May 18, 1965 A. H. BODGE 3,184,178

REELS

Original Filed July 21, 1958

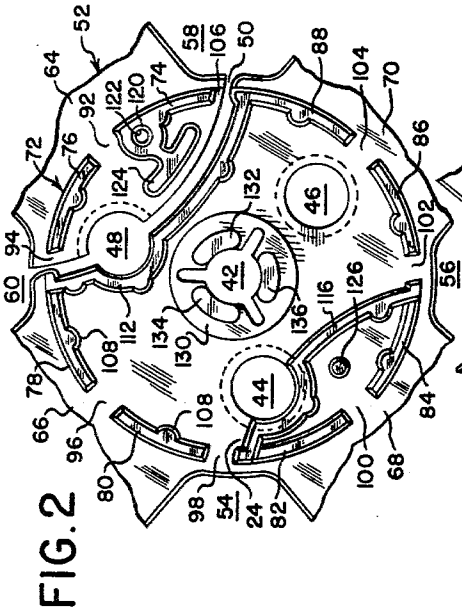


FIG. 2

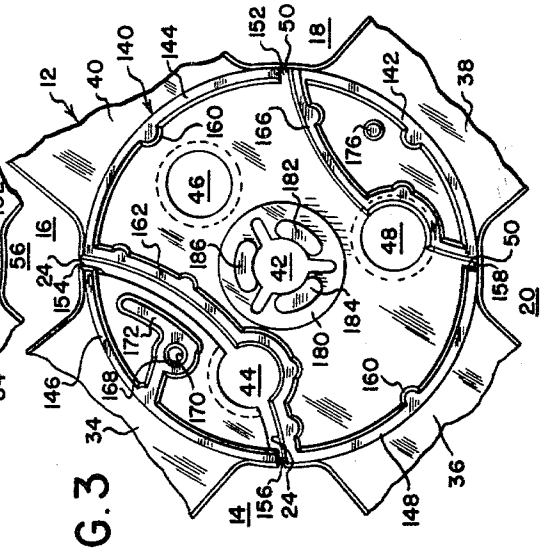


FIG. 3

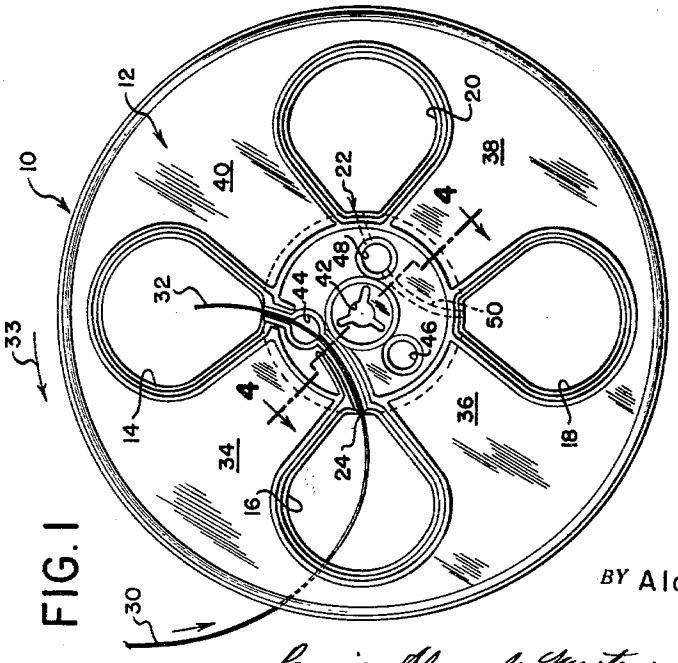


FIG. 1

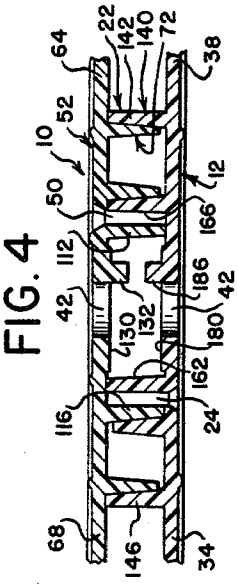


FIG. 4

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REELS

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Continuation of application Ser. No. 749,749, July 21, 1958. This application Feb. 1, 1963, Ser. No. 255,545
3 Claims. (Cl. 242—74)

This application is a continuation of my original application Serial No. 749,749, filed July 21, 1958, now abandoned.

This invention relates to reels and has for its object certain improvements in the construction of reels. The invention relates more particularly to reels of the type used to wind and unwind relatively long lengths of tape, film, ribbon and the like.

The conventional reel comprises a pair of opposed and spaced side flanges secured to a hub centrally disposed between the two flanges. The tape is wound on and unwound from the hub between the flanges. Investigators in this art have proposed numerous forms of reel construction to overcome certain problems. Among those problems is one having to do with the fastening of the starting end of the tape on the reel for the winding operation so that the remainder of the tape may be wound fairly tightly on the reel without slippage of the tape. At the same time it is desired that when the tape is unwound from the reel, the starting end may be freely and easily released from the reel without damage to the tape, or indeed to the reel. To this end various forms of slots, for example, in the hubs have been suggested and used.

Another problem has to do with the ease of fastening the starting end of the tape to the reel. It is desired that an operator may perform the act of fastening the starting end of the tape in a relatively simple and quick manner. To this end the slots have been varied in size and shape and location.

As a result of my investigations I have discovered certain improvements in the construction of reels that go far to solve problems of the kind mentioned.

These and other objects of the invention will be more readily understood by referring to the accompanying drawing, taken in conjunction with the following description, in which

FIG. 1 is a plan view of a reel diagrammatically illustrating a practice of the invention, showing the outer face of a flange provided with a new form of slot to receive the fastening end of the tape;

FIG. 2 is an enlarged fragmentary inside view of the central portion of the opposed flange, showing its hub and associated slot construction;

FIG. 3 is a similar enlarged fragmentary inside view of the central portion of the flange of FIG. 1, showing its hub and associated slot construction; and

FIG. 4 is an enlarged section on the line 4—4 of FIG. 1, showing the central portions of both flanges and hubs in their normally assembled position, but with the flanges in reverse positions.

Referring first to FIG. 1, it shows a reel 10 with an outer circular first flange 12 provided wit ha plurality of spaced pear-shaped openings or windows 14, 16, 18 and 20. These openings terminate at their inward portions with a composite cylindrical hub 22. A curved or arcuate

tape threading slot 24 etxends across the flange through the composite hub into and through the hollow interior of the hub from window 14 to window 16. The slot thus cuts through the hub at two spaced places. The outer edges of the slot in flange 12 are beveled to facilitate insertion of the tape (FIGS. 1 and 4). A piece of tape 30 is shown threaded in the slot. To accomplish this, the free end of the tape to be fastened to the reel is fed between the flanges in the customary manner. It is then grasped by the fingers of the operator through window 16, for example, pulled outwardly, pushed sidewise into the slot, with its extreme end 32 protruding a short distance from the slot through window 14, as shown. The reel may then be rotated anti-clockwise, as one looks at FIG. 1, in the direction indicated by arrow 33. Free end 32 extends outwardly from the hub, thus providing a small portion of tape that can be bent to the right, as one views FIG. 1, toward and in engagement with the hub. As the reel rotates, the first wound layer of tape 30 bears the free end 32 downwardly onto the hub and fastens it securely into position, thus preventing slippage of the tape on the hub and hence in the reel.

Still referring to FIG. 1, it will be noted that flange 12 and spaced windows 14, 16, 18 and 20 form what may be referred to conveniently as spokes, or spoke portions, 34, 36, 38 and 40 of flange 12 extending therebetween. The latter three spokes form a rigid integral part of the flange. Spoke 34, between spaced open windows 14 and 16, however, terminates at slot 24. With the reel in its unassembled condition, the portion of the spoke next to the slot is quite free and flexible; which, however, is not the case when the reel is assembled, as will appear below. The bottoms of open windows 14 and 16 and the bottom of spoke portion 34 are formed of a succession of rim sections to be described below.

The central portion of flange 12 is provided in its axial center with the usual spindle hole 42 with spaced lateral keyways. Also in the central portion of the flange, inside the area defined by composite hub 22, is a plurality of coutersunk drive-pinholes 44, 46 and 48. One or more of them are adapted to engage with one or more drive-pins on a tape transport found on recorders.

As shown in FIG. 2, a similar curved or arcuate slot 50 extends between the windows 58 and 60 of the second flange, opposed to windows 18 and 20 in the first flange 12. That construction is described below in more detail. The outer edges of the slot are beveled (FIG. 4) to facilitate insertion of the tape.

FIGS. 2, 3 and 4 show the construction of hub 22. It is a composite of two interlocking or telescoping hubs, as will now be described. Flange 12 (FIGS. 1, 3 and 4) has its opposed and complementary flange 52 (FIGS. 2 and 4). They may be regarded for convenience as female flange 12 and male flange 52.

Going to FIG. 2, it shows the second or male flange 52 in an enlarged fragmentary view. Spaced windows 54, 56, 58 and 60 are shown partially. They have their complementary counterparts (FIG. 1) in windows 14, 16, 18 and 20 in the first or female flange 12. As just indicated composite hub 22 (FIG. 1) is integrally formed of a pair of telescoping hubs (FIG. 4). FIG. 2 also shows spokes, or spoke portions, 64, 66, 68, and 70 of flange 52 extending between the windows. They have their complementary counterparts in spokes 34, 36, 38 and 40 except

that spoke 64 has a loose end at slot 50 (actually where slot 50 is to be located, so far as FIG. 2 is concerned), whereas spokes 66, 68 and 70 form a rigid integral part of their flange 52. This is because slots 24 and 50 (FIG. 1) not only are on reverse sides of the reel but are in opposed directions to each other. As indicated composite hub 22 is formed in part of a male cylindrical hub 72 integrally secured to its flange. As shown in FIG. 2, this latter hub is in turn formed of wall sections, going in a counterclockwise direction, 74, 76, 78, 80, 82, 84, 86 and 88; the sections in turn being divided by spaces 92, 94, 96, 98, 100, 102, 104 and 106, respectively. Spaces or slits 94 and 106 become a part of curved slot 50 and spaces or slits 98 and 102 become a part of curved slot 24 when the hubs are telescoped into each other (FIG. 4). The other free spaces are adapted to accommodate complementary portions of the female hub. The peripheral edges of the male hub sections are beveled, as shown. This is to facilitate telescoping of the male and female hubs. The hub sections are provided inwardly with reenforcing ribs 108 to give them added lateral strength.

Still referring to FIG. 2, curved slot 24 extends through male flange 52. However, more is to be said about its formation. A curved or arcuate tape guiding inner (closest to the axial center of the reel) wall 112 integrally secured to the inner side of the flange extends along the inner side of the arc, including a portion of pinhole 48, the extreme lateral ends of the wall being integrally secured to wall sections 78 and 88 of male hub 52, the outer or free portions of the arc wall having beveled edges, as shown. The arc wall is provided with reenforcing ribs, as shown, to give added lateral strength. As will be evident below, this arc wall complements another arc wall in the female portion of the reel to give the desired slot 50.

Now, going to slot 24, FIG. 2 shows a cooperating curved or arcuate tape guiding outer (farthest from the axial center of the reel) wall 116 integrally secured to the inner side of male flange 52, the free edges of the wall being beveled, as shown. The arc wall extends around a portion of pinhole 44. The extreme lateral ends of the arc-wall are integrally secured to sections 82 and 84 of male hub 52. The wall is provided with reenforcing ribs, as before.

The reel shown, particularly in FIGS. 2, 3 and 4, is provided with special means for aligning or orienting the male and female hubs, and hence flanges 12 and 52, and for preventing lateral displacement between the two. Thus the male portion of the reel, FIG. 2, is provided with a boss 120 integrally secured to the inner side of hub section 74 and the inner side of flange 52; the boss in turn having a hole 122 to receive a complementary telescoping pin from the female flange. The boss includes a laterally extending reenforcing wall 124. As part of the aligning means, FIG. 2 also shows a telescoping or orienting pin 126 adapted to fit in a complementary hole in a boss, such as just described, extending from the inner side of the female flange.

Spindle hole 42 is described above in connection with FIG. 1. It is also shown in FIG. 2. A raised circular portion 130 of the inner side of male flange 52 is reenforced with outwardly extending hub portions 132, 134 and 136. They are the counterpart of similar hub portions on the inner side of the female flange. The parts just referred to may be considered as part of an inner hub specially provided for the spindle when in use, for example, on a recording machine.

FIGS. 1, 3 and 4 show the female part of the reel to advantage. On comparing FIGS. 1 and 3, it will be noted that FIG. 3 is a reverse view in enlarged fragmentary part of that shown in FIG. 1. FIG. 3 is quite similar to FIG. 2 except generally that cylindrical female hub 140 has a slightly larger diameter than male hub 72 so that the two may be telescoped into one another quite readily. Female hub 140 is also divided into a plurality of wall sections, counterclockwise, 142, 144, 146 and 148; the same being separated from each other by spaces 152, 154, 156 and 158, respectively. Spaces 154 and 156 help to form slot 24 while spaces 152 and 158 help to form tape threading slot 50. The hub sections are provided inwardly with a plurality of reenforcing ribs 160 to give them added lateral strength.

Still referring to FIG. 3, slot 24 extends through female flange 12. A curved or arcuate tape guiding (closest to the axial center of the reel) wall 162 integrally secured to the inner side of the flange extends along the inner side of the arc, including a portion of pinhole 44, the extreme lateral ends of the wall being integrally secured to wall sections 144 and 148 of female hub 140. The outer or free portions of the arc walls have beveled edges, as shown. The arc wall is provided with reenforcing ribs, as shown, to give added strength. This arc wall complements arc wall 116 in the male portion of the reel to give the desired slot 24.

Now, going to slot 50, FIG. 3 shows a cooperating curved or arcuate tape guiding outer (farthest from the axial center of the reel) wall 166 intgerally secured to the inner side of the flange, the free edges of the wall being beveled as shown. The arc wall extends around a portion of pinhole 48. The extreme lateral ends of the arc wall are integrally secured to wall section 142 of female hub 140. The wall is provided with reenforcing ribs, as before.

As indicated above, and as shown particularly in FIGS. 2, 3 and 4, the reel is provided with special means for aligning the male and female hubs and for preventing lateral displacement between the two. The parts for the two complement each other, as will be shown. Thus, the female portion of the reel (FIG. 3) is provided with a boss 168 integrally secured to the inner side of hub section 146 and the inner side of flange 12; the boss in turn having a hole 170 to receive a complementary telescoping or orienting pin 126 (FIG. 2) from the male flange. The boss includes a laterally extending reenforcing wall 172. As part of the aligning means, FIG. 3 also shows a telescoping pin 176 adapted to fit in its complementary hole 122 in boss 120 (FIG. 2).

Spindle hole 42 is described above in connection with FIGS. 1 and 2. It is also shown in FIG. 3 in a raised circular portion 180 of the inner side of female flange 12, reinforced with inwardly extending hub portions 182, 184 and 186. They are the counterpart of similar hub portions 132, 134 and 136 (FIG. 2), on the inner side of the male flange. The parts just referred to, as indicated above, may be considered as part of an inner hub specially provided for the spindle when in use, for example, on a recording machine.

The two halves of the reel, constituting the male and female portions, may be made of any suitable material. Plastics have practically replaced metals. It is preferred to use a suitable plastic, such as styrene, because the two halves lend themselves readily to being separately moulded. Once they have been moulded, they are fitted or telescoped into each other to form an integral unit. To this end, a suitable solvent or adhesive, for the particular plastic employed, is placed on the male or female, or both, hub surfaces that are to be brought into sliding contact with each other.

Curved wall 162 (FIG. 3) of the female half is brought, for example, in a generally juxtaposed position to wall 116 (FIG. 2) of the male half. This brings pinholes 44 of each half in alignment with each other. At the same time curved wall 112 (FIG. 2) is brought in a generally juxtaposed position to wall 166 (FIG. 3), thus bringing pinholes 48 of each half in alignment with each other.

As shown in the drawing, the bottoms of spaced open windows 14 and 16 and the bottom of spoke portion 34 of flange 12 therebetween are formed of a succession of sections 148, 146 and 144 of the rim portion of the hub 22,

the sections being separated by tape threading slot 24 at the bottoms of the open windows 14 and 16; and the bottoms of spaced open windows 58 and 60 and the bottom of the spoke portion 64 are formed of a succession of sections 144, 142 and 148 of the rim portion of the hub 22, the sections being separated by tape threading slot 50 at the bottoms of the open windows 58 and 60.

Aligning pin 176 (FIG. 3) is inserted in aligning hole 122 (FIG. 2), while aligning pin 126 (FIG. 2) is inserted in aligning hole 170 (FIG. 3). Furthermore, reenforcing shoulders 169 (FIG. 3) of female hub 140 fit into spaces 92, 96, 100 and 104 in male hub 72. This brings the central portions of the two halves into a position, such as shown by FIG. 4. Once the solvent or adhesive action goes to completion, the two halves are held in a permanent unitary whole reel, and spokes 34 and 64 are no longer loose.

Curved or arcuate slots 24 and 50 depend from composite hub 22 a convenient distance. They should, of course, be clear of the spindle and its associated parts. While arcuate slots are shown, they could, of course, be sinuous, for example, or any other desired shape. The arcuate slot has the advantage of simplicity, which also facilitates the moulding operation referred to.

Returning to slot 24, it may be regarded as an open sided channel defined by three side walls: the inner side of male flange 52 (FIG. 2), outer tape guide wall 116 (FIGS. 2 and 4) and inner tape guide wall 162 (FIGS. 3 and 4). The open side is, of course, in female flange 12. Slot 50 may be regarded, similarly, as an open sided channel defined by three side walls: the inner side of female flange 12 (FIGS. 1 and 4), inner tape guide wall 112 (FIGS. 2 and 4) and outer tape guide wall 166 (FIGS. 3 and 4). The open side is, of course, in male flange 52. Both slots or channels may be regarded as being formed wholly in composite hub 22, the hub itself providing two open spaces communicating with the extreme open ends of the slots. The reel may be mounted on a spindle with either flange on top. Thus slot 24 or slot 50 may be made available to the operator. One at a time is enough. Furthermore, the type of slot herein disclosed makes it very easy for the operator to thread the tape on the reel.

It is possible today to mould the parts with extreme precision. The flanges may be quite thin, as may the male and female hubs; as a result of which the composite hub of the assembled reel is itself quite thin. The latter is more than strong enough, however, to hold the tape and to withstand its winding and unwinding during use of the reel.

It will be appreciated by those skilled in this art that the above is by way of illustrating a practice of the invention, and that the invention lends itself to some useful modifications.

I claim:

1. In a reel having a pair (12, 52) of spaced flanges opposed to each other and a relatively thin hub (22) disposed centrally therebetween for the winding and unwinding of tape (30) and the like, the interior core portion of the hub (22) being hollow and the exterior side portions of the hub core being defined by the side walls of the flanges, and in which a spindle hole (42) extends centrally and axially through the hub core of the side walls of both flanges (12, 52) for rotation of the reel and in which the hub core section of a flange side wall is provided with a hub core tape threading slot (24) for the insertion sideways of the tape when the reel is to be loaded with tape; the improvement comprising in combination therewith: at least one pair of spaced open windows (14, 16) is located in the first (12) of said flanges adjacent to and connecting with and extending outwardly from the hollow hub (22) toward the perimeter of said first flange (12); a spoke portion (34) of the flange (12) separates the pair of spaced open windows (14, 16); the bottoms of both windows (14, 16) and of the spoke portion (34) are formed of a succession of at least three spaced sections (148, 146, 144) of the rim portion of the hollow hub (22); the three sections of the rim portion of the hub have an axially-extending transverse rim slot (156, 154, respectively) at the bottom of each of said two windows (14, 16) for receiving the end portion of the tape (30) to be wound onto the rim of the hub; said first flange (12) has a hub core tape threading slot (24) through the core of the hub side wall section of the first flange (12) for the insertion sideways of the tape (30); the respective ends of the hub core slot (24) terminate at said transverse rim slots (156, 154) in the hub; the hub core tape threading slot (24) is disposed between the rim sections (148, 146, 144) of the hub and said spindle hole (42); the transverse hub rim slots (156, 154) terminate at their far outer ends by a solid side wall portion of the second flange (52) which acts as a stop wall for tape (30) to be inserted in the flange-hub core tape threading slot (24) and the transverse hub rim slots (156, 164); the flange-hub core tape threading slot (24) and the transverse hub rim slots (156, 154) are defined by a pair of spaced tape guiding inner and outer hub core slot walls (162, 116, respectively) extending between said pair of spaced open windows (14, 16) and transversely between the two flanges; the tape guiding inner and the outer hub core slot walls (162, 116) are integrally secured to the hub core side wall of at least one of the flanges; the outer hub core slot wall (116) defines the bottom portion of opposite spokes (34, 68) of the flanges between said transverse hub rim slots (156, 154) and between said pair of spaced open windows (14, 16); the ends of the outer wall are integrally secured to a hub rim section; and each hub rim section is, in turn, integrally secured to the inside of the flanges to give rigidity to the spokes and hence to the entire reel assembly.

2. A reel according to claim 1, in which the hub (22) is a composite formed of two telescoping hubs (140, 72); one of the telescoping hubs is integrally secured to one of the flanges and the other telescoping hub is integrally secured to the other flange; one of said pair of slot-defining walls is integrally secured to one of the flanges, and the other of said pair of slot-defining walls is integrally secured to the other flange; and the side walls of the hub cores are provided with orienting means (170, 126) to bring the two flanges (12, 52) into predetermined position with respect to each other.

3. A reel according to claim 1, in which at least one pair of spaced open windows (58, 60) is located in the other flange (52) adjacent to and connecting with and extending outwardly from the hollow hub (22) toward the perimeter of said second flange (52); a spoke portion (64) of the flange (52) separates the pair of spaced open windows (58, 60); the bottoms of both latter windows (58, 60) and of the latter spoke portion (64) are formed of a succession of at least three spaced sections (144, 142, 148) of the rim portion of the hub (22); the sections of the rim portion of the hub have an axially-extending transverse rim slot (152, 158) at the bottom of each of said latter two windows (58, 60) for receiving the end portion of the tape (30) to be wound onto the rim of the hub; said second flange (52) has a hub core tape threading slot (50) through the core of the hub side wall section of the second flange (52) for the insertion sideways of the tape (30); the respective ends of the hub core slot (50) terminate at said transverse rim slots (152, 158) in the hub; the hub core tape threading slot (50) is disposed between the rim sections (144, 142, 148) of the hub and said spindle hole 42; the transverse hub rim slots (152, 158) terminate at their far outer ends by a solid side wall portion of the first flange (12) which acts as a stop wall for tape (30) to be inserted in the flange-hub tape threading core slot (50) and the transverse hub rim slots (152, 158); the flange-hub core tape threading slot (50) and the transverse hub rim slots (152, 158) are defined by a pair of spaced tape guiding inner

and outer hub core slot walls (**112**, **166**, respectively) extending between said latter pair of spaced open windows (**58**, **60**) and transversely between the two flanges; the tape guiding inner and outer hub core slot walls (**112**, **166**) are integrally secured to the hub core side wall of at least one of the flanges; the outer hub core slot wall (**166**) defines the bottom portion of opposite spokes (**38**, **64**) of the flanges between said transverse hub rim slots (**152**, **158**) and between said latter pair of spaced open windows (**58**, **60**); the ends of the outer wall are integrally secured to a hub rim section; and each hub rim section is, in turn, integrally secured to the inside of the flanges to give rigidity to the spokes and hence to the entire reel assembly.

References Cited by the Examiner

UNITED STATES PATENTS

2,704,641	3/55	Schnetzer et al.	242—74
2,746,692	5/56	Wijchman	242—71.8
2,954,941	10/60	Hultgren	242—74
3,128,959	4/64	Pelso	242—74

FOREIGN PATENTS

1,153,503	10/57	France.
1,164,842	5/58	France.
1,191,627	4/59	France.

MERVIN STEIN, *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,184,178 May 18, 1965

Alan H. Bodge

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 10, after "guiding" insert -- inner --; line 23, for "intgerally" read -- integrally --; column 6, line 19, for "164" read -- 154 --.

Signed and sealed this 19th day of October 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents