

## 2004 PAPER P3

### SAMPLE SCRIPT A

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#### **Title: A Suspension Device.**

#### ***Field of the Invention:***

The invention relates to suspension devices, and in particular to self-locking rotary suspension devices.

#### ***Background to the Invention:***

Suspension devices are widely used in a whole range of industries and activities. One of the most common devices is the traditional pulley system. Pulleys may be a simple drum around which a rope can be coiled and moved, and may further comprise a frame to facilitate their attachment to another object.

One problem associated with a simple pulley is the lack of an integral locking means by which rotation of the pulley wheel may be prevented. Therefore when a load is suspended by a rope passing over a pulley, it is usually necessary to secure the rope to a nearby cleat or hook, for example. The alternative is to rely on frictional forces between the rope and pulley which may be insufficient. Even when friction is sufficient, it would be desirable to lock the motion of the pulley.

A particular domestic application of pulley type suspension systems is for supporting hanging baskets used for flowers. Due to the weight of a filled basket, it is desirable to have a suspension means that allows lowering and raising of the basket whilst having a mechanism to prevent the basket from dropping if accidentally released.

#### ***Summary of the Invention:***

According to a first aspect of the invention there is provided [Claim 1]

Preferably, [feature of claim 2]

Preferably, [feature of claim 3].

The invention therefore provides a simple rotary suspension device with integral locking mechanism which may lock under the weight of a load and may similarly be unlocked by raising the load to lessen the weight. The locking mechanism is thus self locking on releasing under gravity. As such, the invention may be adapted to existing suspension devices such as pulleys.

Preferably, [feature of claim 4].

An indexed locking means provides a series of discrete locking positions which may be widely or closely spaced.

Preferably, [feature of claim 5].

Ratchet mechanisms for indexing motion would be apparent to the skilled man. However, it is preferred that [feature of claim 6], particularly when [feature of claim 7].

A disc based ratchet shares the symmetry of the drum, and may be attached thereto. Typically the pivoted pawl would then be attached to the frame, and would drop under gravity to lock the drum.

In order to provide a “self-return” mechanism, it is preferred that [feature of claim 8], which is preferably achieved by means of a circular spring. By biasing the drum against one (unwinding) direction, the drum will be rotated in the other (winding) direction when the weight is reduced. This may provide the desired “self-release” of the locking means when the weight is raised.

According to another aspect of the invention the suspension device further comprises [feature of claim 12].

The provision of an integral suspension member, such a band coiled around the drum, negates the need for a separate means, such as rope or string. With the band secured to the device at one end it may exhibit a self-recoiling action under the bias means as the weight is raised.

***Detailed Description:***

Embodiments of the invention will now be described in more detail with reference to the figures in which:

Figure 1 shows a perspective view of a rotating suspension device according to the present invention.

Figure 2 shows a plan view of the device from one side without the casing.

Figure 3 shows a plan view of the device from the other side without the casing.

Figure 4 shows a side view of the device shown in Figures 2 and 3 and,

Figures 5A to 5D show the action of the ratchet and pawl locking mechanism.

Figure 1 shows an external view of a suspension device 10 comprising a casing 11 of two halves 12, 13. A suspension eye 14 is provided at the top of the casing for suspending the device from an object and a mounting eye 15 is provided at the bottom of a band protruding from the casing.

The band 16 is more clearly seen in Figure 2 where one half of the casing has been removed. The free end of the band with the mounting eye 15 protrudes from the casing whilst the bulk of the band 16 is coiled around a drum 17 which is rotatably mounted on a boss 19 attached to the casing half 12. The

inner end of the band 18 is secured to the boss 19 by a loop. A pivoted pawl 20 is also visible and will be described in the following.

Figure 3 shows the suspension device from the other side view. The pawl 20 mounted on pivot 21 is more easily seen. Also visible is a serrated disc 22 attached to the backplate 23 of the drum. The edge of the disc 22 is serrated to provide a series of notches 24 around its periphery interspersed with a corresponding number of lobes 25. The lobes 25 have a height which increases radially in the winding direction 90. Finally, a coiled circular spring 26 is also visible adjacent and attached to the disc at one end and to the boss 19 at the other. The various components may also be seen clearly in relation to one another in the side view of Fig 4.

In use, a weight is supported from the mounting eyelet 15 and the device is suspended via the suspension eye 14. The band 16 may not unravel when the pawl 20 is located in a notch 24, as shown in Figure 5A.

However, if the weight is lifted, the spring 26 causes the drum 17 and disc 22 to rotate in the unwinding direction 90, as illustrated in Figure 5B. The pivoted pawl then rides up the edge of the notch 24 to rest against a lobe 25.

If the weight is then lowered, the pawl 20 drops towards the notch 24, as shown in Figure 5C. However, if the speed of rotation is sufficiently high, the pawl does not have time to drop under gravity back into the notch 24 as the disc moves in the unwinding direction 91. Instead, the pawl falls against the lobe 25, which has a smaller radial height at this point to ensure that it catches the pawl. Under further rotation the pawl tracks along the lobe 25 rising in height. Thus the weight may be lowered without the pawl locking, but instead describing an oscillatory motion.

Once the weight is reduced by hold it at a given height, the pawl will lock in the nearest notch under action of the return spring, thus safely locking. (Fig 5A).

In this way a weight may be safely raised and lowered, for example a hanging basket. Other applications one of course possible.

#### **CLAIMS:**

1. A suspension device comprising a frame, a drums rotatable relative to the frame; and integral releasable locking means for preventing rotation of the drum relative to the frame, in use, a member for supporting a weight disposed around at least an arc of the periphery of the drum.
2. A suspension device according to claim 1, wherein the releasable locking means locks by action of the suspended weight under gravity.
3. A suspension device according to claim 1 or claim 2, wherein the releasable locking means is released by raising the suspended weight.
4. A suspension device according to any preceding claim, wherein the releasable locking means is indexed.

5. A suspension device according to claim 4, wherein the releasable locking means comprises a ratchet.
6. A suspension device according to claim 5, wherein the ratchet comprises a disc having at least one notch and a locking member for engaging the notch.
7. A suspension device according to claim 6, wherein the locking member comprises a pivotally mounted pawl.
8. A suspension device according to claim 6 or claim 7, wherein a lobe between adjacent notches is of increasing radial height along its length.
9. A suspension device according to any preceding claim, further comprising resilient biasing means for biasing the drum rotationally relative to the frame.
10. A suspension device according to claim 9, wherein the resilient biasing means is a spring.
11. A suspension device according to claim 10, wherein the spring is a spiral spring..
12. A suspension device according to any preceding claim, further comprising an integral suspension member for supporting a weight, the member disposed around at least an arc of the periphery of the drum and secured at one end to a boss on which the drum rotates.
13. A suspension device according to claim 12, wherein the suspension member is a band.
14. A suspension device according to claim 12 or claim 13, wherein the suspension member is formed from plastic.
15. A suspension device, according to any of claims 12 to 14, wherein a free end of the suspension member includes an eyelet.
16. A suspension device comprising a frame; a drum rotatable relative to the frame; releasable locking means for preventing rotation of the drum relative to the frame; and, an integral suspension member for supporting a weight, the member disposed around at least an arc of the periphery of the drum and secured at one end to a boss on which the drum rotates.

*There follow 3 pages of drawings*

\* \* \* \* \*

Fig 1.

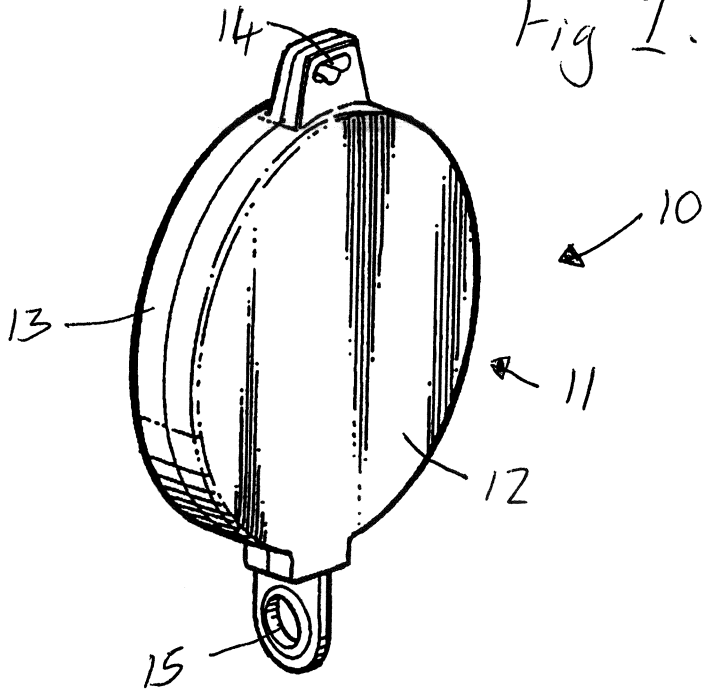
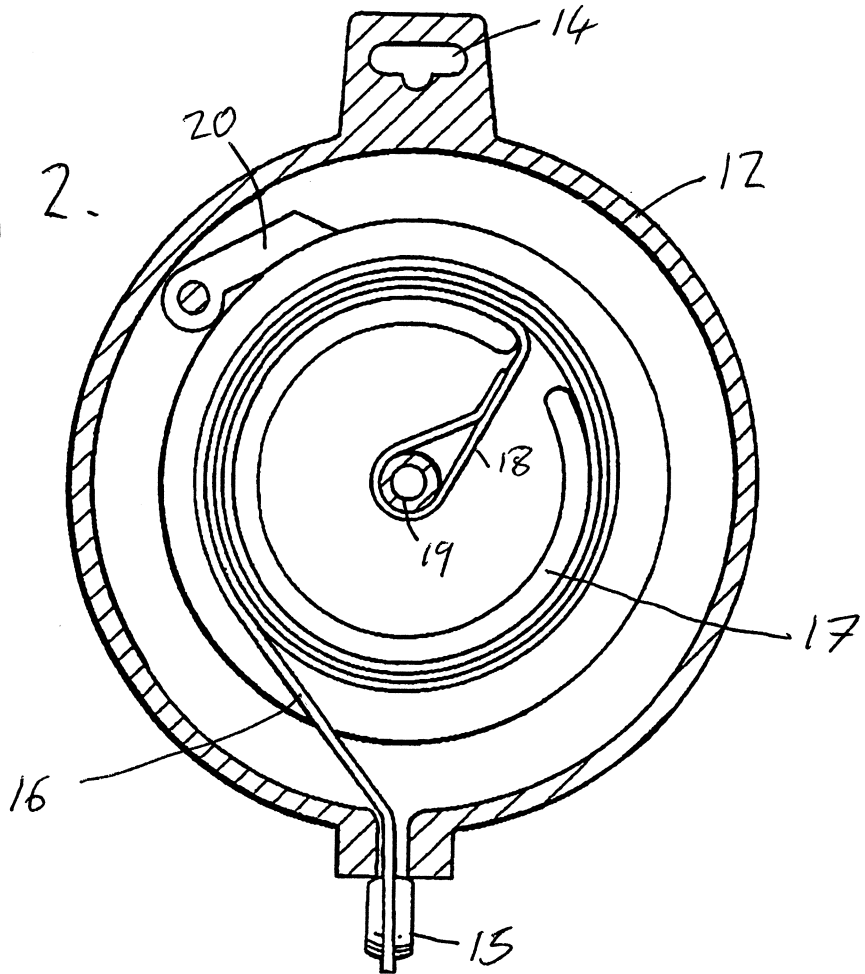


Fig 2.



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Fig 3.

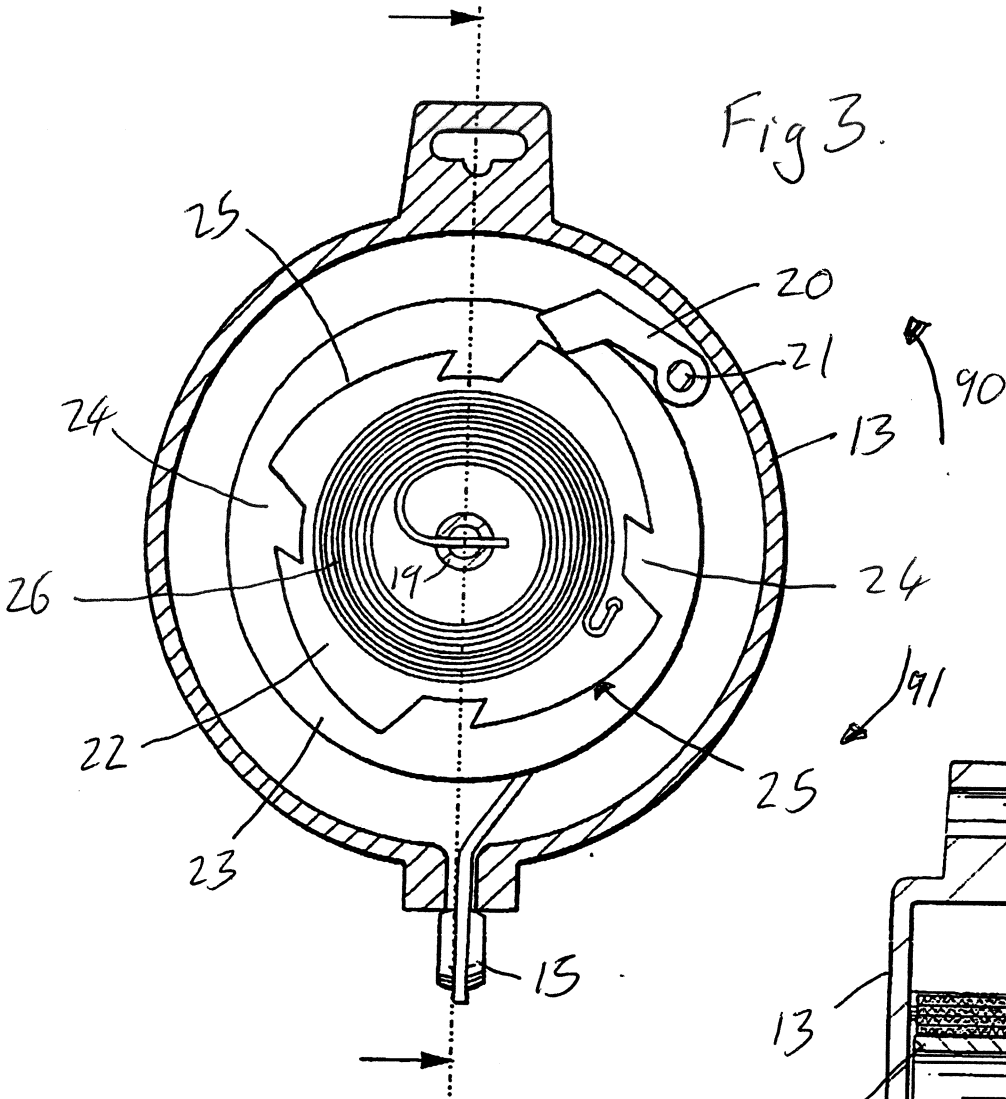
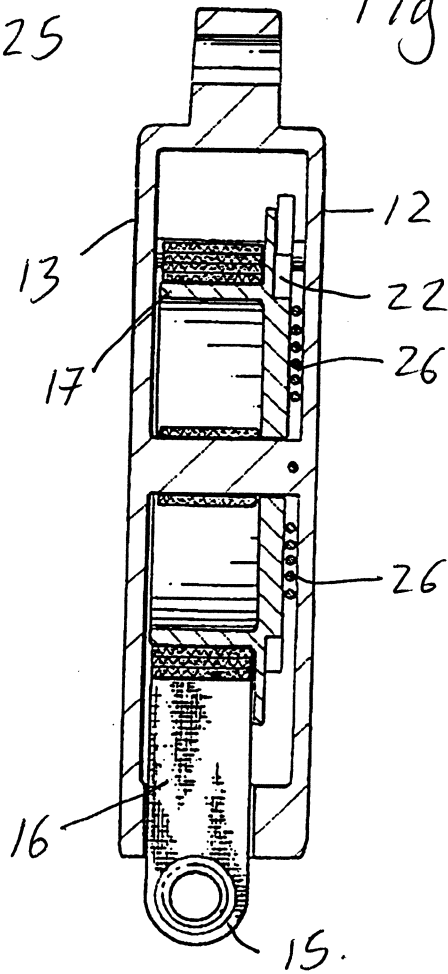


Fig 4.



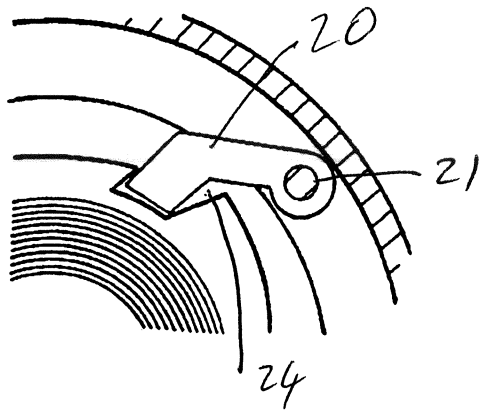


Fig 5A

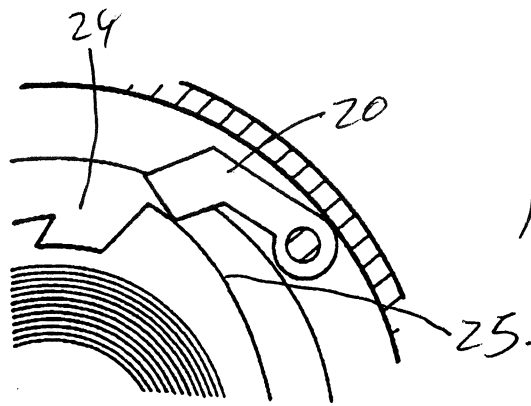


Fig 5B

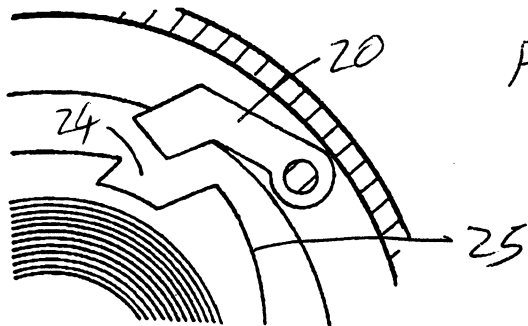


Fig 5C

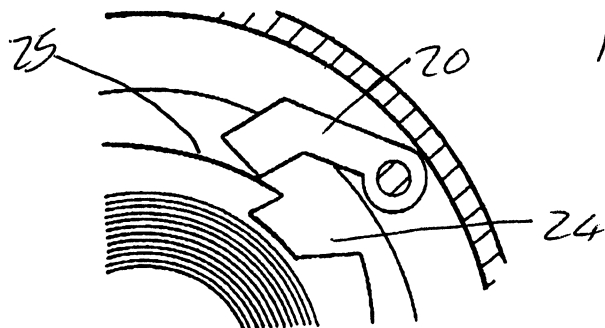


Fig 5D

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### SAMPLE SCRIPT B

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#### **Raising and lowering device**

The present invention relates to a device for raising, lowering and suspending a load. The invention relates particularly to the raising, lowering and suspending of a hanging basket.

In the gardening industry, hanging baskets are a popular product. Hanging baskets are typically suspended some distance off the ground and are typically filled with soil and flowers or herbs. Hanging baskets come in a variety of different sizes, and the larger ones, when filled with soil can be rather heavy. Hanging baskets may be attached to the side of a house or to some other framework.

Hanging baskets other require regular watering. To water a hanging basket, the user must either raise the watering can high enough to reach the basket, or take the basket down to water it. Many people balance unsteadily on chairs or ladders in order to reach their hanging baskets. Also, the elderly and the infirm may find it difficult to climb up or to raise a watering can above their head. Taking a hanging basket down can be awkward if the basket is large or heavy and putting it back up can be even more difficult.

One solution to this problem is to provide an elongate hose fitting which is attached to an ordinary garden hose and direct water up into the baskets. However, users find this inconvenient as it requires the use of the hose and connecting the extension to the hose. It is a lot of effort if only a small number of baskets need watering.

Another solution is to provide a system of pipes which take the water directly to the baskets when a tap is turned on. Installing such a system is expensive and not easily upgraded if more baskets are put up.

Pulley system have been employed in the past to provide a way of lowering the basket for watering and raising it up again afterwards. However, these pulley systems tend to be expensive and are prone to jamming if the ropes become twisted. Such systems can also be difficult to set up. With such a pulley system, once the basket is raised to the chosen height, the rope must be secured in some way to stop the basket from falling back down. For example, the rope can be tied to a cleat or hook on a nearby wall. These fixings can be unsightly and are also prone to failure; if the rope becomes loose or are not properly secured, the basket can fall down. As mentioned above, baskets can be at considerate weight and this could be rather dangerous.

In light of the problems of the above systems, the invention provides a device for raising, lowering and



suspending a load, the device comprising: a rotatable drum; a biasing means for rotatably biasing the drum in a direction of raising the load; a length of cord or strapping having one end for attaching the load and the other end attached to the rotatable drum; and a restricting means which prevents rotation of the drum in the direction of lowering the load below a certain speed of rotation, but permits the rotation of the drum in the direction of lowering the load above said speed of rotation.

Accordingly, when a load, such as a hanging basket is attached to the end of the cord or strapping, and the device is fixed to a bracket or the like (e.g. a bracket suitable for an ordinary basket), the load can be raised up, with the help of the biasing means, to a desired position and then carefully lowered, below the certain speed of rotation, so that the rotation restricting means prevents any further rotation. The load will remain suspended at this height.

If the load is to be lowered, the user needs to support the weight of the load with the help of the biasing means, and then cause the load to drop such that the drum rotates faster than the certain rotational speed and the rotation restricting means does not prevent the rotation.

When the load attains a new desired height, it is once again slowed by the user until the rotation restricting means prevents any further lowering. Preferably, the rotation restricting means comprises a ratchet disc fixed coaxially to the drum and having at least one notch in its circumference, and a pawl for engaging the or one of the notches to prevent rotation at the drum, wherein the radius of the disc at one side of the or each notch is greater than the radius at the other side of the or each notch, so that the pawl will engage the or one of the notches if the disc is rotated below the certain speed, but will skip over the notch or notches if the disc is rotated above the certain speed. In such an arrangement, any number of notches may be used, by in a preferred embodiment, four notches are provided, equally spaced around the circumference of the disc.

More preferably, the radius of the disc gradually increases from the smaller side of the notch to the larger side of the next notch. With this arrangement, the pawl is gradually raised as the disc rotates past it until it is above the larger edge of the next notch.

The pivot may be pivotally moved above the ratchet disc and is raised by the increasing radius of the disc when it is rotated and falls back down under gravity. This arrangement is beneficial as no biasing force needs to be applied to the pawl.

The device is preferably housed in a housing having central boss on which the drum is rotatably mounted and having a hole at a lower end thereof for the cord or strapping and fixing means at an upper end thereof for fixing the device to a bracket.

As discussed above, such a bracket may be fixed to the side of a house or to some other frame. The device therefore does not involve the use of any other fixing means to prevent movement of the load.

In the preferred embodiment, the device is adapted for raising, lowering and suspending a hanging basket. As mentioned above, hanging baskets come in a variety of sizes and weights. Therefore the biasing means should preferably be chosen to provide a balance between helping the user to raise the load, while allowing the load to drop fast enough to avoid the rotation restricting means from preventing rotation.

Although the cord or strapping may be any kind of rope, cord, band, chain, etc., it is preferably a flat band of flexible reinforced plastics.

A flat band is less likely to get tangled when it is wound around the drum. The flat band preferably has an eye fixed at the load bearing end for attaching the load to. This provides an easy and convenient attachment point.

The invention will now be described by way of example only, and with reference to the accompanying drawings in which:

Fig.1 is a perspective view of a device of an embodiment of the invention.

Fig. 2 is a cross-sectional view of the device of Fig. 1 taken parallel to the ratchet disc showing the drum.

Fig. 3 is a cross-sectional view of the device of Fig.1 through the ratchet disc.

Fig. 4 is a cross-section taken through the device of Fig. 1 perpendicular to the ratchet disc.

Figs 5A – 5D show a sequence of positions of the ratchet disc and pawl of the device in use.

Figure 1 shows a perspective view of a device 1 of an embodiment of the invention. The workings of the device are enclosed with casing 2. The eye 11 of band 5 can be seen protruding from a hole (not shown) of the casing.

Fig. 2 is a cross section taken parallel to the ratchet disc, but showing the band 5 wound onto the drum 3. The drum 3 is mounted on central boss 4. The band 5 is fixed to the drum 3 by being inserted through a hole in the drum and fixed around the boss 4.

Fig. 3 shows a cross-section through the ratchet disc. The ratchet disc 7 comprises a plurality (here 4 are shown) of notches 9 each having one side of greater radius than the other side. The radius of the disc 7 increases gradually from the small side of one notch 9 to the large side of the next notch 9 so as to form lobes 8.

Pawl 6 is positioned above the ratchet disc 7 and rest thereon. The pawl is shaped so as to fit into one of the notches and thus prevent rotation of the disc 7 and therefore the drum 3 to wind the disc 7 is fixed.

A spiral spring 10 is provided, which is attached to the housing (boss 4) at one end and to the ratchet disc 7 at the other end. The spring biases the disc in a direction for raising the load, whereon the pawl acts to prevent lowering of the load.

Figure 5A shows the pawl 6 engaging in a notch 9 of the disc 7. Further rotation of the disc and therefore further lowering of the load is restricted.

Fig. 5B shows the pawl resting on a lobe 8 of disc 7 during rotation of the disc in the direction of raising the load.

Fig. 5C shows a position of pawl 6 and disc 7 while the disc is lowering the load at high enough speed to not prevent lowering. The pawl 6 is falling under gravity, but it will not fall fast enough to engage the notch 9 before the notch 9 has past and the pawl 6 will land on the short-radius side of the notch. Thus the disc 7 will continue to rotate and the load will continue to lower.

This position is shown in Fig. 5D.

Although the above description is in relation to a ratchet and pawl, it will be appreciated that the device need be not be so restricted and other

### Claims

1. A device for raising, lowering and suspending a load, the device comprising: a rotatable drum; a biasing means for rotatably biasing the drum in a direction of raising the load; a length of cord or strapping having one end for attaching to the load and the other end attached to the rotatable drum; and a rotation restricting means which prevents the rotation of the drum in the direction of lowering the load below a certain speed of rotation, but permits the rotation of the drum in the direction of lowering the load above said speed of rotation.
2. A device as claimed in claim 1, wherein the rotation restricting means comprises: a ratchet disc fixed coaxially to the drum and having at least one notch in its circumference; and a pawl for engaging the or one of the notches to prevent rotation of the drum, wherein the radius of the disc at one side of the or each notch is greater than the radius of the notch at the other side of the or each notch, so that the pawl will engage the or one of the notches if the disc is rotated below the certain speed of rotation, but will slip over the notch or notches if the disc is rotated above the certain speed of rotation.
3. A device as claimed in claim 2, wherein the radius of the disc gradually increases from the smaller side of the notch to the larger side of the next notch.
4. A device as claimed in claim 3, wherein the pawl is pivotally mounted above the ratchet disc and is raised by the increasing radius of the disc when it is rotated and falls back down under gravity.
5. A device as claimed in any preceding claim, wherein the device is housed in a housing having a central boss on which the drum is rotatably mounted and having a hole at a lower end thereof for the cord or strapping, and a fixing means at an upper end thereof for fixing the device to a bracket.
6. A device as claimed in any preceding claim, wherein the device is adapted for raising, lowering and suspending a hanging basket.

7. A device as claimed in any preceding claim, wherein the cord or strapping is a flat band of flexible reinforced plastics.
8. A device as claimed in claim 7, wherein the band comprises an eye for attaching the load.
9. A device substantially as herein before described and with reference to the drawings.

*There are attached 3 pages of drawings*

\* \* \* \* \*

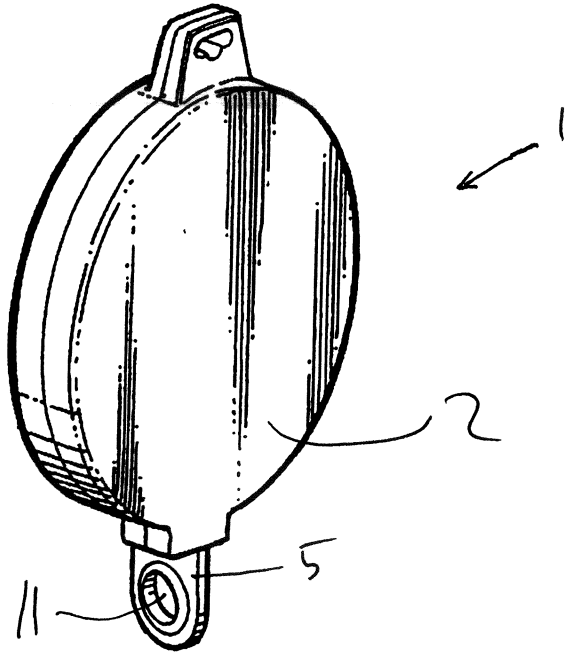


Fig. 1

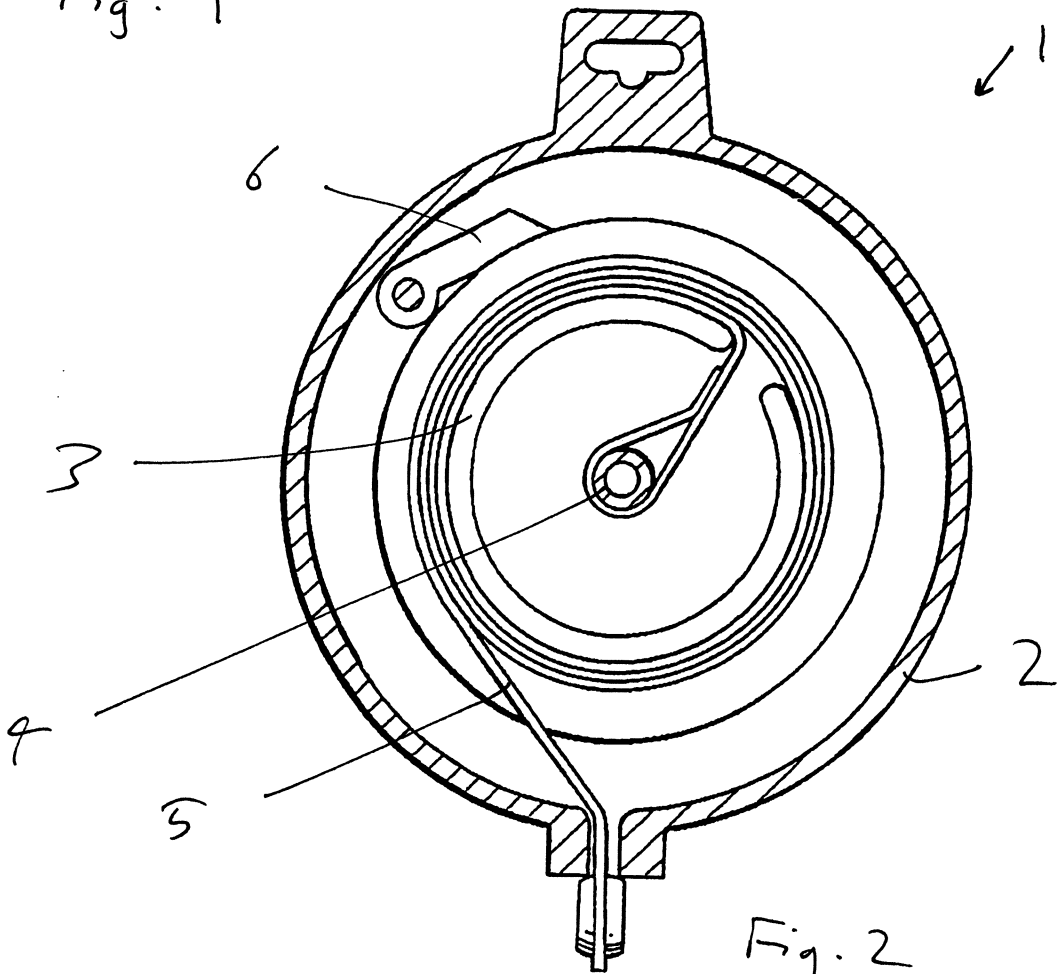


Fig. 2

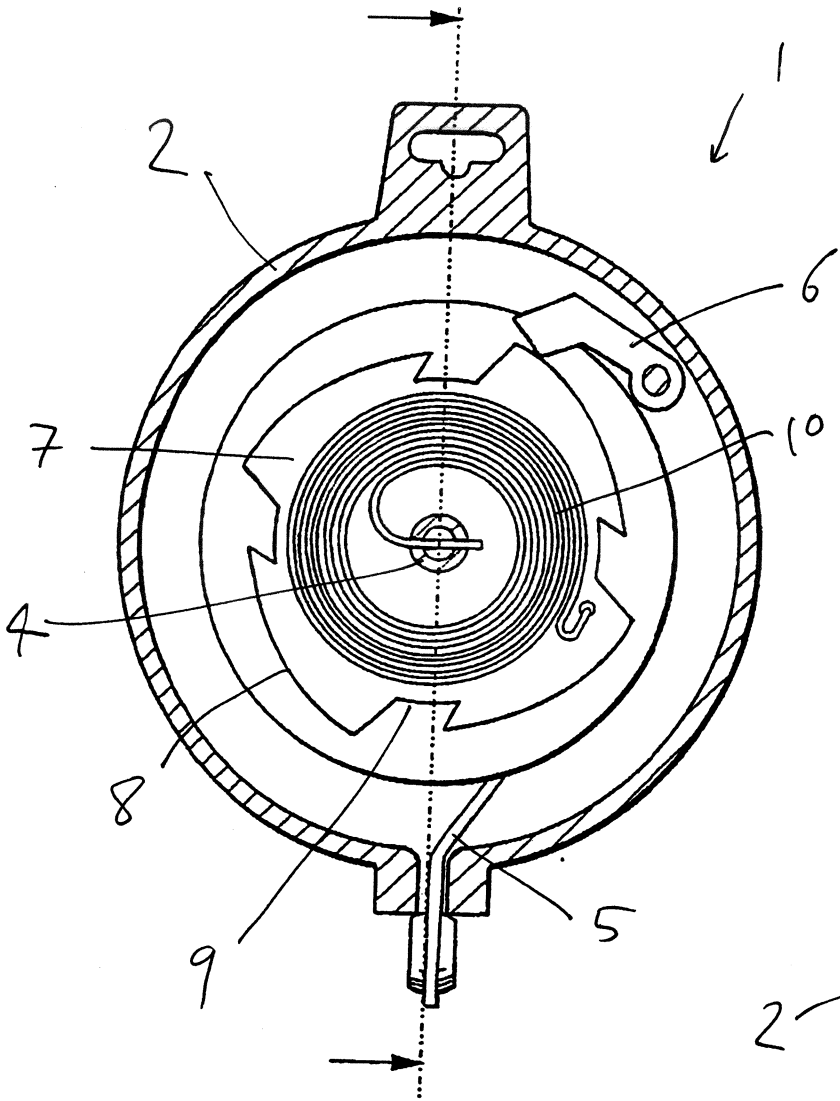


Fig. 3

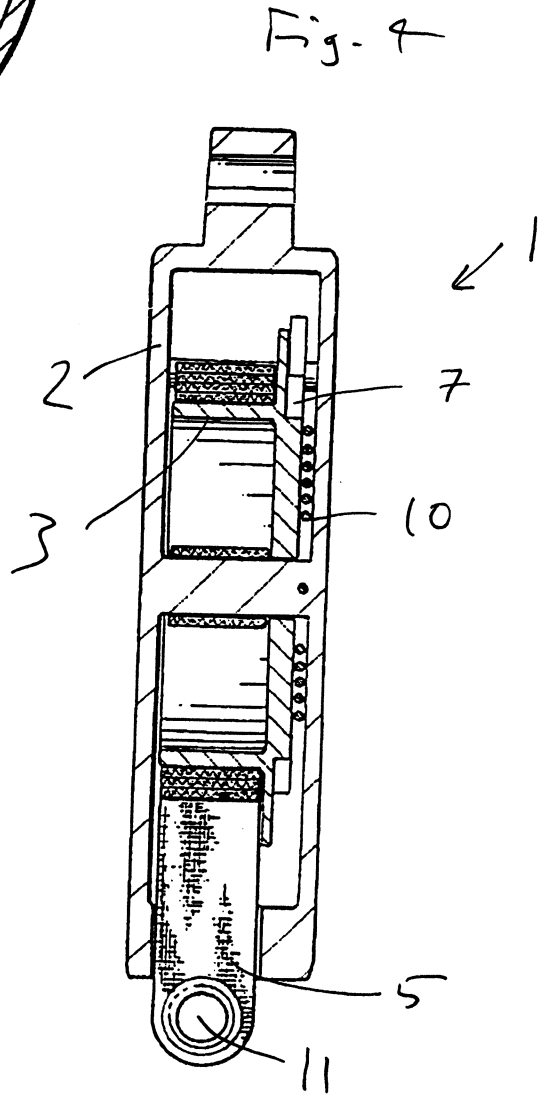


Fig. 4

Fig. 5A

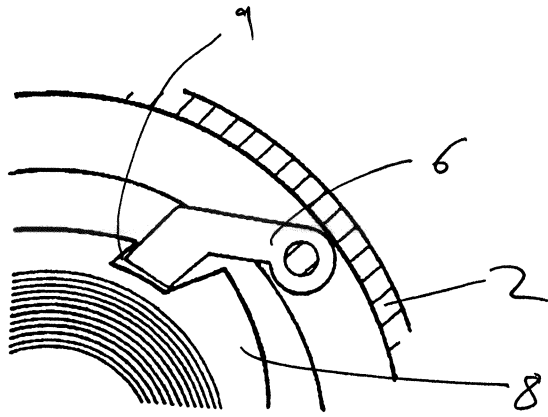


Fig. 5B

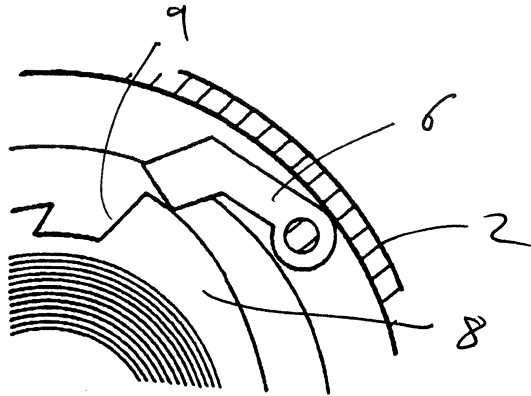


Fig. 5C

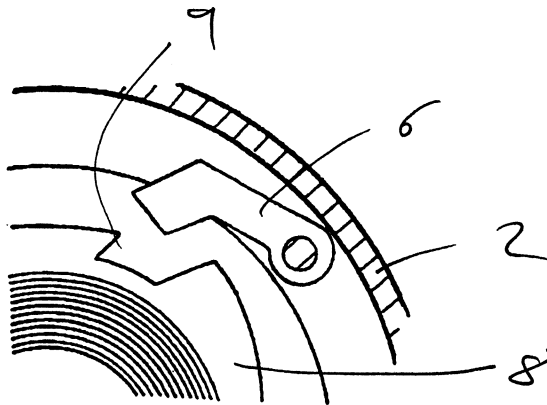
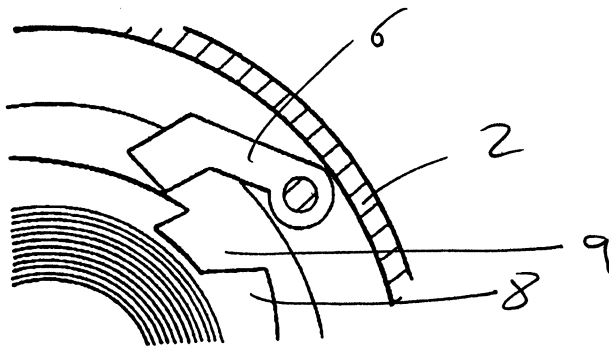


Fig. 5D.



## 2004 PAPER P3

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#### **Suspension Device**

This invention relates to a suspension device for suspending hanging baskets from brackets.

Hanging baskets are usually displayed in an elevated position for optimum visual effect. A problem associated with this elevated position is that watering of the plants in the hanging basket can be difficult.

It is known to use ladders or other suitable devices to access the elevated position for watering. It is also known to provide an elongate hose fitting that is long enough to reach the elevated position of hanging baskets. A system of piping may also be provided to carry water from a water supply to individual hanging baskets.

An alternative known method of watering hanging baskets involves mounting the hanging baskets on pulley systems. A rope suspending from the pulley system is secured to a nearby wall and may be used to raise and lower the baskets. Although such pulley systems provide a satisfactory way of watering hanging baskets, they require a nearby wall or other secure surface for securing ropes.

According to the invention, there is provided [insert claim 1].

The invention thus provides a convenient hanging basket suspension device. Attachment means are provided for a suspension bracket and the hanging basket. The distance between the attachment means can be varied and conveniently locked using a locking means that is part of the device, i.e. positioned between the attachment means. The device can be used to lower the hanging basket for watering, during which the hanging basket is positively suspended.

Preferably, the one attachment means comprises a casing having an attachment eye. The attachment eye may be engagable with a suspension bracket. The casing may enclose the locking means to provide a self contained unit.

The other of the attachment means may comprise a flexible elongate web having an attachment eye. Such a web may be stowed easily, and a flat reinforced plastics web is preferred.

The engagement eye of the web is preferably located at a distal end of the web, so that the end of the web does not descend into, not interfere with hanging baskets.



The locking means preferably comprises a drum rotatably mounted to the casing, an extended portion of the web being wound on the drum. Such an arrangement provides an alternative way of varying the extension of the attachment means, which at the same time compactly stows the web.

The locking means then further comprises an engagement means for engaging the drum, thus restricting rotation of the drum and locking the extension.

In embodiments, the drum is mounted on a central boss of the casing and the web end is attached to the boss. A spiral spring may also be attached to the boss to bias the drum in a winding direction at the drum. The biasing force is preferably minimal, being sufficient to wind in a unloaded web.

The drum preferably comprises a ratchet disc having notches formed in the perimeter. In a preferred embodiment there are four notches.

The radius of the ratchet disc preferably increases in a winding direction of the drum. The engagement means is preferably a pivotable pawl engagable with the notches in the disc. The notches are preferably arranged so that they are only engaged by the pawl when the web is unwinding. However, the radius of the ratchet disc between notches is preferably sufficient to prevent engagement when the web is being unwound at a fast rate.

The invention will now be described, by way of example only, with reference to the following drawings, in which:

Referring to figures 1 to 4 the device 1 comprises a first attachment means 3 and a second attachment means 5. The first attachment means comprises a casing 7 and an engagement eye 9. The engagement eye 9 is located in a peripheral position of the casing 7.

The second attachment means comprises a flat reinforced plastics band 11 having an attachment eye 13 at a distal end and being attached to a boss 15 of the casing 7 at its proximal end.

A drum 17 is rotatably mounted on the boss 15, and the band 11 is wound onto the drum 17. The distal end of the band 11 protrudes through a hole in the casing 7 that is opposed to the attachment eye 9.

The drum 17 carries a ratchet disc 19, which has four notches 21 equally spaced about its perimeter. A spiral spring 23 is connected to the disc 19 and the boss 15 and biases the drum 17 in a winding direction.

A pivotable pawl 25 is mounted to the casing 7 and engages with the notches 21 only during unwinding of the band 11. The radius of the disc 19 varies such that the notches 21 only engage when the drum is rotating at a fast speed.

Use of the device is shown in figs 5a to 5d. [insert page 2 of paper, line 49 to page 3 of paper, line 30]

A specific embodiment is described.

## Claims:

1. A hanging basket suspension device for adjustably suspending a hanging basket on a suspension bracket, the device comprising:
  - a first attachment means;
  - a second attachment means reversibly extensible relative to the first attachment means;
  - and
  - a locking means positioned between the first and second attachment means operable to selectively lock an extension of the second attachment means relative to the first attachment means, thereby enabling a hanging basket to be positively suspended at different heights.
2. The device of claim 1, wherein the first attachment means comprises a casing having an attachment eye.
3. The device of claim 2, wherein the casing encloses the locking means.
4. The device of claim 2 or 3, wherein the second attachment means comprises a flexible elongate web having an attachment eye.
5. The device of claim 4, wherein the attachment eye of the flexible elongate web is located at a distal end of the flexible elongate web.
6. The device of claim 4 or 5, wherein the flexible elongate web comprises a flat reinforced plastics band.
7. The device of any of claims 4 to 6, wherein the locking means comprises:
  - a drum rotatably mounted to the casing, an unextended position of the flexible elongate web being wound on the drum; and
  - engagement means operable to engage the drum, thereby restricting rotation of the drum.
8. The device of claim 7, wherein the drum is mounted on a central boss extended from one of two casing shells.
9. The device of claim 8, wherein a proximal end of the flexible elongate web is attached to the central boss.
10. The device of any of claims 7 to 9, wherein the drum is resiliently biased in a winding direction of the drum.
11. The device of claim 10, wherein the resilient biasing is provided by a spiral spring.
12. The device of claim 10 or 11, wherein the resilient biasing force is substantially less than a weight of a hanging basket.

13. The device of any of claims 7 to 12, wherein the drum carries a ratchet disc having at least one notch formed into its peripheral edge.
14. The device of claim 13, wherein a plurality of notches are formed into the peripheral edge of the ratchet disc.
15. The device of claim 13 or 14, wherein the ratchet disc has a radius between notch edges that increases in the winding direction of the drum.
16. The device of claim 15, wherein the engagement means comprises a pawl pivotally mounted to the casing.
17. The device of claim 16, wherein the pawl is engagable with the notches of the ratchet disc only during unwinding of the flexible elongate web from the drum.
18. The device of claim 17, wherein the increase in the ratchet disc rotation between notch edges is sufficient to prevent engagement of the pawl with the notches during fast unwinding of the flexible elongate web from the drum.
19. A device substantially as hereinbefore described or as shown in the drawings.

*There follow three pages of drawings*

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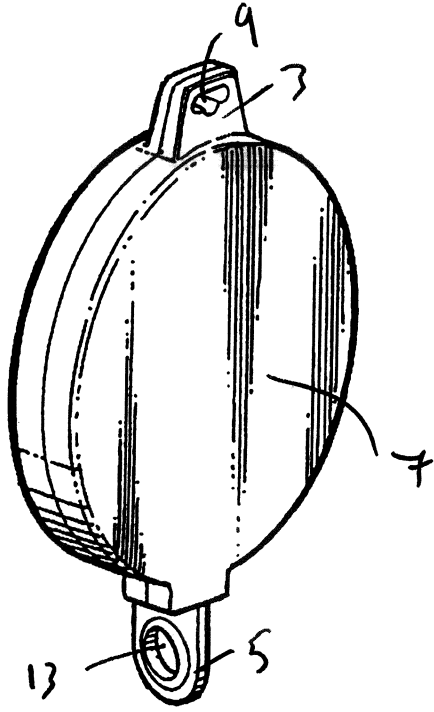


Fig 1

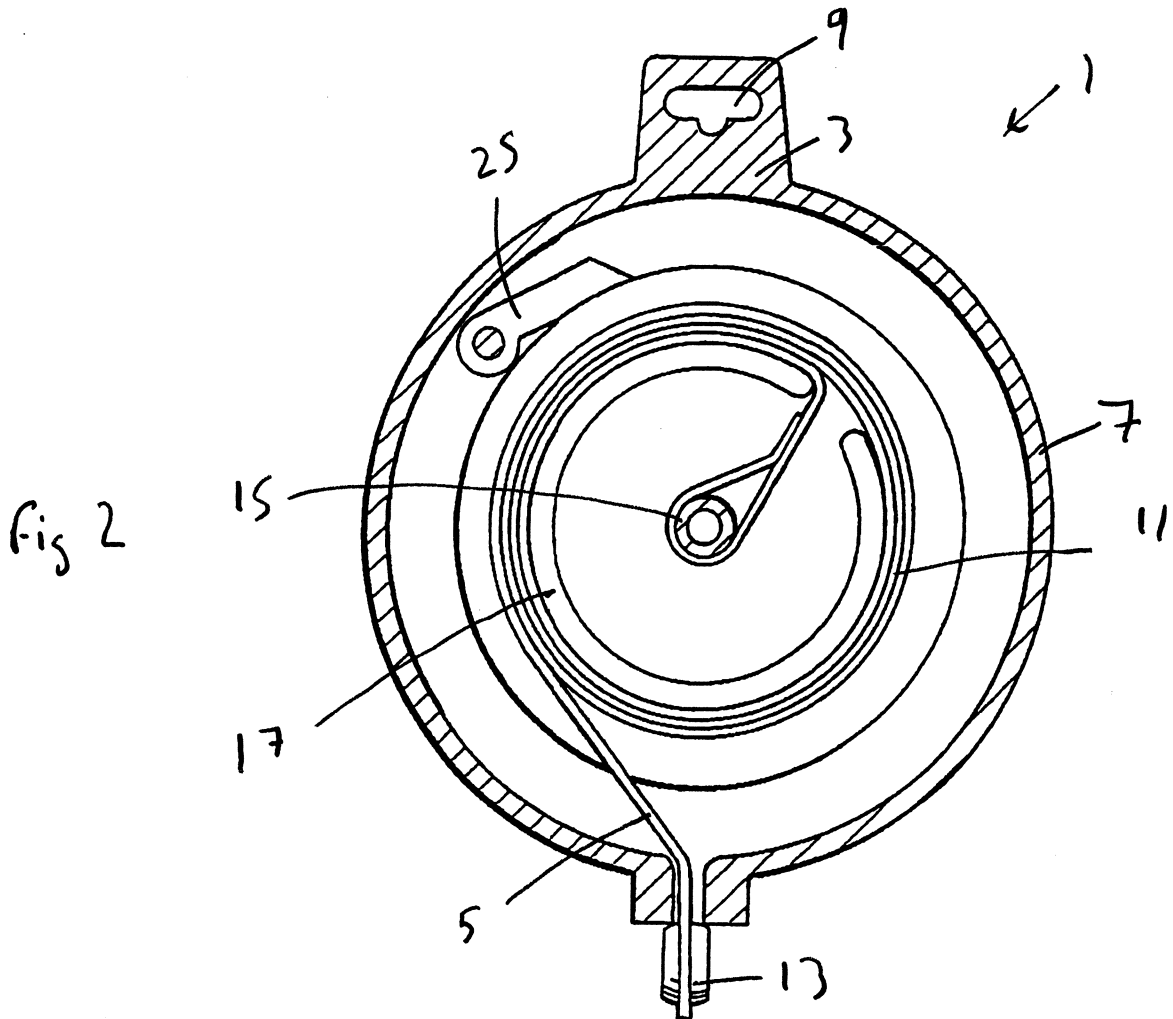
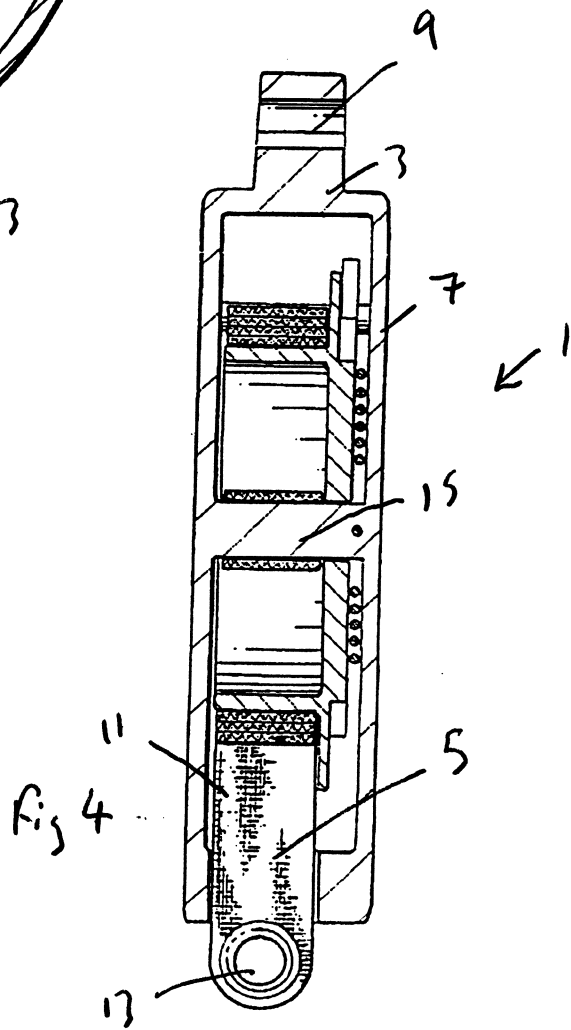
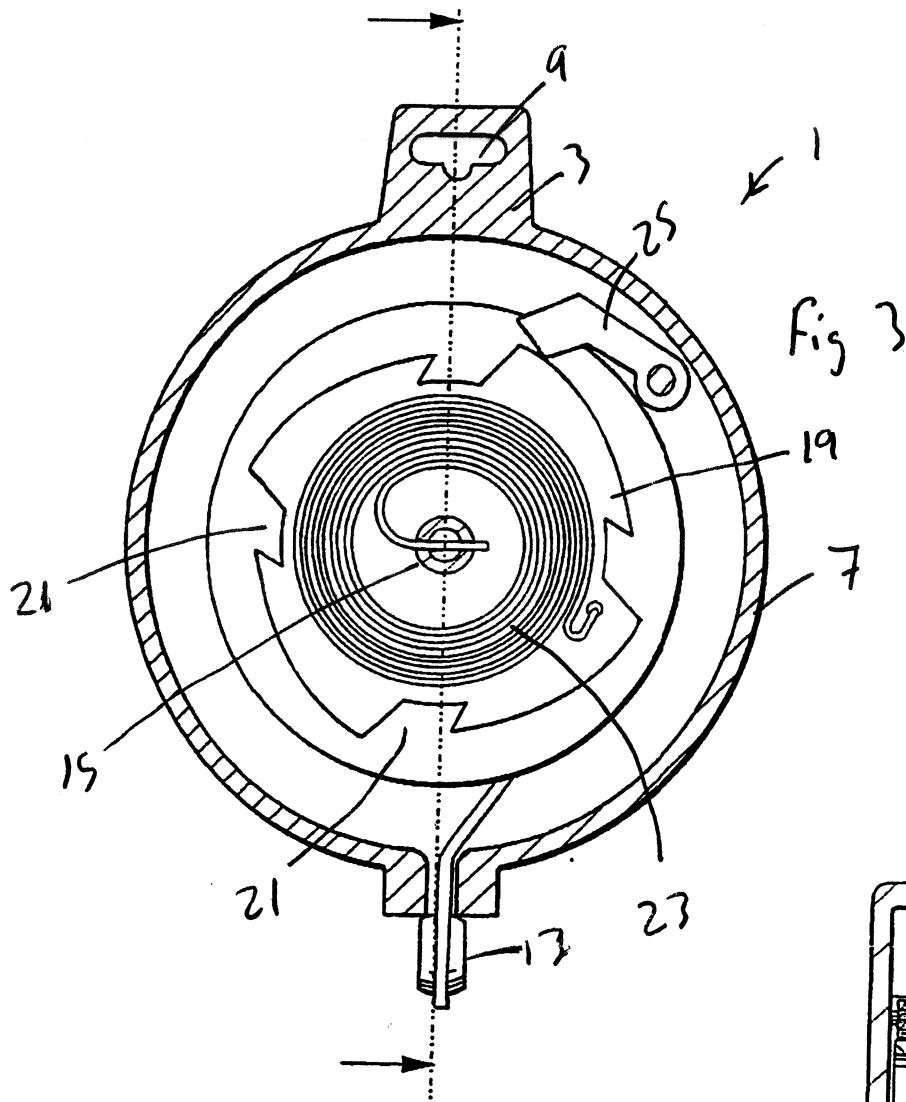


Fig 2



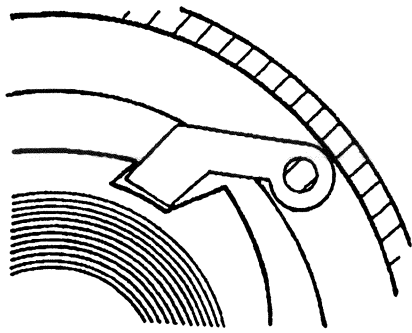


Fig 5a

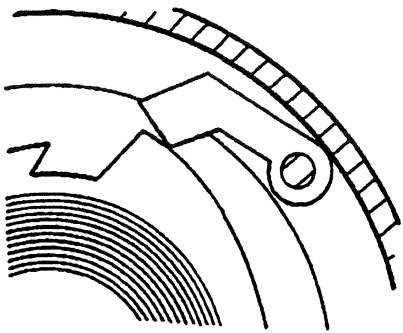


Fig 5b

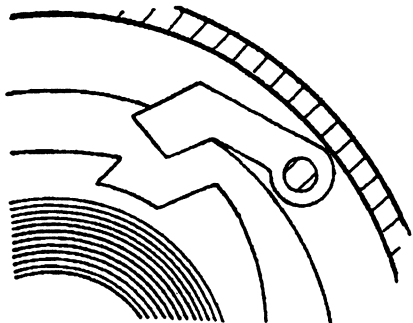


Fig 5c

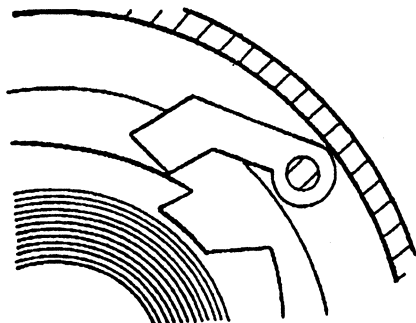


Fig 5d