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NON-ROTATABLE RETAINING RING

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2 Sheets-Sheet 2

FIG. 3.

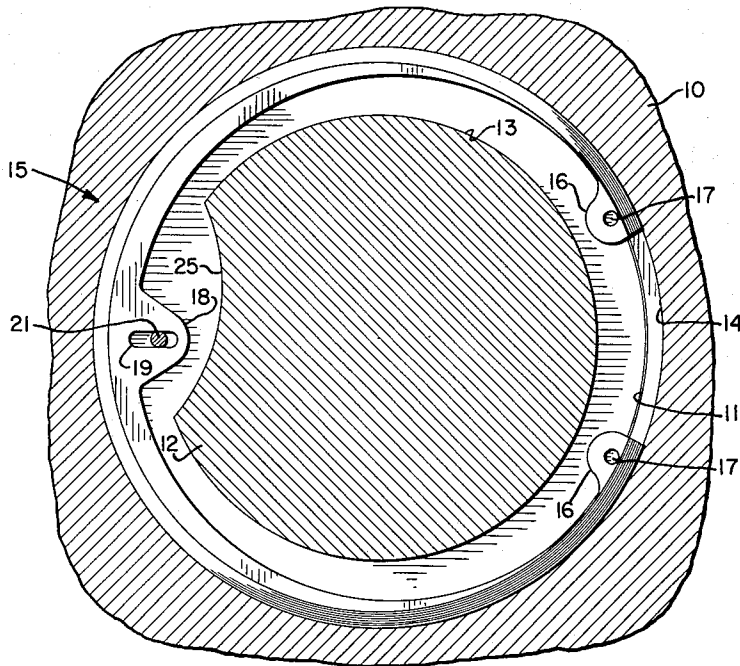
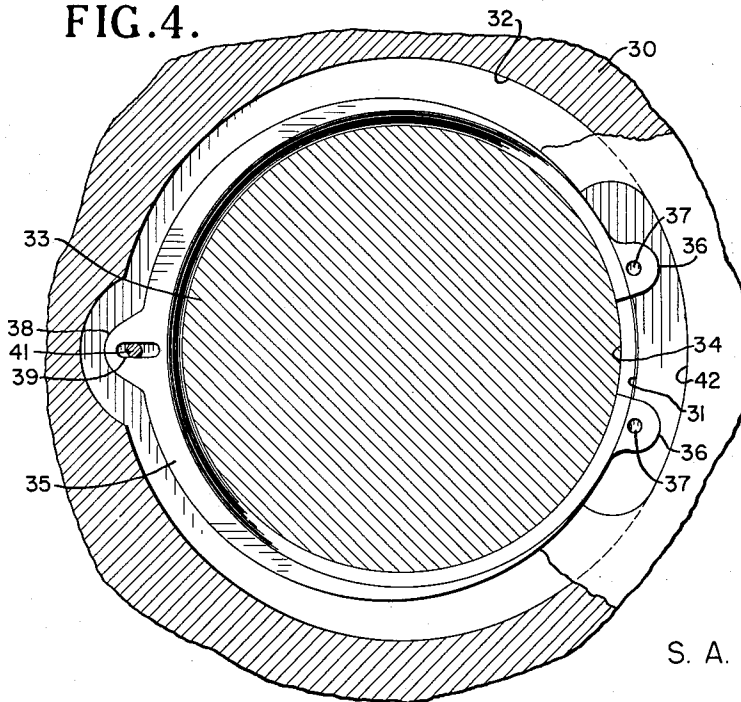


FIG. 4.



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NON-ROTATABLE RETAINING RING

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4 Claims. (Cl. 287—119)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to retaining devices and more particularly to a split retaining ring for retaining a cylindrical device in the handhole of a casing and having apparatus for preventing the rotation of the ring with respect to a slot through which the perforate ends of the ring are engaged by an expanding or contracting tool during installation or removal of the device.

Heretofore retaining rings have been prone to rotation with respect to the aforementioned slot, such rotation being caused by vibration during shipment or by accidental displacement during installation or attempted removal of the device, the ends of the ring moving to an inaccessible position with respect to the slot and cause serious delay particularly in removal of the device.

In the device of the present invention such difficulty is avoided by securing the snap retaining ring against rotation without interfering with the effective securing operation of the ring.

An object of the present invention is to provide a new and improved snap retaining ring which is maintained against rotation thus to facilitate installation and removal of a retainable device.

Another object is to provide new and improved apparatus for retaining a device within a receiving bore wherein a retaining ring is employed having features to facilitate accessibility of a compressing or expanding tool thereto.

Still another object is to provide a novel split retaining ring for retaining a cylindrical device within the handhole of a casing and wherein the ring is prevented from rotating with respect to an access slot for an expanding or contracting tool without interfering with the normal retaining feature of the ring.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a plan view of the device of the present invention installed in the handhole of a suitable casing;

Fig. 2 is a sectional view taken along line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2;

Fig. 4 is a view similar to Fig. 3 and showing a slight modification of the invention.

Referring more particularly to the drawings wherein like numerals indicate like parts throughout the several views, a casing is indicated at 10, and has formed therein a handhole 11. A cylindrical device 12 is shown mounted in handhole 11. Device 12, for example, may be an exploder mechanism and casing 10 may be the casing of a torpedo in which the exploder mechanism is mounted. A circumferential groove 13 is formed in the periphery

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of device 12, while a matching groove 14 is formed in handhole 11.

An expanding split retaining ring 15 is mounted in groove 13 and is adapted to expand into groove 14, thus retaining device 12 in handhole 11. The ends of ring 15 are provided with inwardly extending perforated ears 16, the holes 17 therethrough being for the reception of a ring compressing tool (not shown). On the ring 15, substantially equidistant from the ears 16 is an inwardly extending lug portion 18 having an elongated slot 19 therethrough. A screw-threaded pin 21 is threaded into bore 22 in device 12 as clearly shown in Fig. 2 of the drawings. Pin 21 has a reduced diameter extension 23 which extends through elongated slot 19, thus preventing rotation of ring 15 in groove 13, the purpose of which will be described more fully hereinafter.

A slot 24 is formed in one side of device 12 and extends from groove 13 to the exterior of device 12 thus affording a clearance for insertion and operation of the ring compressing tool, the tool being of a variety well-known in the art and having a pair of fingers for insertion in the holes 17. Groove 13 is provided with a deep cut portion 25 in order that lug portion 18 have sufficient clearance for movement inwardly on pin 21 when the ring 15 is moved from a locking to a disengaged position.

As will be clear from an inspection of Fig. 1 of the drawings, pin 21 maintains ears 16 against rotation in the grooves 13 and 14 and in registry with slot 24 at all times thus the ears may be engaged by the compression tool when it is desired to remove the device 12 from casing 10 or to install the device in the casing.

A slight modification of the invention is disclosed in Fig. 4 wherein a casing is indicated at 30 which is provided with a handhole 31 having a groove 32 therein. A cylindrical device 33 is mounted in the handhole 31 and is provided with a groove 34 in registry with groove 32. In the present instance, a contracting retaining ring 35 is fixed in groove 32 of the casing 30 and is adapted to contract into groove 34 of the device 33. The foregoing is in contradistinction to the preferred form of Fig. 1 wherein the ring is fixed in the groove of the device 12.

Ring 35 is provided with outwardly extending ears 36 at the ends thereof, each ear being provided with a hole 37 for the reception of an expanding tool (not shown) for expanding the ring into groove 32 during the removal or installation of the device 33. In this form of the invention ring 35 is provided with an outwardly extending lug portion 38 having an elongated slot 39 formed therein. A pin 41 similar to threaded pin 21 of the preferred form is threaded in a bore in casing 30 and extends through slot 39 to prevent rotation of the ring 35 with respect to a slot 42 formed in casing 30 adjacent the handhole 31 and providing communication with the groove 32 and the ears 36 of ring 35. It will thus be seen that in both forms of the invention the ring is prevented from rotating with respect to the slot communicating with the ears at the ends of the ring, therefore the ring may be readily compressed or expanded, as the case may be, with an appropriate tool in order to remove or install the device in the handhole of the casing.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. Apparatus for facilitating the installation and removal of a cylindrical member retained in the bore of a casing member, said cylindrical member and said bore

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having formed therein circumferential grooves individual thereto and in mutual registration and comprising in combination, a split retaining ring having spaced perforate ends, said ring being received by said grooves, a lug formed on said ring and having a radially elongated slot formed therein, a pin freely received in said elongated slot and fixed against movement relative to one of said members, said one of said members having a slot communicating from the groove thereof to the exterior for the insertion of a tool for moving the ring out of one of the grooves thereby to free the cylindrical member for removal from the bore, said pin preventing movement of said perforate ends out of registry with said last-named slot.

2. Apparatus as defined in claim 1, further characterized in that said split retaining ring is normally contracted and said lug extends outwardly, and said pin is fixed in the casing member.

3. Apparatus for facilitating the installation and removal of a cylindrical member retained in the bore of a second member comprising, in combination, a normally expanded split retaining ring having spaced perforate ends, said cylindrical member and said bore having formed therein circumferential grooves individual thereto and in mutual registration for receiving said ring, a lug extending inwardly on said ring and having an elongated radially disposed slot formed therein for permitting expansion and contraction of the ring, the groove in said cylindrical member having an access slot communicating with the exterior for insertion of a ring compressing tool therein to engage the perforate ends, and a pin fixed in the cylindrical member and extending through said ra-

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dially disposed slot formed in the lug to prevent rotation of the ring thereby to maintain the ends of the ring in registry with said access slot.

4. Apparatus for facilitating the installation and removal of a first member within a bore in a second member, comprising, in combination, a split retaining ring having a pair of mutually spaced ends thereon, each of said ends being provided with an ear having an opening formed therein for receiving a ring expanding and contracting tool, said members having circumferential grooves individual thereto and in mutual registration to receive said ring, one of said grooves having an access slot communicating with the exterior and in alignment with said ears for allowing said tool to be inserted in said openings, a lug on said ring disposed substantially midway of the ends of said ring, said lug having an elongated radially disposed aperture formed therein for allowing expansion and contraction of the ring by the tool, and pin means fixed to one of said members, said pin means being disposed within said aperture for preventing rotation of the ring in the grooves.

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