Oct. 4, 1960 A. P. HULTGREN 2,954,941

REEL CONSTRUCTION

Filed April 10, 1957

Fig. 1

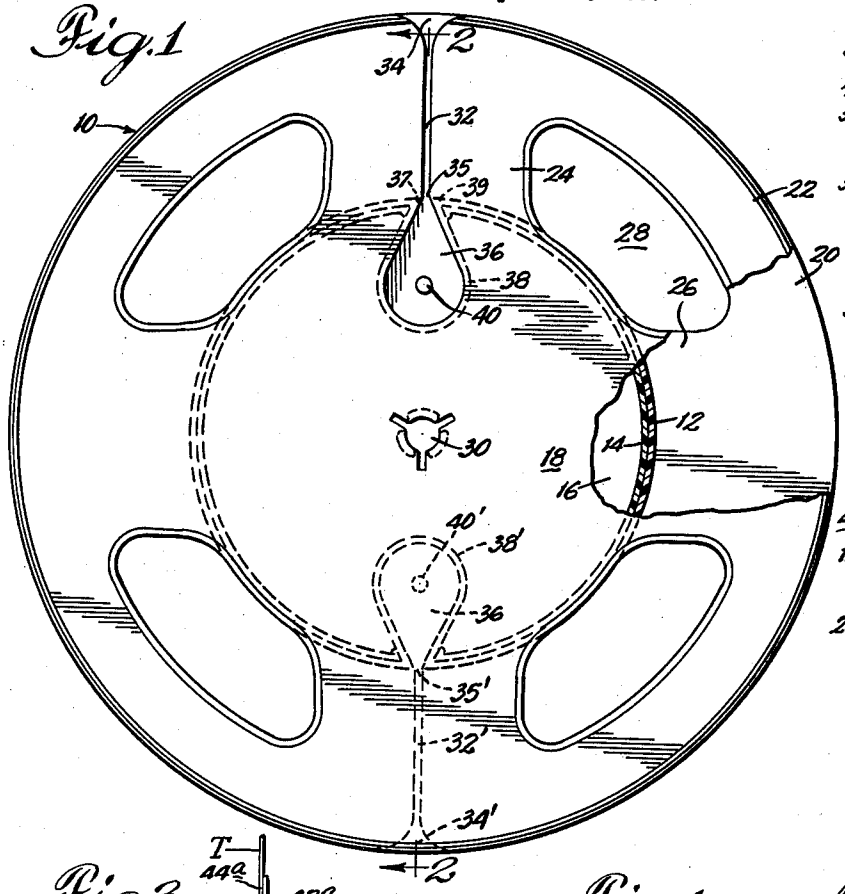


Fig. 2

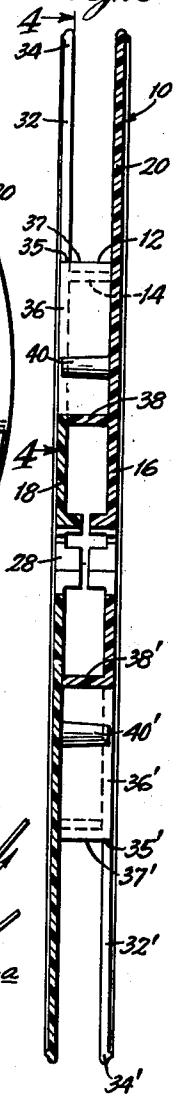


Fig. 3

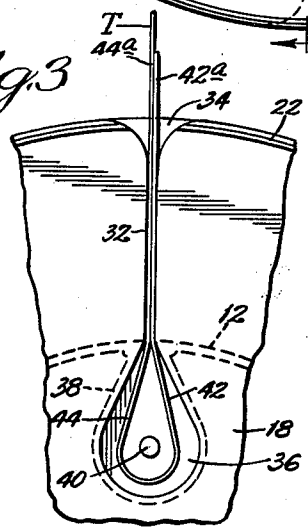
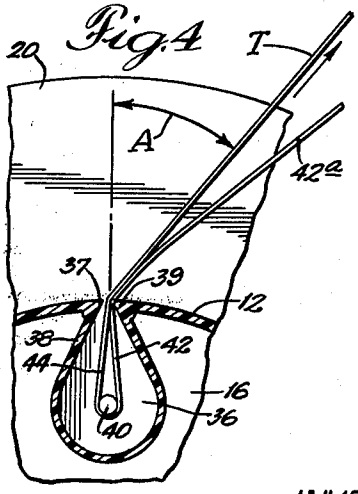


Fig. 4



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REEL CONSTRUCTION

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This invention relates generally to a reel construction, and more particularly to a reel for winding thereon continuous ribbon-like materials, such as film or tape.

Although numerous forms of reel structures have been suggested in the past to facilitate the initiation of reel winding, most such devices have required manual fixing of the free end of the tape for at least one full revolution in order to permit the tape or re-engage upon itself and thereby effect its own frictional restraint. Structures of this general type have been disclosed, for example, in my Patent No. 2,766,947. The present invention provides a novel structure for initiating reel winding, whereby the free end of the tape is looped about a fixed post element and lapped over against itself to effect immediate frictional restraint prior to winding rotation of the reel.

It is a primary object of the present invention to provide improvements in the construction of reels having means for initiating winding of tape or ribbon-like materials, whereby the starting end of the material may be securely held by exerting tension upon the tape in one direction only, thereby enabling single-hand manipulation by an operator and avoiding the need for any substantial reel rotation before secure winding is effected.

It is another object of the present invention to provide novel reel winding means, whereby the starting end of a tape or similar ribbon-like material may be looped back against itself to effect its own self-restraint in cooperation with the reel structure.

Further objects and advantages of this invention will become apparent as the following description proceeds, and the features of novelty which characterize this invention will be pointed out with particularity in the claims annexed to and forming part of this specification.

A preferred embodiment of the invention is shown in the accompanying drawing, in which:

Figure 1 is a side elevational view, partly broken away, showing a reel constructed in accordance with the present invention;

Figure 2 is a cross sectional view taken substantially as indicated along the line 2—2 on Figure 1;

Figure 3 is a fragmentary enlargement of the reel winding structure shown in Figure 1, illustrating the looped positioning of the tape to initiate winding operation; and

Figure 4 is a fragmentary sectional view taken substantially as indicated along the line 4—4 in Figure 2, illustrating self-restraint of the tape against itself for winding.

Referring now more particularly to the drawing, I have indicated generally at **10** in Figure 1 a reel construction embodying the features of the present invention. The reel may be of any conventional hub and flange construction of the kind already well known in the tape reel art, and preferably formed of molded plastic material. For purposes of illustration, I have shown the reel **10** as being of the type comprising a pair of hollow cylindrical hubs **12** and **14**, the hub **12** being of relatively larger diameter than the hub **14**, and the hubs being telescoped into closely adjacent concentric relation with each other.

Each hub provides an enlarged face flange at one end thereof, and the face flanges are positioned at opposite ends of the concentric hubs and at right angles to the longitudinal axes thereof in parallel relation to each other. The face flanges are indicated generally at **16** and **18**, and each include generally circular peripheral portions **20** and **22** and sets of radially disposed spokes **24** and **26**. A plurality of registered apertures **28** are defined between the adjacent face flange spokes. A central drive shaft aperture **30** is provided to receive a suitable drive element for mounting and effecting driving rotation of the reel **10**.

The improvement in reel constructions to which the present invention is directed will now be described. A radially extending threading slot **32** is provided in the face flange **18**, and opens peripherally outwardly in an enlarged entryway **34**. The slot **32** terminates radially inwardly at the hubs **12** and **14** in a narrowly restricted inlet slot **35**, which extends fully through the hubs and transversely between the face flanges **16** and **18**.

An enlarged threading port **36** is formed in the central portion of the face flange **18**, radially inwardly of the hub peripheries. The port **36** is defined by a transversely extending boundary wall **38** between the face flanges **16** and **18**, and from one transverse edge of the restricted inlet **35** to the other edge thereof. The transverse edges of the inlet **35** provide relatively sharp gripping shoulders **37** and **39** formed by the intersection of the boundary wall **38** and the adjacent portions of the slotted hubs **12** and **14** at opposite transverse sides thereof.

It is an important feature of the present invention that the threading port **36** be of substantially enlarged size relative to the restricted inlet **35**, and that the boundary wall **38** be contoured so as to progressively enlarge radially inwardly and terminate in a generally semi-circular end wall, thereby defining a "tear-drop" shape for the port **36**.

A threading post **40** extends transversely across from the opposite face flange **16**, and terminates substantially in the plane of the face flange **18**. The post **40** is disposed at substantially the center of the circularly arcuate portion of the tear-drop shape port **36**.

As best seen in Figures 1 and 2 of the drawing, two threading structures are provided at diametrically opposed stations on opposite faces of the reel **10**. In this way, a threading structure is provided regardless of the face flange which may be uppermost when the reel is mounted on a turntable. The opposite threading structure is identical to the structure already described, and has been designated by the same numerals with a prime added.

The practical operation of the present invention is best described by reference to Figures 3 and 4 of the drawing. A length of tape or similar ribbon like material has been indicated at T. The tape provides a free threading end portion **42** and a main body portion **44** contiguous therewith and extending to a source, such as another and fully-wound reel. The free end of the tape T is looped against itself and cast over the threading post **40**, downwardly into the threading port **36** and through the slot **32**. Since the tape T is narrower in width than the length of the hubs **12** and **14**, and narrower than the distance between the parallel face flanges **16** and **18**, one side edge of the tape T may be brought against the face flange **16** and relatively clear of the face flange **18**. The looped portion of the tape will assume a curved contour generally following the tear-drop shape of the boundary wall **38**.

The operator may with merely two fingers retain the outermost free end **42*a*** of the tape against the adjacent body portion **44*a***, while pulling the loop portion of the tape radially outwardly and against threading post **40**,

By then swinging the engaged tape portions through an arc about the post **40**, with the free end **42** of the tape being tightly held against the adjacent one of the edges of the restricted inlet **35** (for example, edge **39** in Figure 4), and with the body portion **44** of the tape in overlapping contacting engagement with the free end **42**, the threading end of the tape will be self-restrained and fixedly held in position as long as tension is maintained on the body portion **44** (in the direction of the arrow in Figure 4).

The frictional characteristics of the tape being employed will serve to determine a minimum angle (indicated at A in Figure 4) at which slippage of the tape against itself will not occur, provided that a sufficient and corresponding tensioning force is applied to the body end **44** of the tape T. This angle for example is generally less than about 30° for most conventional magnetic tape materials. When the tape is thus held, the free end **42***a* need not be gripped or restrained in any way by the operator.

It will be apparent that through the use of the novel threading structure herein disclosed, an operator may simply "drop in" a looped terminal end of the tape, and then swing the tape at an angle while exerting a tension thereon, so as to effect a self-restraint of the tape end portions against themselves and against a gripping edge of the narrowly restricted threading inlet, whereby the maintenance of sufficient tension on only the body portion of the tape (independently of the free terminal end beyond the gripping edge) will permit immediate reel winding to be effected. There is no necessity for one or more revolutions of the tape to be effected in order to achieve a sufficient overlapping of tape upon tape to insure winding without slipping. It is essential, of course, that the threading loop be formed so as to effect arcuate swinging over the underlying free tape end in a direction of rotation opposite to the subsequent direction of reel winding. For example, the clockwise threading rotation of the tape in Figures 3 and 4 is preparatory to counterclockwise rotation of the reel for winding.

While there has been shown and described a particular embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention and, therefore, it is intended in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A reel comprising a hollow cylindrical hub having a pair of face flanges at opposite ends thereof, said hub having a narrowly restricted inlet slot extending therethrough transversely between said face flanges, one of said flanges having a radially extending threading slot terminating outwardly in an opening at the periphery of said one flange and terminating inwardly in an enlarged threading port communicating with said hub inlet slot, said threading port enlarging radially inwardly from the periphery of said hub in generally tear-drop shape, boundary wall means extending transversely between said face flanges from one transverse edge of said restricted inlet slot to the other transverse edge thereof and defining the periphery of said threading port, the intersection of said boundary wall and said hub at said restricted inlet slot forming acute gripping shoulders, and a threading post extending transversely from the other of said face flanges toward said one face flange centrally of said threading port, whereby a length of tape material to be wound on said reel, having its main portion loosely overlapping its free end portion to define an unsecured closed loop, when dropped into said threading port with the loop disposed about said threading post, will effect a self-restraint of the overlapped free end portion of the tape against a gripping shoulder of said narrowly restricted inlet slot as a winding force is exerted upon the main portion of the tape at an angle relative to the threading post and engaged gripping edge.

2. A reel comprising a hollow cylindrical hub having a pair of face flanges at opposite ends thereof, said hub having a narrowly restricted inlet slot extending therethrough transversely between said face flanges, one of said flanges having a radially extending threading slot terminating outwardly in an opening at the periphery of said one flange and terminating inwardly in an enlarged threading port communicating with said hub inlet slot, said threading port enlarging radially inwardly from the periphery of said hub, boundary wall means extending transversely between said face flanges from one transverse edge of said restricted inlet slot to the other transverse edge thereof and defining the periphery of said threading port, the intersection of said boundary wall and said hub at said restricted inlet slot forming acute gripping shoulders, and a threading post extending transversely from the other of said face flanges toward said one face flange centrally of said threading port, whereby a length of tape material to be wound on said reel, having its main portion loosely overlapping its free end portion to define an unsecured closed loop, when dropped into said threading port with the loop disposed about said threading post, will effect a self-restraint of the overlapped free end portion of the tape against a gripping shoulder of said narrowly restricted inlet slot as a winding force is exerted upon the main portion of the tape at an angle relative to the threading post and engaged gripping edge.

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