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Schnyder et al.

[11] **3,826,548**

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[54] **DISPENSER FOR HAND TOWELLING**

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[30] **Foreign Application Priority Data**

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June 19, 1972 Sweden 9162/72

[52] **U.S. Cl.** **312/38,** 312/38
[51] **Int. Cl.** **B65h 19/00**
[58] **Field of Search** 312/37, 38, 39; 226/126, 226/129

[56] **References Cited**

UNITED STATES PATENTS

2,899,251	8/1959	Birr	312/38
3,214,226	10/1965	Bahnsen	312/38
3,522,978	8/1970	Schnyder	312/38
3,563,623	2/1971	Walton	312/38

Primary Examiner—Casmir A. Nunberg

[57] **ABSTRACT**

A dispenser for hand towelling in web form is disclosed, having a supply roll of fresh hand towelling, a dispensing roller over which towelling can be withdrawn from the supply roll, and a winding-up roller for drawing used towelling in and winding it up on a roll. The winding-up roller is driven by an electric motor which is switched on automatically after a predetermined time of use of the withdrawn hand towelling, so that in the rest condition of the dispenser the towelling is always tensioned over the cabinet, and also the end of the towelling, when the supply is used up, is automatically drawn into the cabinet and wound up. As fresh towelling is withdrawn manually from the supply roll, used towelling may at the same time be dispensed from the used towelling roll to a limited extent.

13 Claims, 13 Drawing Figures

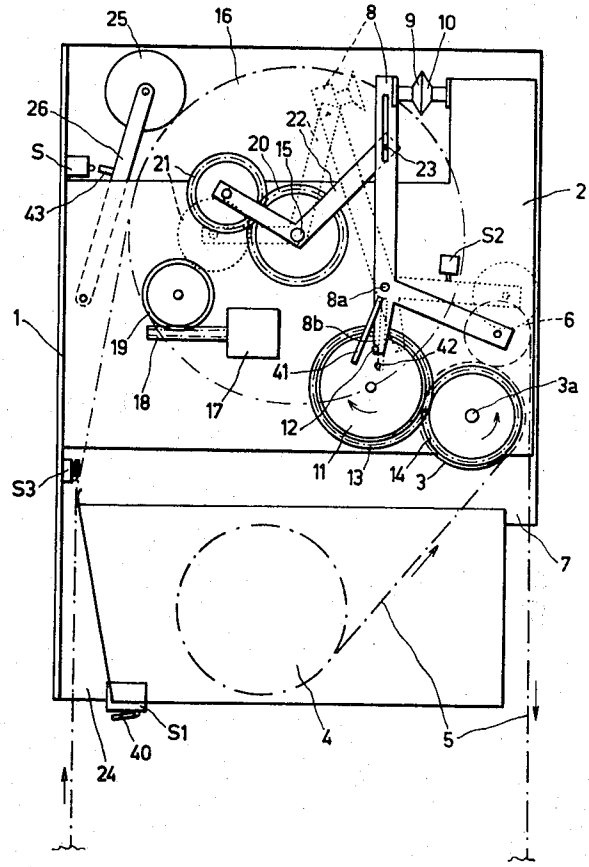


Fig. 1

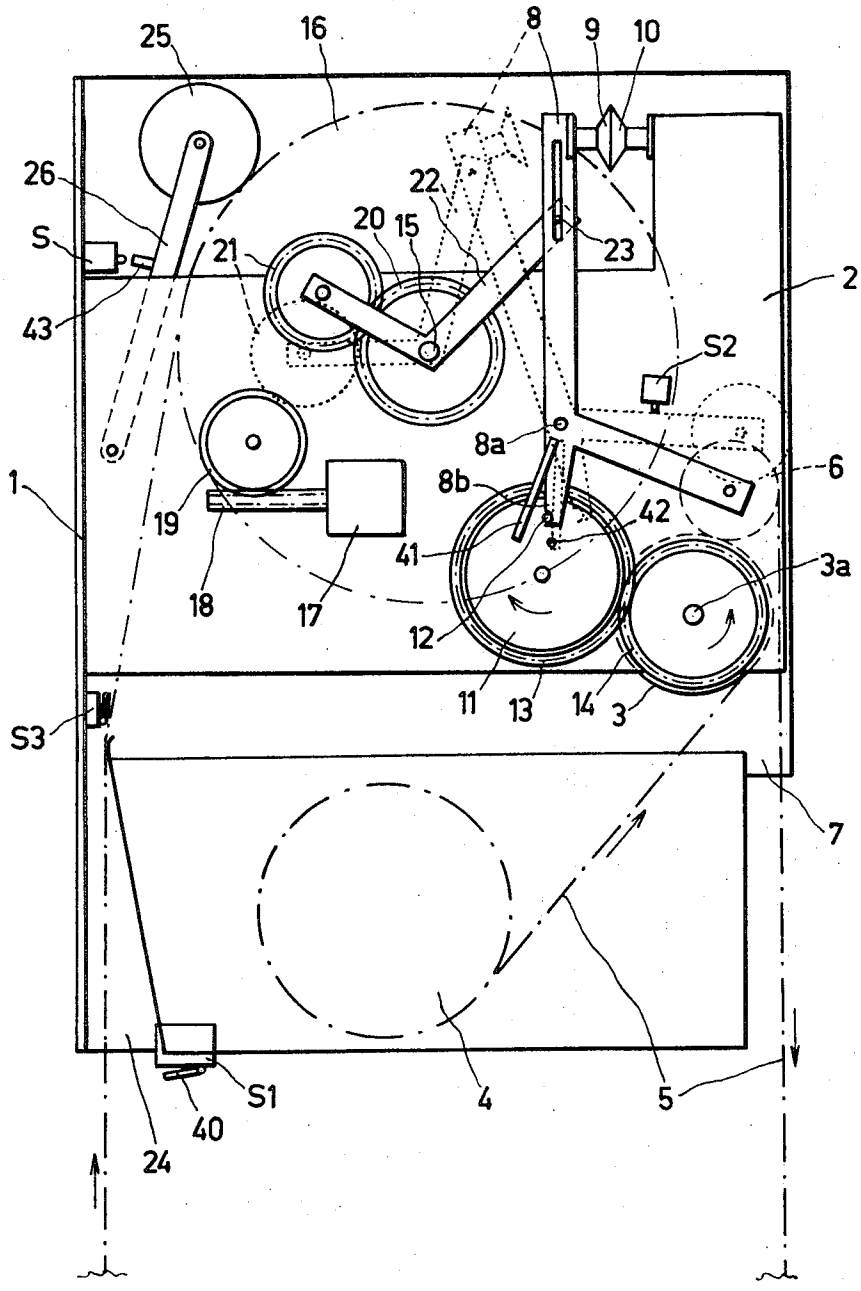

25
16
8
9
10
26
22
S
20
15
21
23
2
43
S2
8a
6
1
8b
42
19
41
3a
18
17
12
11
13
14
3
S3
7
S1
4
5
40
24

Fig. 2

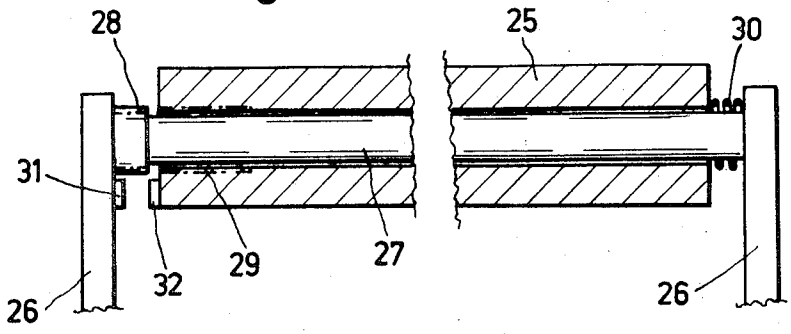


Fig. 3

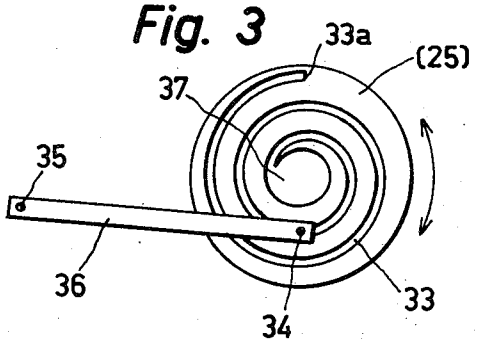


Fig. 7

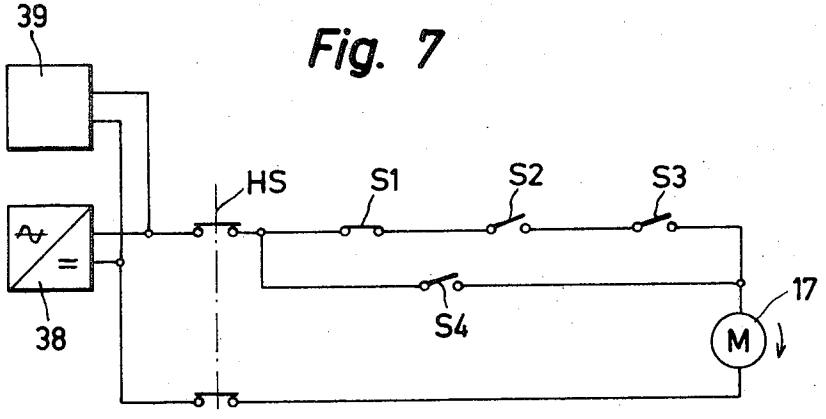


Fig. 4

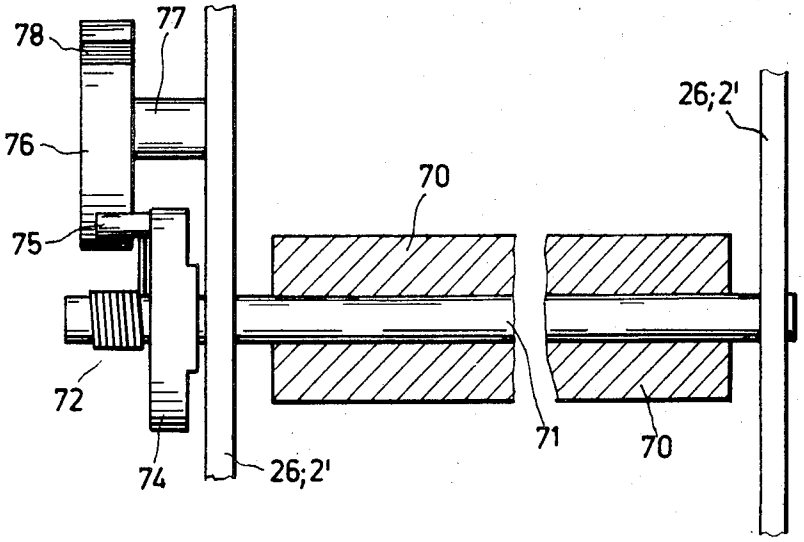


Fig. 5

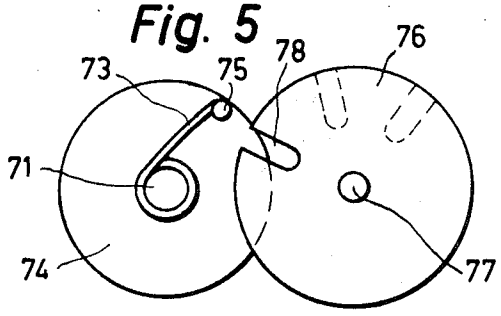


Fig. 6

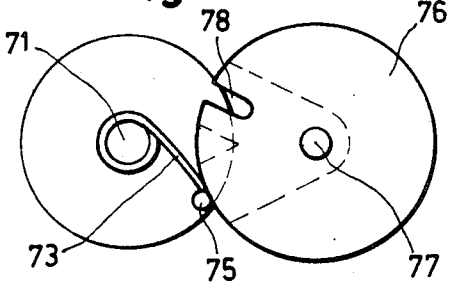


Fig. 8

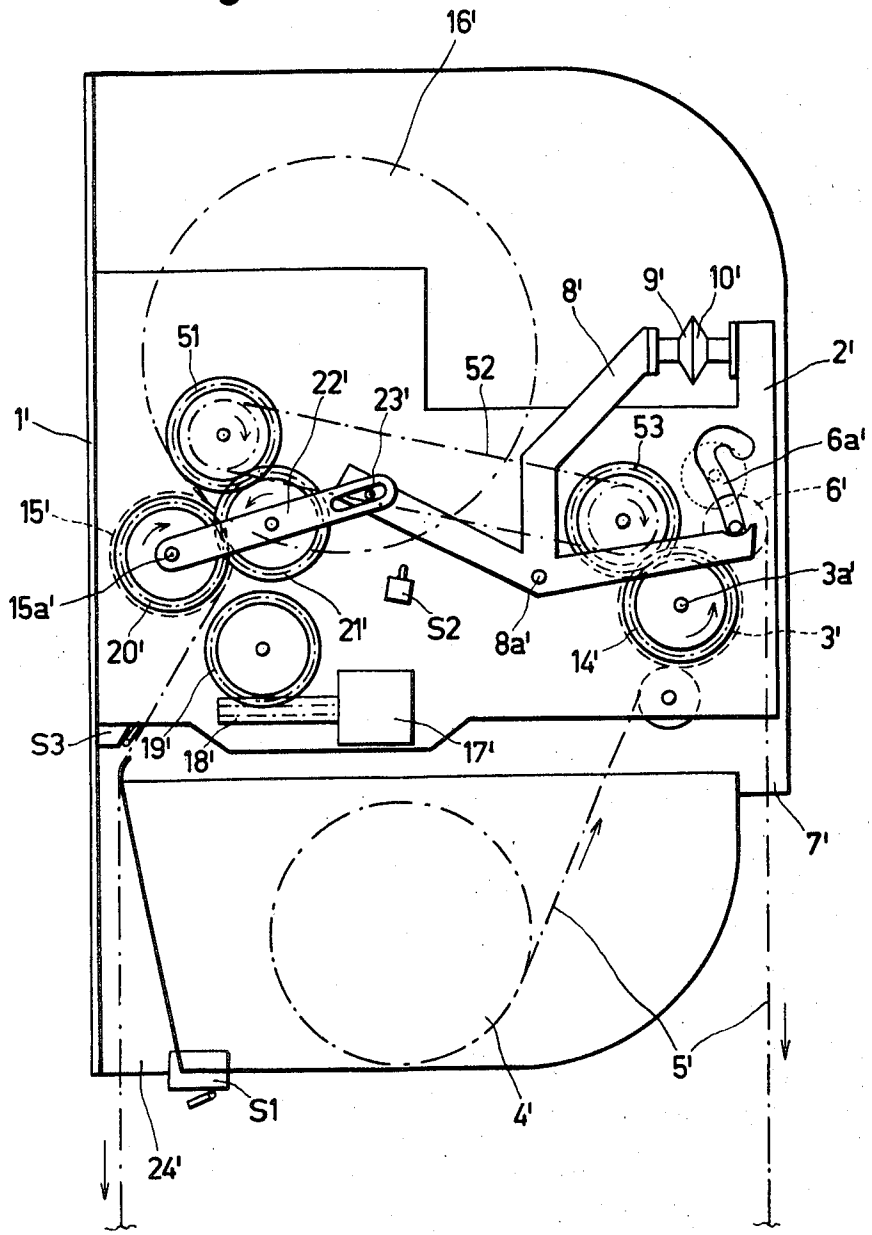

16'
8'
9'
10'
2'
51
52
22'
23'
53
6a'
6'
1'
15'
3a'
15a'
20'
21'
S2
8a'
14'
3'
S3
19'
18'
17'
7'
5'
S1
4'
24'

Fig. 9

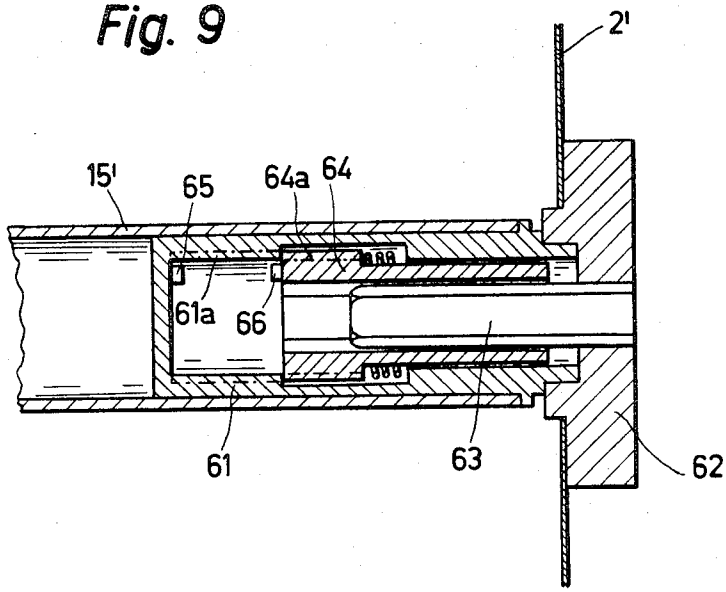


Fig. 10

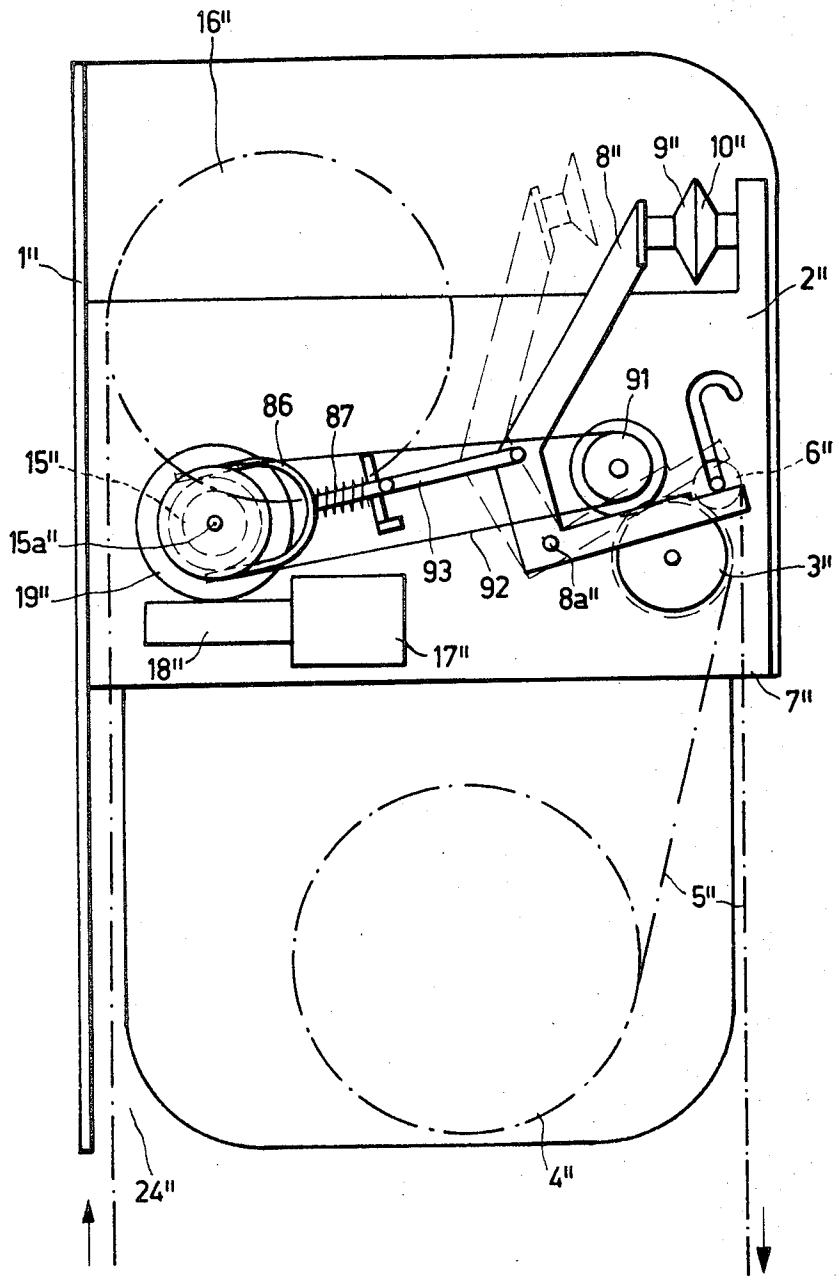


Fig. 11

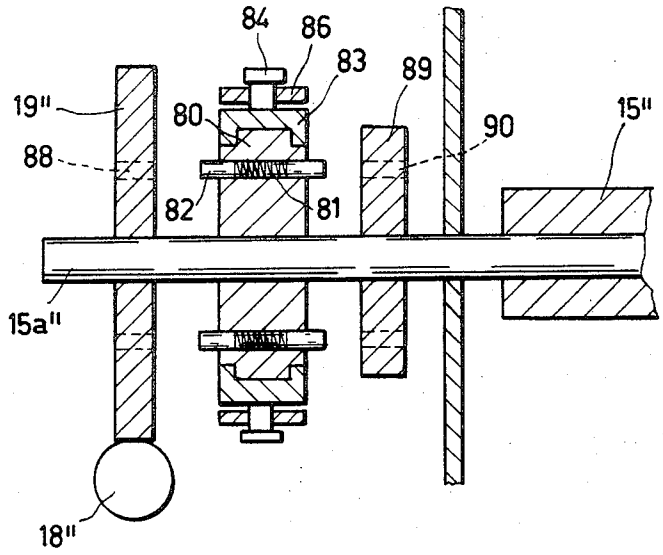


Fig. 12

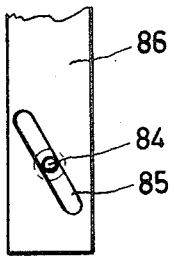
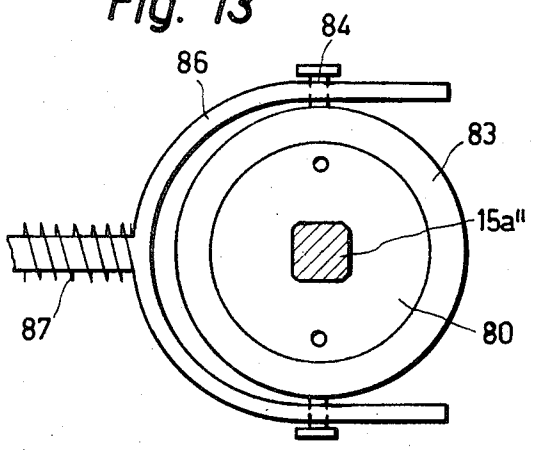


Fig. 13



DISPENSER FOR HAND TOWELLING

This invention relates to a hand towelling dispenser having a dispensing roller over which a web of hand towelling can be drawn from a supply, a wind-up roller for drawing in and winding up the used hand towelling, and a timing stop member which carries a suction cup and is adjustable against a bias, by withdrawal of the towelling, from a rest position to an operative position in which the suction cup is adhered for a predetermined time against a counter element and in which the timing stop member holds effective a limiting device which blocks the dispensing roller for the pre-set period after a predetermined length of hand towelling has been dispensed.

In known hand towelling dispensers of this kind the wind-up roller, which always bears against the periphery of the roll of used hand towelling, is driven through a positive coupling from the dispensing roller, and a loop of hand towelling of constant length always hangs out of the housing. A user is therefore not compelled to pull out fresh towelling before use; instead he can, for reasons of convenience or absent-mindedness, use the hand towelling which has previously been used and is still hanging out. In addition, operation of the wind-up roller becomes impossible as soon as the end of the supply of hand towelling has left the dispensing roller, so that the end section of the towelling hangs from the housing for a long period and can be used by many people. Both situations are undesirable for hygienic reasons.

In order to militate against these draw-backs, hand towelling dispensers have been proposed in which the towelling is normally held taut around the housing between the dispensing slot and the draw-in slot. To dry his hands, a user can pull a loop of hand towelling from the appliance. This loop hangs freely from the housing for a predetermined period but is then pulled back into the latter automatically so that the towelling is tensioned again as before. Likewise after the last use of the towelling the end section is pulled in. The known constructions for achieving this have however many disadvantages. In one known solution a special mechanical hand towelling storage has to be provided in the appliance for drawing-in the used hand towelling. This arrangement is complicated and expensive, and the storage from which the hand towelling is only withdrawn and ultimately wound up during the next use, takes up a lot of space. In another known arrangement the wind-up roller is not positively coupled to the dispensing roller but through a spring means which is loaded by the withdrawal of the hand towelling and only drives the wind-up roller after the expiry of a predetermined period from the time it is released, thereby to wind up the withdrawn loop of hand towelling. This arrangement requires a complicated, expensive construction which, moreover, is liable to faulty operation under some circumstances.

It is an aim of this invention to provide a hand towelling dispenser of the kind set forth above which solves the problems mentioned by automatically drawing-in the loop of hand towelling after it has been used, by means which are simpler, less expensive, less liable to faulty operation, and which use less space than in the case of the known constructions allied with additional advantages.

The hand towelling dispenser according to the present invention is characterised by the fact that an electric motor is provided for driving the wind-up roller and this motor is switched into operation by the movement of the timing stop member back into the rest position.

Advantageously the electric motor can also be used to draw out a small remainder of hand towelling in the supply, for a purpose to be described, and wind it up with the aid of the wind-up roller. Moreover it is no longer absolutely essential for the wind-up roller to bear against the periphery of the roll of used hand towelling; if desired it could from the core of this roll, which makes possible a further saving of space. Moreover the dispenser can, without difficulty, be constructed so that the change of towelling can be carried out in the same, customary fashion which has been used millions of times in the hand towelling dispensers which are at present known and do not have any automatic retraction of the towelling.

Advantageously to cut out the electric motor a switch can be arranged in the circuit of the latter and be opened after the winding-up of a length of hand towelling corresponding to that which has previously been pulled out, for example by the tension or by the pull in the towelling running to the wind-up roller. A further switch (or a means for operating the same switch) can be provided to interrupt the circuit of the electric motor after the end of the hand towelling has been pulled in.

The aforesaid limiting device may, in a very simple form of construction, include an abutment provided on the timing stop member and adapted to be brought into the path of a dog coupled to the wind-up roller when the timing stop member is in its effective position. It is of course always possible that a user will not withdraw the full length of hand towelling required to bring the dog coupled to the wind-up roller into engagement with the abutment on the timing stop member. In order, nevertheless, to bring to dog back to a predetermined starting position after use, a projection may be provided on a wheel carrying the dog and it be arranged that an arm of the timing stop member shall engage this when the member is returned to its original position. A one-way coupling may in this case be arranged between the dispensing roller and the aforesaid wheel.

Since the user will as a rule use only the front part of the loop of hand towelling hanging out of the dispenser for drying his hands, the arrangement advantageously can be such that when the towelling is pulled not only is fresh towelling drawn at the front over the dispensing roller, but at the same time used hand towelling will be drawn from the roll at the rear. To this end the electric motor can be coupled to the wind-up roller through a coupling which is operable by the timing stop member. The length of used hand towelling which can be drawn from the roll should however preferably be limited, for example by means of a roller which bears against the periphery of the roll and which can be turned to an unlimited extent in the wind-up direction but to a limited extent only in the opposite direction.

In this arrangement it may happen that the last-mentioned roller will press somewhat into the roll of used hand towelling when this has become relatively thick, so making it difficult or even impossible to pull the used hand towelling from the roll. This drawback can be ameliorated very simply, if the roller bearing on

the roll of used hand towelling is the wind-up roller, by coupling the latter to the dispensing roller during the dispensing of towelling so as to be driven from this in the winding-off direction. If the windup roller is only capable of limited rotation in the windoff direction, it can, together with a coupling of this nature, at the same time form the aforesaid limiting device for blocking the dispensing roller after the predetermined length of hand towelling has been dispensed. In the arrangement last described, therefore, the wind-up roller bearing on the periphery of the roll of used towelling is connected to a coupling device, controlled by the timing stop member, to couple the wind-up roller with the electric motor when winding up is required, so long as this stop member is in its rest position, and to couple the wind-up roller with the dispensing roller to wind-off hand towelling from the roll as long as the timing stop member is in its operative position.

Preferred embodiments of the hand towelling dispenser in accordance with the present invention are illustrated in more detail in the accompanying drawings. In these drawings:

FIG. **1** is a diagrammatic side view of the internal mechanism of a hand towelling dispenser,

FIG. **2** is a diagrammatic axial section through a roller which is rotatable by a limited amount in one direction but by an unlimited amount in the other direction,

FIG. **3** is an end view of a modification of FIG. **2**,

FIG. **4** is an axial section of a further modification of a roller which is rotatable by a limited amount in one direction,

FIGS. **5** and **6** are diagrammatic end views of the limiting mechanism used in FIG. **4**, showing the parts in different positions,

FIG. **7** is an electrical wiring diagram of the hand towelling dispenser according to FIG. **1**,

FIG. **8** is a diagrammatic side view of the inner mechanism of another hand towelling dispenser,

FIG. **9** shows details of a roller of the dispenser of FIG. **8** the rotation of which is limited in one direction only,

FIG. **10** shows a still further embodiment of a hand towelling dispenser, in a side view similar to that of FIG. **8**,

FIG. **11** shows a detail of the dispenser according to FIG. **10** in an elongated front view, and

FIGS. **12** and **13** show further details of FIGS. **10** and **11**.

The hand towelling dispenser illustrated in FIG. **1** has a housing, which is not illustrated in detail, with a rear wall **1** which can be secured to the wall of a toilet. The rear wall **1** has two parallel side mounting plates **2**, one only of which is illustrated in FIG. **1**. A dispensing roller **3** with a spindle **3***a* is rotatably mounted between the mounting plates **2**.

Textile hand towelling in web form can be withdrawn from a hand towelling supply in the form of a roll **4** disposed in the lower part of the housing, and this web passes over the dispensing roller **3** and a presser roller **6** and is pulled through a front slot **7** of the housing by hand, following a path which is indicated by a chain dotted line **5**.

The presser roller **6** is rotatably mounted on one arm of a timing stop lever **8**, and this in turn is pivotally mounted about a spindle **8***a*. Pulling by hand on the hand towel which emerges from the housing slot **7** causes the timing stop lever **8** to pivot from a rest position, which has been indicated by dotted lines, in opposition to a bias (by a spring which has not been shown) into an operative position which has been shown in full line. In this operative position of the timing stop lever **8** a suction cup **9** carried by the latter adheres against a counter element in the form of a second and fixed suction cup **10**. It is apparent that the suction cups **9** and **10** will detach from one another after a predetermined time (adjustable, if required, by an air inlet valve), whereupon the aforesaid biassing spring will turn the time stop lever back into its rest position.

The lower arm **8***b* of the stop lever **8** constitutes an abutment which, in the operative position of the lever, projects into the path of a dog **12** on a wheel **11**. This wheel is connected to a toothed sprocket **13** through a one-way clutch (not illustrated). The one-way clutch is mounted so that wheel **11** will be turned when sprocket **13** rotates in the clock-wise direction (in FIG. **1**) but wheel **11** can turn into the clockwise direction without taking sprocket **13** with it. The latter meshes with a toothed wheel **14** which is rigidly connected to the dispensing roller **3**.

A wind-up roller (not shown in the drawing) with a spindle **15** is provided for drawing-in and re-reeling used hand towelling through a rear slot **24** in the housing, this spindle **15** being rotatably mounted between the plates **2**. The wind-up roller could, in the usual way, bear against the periphery of the roll of used hand towelling, the roller with its non-displaceable spindle being arranged beneath the loosely-disposed roll of used hand towelling. In the example illustrated, however, the wind-up roller represents the core of the roll **16** of used hand towelling. This has the advantage that when the dispenser is working the roll **16** will gradually build up into the space previously occupied the supply roll **4**. This means that the dispenser does not need to be very deep, that is to say a greater length of hand towelling can be accommodated in a specified height of housing.

An electric motor **17** is provided for driving the spindle **15** of the wind-up roller. This motor drives a pinion wheel **19** through a worm **18**. Mounted on the spindle **15** is a toothed wheel **20** which meshes with an intermediate toothed wheel **21**. This latter is mounted on a lever **22** which pivots about the spindle **15**. Lever **22** carries a pin **23** which engages in a slot in the timing stop lever **8**, and the arrangement as illustrated is that the intermediate wheel **21** is only in engagement with the wheel **19** when the stop lever **8** is in its rest position (i.e., that illustrated in dotted lines).

The intermediate wheel **21** on the pivotable lever **22** thus constitutes a clutch between the electric motor **17** and the wind-up roller operable by the lever **8**. When this clutch is disengaged (after the stop lever **8** has been pivoted into the operative position), the wind-up roller is freely rotatable so that used hand towelling can be wound off backwards from the wind-up roller and withdrawn through the rear slot **24** in the housing. This is desirable because the user, in drying his hands, only uses the forward part of the withdrawn loop of hand towel emerging through dispensing slot **7**, and no fresh length of hand towel is required in the rear part of the loop.

However, for security, care has to be taken that not too much towel can be unwound from the roll **16**. For this reason a restricting roller **25**, rotatably mounted

between pivotable carrier levers **26**, bears against the periphery of roll **16**. The roller **25** can be turned without limitation in the counter clockwise direction (FIG. **1**) that is to say in the wind-up direction (with the roll **16** turning in the clockwise direction). In the opposite sense, that is to say in the clockwise direction, the amount of rotation of roller **25** is limited to about two to three turns.

In order to implement the restriction in one direction, use can be made of a groove of screw or spiral form and a counter element which engages in the groove and is movable to a limited extent in one direction, whereas it can leave the groove at the opposite end of the latter. For example, as seen in FIG. **2**, the roller **25** may be mounted on a non-rotatable spindle **27** which has an external thread **28** at one end near the roller **25**. A groove of screw form represented by a female thread **29** is furnished in the hollow interior of the roller **25**. The external thread **28** can engage in the groove of this nut **29** as a counter element. It will be seen that when there is rotation in one direction, the roller **25** screws up on thread **28**, a compression spring **30** being used to ensure that the counter threads initially engage. Only a limited amount of this screwing up is possible because after a predetermined amount of rotation abutments **31** and **32**, on the carrier lever **26** and the roller **25** respectively, encounter one another. When rotation takes place in the opposite direction the roller **25** screws off the thread **28** and this leaves the counter nut thread **29**. There is no obstacle to this.

FIG. **3** shows a modification of the arrangement illustrated in FIG. **2**, and in this case there is a spiral groove **33** which may be formed for example in an end surface of the roller **25** or of a wheel which is coupled to this. In this case the counter element is a pin **34**, which is secured at **35** to a pivotable lever **36** and engages in the groove **33**. When the member **25** turns in the counter clockwise direction in FIG. **3**, the end of groove **33***a* finally meets the pin **34**, so limiting the amount of rotation which can take place in the counter clockwise direction. In constrast, when the member **25** turns in the clockwise direction, the pin **34** finally leaves the inner end of groove **33** and remains in the inner area **37** without interfering with the rotation. In this modification when rotation in the counter clockwise direction begins again, pin **34** will always be biassed by gravity to bear against the lower boundary of the inner area and will therefore enter groove **33**.

FIGS. **4** to **6** show a further modification of a limiting mechanism operative in one direction of rotation of a roller. As seen in FIG. **4**, a roller **70** is rotatably mounted, by means of a spindle **71**, in carrier levers **26** according to FIG. **1**, or in side plates **2'** according to FIG. **8**. A torsion spring **72** is pushed onto the end of spindle **71**, the free arm **73** of this spring being secured, by means of a pin **75**, to a disc **74** which is rotatable on spindle **71**. Disc **74** can be freely rotated on spindle **71** only in one direction, i.e. in the clockwise direction in FIG. **5**. If it is rotated in the opposite direction, spring **72** is pulled tight around spindle **71** and connects the latter to disc **74**. A braking disc **76** is rotatably mounted on the supporting element **2'** or **26**, respectively, and forms a stop for pin **75** and disc **74**. To ensure that this restriction of disc **74** and therefore of sprindle **71** and roller **70** becomes effective only after more than one revolution in the counter clockwise direction (i.e., in the dispensing direction), braking disc **76** is provided with one or more notches **78** by means of which the braking disc **76** can be turned through an angle by pin **75** on each rotation of disc **74**, in a manner similar to a Geneva motion. The number of the notches **78** corresponds to the number of unhindered revolutions plus one. Broken lines in FIG. **6** indicate the possibility of using a brake element reduced to an angle piece in place of brake disc **76**. Rotation of disc **74** in the clockwise direction also results, after one or more revolutions, in pin **75** abutting on brake disc **76**, but in this case the spring **72** is pushed against its winding direction so that it opens and releases spindle **71** in the clockwise direction (i.e., in winding-up direction).

FIG. **7** shows a wiring diagram of the electrical feed circuit of the electric motor **17**. The feed is from mains through a rectifier **38** and/or from a battery **39**, which may be chargeable, through a mains switch HS. The motor **17** is connected to this through three switches **S1**, **S2** and **S3** in series. A further switch **S4** connected in parallel to switches **S1** and **S3** couples the mains switch HS directly to the motor **17**.

Switch **S4** is a normally open, manually-operable press button switch that has not been shown in FIG. **1**.

Switch **1** is a normally closed switch which is arranged in the lower part of the housing of the dispenser in the vicinity of drawing in slot **24** (FIG. **1**), and it is operated by a detector **40**. This detector **40** opens the switch **S1** as soon as the hand towelling is tightened between the dispensing slot **7** and the entry slot **24** via the lower part of the housing.

Switch **S2** is a normally open switch arranged beside the timing stop lever **8**. This latter holds switch **S2** closed so long as it is in its rest position.

Switch **S3** is a normally open switch which is arranged beside the hand towelling at the part where it runs onto the wind-up roller. This hand towelling holds switch **S3** closed, it opens however when the end of the length of hand towelling has passed by it. It will be understood that the function of the mechanical switch **S3** could be performed instead by a photo cell device or the like.

The hand towelling dispenser described operates as follows:

In the rest position with the apparatus ready to operate the hand towelling **5** from the supply **4** is passed around rollers **3** and **6** between the dispensing slot **7** and the drawing-in slot **24** via the bottom of the housing, and extends from the drawing-in slot to the roll **16**. The timing stop lever **8** is in the rest position (as shown in dotted lines) and the switch **S2** is therefore closed. Switch **S3** is likewise closed, but switch **S1** is held open by the tensioned hand towelling.

A user wishing to dry his hands must now grip the piece of hand towelling which is tensioned around the bottom of the housing and pull it down. This pull acts on the presser roller **6** and in the first place pivots the timing stop lever **8** into its operating position in which it is held by the cooperation of suction cups **9**, **10** for a pre-set period of time. The switch **S2** is now open and the coupling between motor **17** and wind-up roller, i.e., through the agency of the intermediate wheel **21**, is broken so that a (limited) length of previously used hand towelling can also be wound off from the roll **16**. Abutment **8***b* lies in the path of the dog **12** and holds this and thus (through wheel **11**, sprocket **13** and toothed wheel **14**) the dispensing roller **3**, after a pre-

determined length of hand towelling has been dispensed. The predetermined length of hand towelling corresponds to something less than one complete turn of wheel **11** and thus something more than a complete rotation of the metering roller **3.**

The user can now dry his hands on the loop of hand towelling (that is to say at the forward part of the latter) which has been pulled out.

After the period of time predetermined by the suction cups **9, 10** has expired, the timing stop lever is pivoted back from its biassed position into the rest position. In so doing it frees the dog **12** and an arm **41** secured to the timing stop lever **8,** and beneath which the dog **12** can always pass without obstruction, engages a pin **42** carried by the wheel **11** and thereby turns the wheel **11** through a small angle into a pre-set starting position (in which at the beginning of the next operation the dog **12** is disposed behind abutment **8***b*). If the user has not withdrawn the whole of the predetermined length of hand towelling, that is to say the dog **12** has not been turned through the agency of the dispensing roller **3** sufficiently far to meet the abutment **8***b*, the arm **41** can turn the wheel **11** through an even larger angle until the pre-set starting position is reached. Because of the one-way clutch the pinion **13** is not turned with it at this time.

When the timing stop lever **8** is turned back into the rest position the switch **S2** is also re-closed and the coupling between motor **17** and wind-up roller **15** is engaged (as a result of pivoting of the intermediate toothed wheel **21**). The switch **S1** is closed as long as the hand towelling hangs down in a loop and does not touch the detector **40.** The electric motor **17** therefore runs and drives the wind-up roller until all the loop of hand towelling is wound up and the now-tensioned towelling operates the switch **S1** again. This cuts the electric motor out and re-establishes the rest position ready for re-use.

When all the hand towelling is used up in the dispenser by a final user and the end of the towelling has been pulled out through the slot **7** the winding-up of the used towelling takes place in the same way as described under the action of the electric motor **17,** after a time period pre-determined by the suction cups. In fact the electric motor continues to run until the whole end section of the hand towel has been wound up, because the switch **S1** will be opened in the absence of any further tensioned towelling. When the end of the towelling has been wound up the motor is switched off by switch **S3.**

This switch **S3** could even be omitted and the electric motor cut out after a pre-determined running period. A time delay cut-out of this kind could, if desirable, also make the switch **S1** superfluous, and in this event only a slip clitch would be needed in the motor drive. Instead of this the switch **S2** could be replaced by a switch which is opened as soon as the motor exceeds a pre-set torque (because the hand towelling is tensioned).

In the embodiment described the restricting roller **25** bears against the periphery of the roll **16.** This is of course not absolutely necessary; the hand towelling passing to roll **16** could simply be guided over a restricting roller with a fixed spindle. The arrangement described has however the advantage that the position of the carrier lever **26** gives an indication of the size of roll **16** and thus indirectly the size of the remaining supply **4** of hand towelling. Thus the carrier lever **26** could be used to operate a signalling arrangement which will indicate when the supply **4** has fallen to a predetermined minimum value, for instance as average amount of use per day. Thus for instance, the carrier lever **26** can be arranged to close a switch S (FIG. **1**) as soon as the roll **16** has reached a specified diameter, and this switch would then connect in an electrical signalling means, for example an indicator lamp. The switching point can be adjustable through the agency of an operating member **43** which is adjustable fastened to the carrier lever **26,** for example for adjustment to different average daily usages.

To save current, particularly for example where a battery is used, use may be made of a mechanical signalling arrangement instead of the electrical version, and this could comprise an indicator member mechanically movable by the carrier lever **26.**

Naturally the size of the roll **16** or of the supply **4** can be detected mechanically in other ways than that described above using the roller **25.**

The signalling means described has the advantage that the attendant when daily servicing or cleaning a toilet would be able directly to realise, from the exterior, that the supply **4** had become too small and that the hand towelling should be replaced. In the arrangement described it is simple, thanks to the electric motor **17,** to wind-up the remaining and too-small hand towelling supply onto roll **16** rapidly and effortlessly. To this end the attendant (using supporting means which have not beet shown) holds the presser roller **6** approximately in the upper position indicated in dotted lines so that it will not operate the timing stop lever, and he will then simply depress the press button switch **S4** (FIG. **4**) to bring in the motor **17** until the remainder of the hand towelling has been withdrawn and wound up onto roll **16.** The removal of the complete roll **16** and the insertion of a fresh supply roll **4** can then take place in the usual way.

FIG. **8** shows diagrammatically another form of hand towelling dispenser in accordance with the invention. This has a housing, not shown in detail, with a rear wall **1′** which can be fixed to the wall of a toilet. This rear wall **1′** has two parallel side mounting plates **2′** one only of which is visible in FIG. **5.** Mounted between the plates **2′** is a dispensing roller **3′** with a spindle **3***a′*. Material towelling of web form can be withdrawn by hand from a hand towel supply in the form of a roll **4′** disposed in the lower part of the housing, this web, which is indicated by a chain-dotted line **5′**, passing over the dispensing roller **3′** and a presser roller **6′** and out through a front slot **7′** of the housing.

The spindle of the presser roller **6′** extends through a slot **6***a′* in the mounting plate **2′** and rests on an arm of a timing stop lever **8′**, which is pivotable about a spindle **8***a′* on the mounting plate **2′**. The presser roller **6′** and the timing stop lever **8′** are shown in an operative position into which they have been brought by a pull on the hand towelling guided over the presser roller and emerging from the slot **7′** in the housing against a bias provided by a spring (not shown) engaging the timing stop lever. In this operative position of the timing stop lever **8′** a suction cup **9′** carried by this adheres to a counter element in the form of a fixed, second suction cup **10′**. It is apparent that the suction cups **9′** and **10′** will detach from one another after a predetermined period, whereupon the aforesaid bias will turn the tim-

ing stop lever 8' back in the counter clockwise direction into a rest position in which this stop lever will hold the presser roller 6' in the position indicated by dotted lines.

A wind-up roller 15' is provided for drawing used hand towelling through the rear slot 24' in the housing and for winding it up on a roll 16', the periphery of used hand towelling roll 16' bearing against the periphery of this roller 15'. The spindle 15*a*' of the wind-up roller is rotatably mounted in the plates 2'.

An electric motor 17' is provided for turning the roller 15' in the winding-up direction. This motor drives a pinion wheel 19' through a worm 18'. The spindle 15*a*' carries a toothed wheel 20' which is in engagement with an intermediate toothed wheel 21'. The latter is mounted on a lever 22' which is pivotable around spindle 15*a*'. The lever 22' had a slot in which engages a pin 23' which is carried by a rearwardly-projecting arm of the timing stop lever 8'. As shown, the arrangement is such that the intermediate wheel 21' meshes with a toothed wheel 51 when the stop lever 8' is in its operative position as illustrated, but that the intermediate wheel 21' meshes with the pinion wheel 19' when the stop lever 8' is in its rest position. The toothed 51 is coupled through a chain 52 with a toothed wheel 53 which is in engagement with a toothed wheel 14' carried by the spindle 3*a*' of the dispensing roller 3'.

Thus the intermediate wheel 21' on the pivotable lever 22' represents a clutch arrangement which can be changed by the timing stop lever 8' to couple the windup roller 15' alternatively with the electric motor 17' and with the dispensing roller 3'.

The wind-up roller 15' can rotate without restriction in the wind-up direction, that is to say in the counter clockwise direction in relation to FIG. 8. In the unwinding direction, which is indicated by an arrow in FIG. 8, the wind-up roller 15' is restricted to a few turns only. The means to limit the motion in this way can be similar to those which have been suggested for the limiting roller 25 in the arrangement illustrated in FIGS. 1–3, or for the roller 70 in FIGS. 4–6. Another suitable construction is illustrated in FIG. 9.

Secured to one end of the roller 15' in FIG. 9 is a sleeve 61 which is rotatably mounted in a bearing body 62 secured in the mounting plate 2'. A hexagonal mandrel 63 secured in the bearing body 62 engages an axial hexagonal bore in a screw 64 which is thus capable of axial displacement but is held against rotation. An internal screw thread 61' in the sleeve 61 can be screwed up on the external screw thread 64*a*. When the roller 15' is rotated in a direction which will screw the thread 61*a* up on the screw 64 (a spring which biasses the screw to the left being used to ensure the initial engagement), an abutment 65 on the sleeve 61 after a few turns strikes a similar abutment 66 on the screw 64. When rotation takes place in the opposite direction however the threaded engagement is released, enabling the roller 15' to turn without restriction.

Three series-connected switches S1, S2 and S3 can be arranged in the electrical feed circuit of motor 17', similarly to the arrangement depicted in FIG. 7. Here again the switch S1 is a normally closed switch which is arranged on the lower part of the housing of the dispenser so as to be opened by the hand towelling as soon as this is tensioned over the bottom of the housing between the dispensing slot 7' and the entry slot 24'. Switch S2 is a normally open switch arranged beside the timing stop lever 8'. This lever 8', so long as it is in its rest position, holds the switch S2 closed. The switch S3 is a normally open switch which is arranged beside the part of the hand towelling approaching the wind-up roller 15'. This hand towelling holds the switch S3 closed. The latter opens, however, when the end of the web of hand towelling has passed it.

The hand towelling dispenser according to FIG. 5 operates as follows:

In the rest position, ready for operation, the towelling 5' is taken from the supply 4' around rollers 3' and 6' and is tensioned between the dispensing slot 7' and the entry slot 24' around the bottom of the housing, and extends from the entry slot to the wind-up roller 15' and the roll 16'. The timing stop lever 8' is in the rest position (not shown) and the switch S2 therefore is closed. Switch S2 is likewise closed, but switch S1 is held open by the tensioned towelling.

A user wishing to dry his hands engages the section of the towelling which is tensioned around the bottom of the housing and pulls it down. As a result the presser roller 6' will first be drawn down and the lever 8' consequently turned into the operative position in which it is held for a predetermined period of time by the suction cups 9' and 10'. Switch S2 is now open and the windup roller 15' is coupled to the dispensing roller 3' through the intermediate wheel 21' and the toothed wheels 51, 53. As a result of the drawing down of the hand towelling over the dispensing roller 3' the wind-up roller 15' is also turned, as indicated by arrows, i.e., in the wind-off direction, so that used hand towelling will be wound off roll 16' and pass through the slot 24'.

The rotation of the wind-up roller 15' in the unwinding direction is limited, as has previously been described. After a predetermined length of hand towelling has been dispensed over roller 15', and at the same time a predetermined length of hand towelling over the dispensing roller 3', the two inter-coupled rollers are therefore blocked.

The user can now dry his hands on the front part of the loop of hand towelling which he has pulled out.

Subsequently, after the expiry of a period of time predetermined by the suction cups 9' and 10', the timing stop lever 8' is pivoted back into its rest position by the bias thereon. In so doing it releases the intermediate toothed wheel 22' from toothed wheel 52 and brings it back into engagement with the wheel 19'. Furthermore when it is in its rest position the timing stop lever closes the switch S2. This brings in the electric motor 17', the switch S1 being closed, so long as the hand towelling is not tensioned around the bottom of the housing. The electric motor 17' drives the wind-up roller 15' in the reel up direction (the counter clockwise direction in FIG. 1) until the complete loop of hand towelling has been wound up and the tensioned length of this towelling again contacts switch S1. This then cuts out the electric motor and as a consequence the rest position is restored ready for a fresh operation of the unit.

When the complete supply of towelling has been used up in the dispenser and the end of this towelling has been pulled out through slot 7', the used towelling will be wound up immediately, in the same way as has been described above, by the electric motor after a last use of the towel and after the expiry of the time set by the suction cups. The electric motor continues to run until the complete end section of the hand towelling has

been wound up, because switch S1 will be opened in response to an absence of tensioned towelling. After the end of the towel has been wound up the motor is stopped by switch S3.

When the attendant sees, for example during a daily servicing or cleaning of the toilet, that the supply has become very small, this remainder can very easily be wound on to the roll 16' to enable a fresh hand towel supply to be introduced. The attendant first of all lifts the presser roller 6' in a forwardly curved part of the slot 6a'. He can then withdraw the remainder of the hand towelling rollers 3' and 6' without bringing the timing stop lever into its effective position. The hand towelling so extracted, is readily wound up by motor 17'.

A further possible modification of a hand towelling dispenser is diagrammatically shown in FIGS. 10 to 13. According to FIG. 10 two side mounting plates 2'' are carried by a rear wall 1'. Mounted between the plates 2'' is a rotatable dispensing roller 3'' with a spindle 3a''. Towelling of web form can be withdrawn from a supply roll 4'' over the dispensing roller 3'' and a presser roller 6'' and out through a slot 7'' of the housing. Pulling on the hand towelling 5'' moves presser roller 6'' downwards, and this in turn brings a timing stop lever 8'' into the illustrated operative position, against the action of a spring. After a predetermined time period, a suction cup 9'' carried on the timing stop lever 8'' detaches from a fixed suction cup 10'' and the timing stop lever returns into a rest position under the influence of said spring.

A wind-up roller 15'' is provided for drawing used towelling through a rear slot 24'' in the housing and for winding it up on a roll 16'', the periphery of the latter bearing against roller 15''. The roller 15'' is rotatably mounted in the side plates 2'' by means of a spindle 15a'' which is rigidly connected to the roller 15''.

An electric motor 17'' is provided for turning the roller 15'' in the winding-up direction. This motor drives a pinion wheel 19'' through a worm 18''. The pinion wheel 19'' is rotatable on the spindle 15a''. Also mounted on the spindle 15a'' is a shifting clutch 80 (FIG. 11) which is axially displaceable, but not rotatable relatively to the spindle. Pins 82 project from the clutch on both sides under the action of springs 81. Clutch 80 is encircled by a guide ring 83 carrying two radially projecting dogs 84 which engage in slots 85 in a shifting fork 86. A spring 87 tends to hold this fork in a position in which the dogs 84 are so positioned by the slots 85 that the guide ring 83 forces the clutch 80 against the pinion wheel 19''. To ensure a safe entraining connection between the clutch 80 and the wheel 19'' the latter is provided with six bores 88 into which the pins 82 engage after a rotation of 60° at most.

A sprocket wheel 89 having bores 90 is also rotatably mounted on the spindle 15a'' of the wind-up roller 15''. This sprocket wheel 89 is coupled to the dispensing roller 3'' via an intermediate wheel 91 and a sprocket chain or toothed belt 92. (The connection between the wheel 89 and the dispensing roller 3'' could also be via gear wheels in place of the chain or belt 92, if desired).

A pulling element 93 connects the timing stop lever 8'' with the shifting fork 86. Pivoting of the timing stop lever 8'' on its spindle 8a'', brought about by pulling in the dispensing direction on the hand towelling 5'' passing around the roller 6'', results in the shifting fork 86 being moved from its rest position to the right (in FIG. 10). As a consequence, guide ring 83 is shifted to the right (in FIG. 11) by dogs 84 sliding in slots 85, so that the clutch 80 is forced against the sprocket wheel 89. Thus, after 60° rotation at most of the sprocket wheel, the dispensing roller 3'' is positively coupled with the wind-up roller 15''. The operation is the same as in the embodiment of FIG. 8. The wind-up roller 15'' is rotatable without restriction in the winding-up direction, i.e., in the counter clockwise direction in FIG. 10, whereas in the winding-off direction the number of possible revolutions of roller 15'' is limited. This restriction can be achieved by means of mechanisms similar to those shown in FIG. 2, FIG. 3, o FIGS. 4– 6.

What we claim is:

1. A dispenser for a web of hand towelling comprising

a housing receiving a supply of hand towelling,

a dispensing roller over which the web of hand towelling can be withdrawn from said supply,

a wind-up roller for drawing in and winding up used hand towelling,

a timing mechanism including a timing stop member, a suction cup carried on said timing stop member, and a counter element for said suction cup, said timing stop member being movable from a rest position against a predetermined bias into an operative position by the withdrawal of hand towelling, in which latter position said suction cup adheres for a pre-set period of time against said counter element,

a limiting device arranged for being held in an effective position by said timing stop member when the latter is in its operative position, said limiting device in said effective position being effective for blocking said dispensing roller for said pre-set period of time after a predetermined length of hand towelling has been dispensed,

an electric motor arranged for driving said windup roller, and

means for switching said electric motor into operation by the movement of said timing stop member back into said rest position,

a coupling operable by said timing stop member, for connecting said electric motor to said wind-up roller, said coupling only being engaged as long as said timing stop member is in its rest position,

said wind-up roller being so disposed as to bear against the periphery of a roll of used hand towelling, said wind-up roller being connected to a coupling arrangement which can be shifted by said timing stop member to couple said windup roller with said electric motor for winding purposes, so long as said timing stop member is in its rest position, and to couple said wind-up roller with said dispensing roller for winding off hand towelling from said roll, so long as said timing stop member is in its operative position.

2. A hand towelling dispenser according to claim 1 and further comprising a switch in a circuit of said electric motor for cutting out the latter, and means for opening this switch after the winding up of a length of hand towelling corresponding to the length which was previously pulled down.

3. A hand towelling dispenser according to claim 2, wherein said means for opening said switch include a

detector member which responds to the tensioning of the hand towelling running to said wind-up roller.

4. A hand towelling dispenser according to claim **3** and further comprising means for interrupting the circuit of said electric motor after the end of the web of hand towelling has been drawn in.

5. A hand towelling dispenser according to claim **2,** wherein an operating element for producing the aforesaid movement of said timing stop member is arranged for being made inoperative at will, and wherein a separate switch, operable by hand, is provided for switching said electric motor on, to enable a remainder of hand towelling to be extracted from said supply and wound up with said wind-up roller without interruption.

6. A hand towelling dispenser according to claim **1,** wherein said limiting device contains means which permit unlimited rotation of said wind-up roller in the wind-up direction but only a limited rotation of this roller in the unwinding direction, as a result of which the rotation of said dispensing roller in the dispensing direction is limited, through said coupling arrangement with said timing stop member in its operative position.

7. A hand towelling dispenser according to claim **6,** wherein said means include a helical groove in which engages a counter element which is movable to a limited extent only in one direction whilst it can leave said groove at the opposite end of the latter.

8. A dispenser for a web of hand towelling comprising

a housing receiving a supply of hand towelling,

a dispensing roller over which the web of hand towelling can be withdrawn from said supply,

a wind-up roller for drawing in and winding up used hand towelling,

a timing mechanism including a timing stop member, a suction cup carried on said timing stop member, and a counter element for said suction cup, said timing stop member being movable from a rest position against a predetermined bias into an operative position by the withdrawal of hand towelling, in which latter position said suction cup adheres for a pre-set period of time against said counter element,

a limiting device arranged for being held in an effective position by said timing stop member when this is in its operative position, said limiting device in said effective position being effective for blocking said dispensing roller for said pre-set period of time after a predetermined length of hand towelling has been dispensed,

an electric motor arranged for driving said windup roller,

means for switching said electric motor into operation by the movement of said timing stop member back into said rest position,

a detector member which checks the size of said roll of used hand towelling, and a signal means operated by said detector member for indicating the moment at which said supply has fallen to a predetermined minimum value.

9. A hand towelling dispenser according to claim **8,** wherein said limiting device comprises an abutment disposed on said timing stop member and projecting into the path of a dog coupled to said dispensing roller in the operative position of said timing stop member.

10. A hand towelling dispenser according to claim **9** and further comprising a one-way clutch arranged between said dispensing roller and a wheel carrying said dog, for the purpose of driving said dog along with said dispensing roller in the dispensing direction, and a projection arranged on said wheel which projection, when said timing stop member is moved back into its rest position, is engaged by an arm carried by the latter to turn said wheel on until it reaches a predetermined starting position.

11. A hand towelling dispenser according to claim **8,** wherein said signalling means is connected to said detector member in such a way as to enable the aforesaid predetermined minimum value at which the signalling means respond, to be adjusted.

12. A hand towelling dispenser according to claim **11,** wherein said signalling means is an indicating member which is mechanically movable by said detector member.

13. A hand towelling dispenser according to claim **11,** wherein said signalling means is an electric signal lamp which can be switched in by said detector member.

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