Oct. 1, 1963 R DELL HULL 3,105,651

CLOSED-FACE SPINNING REEL

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Fig. 1

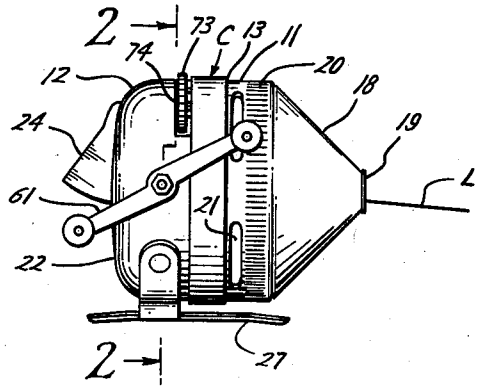


Fig. 3

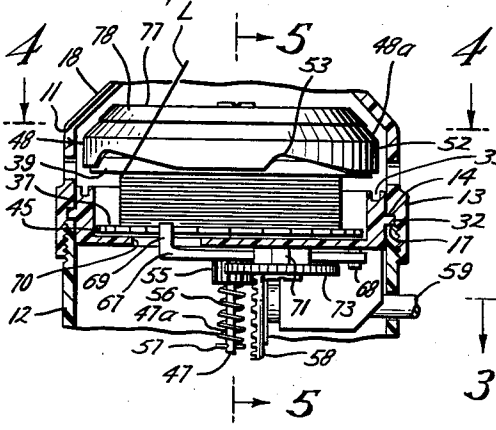


Fig. 2

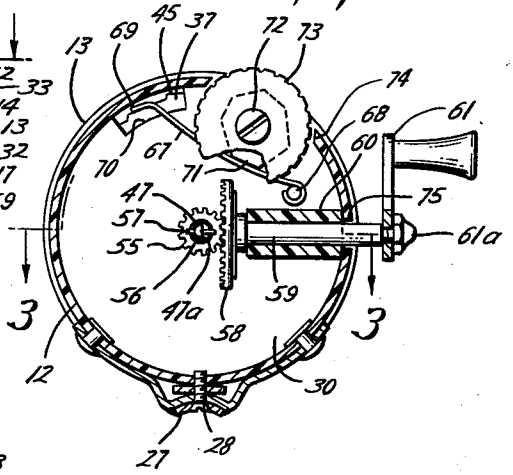
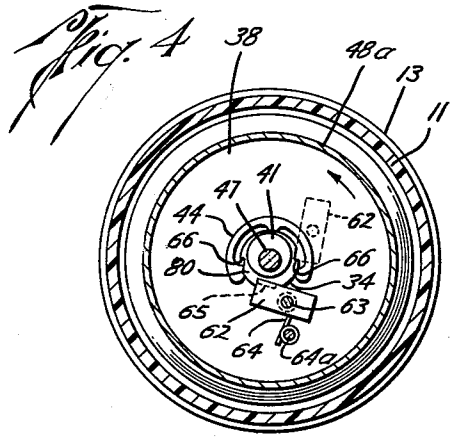


Fig. 4



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Fig. 5

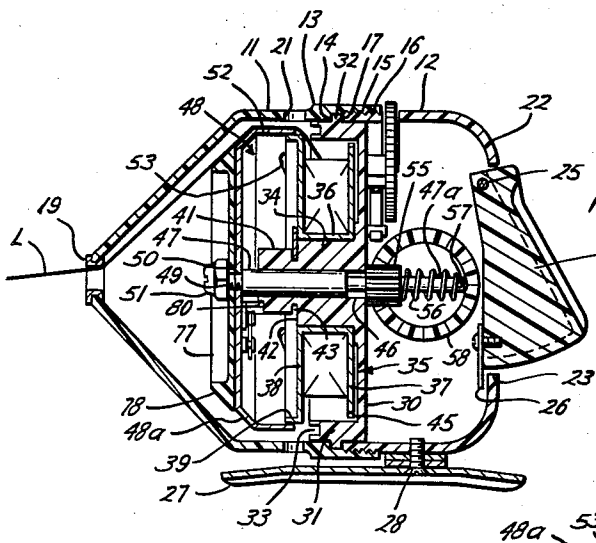


Fig. 6

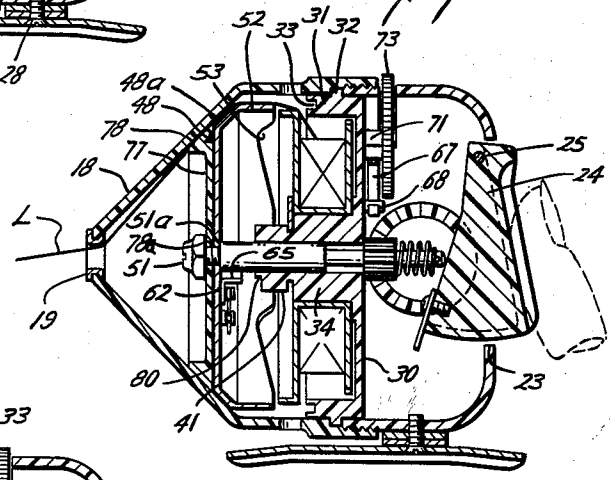
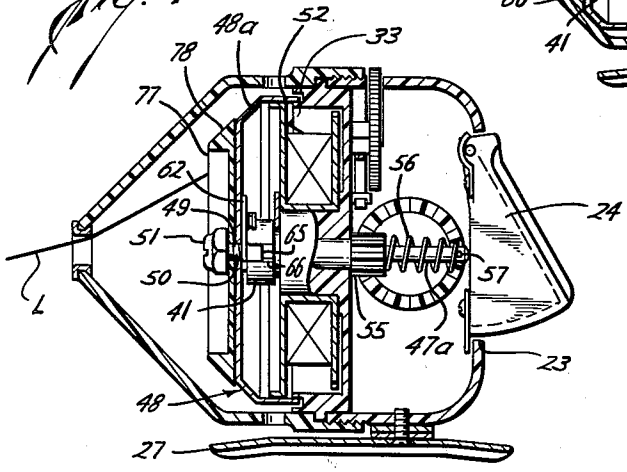


Fig. 7



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Fig. 8

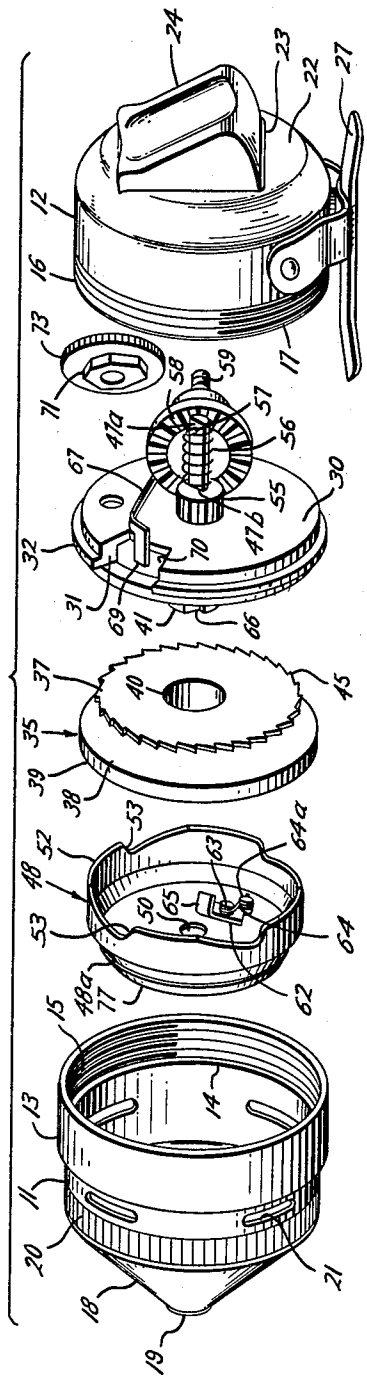
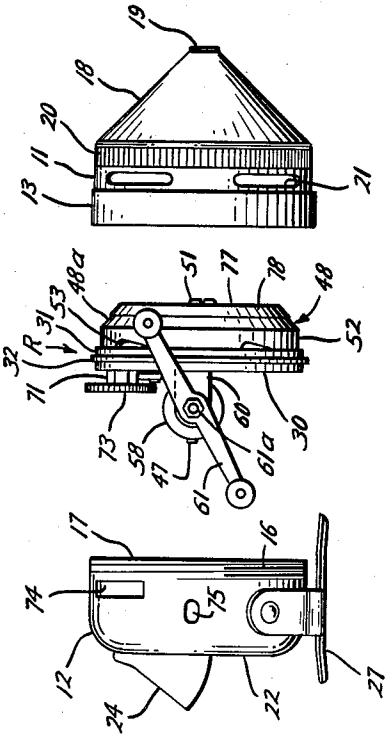


Fig. 9



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United States Patent Office 3,105,651 Patented Oct. 1, 1963

3,105,651

CLOSED-FACE SPINNING REEL

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Filed Jan. 31, 1961, Ser. No. 86,049
4 Claims. (Cl. 242—84.2)

The present invention relates to fishing reels, especially so-called closed-face spinning reels, and is directed more specifically to certain novel structural improvements in closed-face spinning reels, to improve the operation thereof, to accommodate improved materials of construction and to simplify the manufacture thereof.

One of the specific features of the invention resides in the provision of a novel construction for a closed-face spinning reel, comprising front and back cover members and a reel mechanism sub-assembly which is engaged by the cover members and held in position in the complete reel assembly solely, or substantially solely, by the assembled relationship of the cover members. More specifically, the improved construction includes a pair of cover members which are threadedly engaged for assembly into a complete reel housing and which, when so engaged, form an annular recess. The reel mechanism sub-assembly includes radially projecting means which are received in the before-mentioned annular recess and are clamped tightly between the cover members when the members are threadedly engaged. The improved construction, which is particularly rugged and durable, affords greatly simplified assembly and disassembly and facilitates the bodily removal of the reel sub-assembly for such maintenance as may be necessary from time to time. Further, the improved construction permits advantageous use to be made of certain desirable materials of construction, such as certain presently available structural plastics.

Other and more specific features and advantages of this invention will become more readily apparent from the following detailed description when read in conjunction with the accompanying drawing which illustrates a useful embodiment in accordance with this invention.

In the drawing:

FIG. 1 is a side elevational view of the reel in accordance with this invention, shown in assembled operative form;

FIG. 2 is a transverse sectional view taken generally along line 2—2 of FIG. 1;

FIG. 3 is a top, partially sectional, view taken generally along line 3—3 of FIG. 2;

FIG. 4 is a transverse sectional view taken generally along line 4—4 of FIG. 3;

FIGS. 5, 6 and 7 are all transverse sectional views taken generally along line 5—5 of FIG. 3, showing the parts of the reel at different stages of operation thereof;

FIG. 8 is an exploded perspective view of the entire reel structure; and

FIG. 9 is an exploded elevational view of the principal parts of the reel, the sub-assembly comprising the major reel portion being shown in its assembled form.

Referring to the drawing and more particularly to FIGS. 1, 8 and 9 initially, there is shown a reel including a casing C, of generally cylindrical form, comprising a front cover 11 and a rear cover 12 joined coaxially by means of a threaded connection. The rearward end portion of the front cover 11 is annularly enlarged to form a rearwardly projecting annular flange 13, and a rearwardly facing internal annular shoulder 14 is formed at the junction of flange 13 with cover 11. The interior of flange 13 is provided with threads 15 and is adapted to receive the forward end portion of the rear cover 12, which is provided with external threads 16 complementary to the threads 15. The forward end of the cover 12 forms a forwardly facing annular shoulder 17 which registers with the shoulder 14 when the front and rear covers 11, 12 are assembled. The assembled casing encloses a spinning reel structure comprising a complete sub-assembly, designated generally by the letter R (FIG. 9), which is adapted to be bodily inserted as a unit into the casing and secured therein between shoulders 14 and 17, as will be subsequently described.

Advantageously, the cover 11 is formed to provide a forwardly tapering, generally conical front face 18, the center of which is pierced by an eye 19 through which the fishing line L passes. Preferably, a portion of the front cover, adjacent the conical face 18, may be knurled, as at 20, to provide a gripping surface to facilitate assembly of the front cover with the rear cover.

A plurality of angularly spaced windows 21 are provided through the cylindrical portion of front cover 11, between the flange 13 and the knurled surface 20 to permit drainage of water from the casing and to provide openings through which the operator may view the line spool in order to judge the amount of line on the spool at various stages of operation.

The rear cover 12 has a rear wall 22 provided with a generally rectangular opening 23, in which is mounted a thumb pressure plate 24. The upper end of the plate 24 is pivoted on a hinge pin 25, extending transversely of the upper end of opening 23, for swinging movement of the thumb plate through the rear wall of the cover 12, for controlling the operation of the reel, as will be more fully described hereinafter. A short extension 26 is secured to the front face of thumb plate 24 and projects below the lower edge of the opening 23, in order to limit the outward movement of the thumb plate with respect to rear wall 22.

A tang 27 is suitably secured to the bottom of rear cover 12, as by means of one or more screws 28, and is disposed parallel to the longitudinal axis of the reel, serving in the known manner to mount the reel on the reel seat of a conventional fishing rod (not shown).

The sub-assembly R, comprising the reel structure, includes a circular mounting plate 30 adapted to be positioned transversely of casing C. The mounting plate 30 is formed to provide about its periphery a forwardly extending cylindrical rim 31 having an external diameter to fit snugly within the inner walls of the abutting portions of the front and rear covers. Intermediate its ends, the rim 31 is provided with a radially outwardly extending annular flange 32 which is adapted to be received between the shoulders 14 and 17 of the front and rear covers, respectively, so that the shoulders will abut the opposite faces of the flange 32, to clamp the plate 30 and the reel structure supported thereby between the covers, when the latter are assembled. The forward edge of the rim 31 is provided with an annular forwardly facing groove 33, for purposes to be described hereinafter. The mounting plate 30 also is provided with a central forwardly projecting cylindrical boss 34, preferably integral with plate 30 but which may be otherwise secured to the forward face thereof in any known manner.

A line spool, designated generally by the numeral 35, comprises a hollow hub 36 and axially spaced annular rear and front flanges 37 and 38, respectively. The front flange 38 is provided with a short forwardly extending annular rim flange 39, and the hub 36 has an axial opening 40 adapted to slidably receive boss 34. The boss projects forwardly through the opening 40, and its forward end is reduced somewhat in diameter to form a generally cylindrical extension 41 and a forwardly facing annular shoulder 42 at a point along the boss 34 which is substantially flush with the forward face of front spool flange 38 when the spool is seated on the boss 34. A locking groove 43 is provided about the extension 41, immediately adjacent the shoulder 42, and is adapted to receive a removable locking clip 44, by means of which spool 35 is releasably

secured on boss 34 and held snugly against the forward face of plate 30. The peripheral edge of rear spool flange 37 is provided with ratchet teeth 45, for purposes to be subsequently described.

An axial bore 46 is provided in the boss 34, in which is rotatably and slidably journalled a cylindrical shaft 47, which projects through bore 46 both rearwardly of plate 30 and forwardly of the boss extension 41. A line pick-up head 48 is mounted on the forward end of shaft 47 for rotation and axial movement with the shaft. The latter has a forwardly extending threaded pin 49 which projects through a central opening 50 in the pick-up head to receive a cap nut 51, to thereby provide means by which the pick-up head may be releasably secured to the shaft 47, against an annular shoulder 51*a* at the base of pin 49.

The line pick-up head 48 is generally circular and advantageously is formed with a rearwardly and outwardly tapering conical section 48*a* terminating in a generally cylindrical rearwardly extending peripheral flange 52 which is adapted to extend rearwardly over the periphery of rim flange 39 of the front spool flange to a point intermediate front and rear spool flanges 38 and 37, respectively, when the pick-up head is in a retracted position against the forward end of boss extension 41. The rearward edge of flange 52 is provided with a plurality of angularly spaced notches 53 of generally smooth curved configuration, as shown, which are adapted to engage or pick up line L upon appropriate rotation of pick-up head H and to wind the line about hub 36 of line spool 35. As shown particularly in FIG. 3, the line-engaging surfaces of the notches 53 are disposed at a substantial angle, relative to the longitudinal direction, the direction of the angle being such that the line-engaging surface extends, starting from the apex of the notch, rearward and in a direction opposite to that in which the pick-up head rotates in winding line upon the spool. This angle which, for facility of description, may be referred to as a receding angle, is advantageous in that it prevents accidental snagging of the line during payout. In this respect, it will be observed that the line is drawn across and about flange 52 while being withdrawn from the reel. The illustrated construction of the reel, including in combination the above-described notch configuration and the cooperating forwardly facing annular groove 33, constitutes an important and advantageous feature of the reel, which forms the subject matter of and is covered by a copending divisional application.

A portion of shaft 47 projects behind the plate 30 and has mounted thereon a spur gear 55 which is suitably splined to the shaft by means of the flat 47*a* on the shaft, as best seen in FIG. 8, and a cooperably shaped opening 47*b* in the spur gear, to permit relative longitudinal movement of the shaft through the gear without relative rotation therebetween. A coil spring 56 is positioned about the rearward end of the shaft 47 and is held in compression between gear 55 and a laterally projecting stop pin 57 mounted on the rearward end of the shaft. The spring 56 serves to urge the shaft 47 to its rearward position, while at the same time, thrusting the gear 55 against the rear face of the plate 30, which serves as a bearing for the gear. A ring gear 58 is mounted on a winding shaft 59 (FIG. 2) and is disposed to mesh with spur gear 55. The shaft 59 is suitably journalled in a bearing 60, mounted on the rear face of the plate 30 (FIGS. 2 and 9), and is of a length sufficient to project through the side wall of casing C when the structure is assembled. The outer end of the shaft 59 carries a handle 61, by which the shaft may be rotated in order to drive the main shaft 47 through the intermeshing gears 55 and 58. Rotation of the shaft 47 drives the pick-up head 48, which is rotated in a counterclockwise direction (as viewed from the front of the reel) in order to wind the line onto the spool.

It is desirable to positively prevent reverse rotation of the pick-up head and the present structure includes a simple form of anti-reverse device for this purpose. This device comprises a pawl 62 (FIGS. 4 to 8) pivotally supported on a pivot pin 63, mounted on the inner face of the pick-up head 48 at a point between the periphery of the boss extension 41 and the flange 52. A wire spring 64 (FIGS. 4 to 8) has one end curled about the pivot pin 63 and the other end about an upstanding pin 64*a* projecting from the inner face of the pick-up head 48 at a point spaced a short distance from the pivot pin. The spring thus is arranged to bias one end of pawl 62 radially inwardly urging the toe 65 toward the periphery of the boss extension 41. The latter has a pair of circumferentially spaced longitudinal notches 66 (FIGS. 4 and 8) in its peripheral surface, which are adapted to receive the toe 65 and to serve as stops for preventing reverse rotation of the pick-up head.

The arrow shown in FIG. 4 indicates the normal direction of rotation of the pick-up head when the line is being retrieved. It will be observed that, when rotation of the pick-up head is in the proper direction, indicated by the arrow, the toe 65 of the pawl will merely ride around the periphery of extension 41, sliding over the notches 66. But, when reverse rotation of the pick-up head is attempted, the toe 65 will drop into one of the notches 66, under the urging of spring 64 (FIG. 4) to lock the pick-up head.

As best seen in FIGS. 2, 3 and 8, the reel structure is provided with a "drag" for the line spool in order to regulate tension which may be applied to the line before the line spool is permitted to slip on boss 34, in order to prevent line breakage under an excessive pull. This drag means comprises a leaf spring 67 pivoted at one end about a pin 68, which projects from the rear face of the plate 30. The free end of the leaf spring 67 has a forwardly turned head 69 projecting through an arcuate slot or window 70 in the plate 30, near the periphery thereof, opposite a segment of the serrated edge 45 of the line spool. The spring head 69, which functions as a brake shoe, is positioned to rest on the serrated edge 45 and is urged against this edge by means of a stepped control cam 71 rotatably mounted on a pivot pin 72 secured to the rear face of the plate 30. The control cam 71 is shaped so that, as it is rotated about pin 72, it will appropriately increase or decrease pressure, depending upon the direction of rotation, against leaf spring 67, which will, in turn, transmit this pressure in the form of a frictional drag on the rear flange of the line spool. A drive disk 73, having a knurled periphery, is secured to the cam 71 and is arranged to have a segment of its periphery projecting through an opening 74 in the wall of the rear cover 12. The disk thus is exposed to the exterior of the casing at a point at one side and near the top of the casing (as shown in FIGS. 1 and 9), where it may be readily contacted by the thumb or finger of the operator for adjusting the pressure on the drag spring. The serrations on edge 45 also cooperate with the spring head 69 to provide a clicking sound when the tension on the fishing line is great enough to overcome the resisting pressure of drag spring 67 and thereby produce rotation of the spool about boss 34.

The sub-assembly R, comprising all of the reel mechanism carried on the mounting plate 30, as heretofore described, is insertable bodily in casing C. Ordinarily, the sub-assembly will be inserted into the open end of rear cover 12, the drive shaft being slipped through an elongated opening 75 in the wall of rear cover 12. After the sub-assembly is in place in the rear cover 12, the handle 61 will be remounted on the end of the shaft 59 and the cap screw 61*a* applied to secure the handle in place. The opening 75 is so positioned in relation to the opening 74 that drag drive disk 73 projects through the latter when the shaft 59 has entered the opening 75. The line L is threaded through eye 19 and front cover 11 is then screwed onto the rear cover 12 to clamp the sub-assembly R lightly in the casing. When the covers and the reel have thus been assembled, the inner end face of the thumb plate 24 will normally rest against the

rearward end of the shaft **47**, in position to be manipulated in the casting and retrieving operations of the reel.

In the operation of the reel, it is necessary to hold the line L against premature release during the initial stages of the casting operation. This holding operation may be accomplished by gripping the line between pick-up head **48** and the inner wall of the conical face **18** of the front cover. Means for performing this gripping operation are provided on the pick-up head **48** and comprises a brake ring **78** formed about the periphery of a disk **77**. The forward end of the pin **49** extends through a central opening **78***a* in the disk, and cap nut **51**, when mounted on pin **49**, serves to clamp the disk **77** to the forward face of pick-up head **48**. The brake ring **78** advantageously is shaped to provide a forwardly tapering frusto-conical braking surface which may have substantially the same taper as the inner wall of the forward face **18** of the front cover. The conical braking surface **78** extends outside of the tapered section **48***a* of the pick-up head, but well inside the outer flange **52** of the pick-up head, and it will be seen that line L flows over flange **52**, tapered section **48***a*, and thence over the braking surface in its passage through eye **19** to and from spool **35**. When pick-up head **48** is moved forwardly in operation of the reel, as will be subsequently described, it will be seen that line L will be pinched between the wall of cover portion **18** and surface of the braking ring **78** (FIG. 6). At any other position of the pick-up head, the line is free to move to and from the spool as required. It will be understood that the brake ring may be formed integral with pick-up head **48**, if desired.

The operation of the reel will now be described, reference being had particularly to FIGS. 5, 6 and 7, which illustrate several stages in the operation. Referring first to FIG. 7, which illustrates the position of the reel parts when the line is being retrieved and wrapped about the spool **35**, it will be noted that the pick-up head **48** has moved to its rearmost position at which it bears against the forward end of the boss extension **41**, and the line L is engaged in one of the notches **53**. It will be noted that, at this position of the pick-up head, the rearward edge of the flange **52** will have been received in the confining groove **33**, thereby closing the notch so that movement of the line to the spool will be confined to passage through the notch **53** from which it cannot escape, thus assuring against pinching or fouling of the line while it is being retrieved. In this respect, it will be understood that, in the assembled reel, in line retrieving condition, the depth of the notches **53** is greater than the entry of the flange **52** into the groove **33**, so that an opening remains for the free passage of the line.

FIG. 6 shows the first stage of the casting position, which is also a temporary gripping position for holding the line against premature outward movement. Pressure will have been applied to the thumb plate **24** to move the latter inwardly of the casing, whereby the forward end of the thumb plate will urge shaft **47** forwardly to thereby move pick-up head **48** forwardly until the brake ring **78** grips the line and prevents its outward movement. Thus the line and the lure attached thereto can be held against outward movement while the casting movement of the rod is begun. Thumb pressure is then relieved from thumb plate **24** and spring **56** will then act to move shaft **47** rearwardly to draw the pickup head **48** rearwardly and carry the brake ring out of contact with the casing wall **18**, thereby freeing the line for outward movement. The cast may then be made, this occurring contemporaneously with the release of thumb pressure on the plate **24**.

When the pickup head **48** is moved outwardly, as previously noted, the pawl **62** will also be moved out in front of the end of the boss extension **41**, as seen in FIG. 6. When the pressure on the thumb plate **24** is relaxed, to release the line, the pawl will have been rotated by the pressure of the spring **64** to a point at which toe **65** will

be positioned radially inwardly of the periphery of boss extension **41** (FIG. 6), with the result that the pawl **62** will engage the forward face of the boss extension **41** (FIG. 5) and prevent the pick-up head **48** from returning to its rearmost position, thereby holding the notched edge of the flange **52** in front of the front flange of the line spool, as best seen in FIG. 5. In this position, the notches **53** are held out of the path of movement of the line L, which will be flowing over the flange **52** as the cast is being made.

When the cast has been complete, it is necessary for the pick-up head to be retracted to its rearmost position, as shown in FIG. 7, in order to retrieve the line. It is necessary, therefore, to remove the pawl **62** from its engagement with the front face of the boss extension **41** in order to allow this further rearward movement of the pick-up head. This additional retraction is effected upon the initial rotation of the pick-up head in the pick-up direction by the provision of guide elements arranged on the forward face of the boss extension **41** and an adjacent portion of the pawl **62**. This guiding mechanism is best seen in FIG. 4 where it will be observed that the front face of the boss extension **41** has been cut away along the segment adjacent the periphery thereof to form a shallow arcuate cam **80** which merges into the periphery of boss extension **41** on opposite sides of the boss extension.

The pawl toe **65** is adapted to engage the cam **80** when rotation of the pick-up head in the line-retrieving direction is initiated. The shape of cam **80** is such as to cooperate with the toe **65** of the pawl to swing the latter outwardly against the resistance of the spring **64** and cause the toe to ride on to the periphery of boss extension **41**, whereupon the pick-up head will be freed for rearward movement under the urging of the spring **56**, in order to reassume the position shown in FIG. 7, at which point it again rests against the forward end of boss extension **41**. Continued rotation of the pick-up head in the retrieving direction will retrieve the line, and since pawl **62** is now riding on the periphery of boss extension **41**, it will be in position to drop into one of the notches **66** in the event reverse rotation of the pick-up head tends to occur.

From the foregoing, it will be seen that the present invention provides a compact, simply constructed spinning reel of the closed-face type which may be quickly and easily assembled and dis-assembled, which is substantially fool-proof in operation, particularly in assuring absence of back-lash and a positive anti-reverse mechanism.

The reel construction herein described lends itself particularly to the employment of plastic materials for the construction not only of casing C, but also of support plate **30** and many other parts of the sub-assembly R, thereby greatly reducing both the cost of fabrication and the cost of material, as well as providing a lighter assembly, which is also highly resistant to salt water corrosion, and other deleterious conditions commonly encountered in the use of fishing reels.

It will be understood that various alterations, modifications and changes may be made in the details of the illustrative embodiment within the scope of the appended claims, but without departing from the spirit of this invention.

I claim:

1. A spinning type fishing reel assembly comprising a reel mechanism sub-assembly including a plate-like member having an annular flange projecting radially outward therefrom, a front cover member, and a back cover member, one of said cover members having external threads thereon and having an annular end surface engaging one side of said flange, the other of said cover members having internal threads for engagement with the external threads of said one cover member, and said other cover member having a shoulder engaging the other side of said flange, said sub-assembly being rigidly clamped relative to said

cover members between said end surface and said shoulder, whereby said fishing reel assembly is completed upon the threaded engagement of said covers with one another.

2. A spinning type fishing reel assembly comprising a reel mechanism sub-assembly, a front cover member, a back cover member, cooperating internal and external threads on said cover members for assembling said cover members to form a reel casing, said sub-assembly being received internally of said cover members, and cooperating abutment surface means on said sub-assembly and on said cover members operative upon threaded assembly of said cover members to clamp said sub-assembly tightly in relation to said reel casing and to complete the fishing reel assembly, one of said cover members having a generally cylindrical externally threaded wall at its open end, the end surface of said wall forming a first abutment, the other of said cover members having a first wall portion of generally cylindrical form and of diameter substantially equal to that of said externally threaded wall and a second wall portion of enlarged diameter, said second wall portion having internal threads engaging said external threads, said second cover member forming a second abutment at the junction of said first and second wall portions, and said sub-assembly having radially projecting means received between and tightly clamped by said first and second abutments.

3. The reel of claim 2, in which said radially projecting means comprises an annular flange having an outside

diameter substantially equal to the diameter of said externally threaded wall.

4. The reel of claim 2, in which said sub-assembly includes means forming a cylindrical surface extending forward and rearward from said radially projecting means and telescopically received closely within said cover members.

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