Oct. 3, 1961 S. D. NOBLE 3,002,707

REEL MOUNTING

Filed Sept. 26, 1957 2 Sheets-Sheet 1

Fig. 2.

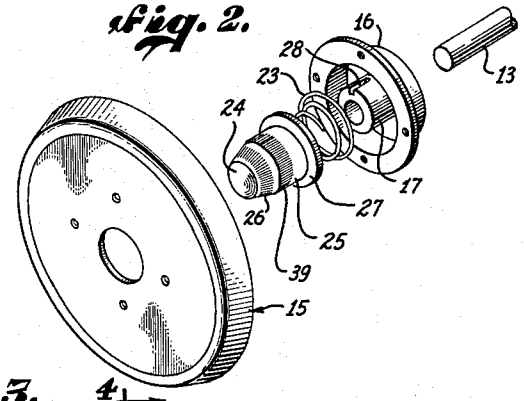


Fig. 1.

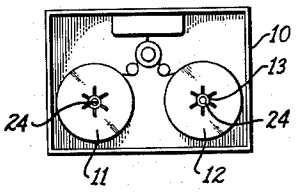


Fig. 3.

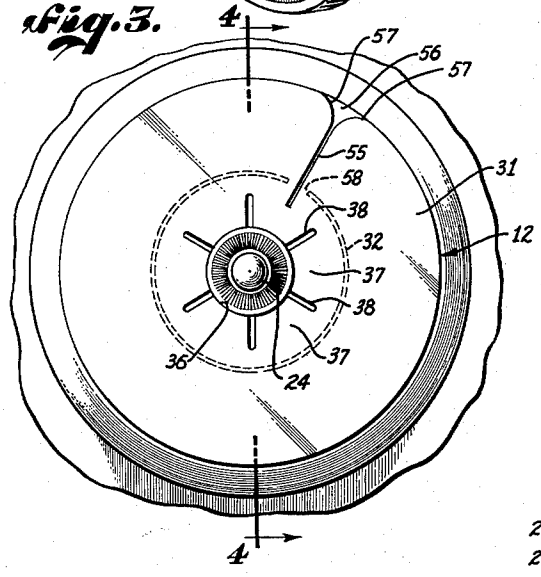


Fig. 4.

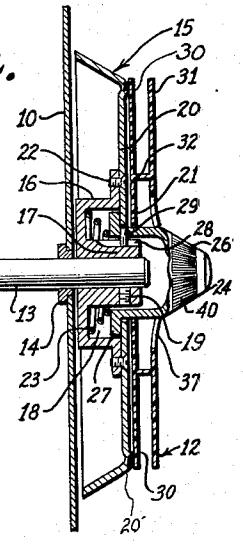


Fig. 5.

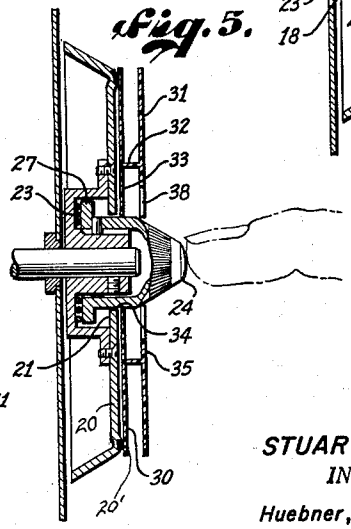


Fig. 6.

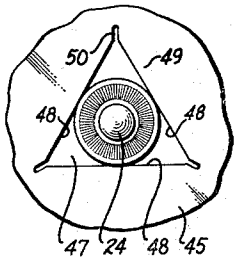
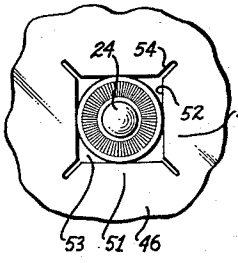


Fig. 7.



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Oct. 3, 1961 S. D. NOBLE 3,002,707

REEL MOUNTING

Filed Sept. 26, 1957 2 Sheets-Sheet 2

Fig. 8.

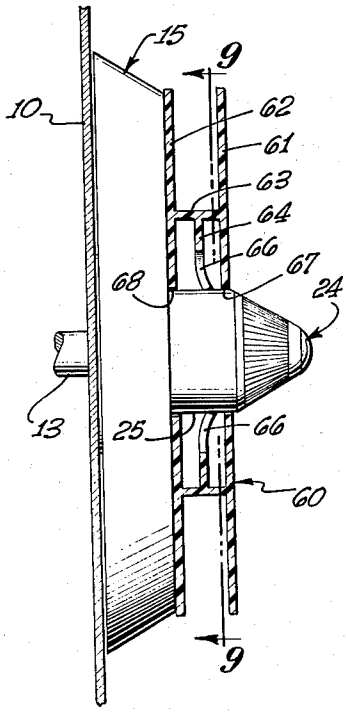


Fig. 9.

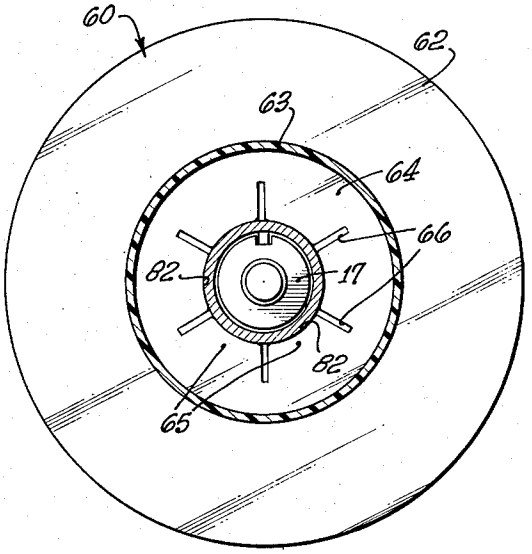


Fig. 10.

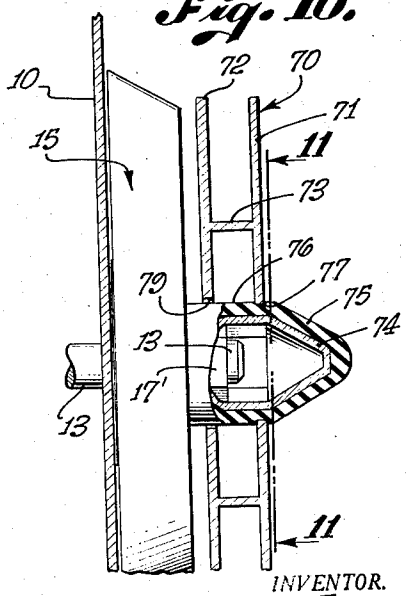
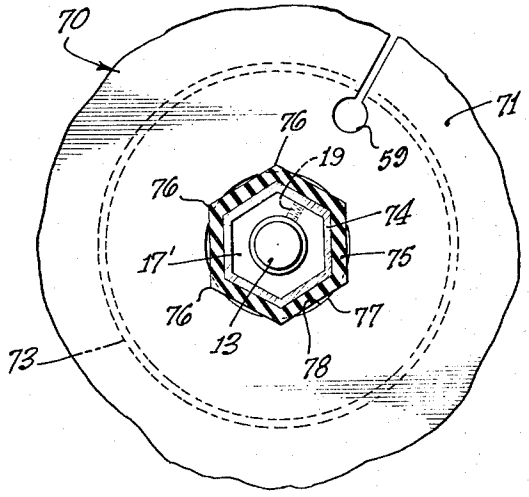


Fig. 11.



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United States Patent Office 3,002,707 Patented Oct. 3, 1961

3,002,707

REEL MOUNTING

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Filed Sept. 26, 1957, Ser. No. 686,310
10 Claims. (Cl. 242—68.3)

The invention relates to reel mountings and has particular reference to a quick and easy means of mounting and dismounting a reel on a drive shaft, the reels adapted for this type of mounting being those found useful in storing materials such as record tape, typewriter ribbon, wire, etc. This is a continuation-in-part of co-pending application Serial No. 469,998, filed November 19, 1954, and now abandoned.

In certain types of mechanisms, reels for film and wire are employed in such fashion that the strands of tape or wire are payed out from one reel, then passed through the mechanism and reeled up on another. The take-up reel must be driven in some fashion by the shaft upon which it is mounted. This necessitates keying or otherwise securing the reel non-rotatably to the shaft but the means of securement must be such that the reel can be manually mounted and dismounted with some degree of ease. To a large extent keying has been resorted to, that is, the employment of a driving key whereby a keyway is provided in the reel adapted to match a key on the shaft. Even though there may be provided a number of keyways, use of this type of attachment always necessitates hunting for a keyway in order to anchor the reel in place. In many types of installations friction alone cannot be depended upon because of the character of the mechanism in which the machine is to be used. Hence, a positive drive must be assured. In other sorts of mountings to secure such positive drives rather cumbersome and complicated mechanisms have been resorted to which prevent quick and easy application of the reel to the shaft and removal therefrom.

It is therefore among the objects of the invention to provide a new and improved reel mounting by means of which a reel for strands of tape, wire, etc., can be very quickly mounted upon a shaft for positive driving relationship therewith and at the same time be quickly and easily removed therefrom.

Another object of the invention is to provide a new and improved positive drive mounting for a reel on a shaft which avoids employment of keys and the necessity of hunting for the requisite key when the reel is being mounted on the shaft.

Still another object of the invention is to provide a new and improved reel mounting wherein a resilient device is depended upon for positively securing the reel in non-rotatable relationship to the drive shaft and which at the same time assists in holding the reel in a precisely aligned relationship with respect to the axis of the shaft so that there is no wobble during its rotation.

Also included among the objects of the invention is to provide a new and improved reel for combining strand material such as wire, tape, and ribbon which is specially construction to provide a central aperture capable of frictional engagement with an appropriate shaft or spindle, thereby making the reel easy to apply and remove, it being also among the objects to provide a shiftable spindle in such design that the reel can be removed from the spindle by shifting the position of the spindle axially.

An object also is to provide a new and improved reel and mounting thimble combination of such construction that the mounting thimble may be equipped with a resilient friction surface capable of firmly engaging a suitable hole or aperture at the center of the reel.

Still further among the objects of the invention is to provide a new and improved reel and mounting therefor which is particularly simple in its design and construction so that the reel and mounting may be supplied at relatively low cost.

Also included among the objects of the invention is to provide a new and improved reel for strands of tape so constructed that the tape may be anchored to the reel at the core by manipulation of a free end of the tape through a strand-holding side of the reel so that even with reels for very narrow strands of tape or wire there need be supplied no special instrument for manipulating the strand into the reel to secure it upon the core preparatory to winding the strand upon the reel.

With these and other objects in view, the invention consists in the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a plan view of a typical mechanism equipped with supply and take-up reels.

FIGURE 2 is a perspective exploded view of portions of the reel mounting exclusive of the reel.

FIGURE 3 is a plan view of a reel applied to the mounting.

FIGURE 4 is a longitudinal sectional view of the reel applied to the mounting taken on the line 4—4 of FIGURE 3.

FIGURE 5 is a view similar to FIGURE 4 showing the reel mounting in a different position of manipulation.

FIGURES 6 and 7 are modified forms of the reel adapted to be employed with the mounting.

FIGURE 8 is a longitudinal sectional view of still another modified form of the device.

FIGURE 9 is a cross-sectional view taken on the line 9—9 of FIGURE 8.

FIGURE 10 is a longitudinal view of still another modified form of the device.

FIGURE 11 is a cross-sectional view taken on the line 11—11 of FIGURE 10.

In a form of the device chosen for the purpose of illustration there is shown a casing 10 which provides a frame, mounting or support of some kind for an appropriate mechanism and also for the reel mountings which are to be used thereon. Reels 11 and 12 are shown mounted on the casing, one being a pay-out reel and the other being a take-up reel, depending upon which may be the direction of operation of a mechanism in the housing.

Regardless of the particular character of the mechanism there is provided in the housing, which as has been noted serves as a frame, a drive shaft 13, the outer end of which extends through a bearing 14 in the frame to an accessible location. A similar shaft is used for the pay-out reel, the only difference being that the shaft for the pay-out reel is not driven. Nevertheless, the pay-out reel must be mounted in smooth-running accurate alignment on the frame so as to cooperate with the take-up reel.

Secured to the outer or free end of the drive shaft is a reel support indicated generally by the reference character 15. The reel support is adapted to rotate clear of the outer face of the frame 10 by operation of the drive shaft. The reel support includes a central portion 16 which includes a hub 17 around which is an annular well 18. The hub has an aperture for reception of the shaft 13 and a set screw 19 by means of which the hub and consequently the reel support is non-rotatably anchored upon the drive shaft, a slight clearance being al-

lowed between the central portion and the adjacent area of the frame 10.

The reel support moreover is provided with a substantially flat section 20, a central part of which forms a flange 21 overlying the outer edge of the well 18. The flat section 20 is indicated as being secured to the central portion 16 by means of appropriate conventional screws 22. A spiral spring 23 is located in the well in such fashion that the widest turn of the spiral may be positioned at the bottom of the well and the smallest turn adjacent the outer end as a matter of convenience.

For securing one of the reels 12, for example, to the drive shaft, there is provided a drive thimble indicated generally by the reference character 24. The thimble has a cylindrical body 25 in the form of the invention herein illustrated and a conically tapered outer end 26. At the inner end of the thimble is a rim 27 which lies beneath the flange 21. As noted, the spring 23 normally urges against the inside face of the rim 21 pressing the drive thimble outwardly of the free end of the drive shaft 13.

In order that the thimble be free to move axially inwardly against the spring and outwardly with respect thereto, there is provided a slot 28 in the hub 17 in which a pin 29 of the thimble is adapted to ride. By this means the thimble is nonrotatably mounted on the shaft 13 but in a manner free to shift endwise within certain limits.

The reel 12 is formed of an inner strand-holding section 30 and an outer strand-holding section 31 parallel to each other and spaced apart by a distance conforming to the particular strand material to be wound on the reel. For positioning the strand-holding sections there is provided a hollow core 32 spaced outwardly a substantial distance from the center of the reel. The inner strand-holding section 30 has a central portion 33 lying inside the hub 32 and at the center of the central portion is a hole 34 slightly greater than the exterior circumference of the cylindrical body 25 so as to provide a free clearance therearound. The outer strand-holding section 31 has a central portion 35 also lying within the core 32 and the central portion 35 also has a hole of circumference 36 somewhat smaller than the circumference of the cylindrical body 25.

It will be noted still further that the central portion 35 is composed of a series of tabs 37 spaced one from another by slits 38. This construction provides somewhat resilient tabs having inner free ends at the circumference 36. The material of the central portion forming the tabs may be one of a number of somewhat flexible inexpensive materials such as sheet metal, plastic, or even stiff cardboard.

The thimble 24 is provided with a roughened gripping portion 39 here shown in the form of a band of serrations. These need extend throughout the area occupied by the central portion 35 but need not extend clear to the base of the cylindrical body.

When the reel thus described is to be applied to the mounting, it is placed over the tapered outer end of the thimble thereby facilitating finding the hole 34. This hole, having a slight clearance, permits the reel to be slid freely over the cylindrical portion until the edges of the tabs 37 bear against the cylindrical portion. At this point the reel can be easily pushed a slight distance further until the strand-holding section 30 lies flat against the flat section 20 of the wheel support. In that position the tabs will assume a slight bend, as illustrated particularly in FIGURE 4, and the edges of the tab at the circumference 36 will bear edgewise against the gripping portion 39. The slight resilience or spring pressure provided by the tabs 37 evenly spaced circumferentially around the gripping portion is sufficient to cause a slight embedment of the serrated area of the gripping portion in the edges of the tabs so that there will be a positive drive connection between the thimble and the reel. At the same time pressure exerted by the resiliency of the

tabs will tend to force the strand-holding section 30 flat against a rim of the flat portion 20 of the reel support so that there will be no maladjustment of the reel sufficient to create a wobble during rotation. If desired an annular strip 20' of friction material may be applied to the raised portion. Reels of extra large diameter are assured by this device of a stronger driving grip.

Once the reel is mounted, the reel can be readily rotated, for example, to take up slack in the strand, by manually grasping a roughened portion 40 of the tapered outer end of the spindle 24.

When it is desired to release the reel, it is necessary only to press the thimble inwardly as suggested in FIGURE 5. The thimble moves inwardly a distance sufficient that the cylindrical body moves clear of the edges of the tabs 37, thereby releasing tab pressure upon the thimble. This pressing of the thimble inwardly collapses the spiral spring 23, the smaller turns of which nest in the larger turns to permit a maximum movement of the thimble with a minimum space allowed for the spring. The pin 29 slides inwardly in the key slot 28.

After the tension of the tabs 37 has been released, when the thimble is then released and the spring 23 pushes it outwardly until the rim 27 is stopped by the flange 21, contact of the cylindrical body portion with the inner faces of the tabs is sufficient to knock the reel off the thimble and the reel can thereupon be caught in the hand and removed.

In FIGURES 6 and 7 there are shown fragmentary central portions 45 and 46 of reels fashioned somewhat differently with respect to the hole for reception of the thimble. In FIGURE 5 there is shown a triangular hole 47 having sides 48 forming an equilateral triangle subtending the circumference of the cylindrical portion of the thimble. This structure provides tabs 49 which are resilient, separated as they are by slits 50, and the edges of these tabs are also such that they provide a resilient tension against the thimble. The circle subtended by the midportions of the sides 48 is slightly smaller than the circumference of the thimble.

Similarly in FIGURE 7 tabs 51 form sides 52 of a square opening 53. The tabs are separated by slits 54 so that these tabs also are resilient. The square opening 53 is such that it is slightly smaller from one side to the other than the adjacent diameter of the thimble 24 to the end that the tabs 51 when sprung, as described in connection with the first indicated form, will push edgewise against the gripping portion of the thimble to positively attach the reel non-rotatably to the thimble. Release of the thimble of the design illustrated in FIGURES 6 and 7 is accomplished by means already described.

To facilitate in particular application of a strand in the form of a tape to a reel of the type described, there may be provided in the strand-holding section 31, for example, a slit 55 which extends radially relative to the central axis. The slit 55 has an open end 56, opposite sides of which are rounded as indicated at 57 so that the tape will not be caught at the corners as it is attached. The slit 55 extends inwardly past the circumference of the core 32 and into the central portion 35 at the area of one of the tabs 37. A slot 58 is formed in the core 32 in alignment with the slit 55.

To make use of the slit 55 in anchoring the end of a tape, the tape at its free end is grasped with the fingers and a bight of the tape adjacent the free end drawn flatwise through the slit 55 and the slot 58 to the bottom of the slit. When the tape is fed from one side tangentially with respect to an adjacent surface of the core 32 to the location of the slit 55, the tape will automatically be given a 90-degree turn at the bottom of the slit but the surface of the tape will lie flat against the core at the near edge of the slot 58. The tape may be held by the fingers long enough to give the reel one or two rotations sufficiently to bind the tape upon itself over the core and the mechanism then started for rotating the

reel. Because of the straightness of the slit 55 when a similar attachment on the pay-out reel is employed and the tape reaches the end of its length, the end caught by the reel will readily loosen and permit the tape to run free. By providing an enlargement 59 as shown in FIGURE 11, the manipulation of the tape in the slit 55 is still further improved.

In the form of device illustrated in FIGURES 8 and 9 a reel 60 is shown comprising an outside strand-confining section or disc 61, an inside strand-confining section or disc 62 and a substantially cylindrical core section 63 secured between the outside and inside discs and serving to position the discs in spaced parallel relationship. In this embodiment an intermediate disc element 64 forming part of the core section is constructed in such fashion as to make engagement with the exterior circumference of the cylindrical body 25 of the drive thimble 24. To accomplish this the disc element 64 is provided with appropriate tabs 65 separated by slits 66. The tabs are resilient and are adapted to engage the outer circumference of the cylindrical body 25 of the thimble 24 in the same manner as has been previously described.

The outside disc 61 and inside disc 62 are provided with holes 67 and 68 respectively, larger in diameter than the thimble, to clear the thimble whenever the reel is in place.

Still another embodiment of the invention illustrated in FIGURES 10 and 11 shows a somewhat reverse arrangement. In this instance a reel 70 provided, as previously described, with an outer section 71 and an inner section 72 mounted in spaced parallel relationship by means of a substantially cylindrical core section 73, may be constructed entirely of non-resilient material if desired. In this embodiment a drive thimble 74 on the shaft 13 has a resilient deformable friction jacket 75. As best viewed in FIGURE 11 it will be noted that the drive thimble 74 need not be cylindrical in form but may take some other shape such as the hexagonal form illustrated. The jacket of course may be appropriately constructed with a similar form presenting corners 76 lying in a circle slightly greater in diameter than the diameter of a rim 77 of a central hole 78 in the outer disc 71. A hole 79 in the inner disc 72 is made sufficiently large in diameter to comfortably clear the corners 76 in all positions.

In this form of the device the thimble 74 includes the same axial movement shown and described in connection with FIGURES 4 and 5 and hence details of that movement have not been illustrated in FIGURES 10 and 11 to the same degree.

In applying a reel to the thimble 74 the reel is impressed over the thimble into the position shown in FIGURE 10. By having the rim 77 rigid and non-expansible, the rim will depress or deform the resilient corners 76 of the jacket 75 and thus provide a friction grip of the thimble upon the reel. The hole 79, large in diameter as has been described, serves initially as a guide when the reel is being applied.

When removal is desired, the thimble 74 is pushed inwardly from right to left, as viewed in FIGURE 10, in the customary fashion until the rim 77 is clear of the corners, at which point the reel is free for removal.

It will be appreciated that although in FIGURES 8 and 9 and other figures of the drawing, resiliency in the reel for application to a rigid thimble is made possible by providing resilient tabs 65, other means providing a resilient or expandable circumference for a circle defined by edges 82, for example, of the tabs 65 may be employed with equal effectiveness.

There has accordingly been described a reel mounting and reel therefore of simple design yet possessing necessary elements adapted to positive gripping of the reel on a drive shaft and positive gripping of the tape on the reel, the same facility being employable with equal ease for removal of the reel and also of the tape from the reel when removal is desired.

While I have herein shown and described my invention in what I have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of my invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A rotating mounting for a reel comprising a frame, a shaft rotatably mounted on the frame, a reel support non-rotatably mounted on the shaft and a drive thimble non-rotatably mounted on the reel support and movable axially relative thereto, said drive thimble having a substantially cylindrical reel-receiving portion and a perimetral gripping surface thereon, and a reel having strand-confining sections on opposite sides and a strand-holding core therebetween, one of said sections having an axially located hole adapted to surround the thimble with a clearance, the other of said sections having an axially located hole smaller in diameter than the thimble and having a series of slits extending outwardly from the hole providing resilient tabs, said tabs being adapted to assume positions spring pressed against the perimetral gripping surface when the thimble is extended and to be removed therefrom when the thimble is depressed to a position wherein the gripping surface is moved axially away from the tabs.

2. A rotating mounting for a reel comprising a frame, a shaft rotatably mounted on the frame, a reel support non-rotatably mounted on the shaft and a drive thimble non-rotatably mounted on the reel support and mounted for axial movement relative thereto, said drive thimble having a reel-receiving portion and a perimetrally extending gripping area thereon, and a reel having strand-confining sections on opposite sides and a strand-holding core therebetween, one of said sections having an axially located hole adapted to surround the thimble with a clearance, the other of said sections having an axially located hole and having a series of resilient tabs extending radially inwardly to positions wherein inner edges resiliently engage the gripping area of the thimble, said tabs being adapted to assume positions in resilient engagement against the gripping area when the thimble is extended and to be removed therefrom when the thimble is depressed axially on the shaft.

3. A rotating mounting for a reel comprising a frame, a shaft rotatably mounted on the frame, a reel support non-rotatably mounted on the shaft including a central hub anchored to the shaft and having a well surrounding the hub, a drive thimble having an axially slidable and non-rotating connection to the hub, a spring in the well normally urging said thimble outwardly and means acting between the thimble and the reel support to limit outward movement of the thimble, said thimble having a cylindrical body and a gripping portion around the body, and a reel comprising parallel strand-confining sections on opposite sides and a strand-holding core therebetween, one of said sections being adapted to lie against the reel support and having an axially located hole therethrough providing a clearance around said body, the other section comprising circumferentially arranged resilient tabs having inner free ends lying in a circle of diameter smaller than said body whereby inner edges of the tabs are adapted to bear resiliently against said gripping portion holding the reel non-rotatably on the thimble, said thimble having a movement inwardly against spring tension a distance sufficient to clear said tabs.

4. A rotating mounting for a reel comprising a frame, a shaft rotatably mounted on the frame, a substantially flat reel support non-rotatably mounted on the shaft including a central hub anchored to the shaft and having a well surrounding the hub and a flange at an outer edge of the well extending radially inwardly, a drive thimble including a rim located in the well beneath the flange,

said thimble having an axially slidable and non-rotating connection to the hub, and a spring in the well normally urging said thimble outwardly, said thimble having a tapered outer end, a cylindrical body and an annularly extending gripping area around the body, and a reel comprising parallel strand-confining sections on opposite sides and a strand-holding core therebetween, one of said sections being adapted to lie against the reel support and having an axially located hole therethrough providing a clearance around said body, the other section comprising circumferentially arranged resilient tabs having inner free ends lying in a circle of diameter smaller than said body whereby inner edges of the tabs are adapted to bear resiliently against said gripping portion whereby to hold the reel non-rotatably on the thimble and to press said reel against the reel support, said thimble having a movement inwardly against spring tension a distance sufficient to clear said tabs.

5. A rotating mounting for a reel comprising a frame, a shaft rotatably mounted on the frame, a substantially flat reel support non-rotatably mounted on the shaft including a central hub anchored to the shaft, a drive thimble having an axially slidable non-rotating connection to the hub, said thimble having an axially extending body, and a reel comprising parallel strand-confining sections on opposite sides and a strand-holding core therebetween, one of said sections being adapted to lie against the reel support and having an axially located hole therethrough providing a clearance around said body, the other section comprising circumferentially arranged resilient tabs having inner free ends lying in a circle of diameter smaller than said body whereby inner edges of the tabs are adapted to bear resiliently against said body and to hold the reel against the reel support.

6. A rotating strand-holding reel and mounting therefor comprising a frame, a drive thimble rotatably mounted on the frame and having an exterior reel-contacting portion, said thimble being movable axially toward the frame to a reel release position and being movable resiliently and axially outwardly relative to the frame to a reel engaging position, said reel comprising an inner strand-holding section, an outer strand-holding section and a core of a diameter larger than the thimble secured to said sections and holding said sections in spaced parallel relation, said inner section having a central hole therein of size greater than the diameter of the reel-contacting portion, said outer section having a central hole therein having a rim forming a thimble-contacting portion, said last identified hole having a size less than the diameter of said reel contacting portion, one of said contacting portions being of resilient material and subject to deformation by the other contacting portion when the thimble is in reel-engaging position, said thimble in reel release position being clear of the thimble-contacting portion of the respective strand-holding section.

7. A rotating strand-holding reel and mounting therefor comprising a frame, a drive thimble rotatably mounted on the frame and having an exterior reel-contacting portion, said thimble being movable axially inwardly toward the frame to a reel release position and being movable resiliently and axially outwardly relative to the frame to a reel-engaging position, said reel comprising an inner strand-holding section, an outer strand-holding section and a core of a diameter larger than the thimble secured to said sections and holding said sections in spaced parallel relation, said inner section having a central hole therein of size greater than the diameter of the reel-contacting portion, said outer section having a central hole therein having a rim forming a thimble-contacting portion, said last identified hole having a size less than the diameter of said reel contacting portion, said thimble-contacting portion being of resilient consistency subject to expansion when the thimble is in reel-engaging position, said thimble in reel release position being clear of the thimble-contacting portion.

8. A rotating strand-holding reel and mounting therefor comprising a frame, a drive thimble rotatably mounted on the frame and having an exterior reel-contacting portion, said thimble being movable axially inwardly to a reel release position and being movable resiliently and axially outwardly relative to the frame to a reel-engaging position, said reel comprising an inner strand-holding section, an outer strand-holding section and a core of a diameter larger than the thimble secured to said sections and holding said sections in spaced parallel relation, said inner section having a central hole therein of size greater than the diameter of the reel-contacting portion, said outer section having a central hole therein having a rim forming a thimble-contacting portion, said last identified hole having a size less than the diameter of said reel contacting portion, said reel-contacting portion being of resilient compressible consistency subject to depression by the thimble-contacting portion when the thimble is in reel-engaging position, said thimble in reel release position being clear of the thimble-contacting portion.

9. A reel for carrying a coil of continuous elongated strand material wound thereon and a spindle for mounting said reel, said reel comprising an inner strand-holding section, an outer strand-holding section and a core section secured between said first two sections and holding said first two sections in parallel spaced relation, central sections extending radially inwardly of said core section, means forming a first central hole in at least one of said central sections having one diameter, means forming a second central hole in at least one other of said central sections having a circumferential portion of diameter less than the circumferential portion of said spindle and said first hole, said last identified circumferential portion being defined by resilient material throughout the circumference thereof and expandable generally within the plane of said respective strand-holding section to a diameter greater than the initial diameter and adapted to resiliently engage said spindle and to provide a driving connection therebetween.

10. A reel and mounting therefor for carrying a coil of continuous elongated strand material wound thereon and for mounting on a spindle, said reel comprising an inner strand-holding section, an outer strand-holding section and a core section secured between said first two sections and holding said first two sections in parallel spaced relation, central sections extending radially inwardly of said core section, means forming a first central hole in at least one of said central sections having a circumferential rim of one diameter greater than the diameter of the spindle, means forming a second central hole in at least one other of said central sections having a rim of diameter less than the diameter of said first identified rim and of the spindle, said last identified rim comprising edges of circumferentially spaced resilient tabs of the material forming the corresponding strand-holding section and being expandable to an operating diameter greater than the initial diameter and not greater than the diameter of the spindle whereby said spindle is adapted to be grasped in non-rotatable engagement with said reel, said spindle being movable axially toward the frame to a reel release position and being movable resiliently and axially outwardly of the frame to a reel engaging position.

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