H. A. FARRAND.

RULE.

APPLICATION FILED OCT. 23, 1919.

1,402,589.

Patented Jan. 3, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

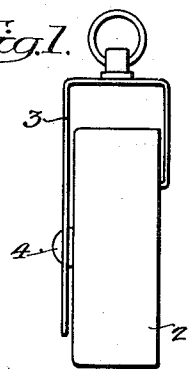


Fig. 2.

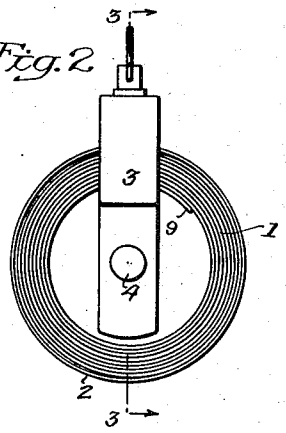


Fig. 3.

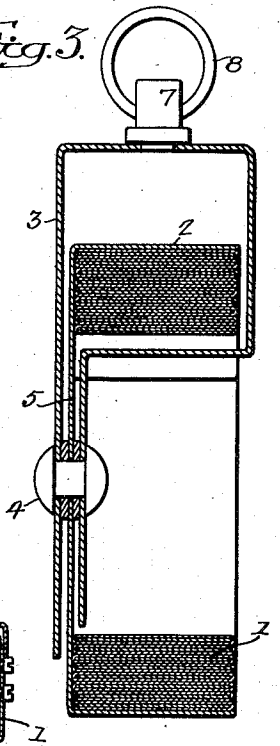


Fig. 4.

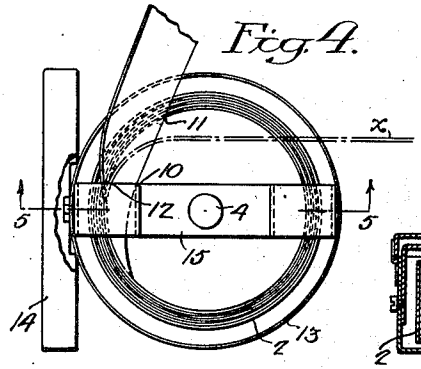


Fig. 5.

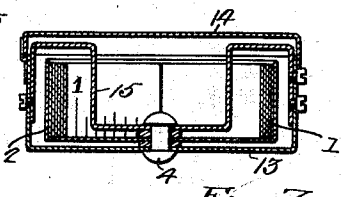


Fig. 6.

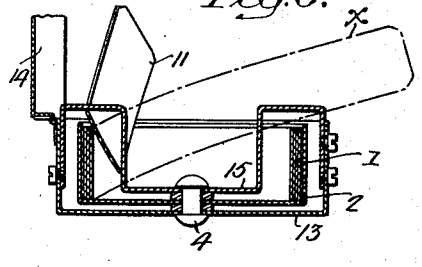


Fig. 7.

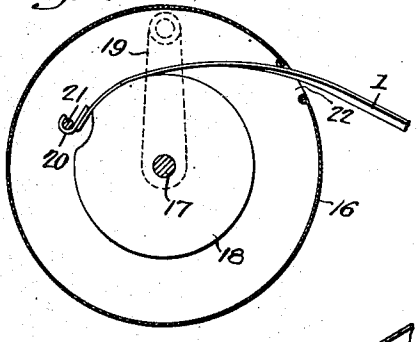


Fig. 8.

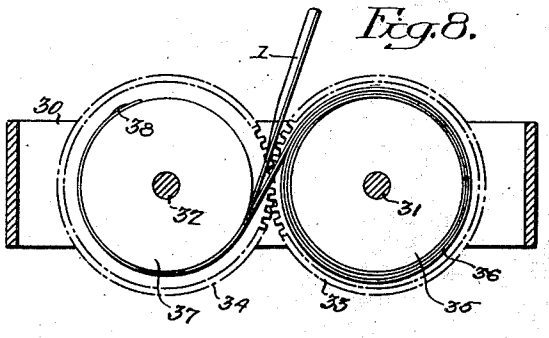
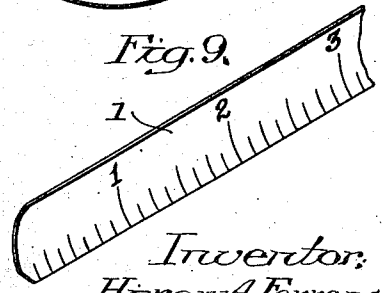


Fig. 9.



Inventor:
Hiram A. Farrand,
by his Attorneys,
Howson & Howson

H. A. FARRAND.

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2 SHEETS—SHEET 2.

Fig. 10.

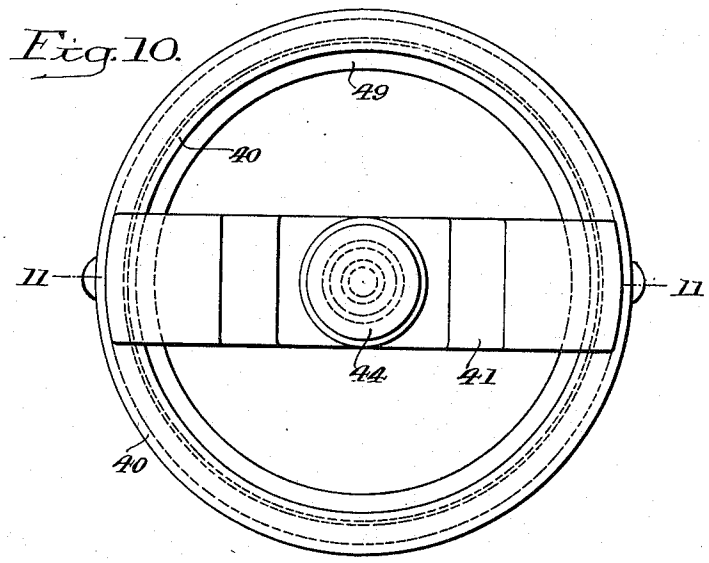


Fig. 11.

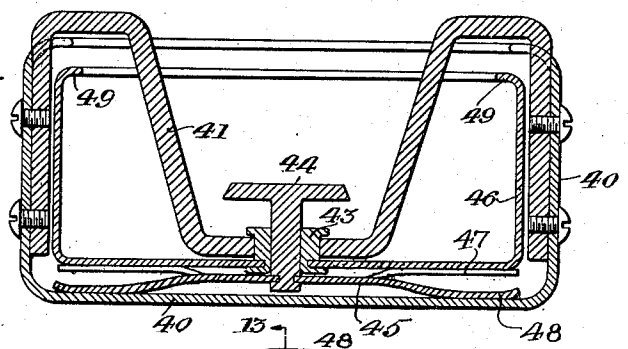


Fig. 12.

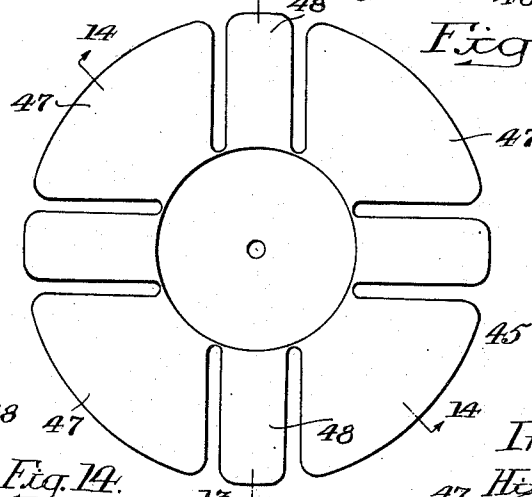


Fig. 13.

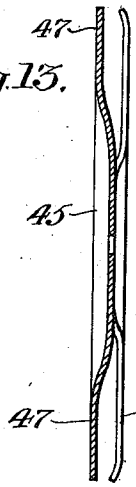
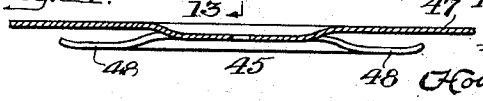


Fig. 14.



Inventor.

Hiram A. Farrand.

by his Attorneys.

Howson & Howson

UNITED STATES PATENT OFFICE.

HIRAM A. FARRAND, OF MERCHANTVILLE, NEW JERSEY.

RULE.

1,402,589. Specification of Letters Patent. Patented Jan. 3, 1922.

Application filed October 23, 1919. Serial No. 332,634.

To all whom it may concern:

Be it known that I, HIRAM A. FARRAND, a citizen of the United States, residing in Merchantville, New Jersey, have invented Rules, of which the following is a specification.

This invention relates to measuring tape made of metallic ribbon curved to have a concavo-convex cross section and sufficiently flexible to permit of its being rolled or coiled; its stiffness and resiliency being sufficient to cause it to remain in or return to a straight or unrolled condition when it is released or free to move.

One object of the present invention is to provide a simple but inexpensive form of holder for the reception of a coil of tape of the type indicated and more particularly, a holder which will permit said tape to be drawn from or manually fed to the interior rather than the exterior of the coil.

It is further desired to provide a novel combination of tape and holder whereby the former may be so held as to be capable of automatically moving from its coiled to its straight condition when desired, the parts being so arranged as to provide braking means for stopping and holding the tape when any desired length thereof has been delivered.

I also desire to provide a novel form of holder for a concave ribbon tape or rule which will permit it to be coiled up by the exertion of a force applied tangentially of the coil, the arrangement being such that the tape may be easily detached from the holder when this is desirable.

A further object of the invention is to provide a form of flexible tape of a composite structure which may be coiled and operated as above indicated and which shall include a flexible concave supporting body with a fabric or other cover also of flexible nature upon which suitable graduations may be formed.

These objects and other advantageous ends I attain as hereinafter set forth, reference being had to the accompanying drawings, in which,

Figs. 1 and 2 are respectively a side and a front elevation of a tape and one form of holder therefor constructed in accordance with my invention;

Fig. 3 is an enlarged transverse vertical section on the line 3—3, Fig. 2;

Fig. 4 is a front elevation illustrating a slightly modified form of holder and tape with the cover removed;

Fig. 5 is a transverse section on the line 5—5, Fig. 4, showing the cover in position;

Fig. 6 is a transverse section similar to Fig. 5 showing the tape in the position in which its projecting part is automatically held from movement;

Fig. 7 is a horizontal section of a modified form of my invention, illustrating one method of detachably connecting the tape to the holder;

Fig. 8 is a horizontal section of another modification of my invention;

Fig. 9 is a fragmentary perspective illustrating a portion of the tape proper;

Fig. 10 is a plan of another modification of my tape holder;

Fig. 11 is a transverse section on the line 11—11, Fig. 10;

Fig. 12 is a plan of the brake plate of that form of holder shown in Fig. 10; and

Figs. 13 and 14 are transverse sections on the lines 13—13 and 14—14, Fig. 12.

In Figs. 1 to 3 inclusive of the above drawings, 1 represents a coiled length of the tape forming part of my invention which, as shown in Fig. 9, is transversely concave and graduated in any desired manner, preferably on its concave surface, to provide a scale of units of length and sub-divisions thereof. It is a peculiarity of such a tape, which is usually made of thin flexible steel ribbon, that when it is coiled its convolutions temporarily lose their concavo-convex section and flatten out, although they at all times tend to regain their original form as well as to uncoil in order that the tape as a whole may assume a straight condition.

In order to provide a suitable holder for such a tape when in the coiled condition, I preferably employ a cylindrical case in the form of a shallow box rotatably mounted in a frame or holder 3 by means of a pivot spindle in the form of a bolt or rivet 4. This spindle extends centrally through the center of the single end or head 5 with which the case 2 is provided, and the frame preferably consists of a length of relatively stiff strip material having its two ends extended parallel to each other on opposite sides of the casing end 5 and connected by the spindle 4. As shown in Fig. 3, the frame or holder strip extends radially outward from the center of the casing in a generally rectangular form so that it may be conveniently grasped by

the fingers of the user and it preferably has connected to the center of its outermost portion a stud 7 with a ring 8 for attachment to a chain or other supporting or retaining element.

The casing 2 with the tape 1 coiled therein is thus rotatably carried by the holder frame 3 and it is to be particularly noted that said tape coils from the inside, i. e., in withdrawing it from the casing 2, its inner end 9 is moved laterally until it projects from the coil in the relative position indicated in Figs. 4 and 6 which show another form of holder, utilizing and supporting the tape in the same manner as is characteristic of Figs. 1 to 3 inclusive.

When said tape is in this position last indicated, its natural resiliency causes its lower or inner edge to frictionally engage a bridge-like portion of the holder frame at the point 10 and also to engage its next outer convolution at the point 11 while its outer edge also frictionally engages the bridge portion of the holder frame at the point 12, with the result that it is prevented by the friction exerted at these three points from moving out beyond any point to which it may be forcibly drawn. When it is desired to draw out a further length of said tape, its projecting end is bent inwardly toward the central spindle so that it approaches the position indicated in dotted lines at x (Figs. 4 and 6), with the result that its inner edge is freed from engagement with its next outer coil or convolution. As a consequence the friction holding it from movement is so far reduced that it automatically uncoils, bodily projecting its straight extended end for any desired distance until the pressure holding it in the dotted line position is relieved, whereupon it returns to the position shown in full lines Figs. 4 and 5 with its inner edge frictionally engaging its next outer coil in the casing and is held from further uncoiling. If desired, the projected portion of the tape may be held in its released position until it has so far rotated the casing that it is wholly delivered therefrom, after which it may be used in its straight condition as a rule, its concavo convex structure and its dimensions being such that when so extended and straightened, it possesses sufficient structural strength to prevent it from buckling.

When it is desired to return the tape to its holder, one of its ends is introduced into the rotatable casing 2 where it is held by reason of its frictional engagement with the cylindrical wall thereof. Thereafter as the projecting part of the tape is forced to move longitudinally toward the casing while this remains free to rotate by reason of the user grasping the frame 3, said casing is turned on the spindle 4 and the tape is coiled from without inwardly. In so coiling the tape it is moved alternately into and out of the position indicated in dotted lines in Figs. 4 and 6 as it is successively grasped and released by the user in order that successive lengths may be coiled up. The end of the tape is finally moved from the laterally projecting position to a position in which it lies parallel with and immediately adjacent to the other convolutions within the casing, and between the planes of its two faces.

In that form of the invention shown in Figs. 4 to 6 inclusive I have mounted the coil-containing casing 2 within a second casing 13 which is practically a closed extension of the holder frame 3 of Figs. 1 to 3 inclusive, and in this instance provide a hinged cover 14 for the outer casing whereby the tape and its container may be completely enclosed. With such an arrangement of parts I provide a bridge strip 15 extending between opposite portions of the holder casing 13 and bent inwardly for engagement with the inner end of the spindle 4, although this operates in the same manner as does the bridge portion of the holder frame 3, to serve as a brake and retainer for the tape, whereby any desired length thereof may be releasably held in its projected position while the remainder of its length is coiled in the casing.

The ability to detach the concavo-convex tape from its reel or containing casing is one of the useful features of my invention and in case said reel has the form indicated in Fig. 7, said tape may be constructed to retain this feature. In this modification a flat cylindrical casing is provided with a central spindle 17 carrying a drum 18 which may be turned by a handle 19. The convex tape in this instance would be provided at its inner end with a hook 20 designed to removably engage a pin 21 extending transversely between the flat faces of said casing 16, so that while it may be wound up in the manner hitherto common in the art by turning the handle 19, when its complete length has been drawn out, it may be easily detached from said drum for use independently of the casing. After such use its hook end 20 may be reintroduced through the side opening 22 of the casing 16 and again engaged with the transverse pin 21, whereupon it may be drawn into the casing by the rotation of said pin and drum by the handle 19.

In those forms of the invention hitherto described I may etch or engrave the desired graduations upon either or both faces of the metallic ribbon constituting the tape, or as shown in Figs. 3 and 10, may employ such a ribbon with a covering of fabric or other suitable material on which the graduations are printed or otherwise displayed. In any case however, the device operates as above described.

In that form of my invention shown in

Fig. 8, I may cause the tape to be wound up by forcing it toward its casing or holder as in those forms of the invention shown in Figs. 1 to 6, and for this purpose I employ a rectangular frame 30 supporting a pair of parallel spindles 31 and 32. These have fixed to them a pair of coacting gear wheels 33 and 34 and each likewise has mounted on it a drum, of which that indicated at 35 on the spindle 31 has wound on it a fabric, metal or other flexible strip or ribbon 36. The drum 37 on the other spindle has one end of this strip permanently fixed to it at 38 and when it is desired to wind the tape on this latter drum, one end thereof is inserted between it and the strip 36 at the point where the latter is tangent thereto. If the tape 1 be then forced longitudinally toward the drum 37 the latter is caused to rotate, and thus simultaneously wind up the tape and the strip 36 in alternating layers, as said strip is drawn off of the second drum. When the tape is drawn out, the rotation of this latter drum by the gear wheels causes the simultaneous winding up of the strip 36.

In that form of my invention shown in Figs. 11 to 14 inclusive the tape reel or holder consists of a flat cylindrical casing 40 which as before is closed at one side or end and is inwardly flanged at the opposite end. Extending into this open end is a bridge 41, which while of substantially U-shaped outline as to its main portion has the ends of its arms bent outwardly and then back parallel with each other so as to fit into the casing 40 which they engage at opposite sides and to which they are rigidly fastened.

The middle of the inwardly extending portion of the bridge 41 carries a journal or pivot 43 having the form of a sleeve for the reception of a longitudinally slidable pressure button 44. This has a head on one end and its opposite end is riveted or otherwise fixed to the center of a spring brake plate 45 mounted between the closed end of the casing 40 and the inner or closed end of a second casing 46 mounted on the journal 43 so as to be free to turn concentrically within the casing 40.

The brake plate 45 is formed of a substantially circular centrally dished body of spring sheet metal having slots extending inwardly from its edge in such positions as to provide two series of alternately arranged tongues 47 and 48. The latter of these are preferably deflected to one side of the plane of the plate and have their edges slightly curved so as to bear upon the inner face of the closed end of the outer casing 40, while the tongues 47 project so as to bear upon the adjacent outer face of the closed end of the inner casing 46,—the central part of the brake plate being concaved or slightly dished to accommodate the projecting end of the journal 43.

The spring tape above described may be coiled within the inner casing of the reel as described in connection with the other forms of my invention, although in this case it is necessary to depress the button 44 so as to remove the arms or tongues 47 of the brake plate from frictional engagement with the bottom of the casing 46, in order that this may be free to turn on or with the journal 43. When it is desired to release the tape, its inner end is moved laterally with respect to the plane of its coil so that it projects beyond the periphery of the latter and it may thereafter be permitted to uncoil by reason of its own resiliency whenever the brake plate is depressed by the button 44 to lessen or remove the friction between said plate and the casing 46 so that it may automatically assume its straight form as previously described.

At any desired point the projection of the tape may be stopped by a release of the pressure on the button 44 whereupon the brake plate 45 frictionally engages the casing 46 to prevent its further rotation and I preferably adjust the pressure of said plate upon the rotatable casing 46 so that as long as the tape is being fed or forced into the latter, it will be free to turn regardless of the action of the brake plate. When however this force tending to coil the tape is released or removed, the brake plate 45 will automatically act to prevent projection of the tape.

It will further be noted that the inner casing 46 has its open end provided with an inwardly extended flange 49 serving to prevent lateral displacement of the convolutions of the tape as well as of the outer end of said tape during the reeling up operation.

I claim:

1. The combination of a holder and a flexible rule coiled therein with its inner end free and accessible for withdrawal; with means for guiding the inner end of the rule while it is being withdrawn from the holder.

2. The combination of a holder; a flexible rule coiled therein with its inner end free and accessible for withdrawal; and a structure rotatably supporting said holder; and means for guiding the inner end of the rule while it is being withdrawn from the holder.

3. The combination of a holder; and a flexible rule coiled therein with its inner end accessible for withdrawal, said rule being formed to automatically project itself from the holder when its inner end is moved laterally out of the plane of the coil with means for retaining said free end in a predetermined position when it is projected laterally from the plane of the coil.

4. The combination of a holder; and a flexible rule coiled therein with its inner end accessible for withdrawal, said rule be-

ing formed to automatically rotate the holder and project itself therefrom in a substantially straight line when its inner end is moved laterally of the plane of the coil into a predetermined position.

5. The combination of a flexible rule of concavo-convex cross section; with a holder normally retaining said rule in a coiled condition and formed to permit uncoiling of the rule from its inner end; with means for guiding the inner end while it is being uncoiled from the holder.

6. The combination of a flexible rule having a free inner end; with a holder normally retaining the same in a coiled condition and open at one side to permit of uncoiling said rule from its inner end; with means for guiding the inner end while it is being uncoiled from the holder.

7. The combination of a flexible rule; means for retaining said rule in a coiled condition while permitting its inner end to be laterally projected; and a device for frictionally holding the inner portion of said rule from movement when it is projected laterally at one side of its coiled portion.

8. The combination of a flexible rule; with a device for retaining it in a coiled condition and including a portion formed to frictionally engage the rule when a part thereof projects laterally from the plane of its coil.

9. The combination of a supporting structure; a casing rotatably mounted thereon; and a flexible tape of concavo-convex section coiled in said casing with its inner end free to be moved laterally out of the plane of its coil to permit of its withdrawal.

10. The combination of a supporting structure; a casing rotatably mounted thereon; and a flexible tape of concavo-convex section coiled in said casing with its inner end free to be moved laterally out of the plane of its coil to permit of its withdrawal, said structure including a portion placed to engage and normally hold said inner end of the tape from movement when it is projected laterally from said plane.

11. The combination of a supporting structure; a casing rotatably mounted thereon; and a flexible tape of concavo-convex section coiled in said casing with its inner end free to be moved laterally out of the plane of its coil to permit of its withdrawal, said structure being formed to normally guide the laterally projecting end of the tape into a position in which it is normally engaged at a plurality of points with friction sufficient to prevent its further movement.

12. The combination of a supporting structure; a casing rotatably mounted thereon; and a flexible tape of concavo-convex section coiled in said casing with its inner end free to be moved laterally out of the plane of its coil to permit of its withdrawal, said supporting structure extending across the coil in position to be engaged by the opposite edges of the tape when one of said edges engages part of the coil to normally prevent movement of the projecting inner end.

13. The combination of a flexible ribbon rule of concavo-convex cross section and sufficient stiffness to maintain itself in a substantially straight form; with a holder for maintaining said rule in a coiled condition and formed to allow it to be coiled and uncoiled from its inner end, the rule being completely detachable from said holder when in its fully projected condition.

14. The combination of a concavo-convex rule of flexible ribbon of sufficient strength to maintain itself in a straight condition; a casing formed to hold said rule in a coiled condition with its inner end in position to be laterally displaced from the plane of the coil for removal or insertion; with a holder rotatably supporting said casing and including a bridge portion extending over the coil in position to be frictionally engaged by the end of the ribbon when this is displaced laterally from the coil.

15. A holder for a spring tape consisting of a supporting structure; with a casing rotatably mounted on said structure and formed to retain said tape in a coil with its inner end accessible for lateral withdrawal.

16. A holder for a spring tape consisting of a supporting structure; a casing rotatably mounted on said structure and formed to retain the tape in a coil with its inner end accessible for lateral withdrawal; with means for engaging and holding said end from movement when it is displaced laterally from the plane of the coil.

17. The combination of a supporting structure; a substantially cylindrical casing mounted thereon and having at least one end open; with a bridge piece mounted on the structure and extending across the casing in position to engage the laterally displaced portion of a spring tape carried by the casing.

18. The combination of a supporting structure; a reel rotatably mounted thereon and open at one end; with a bridge piece extending into the open end of said reel in position to engage the laterally displaced inner portion of a spring tape whose outer portion is wound in the reel.

In witness whereof I affix my signature,

HIRAM A. FARRAND.