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(71) Applicant: CALGON CORPORATION
Route 60-Campbell's Run Road
Robinson Township Pennsylvania 15205(US)

(72) Inventor: Acklin, John R.
159 Sappington Acres Drive
St. Louis Missouri 63126(US)

(72) Inventor: Bush, Lee W.
14385 Stablestone Court
Chesterfield Missouri 63017(US)

(72) Inventor: Rauk, George A.
7 Troll Court
Manchester Missouri 63011(US)

(72) Inventor: Danna, Joseph J.
3680 Pyrenees Drive
Florissant Missouri 63033(US)

(72) Inventor: Devitt, John L.
1639 South Kearney Drive
Denver Colorado 80224(US)

(74) Representative: Purvis, William Michael Cameron et al,
D. Young & Co. 10 Staple Inn
London WC1V 7RD(GB)

(54) A fluid dispenser.

(57) A fluid dispenser, particularly for hand-washing detergent, has a flexible container (19) with means (11, 12) associated therewith for squeezing the container (19); an outlet means (4), attached to the container (19); and an electrically operated valve mechanism (15, 16, 17) associated with the outlet means (4) which is triggered by a detector means (6, 7) in close association with the outlet means (4) and which operates the valve mechanism (15, 16, 17) for a time interval when an object passes beneath the detector.

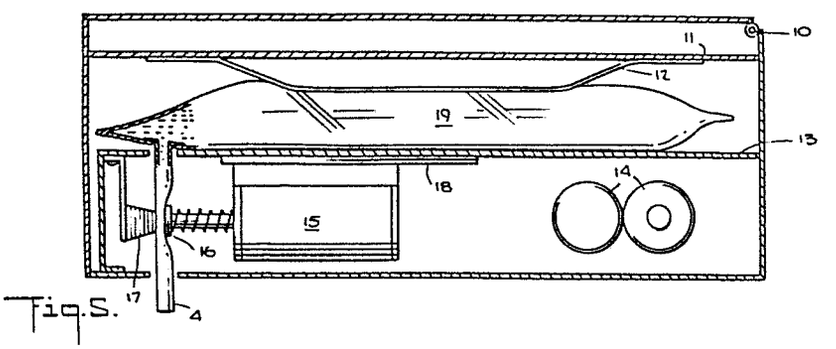

Fig.5.

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A FLUID DISPENSER

The invention relates to fluid dispensers, in particular, for dispensing detergents.

Automatic operation of dispensers for dispensing detergent for hand-washing is desirable to ensure that no harmful micro-organisms will be spread by contact with handles, buttons or other devices to cause operation of the dispenser. Detergent dispensers requiring no manual contact for their operation are particularly desirable in hospital operating rooms and similar places where sanitary conditions must be maintained.

According to the invention there is provided a fluid dispenser comprising a flexible container for containing fluid and having outlet means for the fluid, characterised by means associated with the flexible container for squeezing the flexible container; a valve mechanism to close the outlet means and operable to open the outlet means; and proximity detector means in close association with the outlet means and effective to operate the valve mechanism for a time interval when an object passes beneath the detector means.

The flexible container may be made of any suitable material which will contain the flowable contents. A flexible bag made of plastics or rubber is preferred.

Since battery operation is preferred in many applications, squeezing means with a low energy requirement can be provided by depressing the flexible container by means of a weight to provide the pressure necessary for flow at a practical rate.

Such a weight, preferably associated with the top of the flexible container, should be of sufficient magnitude to minimize pressure fluctuations and allow a constant rate of flow of fluid irrespective of the volume of fluid in the container. This reduces the amount of energy required to operate the dispenser and facilitates the usage of batteries.

The outlet means is preferably a resilient tube outlet, which will allow the flowable contents, preferably a liquid, to be discharged.

In a preferred embodiment of the invention, the outlet means is

integrally connected to the flexible container and both the container and the outlet means are disposable. In this way, the entire liquid-contacting dispensing pathway can be discarded when the container has become empty. This pathway is then renewed when a new, full container is placed in the dispenser.

The valve mechanism is preferably a simple pinch valve, using a thin-walled rubber tube attached to the flexible container. The tube passes through a pair of solenoid-operated jaws which are opened for the length of time needed to dispense a desired quantity of liquid, then closed to prevent further flow.

Other types of valves are also suitable. For example, the valve may be an inexpensive plastics structure which may be discarded along with the flexible container. It may also be corrosion resistant. Simple poppet and movable-flap valves are examples.

The valve mechanism may be operated by any electrical source, however, batteries are preferred because of the general absence of electrical outlets in many applications where the dispenser could be used. In the pinch-valve embodiment of the instant invention, a movable plastics jaw is attached to a spring mechanism which extends the jaw toward a similar, stationary jaw. When fully extended, the movable jaw rests against the stationary jaw. When a tube is placed between the two jaws, the tube is pinched closed when the pinch mechanism is extended by the spring mechanism. When actuated electrically, the movable jaw is retracted away from the fixed jaw, in effect opening the pinch valve.

As an alternative valve mechanism, the resilient tube may be bent to provide a kink seal. The minimum angle to provide a kink seal is defined for each resilient material and can be accomplished by any suitable mechanism that can bend the tube to the required angle.

Any detector means capable of sensing proximity may be used. In one embodiment of the invention, the detector is an infrared light-emitting diode (LED) and a phototransistor. The infrared LED emits short pulses of light. The phototransistor receives background light and reflected light from the infrared LED. The phototransistor is set so that when a set amount of reflected light is received, the pinch mechanism is disengaged for a set time interval.

Means may be associated with the flexible container to provide a

signal when the flexible container is empty or nearly empty. In the alternative, this may be associated with the optional weight. When the weight falls to a certain level, the empty container signal is activated.

The invention is diagrammatically illustrated by way of example in the accompanying drawings, in which:-

Figure 1 is a perspective view from above, the front and one side of a fluid dispenser according to the invention;

Figure 2 is a perspective view from below, the front and one side of the dispenser of Figure 1;

Figure 3 is a view of the dispenser of Figures 1 and 2 with a lid raised, showing a shelf on which a flexible bag container sits;

Figure 4 is a view of the underside of the shelf of Figure 3;

Figure 5 is a sectional view taken on line A-A of Figure 4;

Figure 6 is a block diagram of electronic circuitry of a light-emitting diode driver of a fluid dispenser according to the invention; and

Figure 7 is a block diagram of electronic circuitry of a phototransistor and valve mechanism of a fluid dispenser according to the invention.

Referring to the invention and firstly to Figure 1, a proximity fluid dispenser 1 has a backplate 3 whereby the dispenser 1 can be mounted on a wall. A low-soap indicator 2 is visible from the outside of the dispenser.

Figure 2 shows that on the underside of the dispenser 1 an infrared LED 7 emits infrared light which can be bounced from an object, such as a hand, placed in its path. The infrared light bounced off of an object is received by a phototransistor 6 which causes the disengagement of a pinch mechanism so that liquid may be dispensed through a resilient tube outlet 4 which extends through an opening 5 in the underside of the dispenser.

Figure 3 shows the dispenser 1 with a lid 9 thereof mounted on a hinge 10 in a raised position. A container pressure plate 11, in combination with a spring 12, can apply pressure to a bag (not shown in Figure 3) which rests on a shelf 13. The resilient outlet of the flexible container is inserted through an opening in the shelf 13 and through the opening 5 in the base of the dispenser. A low-battery indicator 8 on the shelf 13 indicates when batteries need to be replaced.

Figure 4 shows a view of the underside of the shelf 13. The phototransistor 6 can trigger a pinch mechanism formed by a solenoid 15

with a spring biassed core having a jaw member 16 and a fixed plate 17. The pinch mechanism is in an extended position prior to its disengagement via an interruption of the infrared light. The jaw member 16 can pinch the resilient tube outlet 4 (not shown in Figure 4) against the fixed plate 17. The electric circuitry is powered by batteries 14. The various electrical components are attached to a circuit board 18.

Figure 5 shows a flexible container 19 containing fluid resting on the shelf 13. The flexible container 19 has an outlet on which the resilient tube 4 is engaged. The resilient tube 4 passes between the jaw 16 and the fixed plate 17.

Figures 6 and 7 show block diagrams of electronic circuitry, Figure 6 showing the LED driver and Figure 7 showing the phototransistor electronic circuitry.

The LED driver is a separate circuit. A pulse oscillater applies very short (150 microseconds) pulses, at a rate of about 20 per second to a power amplifier. The integral-lens infrared LED 7 is aimed below the dispenser toward an approaching hand.

Reflected infrared pulses, plus some ambient light, are picked up by the phototransistor 6. The composite signal (infrared + ambient (or background 50 Hz light)) is amplified by an amplifier and applied through a background light discriminator and a pulse collector. The background light discriminator biasses out the background 50 Hz noise, passing the infrared pulses as positive spikes to the pulse collector. In the absence of the infrared signal, 6v d.c. appears at a trigger terminal of a one-shot timer. (It takes a negative-going <2v signal to trip the one-shot timer.) When enough pulses have reduced the voltage in the pulse collector below 2v (about 1/2 second), the one-shot timer sends a pulse to a power amplifier and the power amplifier operates the solenoid 15. Pulse length (and pinch-valve-open-time) is adjustable from under 1 second to several seconds. A non-repeat circuit prevents another trip immediately following the first one. The non-repeat circuit shorts out the input of the pulse collector as soon as the solenoid pulse begins, and this condition persists for a set time period.

The low-soap indicator 2 can be a microswitch operated by the container pressure plate 11 as the flexible container 19 becomes nearly empty (thin). Then, every time the solenoid 15 operates, the low-soap indicator light (LED) 2 comes on.

In operation, the infrared LED 7 emits pulses of infrared light and, when an approaching hand intersects the pulsating light, infrared light is reflected and picked up by the phototransistor 6. A pulse is sent to the solenoid 15 which moves the jaw 16 away from the stop plate 17 so that fluid contained in the flexible container 19 is discharged through the resilient tube outlet 4 into the hand positioned below it. The jaw 16 is disengaged for a preset period of time. In one embodiment, if the hand remains projected in the path of the infrared pulses, the cycle will repeat itself after a short delay period.

CLAIMS

1. A fluid dispenser comprising a flexible container for containing fluid and having outlet means for the fluid, characterised by means (11,12) associated with the flexible container (19) for squeezing the flexible container (19); a valve mechanism (15, 16, 17) to close the outlet means (4) and operable to open the outlet means (4); and proximity detector means (6, 7) in close association with the outlet means (4) and effective to operate the valve mechanism (15, 16, 17) for a time interval when an object passes beneath the detector means (6, 7).

2. A fluid dispenser according to claim 1, wherein the detector comprises an infrared light-emitting diode (7) and a phototransistor (6).

3. A fluid dispenser according to claim 1 or claim 2, further comprising means (2) associated with the flexible container (19) which provides a signal when the flexible container (19) is empty or nearly empty.

4. A fluid dispenser according to any one of claims 1 to 3, wherein the squeezing means (11, 12) is a weight.

5. A fluid dispenser according to any one of claims 1 to 4, wherein the flexible container (19) is a plastics bag.

6. A fluid dispenser according to any one of claims 1 to 5, wherein the outlet means (4) for the container (19) is a resilient tube.

7. A fluid dispenser according to any one of claims 1 to 6, wherein the container (19) and the outlet means (4) are disposable.

Fig.1.

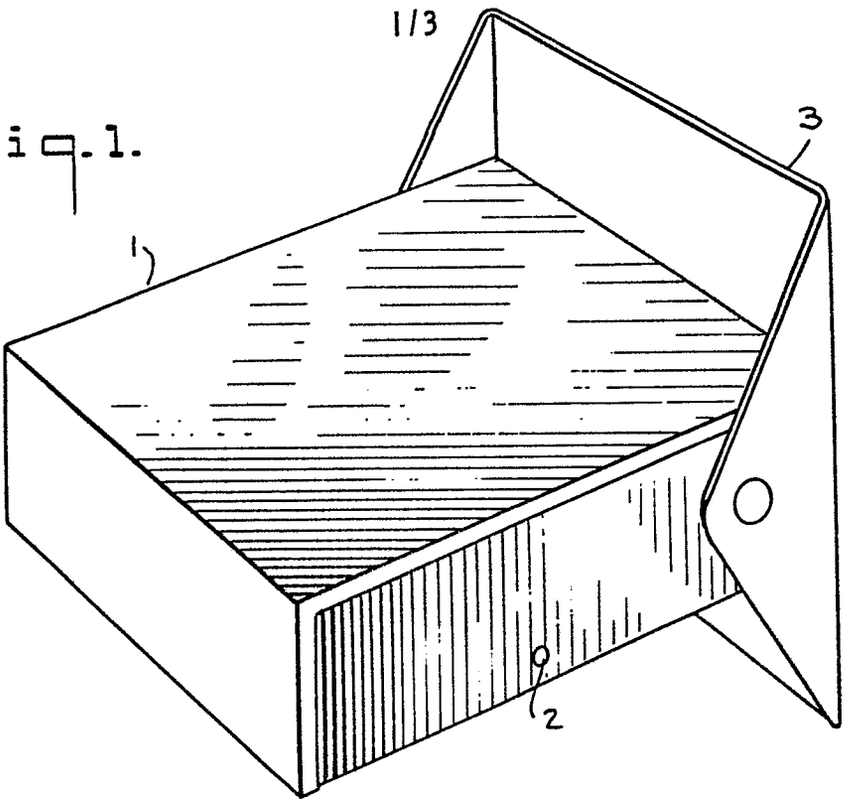


Fig.2.

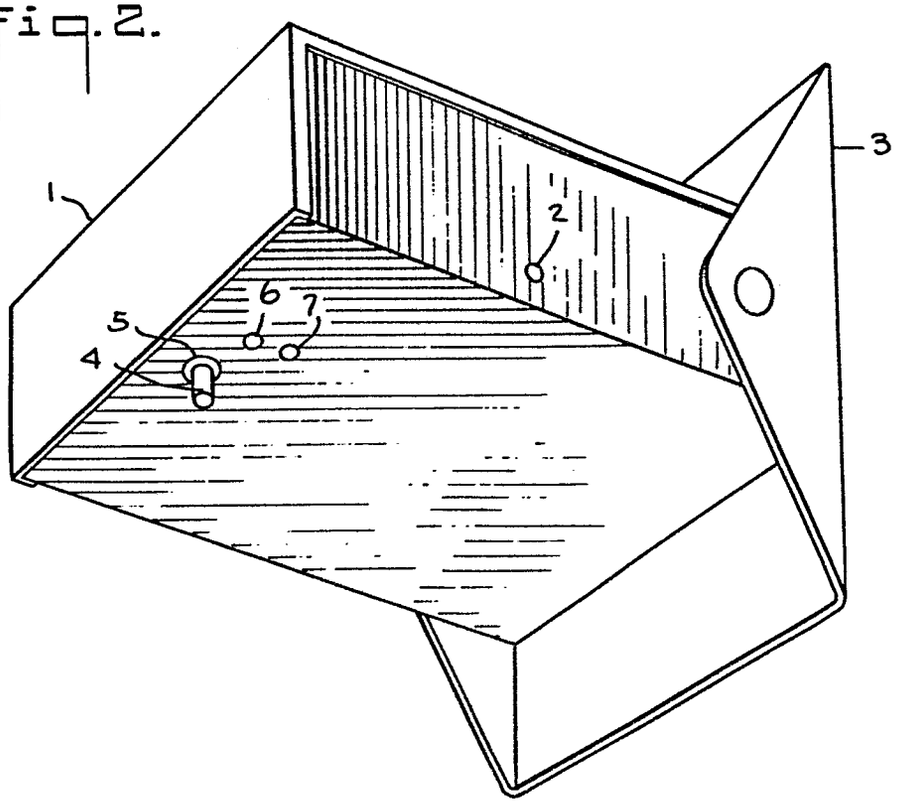


Fig.3.

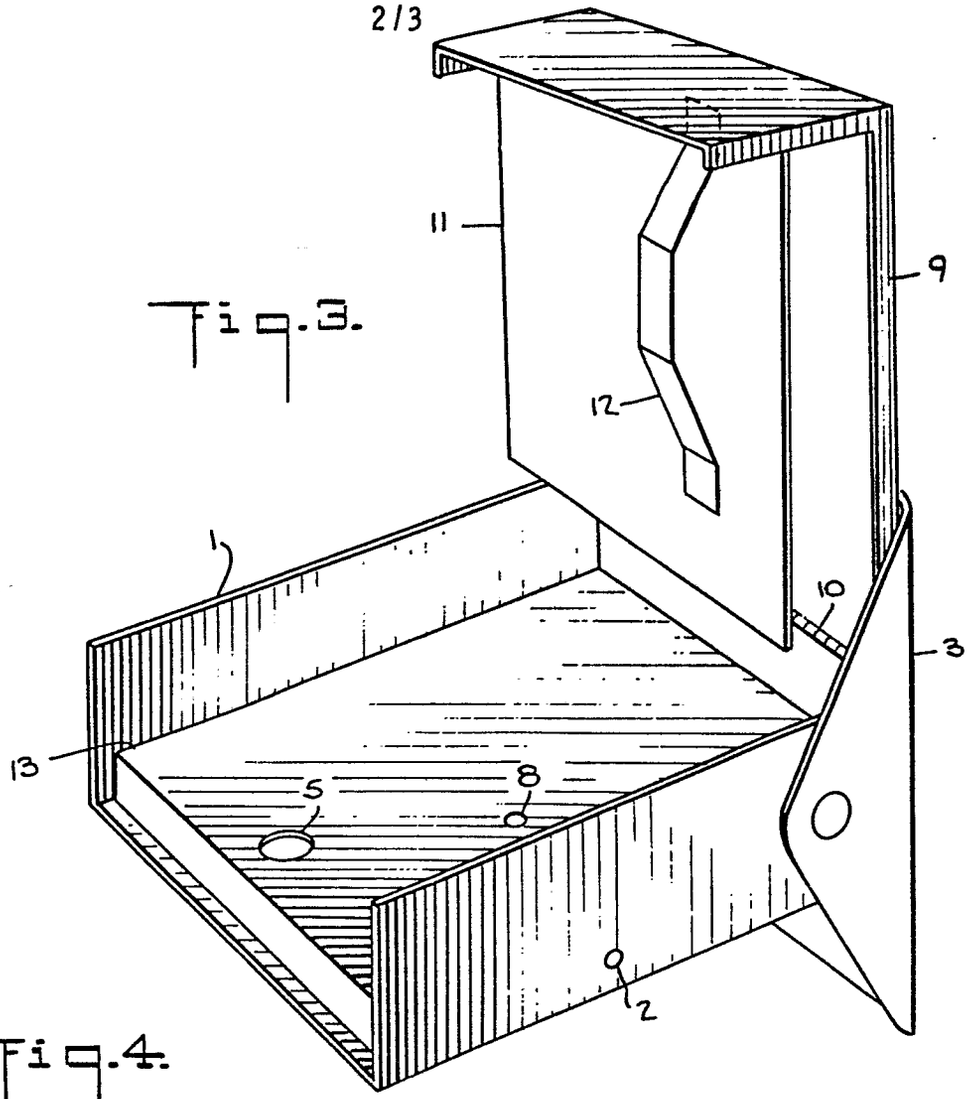
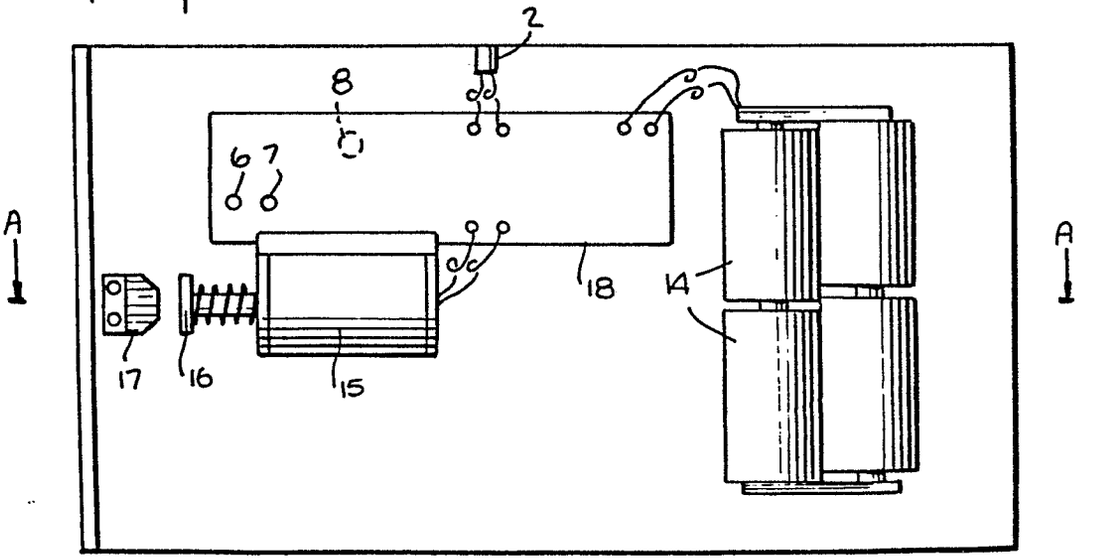


Fig.4.



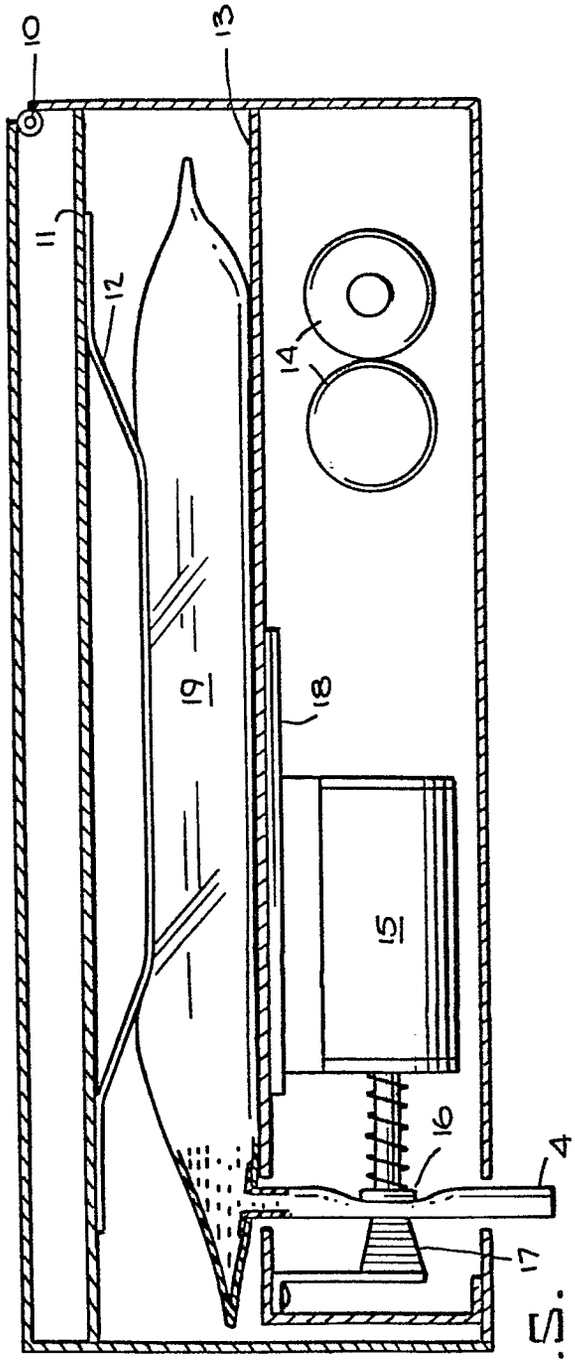


Fig. 5.

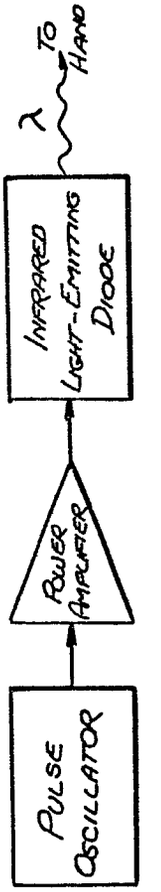


Fig. 6.

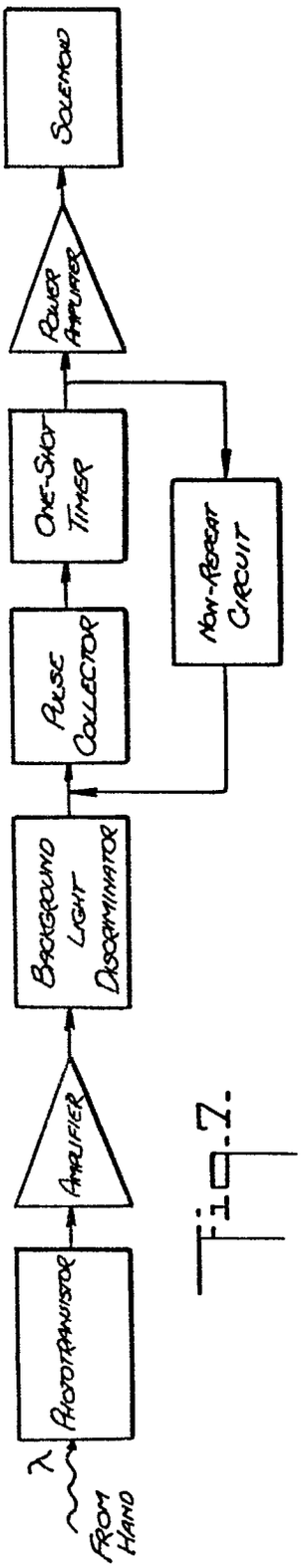


Fig. 7.

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EUROPEAN SEARCH REPORT

0078181
Application number

EP 82 30 5710

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Y	FR-A-2 016 862 (MANDTHANN) *Page 4, lignes 19-30; page 5, lines 1-30; page 6, lines 1-30; page 7, lines 1-21; figures 3,5,6,7,9,10,11*	1,6	A 47 K 5/12
Y	US-A-3 327 901 (YERKOVICH) *Column 2, lines 62-72; column 3, lines 1-75; column 4, lines 1-37; figures 1,2,3*	1	
A	US-A-3 434 628 (CERALDI) *Column 3, lines 67-75; column 4, lines 1-24; figures 1-4*	2	
A	US-A-3 273 752 (HORECZKY) *Column 3, lines 26-75; column 4, lines 1-2; figure 1*	2	TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
A	US-A-4 036 406 (JESPERSEN) *Column 3, lines 17-30; figure 2*	3	A 47 K
A	DE-A-2 341 259 (GSS) *Page 7, lines 25-33; figure 1*	7	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	31-01-1983	SCHOLS W.L.H.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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