March 23, 1971 J. R. HARKNESS ET AL 3,572,307

HANDLE FOR PULL ROPE ENGINE STARTER

Filed Jan. 27, 1969 5 Sheets-Sheet 1

Fig. 1

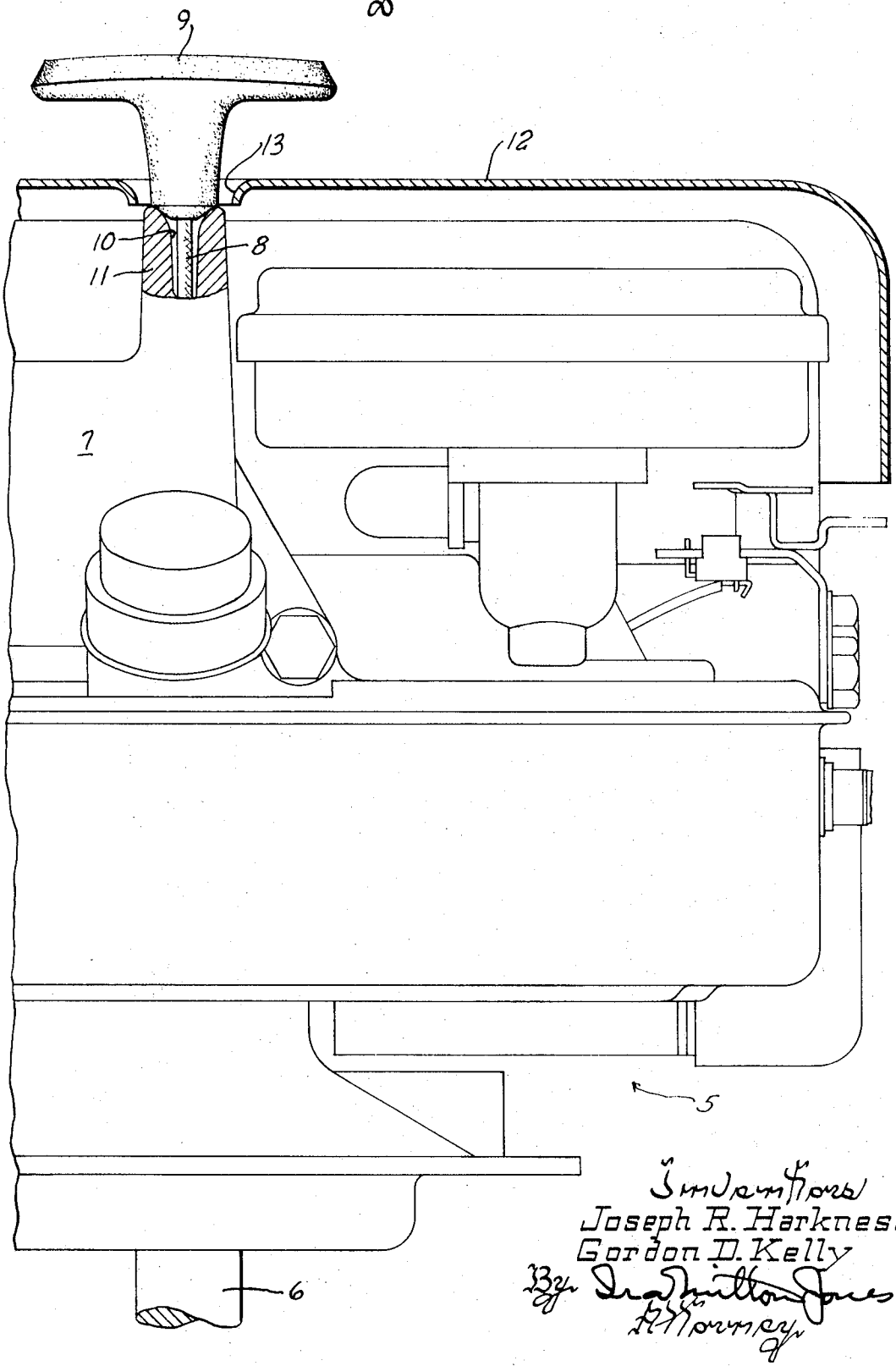

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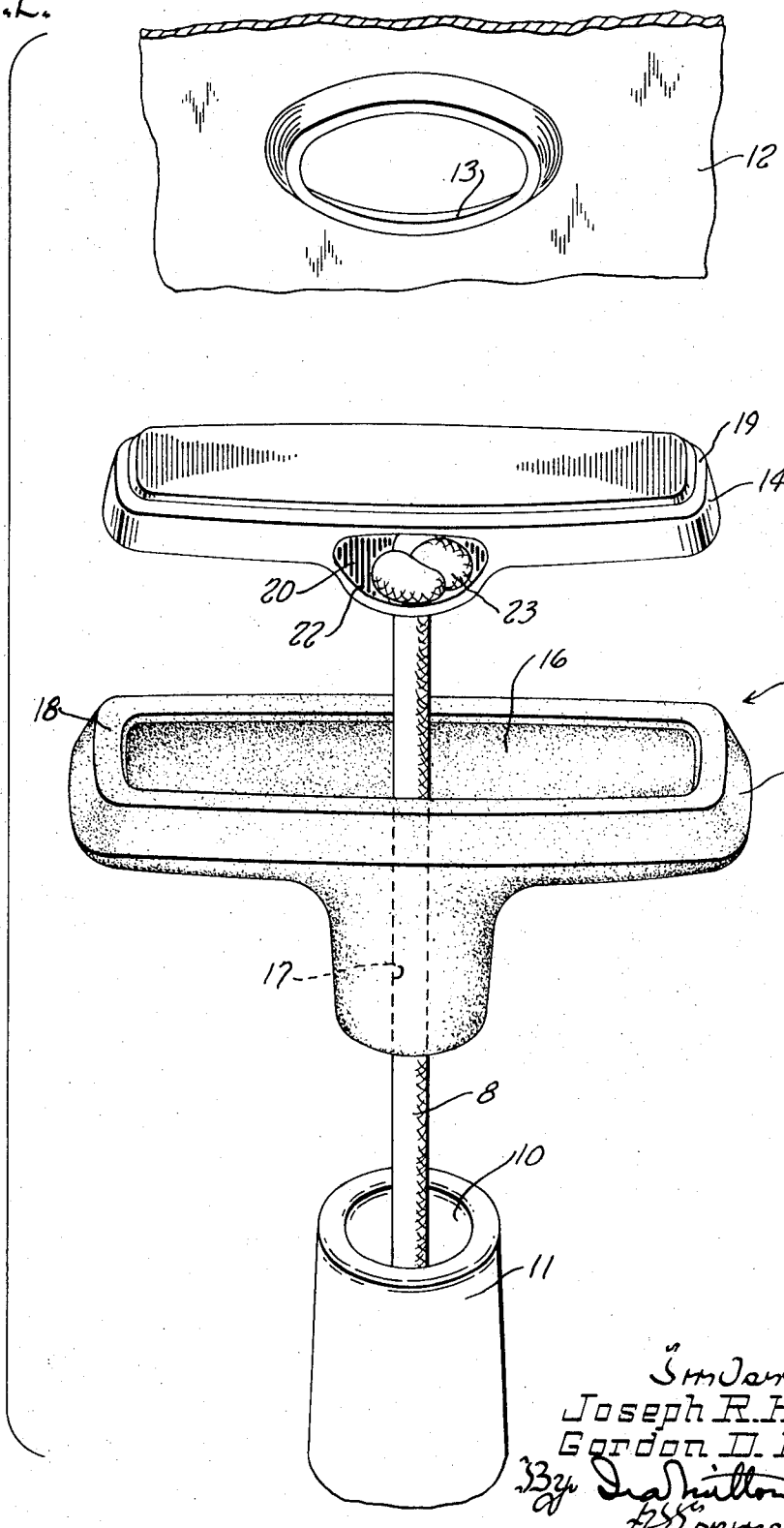
Fig. 2.



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HANDLE FOR PULL ROPE ENGINE STARTER

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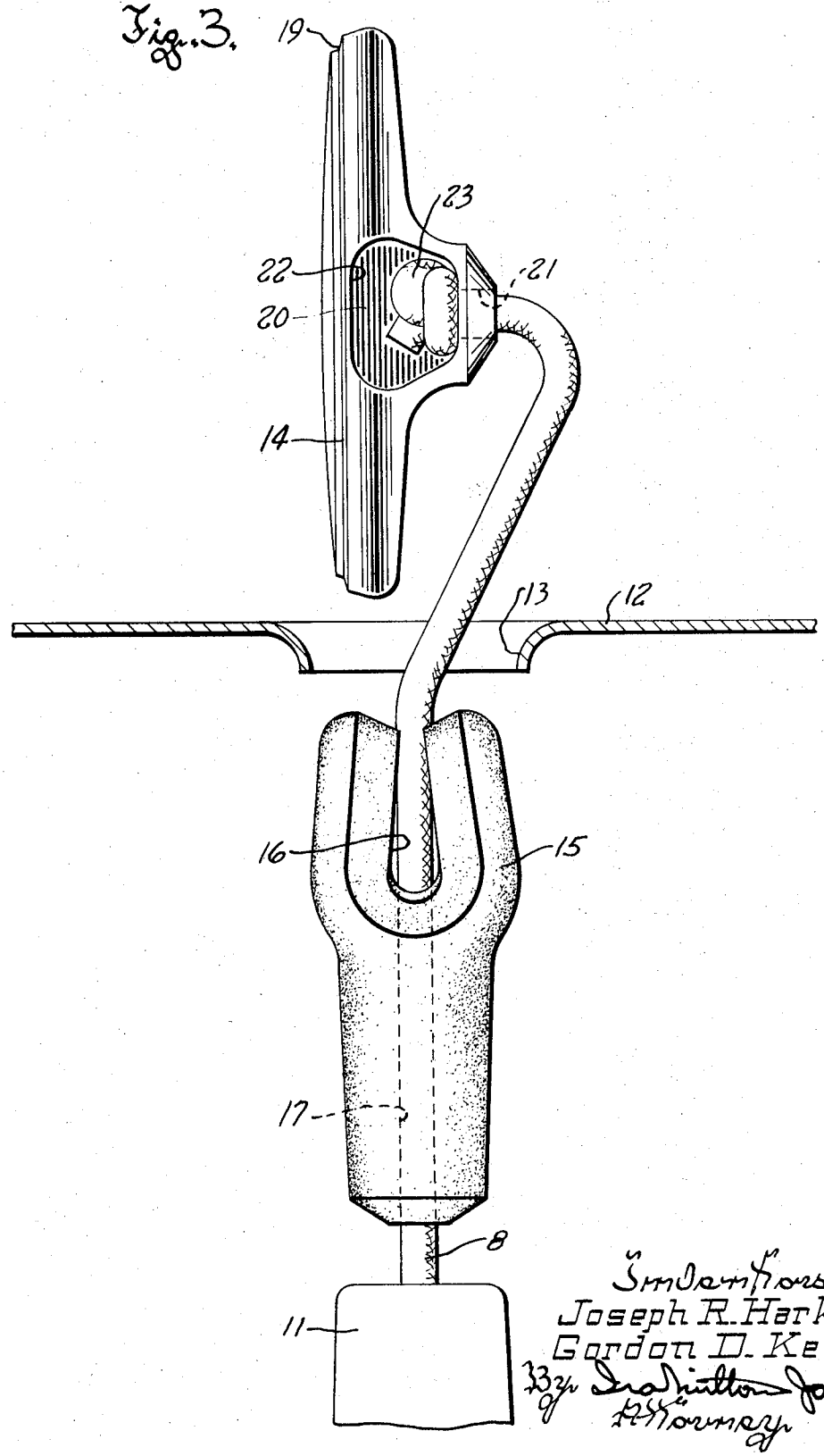
Fig. 3.



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HANDLE FOR PULL ROPE ENGINE STARTER

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Fig. 4.

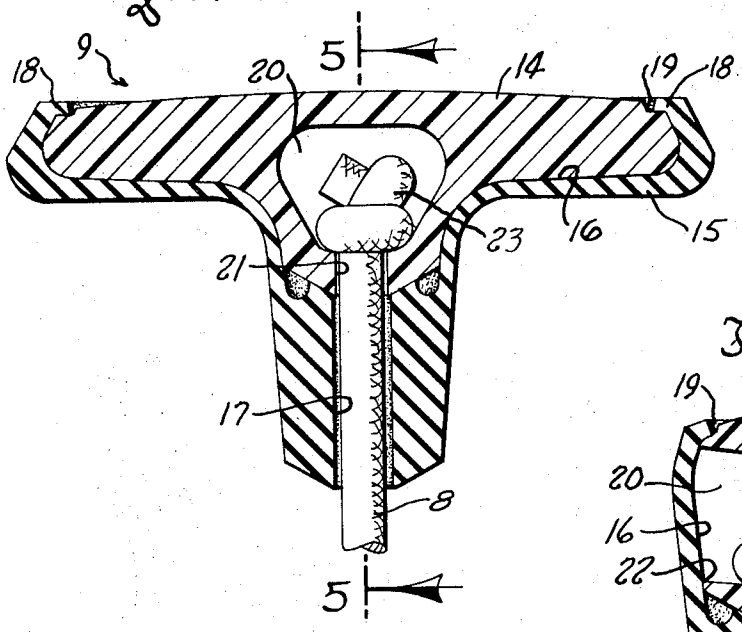


Fig. 5.

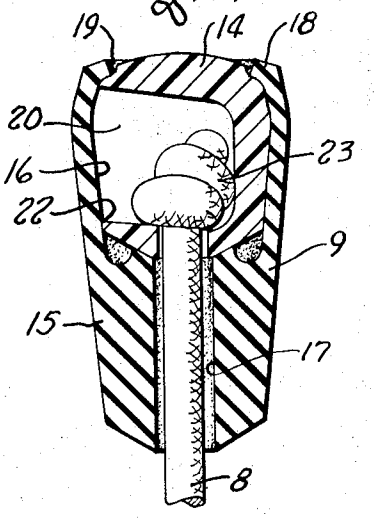


Fig. 6.

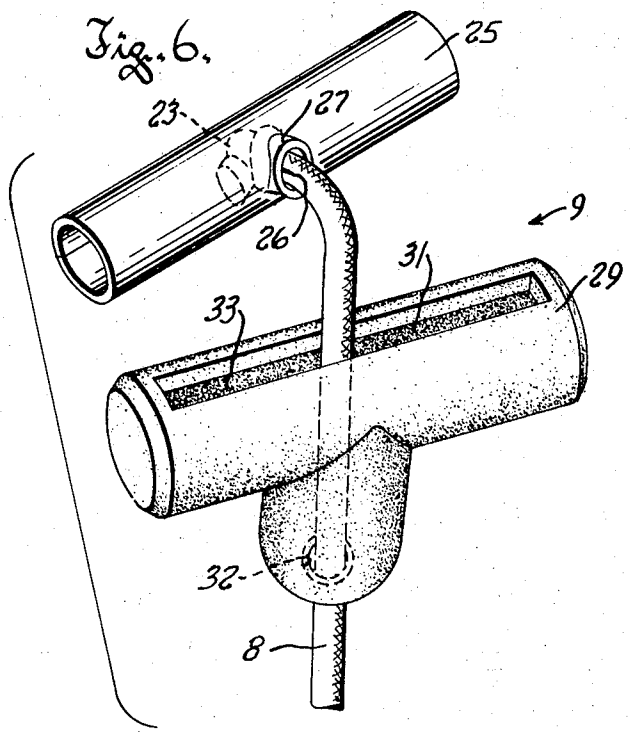
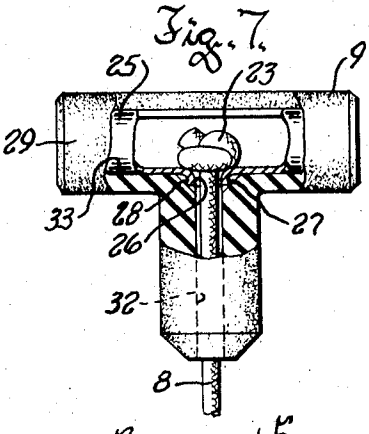


Fig. 7.



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HANDLE FOR PULL ROPE ENGINE STARTER

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Fig. 8.

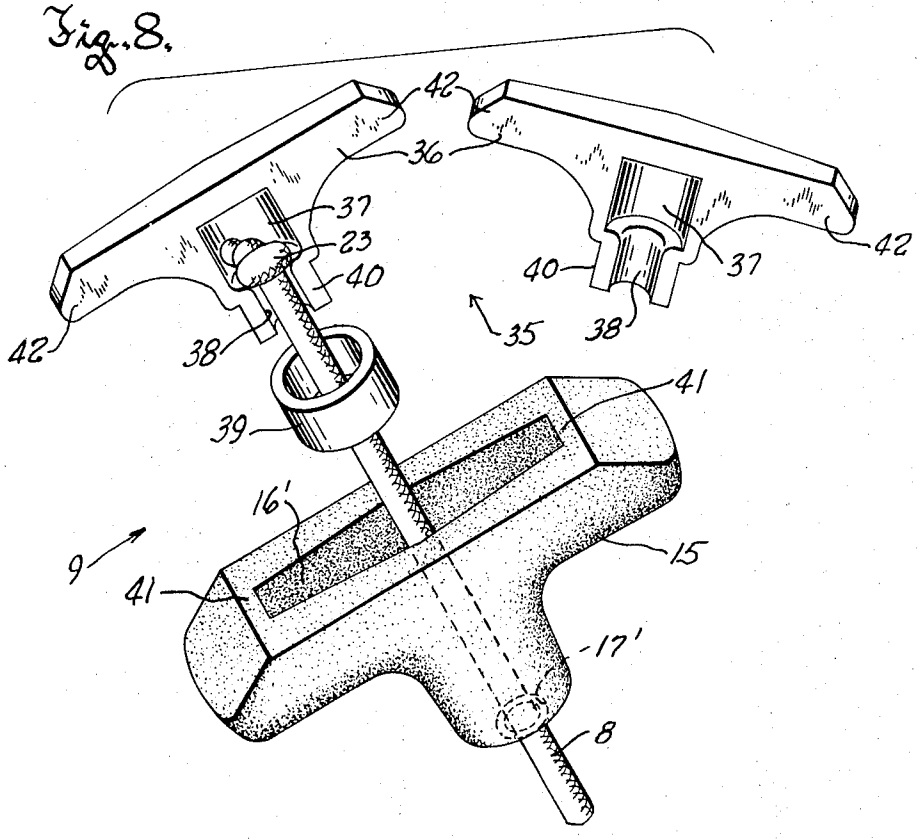
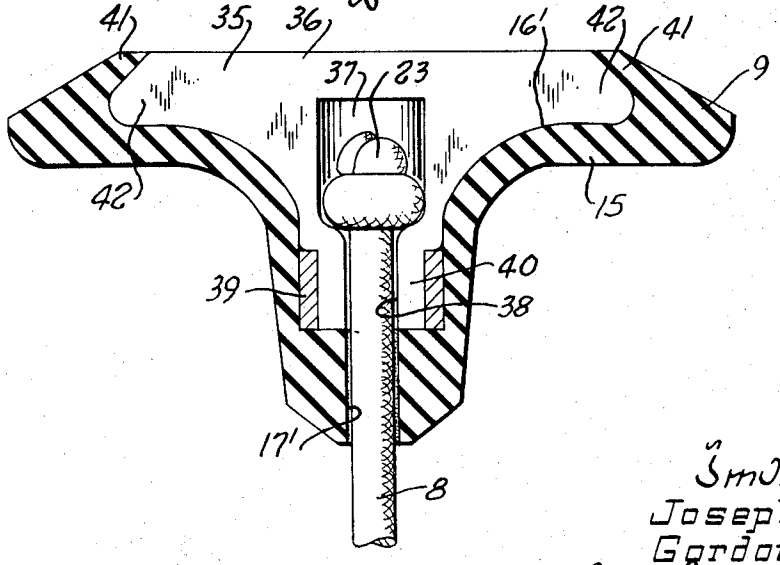


Fig. 9.



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3,572,307

HANDLE FOR PULL ROPE ENGINE STARTER

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Int. Cl. A47b 95/02
U.S. Cl. 123—185 5 Claims

ABSTRACT OF THE DISCLOSURE

A T-shaped handle attached to the pull rope of a rewind type engine starter comprises separably nested inner and outer sections, the latter being capable of deformation into a shape permitting it to be passed through a hole only large enough to accommodate the smaller rigid inner section when the sections are separated but still connected with the rope.

SUMMARY OF THE INVENTION

This invention relates broadly to starters for small internal combustion engines, and refers more particularly to the handle for the pull rope of a rewind type engine starter.

The invention resides in an improved handle for the pull rope of a rewind type engine starter comprising a pair of separably nested inner and outer sections, at least the outer one of which is T-shaped and has a cavity in its head portion to snugly receive the inner section, and a bore axially through its stem portion through which the rope is threaded and then attached to the inner section, such attachment being effected while the handle sections are disassembled.

The inner section is a rigid member with a recess therein of a size to accommodate a knot formed in the end portion of the rope. The rope enters this recess through an access opening just large enough to permit the rope to slide therethrough, and before the knot is formed in the rope, the rope projects from the recess through another access opening large enough to permit the knot to pass therethrough and be seated in the recess. When the handle sections are reassembled, the inner section and its connection with the rope are completely concealed within the outer section and the two sections are held against unintentional disassembly by the re-entrant shape of the cavity in which the inner section is received.

The outer T-shaped section is formed of rubber or similar material so that when the sections are disassembled, but while they are still connected to the rope, the outer section can be deformed into a shape permitting the same to be passed through a hole in a cowling covering the engine, which hole is only large enough to accommodate the smaller, rigid inner section.

The object and purpose of this invention is to provide a handle for the pull rope of a rewind type engine starter which enables an equipment manufacturer—as, for instance, a producer of lawn mowers and riding tractors—to install an engine equipped with a pull rope starter having the handle attached thereto, without necessitating detachment of the handle from the rope, despite the fact that the machine on which the engine is installed includes a cowling covering the top of the engine and having only a relatively small hole through which the rope is pulled.

With these observations and objects in mind, the manner in which the invention achieves its purpose will be appreciated from the following description and the accompanying drawings. This disclosure is intended merely to exemplify the invention. The invention is not limited to the particular structure or method disclosed, and changes

can be made therein which lie within the scope of the appended claims without departing from the invention.

The drawings illustrate several complete examples of the physical embodiment of the invention constructed according to the best modes so far devised for the practical application of the principles thereof, and in which:

FIG. 1 is a partial side view of a single cylinder internal combustion engine of the vertical shaft type, equipped with a pull rope rewind type starter, and illustrating the relationship between the starter, the handle of its pull rope, and a cowling covering the engine;

FIG. 2 is an exploded perspective view of the handle in its preferred embodiment, the adjacent portion of the starter from which the pull rope emerges, and the overlying section of the cowling, the handle being illustrated with its complementary inner and outer sections separated;

FIG. 3 is a side view of the parts shown in FIG. 2, illustrating the manner in which both sections of the handle can be passed through the hole in the cowling without detaching the handle from the pull rope;

FIG. 4 is a detail sectional view through the assembled handle and rope;

FIG. 5 is a cross sectional view through FIG. 4 on the plane of the line 5—5;

FIG. 6 is a perspective view of a handle of modified construction, illustrating the same with its complementary sections disassembled;

FIG. 7 is a view in side elevation and partially broken away, of the handle illustrated in FIG. 6, showing the same in its assembled condition;

FIG. 8 is an exploded perspective view of still another modified embodiment of this invention; and

FIG. 9 is a longitudinal sectional view through the handle of FIG. 8, illustrating the same in its assembled condition.

Referring now particularly to the accompanying drawings in which like numerals are applied to like parts throughout the several views, the numeral **5** designates generally a single cylinder internal combustion engine of the type commonly used to power lawn mowers and riding tractors. The engine is of the type in which the crankshaft **6** is vertical and projects downwardly from the underside of the engine.

The engine is started by means of a rewind type pull rope starter **7** which preferably is like the starter forming the subject matter of the pending application Ser. No. 705,100. As such, the pull rope **8** is retracted into the starter housing and wound upon a spool by spring energized mechanism (not shown) when the operator lets go of the handle **9** by which the rope is pulled to start the engine.

The rope emerges from the housing of the starter through a bore **10** in a post **11** that is an integral part of the starter housing. When the rope is retracted by the rewind mechanism of the starter, it is drawn down into the starter housing until the handle **9** seats upon the top of the post **11**.

For engine installations in which the top of the engine is unobstructed, the handle by which the starting rope is pulled can be of any design and construction; but where the engine powers equipment such as a riding tractor where—either for aesthetic reasons or safety purposes—the engine is covered by a shroud or cowling, as indicated at **12** in FIG. 1, a problem not heretofore encountered had to be solved. It is not feasible nor desirable for the engine manufacturer to omit the handle from the pull rope of its starter. Accordingly, the equipment manufacturer to whom the engines thus equipped are delivered, was faced with a rather awkward choice during installation of the engine. Either the handle had to be de-

tached from the pull rope and threaded through the hole in the cowling without allowing the rope to disappear into the starter mechanism—or some way had to be found of passing the handle through the hole in the cowling without disconnecting the handle from the rope, despite the fact that, as seen in FIG. 1, the hole **13** in the cowling through which the rope is pulled is too small to permit passage of the handle therethrough.

This invention makes the latter alternative completely feasible and possible.

To this end, the handle **9** comprises a pair of separably nested inner and outer sections **14** and **15**, the inner section to which the rope is attached being rigid and of a size and shape to pass through the hole **13** in the cowling, and the outer section—which encompasses the entire inner section and its connection to the rope when the sections are assembled—being formed of pliable rubber or the like. The pliability of the outer section allows it to be deformed into a shape permitting it to be passed through the hole in the cowling when the sections are separated, despite the fact that the hole in the cowling is only large enough to accommodate the smaller inner section and both sections remain connected with the rope. FIG. 3 illustrates how this is accomplished.

In the preferred embodiment of the invention illustrated in FIGS. 1 through 5, both sections of the handle are T-shaped, though the stem of the inner section is much shorter than that of the outer section. The outer section has a cavity **16** located primarily in its head portion but extending somewhat into its stem, and a bore **17** passing axially through the stem and opening into the cavity. The bore **17** is of a size to freely accommodate the rope.

The cavity **16** has a re-entrant shape so that its mouth is defined by an inwardly directed lip **18** around its entire perimeter which overlies the marginal edge portion of the inner section when the handle sections are assembled. Since it is preferred to have the top surfaces of the sections flush with one another, the inner section has a rabbet **19** in its outer edge to receive the lip **18**.

It is of course to be understood that the elastic pliability of the outer section permits the mouth of its recess to be stretched as needed during assembly and disassembly of the sections.

The inner section **14** has a recess **20** formed in its medial portion, with two access openings **21** and **22** leading thereto. The opening **21** passes axially through the stem portion of the inner section to align with and form a continuation of the bore **17** in the stem of the outer section.

The size of the opening **21** is just sufficient to permit the rope to pass therethrough so that a knot **23** formed in the end of the rope and seated in the recess **20** cannot be pulled through the opening **21**. The knot is formed in the rope after the rope has been pushed through the opening **21** into the recess **20** and out of the second access opening **22** which opens to one side of the inner section and is large enough to permit the formed knot to be passed therethrough and into the recess. When thus attached to the rope the inner section is inserted into the cavity in the outer section, whereupon the mouth of the access opening **22** is covered by the adjacent wall of the cavity with the result that there are no appearance-detracting breaks in the exterior surfaces of the handle.

In the modified embodiment of the invention shown in FIGS. 6 and 7, the inner section **25** of the handle is simply a length of metal tubing with a hole **26** formed in the wall thereof midway between its ends. The edge portion of the hole is flared outwardly to form a short stem **27** which gives the inner section at least a semblance of a T-shaped formation and, by its entry into a pocket **28** in the interior of the outer section **29**, holds the cylindrical inner section against turning. The hole **26**, as will be evident from FIGS. 6 and 7, is of a size to rather snugly receive the rope which is passed therethrough and out of one end of the tubular inner section preparatory to having the knot **23** formed in the rope.

The T-shaped outer section **29** is again formed of pliable rubber or the like so as to be deformable into a shape permitting it to be passed through the hole **13** in the cowling. A cavity **31** is formed in its head portion with two access openings **32** and **33** leading thereto. The cavity **31** is of a size and shape corresponding to that of the tubular inner section, and the opening **33** is substantially an elongated gap in the top surface of the handle of such size as to permit the tubular inner section to be forced therethrough. When the sections are assembled, the opening **32** which extends axially through the stem of the handle and leads to the pocket **28**, accommodates the rope.

The handle shown in FIGS. 8 and 9 is quite similar in appearance to the preferred form of the invention illustrated in FIGS. 1 through 5, but differs therefrom in the manner in which the inner section **35** is constructed and attached to the rope. In this case, the inner section consists of two complementary halves which are mirror images of one another with flat faces **36** that meet on the median plane of the handle. Each half has a semicylindrical pocket **37** and a half bore **38** opening to its face **36**. Together the pockets **37** form a knot-receiving recess comparable to the recess **16** of the preferred form of the invention, and the half bores **38** define an entrance into the recess through which the rope passes.

A metal ring **39** encircles a reduced neck **40** on the stem of the T-shaped inner section formed by the face-to-face engagement of the half sections, to hold the same together preparatory to assembly of the handle sections. It is to be understood that in effecting attachment of the rope to the handle, the rope must be passed through the ring **39** after it has been threaded through the bore **17'** in the stem of the outer section, before its knotted end is confined in the recess formed by the pockets **37**.

After the handle sections are assembled they are held against accidental disassembly by the re-entrant shape of the ends of the cavity **16'** formed in the outer section which results in the end portions **41** of the outer section overlying the correspondingly shaped ends **42** of the inner section.

From the foregoing description taken together with the accompanying drawings, it will be readily seen that in each of the illustrated and described embodiments of the invention, the objective thereof is achieved. In every case, the disassembly of the handle sections enables the entire handle to be passed through a relatively small hole in the shroud or cowling by which the implement manufacturer covers the engine, without entailing disconnection of the handle from the rope. It will also be evident that this invention provides a sturdy good looking pull rope handle.

What is claimed as our invention is:

1. In combination with an internal combustion engine having a pull-rope rewind type starter contained within a housing that is mounted on the engine and has an upwardly opening rope-guiding port through which the starting rope enters and leaves the starter housing, a cowling securable over the engine with a part thereof closely adjacent to the mouth of said rope-guiding port, said cowling having a hole in line with said port when the cowling is secured in place, and a T-shaped handle attached to the rope, the stem of the T having a girth slightly smaller than the hole in the cowling so as to be receivable therein and the end of the stem seating on the mouth of said rope-guiding port when the rope is retracted to limit retraction of the rope into the starter housing and locate the head of the T-shaped handle a fixed distance above the cowling, said handle comprising:

(A) an outer T-shaped section having

(1) a head with oppositely projecting wings and a cavity, the mouth of which opens to the top surface of the head, and

(2) a stem with a bore extending axially there-

through with its inner end opening into said cavity;

(B) inwardly directed lip means on the head of the outer section defining at least a part of the mouth of said cavity;

(C) an inner section of a size to just pass through said hole in the cowling and further being of such size and shape as to fit said cavity with a part thereof lying under said lip means when the sections are assembled,

the outer section being formed of resiliently yieldable material so that the mouth of its cavity can be stretched to enable assembly and disassembly of the sections; and

(D) means on the inner section for securing the end of the rope thereto when the sections are disassembled, so that the rope after being threaded through the bore and cavity of the outer section while the sections are disassembled can be attached to the handle and remain so attached whether the handle sections are assembled or not, the yieldability of the outer section enabling the oppositely projecting wings of its head to be folded up into contiguity so that the outer section, despite its being larger than the inner section can be passed through said hole in the cowling which is only slightly larger than necessary to permit passage therethrough of the inner section, so that the entire handle without detachment from the rope, can be passed through said hole during placement and securement of the cowling in position over the engine.

2. The handle of claim **1**, wherein the inner section is formed of stiff not readily deformable material, and wherein the means for securing the end of the rope to the inner section comprises a recess in the inner section with spaced access openings leading thereto, one of which is a round hole that aligns with and opens to the inner end of the bore in the stem of the outer section to provide

for passage of the rope from said bore into the recess, and another of which opens to a surface of the inner section which is covered when the sections are assembled but uncovered when the sections are disassembled, so that a knot formed in the end portion of the rope can be inserted therethrough into said recess for confinement therein.

3. The handle of claim **2**, wherein the inner section comprises an open ended tube with a hole through the wall thereof medially of its ends, the interior of the tube providing the recess of the inner section, the hole in the wall thereof providing said round hole through which the rope enters the recess, and one of the open ends of the tube providing the access opening through which the knot is inserted.

4. The handle of claim **2**, wherein said inner section comprises a pair of mating halves, the interface of which bisects the recess and its access opening which aligns with the bore in the stem of the outer section, and wherein the access through which the knotted end of the rope is inserted into the recess is the space between said halves when they are separated.

5. The handle of claim **4**, further characterized by a T-shaped formation for the inner section, and a ring removably telescoped onto the stem of the T to hold the mating halves of the inner section together.

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U.S. Cl. X.R.

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