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Heckrotte, Sr. et al.

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[54] **ELECTRIC METER LOCK RING**

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[52] **U.S. Cl.** ..... **70/164**, 24/280, 70/229, 215/275, 220/55 AN, 285/410, 292/256.67, 403/338

[51] **Int. Cl.** **G01r 11/04**, F16l 21/06

[58] **Field of Search** ..... 24/280; 70/18, 19, 164, 70/166, 229, 232, 260; 220/55 AN; 285/39, 80, 366, 367, 410, 411; 292/256.67, 327; 339/82; 403/313, 338; 215/275

[56] **References Cited**

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934,760	9/1909	Roy et al.	339/82
2,434,878	1/1948	Williams	285/129
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3,172,282	3/1965	Heckrotte	70/178
3,259,414	7/1966	Rothert	292/256.67

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[57] **ABSTRACT**

An electric meter lock ring having an arcuate band provided with a pair of opposed ends arranged forming a split ring. A locking arrangement associated with the opposed band ends has a locking member, actuated by a cammed-ball key member, mounted on one end of the band and arranged for selectively engaging a locking member disposed on the other band end and locking the pair of opposed band ends together.

3 Claims, 3 Drawing Figures

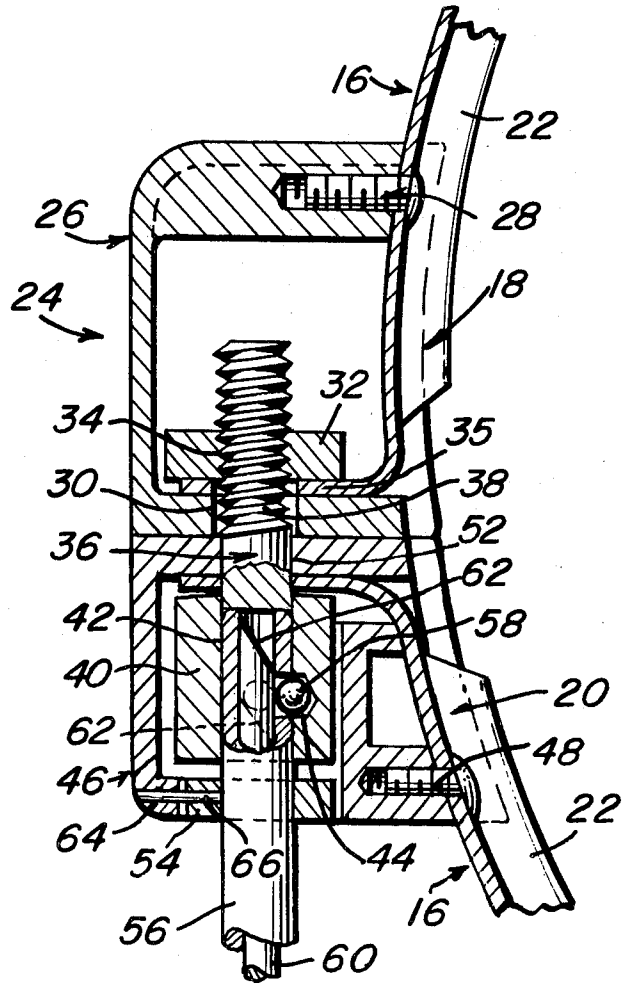


Fig. 1

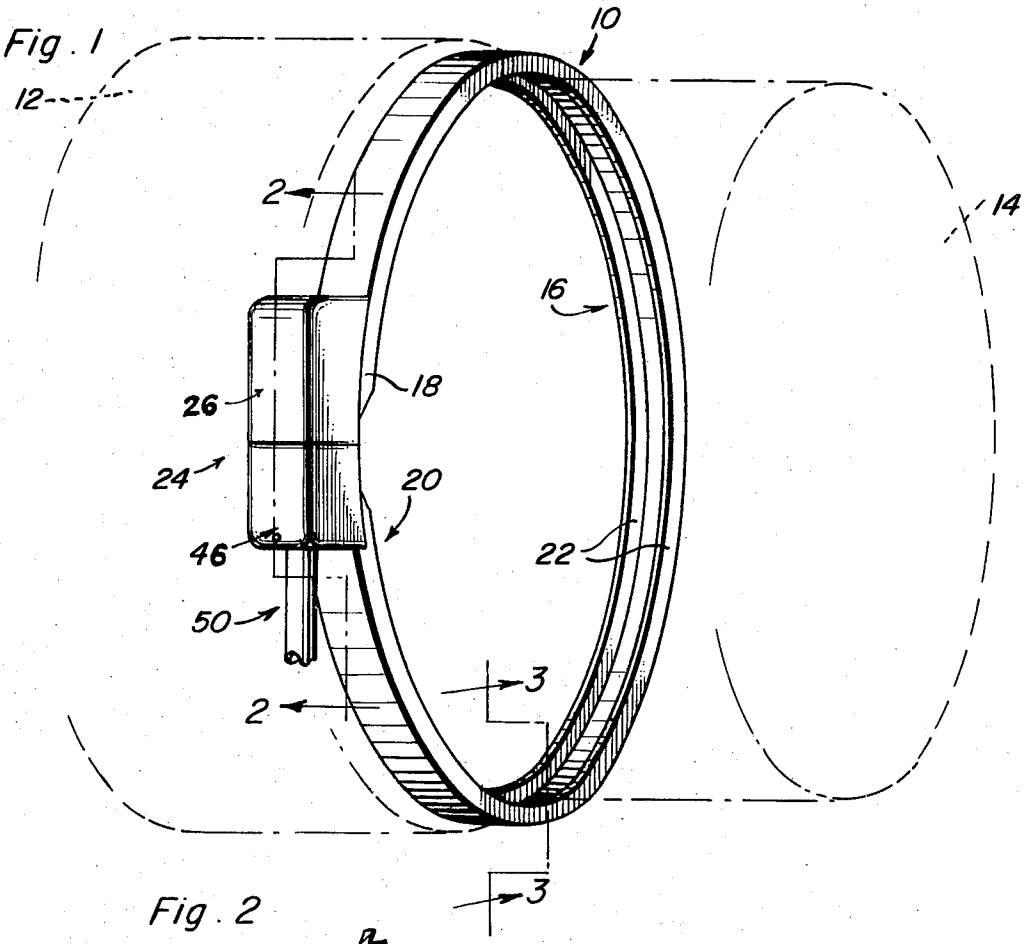


Fig. 2

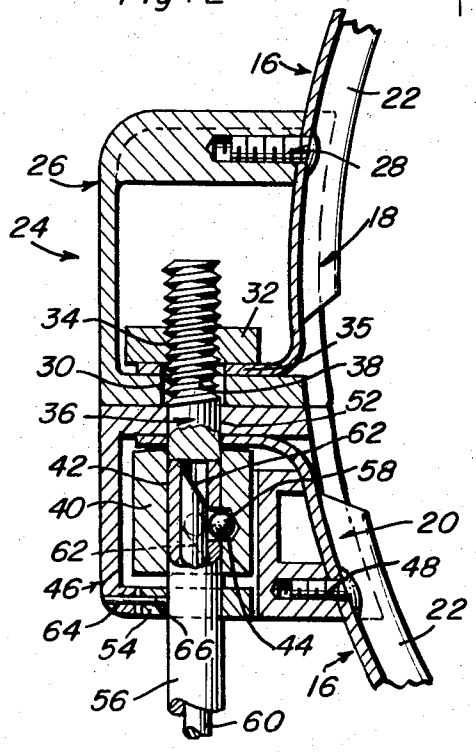
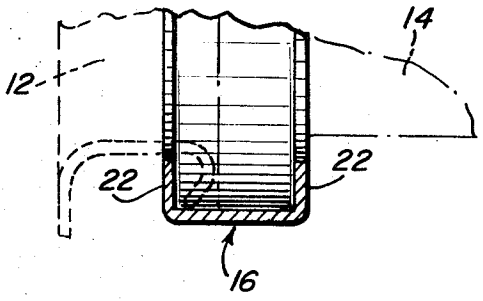


Fig. 3



ELECTRIC METER LOCK RING

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to a lock ring, and particularly to a key-operated electric meter lock ring.

2. Description of the Prior Art

It has long been sought to produce an electric meter lock ring that is essentially tamper-free. Such lock rings are desirable for reasons of security and safety, since tampering of an electric meter by untrained personnel could not only result in a loss of revenue to a supplier of electric power, but electrocution of the person or persons as well.

Electric meter lock rings are known that are locked by a threaded member mounted on an end of a split ring and arranged for selectively engaging a threaded bore mounted on the other end of the ring. See, for example, U.S. Pat. No. 2,231,737, issued Feb. 11, 1941, to A. R. Rutter. The securing of such lock mechanisms, however, is usually achieved by using a standard sealing device, and the like. These seals have the disadvantage that while one may determine if the seal has been removed, it is a relatively simple matter for unauthorized persons to remove the seal and tamper with the meter without being detected.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an electric meter lock ring having a simple, reliable, and secure locking arrangement.

It is yet another object of the present invention to provide an electric meter lock ring which is actuated by a specially constructed key member.

These and other objects are achieved according to the present invention by providing an electric meter lock ring having: an arcuate band provided with a pair of opposed ends arranged forming a split ring; and a key-operated locking arrangement disposed at the opposed ends for selectively locking same together

A preferred embodiment of a locking arrangement according to the present invention has a locking member arranged on one of the opposed ends of the split ring, and a locking element arranged on the other of the opposed ends for selectively engaging the locking member and locking together the opposed ends to secure the locking ring.

Advantageously, the locking element is provided with an enlarged head having a cavity and an aperture in the enlarged head communicating with the cavity for receiving a key element having a cammed-ball captively held in a sleeve of the key member and arranged to enter the aperture of the enlarged head by a movement of a plunger arranged within the sleeve in a direction parallel to the axis of rotation of the plunger to force the ball into the aperture and rotatably connect the key member or element to the locking element.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary, perspective view showing an electric meter lock ring according to the present invention.

FIG. 2 is a fragmentary, sectional view taken generally along the line 2—2 of FIG. 1.

FIG. 3 is a fragmentary, sectional view taken generally along the line 3—3 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now more specifically to FIGS. 1 and 3 of the drawings, an electric meter lock ring **10** according to the present invention is shown connecting together portions **12** and **14** of a conventional electric meter housing. Portions **12** and **14** may be, for example, the usual standard base and glass cover of the conventional electric meters in common usage around the United States. Lock ring **10** is formed by an arcuate band **16** having a pair of opposed ends **18** and **20** arranged forming a split ring. Bank **16** is provided with a pair of parallel, codirectionally extending flanges **22** arranged extending along the edges of band **16** between the ends **18** and **20.** A locking arrangement **24** is arranged at ends **18** and **20** for locking same together about, for example, electric meter housing portions **12** and **14.**

Referring now to FIG. 2 of the drawings, locking arrangement **24** includes a first housing **26** mounted on end **18** as by a conventional sheet metal screw **28,** and the like. An opening **30** is provided in one wall of housing **26** for a purpose to be set out below. A locking member in the form of a nut **32** is arranged on end **18** and within housing **26,** and is provided with a threaded bore **34** arrangeable in screw-threaded mating engagement with a locking member to be described below. Nut **32** may be either affixed on end **18** as by being attached in a suitable, known manner, to the flange portion **35** thereof or may be movably mounted within housing **26** so as to float with respect thereto. Advantageously, a guide (not shown) is provided for limiting the movement of nut **32** when movably mounted in housing **26.** For example, flange **35** of end **18** of band **16** could be arranged spaced from the wall of housing **26** in which is provided opening **30** so that nut **32** is arranged between that wall and flange **35.**

Locking arrangement **24** further includes a locking element **36** having a threaded shank portion **38** and an enlarged head **40** provided with a cavity **42** and an aperture **44** communicating with cavity **42.** This locking element **36** is arranged in a second housing **46** attached to end **20** as by a conventional screw **48** in a manner similar to the attachment of housing **26** by screw **28.** As can be readily appreciated from FIG. **2,** housing **46** forms a chamber in which locking element **36** is arranged. A key element **50,** similar to the key element set out in more detail in my U.S. Pat. No. 3,172,282, issued Mar. 9, 1965, is provided for actuating locking element **36,** which is arranged with its threaded shank portion **38** extending out of housing **46** through an opening **52** provided therein so as to pass selectively through opening **30** and into engagement with bore **34** of nut **32.** A bushing **54** is arranged in an opening provided in a wall of housing **46** arranged opposed to the wall in which is provided opening **52.** The bore of this bushing **54** permits a sleeve **56** of key element **50** to pass into the chamber of housing **46** and, simulta-

neously, into cavity **42.** This sleeve **56** is dimensioned to fit closely in cavity **42,** and is provided with a hole in which is captively held a ball **58** arranged and dimensioned to enter aperture **44** by movement of a longitudinal plunger **60** parallel to the longitudinal axis thereof. This plunger **60** defines a camming surface **62** which cams ball **58** into aperture **44** when sleeve **56** is arranged, as shown in FIG. **2,** in cavity **42** for rotatably connecting key element **50** to locking element **36.** This is achieved by threaded shank portion **38** mating with nut **32** so as to threadedly engage bore **34** when the associated band opposed ends **18** and **20** are locked together, whereby shank portion **38** may enter bore **34** and lock together these ends **18** and **20.** In operation, sleeve **56** of key element **50** is inserted through the bore in bushing **54,** that may be retained in its associated opening in housing **46** as by splines and the like, and into cavity **42.** Plunger **58** is now moved parallel to its longitudinal axis in the direction to insert it further into cavity **42.** This movement will move ball **60** into aperture **44** and cause key element **50** and locking element **36** to be rotatably connected together. Rotation of sleeve **56** in the appropriate direction, dependent upon the direction of the screw threads, will cause threaded shank portion **38** to mate with nut **32** and cause ends **18** and **20** to be locked together. Reverse rotation of sleeve **56** will unthread shank portion **38** and nut **32** and unlock ends **18** and **20.** Key element **50** may be withdrawn from housing **46** by moving plunger **60** along its longitudinal axis in the direction away from housing **46** and cavity **42** so as to permit ball **58** to move within sleeve **56** and release same from enlarged head **40** of locking element **36.** once key element **56** is removed from housing **46,** it will be readily appreciated from the above description and from the drawings that locking arrangement **24,** if it has been left in the position shown in FIG. **2** of the drawings wherein housings **26** and **46** and their associated ends **18** and **20** are locked together, is virtually tamper-free since the relatively small, semi-hemispherical construction of aperture **44** would make it very difficult to project a, for example, piece of wire, and the like, into cavity **42** and aperture **44** to effect a rotation of locking element **36** to disengage the shank portion **38** of same from nut **32** and unlock ring **10.** At the same time, a person equipped with a key element **50** may quickly, easily, and conveniently disengage and engage shank portion **38** with nut **32** as desired. Thus, a lock ring **10** according to the present invention provides a simple, reliable, convenient, and secure locking arrangement.

Further, locking arrangement **24** according to the present invention provides a pair of housings **26** and **46** which are selectively held together by a rotatable locking device completely enclosed within the two aligned recesses or chambers in housings **26** and **46,** and which is made and broken by key element **50.** It is to be understood, of course, that band **16** locks portions **12** and **14** of an electric meter housing in position adjacent one another by being tightened around these portions **12** and **14** when threaded shank portion **38** is threaded into bore **34** of nut **32.**

A seal hole **64** may be provided in the front portion of housing **46** and arranged passing through the bushing **54** for receiving a suitable retaining element and protecting bushing **54** against unauthorized removal. A, for example, pin **66** may be used as the retaining element, and sealed in hole **64** in a conventional manner.

Alternatively to a one piece ring **16,** a ring (not shown) may be used that has two pieces hinged in a conventional manner at, for example, a point **180** degrees from the center of locking arrangement **24.** A, for example, conventional leaf and pin hinge (not shown) may be employed for this purpose

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. An electric meter lock ring, comprising, in combination:

a. an arcuate band having a pair of opposed ends arranged forming a split ring, the arcuate band being provided with parallel, codirectionally extending flanges arranged extending along the band between the opposed ends; and

b. means arranged at the opposed ends for locking same together, the means for locking including a locking member arranged on one of the opposed ends and means arranged on the other of the opposed ends for selectively engaging the locking member and locking together the opposed ends, the means for engaging including a locking element and an associated key element, a threaded shank portion on said locking element, the locking element having an enlarged head provided with a cavity and an aperture in the enlarged head communicating with the cavity; the key element including a sleeve dimensioned to fit closely in the cavity, and being provided with a ball captively held in the sleeve and arranged to enter the aperture by movement of a longitudinal plunger slidably arranged within the sleeve in a direction parallel to the longitudinal axis of the plunger, the plunger defining a camming surface arranged for camming the ball into the aperture and rotatably connecting the key element to the locking element when the sleeve is arranged in the cavity, and a bore provided in the locking member and arranged to mate with the shank portion when the arcuate band opposed ends are locked together, whereby the shank portion may enter the bore and lock together the arcuate band opposed ends, the means for locking further including a first housing mounted on a one end of the opposed ends, and a second housing mounted on the other end of the opposed ends, the locking member being arranged within the first housing and the means for engaging being arranged within the second housing, a bushing arranged in an opening provided in a wall of the second housing spaced farthest from the one end, the bushing provided with a bore arranged for receiving the key element sleeve, and seal means for protecting the bushing against unauthorized removal.

2. A structure as defined in claim **1,** wherein the locking member is a nut affixed on the one of the opposed ends.

3. A structure as defined in claim **1,** wherein the locking member is a nut movably mounted on one of the first and second housings.

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