

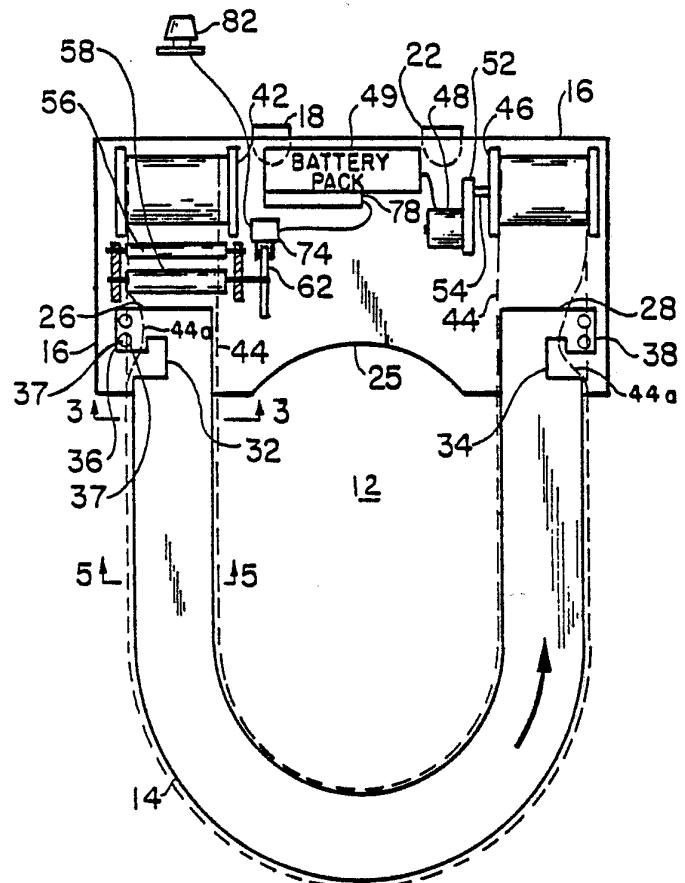


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(54) Title: TOILET SEAT COVERING**(57) Abstract**

Apparatus for supplying a toilet seat (14) with fresh and sanitary cover material (44) and taking up the used material. The cover material (44) is folded lengthwise and is dispensed from a supply reel (42) to one terminus of the seat (14). The material (44) encircles the body of the seat (14) and a take-up reel (46) at the other terminus of the seat (14) takes up the used material and at the same time pulls in fresh material. Both termini of the seat (14) are attached to and spaced from the toilet bowl. The seat is provided with a slot (64) to guide the material (41) which is provided with beads (68) and (72) along its edges to ride within the slot (64).



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TOILET SEAT COVERINGBACKGROUND OF THE INVENTION

The present invention relates to a toilet seat covering and more particularly to a toilet seat covering which is automatically replaced upon command.

5 In United States Patent 4,213,212 issued to Hefty et al there is a brief discussion of the state of the art of applying hygienic covers to toilet seats. The patent describes a variety of earlier arrangements covered by German patents and discloses and claims an arrangement for
10 dispensing from a supply reel a tubular plastic to feed on one end of a toilet seat to be pulled the length of the toilet seat and then wound up on a take-up reel from the other end for last disposition.

The arrangement of Hefty et al requires that one end
15 of the horse shoe spaced toilet seat be free, or in effect, floating, in order for the tubular plastic material being dispensed to be fed onto and surround the seat itself. The necessity for surrounding the seat is dictated by the need to insure that the plastic covering will
20 not fall off the top of the seat, a problem generally associated with previous such devices as described by the patentees.

Several drawbacks are associated with the device described in the patent. The presence of a free end of
25 the horse shoe shaped seat can interfere with the movement of the tubular plastic material from the supply reel if the free end is inadvertently or intentionally pulled away



from the top of the commode. Furthermore, when a child uses the seat there could be a safety hazard because the free end makes it possible for a limb to be caught between the free end and the commode. In addition, the exposed
5 knife edge which is required at the other end of the seat to slit the plastic tubing to permit egress from the seat for winding on the take-up reel is a safety hazard as well. An exploratory poking of a finger into the region
10 where the blade is located could very well result in a serious injury and bleeding. Other potential problems can be caused by twisting of the plastic on the seat resulting in jamming of the device, or tearing of the plastic which can result in a total failure of operation.

SUMMARY OF THE INVENTION

15 This invention completely overcomes or substantially reduces the problems and drawbacks associated with earlier and existing toilet seat covers and provides additional advantages not found in such earlier arrangements.

In the present invention, there is provided an
20 arrangement for automatically replacing a toilet seat covering prior to use, said arrangement being simple to use, is reliable and relatively foolproof in operation, more economical than such devices heretofore in use, and avoids safety hazards associated with earlier devices.

25 In one preferred embodiment of the invention, the apparatus comprises a toilet seat, a reel for supplying folded unused cover material to said seat for enclosing the contact surface of said seat, and a take-up reel for taking up used cover material after transversing the
30 length of the seat. The seat is provided with an arrangement for joining the edges of the cover material and making positive engagement with the cover material for guiding the movement of the cover material along its length and preventing twisting of the material along the
35 length of the seat.

Other features of the invention include provision for advancing the cover material no more than is required to

completely replace the used material, and insure movement of the material even when a substantial portion of the material is torn or damaged.

In other embodiments of this invention there is provided a beaded plastic sheet material for use as the cover material on a toilet seat and method for forming said sheet material.

It is therefore a principal object of this invention to provide improved apparatus for replacing toilet seat covering material with unused material overcoming many of the problems and deficiencies associated with prior art devices.

Another object is to provide improved toilet seat covering material and a method for preparing said material.

Other objects and advantages of this invention will hereinafter become obvious from the following detailed description of preferred embodiments of this invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an elevation side view of a commode or toilet bowl incorporating a preferred embodiment of the toilet seat of this invention.

Fig. 1a shows the toilet seat in a raised position.

Fig. 2 is a plan view of the toilet seat shown in Fig. 1 with the housing removed.

Fig. 3 is a section along 3-3 of Fig. 2 with the housing in place.

Fig. 4 is a schematic illustration of the supply reel with its idlers.

Fig. 5 is a view along 5-5 of Fig. 2.

Fig. 6 is a plan view of a portion of the covering material before folding.

Fig. 7 is a view along 7-7 of Fig. 6.

Fig. 8 is a section view of the cover material in tubular form prior to slitting.

Fig. 9 is a partially expanded, isometric view of the covering material as folded for use on the supply reel.

Fig. 10 is an isometric view in partial section of

the take-up terminus of the toilet seat with the covering material being fed.

Fig. 11 is a schematic for the control board.

Fig. 12 is an isometric view of an alternative embodiment of the toilet seat.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Figs. 1 and 2 there is illustrated a conventional toilet bowl 10 with a rearwardly mounted flush tank 11, and apparatus 12 embodying the principles of this invention. Apparatus 12 includes a toilet seat 14 shown in Fig. 1 and in its partially raised position in Fig. 1a attached to a plate 16, and pivoted by hinges 18 and 22 mounted on base 23. A housing 24 encloses the mechanism of the apparatus. Apparatus 12 can be designed as a unit to replace the standard toilet seat found on toilet bowls. Plate 16 is generally rectangular in configuration with a concave section 25 to conform to the shape of bowl 10 while the outline of housing 24 will generally follow the shape of plate 16 so that everything mounted on the latter will be fully enclosed. The rear of housing 24 is curved or circular to facilitate pivoting of the assembly of seat 14, plate 16, and housing 24.

Referring in particular to Fig. 2, it will be seen that toilet seat 14 has a generally ring-like configuration shaped like a horse shoe with its termini 26 and 28 overlapping base 16. Adjacent terminus 26 there is a generally L-shaped cutout 32 in seat 14, while an oppositely facing similar cutout 34 is provided adjacent terminus 28. Termini 26 and 28 and cutouts 32 and 34 would in the normal installation of apparatus 12 be enclosed in their housing 24 and not be visible. As seen in Fig. 3, housing 24 is provided with an opening 29 for seat 14 on one side while there would be a corresponding opening on the other side for the other leg of seat 14.

Termini 26 and 28 of seat 14 are supported on plate 16 by a pair of identical members 36 and 38 which could be an integral part of seat 14 to insure that the exposed

termini 26 and 28 are spaced above and do not contact plate 16. As also seen in Fig. 3, member 36 may be attached to plate 16 with screws 37 to maintain the spacing noted above. Member 38 performs a similar function at the other terminus of seat 14.

A supply reel 42 for fresh cover material 44, preferably a plastic film, is mounted in any convenient fashion on plate 16 opposite terminus 26 to feed material 44 over the body of seat 14 as illustrated in Fig. 2. The material is moved in the direction as indicated by the arrow and a take-up reel 46 mounted on base 16 opposite terminus 28 collects the used material. An electric motor 48 powered from a battery pack 49, as will be later more particularly described, provides the drive for take-up reel 46 through a stepdown gearing assembly or transmission 52 and a shaft 54, of conventional design.

It will be noted in connection with supply reel 42 there are provided a pair of idlers 56 and 58, which as shown in Fig. 4, are designed to exert some tension on cover material 44 to avoid slack as it comes off reel 42. One or both of idlers 56 and 58 may be spring mounted, if desired or needed, to insure the proper tension. Attached to rotate with roller 58 is a disk 62 whose function will be described below.

As seen in Fig. 5, seat 14 is provided along its outer rim or circumference with a slot 64 terminating in a well 66. The body of seat 14, which can be constructed of separate parts 14a and 14b to form slot 64 and well 66, is shown surrounded by cover material 44 whose edges pass through slot 64 and terminate in a pair of beads 68 and 72 trapped within well 66. As can be seen in Figs. 6 and 7, cover material 44 is a plastic sheet material of suitable thickness whose edges terminate in beads 68 and 72 with short tails 68a and 72a, respectively. On supply reel 42, material 44 is folded in the manner illustrated in Fig. 9 for ease of dispensing on to seat 14 as will now be described. Parts 14a and 14b of seat 14 can be joined by

any convenient means such as screws 14c.

Referring to Figs. 6 and 7, plastic sheet material 44 is provided with beads 68 and 72 extending along and adjacent the edges of the material with tails 68a and 72a.

5 One way of preparing material 44 is illustrated in Fig. 8 where it is seen that tubing 74 which may be extruded is provided internally with pairs of spaced beads 68 and 72, 68' and 72', and 68" and 72". By slitting tubing 74 at 76, 76' and 76" it can be seen that several extended sheets of

10 cover material can be prepared from a single tube 74.

On the other hand, if desired, sheet material 44 shown in Fig. 6 can be extruded directly in the shape shown.

Referring to Fig. 10, it is seen that the folded

15 covering material 44 having egressed from supply reel 42 and idler rollers 56 and 58, separate to pass above and below terminus 26 of seat 14. The bottom portion 44a curves away to get by member 36 as seen in Figs. 2 and 10. Slot 64 and well 66 terminate at cutout 32 where beads 68 and 72 of material 44 enter well 66, so that when take-up

20 reel 46 is actuated, material 44 is pulled around and there is a continuous feed of beads 68 and 72 into well 66.

At terminus 28 where cover material 44 is leaving

25 seat 14, the reverse occurs, with beads 68 and 72 leaving seat 14 at cutout 34 and the folded material 44 is wound for later disposal.

Advantages of this arrangement for feeding and taking up the material are immediately evident. Since it is the

30 beads along the edges of the material which effectively accomplish the pulling of the material along the seat, any tearing of the covering material will not prevent operation of the device, as may occur in previous designs involving movement of the material along the seat. In

35 addition, since the beads are trapped in a well, no twisting of the material is possible. In some other arrangements, rough usage of the seat between movements of the

material could cause some twisting with jamming of the apparatus. Also, as the material along the outer edge of the seat must move a greater distance than material along the inner edge, in some arrangements this could also
5 result in jamming of the apparatus. In the present arrangement, all of these problems are avoided.

This invention also embodies features designed to render it more efficient in terms of use of the material. Referring back to Fig. 2, there is shown mounted on plate
10 16 an encoder 74 enclosing the outer periphery of disk 62 which would be provided with a slot 76 (See Fig. 4) permitting encoder 74 to count each revolution of roller 58. Encoder 74 is connected to a printed circuit (PC) board 78 containing circuitry to count the revolutions of roller 58
15 thereby measuring the exact length of fresh material 44 to replace that which has been used. Roller 58 may be provided with a rubber or other high friction material to prevent slipping of the plastic material. Foot switch 82 wired to PC board 78 upon actuation initiates the cycle of
20 replacing used covering material on seat 14 by energizing motor 48. After disk 62 has made sufficient rotations to provide the full replacement, but no more, of used material, PC board 78 will terminate actuation of motor 48. Seat switch 84 as seen in Fig. 1 extending from the bottom
25 of seat 14 to contact base 23 is employed to insure that actuation of the mechanism will not occur unless seat 14 is up.

It should be noted that in some previous arrangements, material movement is governed by rotation of the
30 supply reel. Since the diameter of the wound reel changes as the supply is used up, it can be seen that during a good portion of the cycles, excess material is used with a great deal of extra expense involved, both in the amount of material being used and in frequency of service which
35 is required.

EXAMPLE

An example of encoder 74 and circuit board 78 used

successfully is illustrated in Fig. 11. Encoder 74 is a photon coupled interrupter module H21A1 available in the industry. It utilizes a gallium infrared emitting diode coupled to a silicon photo transistor so that the latter
5 is actuated on each cycle as slot 76 on disk 62 passes an infrared emitting diode.

Circuit 78 contains all the necessary electronics to control the movement of a section of material 44 around the seat. The two sections U1a and U1b (4013B) form a
10 sequence memory. If the seat switch 84 has been pressed, the Q output of U1-a is set high. This enables the gate U2a(4088). In addition, this also frees the preset input of U1b via diode CR1 to allow U2b to preset when switch 82 is pressed. Switch 82 will only set U2b if U1a has
15 already been preset (due to CR1).

When both Q outputs have been set high (by pressing switches 84 and 82, the AND gate U2a output will go high. This turns on the darlington transistor Q1M (TIPL22) which turns on motor 48.

20 While motor 48 is on, Q2 (2N3906) enables the power to the slotted optical detector (OPTO) on encoder 84. This is done to conserve battery power. The mechanical interrupter causes a series of pulses to occur at the collector of the detector. These pulses go 15 into a
25 divide by 16 counter U3. After sixteen pulses, the counter overflows and resets the sequence memories U2a and U2b which turns off motor 48. This completes the cycle.

If a cycle has been completed, both Q outputs for U1 will be too low. This is detected by CR2 and CR3 and Q4.
30 If the start switch 82 is now pressed, U2-b gate will turn on the READY LED via Q3. Motor 48 will not start in this mode.

If the FILM EMPTY switch 86 detects the roll is finished, it will apply power to the EMPTY LED whenever
35 the START switch is pressed, indicating a new roll of film is needed.

The circuit shown in Fig. 11 is made up of commer-

cially available integrated circuits and components which are identified.

In the operation of the apparatus described, the prospective user of the toilet will step on foot operated start switch 82 while seat 14 is in the up position which will initiate the operation of motor 48 to begin the rotation of take-up reel 46. Encoder 74 will insure that just sufficient material will be wound on reel 46 to fully replace, from supply reel 42, all of the used material on seat 14.

With housing 24 in place, as seen in Fig. 2, it should be noted that there could be some contact between the user of toilet 10 and the front of housing 24. Some soiling could take place with the result that there could be concern about the total hygienic environment of the apparatus.

In an alternative embodiment of this invention, that problem can be avoided by changing the shape of the seat as seen in Fig. 12. There, seat 90 having a similar annular slot 92 with the well (not shown) is provided with termini 94 and 96 raised substantially above the level of the remainder of seat 90 by sloping sections 98 and 102. Elongated members 104 and 106 support seat 90 from base plate 108. However, it is seen that in this configuration, the user of seat 90 is prevented from contacting housing 110 with his backside by sloping sections 98 and 102. A pair of cutouts 112 and 114, as before, provide entry to the annular slot 92 and its well. As in the arrangement of Fig. 1, cutouts 112 and 114 are contained within housing 110. Housing 110 is rounded along its back surface to permit the use of hinges (not shown) for raising toilet seat 90, housing 110, and base plate 108. The remaining structure within housing 110 is the same as that which appears in the previously described configuration.

The use of an extended sheet of plastic material with beaded edges, folded as described, makes it possible to

use this material most effectively with reduced cost, increased efficiency, and with greater safety. In the form described, it is believed that this plastic film material 44, and the methods of manufacture, as described
5 could be useful in a variety of other applications where it might be desirable to fully enclose an extended member where twisting is to be avoided or where the preparation of tubular material may be considered uneconomical.

Variations are possible without departing from the
10 principles of this invention. Instead of the seat being shaped like a horse shoe, it can be oval or circular with cutouts appropriately located to reel in the cover material. By using slots and wells both along the inner and outer edges of the sheets, a sheet material covering only
15 the top and side surfaces with beads entering both slots may be useful under certain circumstances.

Other ways of controlling the size of the feed could also be employed utilizing new technology as it develops, and cassettes may be substituted for the reels should that
20 be desired. In any event, many changes and alterations are possible for those skilled in the art without departing from the principles of this invention as defined in the claims which follow.

What is claimed is:

1. Apparatus for supplying a cover on a toilet seat comprising:

5 a. a toilet seat made up of a body extending in a generally ring-like configuration;

b. means for supplying fresh cover material to said seat for encircling and extending along the length of the body of said seat;

10 c. means for taking up used cover material which has passed along and over at least a substantial portion of said body; and

d. means included in said body for making positive engagement with said cover material to guide said cover material along said body.

15 2. The apparatus of claim 1 in which said cover material includes means to engage said guide means on said body to insure movement without twisting along said body.

3. The apparatus of claim 2 in which said guide means includes a slot along an edge of said body for
20 receiving an extended portion of said cover material.

4. The apparatus of claim 2 in which said cover comprises an extended, flat sheet of material folded lengthwise and said guide means includes a slot along an edge of said body for receiving both edges of said material encircling said body.
25

5. The apparatus of claim 4 in which said slot forms an extended well within said seat and said material is provided with beaded portions terminating within said well.

30 6. The apparatus of claim 5 in which said slot and well extend along the outer edge of said body.

7. The apparatus of claim 2 in which said supplying means carries said cover material folded lengthwise with exposed edges located when fed to said body on the same
35 side as said guide means for engagement with the latter, said seat having means for guiding said exposed edges into said guide means.

8. The apparatus of claim 2 having means for energizing said taking up means for removing from said seat only the used portion of said cover material.

9. The apparatus of claim 8 in which said energizing means includes means to measure the amount of material coming out of said supplying means and terminating drive of said taking up means when a length of material has been dispensed equal to the used length of material on said seat.

10. The apparatus of claim 2 having a housing for said supplying means and taking up means, said seat including means for preventing the user of said toilet seat from making contact with said housing.

11. The apparatus of claim 10 in which said preventing means comprises sloped sections of said body to prevent said contact.

12. Apparatus for supplying a cover on a toilet seat mounted on a toilet bowl comprising:

a. a toilet seat having a body of generally ring-like configuration with a pair of spaced first and second termini;

b. means for attaching to and supporting said termini on said toilet bowl with both termini spaced above said bowl.

c. means for supplying fresh sheet cover material folded lengthwise to the first terminus of and encircling said body, a portion of said cover material passing under said first terminus and bypassing said attaching means;

d. means for taking up from said second terminus used cover material;

e. means for energizing and taking up means to pull said material along said body for a sufficient distance to replace all of said used material; and

f. means included in said body and said material for making positive engagement to insure that said material remains encircled of said body both during use of said

seat and movement of said material.

13. The apparatus of claim 23 in which said positive engagement means includes slot means along an edge of said body to accommodate and retain the edges of said material.

5 14. The apparatus of claim 13 in which said edges of said material are provided with beads to be trapped in said slot means.

15. The apparatus of claim 14 in which said slot means is located along the outer edge of said body.

10 16. The apparatus of claim 12 having housing means for enclosing and supplying means, taking up means, and energizing means, said toilet seat having means to prevent the user of said toilet seat from making contact with said housing means.

15 17. An extended sheet of plastic material having beaded edges and folded lengthwise once down the center and second and third times, respectively, adjacent said beads with the latter folded into the space between the two folded sides.

20 18. The extended sheet of plastic material as recited in claim 17 formed into a reel for dispensation as required.

25 19. A method of making an extended sheet of plastic material with beaded edges comprising the steps of forming continuously tubular sheet material having a pair of extended beads adjacent each other, and slitting said tubular material lengthwise between said beads.

20. The method of claim 19 in which said beads are formed inside the tube formed by said material.

30 21. The method of claim 19 in which said tubular sheet material is provided with multiple pairs of beads adjacent each other, and said tubing is slit between each pair of adjacent beads.

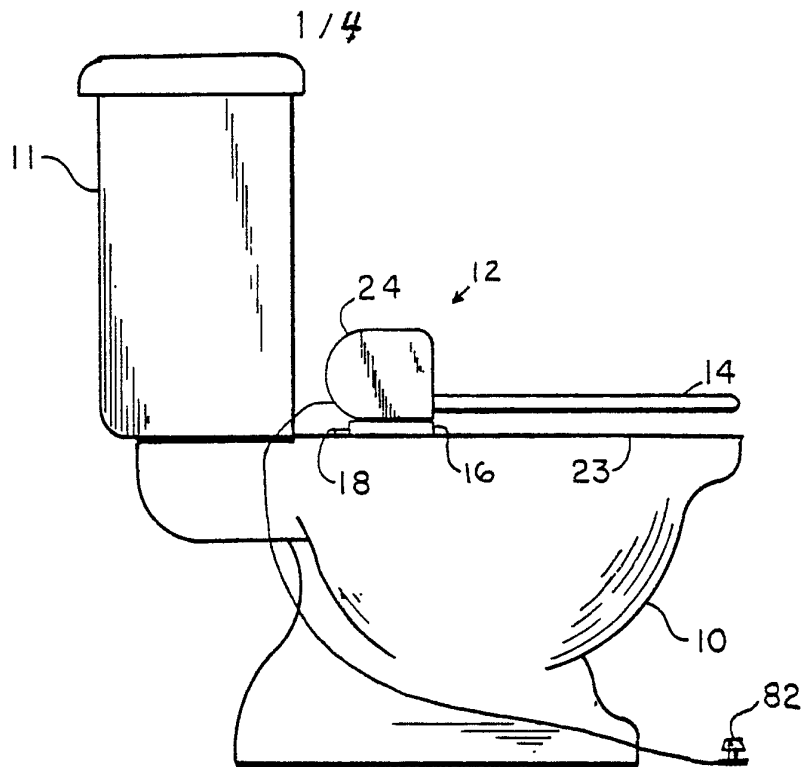


Fig. 1

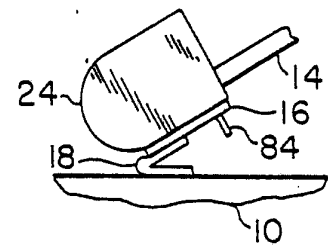


Fig. 1a

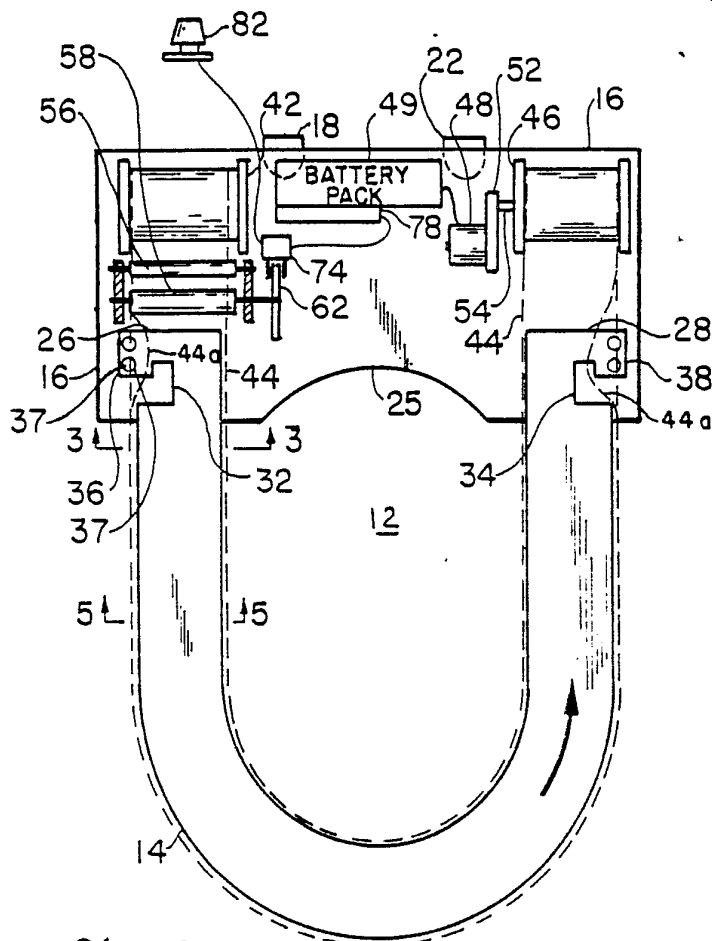


Fig. 2

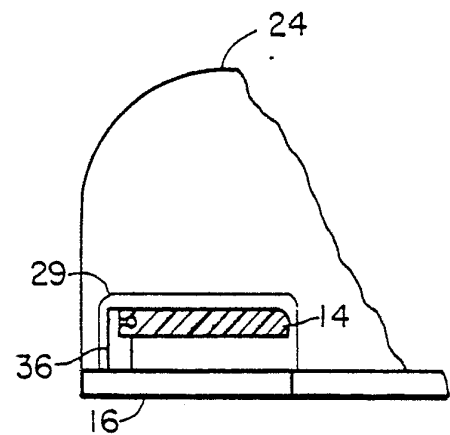


Fig. 3

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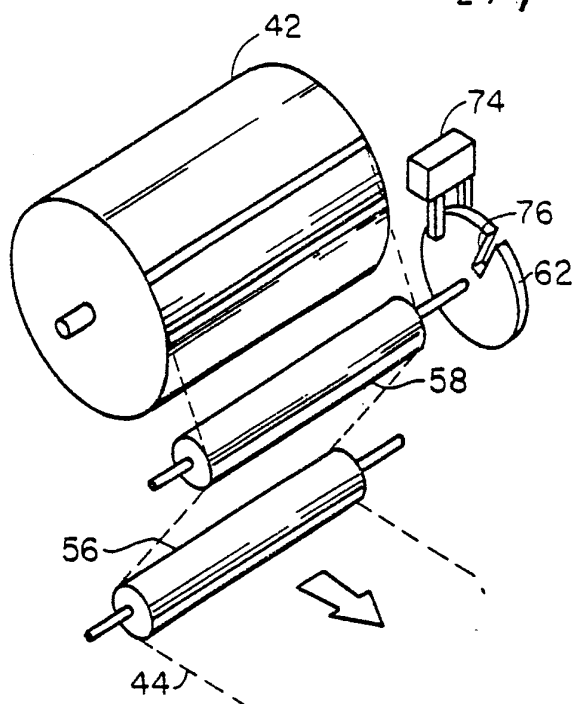


Fig. 4

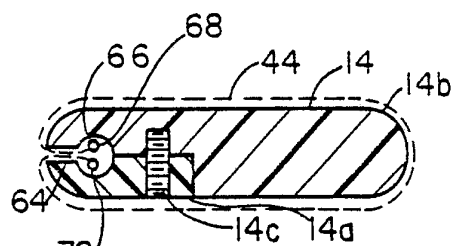


Fig. 5

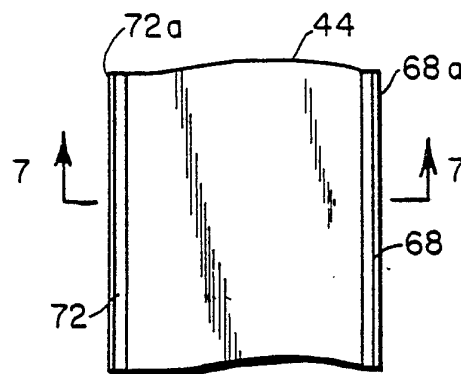


Fig. 6

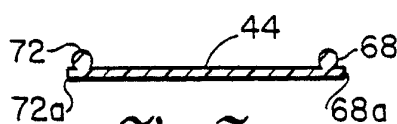


Fig. 7

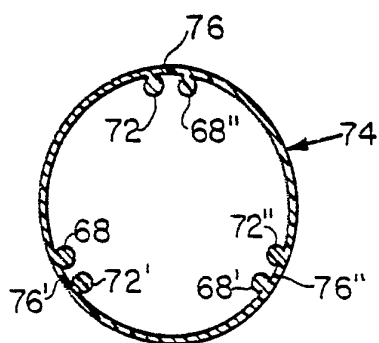


Fig. 8

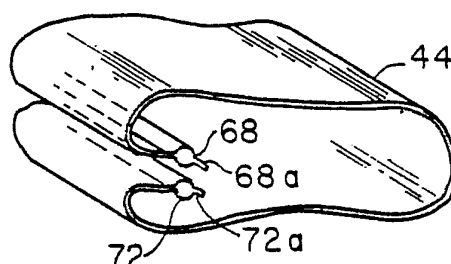


Fig. 9

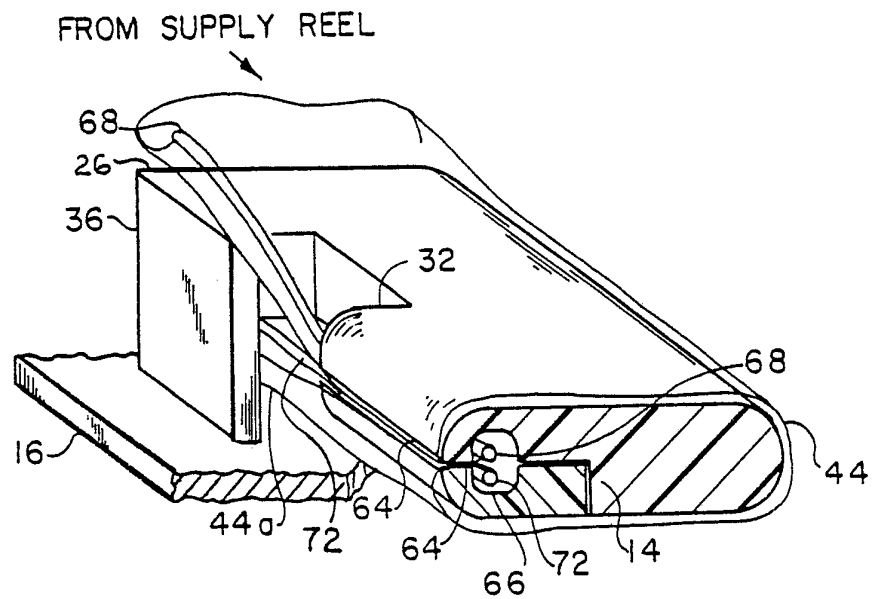


Fig. 10

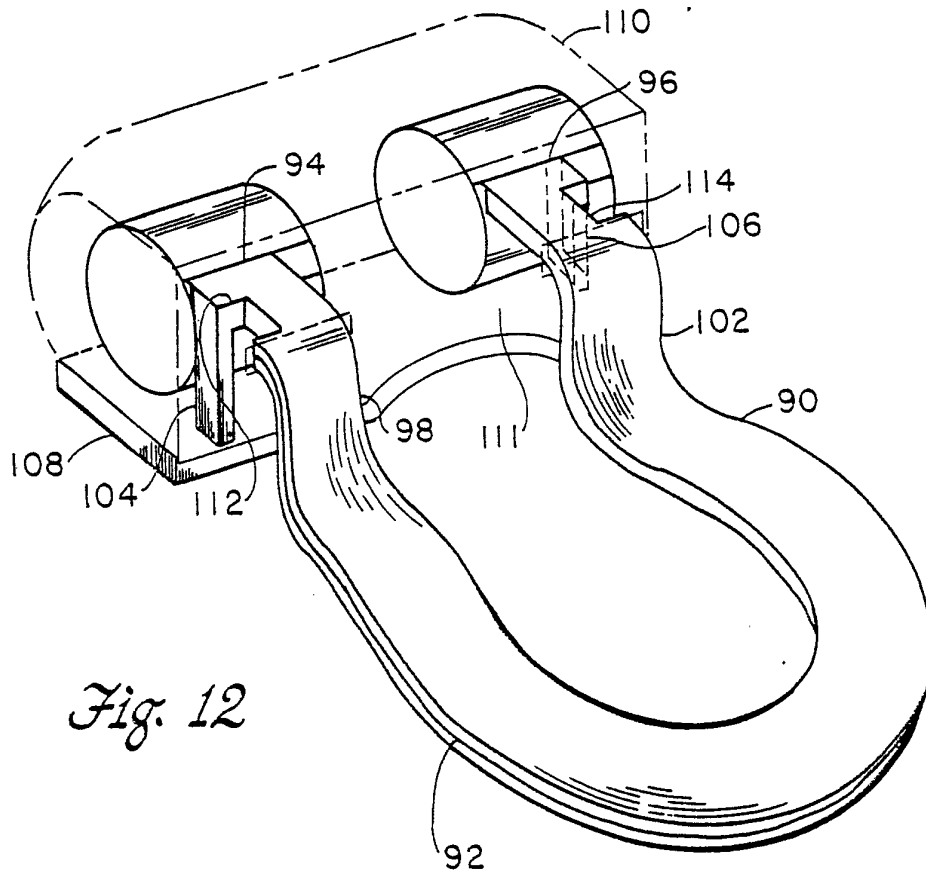


Fig. 12

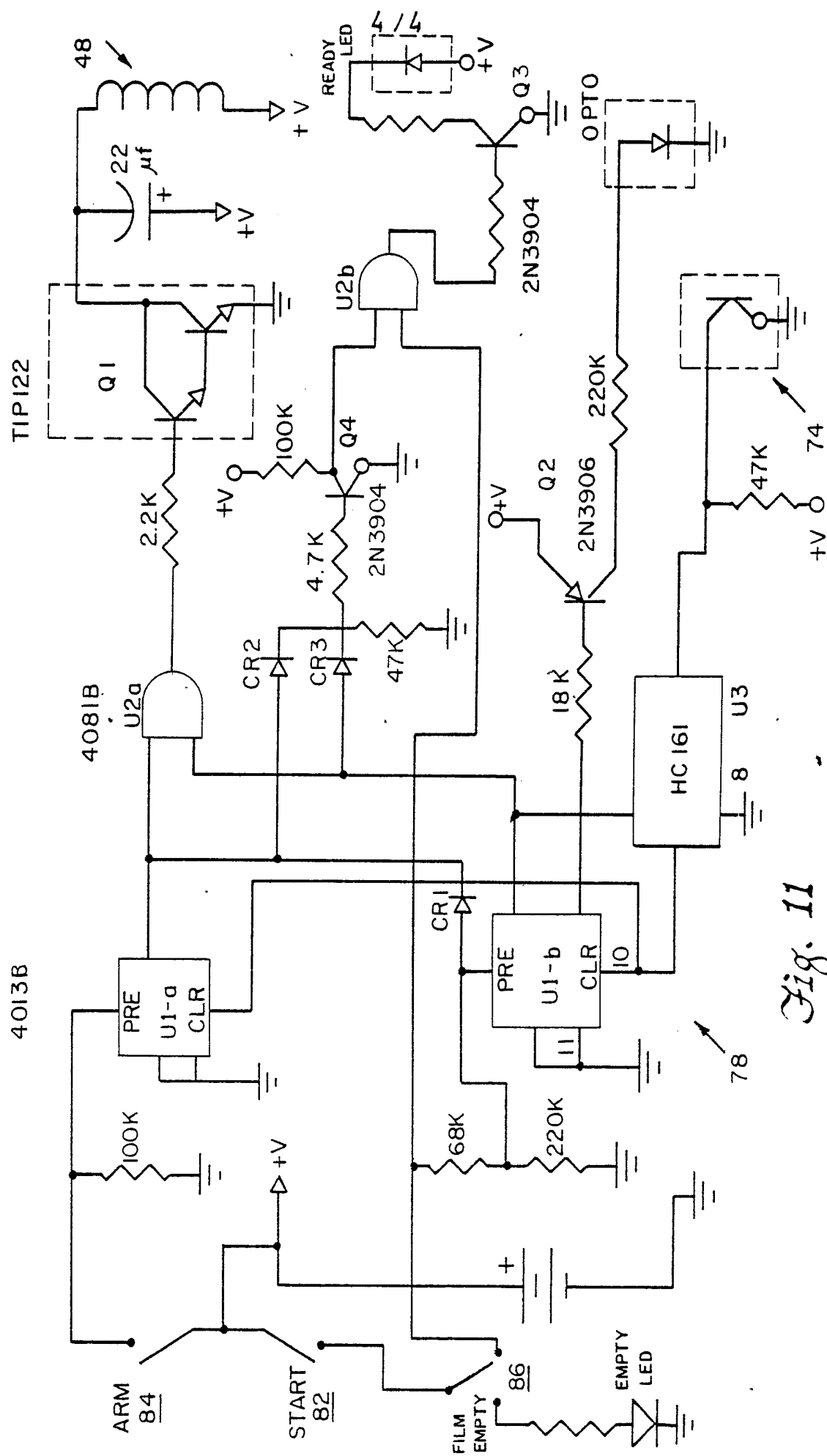


Fig. 11

SUBSTITUTE SHEET

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US87/01234

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ³ According to International Patent Classification (IPC) or to both National Classification and IPC <div style="font-family: monospace; font-size: 1.2em;">IPC(4) A47K 13/14</div>														
II. FIELDS SEARCHED <div style="text-align: center; font-size: 0.8em;">Minimum Documentation Searched ⁴</div> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%; border: none; vertical-align: top;"> <div style="font-family: monospace; font-size: 1.2em;">U.S.</div> </td> <td style="border: none; vertical-align: top;"> <div style="font-family: monospace; font-size: 1.2em;">4/242,237,243,247; 138/118; 56/251; 264</div> </td> </tr> </table> <div style="text-align: center; font-size: 0.8em; margin-top: 10px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁵</div>			<div style="font-family: monospace; font-size: 1.2em;">U.S.</div>	<div style="font-family: monospace; font-size: 1.2em;">4/242,237,243,247; 138/118; 56/251; 264</div>										
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III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; font-size: 0.8em;">Category *</th> <th style="width: 60%; font-size: 0.8em;">Citation of Document, ¹⁵ with indication, where appropriate, of the relevant passages ¹⁷</th> <th style="width: 30%; font-size: 0.8em;">Relevant to Claim No. ¹⁸</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td style="vertical-align: top;">US, A, 4,213,212 Published July 1980 (Hefty et al) (See entire document).</td> <td style="text-align: center; vertical-align: top;">1,2,8,9,12</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">Y</td> <td style="vertical-align: top;">US, A, 1,979,634 Published November 1934 (Nelson) (See entire document).</td> <td style="text-align: center; vertical-align: top;">17,18</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td style="vertical-align: top;">US, A, 3,246,672 Published April 1966 (Naito) (See entire document).</td> <td style="text-align: center; vertical-align: top;">19,20,21</td> </tr> </tbody> </table>			Category *	Citation of Document, ¹⁵ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸	X	US, A, 4,213,212 Published July 1980 (Hefty et al) (See entire document).	1,2,8,9,12	Y	US, A, 1,979,634 Published November 1934 (Nelson) (See entire document).	17,18	X	US, A, 3,246,672 Published April 1966 (Naito) (See entire document).	19,20,21
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Y	US, A, 1,979,634 Published November 1934 (Nelson) (See entire document).	17,18												
X	US, A, 3,246,672 Published April 1966 (Naito) (See entire document).	19,20,21												
<div style="font-size: 0.8em;"> <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>* Special categories of cited documents: ¹⁵</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 48%;"> <p>"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</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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.</p> <p>"&" document member of the same patent family</p> </div> </div> </div>														
IV. CERTIFICATION <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <div style="font-size: 0.8em;">Date of the Actual Completion of the International Search ²</div> <div style="font-family: monospace; font-size: 1.2em; margin-top: 10px;">22 JUNE 1987</div> <div style="font-size: 0.8em;">International Searching Authority ¹</div> <div style="font-family: monospace; font-size: 1.2em; margin-top: 10px;">ISA/US</div> </td> <td style="width: 50%; border: none; vertical-align: top;"> <div style="font-size: 0.8em;">Date of Mailing of this International Search Report ²</div> <div style="font-family: monospace; font-size: 1.2em; margin-top: 10px;">28 AUG 1987</div> <div style="font-size: 0.8em;">Signature of Authorized Officer ²⁰</div> <div style="text-align: center; margin-top: 10px;"> <div style="font-family: monospace; font-size: 1.2em;">Charles E. Phillips</div> </div> </td> </tr> </table>			<div style="font-size: 0.8em;">Date of the Actual Completion of the International Search ²</div> <div style="font-family: monospace; font-size: 1.2em; margin-top: 10px;">22 JUNE 1987</div> <div style="font-size: 0.8em;">International Searching Authority ¹</div> <div style="font-family: monospace; font-size: 1.2em; margin-top: 10px;">ISA/US</div>	<div style="font-size: 0.8em;">Date of Mailing of this International Search Report ²</div> <div style="font-family: monospace; font-size: 1.2em; margin-top: 10px;">28 AUG 1987</div> <div style="font-size: 0.8em;">Signature of Authorized Officer ²⁰</div> <div style="text-align: center; margin-top: 10px;"> <div style="font-family: monospace; font-size: 1.2em;">Charles E. Phillips</div> </div>										
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