4

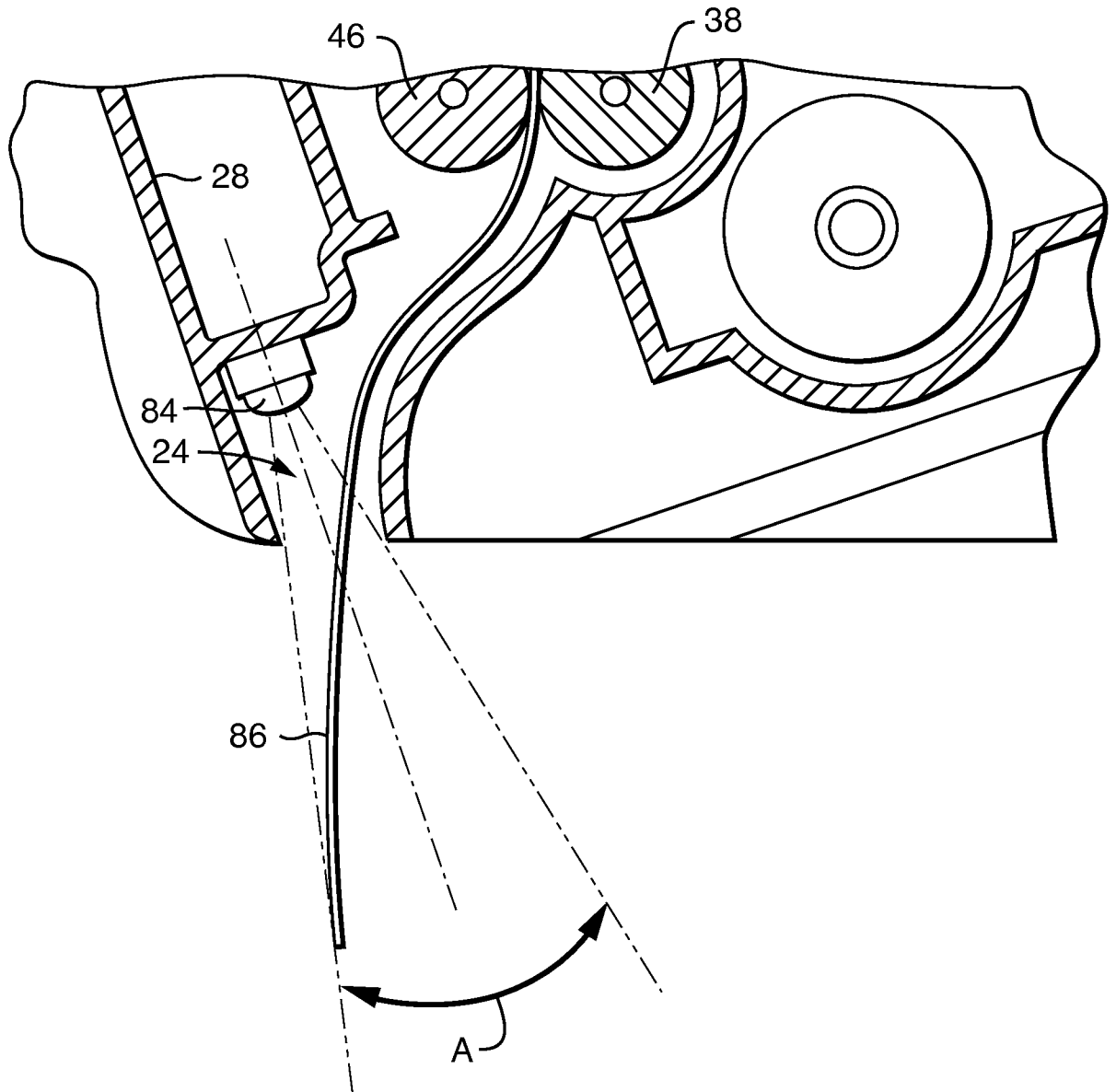


FIG. 5

