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I. E. BLACK

2,929,480

APPARATUS FOR DISPENSING CLOTH TOWELS

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FIG. 1.

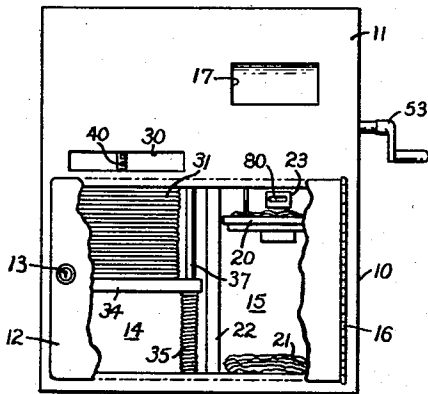


FIG. 2.

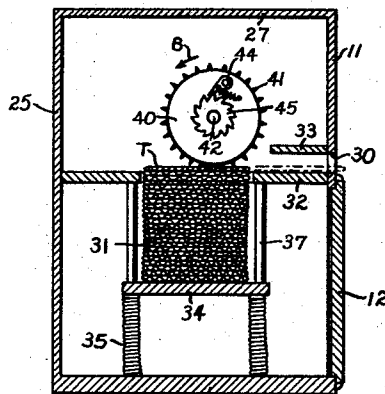


FIG. 3.

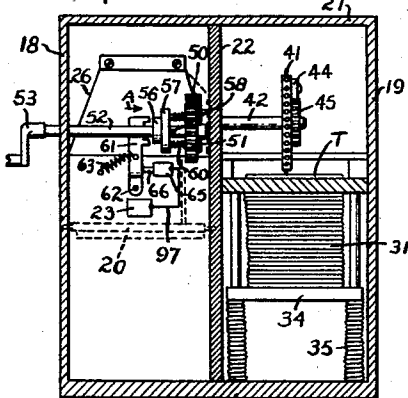


FIG. 4.

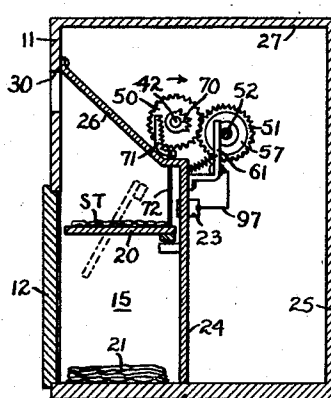


FIG. 5.

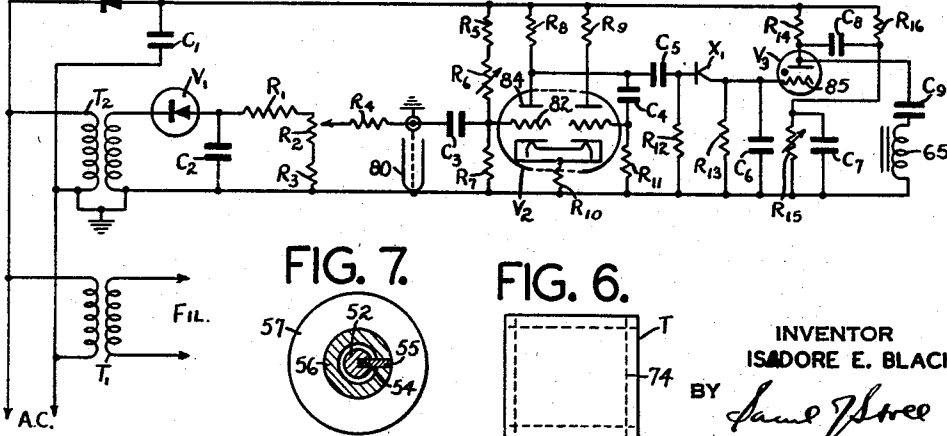


FIG. 7.

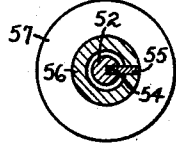
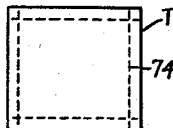


FIG. 6.



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APPARATUS FOR DISPENSING CLOTH TOWELS

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1 Claim. (Cl. 194—4)

This invention relates to apparatus for dispensing cloth towels and more particularly to apparatus for dispensing individual cloth towels one at a time from the top of a pile of such towels, the dispensing apparatus being particularly applicable for use in factories, office buildings, and other locations where towels are supplied to employees.

The invention is directed to apparatus which is manually actuatable upon the return of a soiled towel thrown into an opening in a dispenser so as to insure the return of a soiled towel for each clean towel dispensed to minimize loss of towels due to carelessness or neglect in returning soiled towels.

A principal object of the invention is to provide a dispensing apparatus which will operate in conjunction with a pile of individual cloth towels and which will reliably deliver one towel at a time and which will not be affected by the condition of the towels, that is, whether the towels are new, patched, or worn threadbare.

A further object is to provide a dispenser of the character described above which operates rapidly so that a single dispenser can be used to serve a large group of workers.

The apparatus includes a pilfer-proof receptacle for soiled and clean towels and in which the dispensing mechanism is operable only upon the deposition of a soiled towel into the apparatus.

The apparatus is simple in construction, inexpensive and able to stand up under conditions of severe and constant use without getting out of order or requiring repairs.

In prior known types of towel dispensing apparatus, the apparatus could be operated merely by throwing a crumpled mass of waste paper, a block of wood, a rag or cloth having soft woven fibers, or any object having the characteristics of a used towel. This manner of operation defeated another principal object of the apparatus which was to dispense a fresh towel only upon return of a used towel previously dispensed, and not to respond to deposition of anything else.

Another object of the invention is to provide an apparatus having a recognition mechanism capable of positively identifying a towel of the type dispensed.

Another object is to provide a device for recognizing a towel having a radioactive thread or threads and adapted to unlock a towel dispensing mechanism upon recognizing the presence of a deposited towel of the same type.

Another object is to provide a towel dispensing system in which towels, cloths or rags of types not dispensed by the apparatus cannot be adapted by any simple means to render the apparatus actuatable for dispensing fresh towels.

Other and further objects and advantages of the invention will become apparent from the following description taken together with the drawing, wherein:

Fig. 1 is a front view of an apparatus embodying the invention with a portion of a wall cut away to show interiors of fresh and soiled towel storage compartments.

Fig. 2 is a sectional view taken on lines 2—2 of Fig. 1.

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Fig. 3 is a sectional view taken on lines 3—3 of Fig. 2.

Fig. 4 is a sectional view taken on lines 4—4 of Fig. 3.

Fig. 5 shows a diagram of a circuit responsive to energy radiation from a towel having a radioactive thread.

Fig. 6 shows a towel having a radioactive thread woven or sewn into the towel.

Fig. 7 is a sectional view of a drive shaft and clutch plate keyed thereto.

In Figs. 1 to 4, the towel dispenser is shown as embodied in a casing 10 generally cubical in shape but which can be of any other suitable form to enclose the operating mechanism and serve as a receiver or receptacle for fresh and soiled towels. The front wall 11 of the cabinet or casing 10 has in its lower part a door 12 provided with a lock 13 through which access can be had to the lower part of the cabinet. In the lower part of the cabinet is a compartment 14 where fresh towels are stored and a compartment 15 where soiled towels are stored. The door is mounted on a hinge 16.

In the upper part of wall 11 is an opening 17 above compartment 15 into which soiled towels are deposited. A platform 20 is pivotally mounted in the upper portion of the compartment 15. Upon deposition of a soiled towel S.T. on the platform the platform tilts as shown in Fig. 4 and the soiled towel falls into the pile of soiled towels 21. The walls of chambers 14 and 15 are lined to prevent escape of undesired radiation from the chambers which would actuate a radiation detector contained in a housing 23. The lining may be lead, lead foil or other radiation-proof material and may be applied to walls 11, 18, 19, 22, 24, 25, 26 and 27, platforms 20, 32, door 12 and floor 28 or the walls, platforms, floor and door may be made in whole or in part of radiation-proof material.

A rectangular opening 30 is provided in front wall 11 out of which fresh towels are dispensed or discharged from a pile of towels 31. The platform or table 32 is disposed flush with the lower edge of opening 30 and a guide plate 33 extends inwardly from wall 11 to guide a dispensed towel out of the opening 30. The stack of fresh towels 31 is carried by a platform 34 supported on compressed coil springs 35. Guide rods 37 extend through the springs to guide platform 34 in its upward motion.

A sprocket wheel 40 having teeth 41 is rotatably mounted to engage the topmost towel T in stack 31. A shaft 42 supports wheel 40. The wheel carries a pawl 44 engaged with a ratchet 45. The disposition of pawl and ratchet is such that the wheel 40 cannot rotate with respect to shaft 42 in a direction opposite to arrow B.

Shaft 42 carries a spur gear 50 which has teeth engaged with those of a spur gear 51. The gear 51 rotates freely on crankshaft 52 which is manually rotatable by a crank 53. The crankshaft 52 has a slot 54 in which rides key 55 of hub 56. The hub is integral with clutch plate or disc 57. The clutch plate carries projecting pins 58. Clutch plate 57 is spaced from gear 51 by springs 60. A bell crank member 61 is pivoted on pintle 62 mounted in wall 24. The crank member is biased away from the hub 56 by spring 63. A solenoid 65 is provided with an armature 66 attached to crank 61 to pull the crank forward in the direction of arrow A. This movement presses the clutch plate forward until pins 58 touch the face of gear 51. The face of the gear is provided with recesses or bores (not shown) corresponding in location to pins 58, so that when the crank 53 is turned manually the pins enter the recesses while solenoid 66 pulls the bell crank forward. When the pins become engaged in the bores in the gear 51 further turning of crank 53 will cause gear 50, shaft 52 and sprocket wheel 40 to rotate and dispense one towel through opening 30.

Shaft 52 also carries a partial spur gear 70. As the gear 50 rotates on shaft 52 the teeth on gear 70 engage the teeth of rack gear 71 causing the rod 72 connected to platform 20 to be lifted. When the rod is lifted the platform tilts to the dotted line position shown in Fig. 4 and the soiled towel S.T. drops down to the pile of soiled towels 21 in compartment 15. As the fresh towel T is dispensed from the cabinet the springs push up the pile of towels 31 until the teeth of the sprocket 40 engage the topmost towel T on the pile.

Each towel T such as shown in Fig. 6 has one or more threads 74 sewn or woven into the fabric. These threads are rendered radioactive by suitable means. One method of obtaining a suitable radioactive thread is by using strontium 90. This substance has a half life of 25 years and is a .537 mer. beta ray emitter. It decays into yttrium 90 by emitting a 2.18 mer. beta ray. To make the radioactive thread a quantity of polyethylene, polytetrafluorethylene or other polyhaloethylene, a butyrate or other suitable plastic material is liquified by heating or dissolving in a solvent. A solution consisting of one half milliliter of hydrochloric acid and one microcurie of strontium 90 is then made up. This solution is stirred into the viscous liquid plastic. After complete blending, flexible threads are drawn from the mixture. The threads harden in air on drying and/or cooling and are then washed and dried and checked for sufficient radioactivity. The threads are then ready to be woven or sewed into towels to be dispensed by the present apparatus. The plastic thread impregnated with the radioactive material is insoluble in most solvents and resists the moisture, acids, heat and detergents usually encountered in laundering and general use of the towels. The amount of radiation emitted is harmless to the human body and is just detectable by suitable detection apparatus above the general level of radiation caused by cosmic rays generally present in the earth's atmosphere.

One type of radiation detection circuit means which may be employed in the apparatus is shown diagrammatically in Fig. 5. The detection circuit is housed in box 23 which has a radiation detector tube or cell 80 exposed to radiation only from a soiled towel resting on platform 20. The cell receives no detectable radiation from the fresh towel stack 31 and soiled towels 21 because of the shielding incorporated in the box 23, platform 20 and all other appropriate portions of compartments 14 and 15.

The circuit shown in Fig. 5 is a Geiger counter type circuit. The circuit requires a radioactivity level obtained from at least 0.1 microcurie of strontium 90. Tube 80 is a Geiger-Mueller tube of conventional type. The tube is connected via capacitor C₃ to grid 82 of amplifier tube V₂. The plate 84 is connected via a step charging circuit to the grid 85 of thyatron V₃. The thyatron is a gas discharge triode which fires on application of a sufficient voltage to the grid 85. The step charging circuit consists of a crystal diode X₁, resistor R₁₃ and capacitor C₆. A charge builds up on capacitor C₆ depending on the rate at which pulses come out of tube V₂ as the tube 80 picks up radiation from an adjacent soiled towel S.T. The pulses issuing from tube V₂ have a constant amplitude and width. There is a background level of radiation (due almost entirely to cosmic radiation) which is substantially constant. The tube V₃ is set to fire when definite increase in radioactivity occurs which is brought about by juxtaposition of a soiled towel having a radioactive thread. In a twentieth of a second after the towel is deposited on platform 20, the tube V₃ fires to pass a pulse through capacitor C₉ and solenoid 65. The solenoid actuates armature 66 to pull crank lever 61 forward. When the crank lever is pulled forward the mechanical connection between crank 53 and sprocket wheel 40 is established so that a towel T can be dispensed when the crank is turned.

While the soiled towel remains on platform 20, the radiation therefrom is picked up by the Geiger tube and tube V₃ remains conducting. Thus the solenoid remains energized and the armature holds the mechanical connection between crank 53 and sprocket wheel 40. As soon as the crank 53 is turned and a towel is dispensed, the platform 20 tilts to drop towel S.T. to the pile 21 in compartment 15 removing the source of radiation from the platform. The Geiger tube ceases counting, tube V₃ becomes nonconducting and armature 66 is restored by the action of spring 63 to its original position to break contact between clutch plate 57 and gear 51.

It will thus be noted that the apparatus is rendered capable of dispensing a fresh towel when and only when a towel having the appropriate radioactive property is deposited on the platform 20. No ordinary rag, waste paper or other article will activate the mechanism so that the apparatus is fool-proof. The fresh and soiled towels are inaccessible in normal use of the apparatus when door 12 is locked.

In Fig. 5, S₁ may be a selenium rectifier. T₁ and T₂ are filament and high voltage transformers. Tubes V₁, V₂ and V₃ may be standard commercial types Zx2, 6J6, and 2021 respectively. X₁ may be a germanium crystal diode and the several resistors R₁—R₁₈ and capacitors C₁—C₁₆ may have the following values:

	Ohms (K=1000)
R ₁ -----	1K
R ₂ -----	500K
R ₃ ----- megohms	1
R ₄ ----- do	1
R ₅ -----	100K
R ₆ -----	250K
R ₇ -----	22K
R ₈ -----	10K
R ₉ -----	4.3K
R ₁₀ -----	1K
R ₁₁ -----	120K
R ₁₂ -----	56K
R ₁₃ ----- megohms	6.8
R ₁₄ -----	40K
R ₁₅ -----	5K
R ₁₆ -----	47K
	Mfd.
C ₁ -----	300
C ₂ -----	.1
C ₃ -----	.005
C ₄ -----	.002
C ₅ -----	.001
C ₆ -----	.01
C ₇ -----	25
C ₈ -----	.1
C ₉ -----	20

Although only a single embodiment of the invention has been disclosed it will be apparent to those skilled in the art that many changes are possible without departing from the spirit of the invention as defined by the scope of the appended claim.

What is claimed and desired to protect by Letters Patent of the United States is:

Apparatus for dispensing cloth towels, comprising a casing having a platform for supporting a plurality of clean towels, a dispensing mechanism for dispensing such clean towels in predetermined quantities from said platform, a receiving compartment in said casing for soiled towels, said soiled towels having a plastic thread incorporated therein which contains radioactive strontium, and a triggering mechanism operatively connected to said dispensing mechanism, said triggering mechanism including a Geiger type of radiation detector which is sensitive to the radiation from the strontium in the soiled towels when deposited in said receiving compartment in order to render the dispensing mechanism operative.

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