March 5, 1935. C. B. HAYWARD 1,992,947

TAPE COILING

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Fig. 1

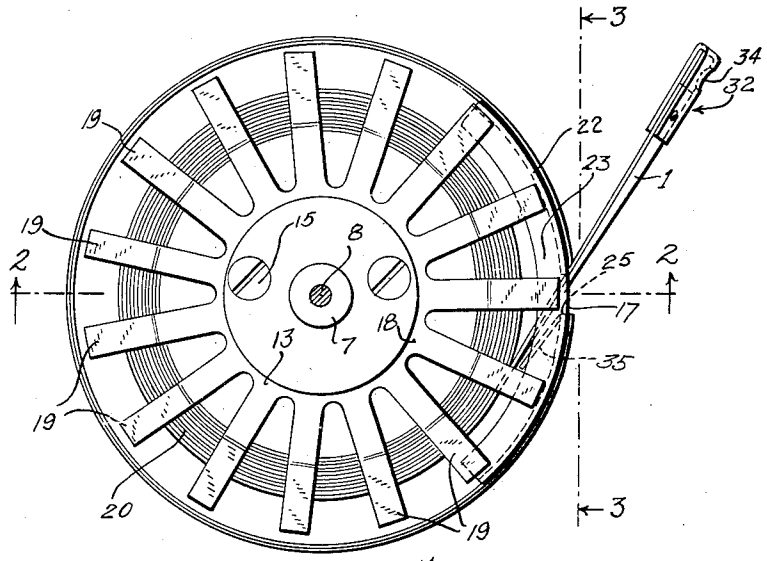


Fig. 2.

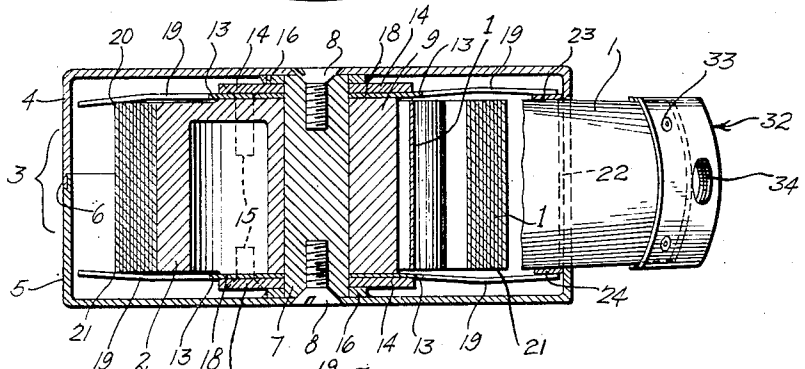
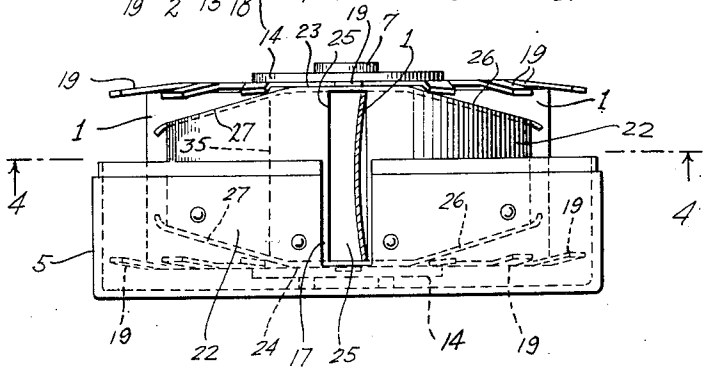


Fig. 3.



INVENTOR
Clarence B. Hayward
BY Janney, Blair & Carter
ATTORNEYS

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Fig. 4.

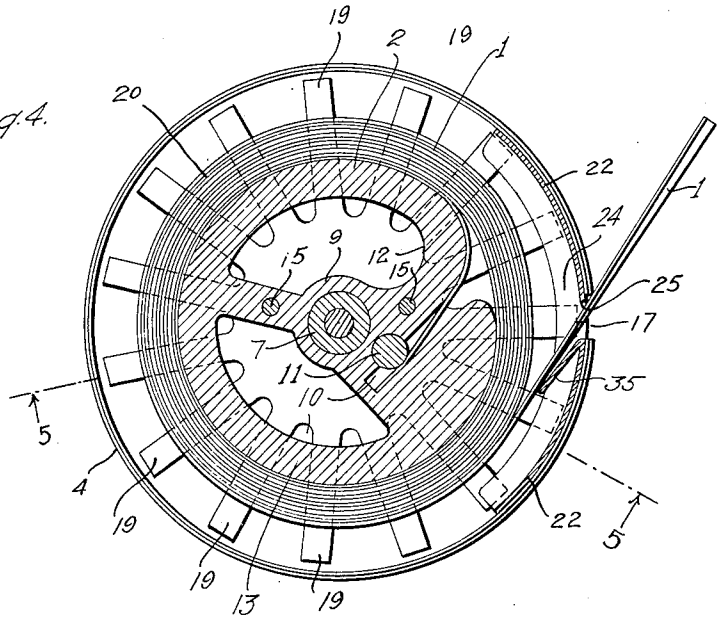
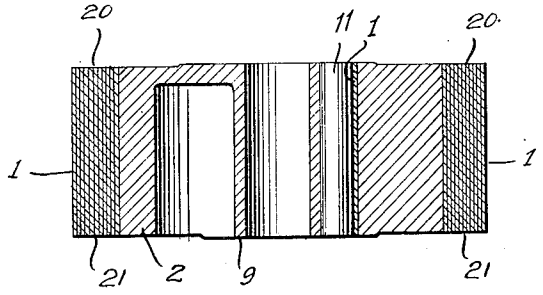


Fig. 5.



INVENTOR
Clarence B. Hayward
BY Gurney, Blair & Curtis
ATTORNEYS

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TAPE COILING

Clarence B. Hayward, Nutley, N. J., assignor to Mayhew Steel Products, Inc., Shelburne Falls, Mass., a corporation of Delaware

Application September 18, 1930, Serial No. 482,660

16 Claims. (Cl. 33—138)

This invention relates to coiling flexible tape of the type having the capacity and a tendency, when coiled, to uncoil and assume a straight line formation, and particularly to coiling a flexible ruler tape of the type referred to.

Among other objects the invention is intended to provide an improved device for coiling and controllably confining flexible tape of the nature described; and particularly to provide a holder in which such a tape may be coiled with its outer end free for withdrawal and from which the tape may be withdrawn by exerting a pull at the outer end in the plane of the coil; and into which the tape may be pushed in a straight line, coiling itself as rapidly as it is received within the device. Another object is to provide simple and practical means for controlling and confining the coiled tape in such a manner as to prevent it from projecting itself, while at the same time permitting coiling or uncoiling when force is applied longitudinally of the uncoiled portion of the tape.

The invention will be clearly understood by reference to one illustrative embodiment thereof shown in the accompanying drawings, in which:—

Figure 1 is a top view with a part of the casing removed.

Fig. 2 is a cross section taken on the line 2—2 of Fig. 1.

Fig. 3 is a side view and partial section taken on line 3—3 of Fig. 1.

Fig. 4 is a cross section taken on line 4—4 of Fig. 3; and

Fig. 5 shows the tape in coiled relation to a reel member taken substantially on line 5—5 of Fig. 4.

Similar reference characters refer to similar parts throughout the different views of the drawings.

The tape which is represented in the drawings by the numeral 1 is concavo-convex in cross section, as is clearly shown in Fig. 3, and is sufficiently flexible to permit of its being coiled while sufficiently resilient to uncoil itself, when free from restraint, and assume a straight line formation. When coiled, the tape flattens out, losing temporarily its concavo-convex formation but retaining the capacity and a tendency to assume its original form when free to do so. Thus, when in restraint, the coiled tape tends automatically to assume a straight line formation lengthwise of itself.

When the tape is used as a ruler or the like, it may be graduated upon one or both sides of its surfaces to provide a scale of units of length and subdivisions thereof as may be found desirable, but such graduations are not indicated in the drawings.

Concavo-convex tapes of the type mentioned have been used as rulers heretofore, advantage being taken of their tendency to uncoil and project themselves automatically, and devices have been devised for containing or holding such tapes which have been characterized by having a controllable braking means normally to restrain the uncoiling of the tape and its self-projection from the holder until some act on the part of the user releases the braking means, when the tape projects itself with considerable force from the holder.

Certain disadvantages have been found in the use of this type of ruler. It has been found difficult to control the amount of projection with any degree of nicety and often such rulers have proved themselves to be dangerous to a degree, for the thin waferlike character of the tape renders it capable of inflicting serious wounds should the projected end thereof strike the user of the ruler, or another.

The present device is intended to overcome these disadvantages and to attain other advantages of a positive nature. In applicant's ruler, self-projection of the tape is completely prevented and the holder is so designed and constructed that the user may pull out or push in as much of the ruler as he may wish to without having to operate any releasing or braking means when doing so.

Referring to Figs. 1 and 2 of the drawings, the tape 1 is wound about a reel 2 forming part of a holder, designated generally in Fig. 2 by the numeral 3. The holder may consist of a casing formed of upper and lower halves 4 and 5 which overlap and join substantially on the central plane of the coiled tape, as shown at 6. As shown in Fig. 2, the entire casing is preferably cylindrical in form, and the two halves are secured to the ends of a centrally disposed post 7 by means of screws 8. As shown in Fig. 4, the reel 2 is of semi-hollow formation having a central hub portion 9 which is rotatable about the central post 7. Hub portion 9 is provided with a recess 10 to receive the inner end of the tape, the latter being jammed against the wall of the recess by means of a pin 11. The lip of the recess is rounded as at 12 so that the tape passing out of the recess and about the circumference of the hub may not be bent too sharply, thus

preventing possible kinking and breakage of the tape.

Returning to Fig. 2, co-axially disposed with reference to the hub portion 9 are a pair of flanges 13 which rest respectively against either end of the hub. Outside of each flange 13 is a disk 14; the flanges 13 and disks 14 being rigidly secured to the hub 9 by means of screws 15. Between the disks 14 and the walls of the casing, washers 16 are interposed. The arrangement is such that the reel 2, its hub portion 9, the flanges 13, and disks 14 rotate together about the central post 7, and may be rotated by merely pushing or pulling the tape lengthwise through an opening 17 formed in the cylindrical portion of the casing; the tape being confined about the hub in a compact spiral coil by the flanges 13 in the manner next described.

Each flange 13 has a substantially flat portion 18 against which a disk 14 presses and a plurality of radially extending fingers 19 which are bent laterally or inwardly toward the central plane of the reel and coil. Fingers 19 are of a radial length to extend beyond the coil when the entire tape is contained within the holder. The fingers 19 are made of a spring material to resiliently engage the upper and lower edges 20 and 21 of the outer convolutions of the coil, with sufficient pressure to hold the tape in its coiled formation against its natural tendency to expand and assume a straight line formation.

As shown in Fig. 3, provision is made adjacent opening 17 of the casing for releasing the tape from the confining action of the fingers 19, to permit it to pass in and out of the opening 17. This is accomplished by means of a cam plate, the shape of which is clearly shown in Fig. 3, comprising an arcuate web portion 22 curved to closely fit the inner cylindrical wall of the casing, and upper and lower cam surfaces 23 and 24. The cam plate which may be secured to the lower half of the casing, by rivets, or in any other suitable manner, is symmetrically arranged with respect to the opening 17, and is provided with an opening 25 which registers with the opening 17. Adjacent the opening 25 the cam surfaces 23 and 24 are substantially in the same horizontal plane respectively as the central portion of the flange 13, and at either side of the opening 25 the cam surfaces taper symmetrically toward the central plane of the casing, as shown at 26 and 27, and below the horizontal plane of the fingers 19.

It will be apparent that upon rotation of the reel in either direction, the fingers of the retaining flanges as they advance toward the opening 17 will be engaged, in pairs, by the cam surfaces 23 and 24 and gradually spread apart during their advance toward the openings 17 and 25 until they are completely clear of the coiled tape, as shown at the right hand side in Fig. 2. This action releases the tape from the grip of the fingers adjacent the openings 17 and 25 and permits the withdrawal or insertion of the tape through said openings. Similarly and succesively each pair of opposing fingers, as they approach the opening, are spread, and the tape confined thereby released, and this action results whether the reel is turned in one direction by withdrawal of the tape or in the opposite direction by insertion of the tape.

In order that the end of the tape may be more easily handled and to protect it against being deformed or mutilated, and also to protect objects with which it may come in contact from being injured, a guard 32 of any suitable construction is provided which may be riveted to the end of the tape, as indicated at 33, and the guard may be provided with an eye 34 by means of which it may be attached to a pin or other article when the tape is being used for measuring purposes. This guard also serves to stiffen the end of the tape and maintain it in its concavo-convex form.

Adjacent one lateral edge of the opening 17 toward which the tape moves when it is entering the holder there is provided a lip or guide 35 which extends inwardly in a direction generally tangential to the coiled tape. This lip extends inwardly far enough to guide and direct the tape toward the reel and within the confines of the fingers 19 so that the tape will coil compactly about the reel with its outer edge uniformly engaged by the detent fingers of the restraining flanges.

From the foregoing it will be seen that this invention is one well adapted to attain the objects hereinbefore set forth in a thoroughly practical and simple manner and that the whole device may be simply and economically made. The detent fingers confine the tape in coiled formation at all times while permitting a ready withdrawal and insertion of the tape. Because the confining means contacts only with the upper and lower edges of the outer convolution of the coiled tape, the lateral surfaces of the tape are not injured or disfigured as would be the case if the confining means contacted therewith.

As many possible embodiments of the invention may be made without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a holder for a coiled flexible tape having the capacity and a tendency to uncoil and assume a straight line formation, in combination, a rotatable reel about which the tape is to be coiled; a pair of resilient dished flanges disposed at the opposite ends of said reel with their concave sides mutually opposed and adapted to confine the tape in coiled formation therebetween; a casing provided with a peripheral opening to permit ingress and egress of the tape; means on said casing adjacent said opening for spreading portions of said flanges to permit withdrawal of said tape through said opening; and means adjacent said opening for guiding said tape in its movement into said casing.

2. In a holder for coiled flexible tape having the capacity and a tendency to uncoil and assume a straight line formation, in combination, a rotatable reel about which the tape is to be coiled; a pair of members at the ends of said reel, each having a plurality of resilient fingers extending radially and inturned toward the central plane of the reel, said fingers being adapted to confine the tape in coiled formation; a casing having an opening in the plane of the coil through which the outer end of the tape extends; and means within said casing adjacent said opening for progressively spreading opposed pairs of advancing fingers upon rotation of said reel to permit said tape to coil or uncoil when pushed or pulled through said opening.

3. In a holder for a coiled flexible tape having the capacity and a tendency to uncoil and assume a straight line formation, in combination, a rotatable reel about which the tape is to be coiled;

a pair of resilient dished flanges disposed at the opposite ends of said reel with their concave sides mutually opposed and adapted to confine the tape in coiled formation therebetween; a casing provided with a peripheral opening to permit ingress and egress of the tape; and means within said casing extending peripherally both ways from said opening for spreading the advancing portion of said flanges upon rotation of said reel in either direction to permit coiling and uncoiling of said tape when pushed or pulled through said opening.

4. In a holder for a coiled flexible tape having the capacity and a tendency to uncoil and assume a straight line formation, in combination, a rotatable reel about which the tape is to be coiled; a pair of resilient dished flanges disposed at the opposite ends of said reel with their concave sides mutually opposed and adapted to confine the tape in coiled formation therebetween; a casing provided with a peripheral opening to permit ingress and egress of the tape; and means on said casing adjacent said opening for spreading portions of said flanges to permit withdrawal of said tape through said opening.

5. In a holder for a coiled flexible tape having the capacity and a tendency to uncoil and assume a straight line formation, in combination, a rotatable reel about which the tape is to be coiled; means rotatable with said reel for confining the tape in coiled formation; a casing provided with an opening to permit ingress and egress of the tape; means on said casing for displacing the confining means to permit withdrawal of the tape through said opening; and a guard covering the outer end of said tape.

6. In a holder for coiled flexible tape, in combination, a flexible resilient tape having the capacity and a tendency to uncoil and assume a straight line formation, a rotatable reel about which the tape is coiled; a pair of members at the ends of said reel, each having a plurality of resilient fingers extending radially from the reel and having their outer ends inturned toward the central plane of the reel, said fingers being adapted to rotate with the reel and confine the tape in coiled formation.

7. In a holder for a coiled flexible tape having the capacity and a tendency to uncoil and assume a straight line formation, in combination, a rotatable reel about which the tape is coiled; means rotatable with said reel for confining the tape in coiled formation; a casing provided with an opening to permit ingress and egress of the tape; and means on said casing for displacing the confining means to permit withdrawal of the tape through said opening.

8. In a holder for a coiled tape having the capacity and a tendency to uncoil, the combination of a flexible and resilient tape, a casing provided with an opening to permit ingress and egress of the tape; a rotatable reel about which the tape is coiled; means rotatable with the reel and acting upon an edge of the coiled tape to confine the tape in coiled formation; and means to release the confining means from the tape adjacent said opening while permitting the confining means to function at other points about the periphery of the coiled tape.

9. In an article of the character described, in combination, a holder and a flexible tape coiled therein with its outer end free for withdrawal therefrom, said coiled tape having the capacity and a tendency to uncoil and project itself lengthwise from the holder and displaceable confining means in said holder for the coil adapted to engage the coil at a plurality of spaced points; and means for displacing said confining means progressively from point to point to permit withdrawal of said tape from and insertion into said holder.

10. In an article of the character described, in combination, a holder and a flexible tape coiled therein with its outer end free for withdrawal therefrom, said coiled tape having the capacity and a tendency to uncoil and project itself lengthwise from the holder and resilient means in said holder for exerting holding pressure upon the side edges of said coiled tape at a plurality of spaced points for retaining the tape in coiled formation; and means for displacing said resilient means progressively from point to point to permit withdrawal of said tape from said holder.

11. In a holder for a coiled flexible tape, in combination, a flexible resilient tape having the capacity and the tendency to uncoil and assume a straight line formation, a rotatable core about which the tape may be coiled, and means fixedly secured with respect to said core for rotation therewith for exerting a force upon the outer coil in a direction toward the core, said force being applied around a substantial part of the periphery of the outer coil.

12. In a holder for a coiled flexible tape having the capacity and the tendency to uncoil and assume a straight line formation, in combination, a rotatable core about which the tape may be coiled, guide means for guiding the rotation of said core, means movable with said core for confining the tape in coiled formation, and means associated with said guide means for continually displacing the confining means during the coiling or uncoiling of the tape from said core at a point fixed in relation to said guide means.

13. In combination with a convex-concave metal tape, a rotatable core about which the tape may be coiled by manually pushing the tape substantially tangentially toward the core, and from which the tape may be uncoiled by pulling it away from the core; confining means fixed to said core for exerting a confining influence on the tape as it is coiled about the core, and means coacting with the confining means when the tape is being manually pushed or pulled to or from the core for continuously releasing the confining means at a point following the tangential point as the tape is coiled about the core and preceding the tangenial point as the tape is drawn from the core.

14. In combination with a convex-concave metal tape, a rotatable core about which the tape may be coiled by manually pushing the tape substantially tangentially toward the core, and from which the tape may be uncoiled by pulling it away from the core; confining means fixed to said core for exerting a confining influence on the tape as it is coiled about the core, and means coacting with the confining means when the tape is being manually pushed toward the core for continually releasing the confining means at a point following the tangential point as the tape is coiled about the core.

15. In a holder for a coiled flexible tape having the capacity and the tendency to uncoil and assume a straight line formation, a rotatable core about which the tape may be coiled by manually pushing the tape substantially tangentially toward the core and from which the

tape may be uncoiled by pulling it away from the core; confining means movable with the periphery of said core for exerting a confining force on the outer coil of said tape in a direction toward the axis of said core, and means for relieving the tape of the confining force exerted by said confining means between the point of tangency and a point following the point of tangency as the tape is coiled by pushing it tangentially toward the core.

16. In a holder for a coiled flexible tape having the capacity and the tendency to uncoil and assume a straight line formation, in combination, a rotatable core about which the tape may be coiled, at least one resilient dished flange secured to one end of said core, the concave side of said flange facing the core, supporting means for rotatably supporting said core, and the angle of said dished flange to the axis of said core being sufficient to cause a substantial resultant force to be exerted on the outer coils of the tape coiled about said core in the direction of said core.

CLARENCE B. HAYWARD.