

July 29, 1969

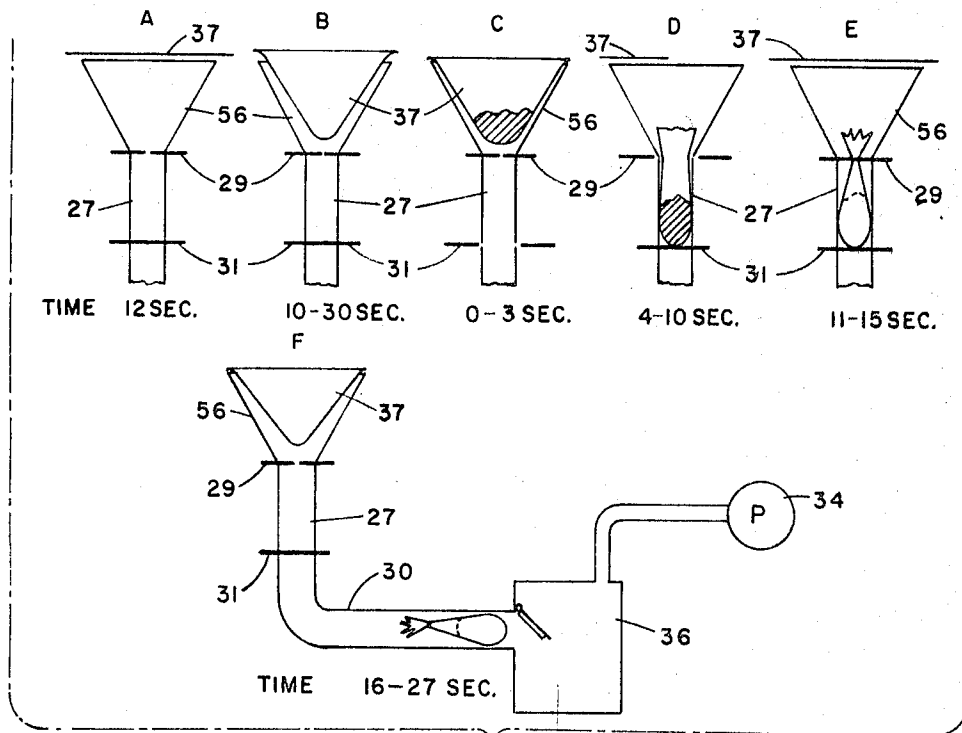
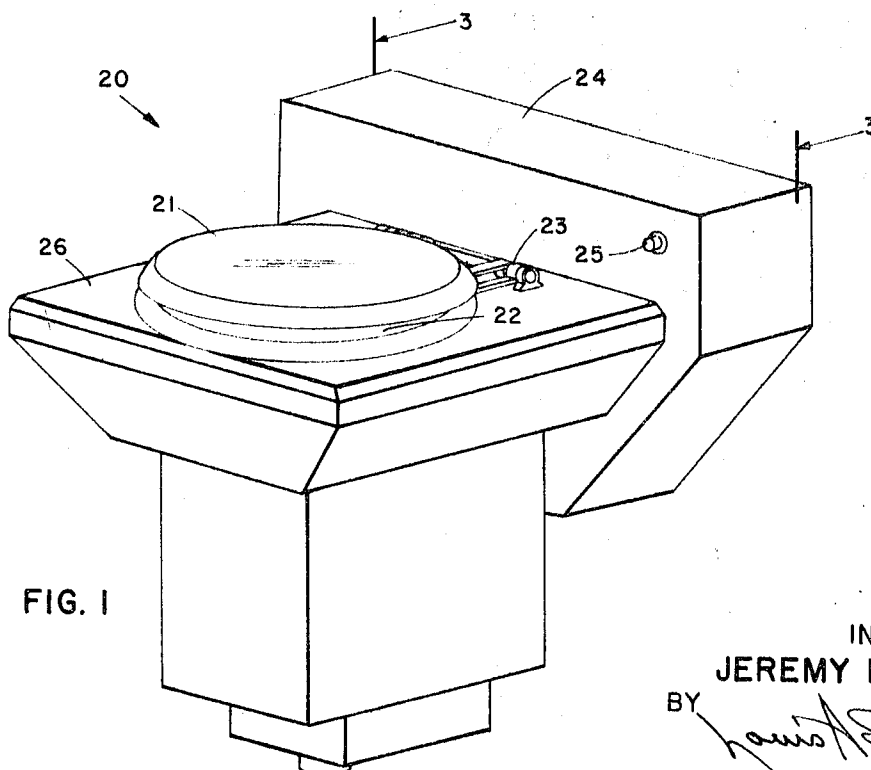
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3,457,567

HUMAN WASTE DISPOSAL SYSTEM

Filed June 28, 1967

6 Sheets-Sheet 1



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HUMAN WASTE DISPOSAL SYSTEM

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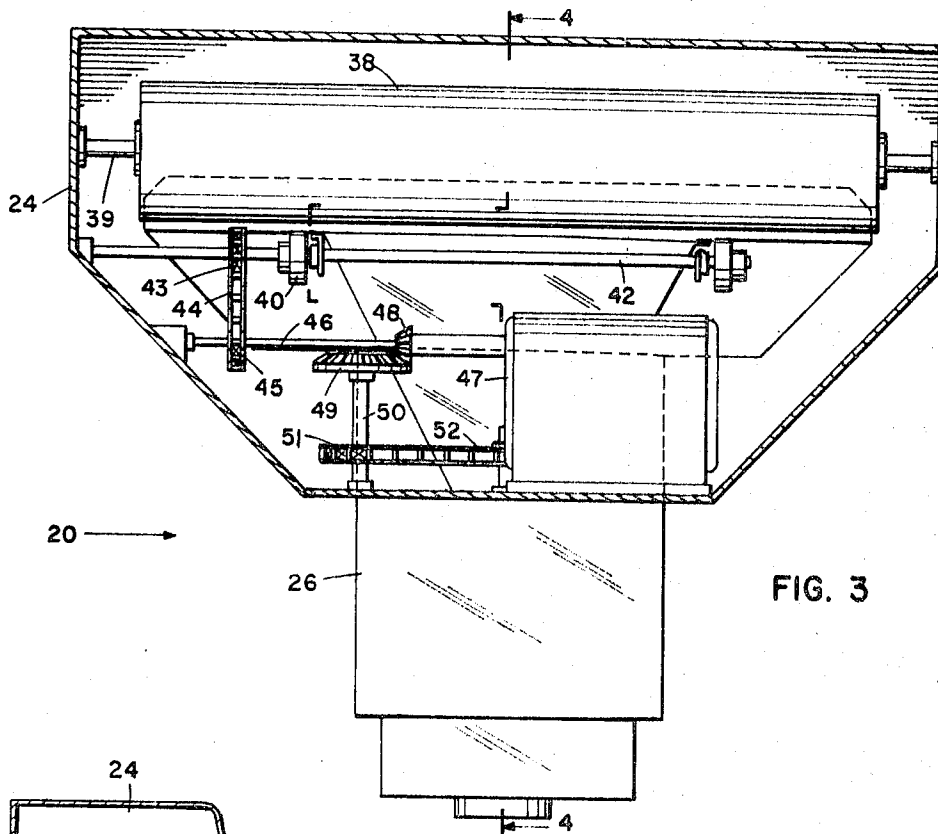


FIG. 3

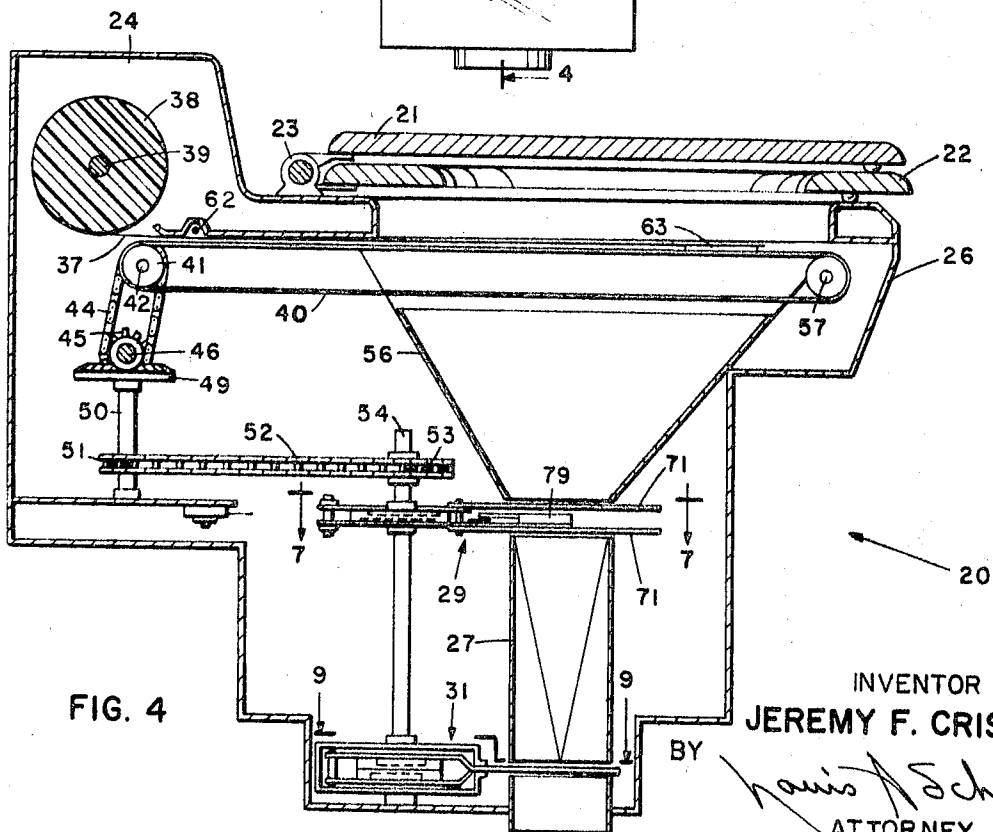


FIG. 4

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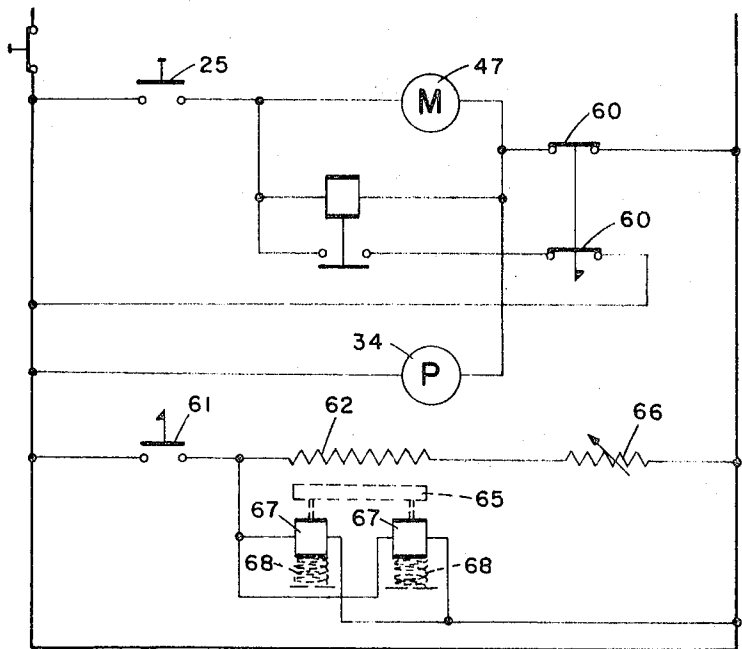


FIG. 5

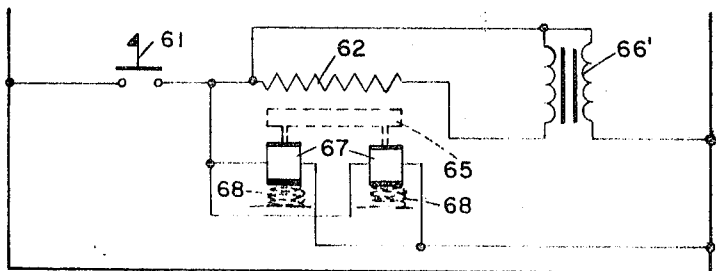


FIG. 5A

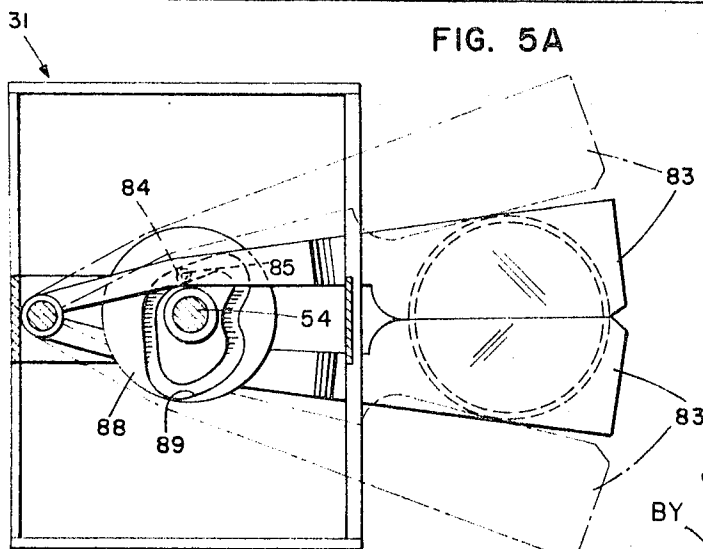


FIG. 9

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HUMAN WASTE DISPOSAL SYSTEM

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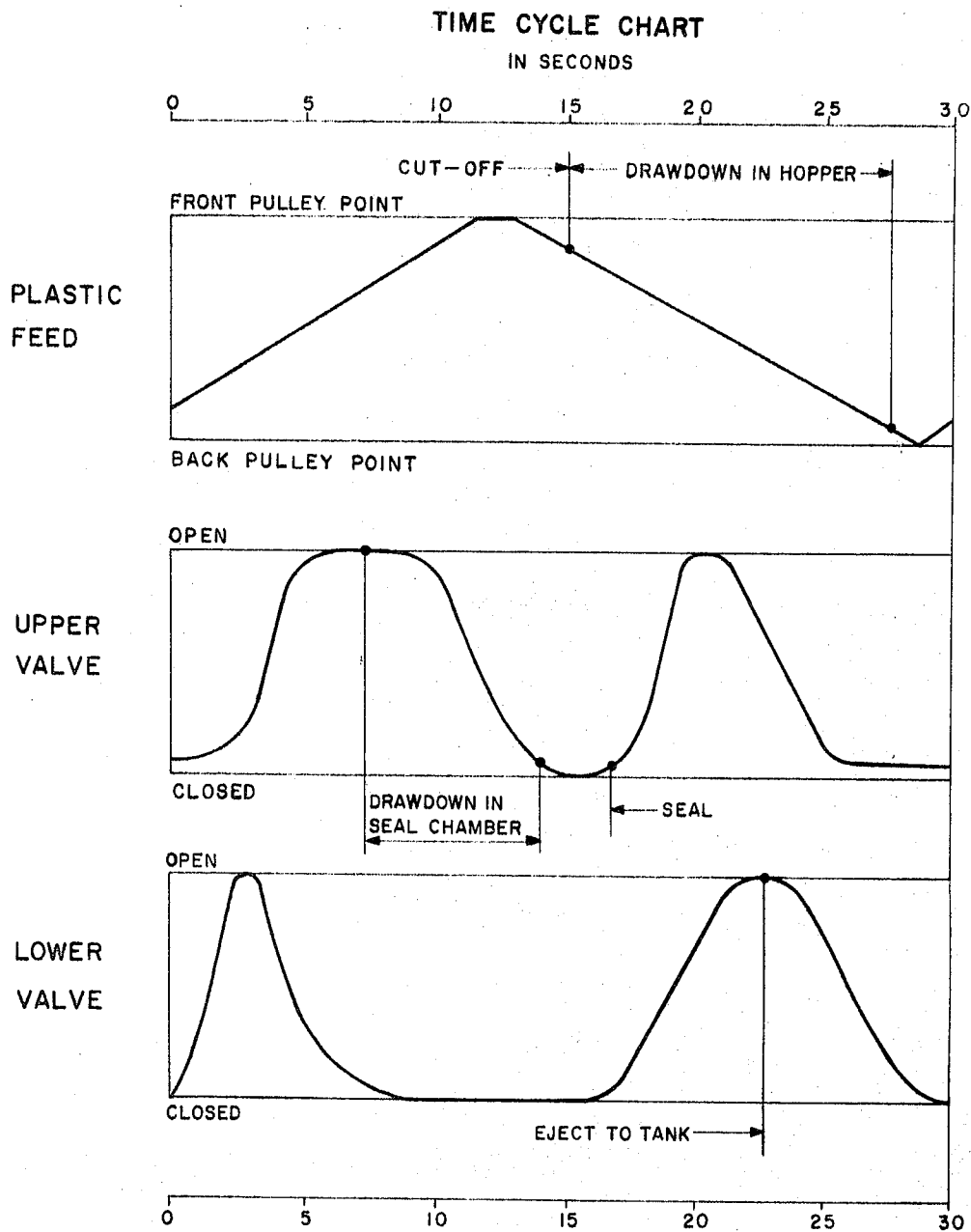


FIG. 6

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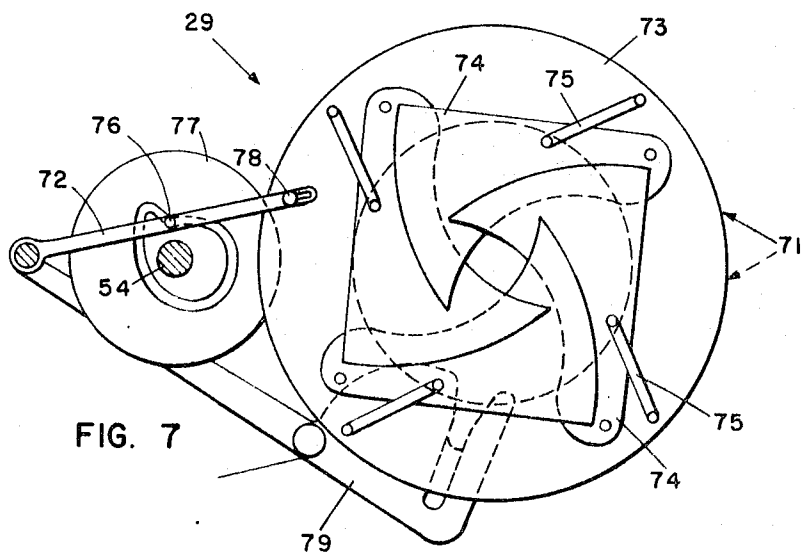
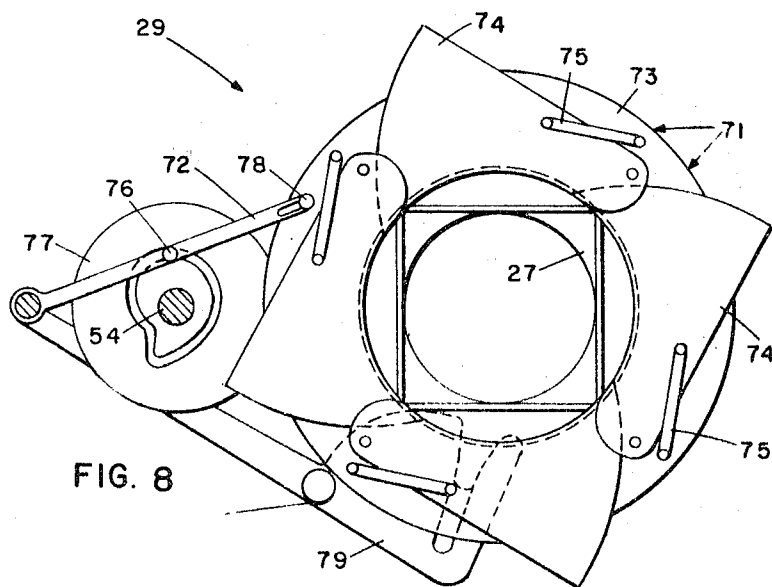
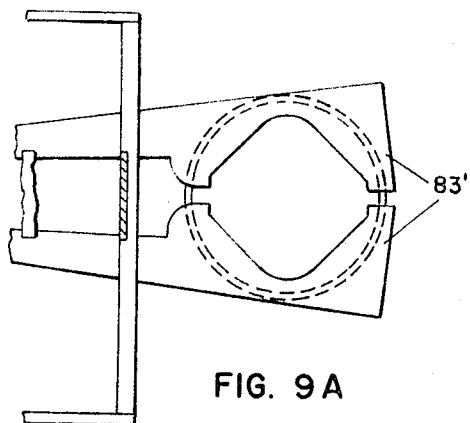
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HUMAN WASTE DISPOSAL SYSTEM

Filed June 28, 1967

6 Sheets-Sheet 5



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HUMAN WASTE DISPOSAL SYSTEM

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Filed June 28, 1967, Ser. No. 653,598

Int. Cl. A47k 11/02

U.S. Cl. 4—132

12 Claims

ABSTRACT OF THE DISCLOSURE

This invention relates to a sanitary multiple operation human waste disposing apparatus and method which comprises forming a sheet or web of liquid-resistant material into a receptacle for receiving the waste material, which receptacle is then reformed into a substantially tubular package which is sealed and vacuum-transported to a storage container that is separately accessible. This commode apparatus has special utility where there is a limited water supply or sewer facility.

CROSS REFERENCES TO RELATED PATENTS

In the past there have been many attempts to make usable dry-type toilets with various methods of accommodating the liquid, semi-liquid, and solid matter excreted by human beings. Generally it has been the practice that this excreta is then packaged in bag form, sometimes using clamps or rings that go around the neck of a bag or other container, and sometimes there is a connected series of bags, which bags are used for receiving the waste matter. In some instances, a roll of material is folded into long tubular sectioned bag-like containers for reception of the disposed material, U.S. Patents Nos. 2,769,397; 2,732,664; 2,204,405. In other instances, the art discloses a bag-like container which is integral with the commode seat, U.S. Patents Nos. 2,506,502 and 2,250,652, and sometimes disposed material is incinerated, U.S. Patent No. 464,197, or dehydrated by heat, U.S. Patent No. 2,279,578, or high frequency, U.S. Patent No. 2,700,775. Some of the disadvantages of these previous methods that have been discussed are that in the case of the incineration method, the "flush action" takes up to 20 minutes to prepare the unit for the next user and in other cases the commode liner has to be placed or handled manually. In some cases shown in the art, U.S. Patent No. 2,671,906, continuous bagging devices are used, wherein the bag is either heat sealed or sealed off by staples. In the prior art the bag must be of cylindrical shape, and this special shape does not lend itself to either economic or compact storage for any reasonable quantity of bags. A further difficulty encountered by devices of the prior art is that these operations of bag manipulation are largely manual, U.S. Patents Nos. 3,158,874; 2,299,226; and 2,192,335. Other devices have been partially automated automatically, U.S. Patent No. 2,801,426, but none takes care of transporting the waste material in the receptacle to a separately accessible storage container.

In the subject invention the complete operation of receiving the waste material and "flushing" of the disposal unit commonly called a toilet or commode is automatic and the novelty consists among other things of having a bag-like container automatically formed from a substantially flat sheet or web of liquid-resistant material which is first formed into a cone-like receptacle for receiving the human waste matter and which receptacle is further reformed by the combined action of vacuum and where applicable gravity into an elongated tubular container, which is then sealed at its top and then transported through the tube conveyer system by vacuum to a waste storage chamber, and a new sheet of said material is put

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into the receiving position and automatically formed into the same cone-like shape as before, in preparation for the next use.

An understanding of my apparatus and method may be had from the following description and accompanying drawings together forming the specification required by the statute. In said drawings:

FIGURE 1 is an isometric view showing the general appearance of a toilet operating under my invention.

FIGURE 2, A through F, shows diagrammatically the sequence of steps in the operation of the apparatus.

FIGURE 3 is a cross section on line 3—3 of FIGURE 1.

FIGURE 4 is a cross section on line 4—4 of FIGURE 3.

FIGURE 5 is a wiring diagram showing the electrical connections for controlling operation of the apparatus.

FIGURE 5A shows diagrammatically an alternate circuit for the controls of the invention.

FIGURE 6 is a time cycle chart indicating the functional relation of some of the parts of the invention.

FIGURE 7 is a partial section taken along line 7—7 of FIGURE 4 showing a plan view of the iris diaphragm valve (closed position) with a tape sealing device.

FIGURE 8 is a view like FIGURE 7 but showing the iris valve in the open position.

FIGURE 9 is a partial section on line 9—9 of FIGURE 4 but on a larger scale, showing a guillotine-type valve used with subject invention.

FIGURE 9A shows a modification of the valve of FIGURE 9.

FIGURE 10 shows a perspective view of the key parts skeletonized for representing the operational relationships.

Referring to FIGURES 1 and 2, A through F, it is seen that my apparatus has a generally smooth appearance, with a somewhat modified conventional toilet form. The commode generally indicated by 20 has a lid 21 and a seat 22 connected by hinges 23 to the base 26 in a known manner. A cabinet 24 provides a space for storing the roll of plastic 38 (FIGURES 3 and 4) which will be later formed in chamber throat 27 and base 26 into bags for containing human waste matter. The button 25 is used for starting the "flushing" operation.

Referring to FIGURE 2, the operational steps are shown in the sequence 2A, 2B, 2C, 2D, 2E, and 2F. FIGURE 2A shows the plastic sheet 37 having been drawn across the open mouth of the cone-like throat 56 of the commode 20. At this time (see also FIGURE 6) upper valve 29 is partially open and lower valve 31 is closed. Upon completion of the operation of drawing the plastic sheet 37 across the mouth of bowl 56, valves 29 and 31 are then both actuated to a partially open position which allows the vacuum pump 34 to draw down sheet 37 to a position in bowl 56 substantially adjacent to its inner surface as shown in FIGURE 2B, thus preparing it for receiving the human wastes. At position 2C the bag-like or cup-like container formed by the puckered plastic sheet 37 has then received the waste material and the user by depressing operating button 25 actuates the motor 47 (FIGURE 3) which starts the control cycle. Then the lower valve 31 is partially closed and the upper valve 29 is opened so that the vacuum can draw down the conically shaped piece of plastic with the waste material in it. The upper edges of the plastic material are then formed by the constricting action of the closing of the upper valve 29 into a "bag neck," see FIGURE 2E, which then is sealed by the taped sealing assembly 79 (which tape sealing assembly is similar to that known as Devon, Poly Bag single action sealer), which is partially shown in FIGURE 8. See also FIGURES 4 and 10. The upper valve 29 and the lower valve 31 are then open so that the full suction of the vacuum can then draw this reformed

and sealed package through transport tube 30 into the waste storage chamber 36. At this time it can be seen that positions 2E and 2F are respectively analogous to positions 2A and 2B at the beginning of the operation, which operation now leaves the plastic sheet 37 in position for receiving the material for the next use.

Referring to FIGURES 3 and 4 to gain some knowledge as to the interplay of the mechanical elements that aid and assist in the operations previously described, it can be seen that the liquid-resistant web or plastic sheet supply roll 38 is mounted on a roll shaft 39 which is fixedly attached to the interior surface of the plastic storage cabinet 24. The plastic sheet is then drawn out by the action of friction tabs 63 on its lower surface; these tabs are carried on a sheet-pulling belt 40 (FIGURE 10) which is supported on and driven by pulley 41 and its drive shaft 42. These friction tabs 63 grip both lateral edges of the sheet of plastic 37 and press it against the upper smooth and polished under-surface of the commode seat frame 24 and thus draw or pull the plastic forward into position. Pulley 41 is in turn driven by sprocket 43 over which passes a chain 44. A chain driving gear 45 is mounted on shaft 46 which is the output shaft of motor 47 as well as the mount for gear 45. Also fixed on this shaft is beveled drive pinion 48 which meshes with beveled gear 49. Gear 49 drives shaft 50, gear 51, chain 52, and driven gear 53 respectively, and gear 53 actuates shaft 54. Shaft 54 through a plurality of cams 77 and 88 actuates upper valve 29 and lower valve 31 according to the time chart shown in FIGURE 6. Chain 52 has a finger 59 fixed thereto and adapted to operate switches 60 and 61.

Additionally shown in FIGURE 4 as well as diagrammatically in FIGURE 5 is the hot wire plastic sheet-cutting device with its spring-loaded resistance wire frame 65 and balancing resistance 66 or transformer 66' (FIGURE 5a). At the completion of the operation wherein plastic sheet 37 is fed across the throat 56 of the commode 20 at time position shown in FIGURE 6 (at approximately 15 seconds) switch 61 is actuated by finger 59 sending a short pulse of electricity from the power source (110 volts) supply through the resistor 66 or transformer 66' and through resistance wire 62. Simultaneously this same power is directed through electro-magnetic solenoids 67 which then push frame 65 against the underside of the sheet plastic 37 by means of a pair of approximately 1/8-inch wide strips of strong electrically insulating material (not shown) which are positioned closely spaced from both sides of wire 62 so that this frame exerts pressure against the plastic sheet 37 and forces this plastic against the hot wire causing it to be separated from its supply roll 38. Upon the release of the electrical pulse the solenoids are returned by springs 68 to their non-operating positions so that at the next cycle the friction tabs 63 can then engage the newly formed leading edge of the plastic sheet 37 and draw it into position as disclosed herein above.

Referring to FIGURES 4, 7, and 8, the details of the upper valve, which can be of the iris diaphragm type, are shown and referring to FIGURES 4 and 9, details of the lower or guillotine-type valve are shown in FIGURE 9A, whereby this lower valve 31 may be successfully used for the same purpose as the upper valve 29, as shown in FIGURES 7 and 8. The actuation of either of the two valves is accomplished in a known manner by pin and groove type cam and follower-type cams, with a spring biasing means (not shown). The cam groove and pin-type operation, which is shown, has shaft 54 being actuated from motor shaft 46 as previously described. Shaft 54 rotates cam 77 whose groove operates pin 76 against an idler stud 78 that acts as a pivoting link which operates shaft 72 which is an iris ring-actuating shaft, and which in turn actuates the iris ring 73, which in turn operates the iris valve leaves 74 by means of link 75. There are other standard configurations of iris dia-

phragm leaf-actuating devices known particularly in the camera lens or in the valve art that could be substituted for this disclosed device. One device is the iris ring leaf actuating device such as is used in the lens of the U.S. Air Force's Type K-19 camera which is manufactured by Fairchild Camera and Instrument Company. The cam 77 works the iris diaphragm, as the opposite face of the same cam actuates the tape sealing assembly 79. This device is sold by the Devon Tape Corporation, Tuckahoe, N.Y., 10707. This device when actuated moves to the theoretical center of the iris diaphragm valve, then by means that are known in the trade wraps tightly a piece of self-adhering tape around the neck of the bag-shaped plastic sheet 37 as shown in FIGURE 2D.

The operation of cam 88 through the action of its groove 89 and pin actuator 84 on stud 85 actuates the blade 83 of the guillotine valve to open or close the mouth of conduit 30 against the effect of the vacuum caused by blower 34. The relative sequence of these valves and the motion of the plastic sheet is shown in the time cycle chart, FIGURE 6.

It is to be understood that the invention herein shown and described may be additionally used for other purposes such as packaging bulk products for vending, and for disposal of garbage, and for other containering operations. The invention is not intended to be limited to the construction shown herein but may be made in many ways within the scope of the appended claims. As set forth in the appended claims, the invention is directed to the delivery of an essentially planar film which is formed by vacuum into a "package" or container, which is reformed by vacuum to a shape that may be conveniently transported (again by vacuum) through a tubular conduit to a receiving chamber or container.

Having thus described my invention, what I claim is:

1. A method of handling human wastes material deposited at toilets or commodes, without the use of water or other liquids as a transporting medium, comprising the steps of:

- (a) delivering a flexible sheet within a time of not more than 15 seconds, in a generally horizontal plane to an area for receiving waste material,
- (b) applying a source of vacuum for not more than 15 seconds sufficient to produce one-half pound per square inch pressure differential in a standard atmosphere to the under surface of said flexible sheet so as to form therefrom a concave receptacle,
- (c) drawing the concave receptacle down and away from the waste material receiving area by means of said source of vacuum and shaping the receptacle into the approximate form of a cylindrical receptacle in a time period not exceeding 15 seconds,
- (d) closing and sealing the cylindrical receptacle near its upper end in a time period not exceeding 10 seconds,
- (e) also by means of said source of vacuum, transporting the sealed cylindrical receptacle through a conduit or pipe to a sealable container of large volume, so that the entire handling time to prepare the commode for a subsequent deposit does not exceed 60 seconds.

2. A method of handling human waste material deposited at toilets or commodes, without the use of water or other liquids, which consists in delivering a flexible sheet in a generally horizontal plane to an area for receiving waste material; applying a source of vacuum to the under surface of said flexible sheet so as to form therefrom a concave or conical waste-receiving receptacle; drawing the flexible sheet receptacle down and away from the area of said deposit and shaping the receptacle into the approximate form of a cylinder, and closing and sealing the cylindrical receptacle near its upper end; also by means of a source of vacuum; transporting the sealed receptacle through a conduit or pipe to a sealable container of large volume.

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3. The invention defined in claim 2, wherein there is a single source of vacuum operable throughout the handling process.

4. The invention defined in claim 2, wherein the source of vacuum is electrically actuated and controlled and a switch within reach of the user of the toilet or commode is closed by the operator to start the aforesaid operation.

5. The invention defined in claim 2, wherein the flexible sheet is delivered from a roll of plastic and is automatically cut from the roll when the sheet reaches said deposit area.

6. The invention defined in claim 5, wherein the cutting is effected by the heat of an electrically energized wire mechanism.

7. Apparatus for automatically disposing of human waste material discharged at toilets or commodes without the use of water or other liquids comprising, in combination, a supply of sheet plastic; power-operated means for pulling some of the plastic over the bowl opening of a toilet; separating means to separate said sheet plastic from the supply; vacuum means for automatically sucking the separated sheet plastic down into the bowl to cover said bowl interior and to form a concave receptacle for the human wastes; said vacuum means being connected with the toilet bowl as to carry away odors arising when the discharge takes place; power-operated means for closing the upper end of the plastic receptacle and sealing it; a conduit to which the vacuum means is connected; said vacuum means also moving the sealed plastic receptacle down through the conduit; a large container or tank; said conduit being connected to and discharging the sealed receptacle into the large container or tank; and automatic means for sealing the container or tank as soon as it has received the sealed receptacle.

8. An apparatus for automatically disposing of human waste material deposited at toilets or commodes without the use of water or other liquids as a transport medium, comprising in combination;

(a) a supply of water-resistant sheet material,

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(b) power and vacuum means cooperating to position said sheet material within the toilet bowl to receive the human waste material,

(c) a conduit and a larger container thru which said vacuum means is connected to the bottom of said toilet bowl,

(d) signal receiving means, to actuate said power and vacuum means cooperating to automatically form said sheet material into a substantially cylindrical container and close and seal and transport said cylindrical container thru the conduit into said larger container.

9. An apparatus as in claim 8 wherein said vacuum means is so connected with the toilet bowl as to carry away any odors arising when the deposit takes place.

10. An apparatus as in claim 8 wherein said larger container has means for automatically sealing the container as soon as it has received the sealed cylindrical container.

11. An apparatus as in claim 8 wherein said supply of sheet material consists of a plurality of discrete sheets.

12. An apparatus as in claim 8 wherein said supply of sheet material consists of a roll of material, and a cutting means is provided for automatically separating the material into discrete sheets.

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