Aug. 4, 1970 C. W. SCHNYDER 3,522,978

HAND TOWEL DISPENSING APPLIANCE

Filed Aug. 30, 1968 5 Sheets-Sheet 1

Fig. 1

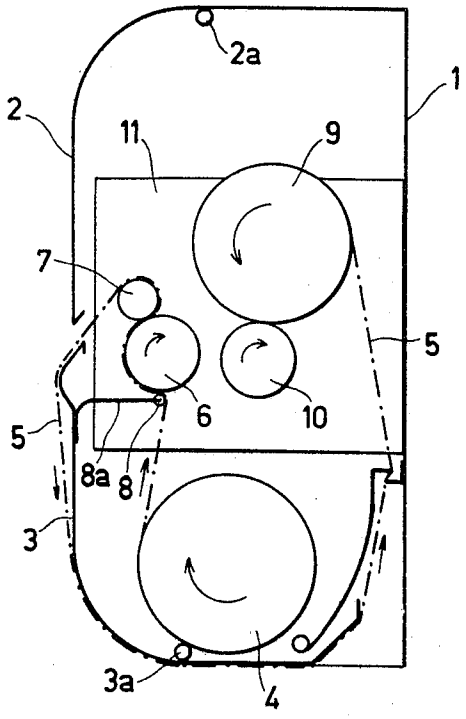


Fig. 3

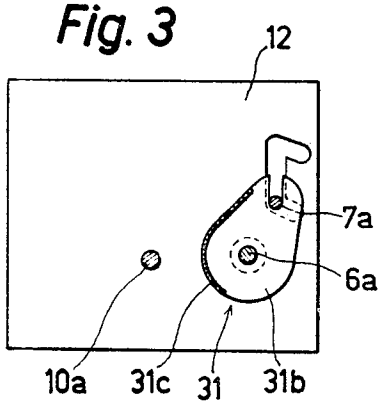
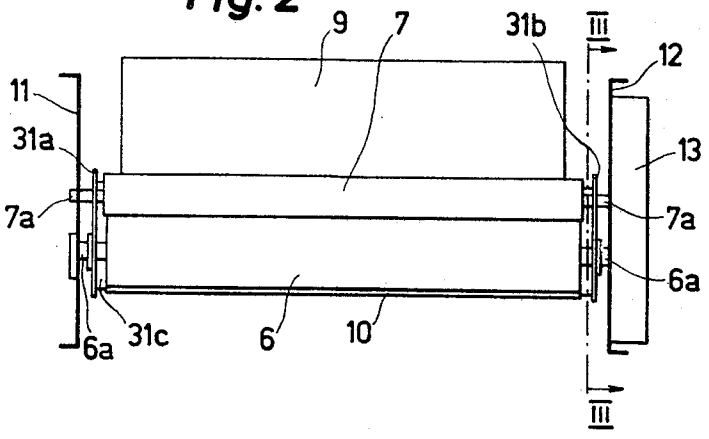


Fig. 2



HAND TOWEL DISPENSING APPLIANCE

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Fig. 4

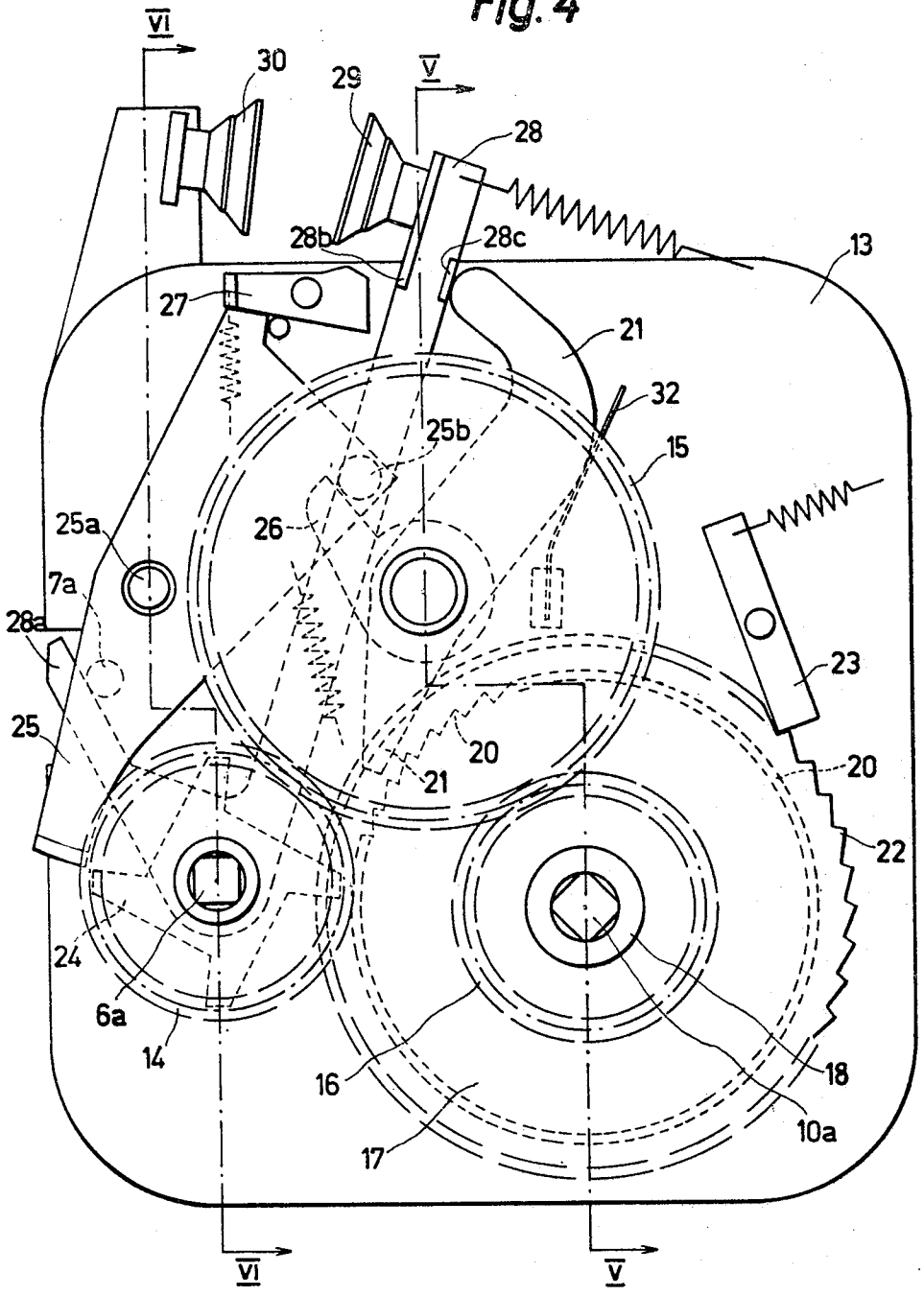

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Fig. 5

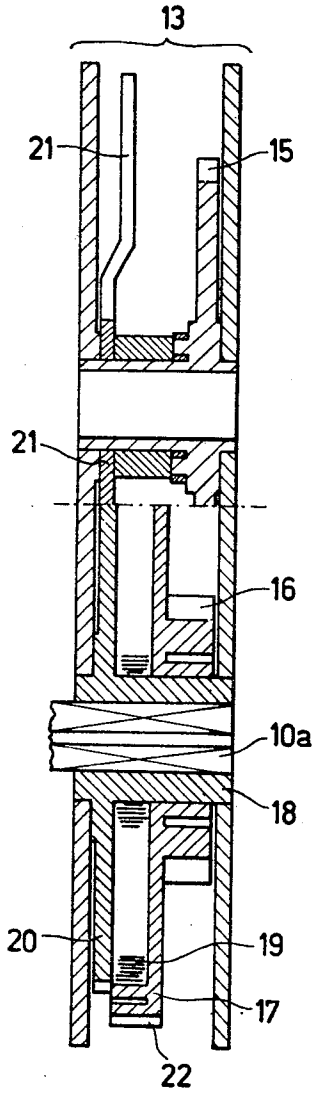
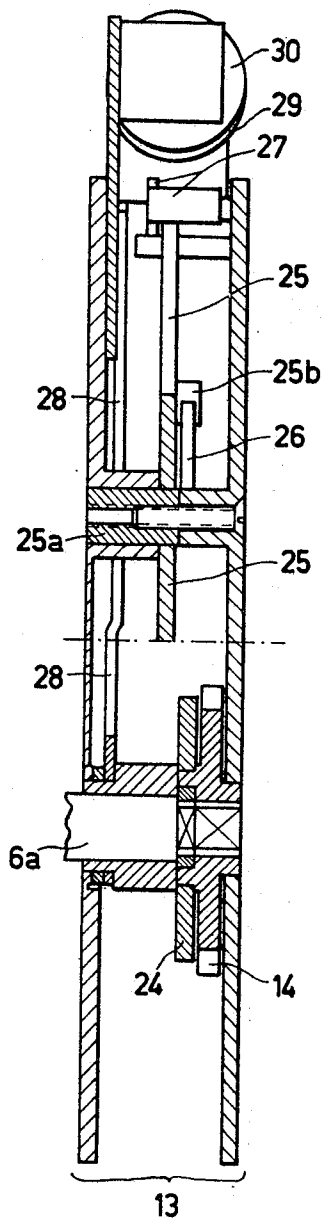


Fig. 6



HAND TOWEL DISPENSING APPLIANCE

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Fig. 7

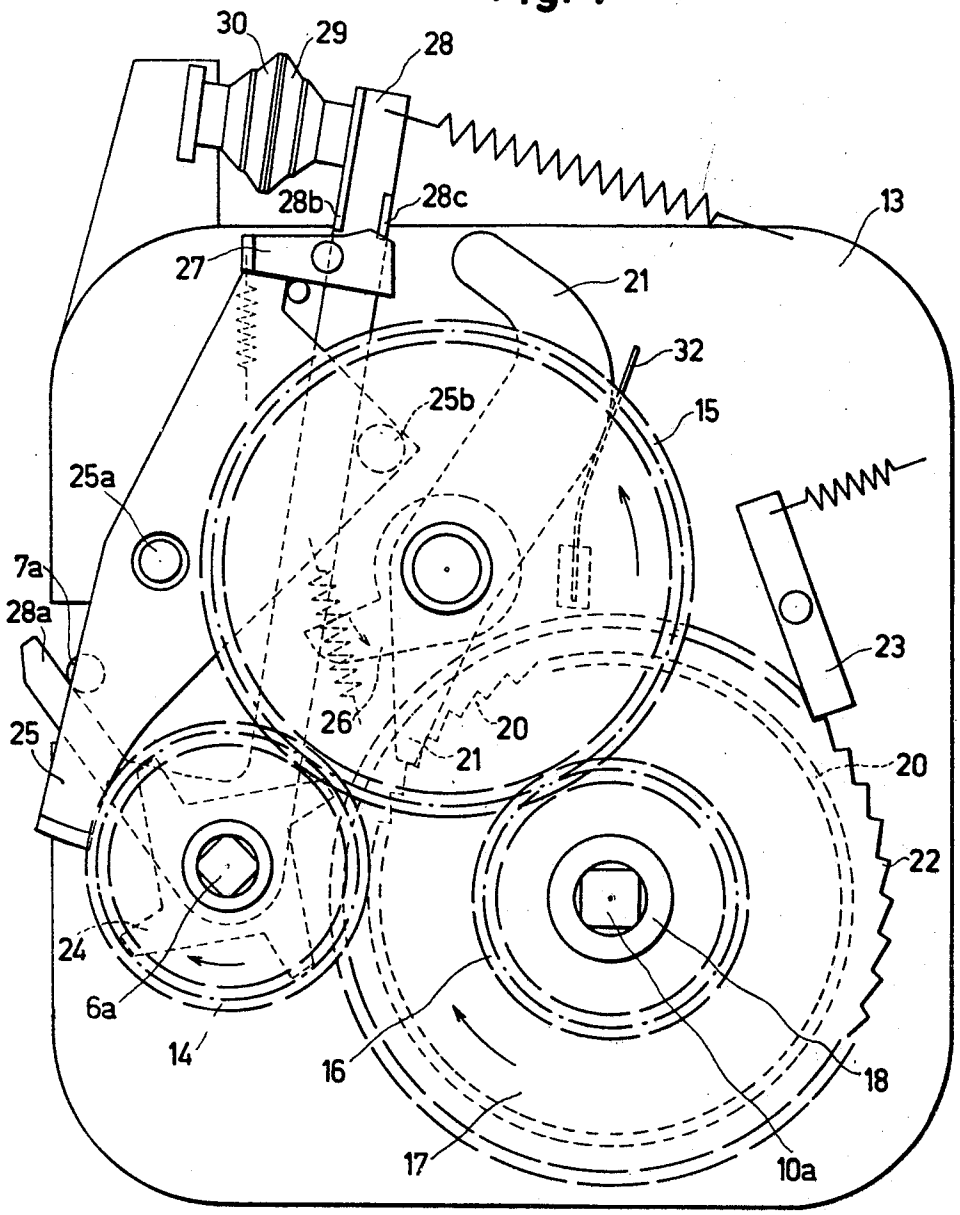

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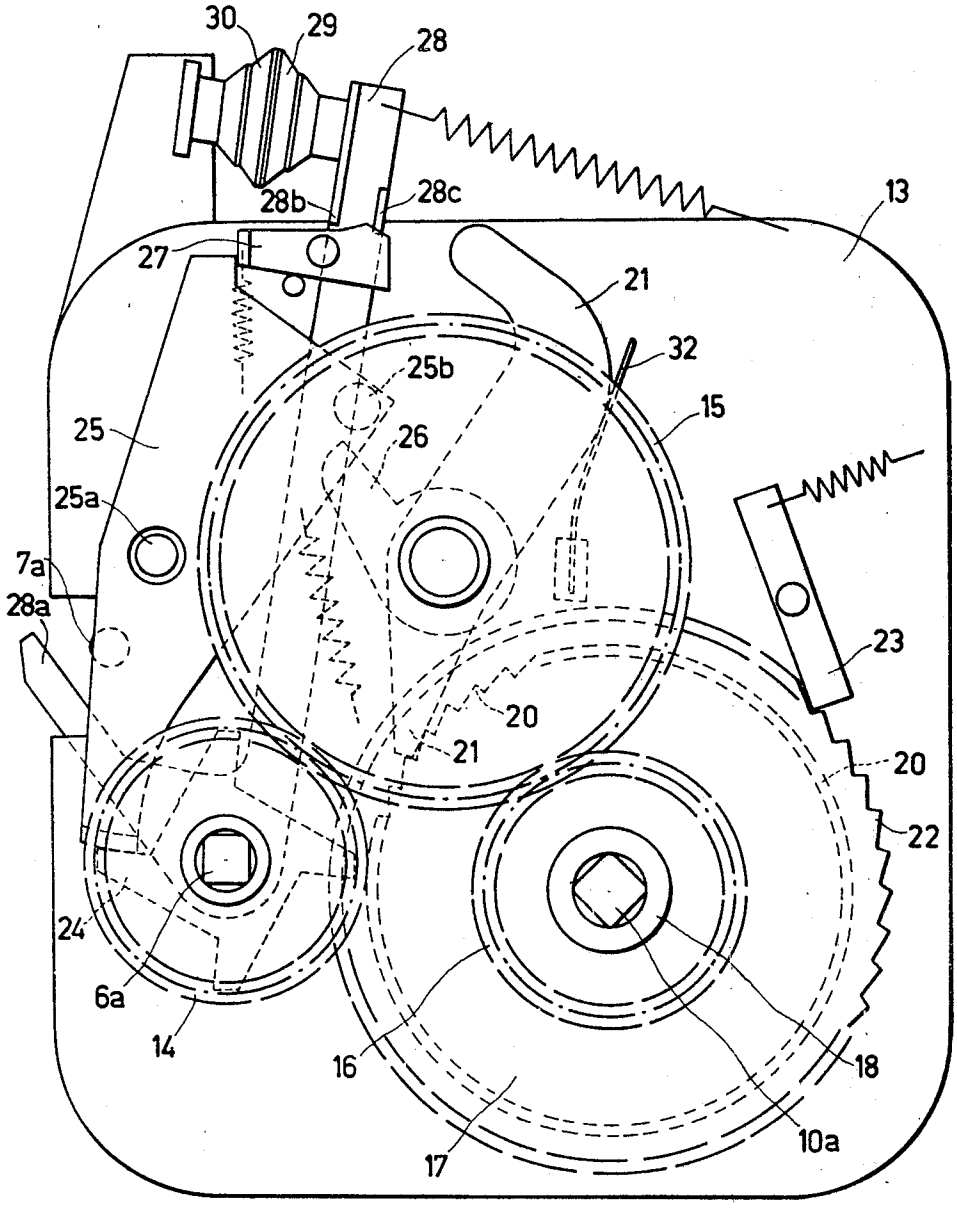
Fig. 8



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HAND TOWEL DISPENSING APPLIANCE

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Int. Cl. B65h 19/00
U.S. Cl. 312—38 5 Claims

ABSTRACT OF THE DISCLOSURE

A hand towel dispensing appliance is disclosed in which a hand towel in strip form can be withdrawn from a supply and over a measuring roller. A driving roller for winding the used towel on a roll is coupled to the measuring roller by gearing means including a spring power storing means. While the hand towel is being withdrawn over the measuring roller a pawl engages a ratchet wheel coupled to the driving roller to prevent rotation of the latter so that the spring power storing means is tensioned. When a predetermined length of the hand towel has been withdrawn a ratchet lever is brought into engagement with a ratchet wheel coupled to the measuring roller so that the latter is arrested. The withdrawal of the hand towel also starts operation of a timing mechanism which is adapted to release, after a predetermined period, the said pawl preventing rotation of the driving roller. After such period, therefore, the tensioned spring power storing means turns the diving roller to wind up the length of towel previously withdrawn. The timing mechanism also releases the ratchet wheel arresting the measuring roller in order to prepare the appliance for a subsequent operation.

This invention relates to a hand towel dispensing applicance having a measuring roller over which a strip-form hand towel can be withdrawn from a supply; a presser roller which bears against the measuring roller and around which the hand towel is conducted, a driving roller for driving a hand towel roll to wind used towel on the roll, this driving roller being coupled by gearing to the measuring roller; a ratchet wheel which is positively coupled to the measuring roller; a ratchet lever which, after the measuring roller has turned each time through a predetermined angle, is adapted to be brought by an element of the said gear coupling into engagement with the ratchet wheel for the purpose of arresting the measuring roller; and having a timing mechanism including a lever which is adapted to be turned by the withdrawal of a length of hand towel from a first into a second position in which it is held for a predetermined period by delay means and which produces a restoration of the ratchet lever when it subsequently returns to its first position. In known hand towel dispensing appliances of this character the driving roller is positively coupled to the measuring roller through the aforesaid gear coupling. The hand towel forms, between the measuring roller and the driving roller, a loop which hangs out of the housing of the appliance and which always remains the same size, in that simultaneously with the withdrawal of hand towel over the measuring roller an equal length of hand towel is wound up by the driving roller.

In these known dispensing appliances a user, when he is too lazy to pull out a fresh length of hand towel, can dry his hands on the loop of towel which is already hanging out of the appliance. Moreover as a rule the end of the hand towel hangs for a long period out of the appliance when the hand towel supply has been used up and is then used by a lot of people. This is most undesirable for hygienic reasons.

The object aimed at by the present invention is to provide expedients which militate against this and so develop the hand towel dispensing appliances referred

to above that when the hand towel supply has been used up, the end of this towel is automatically drawn into the appliance by means of the driving roller, and that when the appliance is ready for use the hand towel is always pulled taut in the rest condition between the measuring roller and the driving roller, for example over a housing of the appliance, and a user can pull out a predetermined length of towel over the measuring roller, a corresponding length of towel being wound up by the driving roller only after a predetermined period of time has expired.

If the hand towel is pulled taut in the rest condition, the user is forced to draw out a fresh length of hand towel each time, and cannot simply use the length of towel which has previously been withdrawn.

It is known to meet the first of these objects by means of a spring power storage means which is loaded by the rotation of the measuring roller when the appliance is in use. In this solution of the problem (Swiss patent specification No. 404,123) a special arrangement which detects the passage of the end of the hand towel from the appliance is required to trigger the spring power storage means.

It has now been found that it is possible to meet both these objects simultaneously and by comparatively simple means.

In the automatic hand towel dispensing appliance according to the present invention there is incorporated in the aforesaid gear coupling a spring power storing means having a driven member which is positively coupled to the driving roller, and having a driving member which is positively coupled to the measuring roller. The transmission ratio of the gear coupling between the measuring roller and the driving roller is so selected that the spring power storing means becomes more tensioned at each successive operation, the peripheries of the measuring roller and the driving roller turning in succession through the same arcuate lengths. A pawl is in locking engagement in its effective position with a second ratchet wheel which is positively coupled to the driving roller, the aforesaid lever of the timing mechanism, so long as it is in its first position, contacting the pawl, and holding it out of engagement with this second ratchet wheel. The said presser roller is disposed for pivoting about the axis of the measuring roller and is arranged to pivot the said lever of the timing mechanism from the first to the second position as soon as it, in turn, is pivoted by withdrawal of a length of hand towel.

An embodiment of the towel dispensing appliance according to the invention is described in more detail below with reference to the accompanying drawings, in which:

FIG. 1 is a diagrammatic vertical section through the hand towel dispensing appliance.

FIG. 2 is a partial view from the front, the housing being omitted,

FIG. 3 is a section of a detail taken on the line III—III of FIG. 2,

FIG. 4 is a partial side view, on an enlarged scale and the housing being omitted, which discloses in its rest position, the mechanism, which cooperates with the measuring roller and the driving roller, a cover plate of this mechanism again being omitted,

FIG. 5 is a section on the line V—V of FIG. 4,

FIG. 6 is a section on the line VI—VI of FIG. 4, and

FIGS. 7 and 8 are views similar to that of FIG. 4 but with the parts in different positions.

The automatic hand towel dispensing appliance illustrated in FIG. 1 comprises a housing with a rear wall 1 and a front wall composed of two sections 2 and 3. These sections of the front wall can be swung up around hinges 2*a* and 3*a* respectively for replacing a hand towel

in the applicance. A supply of fresh hand towel in the form of a roll **4** is arranged in the housing. The hand towel **5**, the path of which is indicated in dotted lines in FIG. 1, can be drawn from the supply roll **4** over a measuring roller **6** and through a slot in the housing between the two sections **2** and **3** of the front wall.

The measuring roller **6** is driven in response to the withdrawal of the hand towel. To obviate any slipping between the hand towel and the measuring roller the latter is given a rough surface, for example in the form of a covering of abrasive cloth. In addition a presser roller **7** is mounted above measuring roller **6** and the hand towel, which is wound around the presser roller, is pressed against the measuring roller by the weight of the roller **7**, and, if required, by a spring loading of the latter (not shown). Furthermore a smooth stripper bar **8** is arranged beneath measuring roller **6** and also serves to press the hand towel against this roller and precludes the formation of folds in the hand towel applied against the roller. The stripper bar **8** is supported from the lower section **3** of the front wall by means of resilient carrier **8***a*.

The hand towel emerging from the slot in the front wall of the housing is tensioned around the bottom part of the housing and re-enters the latter through an opening in the bottom of the same. It passes to a winding up roll **9** driven by a driving roller **10**.

The spindles **6***a* and **10***a* of the measuring roller **6** and the driving roller **10**, respectively, are mounted in two side plates **11** and **12** supported in the housing. Affixed to the outer side of side plate **12** is a box **13** (FIG. 1) containing a mechanism which fulfils the following functions: This mechanism couples the spindles of the measuring roller **6** and the driving roller **10** together and to a timing mechanism in such a way that the measuring roller **6** is stopped each time a predetermined length of hand towel has been pulled out, and that a corresponding length of the towel is wound up by means of the driving roller **10** after the expiry of a predetermined period, and the measuring roller is released again.

The mechanism installed in box **13** is illustrated in FIGS. 4 to 8. As can be seen a toothed wheel **14** is secured to the spindle **6***a* of measuring roller **6**. This wheel **14** engages an intermediate pinion **15** rotatably mounted in box **13**. In turn the intermediate pinion meshes with a toothed wheel **16** which is rigidly connected with the spring housing **17** of a spring power pack, or is made integrally therewith. A bush **18** on the core of this spring power pack, which is secured to the spindle **10***a* of the driving roller **10** is connected to the spring housing **17** through a spiral spring **19** (FIG. 5). The spring housing **17**, with toothed wheel **16**, is rotatably mounted on the bush **18**. This bush **18** carries a ratchet wheel **20** cooperating with a spring loaded pawl **21** which is pivoted to the boss of intermediate pinion **15**. Ratchet teeth **22** are also provided at the periphery of housing **17** and a pivoted spring urged pawl **23** cooperates with these ratchet teeth **22** to prevent rearward rotation of the spring housing **17**, and thus also of the toothed wheels **14** and **16** and pinion **15**, under the action of loaded spring **19**.

It will be appreciated that parts **14** through **19** form a gearing means coupling the measuring roller **6** to the driving roller **10** and including a spring power storage means. This spring power storage means consists of the driving member or spring housing **17**, the spiral spring **19** and the driven member or bush **18**.

A ratchet wheel **24** is also secured to spindle **6***a* of measuring roller **6**, and this ratchet wheel **24** cooperates with a ratchet lever **25** which is adapted to turn about a pivot **25***a*. Ratchet lever **25** is spring urged into its first position illustrated in FIGS. 4 and 7 and in this position it releases the ratchet wheel **24**. A control element **26** which is non-rotatably connected to the intermediate pinion **15** engages a pin **25***b* secured to the ratchet lever **25**, at each rotation of the intermediate pinion **15**, and displaces this lever **25** into the second position thereof indicated in FIG. 8, i.e the position in which the ratchet lever is held by a spring loaded pawl **27** and in turn holds up the ratchet wheel **24**.

The timing mechanism which has been briefly referred to above comprises a lever **28** which is pivotally mounted about spindle **6***a*. This lever **28** is spring urged towards its first position shown in FIG. 4. It has at its free end a suction cup **29** adapted to cooperate with a fixed section cup **30**. Moreover a second and shorter lever **28***a* is made integrally with the lever **28**, and the spindle **7***a* of the presser roller **7** is adapted to engage this lever **28***a* to turn lever **28** into a second position (FIGS. 7 and 8), when the spindle **7***a* (with the presser roller **7**) is pivoted around the axis **6***a* of measuring roller **6**.

This pivoting of the presser roller **7** about axis **6***a* takes place against spring action (not shown) as soon as a user pulls on the hand towel **5** disposed around the presser roller and projecting out of the slot in the front wall of the housing.

The presser roller **7** is mounted on a carrier **31** which is pivotable about the spindle **6***a* of measuring roller **6**. Carrier **31** has two side plates **31***a* and **31***b* which are mounted on spindle **6***a* and are interconnected by a rear plate **31***c* (FIGS. 2, 3).

In the vicinity of its free end lever **28** has two projections **28***b* and **28***c*. When the lever **28** moves back from its second (FIGS. 7 and 8) to its first position (FIG. 4) the projection **28***b* contacts pawl **27** and turns this in opposition to its spring loading. As a result the ratchet lever **25** is released and returns to its position in FIGS. 4 and 7 under the action of its own spring loading. The other projection **28***c* or lever **28** is applied against the upper end of the pawl **21** and holds this out of engagement with the ratchet wheel **20** so long as lever **28** remains in its first position (FIG. 4). A spring **32** moves locking pawl **21** into engagement with ratchet wheel **20** as soon as lever **28** leaves its first position.

The automatic hand towel dispensing appliance described above operates as follows:

In the rest condition the hand towel **5**, as shown in FIG. 1, is stiffly tensioned between the measuring roller **6** or the presser roller **7** and the driving roller **10** over the lower part of the housing, and the various parts are disposed in the positions illustrated in FIG. 4, that is to say lever **28** is in its first position and holds locking pawl **21** out of engagement with ratchet wheel **20**.

As soon as the user pulls on the part of the hand towel **5** located outside the housing the presser roller **7** and its carrier **31** are, as a result, first pivoted forwards against the spring loading thereof (not shown) around the axis of measuring roller **6**. Spindle **7***a* of the presser roller, which bears against lever **28***a* takes this with it and as a consequence pivots lever **28** (against its individual spring loading) into its second position (FIG. 7), the pawl **21** being released and engaging the ratchet wheel **20** in order to hold driving roller **10** against turning. The cups **29** and **30** are firmly applied together under suction. Immediately further pivoting of presser roller **7** and carrier **31** becomes impossible the measuring roller **6** is turned by further withdrawal of hand towel. Toothed wheel **14** turns the spring housing **17** through pinion **15** and toothed wheel **16** and loads spring **19** (the spring core bush **18** being held against rotation). In addition the control element **26** turns with pinion **15**. The condition so established is illustrated in FIG. 7.

After the pinion **15** and the control element **26**, starting from the position of FIG. 4, has performed something less than a single rotation, the control element **26** contacts the pin **25***b* on the ratchet lever **25** and turns the latter into the position shown in FIG. 8. Lever **25** now engages the next tooth of ratchet wheel **25** which abuts it and stops the rotation thereof and thus the rota-

tion of measuring roller **6**. In the example illustrated ratchet wheel **24** has four teeth and the transmission ratio between pinions **14** and **15** is chosen so that ratchet wheel **24** makes exactly 1¾ revolutions for one rotation of the control member **26**. Measuring roller **6** thus stops each time after 1¾ rotations thereof and control element **26** comes to a standstill in the same position each time after one rotation (FIG. 8). Thus a transmission ratio between the measuring roller **6** and the control member **26** which differs from one produces the result that the measuring roller **6** will stop in an intermediate position after each operation, and as a consequence the surface of the measuring roller will not be worn out at one part only.

When the measuring roller **6** has been arrested the withdrawn length of hand towel (corresponding to 1¾ rotations of the measuring roller) hangs in a loop from the housing and the user can then dry his hands. As soon as he discontinues pulling the hand towel the presser roller **7** and its carrier **31** are pivoted back by the spring means thereof into the position shown in FIG. 4, but lever **28** remains temporarily in its second position as a consequence of the engagement between the suction cups **29** and **30**. This condition is illustrated in FIG. 8.

After the lapse of a predetermined period the suction cups **29** and **30** detach from each other and lever **28** is returned by its spring loading to its first position. During this return movement of lever **28** the projection **28***b* thereof releases pawl **27** and so frees the ratchet lever **25** to return to its starting position seen in FIG. 4. In addition projection **28***c* on lever **28** contacts pawl **21** and releases it from the ratchet wheel **20**. The spring core bush **18** and driving roller **10** thus commence to turn under the action of the tensioned spring **19** and the withdrawn hand towel is wound up on reel **9** until this towel is again pulled taut over the lower part of the housing (FIG. 1). All the parts are then back in their starting positions seen in FIG. 4 and the hand towel dispensing appliance is ready to be operated afresh.

It will be clear that, each time the appliance is used in the manner described above a predetermined length of hand towel is first drawn out and, after the expiry of a predetermined period, a similar length of towel is wound up. Thus the peripheries of a measuring roller **6** and driving roller **10** turn over the same arcuate lengths following one another. If driving roller **10**, for example, is of the same diameter as measuring roller **6** then driving roller will, like the measuring roller, make 1¾ rotations each time and will also not become worn at one part. In any case, however, the transmission ratio between the toothed wheels **14** and **16** is so chosen that the spring housing **17** turns, at each operation, through an angle which is very slightly greater than the angle through which the driving roller **10** rotates for winding up the withdrawn length of hand towel. If the measuring roller **6** and driving roller **10** are of the same diameter the toothed wheel **16** would thus turn slightly faster than toothed wheel **14**. The result of this is that the spiral spring **19** is somewhat more tensioned at each operation, that is to say more tensioned than was previously the case. When the complete hand towel supply **4** is used up after a plurality of operations, spring **19** is so powerfully tensioned that it is capable of winding up on to the winding up roll **9** the complete end of the hand towel withdrawn from the housing by the last user.

The fact that first the presser roller **7** and carrier **31**, and thus also the lever **28** of the time regulating arrangement **28**, **30**, are pivoted at each operation of the hand towel dispensing appliance described has the particular advantage that the winding up of the withdrawn hand towel also takes place when the operation is not completed, that is to say when the complete length of hand towel has not been withdrawn until it will stop the measuring roller **6**. The hand towel will be wound up as soon as the lever **28** moevs back into its starting position on detachment of the suction cups **29** and **30**.

What I claim is:

1. A hand towel dispensing appliance comprising:
- a supply of hand towel in strip form;
- a measuring roller over which the hand towel can be withdrawn from the said supply;
- a presser roller which bears against the said measur ing roller and around which the hand towel is conducted, the said pressor roller being disposed for pivoting about the axis of the measuring roller;
- a hand towel roll for taking up used hand towel;
- a driving roller for driving the said hand towel roll to wind the used towel on the roll;
- gearing means coupling the measuring roller to the driving roller, which gearing means include a spring power storing means having a driven member which is positively coupled to the said driving roller, and having a driving member which is positively coupled to the measuring roller;
- a ratchet wheel which is positively coupled to the measuring roller;
- a ratchet lever which is adapted to be brought into engagement with the said ratchet wheel, for the purpose of arresting the measuring roller, by an element of the said gearing means after the measuring roller has turned each time through a predetermined angle;
- a timing mechanism including a lever and means for pivoting this lever from a first into a second position in response to a pivoting movement of the said presser roller about the axis of the measuring roller, caused by the withdrawal of hand towel from the said supply and around the presser roller, the said timing mechanism further including delay means adapted to hold the said lever in the said second position during a predetermined period, the said lever having means for causing, when it subsequently returns to its first position, a restoration of the said ratchet lever;
- a second ratchet wheel which is positively coupled to the said driving roller; and
- a pawl having an effective position in which it is in locking engagement with the said second ratchet wheel, the said lever of the said timing mechanism, so long as it is in its first position, contacting the said pawl and holding it out of engagement with the said second ratchet wheel;
- the transmission ratio of the said gearing means between the measuring roller and the driving roller being so selected that the said spring power storing means becomes more tensioned at each successive operation during which the peripheries of the measuring roller and of the driving roller turn in succession through equal arcuate lengths.

2. A hand towel dispensing appliance as claimed in claim **1**, wherein a preloaded second pawl is provided for retaining the said ratchet lever in the position in which it engages the first said ratchet wheel, and wherein the said means for causing a restoration of the ratchet lever comprise a projection on the said lever of the timing mechanism which projection is adapted to release the said second pawl when the said lever is pivoted.

3. A hand towel dispensing appliance as claimed in claim **1**, wherein the said element of the gearing means which operates the said ratchet lever is so coupled to the said measuring roller that this element and the measuring roller turn at a speed ratio different from unity.

4. A hand towel dispensing appliance as claimed in claim **1**, having a housing with a pivotably mounted front wall section and a smooth stripper bar which is resiliently supported on the said front wall section and is disposed adjacent the said measuring roller and parallel to the latter and adapted to press the hand towel against the measuring roller to prevent the formation of folds in the section of the hand towel passing between the measuring roller and the said presser roller.

5. A hand towel dispensing appliance as claimed in cliam 1, having a housing and two side plates supported in the housing, the said measuring and driving rollers being mounted between the said two side plates, and further having a box mounted at the outer side of one of the said two side plates, the said gearing means including the spring power storing means and also the said first and second ratchet wheels, the said ratchet lever, the said pawl and the said timing mechanism all being disposed in the said box.

References Cited

UNITED STATES PATENTS

2,120,023	6/1938	Bersaques	312—38
2,899,251	8/1959	Birr	312—38
3,215,481	11/1965	Kobi	312—38
3,222,112	12/1965	Bahnsen	312—38

NILE C. BYERS, JR., Primary Examiner