June 10, 1969 I. HALDOPOULOS 3,448,466

COUPLING BOLT WITH PLASTIC HEAD

Filed Dec. 22, 1967

FIG. 1

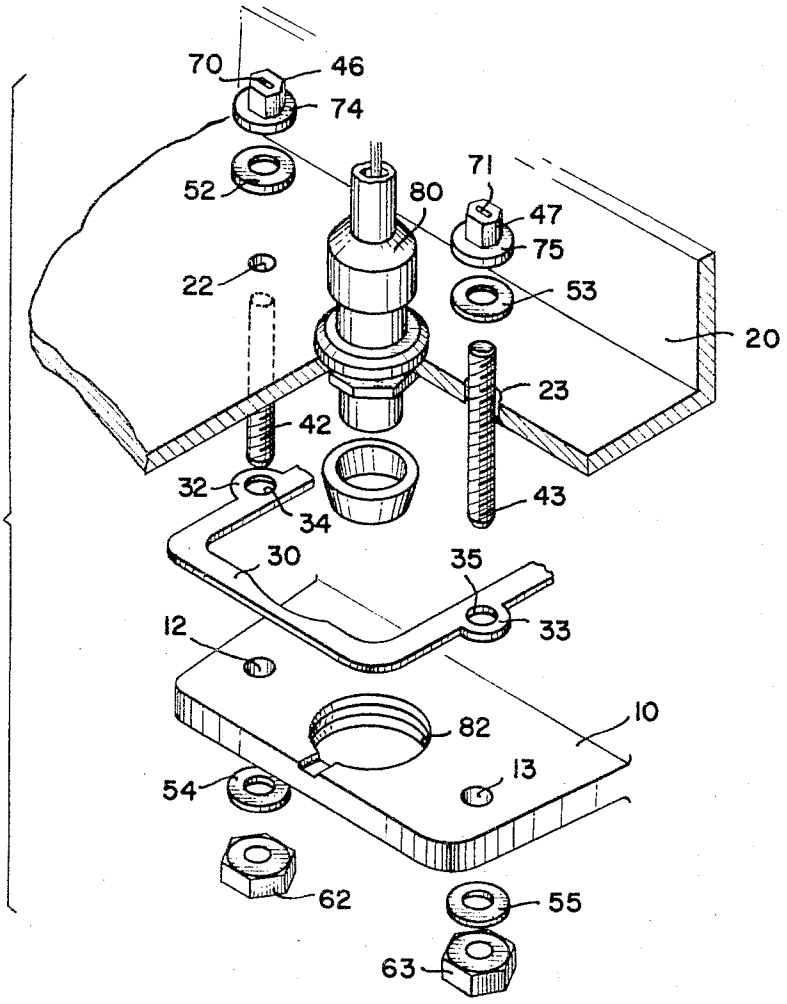


FIG. 2

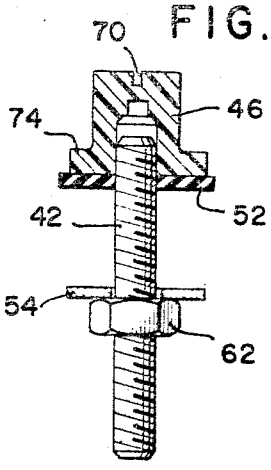
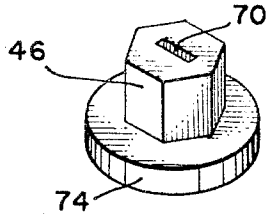


FIG. 3



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COUPLING BOLT WITH PLASTIC HEAD

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ABSTRACT OF THE DISCLOSURE

This invention involves one or more fastening units for securing a water tank to a toilet bowl. Each fastening unit includes a threaded stud; a plastic head which is internally threaded to receive one end of the threaded stud, the plastic having flattened sides and a cap with a slot therein; and a nut to receive the other end of the threaded stud. The plastic head will be positioned at the bottom of the water tank; the stud will be inserted through openings in the water tank and the toilet bowl; and the nut will be positioned on the bowl side of the unit.

This invention relates to fastening devices and, more particularly, to fastening units for plumbing fixtures employed, for example, for fastening a toilet bowl to its water tank.

For many years the conventional water tank was fixedly joined to the conventional toilet bowl (to which water was supplied from time to time and discharged as may be desired or required) by means of conventional bolts and their corresponding nuts, in which each bolt usually embodied a circular or rounded head, as distinguished from a flat-sided head, the head having a spherical cap in which there was a slot to receive a screwdriver bit. The bolt could be tightened or advanced by inserting a screwdriver bit into the slot of the cap of the bolt and then moved clockwise, or the bolt could be loosened or removed by applying pressure via the screwdriver bit to the cap of the bolt to direct it in a counterclockwise direction. Inasmuch as the water tank and the toilet bowl were usually made of ceramic materials, they were easily breakable, and hence it was the quite common practice to apply pressure to the bolt or fastening parts only with considerable precautions for fear of cracking or breaking either of the ceramic components. Too much pressure on the bolt might well result in broken fixtures which then required costly replacement. Too little pressure to avoid any such breakage was sometimes accompanied by leaving a gap between the plumbing fixtures through which water might leak. This constituted one of the more important of the problems which confronted plumbers and repairmen with respect to the installation, repair and maintenance of such fixtures.

When the above-noted plumbing fixtures were in use for some considerable time, certain undesirable changes, sometimes of a chemical nature, occurred. For example, corrosion sometimes set in with respect to the bolts, nuts or other parts of the fastening units, more frequently in

the studs or in the nuts of the fastening units, and this was sometimes due to the action arising from the saline contents of the water used in flushing operations. Furthermore, there was a gradual, perhaps slow but continuous accumulation of foreign substances, sometimes slimy in nature, at the bottom of the tank and in the regions around and adjacent to the studs and other parts of the fastening units. The corrosion and the accumulated materials quite often adversely affected the immediately exposed parts as well as those somewhat more remote. Such accumulations of such materials sometimes covered the cap of the bolt and concealed its position. The corrosion and the accumulation of the chemical and other foreign materials frequently increased the tension on the toilet bowl and the water tank due to the substantial mechanical pressure between the bolt and the ceramic fixtures. In some cases such tension and pressure on the tank and on the bowl unexpectedly produced cracks or other breakage requiring the replacement of these essential parts at considerable expense.

Furthermore, as another problem, the rounded head of the bolt was a definite and inseparable part of the combination and it could be advanced or loosened or withdrawn only by the use of considerable pressure on a screwdriver of sufficient length and diameter. Because of lack of a flat-sided head on the bolt, it was obviously impossible to use a wrench on any such components and hence this inhibited the ready removal of the bolt or even the loosening of the pressure on such parts. It was occasionally necessary to labor quite a while to make repairs or replacements of such parts.

In general, the above noted difficulties may be readily overcome by the fastening unit coupling bolt assembly of this invention which, in its bare essentials, includes; a threaded shaft or stud which may be made of steel and can be suitably plated; a plastic head for screw-threaded attachment to said shaft or stud which is definitely and easily separable from the shaft or stud; a threaded nut for receiving the shaft or stud after it has been inserted through appropriate openings in the water tank and in the toilet bowl and then gripped at the other end by means of the threaded nut, with or without an accompanying washer. The plastic, internally threaded hexagonal head with a slot in its cap serves to render the unit readily movable either by the application of a wrench or by the application of a screwdriver, as may be desired or may be available. Hence, when pressure is applied to advance the hexagonal head, there will be established a firm contact with the stud to provide a fixed connection with the nut on the bowl side of the tank. Such a fastening device may be installed, and just as easily removed, whenever desired, with a minimum of effort. Furthermore, the ar- were used with conventional parts without producing, or threatening to produce, breakage in the ceramic bowls or tanks.

This invention will be better understood from the more detailed description hereinafter following when read in connection with the accompanying drawing, in which FIGURE 1 illustrates an exploded view, in perspective, depicting the fastening unit involved in this invention

with respect to the bowl and tank to be bound together; FIGURE 2 illustrates a cross-sectional view of the fastening unit of this invention; and FIGURE 3 illustrates a perspective view of the hexagonal plastic head which is one of the principal components of this invention.

Referring to the drawing generally and more particularly to FIGURE 1 of the drawing, there is shown part of a toilet bowl **10** having two equally spaced openings **12** and **13**; part of a water tank **20** having two equally spaced openings **22** and **23**; a rubber cushion **30** which is to be inserted as a gasket between the bowl **10** and water tank **20**, the rubber cushion **30** having two ears **32** and **33** having respective openings **34** and **35** which are to be aligned with the openings **12** and **13** of the bowl **10** and with the openings **22** and **23** of the water tank **20**; two threaded studs **42** and **43**; two plastic heads **46** and **47** both of which are internally threaded to receive the threads of the studs **42** and **43** respectively; washers **52** and **53** which are to be applied about the studs **42** and **43** between the rubber cushion **30** and the plastic heads **46** and **47** respectively; washers **54** and **55** and screw-threaded nuts **62** and **63** which are to be positioned on the bowl side of the assembly and are to be employed to rangement may be installed with greater pressures than fasten the studs **42** and **43** to the combination shown in FIG. 1.

As shown more fully in FIGS. 1 and 3, the sides of each head **46**, **47** are hexagonal in shape and the top of each head has a slot, such as **70**, to accommodate the bit of a screwdriver. The respective hexagonal heads have cylindrical flanges **74**, **75**.

The mechanism **80**, shown generally in FIG. 1, is controlled by a hand lever (not shown) of conventional form to open or close the opening **82** of the bowl **10**, either to allow the water in tank **20** to be discharged into bowl **10** or to cut off the flow of such water after the bowl **10** has been flushed. The structural details of mechanism **80** need not be described.

When it is desired to install a water tank, such as **20**, on a toilet bowl, such as **10**, the cap of the head **46** may be partly rotated so that one of the threaded ends of stud **42** may be joined to the internally threaded section of the head **46**, and the other threaded end of stud **42** inserted through opening **34** of the rubber cushion **30**, then through the opening **12** of the bowl **10**, and through washer **54** to join the screw-threaded nut **62**. The same series of operational steps will be performed on the other head **47** and its related hardware to join the bowl **10** to the water tank **20**. The two assemblies should be partly completed before the parts are drawn up tightly. The nuts **62** and **63** may then be advanced, and the heads **46** and **47** likewise advanced preferably by the use of a screwdriver applied to their slots **70**, **71**. This step-by-step advance will be continued until the water tank **20** is pulled down fairly evenly, through the intermediary of a rubber cushion **30**, against the upper surface of the bowl **10**. While a screwdriver may be used on the heads **46**, **47** for the initial assembly, if desired a wrench may be applied to the hexagonal heads **46**, **47** for the same purpose.

It has been determined that by employing the head, such as **46**, which is made of plastic material, the build-up of solid salt solutions and other materials within and about stud **42**, and between the stud **42** and bowl **10** and tank **20**, and between bowl **10** and tank **20**, will be substantially reduced if not completely eliminated. Most importantly, corrosion of the related metal parts such as the stud, the nut, etc., will likewise be substantially reduced if not completely eliminated. Tensions within and about the studs **42**, **43** of the fastening combinations as well as the corrosion factor, will be substantially nullified and this will serve to obviate breakage of the chinaware of which the bowl **10** and tank **20** are made.

In general, the plastic head **46** will be the only part of the fastening unit assembly that will be submerged in the water of the tank **20**. This plastic part, because of its chemical constitution and non-corrosive character, will not serve to introduce corrosion to any of the parts and they will be useful during the lifetime of the installation.

The several parts employed in the fastening unit assembly of this invention are easily assembled whenever desired and just as easily disassembled whenever desired. For example, in order to remove the fastening unit, it may be necessary only to remove the plastic head **46**, so that the stud **42** may then be pushed, by hand or otherwise, through the openings **22**, **34** and **12** so as to separate the stud **42** from the several parts including the bowl **10** and tank **20**.

It has also been determined that the torque permitted to install the fastening unit of this invention is much greater than, perhaps four times as great as, the torque heretofore allowed with conventional fastening units, without any substantial threat of breakage of the water tank **20** or the bowl **10**.

The parts embodied in the fastening units of this invention are more easily manufactured and are therefore lower in cost than those employed in conventional fastening unit constructions. Hence, there will be a substantial saving by the employment of the arrangements of this invention.

Although the plastic head **46** is shown as having a hexagonal shape, it will be obvious that any other cross-sectional shape, whether square or rectangular or pentagonal or otherwise, may be employed in accordance with the features of this invention. It is sufficient to have one or more flattened sides on head **46**. Furthermore, the washers **52**, **53**, and **54**, **55** may be made of rubber, plastic, steel or of any other well known material. Furthermore, although the nuts **62** and **63** are preferably made of steel, they may be also made of plastic materials if so desired. In addition, the studs **42**, **43** are preferably made of steel and are preferably cadmium plated with a chromate finish.

While this invention and its general principles and objects have been shown and described as well as explained merely for the purpose of illustration of the invention, it will be understood that the general principles of this invention may be applied to other and widely varied organizations without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. A fastening device for securing a water tank to a toilet bowl, comprising a threaded stud which may be inserted into holes in said tank and said bowl, a plastic head having an internally threaded portion for receiving one end of said threaded stud and having a cap with a slot theerin for receiving a screwdriver bit, the sides of said plastic head being flattened so as to be graspable and movable by a wrench, and screw-threaded means for grasping the other end of said threaded stud so that, with the plastic head positioned at the bottom of said tank, the device may be tightened to secure said tank to said bowl.

2. A fastening device according to claim **1** in which the sides of said plastic head form a cylinder of hexagonal cross-section.

3. A fastening device according to claim **1** in which said screw-threaded means includes a threaded nut for receiving the other end of said threaded stud.

4. A fastening device according to claim **1** in which the threaded stud is made of steel and is cadmium plated with a chromate finish.

5. A fastening device according to claim **1**, which includes a rubber cushion positioned between the bottom of said plastic head and the top of said toilet bowl.

6. Apparatus for fastening the bottom of a water tank to the top of a toilet bowl, comprising a plurality of fastening devices, each fastening device including: a plastic nut to be positioned at the bottom of said tank and having an internally threaded section, a threaded stud to be inserted through an opening in said bowl and through an

opening in said tank, a threaded metallic nut, one end of said stud being threaded into the internal threaded section of said plastic nut and its other end being threaded into said metallic nut, the cap of said plastic nut having a slot therein and the side walls of said plastic nut being flattened, said bowl and said tank being fastened to each other by advancing either of said nuts toward the other along said stud and being unfastened from each other by reversing the movement of either of said nuts along said stud.

7. Apparatus according to claim 6, which includes a rubber cushion positioned between the bottom of said water tank and the top of said toilet bowl.

8. Apparatus according to claim 7, in which each stud is cadmium plated.

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U.S. Cl. X.R.

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