May 9, 1967 A. QUENOT 3,318,550

TAPE MEASURE REEL

Filed May 25, 1965 2 Sheets-Sheet 1

FIG.1

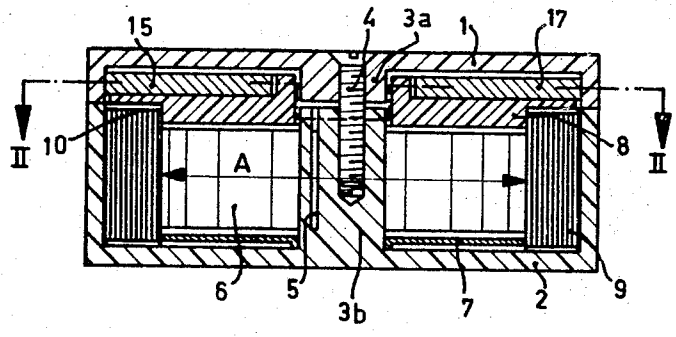
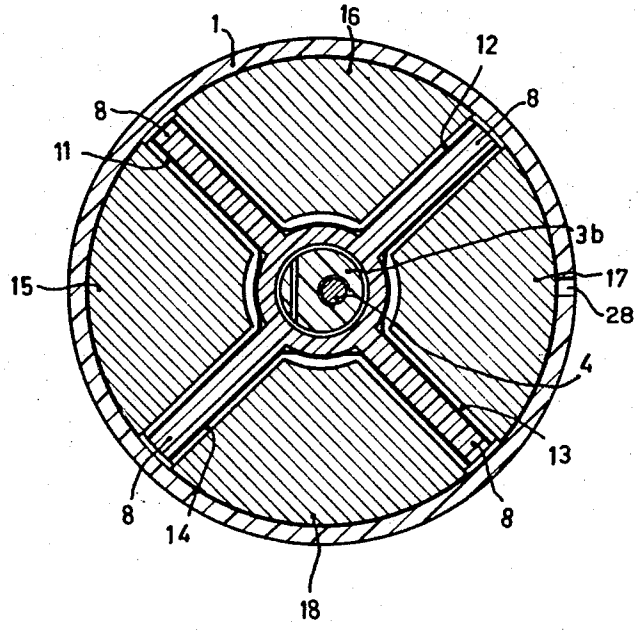


FIG.2



May 9, 1967 A. QUENOT 3,318,550

TAPE MEASURE REEL

Filed May 25, 1965 2 Sheets-Sheet 2

FIG.3

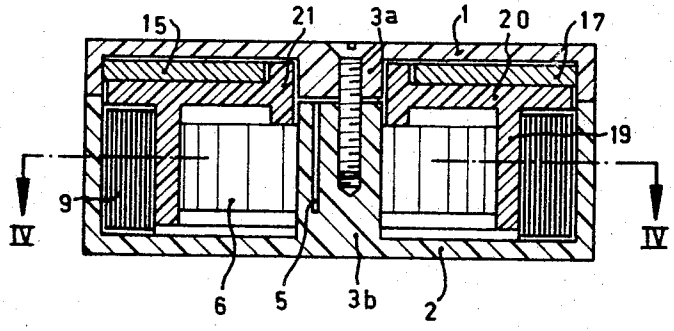
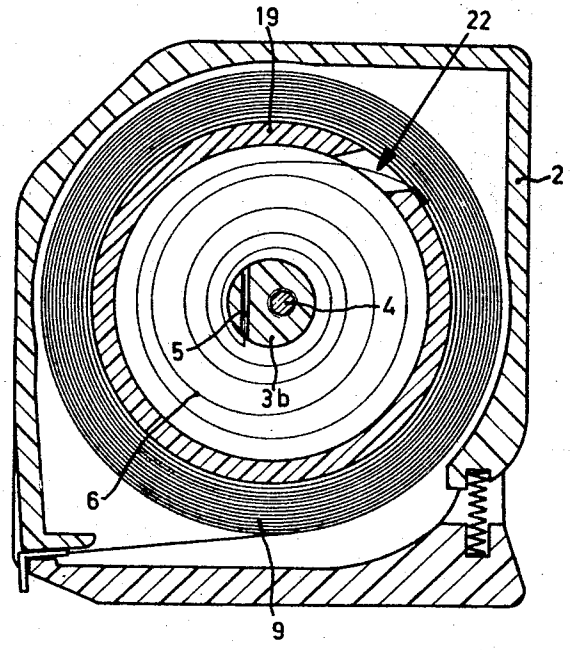


FIG.4



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TAPE MEASURE REEL

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Claims priority, application France, Mar. 13, 1965, 9,169
4 Claims. (Cl. 242—107.3)

The invention relates to a device for winding a coilable tape for linear measurement. Such tapes may be made of steel for instance.

Known devices for winding coilable tapes for linear measurement made of steel, cloth, plastic or similar material, are those where the measuring tape whatever its length is rolled up in a case with the aid of a return spring and they must satisfy in particular two requirements: on the one hand the force of the recoil spring must be sufficient to ensure the complete rolling up of the tape without the help of the user; and, on the other hand, the force of the spring must not be too strong or else the automatic winding of the tape might cause the tongue fixed at the end of the tape to break, the measurement marks on the tape to be rubbed, and the user to be hurt in using it.

Until now some existing devices did not fulfil these conditions. In fact, the force of the recoil spring is frequently insufficient, so that at any rate part of the tape remains unrolled outside the case. In good quality devices, where this inconvenience is avoided the force of the recoil spring is sufficient, so that the tape returns to the case rather roughly with the risk of damage as mentioned.

According to the invention there is proposed a tape measuring device comprising a housing, a shank rigidly attached to the housing a spring attached by its inner end to and coiled around the shank, a tape whose inner end is attached to the outer end of the spring and which is coiled to the outside of the spring in continuance of the coiling formation of the latter, the outer end of the tape passing through a slot in the housing so that a desired length of the tape can be uncoiled and withdrawn from the housing, the spring being partially uncoiled from the shank and tensioned thereabout, and can then be released so that the tape re-coils under the force of the tensioned spring, a tape braking member rotatable about the axis of the shank through frictional contact with the tape during re-coiling of the tape and having at least one recess for receiving a braking element, the arangement being such that when the braking member attains a predetermined speed the braking element is urged into frictional contact with the inner wall of the housing and thereby reduces the rate of which the tape is re-coiling about the axis of the shank.

The invention will now be described by means of the attached drawings. We show two embodiments of the invention but the invention is by no means limited to these embodiments.

FIG. 1 shows a section of the first embodiment of the invention.

FIG. 2 is a section along II—II of FIG. 1.

FIG. 3 shows a section of the second embodiment of the invention.

FIG. 4 shows a section IV—IV of FIG. 3.

The device represented in FIG. 1 and 2 consists of a case having tape opening **28** made of a plastic material formed on the upper part **1** and the lower part **2**, assembled on top of each other. A shaft **3***a*, **3***b* is the means of joining parts **1** and **2**, and gives a lodgement **4** for the screw assembling the case and a slit **5** only in the part of the shaft **3***b* conjointly with the part **2** for fixing at its inside end a return spring **6**.

Around the shaft **3***a*, **3***b* is mounted a drum formed of a first disk **7**, made of metal or plastic material and a second disk **8** made of plastic or other material. The return spring is wound between the two parts opposite the disks **7** and **8**. At its outside end is fixed the inside end of the measuring tape **9** passing through a slot **20** of the housing. This is wound round a diameter A, limited on the one hand by the lateral periphery of the disc **7** and on the other hand by the shoulder **10** of the disc **8**. The means of guiding the tape **9** between the interior and the exterior of the case have not been represented.

On the upper part of the disc **8** are arranged four radial lodgements **11**, **12**, **13** and **14** in each of which is placed a metallic removable braking element **15**, respectively **16**, **17**, and **18** taking the shape of a plaque. When the disc **8** turns, set in motion by friction by the tape **9** winding under the influence of the recall spring **6** in the case, the elements **15** to **18** are urged by centrifugal force against the interior wall of part **1** of the case. The friction is exercised between the said braking elements and the said peripheral wall brakes the disc **8** which as a consequence stops by friction a sudden winding of the tape in the case.

This force of friction is related:

(1) To the coefficient of the friction f between the elements **15–18** and the interior of part **1** of the case. One can vary this coefficient of friction by the choice of materials of which the braking elements are made and the condition of the surface in contact with the friction.

(2) To the radius r of the circle described by the centres of gravity of the elements **15–18**. The more one increases this radius the more important the braking becomes.

(3) To the mass of m of the elements **15–18**.

(4) To the square of the angular speed w of the elements **15–18**.

The equation is:

$$F=kfmrw2$$

Where F is the force of the friction, k is a constant, and the other symbols represent the quantities given above.

Owing to this relation to the square of the speed one sees that the force of the friction is very great at great speed and tends quickly towards zero when the speed tends towards zero.

In the case where a slack length of graduated tape is taken from the case the force of the recoil spring **6** is weak (the slackest position); but in that case the force F will be practically zero and will not oppose the recall of a slack length of tape.

We have thus achieved a regulation of speed allowing for a gradual recoil of the tape without any sudden force.

This device can be used with success whatever may be the length of graduated tape and applies particularly to measures of great length (5–10–20–30–50 m., etc.).

In certain instances one can, nevertheless, observe a slipping between the tape and the shoulder **10** of the disc. The effect of braking of the elements **15–18** then no longer transmits to the tape in the required measure. One can obviate this inconvenience by a variation of the construction as represented in FIGURES 3 and 4.

Here the drum is no longer constructed of two independent discs but on the contrary of a drum in the exact sense of the word, formed by a cylinder **19**, closed at one of its ends by a circular wall **20**, the enlarged part **21** of which forms an abutment on the shaft **3***a*, **3***b*. In that case the spring of the recoil **6** always fixed in the slit **5** is wound in the cylinder **19** while the measuring tape **9** is wound on the outside around the cylinder **19**. The out-

side end of the return spring **6** is attached to the inside end of the tape **9** across an opening **22** provided in the cylinder **19** (FIGURE 4).

The instruments **15–18** are placed as before and have the same function. Nevertheless, when as a result of the winding of the tape in the case under influence of the spring of recoil the elements **15-18** are applied by centrifugal force against the inside wall of the case **1** and therefore brake the drum by friction, the breaking of the cylinder **19** transmits in its entirety to the tape **9** because of its passage in the opening **22**.

The device described in one or other of the two embodiments shown in the example offer the great advantage of allowing a perfect recoil of the tape whilst avoiding all risks of accident caused by too sudden winding. In fact the tape winds in a movement which slows down uniformly, which saves it from mechanical damage and limits the risk of hurting the user.

Naturally a number of variations are envisaged within the scope of the invention. The number of braking elements in particular, their placing on or under the drum as well as the treatment of the contact surface may be difficult and will be determined in each case by the need of obtaining the optimum working conditions.

I claim:

1. A tape measuring device comprising a housing having upper and lower walls having an opening, a generally circular shank in said housing which is rigidly attached to the housing and extends approximately centrally axially thereof, tape guide means surrounding said shank and adapted to rotate thereabout, a coil spring attached by its inner end to the shank so as to coil and uncoil about the latter, a flexible tape located between the spring and said housing and whose inner end is attached to the outer end of the spring while its outer free end can be pulled through the opening in the housing for measuring purposes, at least one annular guide surface on the tape guide means for guiding the tape when it is being unwound for measuring purposes or wound for storage, at least two radially extending recesses in said tape guide means, a braking member located in each recess; the arrangement being such that the tape can be manually unwound and withdrawn from the housing to a desired extent so as uncoil the spring from an unstressed to a stressed condition and can then be released so that the tape and the spring are re-coiled, the tape in its re-coiling action rotating the tape guide means by fricional contact so that the braking members are urged into braking contact with the upper wall of the housing, whereby the rotational speed of the tape guide means and the rate at which the tape is re-wound are controlled.

2. A tape measuring device as claimed in claim **1** wherein the tape guide means is a substantially drum shaped member consisting of interconnected upper and lower discs.

3. A tape measuring device as claimed in claim **1**, wherein said tape guide means is an essentially drum-shaped member having an annular side wall interposed between said coil spring and the tape, the outer end of the coil spring and the inner end of the tape being interconnected by way of a slot in the annular side wall of said tape guide means, a part of said tape frictionally engaging said side wall over substantially its complete width.

4. A tape measuring device comprising a housing having upper and lower walls, and an opening, a generally circular shank in said housing which is rigidly attached to the housing and extends approximately centrally axially thereof, tape guide means surrounding said shank and adapted to rotate thereabout, a coil spring attached by its inner end and having a measuring tape secured to the outer end thereof, said tape being adapted to be pulled through the opening in the housing for measuring purposes, at least one annular guide surface on the tape guide means for guiding the tape when it is being unwound for measuring purposes or wound for storage, two pairs of diagonally opposed radially extending recesses in said tape guide means, four tape braking members each located in a respective one of the recesses; the arrangement being such that the tape can be manually unwound and withdrawn from the housing to a desired extent so as uncoil the spring from an unstressed to a stressed condition and can then be released so that the tape and the spring are re-coiled, the tape in its re-coiling action rotating the tape guide means by frictional contact so that the braking members are urged into braking contact with the upper wall of the housing, whereby the rotational speed of the tape guide means and the rate at which the tape is re-wound are controlled.

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