

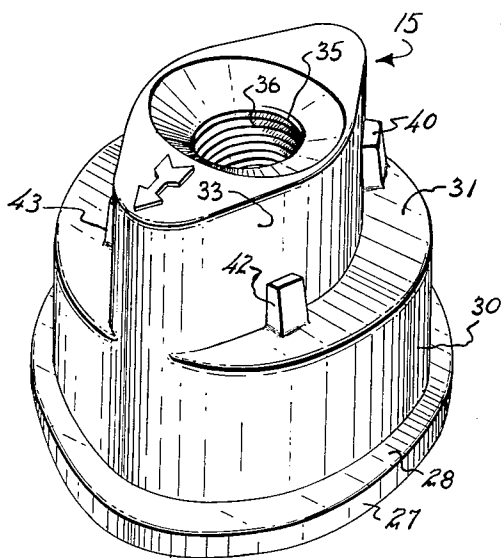
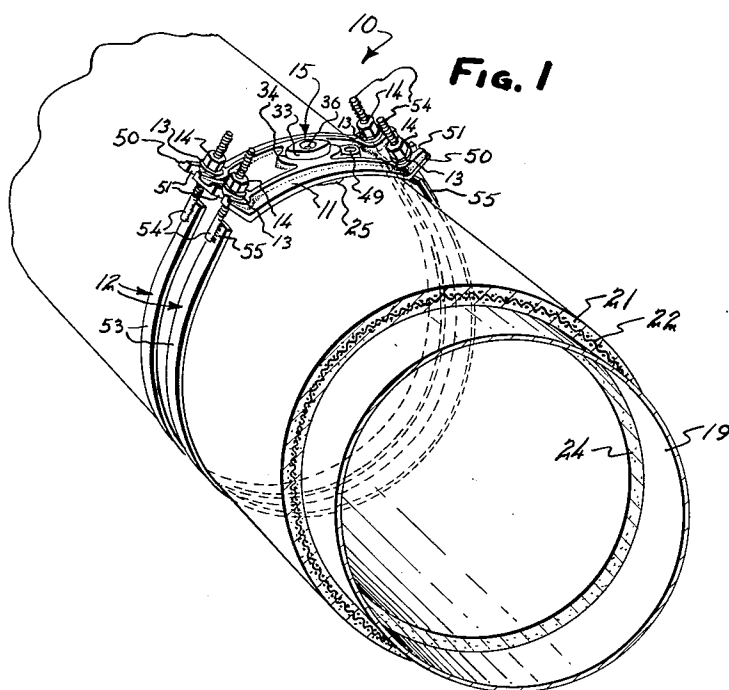
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TAPPING SADDLE

2,997,316

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3 Sheets-Sheet 1



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Fig. 2

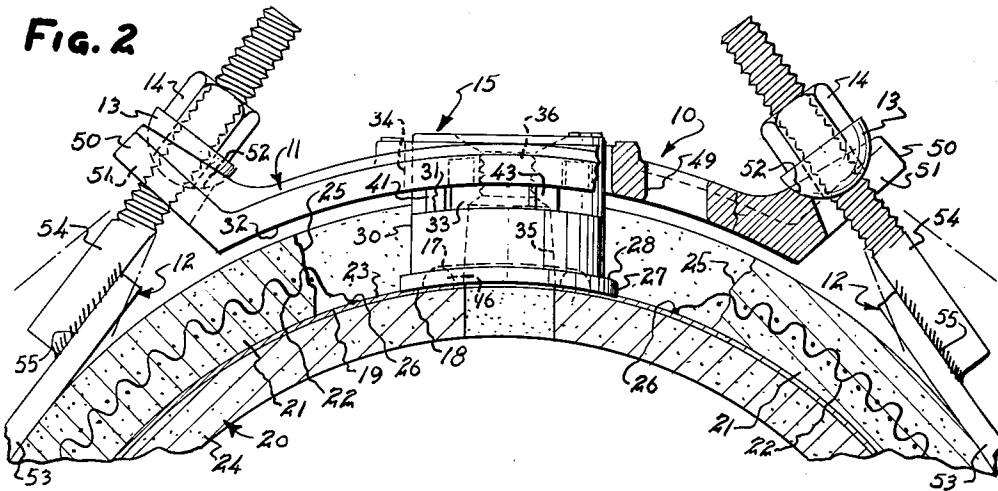


Fig. 3

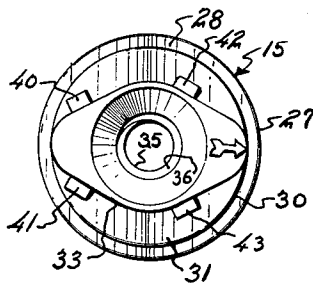
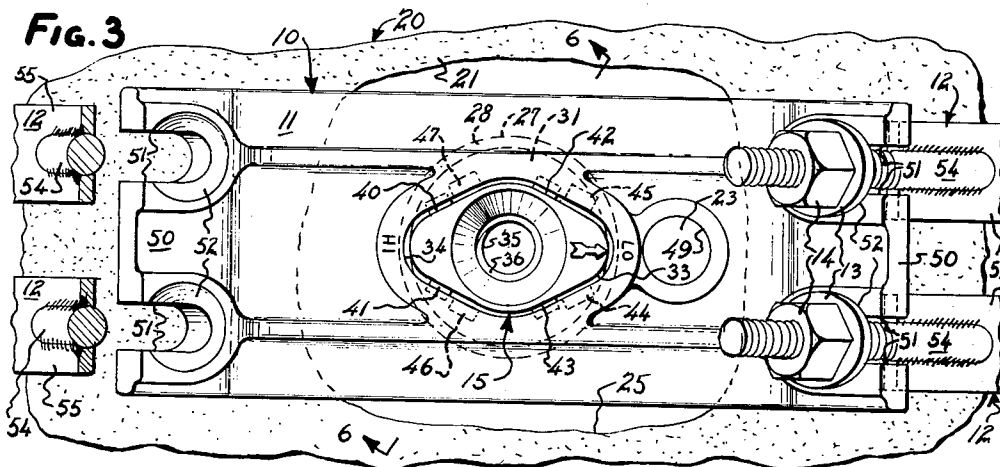


Fig. 4

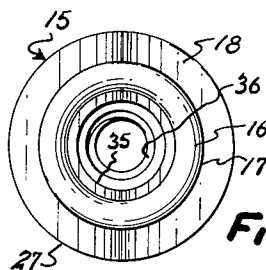


Fig. 5

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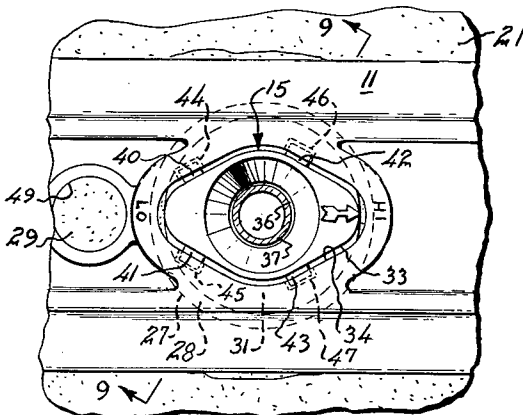
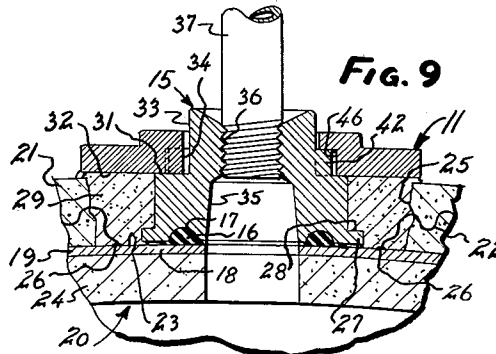
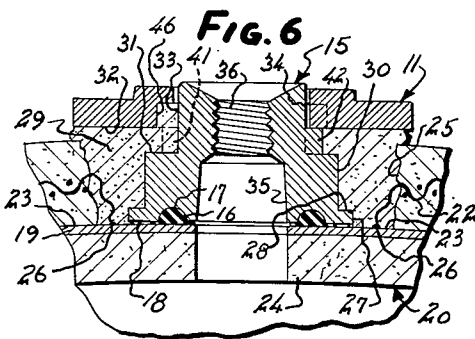
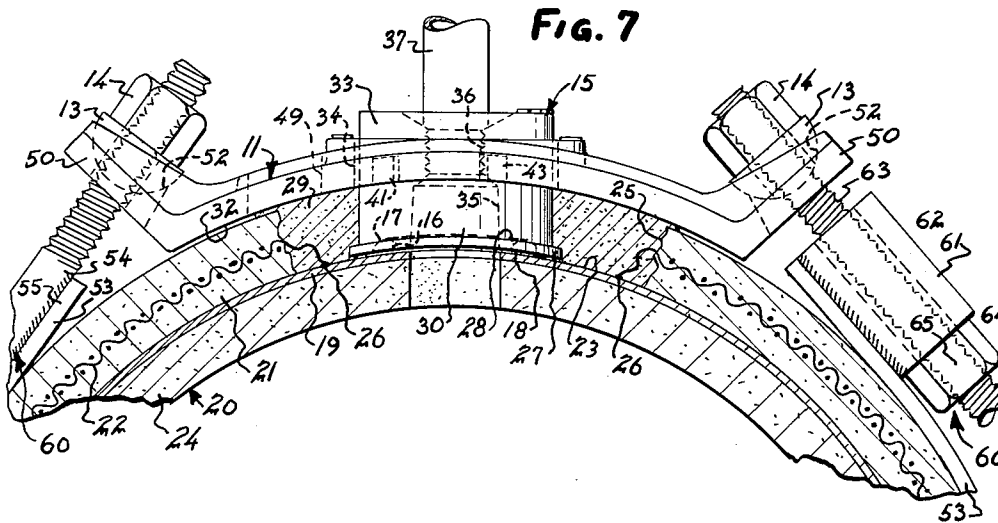
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3 Sheets-Sheet 3



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2,997,316

TAPPING SADDLE

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6 Claims. (Cl. 285-55)

This invention relates to an improved tapping saddle for use with concrete cylinder pipe.

Concrete cylinder pipe, often used in water mains, comprises a cylindrical steel reinforcing shell covered inside and outside with thick layers of concrete, usually reinforced by steel wire. Special problems arise when it is desired to connect this kind of pipe with a side line or service pipe, using a tapping saddle. Such saddles are held by bales against the outer wall of the concrete cylinder pipe while a tapped insert member is held in sealing contact with the steel cylinder, an opening having been chipped away through the outer layer of concrete. One problem has been due to the wide variation in thicknesses of the outer concrete layer—the variation from a nominal thickness runs about plus or minus $\frac{3}{8}$ inch—which makes it difficult to be sure that the saddle will bear properly against the outer concrete surface of the pipe and exert the pressure on the insert needed to seal it against the steel cylinder.

Another problem has been how to tighten the bales against the saddle without bending the threaded portion. A related problem has been how to obtain rapid installation of the saddle on the pipe.

The primary objects of this invention are to solve these problems. Solution is achieved by novel structure to be explained in the course of this specification.

Another object is to provide structure that will lock the insert boss in place with the grout that fills the chipped-away space around it, after the tapping saddle has been installed.

Other objects and advantages of the invention will also appear from the following description of a preferred embodiment of this invention.

In the drawings:

FIG. 1 is a fragmentary view in perspective, partly broken away and partly in section, of an installation of a tapping saddle embodying the principles of this invention, upon a portion of concrete cylinder pipe.

FIG. 2 is a fragmentary view in side elevation and partly in section, on an enlarged scale, of an upper portion of a concrete cylinder pipe on which a tapping saddle assembly embodying the principles of this invention has been tightened in place, but the grout has not yet been put in.

FIG. 3 is a fragmentary top plan view of the assembly of FIG. 2, with the straps or bales removed from one side of the saddle and an upper portion thereof shown in section.

FIG. 4 is a top plan view of insert-type tapping boss used in the saddle assembly of FIGS. 1-3.

FIG. 5 is a bottom plan view of the boss of FIG. 4.

FIG. 6 is a view in section taken along the line 6-6 in FIG. 3.

FIG. 7 is a view similar to FIG. 2 of a completed installation, but showing a modified form of strap assembly and showing the boss in its alternate position. A connection pipe is also illustrated, threaded to the boss.

FIG. 8 is a top plan fragmentary view of a portion of the saddle of FIG. 7.

FIG. 9 is a view in section taken along the line 9-9 in FIG. 8.

FIG. 10 is a view in perspective of the insert boss, on an enlarged scale.

The saddle assembly 10 of this invention, shown in

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FIGS. 1-3, includes a tapping saddle 11, a plurality of bales or straps 12, and a novel form of washer 13 which is used in conjunction with nuts 14 to attach the bales 12 to the saddle 11. The pressure exerted by the bales 12 upon the saddle 11 retains a novel insert tapping boss 15 under pressure so that an O-ring 16 seated in a groove 17 of the boss 15, on the lower complexly curved surface 18 thereof, seals against the steel cylinder 19 of a concrete cylinder pipe 20. The pipe 20 itself has an outer concrete layer 21 with reinforcing wire 22 covering the outer surface 23 of the cylinder 19, and an inner concrete lining 24.

Before installation of the saddle 10, a hole 25 is provided in the concrete outer layer 21 by chipping the concrete away until a significant surface area 23 of the concrete steel cylinder 19 is exposed. The reinforcing steel wire 22 that is encountered is also cut away, and terminal portions 26 thereof may be tack-welded to the cylinder 19. The surface 23 of the steel cylinder 19 is carefully cleaned so that the O-ring 16 can make sealing contact against it. The tapping boss 15 is then placed into the hole 25 with its O-ring 16 in contact with the cleaned surface 23 of steel cylinder 19.

Around the base of the boss 15 is an outwardly projecting circular flange 27 with a shoulder 28 at its upper surface. The flange 27 and shoulder 28 provide a key by which the tapping boss 15 is locked into place when the hole 25 is later filled with grout 29. This keying helps hold the boss 15 in place, even should the straps or bales 12 deteriorate.

Above the shoulder 28 the boss 15 has an upwardly extending cylindrical portion 30 whose height approximates the minimum thickness of the outer concrete layer 21 to be expected in practice. The portion 30 ends at a shoulder 31, whose curved surface matches the lower surface 32 of the saddle 11. Above the shoulder 32 is a generally oval-shaped keying portion 33 that extends up through a similarly shaped oval opening 34 in the saddle 11. The boss 15 has a central opening 35 with an interiorly threaded upper part 36 to receive the tapping pipe 37 (FIGS. 6-8).

Projecting above the shoulder 31 and projecting outwardly from the oval portion 33 are a plurality of projections or studs 40, 41, 42, 43. Preferably, the projections 40, 41, 42, 43 are prismatic and are made in symmetric pairs, with the pair 40, 41 being located asymmetrically with respect to the pair 42, 43. The saddle 11 is similarly provided with matching recesses 44, 45, 46, 47. Thus in one position (see FIGS. 6-8) the projections 40, 41 fit into their recesses 44, 45, and the projections 42, 43 fit into their recesses 46, 47. In this position, the bottom surface 32 of the saddle 11 seats on the shoulder 31 of the boss 15.

However, when the boss 15 (or saddle 11) is turned 180°, the studs 40, 41 no longer engage their recesses 44, 45 and the studs 42, 43 no longer engage their recesses 46, 47. Moreover, the studs 40, 41 cannot engage the recesses 46, 47, and the studs 42, 43 cannot engage the recesses 44, 45. Therefore, the bottom surface 32 of the saddle 11 rests on the top surfaces of the studs 40, 41, 42, 43, thus lifting the saddle 11 about $\frac{3}{8}$ of an inch higher than in the other position. By this simple but novel structure, the saddle-boss combination can not only tolerate about $\frac{3}{8}$ of an inch (the preferable height of the studs 40, 41, 42, 43) variation in the thickness of the concrete outer layer 21, but, by reversal about twice as much. Without this provision, when the layer 21 is more than normal thickness, the outer layer 21 engages the lower surface 32 of the saddle 11 and holds the saddle away from contact with the boss insert 15; then no pressure is exerted on the O-ring 16. By having the novel turn-around feature of this invention, twice as much vari-

ation in the thickness of the layer 21 can be accommodated.

The saddle 11 has a grout opening 49, through which the hole 25 is filled, and at its outer extremities has turned-up flanges 50 provided with open-end notches 51 and a novel ball socket seat 52, which is a spherical segment.

The bales 12 comprise flat steel straps 53 with threaded studs 54 welded to their outer end portions 55. The novel washer 13 is applied over the studs 54. The washer 13 is slightly oversize with respect to the studs 54 and is shaped to provide a lower ball-like spherical segment surface. Over them the nuts 14 are applied. Upon tightening the nuts 14, the ball 13 seats rotatably in the seat 52 and turns enough to take up the torque that develops during tightening. Thus it holds the straps 12 in place without bending the studs 54 or applying unusual pressures upon them.

Since the threaded studs 54 must extend a substantial distance in order to compensate for the tightening and for the initial attachment, another feature of this invention in an alternative form is (FIGS. 6-8) the use of bales 60 having a sleeve member 61 welded to one end of the strap 53, instead of attaching the stud 54 directly (as is done still at the other end). Through the sleeve 61 a stud 62 extends, the stud 62 being a loose member with both ends 63, 64 threaded and nuts used at both ends, the nut 65 on the inner end being an ordinary nut. The result is that the stud 54 at the plain end can be placed with its washer 13 and nut 14 in place in the socket 52, and the stud 62 may be similarly started. Then the tightening can be made, at least initially, by the nut 65, to take up most, if not all, of the slack. If needed, additional tightening can be given by the nuts 14, but the studs will not project a substantial distance beyond them, even though the pipe be one at the lower range of diameters for its nominal size, since that slack is taken up by the sleeve 61 and stud 62.

Thus the invention solves the problem of variation in thickness of the concrete layer 21, both as to exerting pressure on the boss 15 and as to having overlength projections of the bale studs beyond their nuts. And the problem of strain on the bale studs is solved by the ball washers 13 and socket seat 52, so that the studs are not bent when the nuts are tightened.

To those skilled in the art to which this invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. The disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting.

I claim:

1. A tapping saddle for concrete cylinder pipe, having a steel cylinder covered by concrete comprising an arcuate saddle member having lugs at each end and a keying opening through the center, with asymmetrically located recesses adjacent a lower rim of said opening, bales having tightening means engaging said lugs, and an insert boss having a keying portion extending up through said keying opening and a shoulder and wider portion therebelow, with asymmetrically located projections on said shoulder at the base of said keying portion, said insert boss also having a tapped opening extending therethrough and a sealing gasket at a base for bearing against the steel cylinder of said pipe when a portion of said concrete covering is broken away, said asymmetric recesses and projections matching in one relative position of said boss and saddle wherein said saddle lies directly on said shoulder of said boss; and not matching in another position wherein said saddle lies on top of said projections so as to effect a difference in the relative altitude of said saddle and boss.

2. The saddle of claim 1 wherein said lugs provide open end slots with spherical segment seats and said bales have spherical-segment washers as part of said tightening means, so that the bale ends are not bent during tightening, the force thereon being taken up by said washers rotating slightly in said seats.

3. The saddle of claim 1 wherein said boss has a flange near its lower end to hold it in place when grout fills the broken away portion of said pipe.

4. A tapping saddle for concrete cylinder pipe in which a steel cylinder is covered with a concrete coating, comprising an arcuate saddle member having lugs at each end and a keying opening through the center, with two asymmetrically located pairs of recesses adjacent a lower rim of said opening, bales having tightening means engaging said lugs, and an insert boss having a keying portion extending up through said keying opening and a shoulder and wider portion therebelow, with two asymmetrically located pairs of projections on said shoulder at the base of said keying portion, said insert boss also having a tapped opening extending therethrough and a sealing gasket at a base for bearing against the steel cylinder of said pipe when a portion of the concrete coating is broken away, said asymmetric pairs of recesses and projections matching in one relative position of said boss and saddle and not matching in another so as to effect a difference in the relative altitude of said saddle and boss.

5. A tapping saddle for concrete cylinder pipe in which a steel cylinder is covered with a concrete coating, said saddle comprising an arcuate saddle member having lugs at each end and a generally oval opening through the center, with two asymmetrically located pairs of recesses adjacent a lower rim of said opening, bales having tightening means engaging said lugs, and an insert boss having a generally oval portion extending up through and substantially the same size and shape as said generally oval opening and a shoulder connecting said generally oval portion to a cylindrical portion of substantial height therebelow, the diameter of said cylindrical portion being as great as the greatest diameter of said generally oval portion, with two asymmetrically located pairs of projections on said shoulder at the base of said keying portion, said insert boss also having a tapped opening extending therethrough and a sealing gasket at a base of said cylindrical portion for bearing against the steel cylinder of said pipe and being held there under pressure applied by said bales on said boss through said saddle member when a portion of the concrete coating is broken away to expose a portion of said steel cylinder, said asymmetric pairs of recesses and projections matching in one relative position of said boss and saddle so that said saddle member then lies directly on said shoulder and not matching in another so that said saddle member rests on said two pairs of projections and lies further from said steel cylinder than when in the matching position.

6. The saddle of claim 5 wherein said cylindrical portion of said boss has a cylindrical flange extending radially outwardly near its lower end so that when grout fills the broken-away concrete portions of said pipe, said grout acts to hold said boss in place.

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