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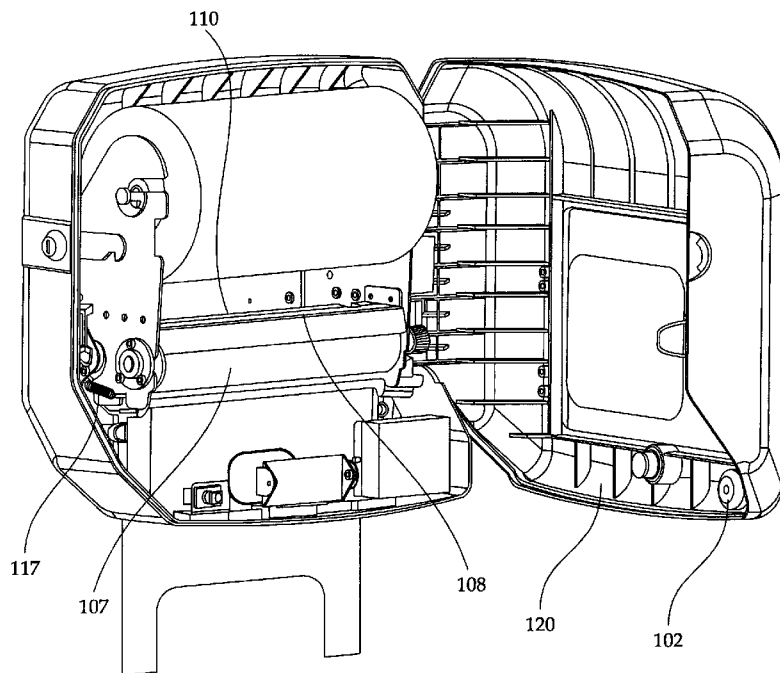


FIGURE 6a

(57) Abstract: The invention is a system and method for dispensing T-shirt type plastic bags singly by means of an automated dispenser. At the push of a button or other control means, a single bag is partially ejected from the machine, whereupon the user can take the bag and use it. The device has detectors for detecting fault conditions (such as bag depletion, wrinkled bags, and the like) as well as display means such as an LCD for displaying ads or other information to users.

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METHOD AND APARATUS FOR ELECTRIC BAG DISPENSING

BACKGROUND

1. Technical Field

[0001] Embodiments of the present invention relate generally to electric dispensing devices, particularly for dispensing plastic bags.

2. Description of Related Art

[0002] A number of devices for dispensing plastic bags are known in the art. For example methods and apparatus for supporting and dispensing bags and are known, often consisting of a framework that holds plastic bags of various sorts. In particular, devices are known which hold and dispense plastic bags of the 'T-shirt' variety (which has two handles, see Fig. 1).

[0003] To minimize the number of bags wasted and make the dispensing thereof easier, however, a recent innovation is to dispense such bags automatically by means of an electrically powered device or coin-operated dispenser. For example a coin-operated bag dispenser that allows a user to remove one bag from the top of a stack is known in the art. Alternatively automatic bag dispensers are known which dispense bags in a folded condition. Similarly systems are known for dispensing bags singly, having in some cases an electrical actuator with controller.

[0004] However there is no provision for automatic, electrical dispensing of T-shirt style bags, stored in roll form. This type of bag is particularly widespread due to its ease of manufacture and usefulness. The roll form of storage is likewise particularly useful since the bags are often produced en masse in the form of rolls, with each bag partially connected to its neighbors by means of perforations in the bag material.

[0005] Hence, an improved method for electrically dispensing T-shirt style bags stored in roll form is still a long felt need.

BRIEF SUMMARY

[0006] The invention provides a system and method for dispensing T-shirt type plastic bags singly by means of an automated dispenser. At the push of a button or other control means, a single bag is partially ejected from the machine, whereupon

the user can take the bag and use it. The device has detectors for detecting fault conditions (such as bag depletion, wrinkled bags, and the like) as well as display means such as an LCD for displaying ads or other information to users.

[0007] In one embodiment consistent with the invention an antistatic coating is provided on the bag surfaces so as to prevent or reduce the effects of static electricity.

[0008] In an embodiment consistent with the invention the bags are identified with a form of code such as a bar code which is read by sensing means of the device, so as to prevent use of foreign bags with the device; in this way the operator can ensure that only a certain type of bag is used.

[0009] Pains have been taken to ensure that the amount of wasted bags (due to tearing, wrinkling, folding etc.) is minimized by use of the invention, which furthermore is of a very small size and weight when compared to devices of similar function.

[0010] According to an aspect of the present invention, there is provided a system and method for dispensing T-shirt type plastic bags singly by means of an automated dispenser. At the push of a button or other control means, a single bag is partially ejected from the machine, whereupon the user can take the bag and use it.

[0011] It is within provision of the invention to disclose an automatic plastic bag dispenser comprising:

- a. a bag axle adapted hold a roll of plastic bags;
- b. a front roller axle and rear roller axle, said roller axles being largely parallel to said bag axle; and a spring mechanism of adjustable tension adapted to push said rollers axles towards one another;
- c. a front roller and a rear roller disposed upon said roller axles, said rollers being adapted to draw a sheet of plastic bags between said rollers;
- d. an electric motor adapted to turn one of said roller axles, said motor being provided with activation means;

whereby plastic bags are dispensed by being drawn between said rollers which are turned by said motor when activated by said activation means, while preventing introduction of static charge buildup.

[0012] It is further within provision of the invention to use computing means and sensing means adapted to activate said motor based upon the condition of said sensing means.

[0013] It is further within provision of the invention to use display means in communication with said computing means adapted to display graphical material to the users of said device.

[0014] It is further within provision of the invention wherein said sensing means are adapted to sense the presence of a plastic bag and said computing means are adapted to prevent operation of said motor when said bag is not sensed.

[0015] It is further within provision of the invention wherein said sensing means comprise infrared sources and detectors.

[0016] It is further within provision of the invention wherein said motor is a stepper motor.

[0017] It is further within provision of the invention wherein said bags are treated with an anti-static coating.

[0018] It is further within provision of the invention wherein said bags are provided with identification means and said computing means are provided with sensing means adapted to prevent use of any bags not possessing said identification means.

[0019] It is further within provision of the invention wherein one of said rollers comprises a material selected from the group consisting of: silicon dioxide sandpaper, material with a surface roughness R_a of greater than 0.5mm, and electrical conductor; while the other of said rollers comprises a material selected from the group consisting of: rubber, silicon, silicone, styrene, acrylic, polyurethane, polypropylene, vinyl, polytetrafluoroethylene, and electrical conductor; thereby preventing buildup of static electrical charge.

[0020] It is further within provision of the invention wherein said roll of plastic bags comprises T-shirt style plastic bags.

[0021] It is further within provision of the invention wherein said motor is adapted to provide a single plastic bag when activated by said activation means.

[0022] It is further within provision of the invention wherein said electric motor is provided electrical power from a source selected from the group consisting of: battery, capacitor, transformer, line-powered ac-dc converter, line-powered ac-ac

converter, photovoltaic cell, radio-frequency power-harvesting coil, static charge collected by said static-preventing means, and combinations thereof.

[0023] It is further within provision of the invention further providing counting means and indicator means adapted to count and indicate information selected from the group consisting of: number of remaining bags, number of bags used, power remaining.

[0024] It is further within provision of the invention further providing alerting means adapted to activate an alert in case of a condition selected from the group consisting of: the number of remaining bags is below a predefined threshold; the diameter of said roll of plastic bags is below a predefined threshold.

[0025] It is further within provision of the invention wherein said alerting means is selected from the group consisting of: SMS, page, email, light indicator, digital message, audible alert.

[0026] It is further within provision of the invention wherein said alerting means comprises communications selected from the group consisting of: computerized communication, communication by wireless means, communication with hand held devices, communication through the internet, communication through an intranet.

[0027] It is further within provision of the invention wherein said bag axle is provided an irregular profile whereby only plastic bag rolls of suitable profile will fit upon said bag axle.

[0028] It is further within provision of the invention wherein said activation means is selected from the group consisting of: button activation, voice activation, motion sensor, remote activation, and timer activation.

[0029] It is within provision of the invention to disclose a method for dispensing plastic bags comprising the steps:

- a. providing a bag axle adapted to hold a roll of plastic bags;
- b. providing a front roller axle and a rear roller axle, said roller axles being largely parallel to said bag axle;
- c. providing front and rear rollers adapted to turn upon said front and rear roller axles, respectively, said rollers being put in mechanical contact by means of an adjustable spring tensioner;

- d. providing an electric motor in mechanical communication with one of said roller axes;
- e. feeding a plastic bag from said plastic bag roll between said rollers;
- f. activating said electric motor to turn said rollers and thereby draw said plastic bag through said rollers, said plastic bag exiting said rollers in a disposition allowing it to be retrieved by a user.

[0030] It is further within provision of the invention further provided with computing means and sensing means adapted to activate said motor based upon the condition of said sensing means.

[0031] It is further within provision of the invention further providing display means in communication with said computing means adapted to display graphical material to the users of said device.

[0032] It is further within provision of the invention wherein said sensing means are adapted to sense the presence of a plastic bag and said computing means are adapted to prevent operation of said motor when said bag is not sensed.

[0033] It is further within provision of the invention wherein said sensing means comprise infrared sources and detectors.

[0034] It is further within provision of the invention wherein said motor is a stepper motor.

[0035] It is further within provision of the invention wherein said bags are treated with an anti-static coating.

[0036] It is further within provision of the invention wherein one of said rollers comprises a material selected from the group consisting of: silicon dioxide, sandpaper, and material with a surface roughness R_a of greater than 0.5mm; while the other of said rollers comprises a material selected from the group consisting of: rubber, silicon, silicone, styrene, acrylic, polyurethane, polypropylene, vinyl, and polytetrafluoroethylene; thereby preventing buildup of static electrical charge.

[0037] It is further within provision of the invention wherein said roll of plastic bags comprises T-shirt style plastic bags.

[0038] It is further within provision of the invention wherein said motor is adapted to provide a single plastic bag when activated by said activation means.

[0039] It is further within provision of the invention wherein said electric motor is provided electrical power from a source selected from the group consisting of: battery, capacitor, transformer, line-powered ac-dc converter, line-powered ac-ac converter, photovoltaic cell, radio-frequency power-harvesting coil, static charge collected by said static-preventing means, and combinations thereof.

[0040] It is further within provision of the invention further providing counting means and indicator means adapted to count and indicate information selected from the group consisting of: number of remaining bags, number of bags used, power remaining.

[0041] It is further within provision of the invention further issuing an alert through alerting means in case of a condition selected from the group consisting of: the number of remaining bags is below a predefined threshold; the diameter of said roll of plastic bags is below a predefined threshold.

[0042] It is further within provision of the invention wherein said alerting means is selected from the group consisting of: SMS, page, email, light indicator, digital message, audible alert.

[0043] It is further within provision of the invention wherein said alerting means comprises communications selected from the group consisting of: computerized communication, communication by wireless means, communication with hand held devices, communication through the internet, communication through an intranet.

[0044] It is further within provision of the invention wherein said bag axle is provided an irregular profile whereby only plastic bag rolls of suitable profile will fit upon said bag axle.

[0045] It is further within provision of the invention wherein said activation means is selected from the group consisting of: button activation, voice activation, motion sensor, remote activation, and timer activation.

[0046] Another aspect of the present invention provides a method for dispensing plastic bags comprising the steps: providing a bag axle adapted to hold a roll of plastic bags; providing a front roller axle and a rear roller axle, said roller axles being largely parallel to said bag axle; providing front and rear rollers adapted to turn upon said front and rear roller axles, respectively, said rollers being put in mechanical contact by means of an adjustable spring tensioner; providing an electric motor in

mechanical communication with one of said roller axles; feeding a plastic bag from said plastic bag roll between said rollers; and activating said electric motor to turn said rollers and thereby draw said plastic bag through said rollers, said plastic bag exiting said rollers in a disposition allowing it to be retrieved by a user.

[0047] These, additional, and/or other aspects and/or advantages of the present invention are: set forth in the detailed description which follows; possibly inferable from the detailed description; and/or learnable by practice of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0048] In order to understand the invention and to see how it may be implemented in practice, a plurality of embodiments will now be described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

[0049] FIG. 1 illustrates a T-shirt style plastic bag;

[0050] FIGS. 2a,b,c illustrate an embodiment of the plastic bag dispenser in isometric view;

[0051] FIG. 3a,b partially illustrates one embodiment of the plastic bag dispenser in cutaway isometric view;

[0052] FIG. 4a,b,c,d partially illustrates one embodiment of the plastic bag dispenser in cutaway isometric view;

[0053] FIG. 5 partially illustrates one embodiment of the plastic bag dispenser in cutaway isometric view; and,

[0054] FIG. 6a,b partially illustrates an embodiment of the plastic bag dispenser in cutaway isometric view;

[0055] FIG. 7a,b partially illustrates an embodiment of the plastic bag dispenser in isometric view;

[0056] FIG. 8 illustrates a possible embodiment of electric circuit suitable for operation of the device;

[0057] FIG. 9 illustrates a possible embodiment of an optical circuit suitable for operation of the device; and,

[0058] FIG. 10 illustrates another view of an optical circuit suitable for operation of the device.

DETAILED DESCRIPTION

[0059] The following description is provided, alongside all chapters of the present invention, so as to enable any person skilled in the art to make use of said invention and sets forth the best modes contemplated by the inventor of carrying out this invention. Various modifications, however, will remain apparent to those skilled in the art, since the generic principles of the present invention have been defined specifically to provide a means and method for providing an automatic plastic bag dispenser.

[0060] In the following detailed description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the present invention. However, those skilled in the art will understand that such embodiments may be practiced without these specific details. Reference throughout this specification to "one embodiment" or "an embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the invention.

[0061] The term '**plurality**' refers hereinafter to any positive integer (e.g, 1,5, or 10).

[0062] The term '**T-shirt plastic bag**' refers hereinafter to a style of plastic bag having two handles or arms, as shown in Fig.1.

[0063] The term '**ESD**' or '**electrostatic discharge**' refers hereinafter to the spark released by a charged object when its field exceeds the dielectric breakdown of air.

[0064] The present invention provides an electrical device that automatically dispenses plastic bags. In a preferred embodiment the bags are T-shirt style bags, which are stored in roll form. Each bag is linked to the rest, with the boundaries between bags being perforated to allow each bag to be separated from its neighbors.

[0065] The invention provides a system and method for dispensing T-shirt type plastic bags singly by means of an automated dispenser. At the push of a button or other control means, a single bag is partially ejected from the machine, whereupon the user can take the bag and use it. The device has detectors for detecting fault conditions (such as bag depletion, wrinkled bags, and the like) as well as display means such as an LCD for displaying ads or other information to users.

[0066] In one embodiment consistent with the invention an antistatic coating is provided on the bag surfaces so as to prevent or reduce the effects of static electricity.

[0067] In an embodiment consistent with the invention the bags are identified with a form of code such as a bar code which is read by sensing means of the device, so as to prevent use of foreign bags with the device; in this way the operator can ensure that only a certain type of bag is used.

[0068] Pains have been taken to ensure that the amount of wasted bags (due to tearing, wrinkling, folding etc.) is minimized by use of the invention, which furthermore is of a very small size and weight when compared to devices of similar function.

[0069] Fig. 1 shows a standard T-shirt style plastic bag 10 having arms or handles 11, 12. This type of bag is often manufactured in a linear process with each bag being connected to its neighbors by means of a perforated section. Thus long rolls of such bags may be provided for easy transport and storage. It is one object of the present invention to provide a device for the automated dispensing of bags from such a roll, such that single bags are provided at the touch of a button.

[0070] Various embodiments of the device are shown in perspective and plan views in Figs. 2a,b,c which present perspective views of an assembled system, including case 1101, activation button 1102, and LCD 1103. In Fig. 2c an additional item is shown, namely the sterilization light 1150.

[0071] An interior view of an embodiment consistent with the invention is shown in Figs. 3a,b, where the external cover has been removed to allow one to view the interior of the device. A roll of plastic bags 103 is held in place by an axle whose tip 104 is visible. A mounting bracket 105 allows the device to be mounted to a wall or other surface. A back roller 108 and front roller 107 are provided to roll the plastic bags between them.

[0072] By turning the gear 152, the roller 107 is turned, thus drawing the plastic bags (not seen) through the rollers. Roller 107 contacts roller 108 and thus turns it as well. The frame 109 holds all the elements in place. As will be clear to one skilled in the art, the back roller 108 may also be turned by the motor, in turn turning the roller 107; which roller is in fact turned directly by the motor is largely irrelevant. In

the arrangement shown the motor 151 is a stepmotor which turns the worm gear 153 which in turn turns the spur gear 152.

[0073] In Fig. 3b a zoom of a drive section of one embodiment 160 of the invention is shown. Here a stepmotor 151 is employed to drive the subsequent worm gear 153 and spur gear 152.

[0074] Further elements of this device are removed in Fig. 4, to show the elements underlying those shown in Fig. 3. The axle 110 holds a roll of plastic bags (not seen). In one embodiment of the invention, this axle 110 has an irregular profile 150, such that only rolls of bags having a mating profile can be easily placed upon the axle. This allows the provider of the device to ensure that only a certain type of plastic bag, or bags from a certain supplier, are used.

[0075] The roller axle(s) 110 hold the rollers 107, 108 (of Fig. 3a) which have a unique design to prevent the buildup of static charge, which as is known to those skilled in the art, is a grave concern in the dispensing of plastic bags. The buildup of static charge can cause problems in separation of bags from each other, and in some cases can shock the unsuspecting customer who attempts to grasp a plastic bag, and/or damage various electronic devices such as cell phones, garage door openers, watches, calculators, laptop computers, or the like the customer may be carrying.

[0076] Static electricity is generated in the case of plastic bag dispensers through tribocharging, the separation of electric charges that occurs when two materials are brought into contact and then separated. The friction between two adjacent plastic bags during separation materials causes a difference of electrical potential that can lead to an electrostatic discharge event (ESD). Furthermore, once the bag is charged, other objects may be affected through induction which can occur when the electrically charged bag comes near any other conductive object isolated from ground.

[0077] The presence of the charged bag creates an electrostatic field that causes electrical charges on the surface of the other object to redistribute, and an ESD event may occur when the object comes into contact with a conductive path. For example, a charged bag may cause an ESD event to occur from a nearby object such as a purse, if the purse is then touched by a grounded conductor such as a checkout counter rail.

[0078] To combat this effect several steps have been taken in the invention to prevent static charge buildup and ESD. In particular the rollers 107,108 of Fig. 3a are made of or coated with specially selected pairs of materials, such as sandpaper and rubber, respectively. This prevents the static charge buildup that would arise were the bags to be rolled between two rubber rollers.

[0079] As is well known from the classic examples of static electric charge buildup using a glass rod and silk, or amber and wool, or hard rubber and fur, the specific pair of materials that are rubbed together will determine the extent of the static charge buildup, involving their chemical composition, surface roughness, temperature, strain, and other properties.

[0080] It has been found after careful experimentation that use of a sandpaper coating on one roller and rubber on the other effectively reduces static charge buildup and hence reduces the likelihood of an ESD. This may in fact be supported by the triboelectric series, in which materials are listed in order of their relative potential for charge separation. Pairs of materials that are widely separated in the triboelectric series will be more likely to create electrostatic charge buildup.

[0081] In this list silicon (a major component of sandpaper) lies near the various plastics (polyurethane, polypropylene, and vinyl), and therefore the relative degree of charge separation and resulting electrostatic buildup is minimal between these two materials. Alternatively, the rollers may be comprised of electrically conductive material, and connected to external circuitry adapted to dissipate any static charge buildup (such as by grounding the rollers).

[0082] Without being bound by theory, it may be surmised that the surface roughness of the sandpaper coating is also involved in the reduction of electrostatic charge buildup. The surface roughness may be quantified by means of the surface roughness R_a which is the arithmetic average of absolute values of deviation from average height, or

$$R_a = \frac{1}{n} \sum_{i=1}^n |y_i|$$

where y_i is the distance from the average surface height of the i th sample of the surface. In sandpaper this value is at least 0.5mm. Thus the amount of surface

actually touching the plastic bag at any given time is greatly reduced, which will also tend to reduce any triboelectric effects leading to electrostatic charge buildup.

[0083] A second and complementary approach is furthermore taken to prevent static charge buildup, namely the use of a conductive static-charge dissipation device as shown in Fig. 5. Here a further embodiment of the invention is shown, with several elements removed to allow easier comprehension of the remaining elements.

[0084] The static electricity eliminator 115 is provided to further eliminate the aforementioned problems associated with static electricity. This eliminator 115 consists of a strip of metal that contacts the bags and allows for dissipation of any charge that may arise thereupon due to the action of pulling apart one bag from the roll. The eliminator 115 may be connected to external circuitry tending to eliminate any static charge buildup, such as connection to an external ground or earth ground.

[0085] In Fig. 5 the activation button 102 is visible, which activates the motor 113. This motor is coupled via a worm gear 114 to the axle 111 or 112 (Fig. 4) causing both axles to turn, drawing between them the sheet of plastic bags, which has prior been introduced between said rollers. The lock 116 prevents opening of the device and removal of the plastic bag roll.

[0086] In Fig. 6a, springs 117 are shown which control the tension between rollers. These springs force the rollers into contact and can be adjusted to change the tension the springs, thus changing the force with which the rollers are forced together. This is useful to allow for different bag thicknesses and adhesive properties. The plastic guide 170 forces the bags along a certain route to be dispensed out of the device, preventing fouling. This device is shown in different views in Fig. 6b.

[0087] Fig. 7a shows the complete device with access door 120 opened. The back of activation button 102 is also visible as are the various rollers 107,108 and plastic bag axle 110 as previously described, as well as tensioning spring 117. Fig. 7b shows the tensioning spring 117 and associated mechanism in detail.

[0088] It is within provision of the invention to provide the motor with control means allowing it to dispense integral numbers of bags, such as 1, 2, or 5 bags per

activation. This will also tend to affect the generation of static charge, and thus can be tuned to prevent static charge.

[0089] It is within provision of the invention that one of the rollers comprises a material selected from the group consisting of: silicon dioxide, sandpaper, material with a surface roughness R_a of greater than 0.5mm, and electrical conductor; while the other roller comprises a material selected from the group consisting of: rubber, silicon, silicone, styrene, acrylic, polyurethane, polypropylene, vinyl, polytetrafluoroethylene, and electrical conductor; thereby preventing buildup of static electrical charge as discussed previously.

[0090] It is within provision of the invention to dispense T-shirt style plastic bags.

[0091] It is within provision of the invention that the dispensing motor (which turns one or both of the rolls, thus dispensing one or more bags) be adapted to provide an integer number of plastic bags when activated by the activation means, which may be a button, voice activation, motion sensor, or the like.

[0092] It is within provision of the invention that the electric motor be provided electrical power from a source including battery, capacitor, transformer, line-powered ac-dc converter, line-powered ac-ac converter, photovoltaic cell, radio-frequency power-harvesting coil, static charge collected by the static-preventing means, and combinations thereof.

[0093] It is further within provision of the invention to provide counting means and indicator means adapted to count and indicate information including but not limited to: the number of remaining bags, number of bags used, and the power remaining in the power source.

[0094] It is within provision of the invention to provide alerting means adapted to activate an alert when the number of remaining bags is below a predefined threshold. This threshold may be 'hardwired' or programmable. Thus for instance if the threshold may be set to alert when there are 100 bags remaining. Alternatively the threshold may be based on the diameter of the bag roll, which will decrease as more bags are dispensed. In this case the threshold may be a minimum bag roll diameter. When the bag roll diameter is less than the threshold diameter an alert is activated.

[0095] It is within provision of the invention that the alerting means include any of the following: SMS, page, email, light indicator, digital message, audible alert, digital signal, computerized message, hand held device indicator, internet-based message, and intranet based message.

[0096] It is within provision of the invention that the bag axle be provided an irregular profile, such that only plastic bag rolls of suitable profile will fit upon the bag axle.

[0097] A possible embodiment of an electrical circuit adapted to provide the electrical functionality of the invention is shown in Fig. 8. Within the case are two manual buttons 801 for providing manual movement and direction commands (for debugging and/or maintenance purposes). The CPU 802 is connected to these buttons, as well as to LEDs 815 and 816, to a manual operation switch 817, motor driver 803, IR transceiver 806, and power supply 810.

[0098] The motor driver 803 drives a stepper motor 804 which is adapted to turn the rollers of the device in the mechanical block 805. The IR transceiver is adapted to control the motor driver so as to stop the motor when the bag has been dispensed. The power supply 812 takes the wall voltage 813, and provides a DC level such as 24VDC, which is then filtered by the power block 811 which also provides a number of DC voltages 808, 809, 810 which are adapted to the necessary voltages of the system namely the LCD 807, CPU 802, and motor driver 803.

[0099] A safety interlock 814 kills power to the device when the switch 814 is opened (e.g. upon opening the device). Green LED 815 indicates normal operation while red LED 816 indicates a fault and/or bag depletion.

[00100] It is within provision of the invention to utilize stepper motors, servomotors, or other motors as will be clear to one skilled in the art.

[00101] It is within provision of the invention to utilize analog or digital electronics to carry out the various functions of the dispenser as described above. Digital electronics may include inter alia processing means, memory means, input and output means, and display means such as LCD and/or touchscreen.

[00102] It is within provision of the invention to utilize a safety interlock adapted to interrupt power to one or more sections of the device in the case of unsafe conditions, such as an opened case.

[00103] It is within provision of the invention to utilize indicator LEDs to indicate device status such as operable status, fault status, and the like.

[00104] It is within provision of the invention to utilize sensing means adapted to sense the presence of plastic bags, for instance IR or other sensors, able inter alia to detect wrinkled bags, bags of inhomogenous texture, and the like.

[00105] It is within provision of the invention to apply an anti-static material onto the bags and/or rollers of the invention in order to eliminate or reduce the effects of static electricity.

[00106] It is within provision of the invention that the component parts may be produced and/or assembled robotically so as to facilitate rapid production and/or assembly.

[00107] In Fig. 9 a possible embodiment of the bag-sensing optics of the device is shown. The mirror 902 may be adjusted by means of adjusting jig 901. The IR LED 904 bounces light off the mirror 902, the light twice passing through the bag 906 on its way to detectors 903,905. A side view of this device is shown in Fig. 10.

[00108] All examples discussed herein are non-limiting examples.

[00109] The disclosed embodiments may be variously combined.

[00110] Although selected embodiments of the present invention have been shown and described, it is to be understood the present invention is not limited to the described embodiments. Instead, it is to be appreciated that changes may be made to these embodiments without departing from the principles and spirit of the invention, the scope of which is defined by the claims and the equivalents thereof.

CLAIMS

What is claimed is:

1. An automatic plastic bag dispenser comprising:
 - a. a bag axle adapted hold a roll of plastic bags;
 - b. a front roller axle and rear roller axle, said roller axles being largely parallel to said bag axle; and a spring mechanism of adjustable tension adapted to push said rollers axles towards one another;
 - c. a front roller and a rear roller disposed upon said roller axles, said rollers being adapted to draw a sheet of plastic bags between said rollers;
 - d. an electric motor adapted to turn one of said roller axles, said motor being provided with activation means;whereby plastic bags are dispensed by being drawn between said rollers which are turned by said motor when activated by said activation means, while preventing introduction of static charge buildup.
2. The device of claim 1 further provided with computing means and sensing means adapted to activate said motor based upon the condition of said sensing means.
3. The device of claim 2 further providing display means in communication with said computing means adapted to display graphical material to the users of said device.
4. The device of claim 2 wherein said sensing means are adapted to sense the presence of a plastic bag and said computing means are adapted to prevent operation of said motor when said bag is not sensed.
5. The device of claim 3 wherein said sensing means comprise infrared sources and detectors.
6. The device of claim 1 wherein said motor is a stepper motor.
7. The device of claim 1 wherein said bags are treated with an anti-static coating.
8. The device of claim 1 wherein said bags are provided with identification means and said computing means are provided with sensing means adapted to prevent use of any bags not possessing said identification means.

9. The device of claim 1 wherein one of said rollers comprises a material selected from the group consisting of: silicon dioxide sandpaper, material with a surface roughness R_a of greater than 0.5mm, and electrical conductor; while the other of said rollers comprises a material selected from the group consisting of: rubber, silicon, silicone, styrene, acrylic, polyurethane, polypropylene, vinyl, polytetrafluoroethylene, and electrical conductor; thereby preventing buildup of static electrical charge.
10. The device of claim 1 wherein said roll of plastic bags comprises T-shirt style plastic bags.
11. The device of claim 1 wherein said motor is adapted to provide a single plastic bag when activated by said activation means.
12. The device of claim 1 wherein said electric motor is provided electrical power from a source selected from the group consisting of: battery, capacitor, transformer, line-powered ac-dc converter, line-powered ac-ac converter, photovoltaic cell, radio-frequency power-harvesting coil, static charge collected by said static-preventing means, and combinations thereof.
13. The device of claim 1 further providing counting means and indicator means adapted to count and indicate information selected from the group consisting of: number of remaining bags, number of bags used, power remaining.
14. The device of claim 13 further providing alerting means adapted to activate an alert in case of a condition selected from the group consisting of: the number of remaining bags is below a predefined threshold; the diameter of said roll of plastic bags is below a predefined threshold.
15. The device of claim 14 wherein said alerting means is selected from the group consisting of: SMS, page, email, light indicator, digital message, audible alert.
16. The device of claim 14 wherein said alerting means comprises communications selected from the group consisting of: computerized communication, communication by wireless means, communication with hand held devices, communication through the internet, communication through an intranet.
17. The device of claim 1 wherein said bag axle is provided an irregular profile whereby only plastic bag rolls of suitable profile will fit upon said bag axle.

18. The device of claim 1 wherein said activation means is selected from the group consisting of: button activation, voice activation, motion sensor, remote activation, and timer activation.
19. A method for dispensing plastic bags comprising the steps:
- a. providing a bag axle adapted to hold a roll of plastic bags;
 - b. providing a front roller axle and a rear roller axle, said roller axles being largely parallel to said bag axle;
 - c. providing front and rear rollers adapted to turn upon said front and rear roller axles, respectively, said rollers being put in mechanical contact by means of an adjustable spring tensioner;
 - d. providing an electric motor in mechanical communication with one of said roller axles;
 - e. feeding a plastic bag from said plastic bag roll between said rollers;
 - f. activating said electric motor to turn said rollers and thereby draw said plastic bag through said rollers, said plastic bag exiting said rollers in a disposition allowing it to be retrieved by a user.
20. The method of claim 19 further provided with computing means and sensing means adapted to activate said motor based upon the condition of said sensing means.
21. The method of claim 19 further providing display means in communication with said computing means adapted to display graphical material to the users of said device.
22. The method of claim 20 wherein said sensing means are adapted to sense the presence of a plastic bag and said computing means are adapted to prevent operation of said motor when said bag is not sensed.
23. The method of claim 22 wherein said sensing means comprise infrared sources and detectors.
24. The method of claim 19 wherein said motor is a stepper motor.
25. The method of claim 19 wherein said bags are treated with an anti-static coating.
26. The method of claim 19 wherein one of said rollers comprises a material selected from the group consisting of: silicon dioxide, sandpaper, and material with a surface roughness R_a of greater than 0.5mm; while the other

- of said rollers comprises a material selected from the group consisting of: rubber, silicon, silicone, styrene, acrylic, polyurethane, polypropylene, vinyl, and polytetrafluoroethylene; thereby preventing buildup of static electrical charge.
27. The method of claim 19 wherein said roll of plastic bags comprises T-shirt style plastic bags.
 28. The method of claim 19 wherein said motor is adapted to provide a single plastic bag when activated by said activation means.
 29. The method of claim 19 wherein said electric motor is provided electrical power from a source selected from the group consisting of: battery, capacitor, transformer, line-powered ac-dc converter, line-powered ac-ac converter, photovoltaic cell, radio-frequency power-harvesting coil, static charge collected by said static-preventing means, and combinations thereof.
 30. The method of claim 19 further providing counting means and indicator means adapted to count and indicate information selected from the group consisting of: number of remaining bags, number of bags used, power remaining.
 31. The method of claim 30 further issuing an alert through alerting means in case of a condition selected from the group consisting of: the number of remaining bags is below a predefined threshold; the diameter of said roll of plastic bags is below a predefined threshold.
 32. The method of claim 31 wherein said alerting means is selected from the group consisting of: SMS, page, email, light indicator, digital message, audible alert.
 33. The method of claim 31 wherein said alerting means comprises communications selected from the group consisting of: computerized communication, communication by wireless means, communication with hand held devices, communication through the internet, communication through an intranet.
 34. The method of claim 19 wherein said bag axle is provided an irregular profile whereby only plastic bag rolls of suitable profile will fit upon said bag axle.

35. The method of claim 19 wherein said activation means is selected from the group consisting of: button activation, voice activation, motion sensor, remote activation, and timer activation.

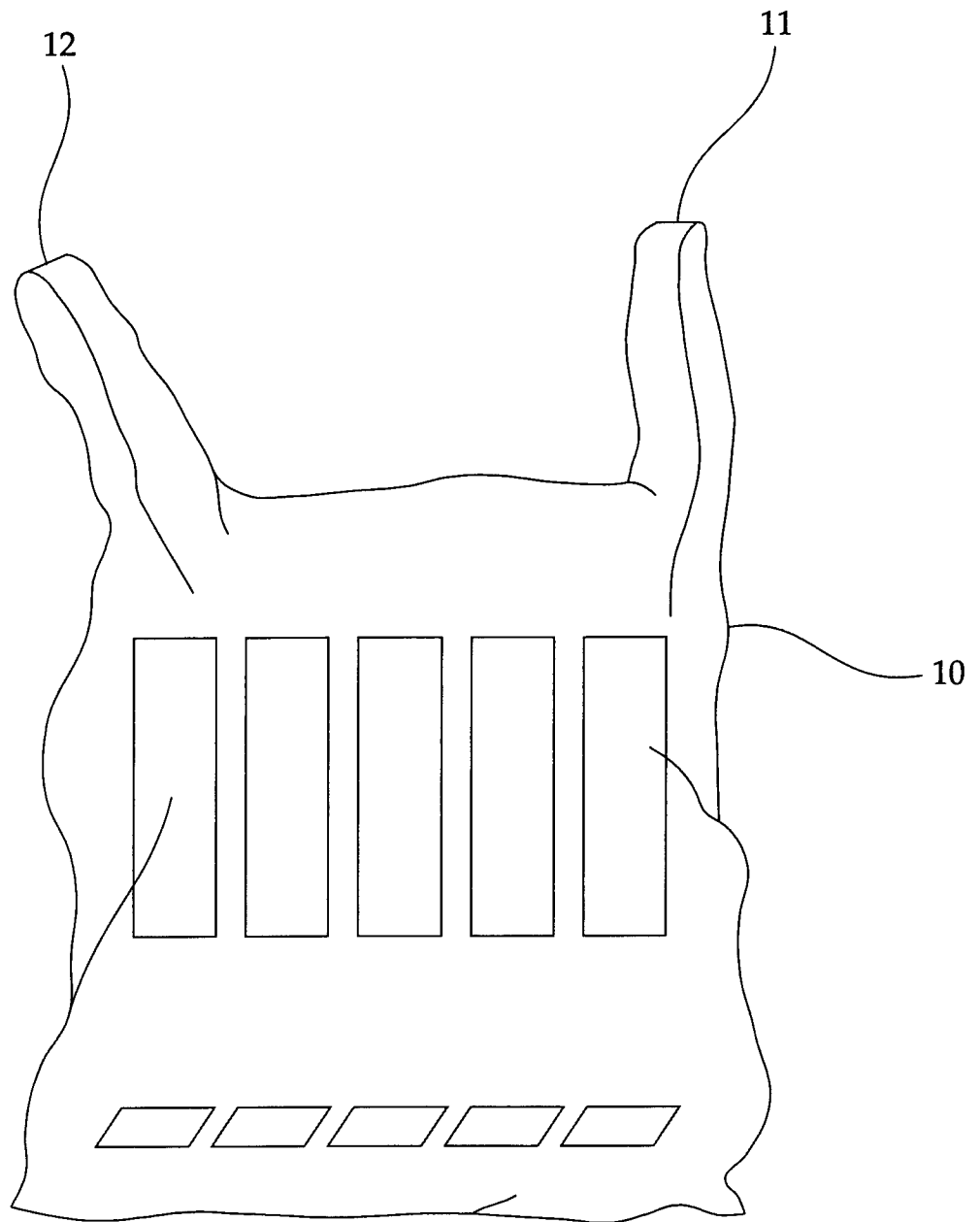


FIGURE 1

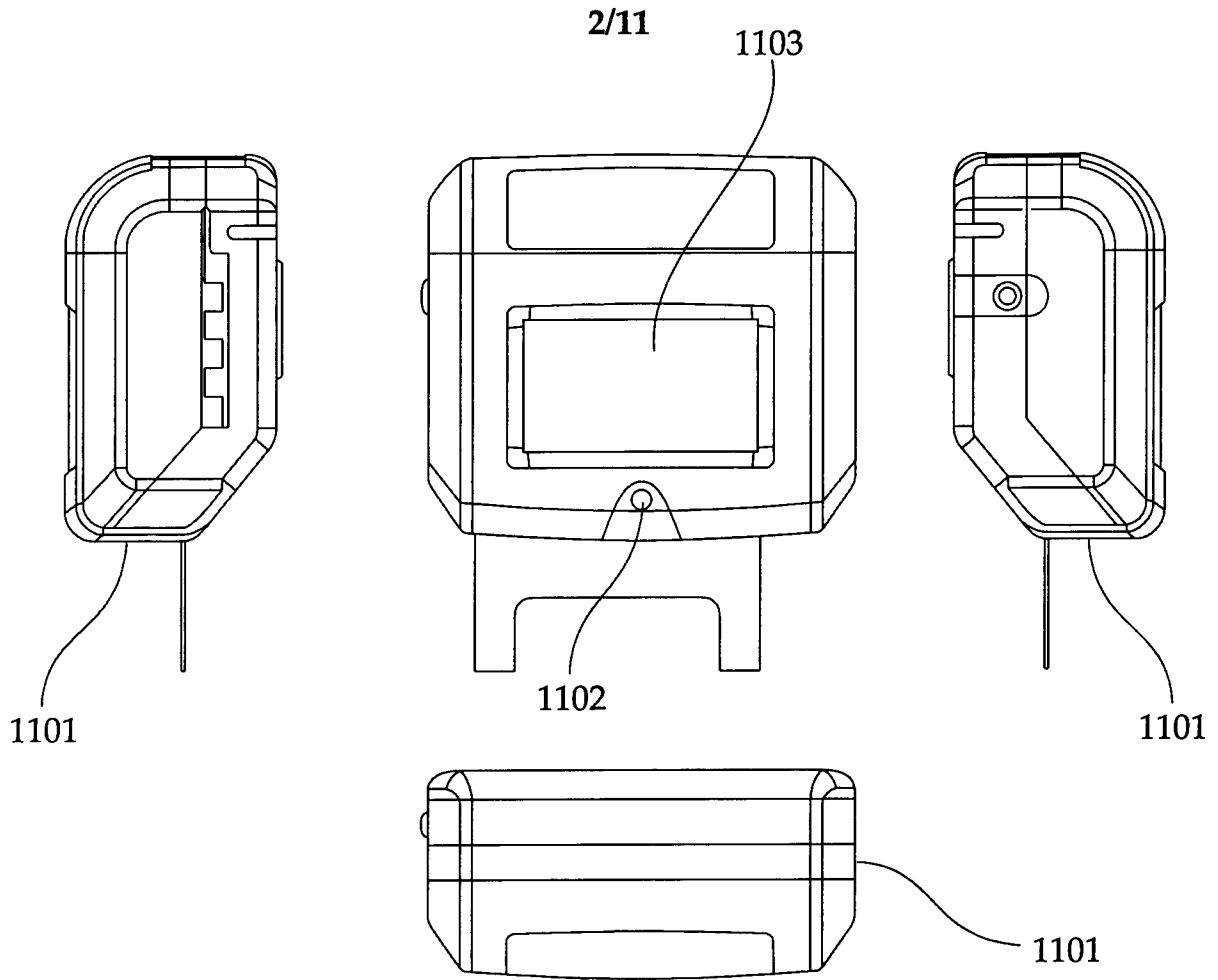


FIGURE 2a

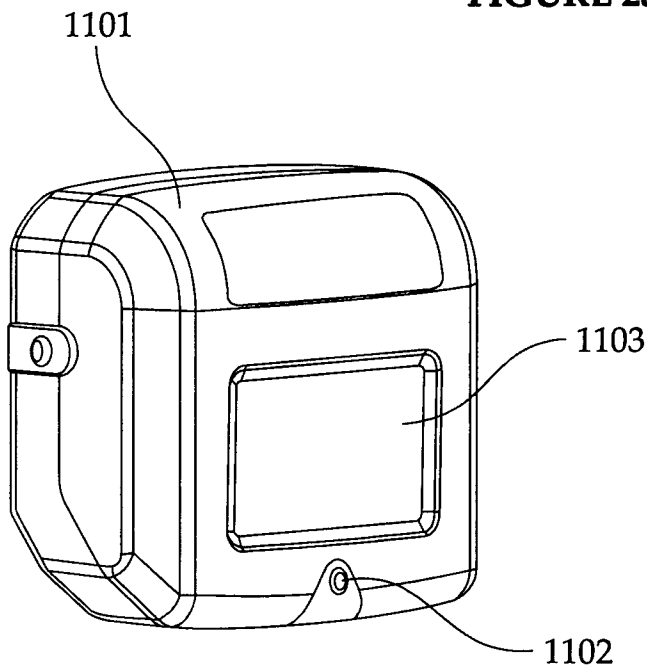


FIGURE 2b

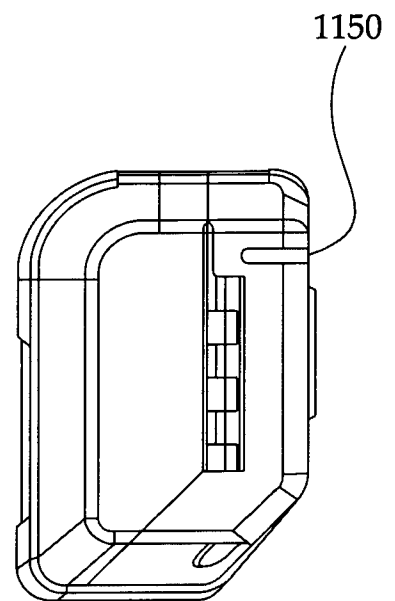


FIGURE 2c

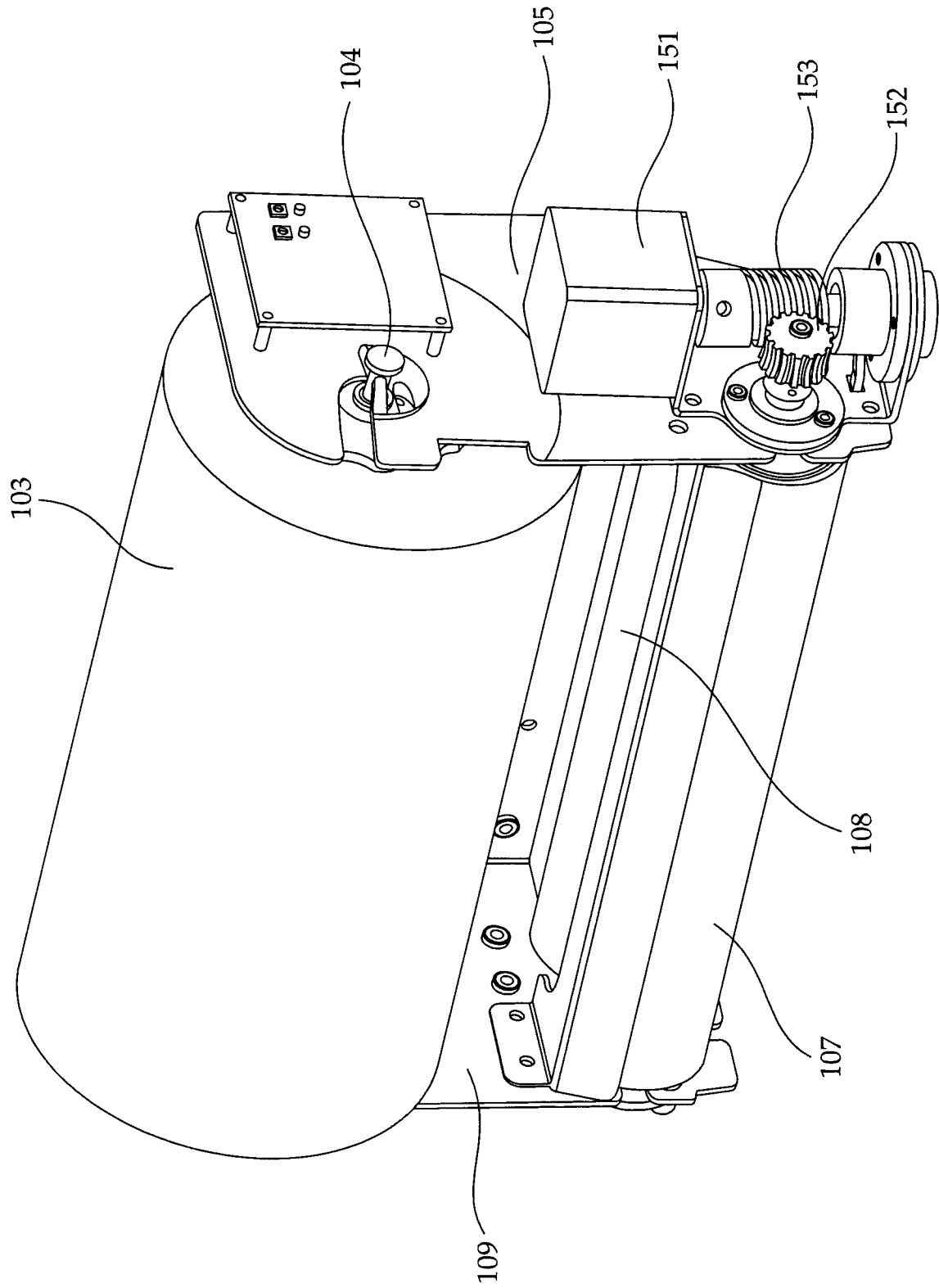


FIGURE 3a

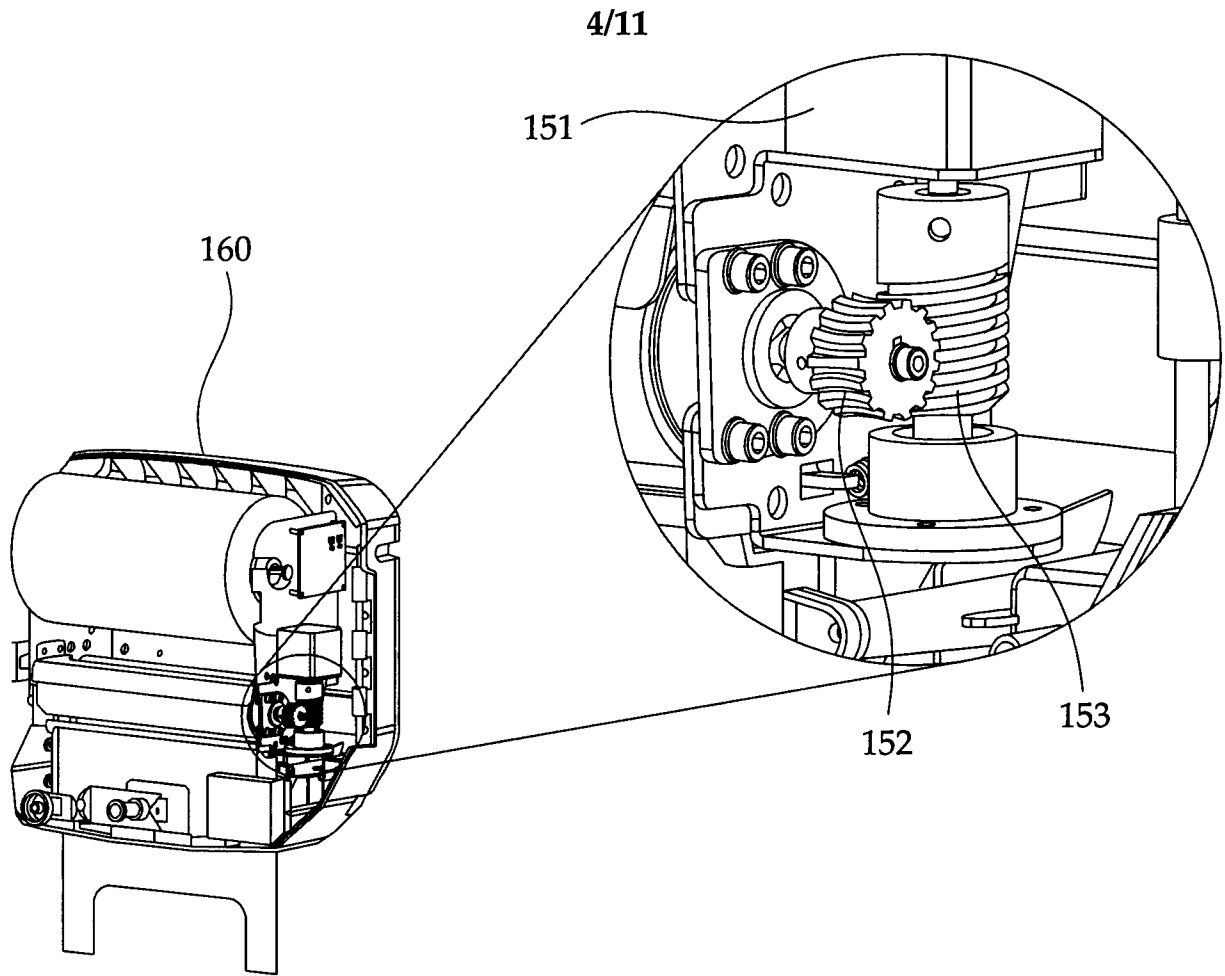


FIGURE 3b

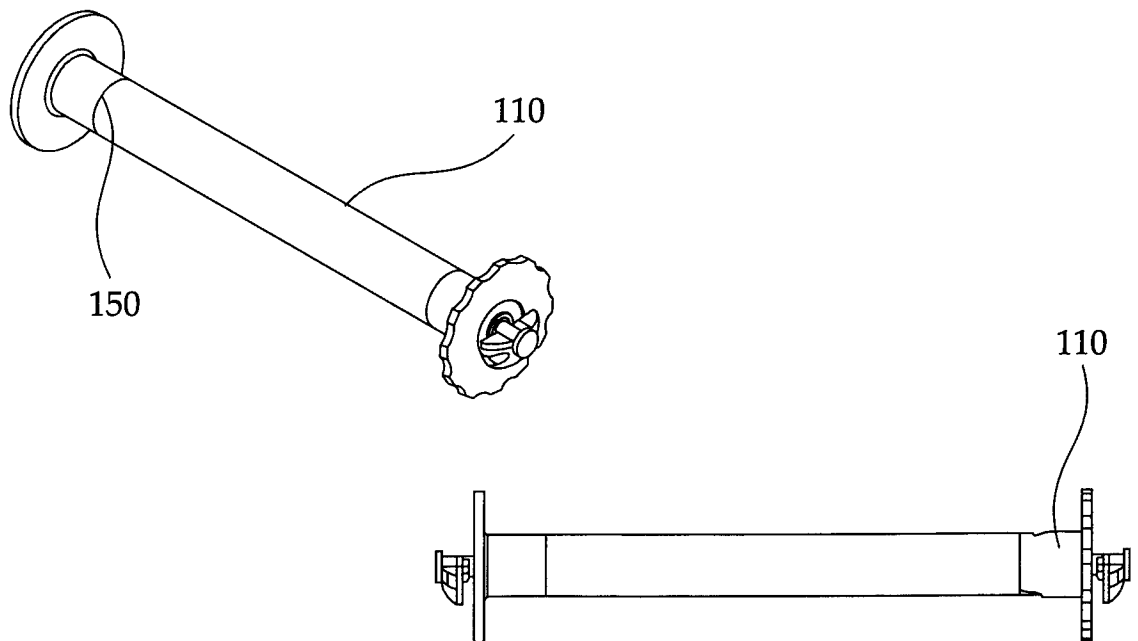


FIGURE 4a

5/11

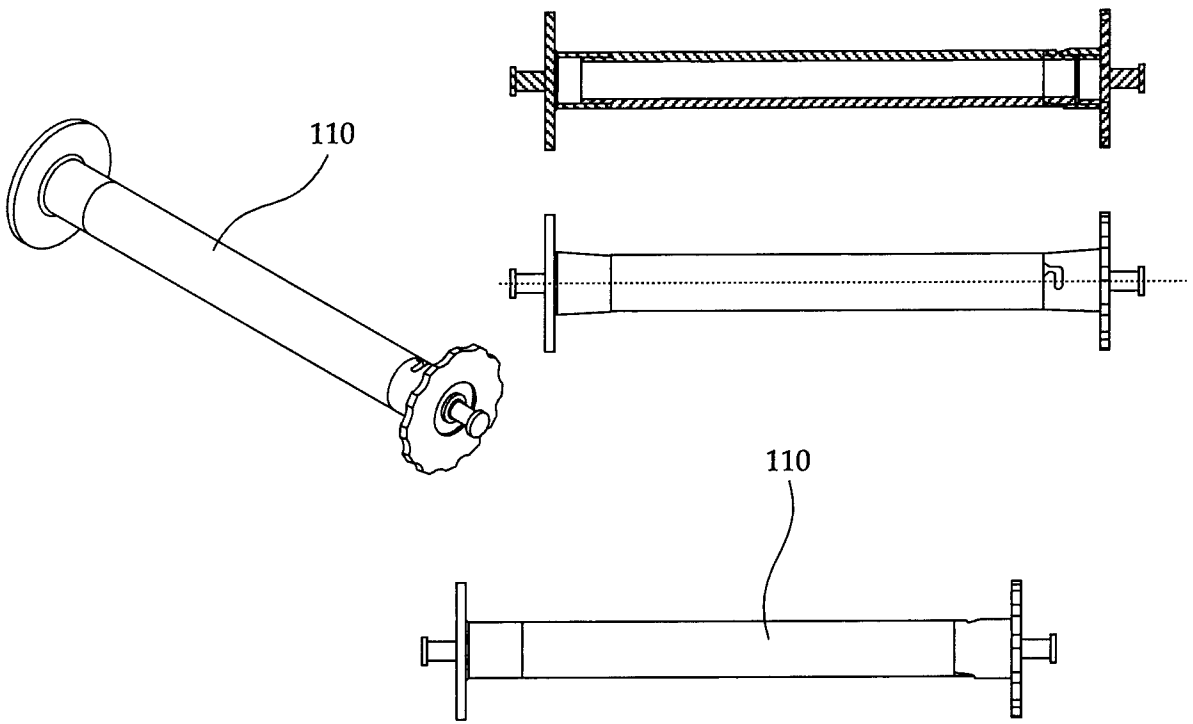


FIGURE 4b

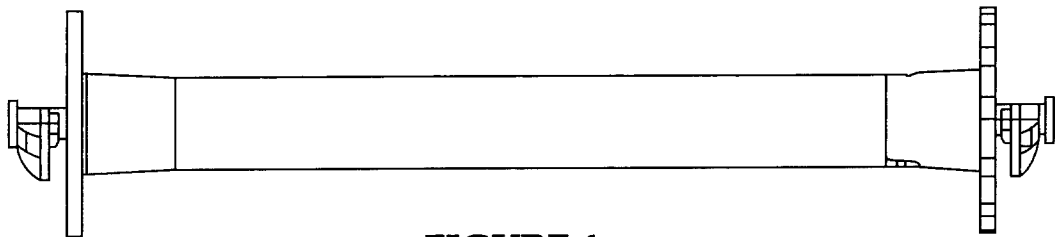


FIGURE 4c

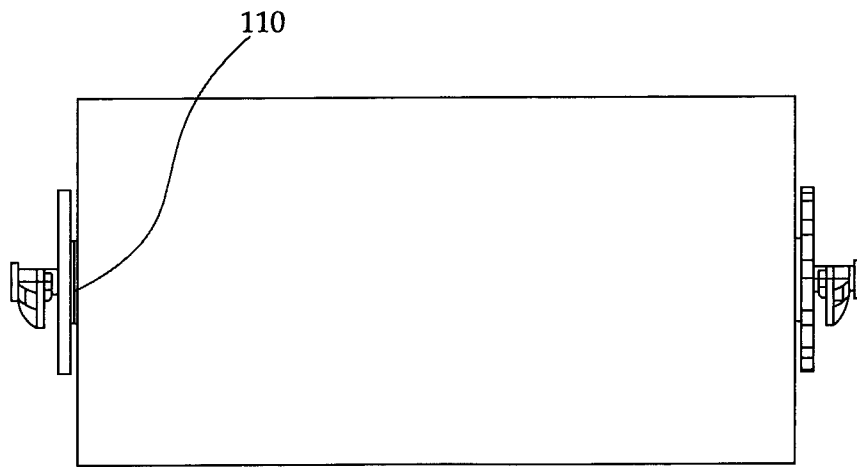


FIGURE 4d

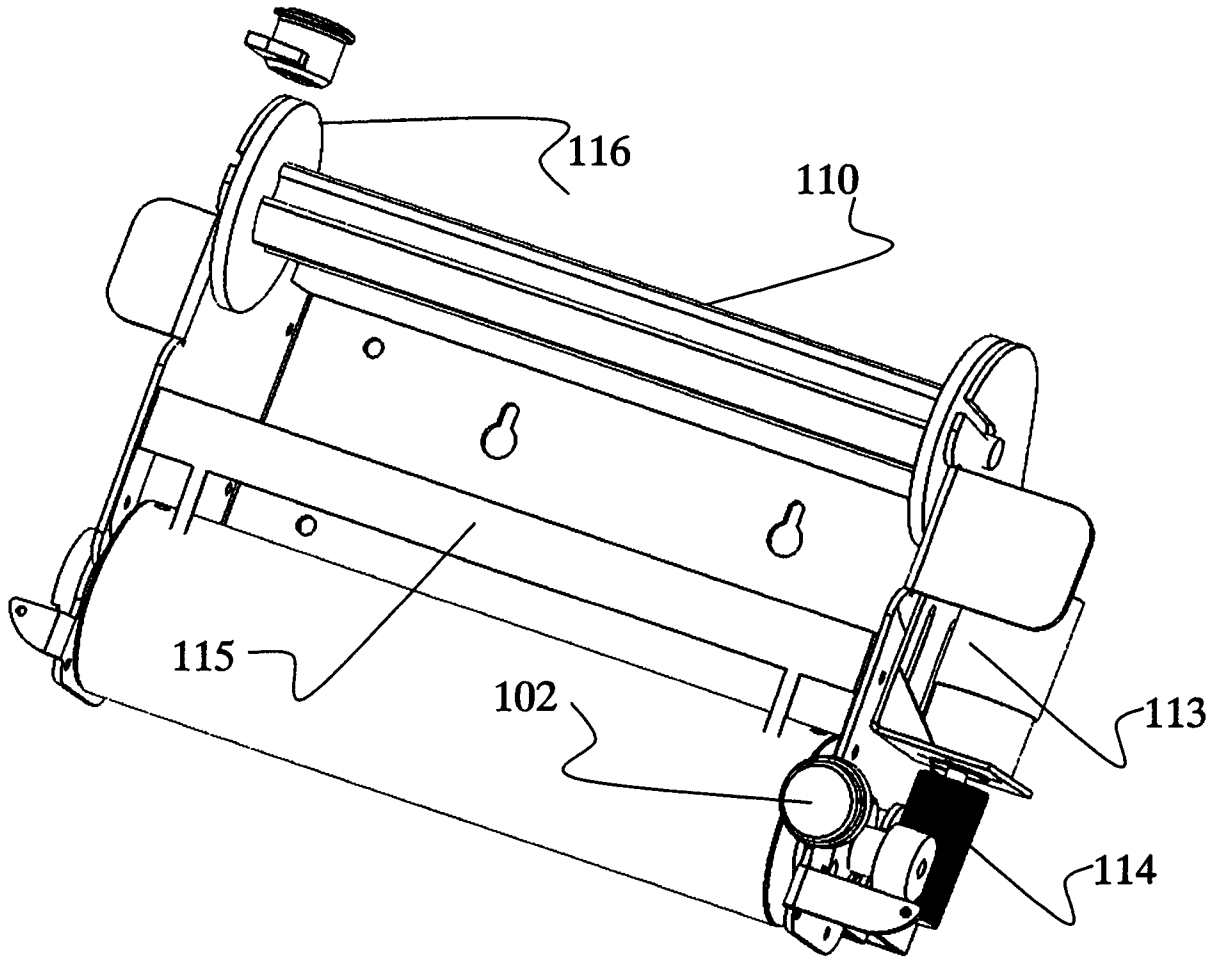


Fig. 5

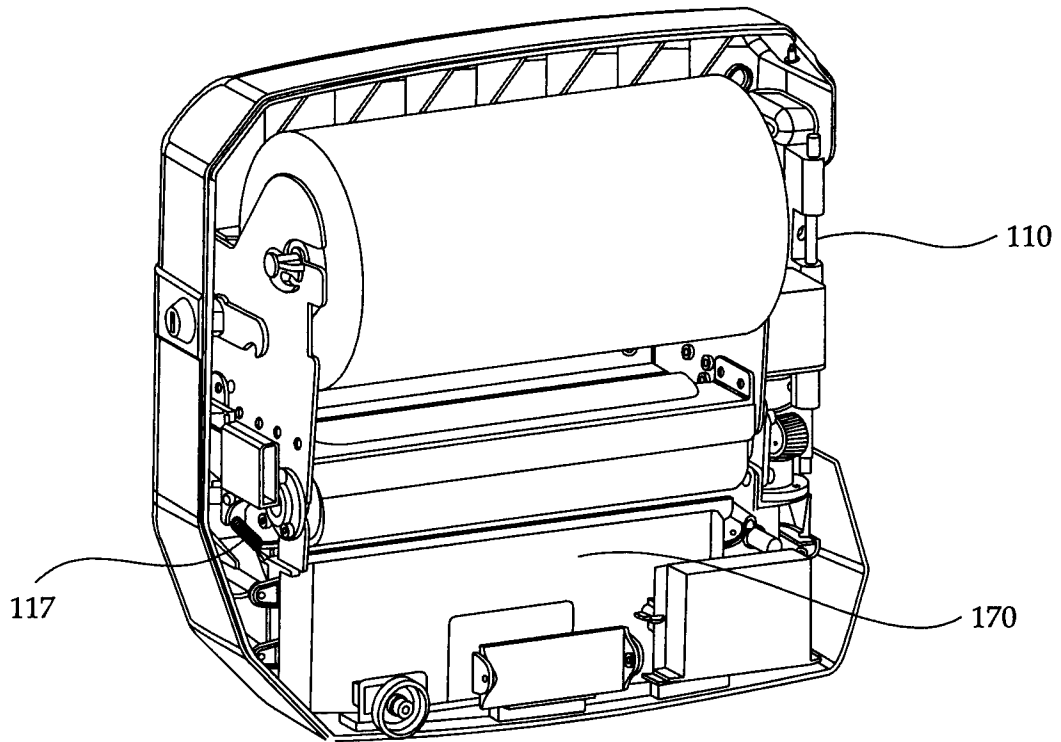


FIGURE 5a

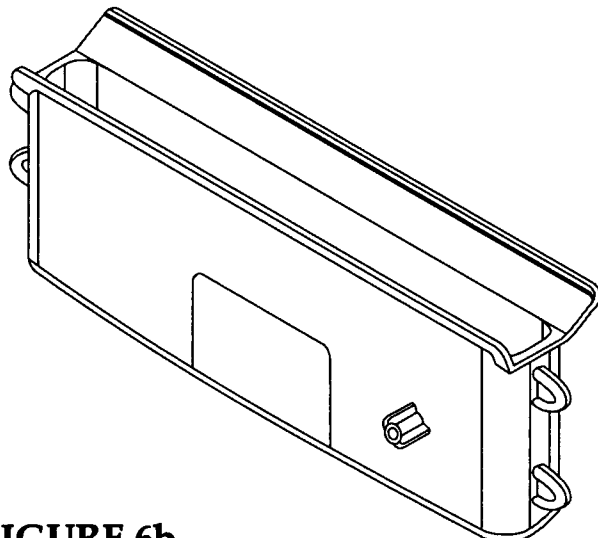
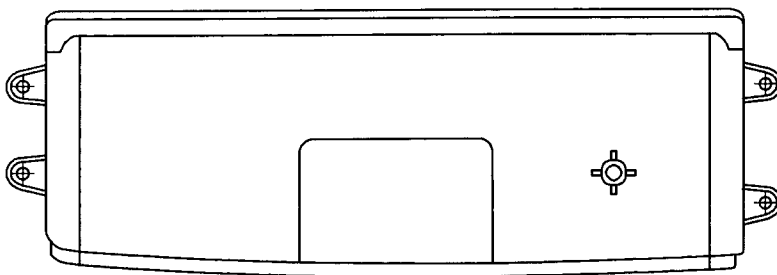


FIGURE 6b

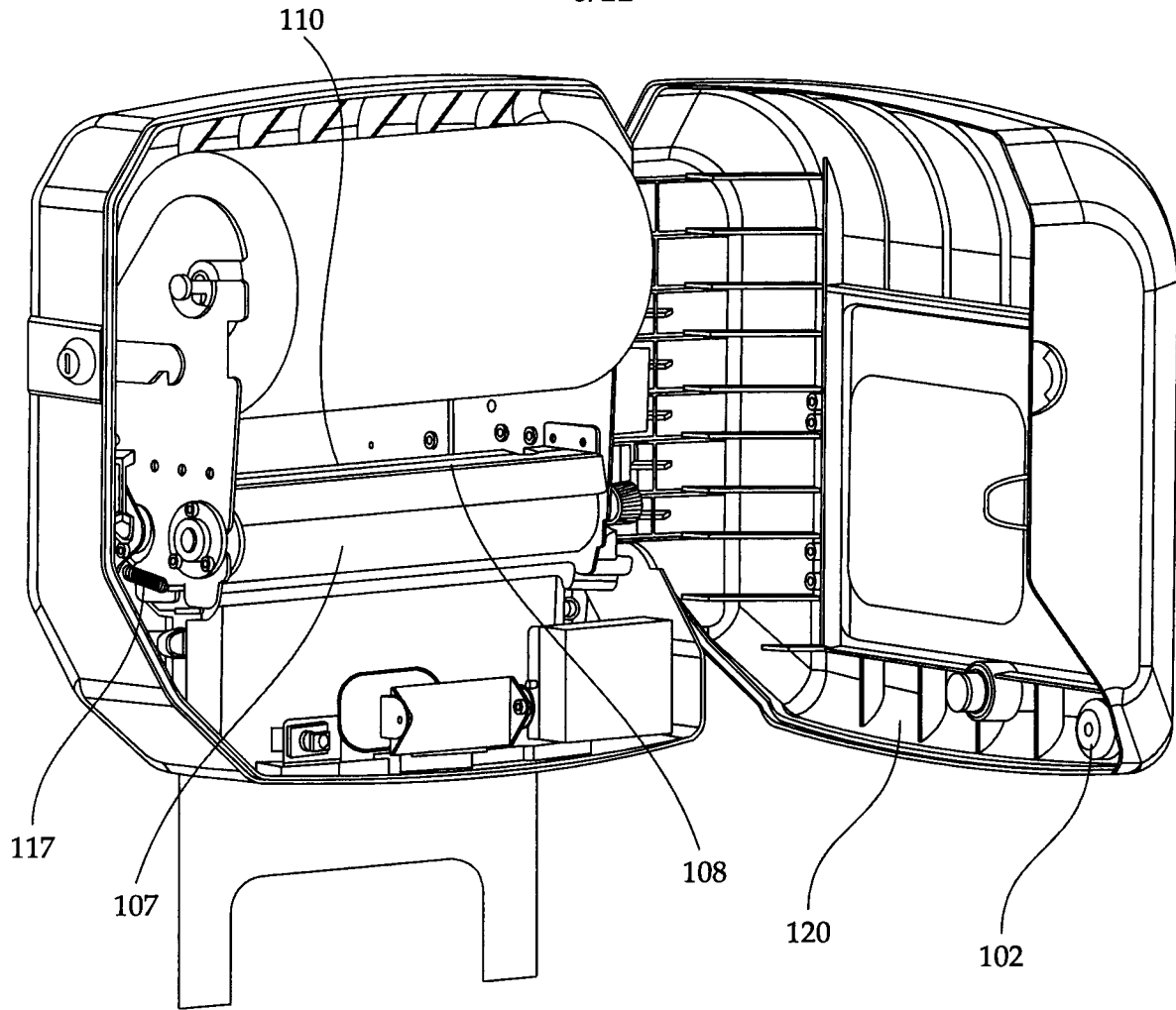


FIGURE 6a

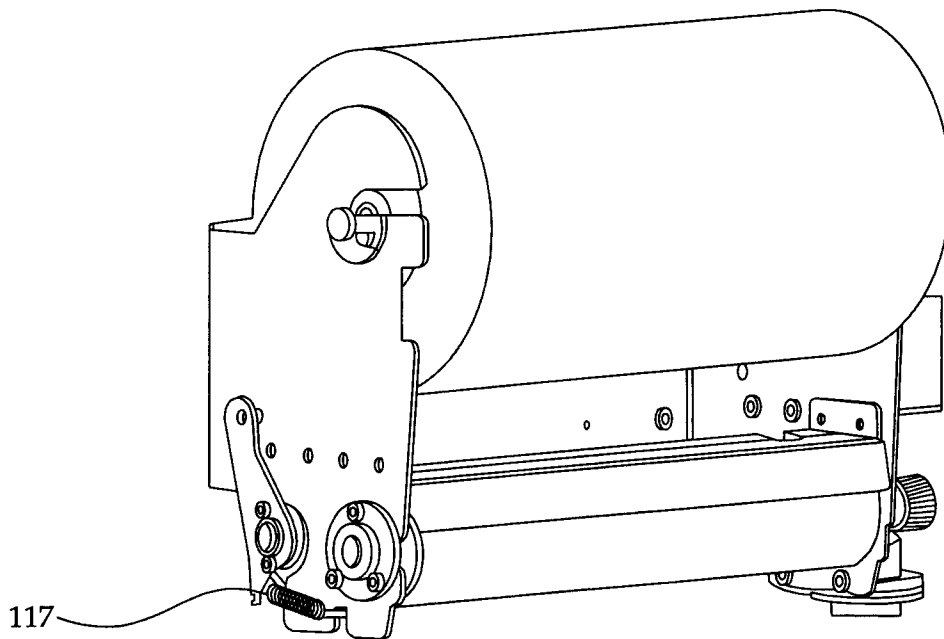


FIGURE 7b

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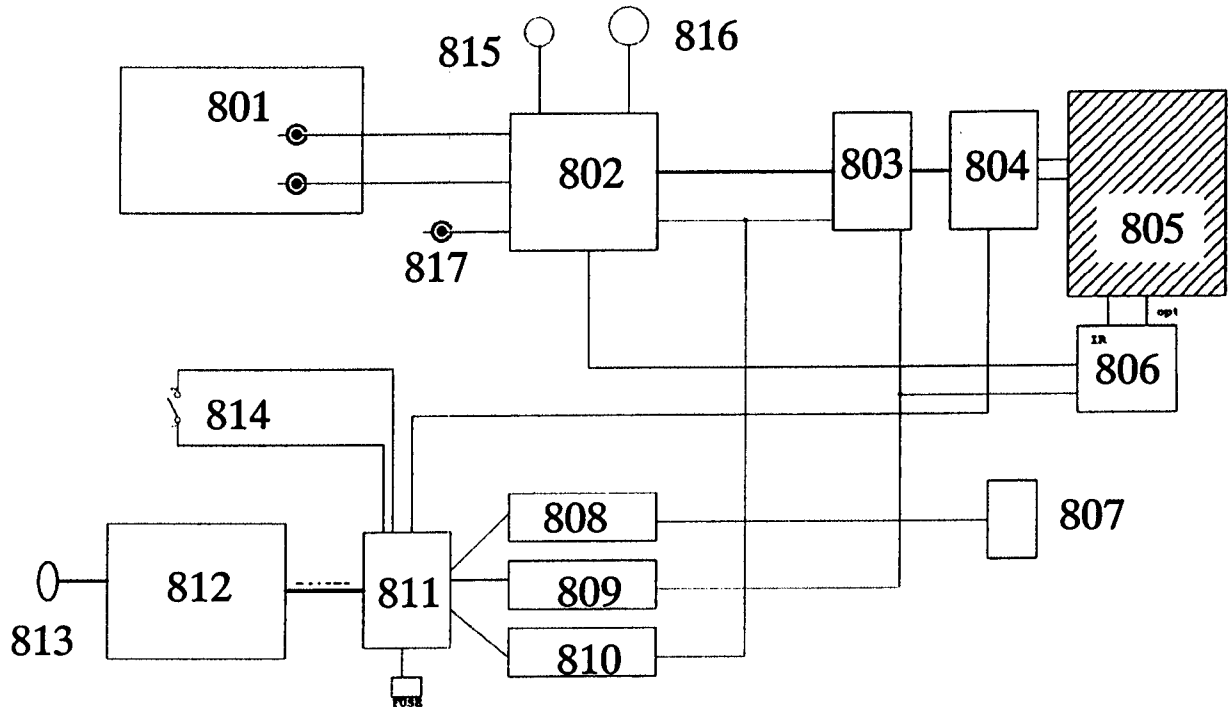


Fig. 8

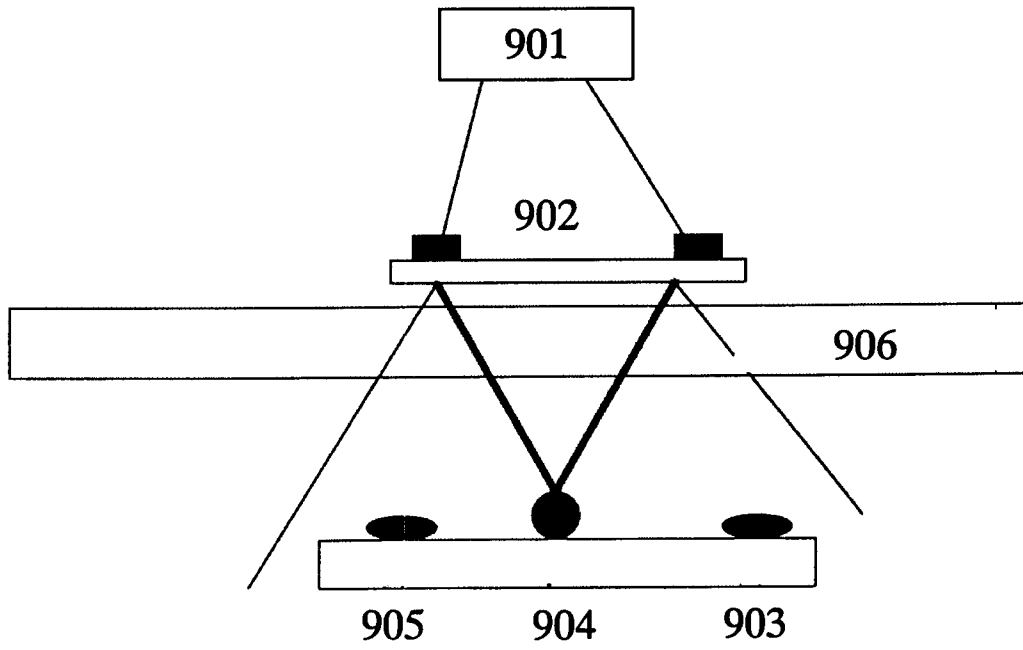


Fig. 9

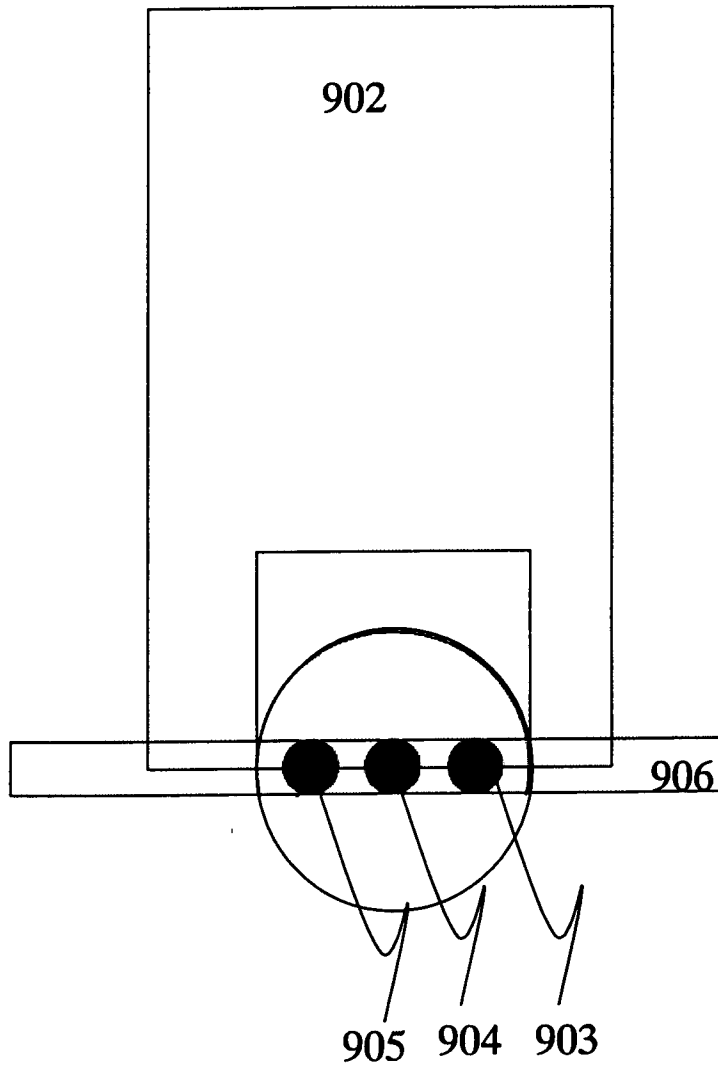


Fig. 10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL 11/00822

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B65H 5/28 (2012.01)

USPC - 221/71

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

USPC: 221/71

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

USPC: 221/13, 69-72, 74; 225/6, 10

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Dialog - roll, sheet, plastic, bag, dispenser, motor, anti-static, roller, display, vend, automatic, automated, silicon dioxide, surface roughness

Google - plastic bag dispenser; automatic plastic bag dispenser; automatic plastic bag dispenser anti-static; bag dispenser roll automatic

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----- Y	US 3,246,797 A (Hoenisch et al.) 19 April 1966 (19.04.1966), figs. 2 and 6-8, and col. 1, ln 8-21, col. 2, ln 15-30, col. 2, ln 47-60, col. 2, ln 72; col. 3, ln 2, and col. 4, ln 11-46	19, 28, 29 ----- 1-18, 20-27, 30-35
Y	US 7,087,351 B2 (Aylward et al.) 08 August 2006 (08.08.2006), col. 1, ln 12-60	1-18, 25, 26
Y	US 2006/0173576 A1 (Goerg et al.) 03 August 2006 (03.08.2006), figs. 4, 8-10, 13A, 13B, 15 and 16, and paras [0108], [0115], [0120], [0123], [0136], [0148], [0159], [0162]-[0165]	2-6, 8, 13-18, 20-24, 30-35
Y	US 2010/0209170 A1 (Saito et al.) 19 August 2010 (19.08.2010), para [0006], [0007], [0135]	26
Y	US 5,425,513 A (Shainker) 20 June 1995 (20.06.1995), figs. 2 and 3, and abstract	10, 27
A	US 7,341,170 B2 (Boone) 11 March 2008 (11.03.2008), figs. 1 and 20-21B, col. 30, ln 64 ? col. 32, ln 3 and col. 32, ln 50; col. 33, ln 29.	1-35

 Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

05 March 2012 (05.03.2012)

Date of mailing of the international search report

21 MAR 2012

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents

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