

12 **EUROPEAN PATENT APPLICATION**

21 Application number: 83302835.0

51 Int. Cl.³: **A 47 K 10/28**

22 Date of filing: 18.05.83

30 Priority: 20.05.82 GB 8214755
28.09.82 GB 8227553

43 Date of publication of application:
30.11.83 Bulletin 83/48

84 Designated Contracting States:
BE CH DE FR IT LI NL

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54 **Continuous towel cabinets.**

57 A continuous towel cabinet has a holder (15) for a roll of clean towel, an arrangement of rollers for repeatedly allowing a length of clean towel to be dispensed into a loop beneath the holder and including a rewind roller (19) on which an equivalent length of soiled towel is simultaneously rewound, and separate take-up means (27, 28) for withdrawing the trailing end of the towel into the cabinet. The take-up means are operated by an electric motor (36) under the control of sensing means (39; 43,44) for detecting the trailing end of the towel.

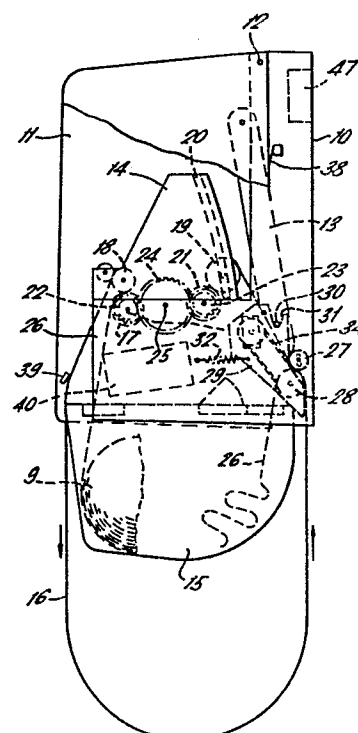


FIG. 1.

CONTINUOUS TOWEL CABINETS

This invention relates to continuous towel cabinets.

A well-known type of continuous towel cabinet has a roller
5 arrangement which allows successive lengths of clean towel
to be dispensed into a loop beneath the cabinet and
simultaneous rewinding of the equivalent length of soiled
towel. The length of towel loop thus remains constant.
However, there is normally no provision for rewinding the
10 last portion or trailing end of the towel which thus hangs
freely until the roll of soiled towel is replaced by a fresh
roll of clean towel and the cycle of operation is repeated.
The trailing end of towel is unsightly and unhygienic and
has been a constant disadvantage to the image of continuous
15 towel cabinets both within the industry and to the user.

One common solution is the provision of drive means
for fully winding up the soiled towel after each time clean
towel has been dispensed thereby removing the loop. Also
when the trailing end of the towel is reached, the whole
20 of the soiled towel is automatically wound onto the rewind

roller. The drive means may involve an electric motor or a mechanical arrangement to rotate the rewind roller.

Proposals are also known to provide a spring motor which is tensioned during repeated dispensing of clean
5 lengths of towel and then used at the end of the cycle to withdraw the trailing end of the towel. The spring motor either winds the trailing end onto the rewind roller or operates an additional roller to take-up the trailing end into the cabinet. Such mechanically operated solutions
10 are complicated, expensive and likely to be unreliable in use.

According to the invention there is provided a continuous towel cabinet comprising a holder for a roll of clean towel, an arrangement of rollers for repeatedly
15 allowing a length of clean towel to be dispensed into a loop beneath the holder and including a rewind roller on which an equivalent length of soiled towel is simultaneously rewound, and separate take-up means for withdrawing the trailing end of the towel into the cabinet, which take-up
20 means include a drive roller driven by an electric motor under the control of sensing means for detecting the trailing end of the towel.

Preferably the take-up means for the trailing end is driven by the electric motor in one direction via a clutch
25 to allow the drive roller to be able to rotate freely

in the same direction prior to the trailing end being detected.

The drive roller may be one of a pair of rollers between which the towel passes positioned before the rewind roller and at a level above the clean towel holder, the
5 other roller being a pressure roller which, in use, applies a constant pressure on the towel acting to tension the towel. Preferably the pressure roller is mounted at its ends in slots to allow limited movement towards and away
10 from the drive roller for the trailing end, and said drive roller is mounted for pivotal movement away from the pressure roller during the cycle of reloading the cabinet with a fresh roll of clean towel.

It is also preferred that the electric motor is
15 operated from a low voltage energy source, e.g. a battery source or a mains supply through a transformer or a solar energised source.

The control means for the electric motor preferably includes an integrated circuit incorporating a resetting
20 facility in the event of the trailing end being held whilst it is being taken up. The integrated circuit may include an initial time delay followed by operation of the electric motor for a predetermined period.

Preferably the control means for the electric motor
25 also includes a switch which must be actuated to trigger

the integrated circuit to start the cycle of operation determined by the integrated circuit and which must be reactivated after completion of the cycle before the cycle can be repeated.

5 In one embodiment of the invention the sensing means comprises a photo sensing eye normally covered by the clean towel being dispensed which when exposed allows the electric motor to cause the drive roller to withdraw the trailing end of the towel into the cabinet.

10 In another embodiment the sensing means comprises one member of an electric switch biased towards a closed position, the member, in use, being maintained open by the towel passing therebetween until the trailing end has passed and the subsequent closure of the switch allowing the motor to cause the drive roller to withdraw
15 the trailing end of the towel into the cabinet. Preferably one switch is both the switch referred to above to trigger the integrated circuit and the sensing switch just mentioned.

By way of example, specific embodiments in accordance with the invention will be described with reference to the accompanying
20 drawings in which:-

Figure 1 is a side elevation of a continuous towel cabinet;

Figure 2 shows the cabinet of Figure 1 with the cover open;

Figure 3 is a front elevation of the trailing end take-up roller; and

25 Figure 4 is a side elevation of another continuous towel cabinet.

Referring to Figures 1 to 3, a continuous towel cabinet comprises a back portion 10 to which a front cover is hinged by pivots 12 and supported by side arms 13. The back portion 10 incorporates two side walls 14 from which a towel bin 15 is hung. Between the side walls 14 extend an arrangement of rollers which allow towel 9 to be dispensed from a roll within the bin 15 into a loop 16 below the bin and for soiled towel to be withdrawn into the cabinet and rewound. At the upstream end of the towel path, the towel passes upwardly over a roughened metering roller 17, around a guide roller 18 and then downwardly into the loop 16. At the downstream end of the towel path, the soiled towel is rewound on a roller 19 mounted in generally upwardly extending grooves 20 in the side walls and which is driven by another roughened metering roller 21 through the outermost turn of the towel which has been rewound. At each end of each metering roller 17, 21, in this embodiment, is a respective gear wheel 22, 23 which mesh with an intermediate gear wheel 24 mounted on a shaft 25. The gear wheels 22, 23 have the same number of teeth so that the length of soiled towel rewound on the rewind roller 19 is the same as the length of towel dispensed at the front of the cabinet, whereby the size of the loop remains constant. As the roll of soiled towel increases the rewind roller slides up the grooves 20.

The towel bin 15 is capable of forward movement when the cover 11 is open into a loading position (Figure 2) for reloading the cabinet. The bin is held locked in its operative position by the closed cover.

5 To limit the length of towel which is dispensed at any one time, there is provided a device for stopping rotation of the metering roller 17 in the direction it rotates when the towel is being dispensed, after a given length of towel has been dispensed. In this embodiment,
10 the stop device is the same as the stop device described in British Patent Application No 2043592.

 Alternatively, the drive arrangement for the rear metering roller 21 and the stop device may be of the kind described in British Patent Application No 8109686.

15 In both cases, the cycle of dispensing and rewinding successive lengths of towel is repeated until the end of the towel roll is reached. The trailing end of the towel has then been dispensed, but it is not normally rewound on the roller 19. Instead it hangs down from the cabinet
20 which is both unsightly and unhygienic.

 For the purpose of taking up the trailing end into the cabinet, there is provided an additional pair of rollers 27, 28 in the towel path in a position which is just before the rear metering roller 21 and at a level above the towel
25 bin 15. The upper roller 27 is a pressure roller which is

mounted in end slots so that under its own weight it applies a constant pressure on the towel acting to tension the towel. However, it is also capable of substantial vertical movement relative to the towel if necessary.

5 The lower roller 28 is a drive roller mounted between end brackets 29 which are pivotally attached to the side walls 14. Movement of the towel bin 15 into its operative position pivots the brackets 29 rearwardly to engage the drive roller 28 with the pressure roller 27, and the
10 brackets are positively held by a locating bar 30 engaging in a notch 31 in at least one of the brackets when the cover is closed. When the cover 11 is raised and the bin 15 moved forwardly, the brackets 29 are released and are pivoted forwardly, the brackets 29 are released
15 and are pivoted forwardly by a spring 32 to provide a gap between the rollers 27, 28 through which the leading end of a fresh roll of towel may be threaded and manually wound onto the rewind roller 19.

The drive roller 28 has a suitable surface, which
20 in this embodiment is provided by a longitudinally fluted rubber sleeve 42, for gripping the towel and is grooved at intervals along its length for the provision of stripping fingers 33 to prevent the trailing end 26 of the towel from wrapping itself around the roller 28 instead
25 of falling into the bin 15.

The drive to the roller 28 is a belt drive 34 including a unidirectional clutch 35 which is operated by an electric motor 36 via a gear box 37. Alternatively the drive 34 may be a chain drive or a gear train. In
5 this embodiment the clutch 35 is a needle roller clutch which allows the roller 28 to be rotated freely by the towel without applying load to the drive 34 but is engaged if a torque is applied by the drive. The clutch may be another unidirectional clutch, e.g. having a
10 ratchet or pawl arrangement.

The drive motor 36 is a low voltage electric motor operated in this embodiment from a low power DC energy source 40, for example one or more alkaline batteries.

15 In this embodiment the control means for the electric motor 36 is an integrated circuit 47, a micro-switch 38 which is made operative by closing the cover 11 and means for sensing the trailing end of the towel. The sensing means, in this embodiment, is a photo sensing eye 39
20 attached to the inside of the cover 11 and normally covered by the towel. When the eye 39 is exposed, the drive to the roller 28 becomes operative. Under the control of the integrated circuit 47, the electric motor 36 is switched on after a time delay, e.g. 4 seconds,
25 and then switched off after a predetermined period of

time which in this embodiment is 15 seconds. Operation of this cycle can only be repeated after it has been triggered by opening and closing the cover controlled micro-switch 38. However, if the trailing end of the towel
5 is held during the take-up process, the cycle is automatically stopped and restarted, including the initial time delay and the full period of operation of the electric motor 36, when the towel is no longer held, and will if necessary repeat this process until the full cycle has
10 been completed. This control feature gives an advantage over, for example, a mechanical arrangement which may lose its power to take-up the trailing end if for some reason the trailing end is temporarily held.

Instead of the drive motor 36 having a battery
15 energy source, it could be operated from a mains supply through a transformer or from a solar powered supply. In each case, the motor may be relatively low powered since it is required only to rotate the roller 28 and not the rewind roller 19.

20 Figure 4 relates to another embodiment of continuous towel cabinet which is substantially identical to the embodiment of Figures 1 to 3, the main difference being the device for sensing the trailing end of the towel 9. In this embodiment the sensing means comprise a pair of bars
25 43, 44 extending parallel to the plane of the towel and

between which the towel passes in a position between the guide roller 18 and the beginning of the loop 16. Bar 43 is fixed to the two side walls 14 from which the towel bin 15 is hung and bar 44 is pivotally mounted to the side walls of the front cover 11 in a manner whereby it is biased to drop downwardly into contact with the bar 43 when the towel is absent. The bars 43, 44 are also electrically wired to the integrated circuit 47 which in this embodiment is mounted on the side wall 14 adjacent the electric motor 36 instead of on the back wall of the cabinet. The bars thus comprise an electrical switch which performs the joint function of sensing the trailing end of the towel and a main switch to trigger the integrated circuit 47 controlling the operation of the electric motor 36, thereby replacing both the photo sensing eye 39 and the micro-switch 38 of the embodiment of Figures 1 to 3. The switch formed by the bars 43, 44 is normally open when the towel is present therebetween but is biased to close when the trailing end of the towel has passed.

An additional feature of this embodiment is a low voltage indicator comprising a bulb 45 operated by a push-button switch 46, the arrangement being such that when the switch 46 is pressed on, the bulb 45 is lit if there is sufficient voltage in the energy source to operate the motor.

In operation the cabinet is loaded with a roll of towel which separates the bars 43, 44. In this condition the switch constituted by the bars 43, 44 is open and there is no loss of current from the energy source through the circuit. When the towel has been used and the trailing end passes between the bars, bar 44 will pivot downwardly to close the switch and to trigger the integrated circuit 47 to operate the motor in the same manner as in the previous embodiment to take-up the trailing end of the towel. At the end of the cycle the circuit will again be in a condition in which there is no loss of current from the energy source. The circuit will only be retriggered for the cycle to be repeated by the switch closing again which in normal operation occurs after a further towel has passed through the cabinet.

It is emphasised that an advantage of the embodiment of Figure 4 over the embodiment of Figures 1 to 3 is that there is no usage of current from the energy source other than during the operative cycle of the integrated circuit.

Also, the passage of the towel over the bars 43, 44 results in a self-cleaning effect of the bars against any adverse effects which might otherwise occur due to corrosion.

CLAIMS

1. A continuous towel cabinet comprising a holder
for a roll of clean towel, an arrangement of rollers
for repeatedly allowing a length of clean towel to be
dispensed into a loop beneath the holder and including
5 a rewind roller on which an equivalent length of soiled
towel is simultaneously rewound, and separate take-up
means for withdrawing the trailing end of the towel into
the cabinet, characterised in that the separate take-up
means include a drive roller (28) driven by an electric
10 motor (36) under the control of sensing means (39; 43,44)
for detecting the trailing end of the towel.

2. A continuous towel cabinet as claimed in Claim 1,
characterised in that the drive roller (28) of the sepa-
15 rate take-up means for the trailing end is driven by the
electric motor (36) in one direction via a clutch (35) to
allow the drive roller to be able to rotate freely in the
same direction prior to the trailing end being detected.

20 3. A continuous towel cabinet as claimed in Claim 2,
characterised in that the drive roller (28) is one of a
pair of rollers (27,28) between which the towel passes
positioned before the rewind roller (19) and at a level
above the clean towel holder (15), the other roller (27)
25 being a pressure roller which, in use, applies a constant

pressure on the towel acting to tension the towel.

4. A continuous towel cabinet as claimed in Claim 3, characterised in that the pressure roller (27) is mounted
5 at its ends in slots to allow limited movement towards and away from the drive roller (28) for the trailing end, and said drive roller is mounted for pivotal movement away from the pressure roller during the cycle of reloading the cabinet with a fresh roll of clean towel.

10

5. A continuous towel cabinet as claimed in any one of the preceding claims, characterised in that the electric motor (36) is operated from a low voltage energy source (40).

15

6. A continuous towel cabinet as claimed in Claim 5, characterised in that the energy source (40) is at least one alkaline battery.

20

7. A continuous towel cabinet as claimed in any one of the preceding claims, characterised in that the control means for the electric motor includes an integrated circuit (47) incorporating a resetting facility in the event of the trailing end being held whilst it is being taken
25 up.

8. A continuous towel cabinet as claimed in Claim 7, characterised in that the integrated circuit (47) includes an initial time delay followed by operation of the electric motor (36) for a predetermined period.

5

9. A continuous towel cabinet as claimed in Claim 7 or Claim 8, characterised in that the control means for the electric motor (36) includes a switch (38; 43,44) which must be actuated to trigger the integrated circuit (47) to start the cycle of operation determined by the integrated circuit and which must be reactuated after completion of the cycle before the cycle can be repeated.

10. A continuous towel cabinet as claimed in any one of the preceding claims, characterised in that the sensing means comprises a photo sensing eye (39) normally covered by the clean towel being dispensed which when exposed allows the electric motor (36) to cause the drive roller (28) to withdraw the trailing end of the towel into the cabinet.

11. A continuous towel cabinet as claimed in any one of Claims 1 to 9, characterised in that the sensing means comprises one member (44) of an electric switch (43,44) biassed towards a closed position, the member (44), in use, being maintained open by the towel passing therebetween until the trailing end has passed and the sub-

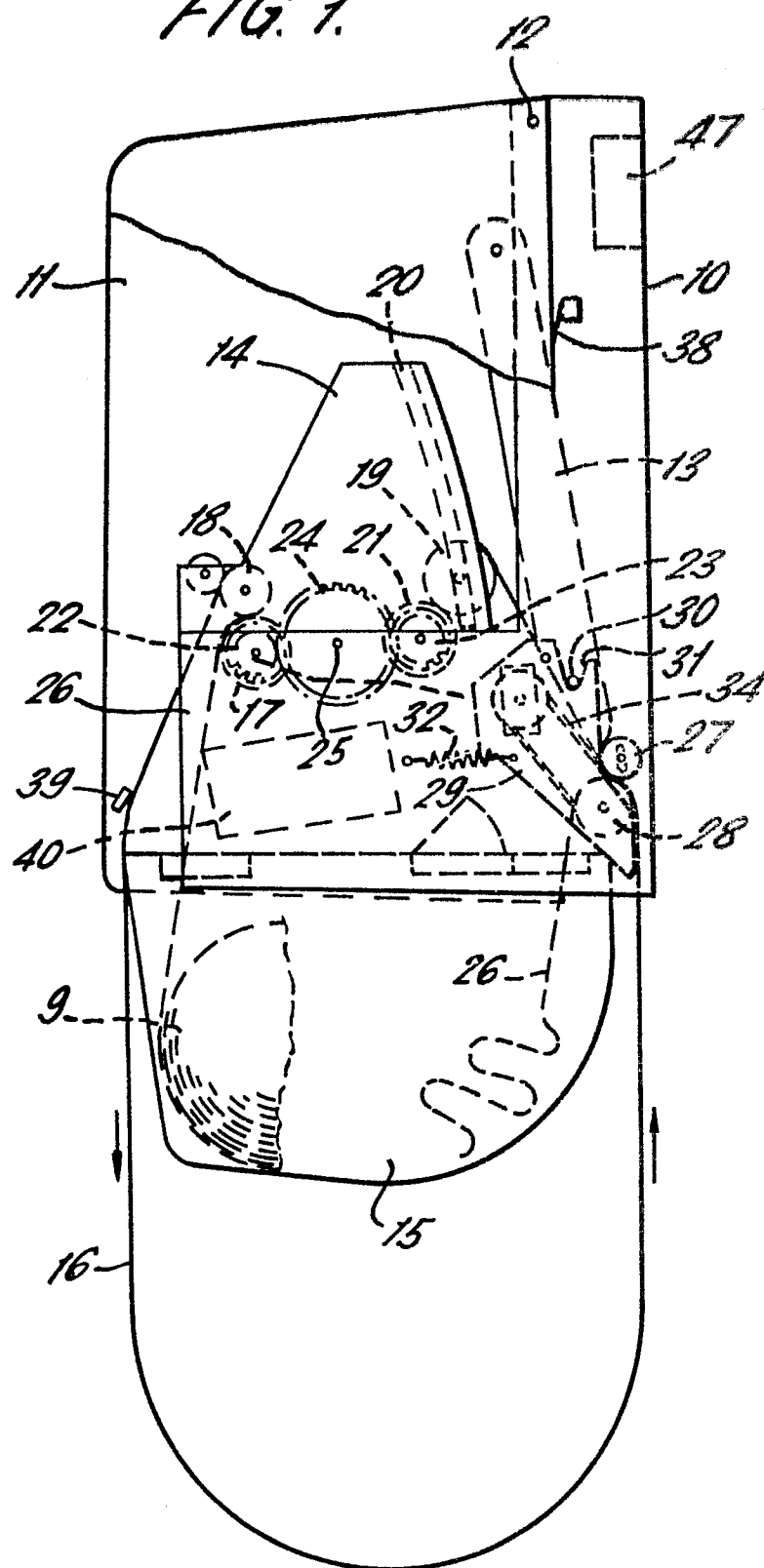
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sequent closure of the switch allowing the motor (36) to cause the drive roller (28) to withdraw the trailing end of the towel into the cabinet.

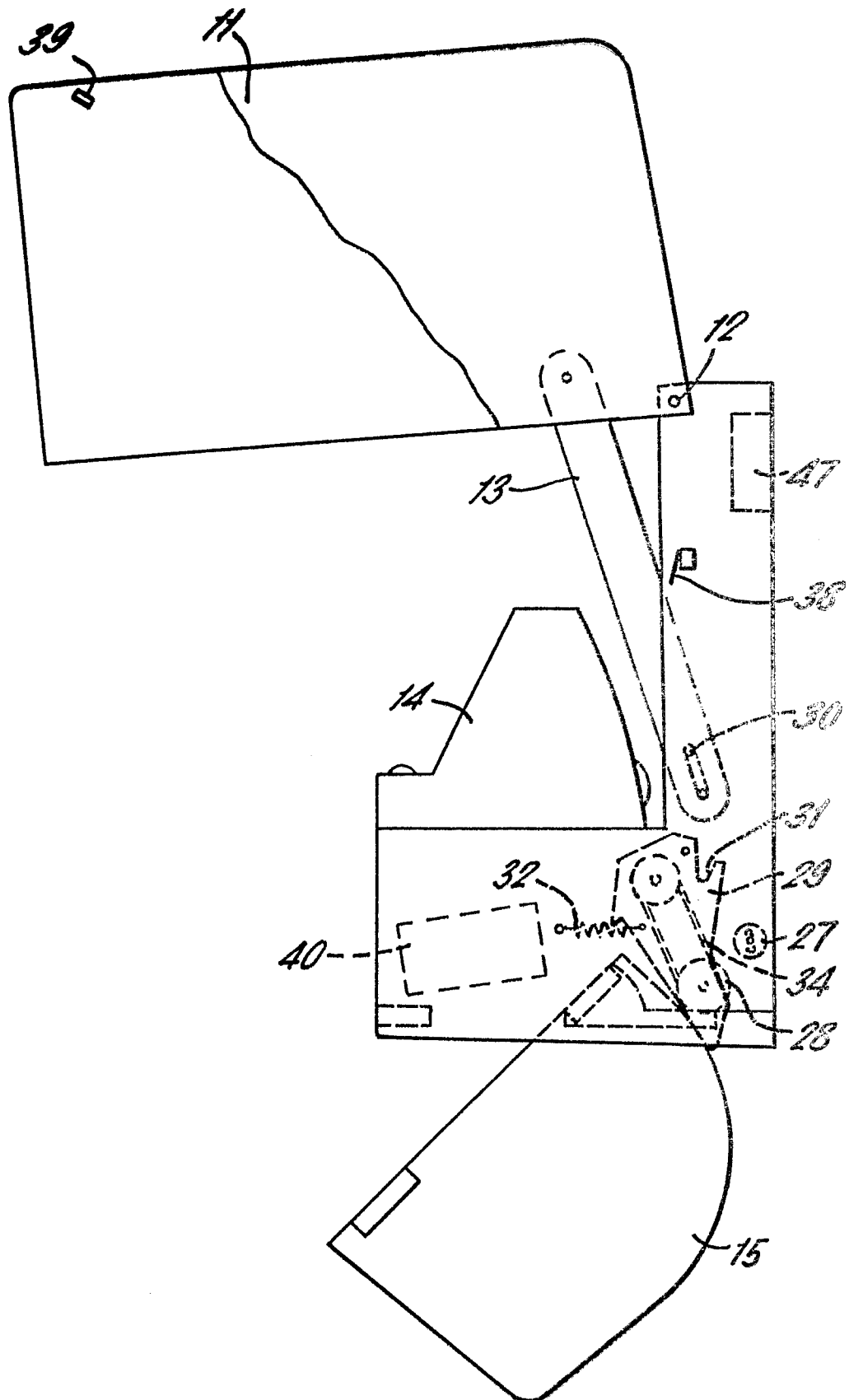
- 5 12. A continuous towel cabinet as claimed in Claim 11 when dependent on Claim 9, characterised in that one switch (43,44) both triggers the integrated circuit (47) and senses the trailing end of the towel.

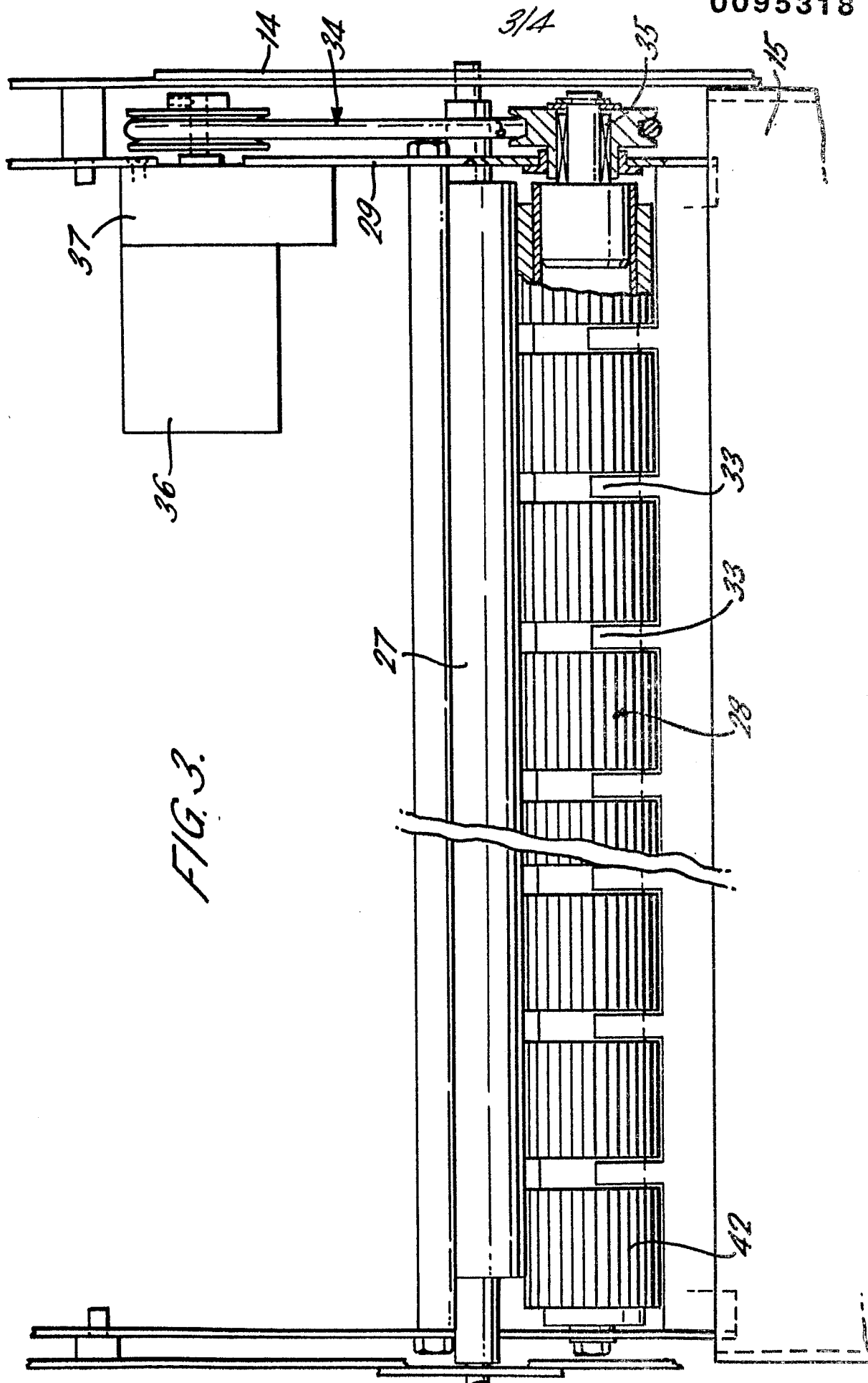
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FIG. 1.



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FIG. 2.





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FIG. 4.

