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Lisk

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[54] **INSULATING RECEPTACLE WITH TEST POINT**

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[52] **U.S. Cl.** ..... **339/59 R,** 339/108 R, 339/143 C

[51] **Int. Cl.** **H01r 11/18**

[58] **Field of Search** ..... 339/59, 60, 36, 108 R, 339/108 TP, 101, 143 C, 198 J

[56] **References Cited**

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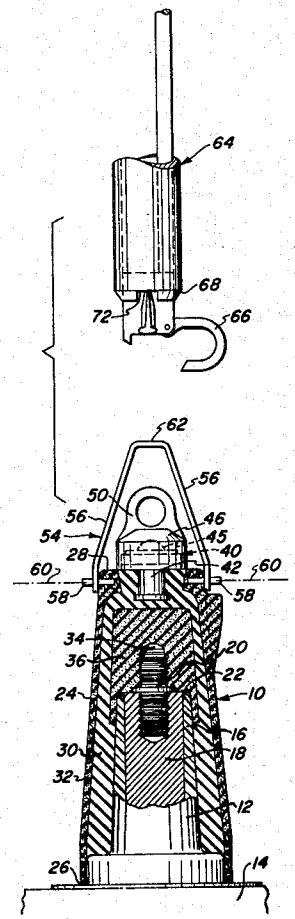
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[57] **ABSTRACT**

A receptacle in the form of a dummy receptacle for insulating, shielding and providing a watertight seal at an open bushing, the receptacle being provided with a capped test point and a bail which straddles the test point, the bail and the test point cap being so located relative to one another as to be gripped simultaneously with a hot-stick for removal of the cap and exposure of the test point and for installation and removal of the receptacle.

10 Claims, 3 Drawing Figures



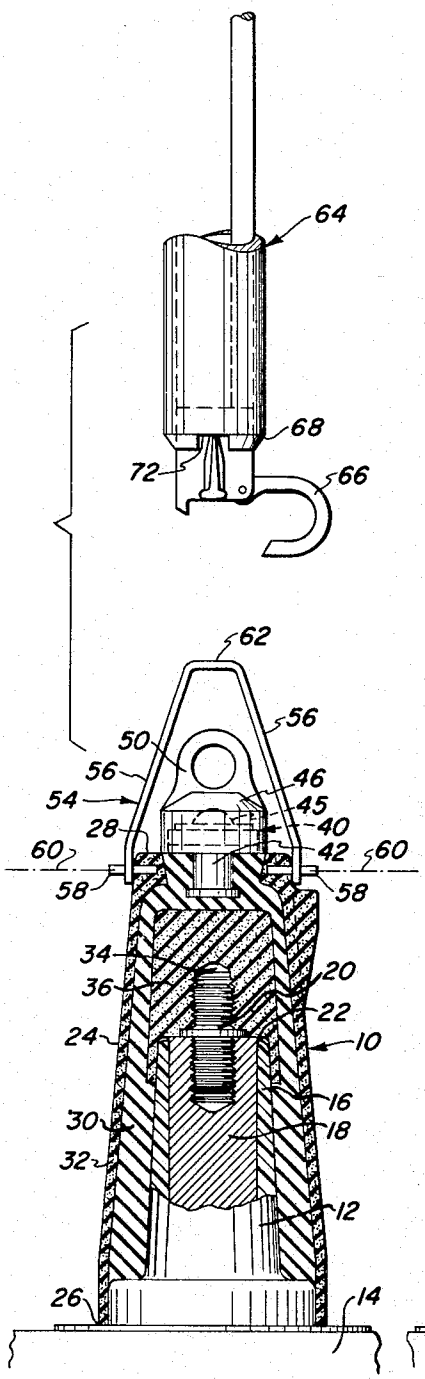


FIG. 1

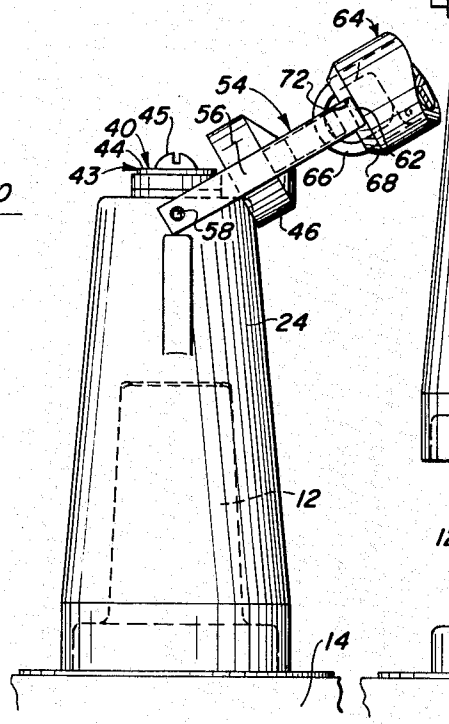


FIG. 2

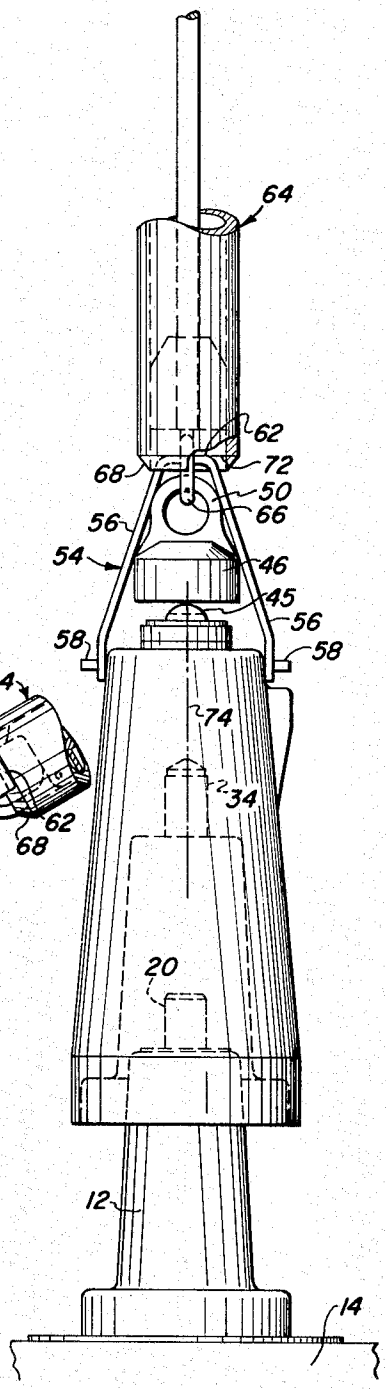


FIG. 3

INSULATING RECEPTACLE WITH TEST POINT

The present invention relates generally to electrical power distribution systems and pertains, more specifically, to an insulating receptacle which can be installed upon a high voltage bushing for insulating, shielding and providing a water-tight seal at the bushing and which is provided with a test point for determining whether or not the bushing is active.

Underground electrical power distribution systems are becoming more prevalent in industrial, commercial and residential areas. As such systems become more widespread, various devices are being developed to facilitate the installation, use and maintenance of these systems. Among these devices are receptacles such as elbows and other insulated components constructed for engagement with the terminals of electrical apparatus employed in electrical power distribution systems. One device which is simple and is widely used in such systems is an insulating cover, known as a dummy receptacle, which is employed to cap or cover an unused terminal, such as a high voltage bushing found at a terminal of a power distribution transformer or other apparatus. When no connection is to be made to a specific terminal, or bushing, a dummy receptacle is installed over the bushing, in place of an actual receptacle, such as an elbow or another connector, to cover what otherwise would be an exposed terminal and thereby insulate, shield and seal the terminal to eliminate possible hazards. In the interest of safety, it is necessary to determine that the bushing is de-energized before the dummy receptacle is removed. Even after such a determination has been made, it is desirable to manipulate the dummy receptacle from a safe distance using an insulating tool, called a "hot-stick."

It is therefore an object of the invention to provide a receptacle having a test point, or voltage detection point, which is ordinarily capped, for safety, but which can be uncapped and exposed for test purposes with ease through the use of a conventional hot-stick.

Another object of the invention is to provide an insulating cover, known as a dummy receptacle, for an open bushing, which dummy receptacle is manipulated readily with a hot-stick.

Still another object of the invention is to provide a method by which a receptacle such as a dummy receptacle easily is installed or removed from an apparatus bushing using a conventional hot-stick.

A further object of the invention is to provide a receptacle having a normally enclosed test point which can be exposed for test purposes utilizing a method which calls for minimum manipulation of a conventional hot-stick.

A still further object of the invention is to provide a receptacle having a normally enclosed test point, the receptacle being constructed for ease of exposure of the test point and subsequent removal of the receptacle from an apparatus bushing with a method employing minimal manipulation of a conventional hot-stick.

Another object of the invention is to provide a receptacle which is simple in construction, economical to manufacture and inexpensive to use.

The above objects, as well as still further objects and advantages, are attained by the invention which may be described briefly as providing, in a receptacle for installation on a high voltage bushing, the receptacle having a longitudinally extending body, a bail, a test point and a test point cap covering the test point, which receptacle is installed and removed by means of a hot-stick having a hook at one end thereof, the improvement comprising laterally extending pivot means affixed to the body and the bail such that the bail may be moved about a lateral axis provided by the pivot means, the test point cap having a hook-receiving means positioned relative to the bail such that the hook-receiving means and the bail will be captured simultaneously by the hot-stick hook to thereby enable the test point cap to be removed and pivoted away from the test point to permit an electrical measurement to be made at the test point.

The invention will be more fully understood, while still further objects and advantages thereof will become apparent, in the following detailed description of an embodiment of the invention illustrated in the accompanying drawing, in which:

FIG. **1** is a front elevational view, mostly cut away, of a receptacle constructed in accordance with the invention, installed upon an apparatus bushing and about to be engaged by a conventional hot-stick;

FIG. **2** is a side elevational view of the receptacle, now engaged by the hot-stick, and showing how the test point thereof is exposed for test purposes; and

FIG. **3** is a front elevational view of the receptacle as it is being removed from an apparatus bushing.

Referring now to the drawing, and especially to FIG. **1** thereof, a receptacle constructed in accordance with the invention is illustrated in the form of a dummy receptacle **10** and is seen to be installed upon a high voltage terminal shown in the form of an apparatus bushing **12** projecting upwardly from the outer casing of the apparatus **14.**

Apparatus bushing **12** has an outer shell **16** of dielectric material within which there is a conductive element **18** connected, through an internal connection, to a lead of the apparatus **14.** A threaded stud **20** is provided at the terminal end **22** of the element **18** to enable electrical connection of a receptacle such as an elbow or another connector (not shown) which ordinarily would be engaged with the bushing **12** in a power distribution system.

In this instance, the external circuit to bushing **12** has been disconnected and, in order to eliminate the hazards of an exposed terminal end **22,** dummy receptacle **10** has been installed over bushing **12** to effectively insulate, shield and provide a water-tight seal at the bushing. Bushing **12** may or may not be energized, or active.

Dummy receptacle **10** has a body in the form of a housing **24** extending longitudinally from a base **26** upwardly to a top **28** and includes a cup-like inner member **30,** preferably constructed of an insulating elastomer and an integral outer member **32,** preferably formed of a conductive elastomer. The conductive outer member **32** provides an electrical shield over the bushing **12,** while the housing encloses and insulates the conductive element **18** of the bushing and provides a watertight seal. Preferably, the inner member **30** and the outer member **32** are molded in an integral construction, in a manner now well known in the fabrication of electrical connectors. A threaded hole **34** extends into an insert **36** of conductive elastomer and engages the threaded stud **20** to secure the dummy receptacle **10** in place upon bushing **12.**

A test point in the form of voltage detection point **40** is located at the top **28** of the housing **24** and includes an internal electrode **42** embedded within inner member **30** and capacitively coupled to conductive insert **36** and an external electrode **43** consisting of a washer **44** and a screw **45** threaded into internal electrode **42.** A cap **46** of conductive elastomer normally covers the otherwise exposed external electrode **43** and effectively continues the shield provided by outer member **32.** The cap **46** is provided with an upwardly extending pulling eye **50** for removing the cap **46** as described in detail below.

In order to enable manipulation of the dummy receptacle **10,** a bail **54** is affixed to the housing **24** adjacent the top **28** thereof. The bail **54** includes a pair of legs **56** which engage a corresponding pair of opposed laterally extending tabs **58** anchored in the housing **24,** such that the bail **54** may be moved about a lateral pivotal axis **60** provided by the opposite tabs **58.** When the bail **54** is in an upright position, that is, when the bail is aligned longitudinally relative to the housing **24,** as illustrated in FIG. **1,** the legs **56** straddle the voltage detection point **40** and extend upwardly above the voltage detection cap **46** to an uppermost portion **62** of the bail **54.**

Turning now to FIG. **2,** as well as to FIG. **1,** when it is desired to determine whether or not the bushing **12** is active, or energized, cap **46** is removed and the electrode **43** is exposed so that a test meter (not shown) can be applied to the electrode. Since the apparatus **14** may be energized, the test procedure is best performed with a conventional hot-stick **64.**

Hot-stick **64** has a hook **66** at one end **68** thereof, which hook **66** ordinarily is biased to an open position, as illustrated in FIG. **1.** The hot-stick **64** is rotated 90° from the position shown in FIG. **1** so that the hook **66** can be passed simultaneously through the bail **54** and the eye **50** in cap **46.** Upon retraction of the hook **66** toward the sleeve **70** of the hot-stick, the hook **66** will close, as seen in FIG. **2,** simultaneously capturing the eye **50** of the cap **46** and the uppermost portion **62** of the bail **54** within the loop of the closed hook **66.** The cap **46** can then be removed from the housing **24** by swinging the hot-stick **64,** together with the captured bail **54** and cap **46,** about axis **60,** causing cap **46** to peel away from external electrode **43** and thereby exposing test point **40,** as seen in FIG. **2.** An appropriate meter can now be lowered to engage the electrode and provide the desired information.

Since the cap **46** is captured between the legs **56** of the bail **54,** and the hot-stick **64** is affixed to the bail, it becomes a simple matter to replace the cap if so desired. The hot-stick need merely be drawn back to the position where the bail is upright and the cap is automatically in position to be replaced over the external electrode **43.** The hot-stick hook **66** is then partially extended and pushed downwardly to effect replacement of the cap.

If the meter has shown that the bushing **12** is inactive, or de-energized, and it is desired to remove the dummy receptacle **10** from the bushing without replacing cap **46,** the hot-stick **64,** together with the captured bail **54** and cap **46,** is moved back to the position where the bail is upright. The uppermost portion **62** of the bail is fabricated so as to engage a complementary transverse slot **72** in the end **68** of the hot-stick in a manner which will preclude rocking of the bail relative to the hot-stick and will enable rotation of the bail about a longitudinal axis **74** in response to rotation of the hot-stick about that axis. Hence, rotation of the hot-stick about axis **74** will release threaded stud **20** from threaded hole **34.** Once the threaded connection is released, the hot-stick may be drawn upwardly to remove the dummy receptacle **10** completely from the bushing **12.** Alternately, the hot-stick may be drawn upwardly without rotation to release threaded stud **20** from threaded hole **34,** in which instance the resiliency of the elastomeric material of insert **36** will enable removal of the dummy receptacle **10.** If it is desired to replace cap **46** over external electrode **43** prior to removal of dummy receptacle **10,** cap **46** may be replaced as described above, and then hook **66** of the hot-stick **64** is again retracted to engage portion **62** of bail **54** in slot **72,** the resilient nature of the material of cap **46** enabling eye **50** to stretch and accommodate such retraction of the hook **66.** Installation or removal of the dummy receptacle with the cap **46** in place over the electrode **43** also may be accomplished readily by merely capturing the bail **54** alone within the hook **66** of the hot-stick.

It will be seen that the relative location of the electrode **43,** cap **46** and bail **54,** together with the configuration of the bail, enables installation and removal of the dummy receptacle, as well as the necessary testing, to be accomplished with ease and with a minimum amount of manipulation of a hot-stick. While in the above detailed description of a preferred embodiment, the illustrated receptacle is a dummy receptacle, it will be apparent that the described relative location of electrode, cap and bail, together with the bail configuration, may be utilized to similar advantage in other types of receptacles.

It is to be understood that the above detailed description of an embodiment of the invention is provided by way of example only. Various details of design and construction may be modified without departing from the true spirit and scope of the invention as set forth in the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a receptacle for installation on a high voltage bushing, the receptacle having a longitudinally extending body, a bail, a test point and a test point cap covering the test point, which receptacle is installed and removed by means of a hot-stick having a hook at one end thereof, the improvement comprising:

laterally extending pivot means affixed to the body and the bail such that the bail may be moved about a lateral axis provided by the pivot means;

the test point cap having hook-receiving means positioned relative to the bail such that the hook-receiving means and the bail will be captured simultaneously by the hot-stick hook to thereby enable the test point cap to be removed and pivoted away from the test point to permit an electrical measurement to be made at the test point.

2. The invention of claim **1** wherein the hook-receiving means is in alignment with the bail when the bail is positioned in longitudinal alignment with the body.

3. The invention of claim **2** wherein the hot-stick hook is capable of being retracted into said one end of the hot-stick and at least a portion of the bail, where the bail is grasped by the hook, is complementary to a

portion of said one end of the hot-stick such that upon retraction of the hook, the bail will be captured in said one end and affixed thereto against rotation and rocking movement relative to the hot-stick.

4. The invention of claim **2** wherein the receptacle is installed and removed by rotational and longitudinal movement of the receptacle relative to the bushing, the body extends longitudinally from a base upwardly to a top, said test point is located in said top, said test point cap extends upwardly at said top and the bail straddles the test point cap and extends upwardly to a top portion.

5. The invention of claim **4** wherein the hook-receiving means of the test point cap is at the top of said test point cap and is located adjacent the top portion of the bail.

6. The invention of claim **5** wherein the hot-stick hook is capable of being retracted into said one end of the hot-stick and at least the top portion of the bail is complementary to a portion of said one end of the hot-stick such that upon retraction of the hook the bail will be captured in said one end and affixed thereto against rotation and rocking movement relative to the hot-stick, thereby coupling the receptacle with the hot-stick for effective rotational and longitudinal movement relative to the bushing.

7. The method for determining if a high voltage bushing is active while the bushing is engaged with a receptacle, the receptacle having a longitudinally extending body, a bail, a test point and a test point cap covering the test point, which receptacle is installed and removed by means of a hot-stick having a hook at one end thereof, the test point cap having hook-receiving means, the receptacle further having laterally extending pivot means affixed to the body and the bail such that the bail may be moved about a lateral axis provided by the pivot means to a position relative to the hook-receiving means such that the hook-receiving means and the bail can be captured simultaneously by the hot-stick hook, said method comprising:

positioning the bail essentially in said position relative to the hook-receiving means;

capturing the hook-receiving means and the bail simultaneously in the hot-stick hook;

retracting the hook relative to the bail; and

laterally displacing the hot-stick to swing the bail and the test point cap about the lateral axis and thereby expose the test point to permit an electrical measurement to be made at the test point.

8. The invention of claim **7** including:

laterally displacing the hot-stick to return the bail and the test point cap to the position wherein the bail is essentially in longitudinal alignment with the body; and

advancing the hot-stick hook, relative to the bail, to replace the test point cap over the test point.

9. The method for removing a receptacle from a high voltage bushing, including first determining if the high voltage bushing is active while the bushing is engaged with the receptacle, the receptacle having a longitudinally extending body, a bail, a test point and a test point cap covering the test point, which receptacle is installed and removed by means of a hot-stick having a hook at one end thereof, the test point cap having hook-receiving means, the receptacle further having laterally extending pivot means affixed to the body and the bail such that the bail may be moved about a lateral axis provided by the pivot means to a position relative to the hook-receiving means such that the hook-receiving means and the bail can be captured simultaneously by the hot-stick hook, said method comprising:

positioning the bail essentially in said position relative to the hook-receiving means;

capturing the hook-receiving means and the bail simultaneously in the hot-stick hook;

retracting the hook relative to the bail;

laterally displacing the hot-stick to swing the bail and the test point cap about the lateral axis and thereby expose the test point to permit an electrical measurement to be made at the test point;

laterally displacing the hot-stick to return the bail and the test point cap to the position wherein the bail is essentially in longitudinal alignment with the body; and

moving the hot-stick in the direction away from the bushing to pull the receptacle from the bushing.

10. The invention of claim **9** wherein a threaded connection interconnects the receptacle and the bushing and the hot-stick is rotated to rotate the receptacle as the hot-stick is moved in said direction away from the bushing.

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