

**MORTAR SUPPORTER FOR USE IN FILLING CAVITY
BETWEEN PIPE AND INTERSTORY SLAB**

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a mortar supporter used with an interstory slab so as to stop a certain annular cavity that will appear around a pipe extending through an opening formed in the slab, when the cavity is filled with mortar, wherein the slab is disposed in a floor or the like between an upper and lower stories of a building.

2. Prior Art

It is common to fill with mortar the annular cavity appearing between the pipe's outer periphery and the opening's inner periphery, after the pipe is laid through the slab. The mortar is inhibited from dripping onto the lower story, so that a proper stopper has to be disposed below the cavity to hold in place the mortar unhardened:

A round hole matching the pipe is opened through a wooden board such as a veneer, and the wooden board is slit to provide split halves each having a half of the round hole. Those splits are opened to fit on the pipe, and then closed and located on the pipe's portion

beneath the slab's opening. A length of wire is wound on that pipe's portion to hold the board, before mortar is poured into the cavity.

However, the preparation and fixing of the stopper made of wooden board does cost much labor, and the wire and stopper are likely to scratch the pipe. It is not easy to have the lower faces of hardened mortar finished neat. Further, the board and wire that cannot be used repeatedly are somewhat expensive.

OBJECTS OF THE INVENTION

An object of the present invention is therefore to provide a mortar supporter used with an interstory slab to stop an annular cavity that will appear around a pipe extending through an opening formed in the slab, when the cavity is clogged with mortar, such that the supporter can be used easily and repeatedly to completely inhibit the mortar from dripping, and such that a clean lower face is given to a hardened block of mortar and the pipe is protected from being scratched.

SUMMARY OF THE INVENTION

These objects will be achieved herein by providing a mortar supporter that is adapted for use mentioned above and consists of a pair of resin split collars each comprising: a half flange having a semicircular inner edge so as to support mortar; a bracket perpendicularly and

downwardly extending therefrom; elastic embracing fasteners perpendicularly extending from the bracket; and connectors each formed at an end of each embracing fastener so that when the split collars are placed on a pipe the elastic fasteners are detachably combined with each other by means of the connectors and secured to the outer periphery of the pipe.

The half flanges may preferably have in their lower faces some breakable grooves such that outer peripheral portions of the half flanges can be broken off.

The bracket may preferably have elastic contacts protruding from the bracket's inner face so as to engage with the pipe's outer periphery.

The elastic contacts may preferably be a number of narrow tongue-shaped lugs.

More preferably, each tongue-shaped lug may jut obliquely and downwards from said inner face of the bracket.

In use, the elastic embracing fasteners of the split collars disposed on the pipe and facing one another will be combined with each other by detachably locking the connectors one in another. In this state of the fasteners secured on the pipe, one flange will be located in one of semicircular spaces around the pipe, with the other flange being located in the other semicircular space. Thus, the half flanges will surely stop the lower end of the annular cavity formed around the pipe

inserted in the opening through the slab.

The pairs of the split collars can thus be tightened easily with the connectors to clamp the pipe. Since the split collars are made of a resin, they may be manufactured efficiently and inexpensively to be lighter in weight and flexible.

The mortar supporter provided herein can be reused many times, because its split collars will not be damaged when separated from the pipe by unlocking the connectors, after mortar has hardened.

The flat and smooth surfaces of the flanges will give the hardened mortar a clean lower face.

In addition, the grooves formed in the lower face of each flange are useful in that the flanges on the adjacent pipes are protected from interfering with one another at their outer peripheral portions, because the outer peripheral portions can be broken off along the grooves.

If the elastic contacts are formed on the bracket, then the elastic contacts can be brought into a tight engagement with the pipe's outer periphery, whereby each split collar is reliably fixed on the pipe.

In a case wherein the elastic contacts are a number of narrow tongue-shaped lugs, the lugs will be depressed elastically so as to ensure a well-balanced circumferential contact of the brackets with the pipe's outer periphery, thereby causing the split collars to more tightly and firmly engage with the pipe.

In a further preferable case wherein the tongue-shaped lugs jut obliquely and downwards, they will never be bent erroneously upwards but surely be flexed downwards to assure the effect just mentioned above.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a mortar supporter provided in a first embodiment to consist of split collars each comprising a flange and a bracket extending therefrom, with the split collars being shown in their disassembled state;

Fig. 2 is a bottom view of the mortar supporter shown in Fig. 1;

Fig. 3A is a side elevation of the mortar supporter shown in Fig. 1, wherein the split collars are disengaged from each other;

Fig 3B is also a side elevation of mortar supporter shown in Fig. 1, wherein the split collars are engaged with each other;

Figs. 4A and 4B are front elevations of the mortar supporter also shown in Fig. 1, wherein one of the collars shown at Fig. 4A, with the other shown at Fig. 4B;

Fig. 5 is a cross section taken along the line 5 - 5 in Fig. 2;

Fig. 6A is an enlarged cross section of connectors formed integral with embracing fasteners possessed by the split collars shown in Fig. 1; and Figs. 6B - 6E illus-

trate modifications of the connectors of Fig. 6A;

Fig. 7 is a vertical cross section of the mortar supporter shown in Fig. 1 and in use to stop an annular cavity around a pipe inserted in an interstory slab, with an adequate quantity of mortar poured in the cavity so as to be stopped by the supporter;

Fig. 8 is a perspective view of a mortar supporter provided in a second embodiment also to consist of split collars, shown in their disassembled state;

Fig. 9 is a plan view of the mortar supporter shown in Fig. 8;

Fig. 10 is a side elevation of the mortar supporter shown in Fig. 8;

Fig. 11 is a bottom view of the mortar supporter shown in Fig. 8;

Fig. 12 is a cross section taken along the line 12 - 12 in Fig. 9;

Fig. 13 is a cross section taken along the line 13 - 13 in Fig. 9;

Fig. 14 is a cross section taken along the line 14 - 14 in Fig. 10;

Fig. 15 is a cross section taken along the line 15 - 15 in Fig. 11;

Fig. 16 is a vertical cross section of the mortar supporter shown in Fig. 8 and in use to stop an annular cavity around a pipe inserted in an interstory slab, with an adequate quantity of mortar poured in the cavity so as

to be stopped by the supporter; and

Fig. 17 is a perspective view of a narrow tongue-shaped lug as an example of elastic contacts formed on the bracket.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[First Embodiment]

Figs. 1 to 4 illustrate a mortar supporter provided in a first embodiment of the present invention.

As shown in those Figures, this mortar supporter consists of a pair of split collars 10a and 10b made of a polyacetate or the like. The split collars comprise semicircular half flanges 20a and 20b each having a semicircular inner edge 21a and 21b. Each of the split collars 10a and 10b comprises a bracket 30a or 30b extending downward from and perpendicular to the semicircular edge. Each split collar further comprises a pair of elastic embracing fasteners 40a and 40a or 40b and 40b protruding from a lower end of the bracket in opposite directions. The elastic fasteners extend along the outer periphery of a pipe on which the split collars have to be fixed. With the split collars 10a and 10b being coupled with each other, the semicircular half flanges 20a and 20b will form a completely round disc.

Each half flange 20a and 20b for supporting mortar has a mirror-finished smooth upper face as well as a satin-finished rough lower face. A lower layer of a

portion near and including one end of each flange is sliced off to provide an upper thin ear 23a and 23b for each half flange 20a and 20b. Similarly, an upper layer of an opposite portion near and including the other end is sliced off to provide a lower thin ear 24a and 24b for each half flange. When the split collars 10a and 10b are united to combine the half flanges 20a and 20b with each other, their upper ears 23a and 23b will fit on their lower ears 24b and 24a. The round disc consisting of the half flanges will thus be of an even thickness around its circumference.

A plurality of straight breakable grooves 25a and 25b are engraved in the lower face of each half flange, in such a manner that a central region and a suburb region are provided, as shown in Fig. 2. The breakable grooves are V-shaped in cross section as shown in Fig. 5. By bending the suburb region along the grooves 25a or 25b and relative to the central region, the suburb region can be torn off, if so desired, as shown at the phantom lines in Fig. 5.

The brackets 30a and 30b are of a partially circular shape in plan view so as to fit on the periphery of the pipe. Four lip-shaped and circumferentially elongate contacts 31a or 31b protrude inwardly from the inner face of each bracket. The uppermost contact has an upper surface in flush with the upper face of each half flange 20a and 20b. Therefore, the uppermost contacts 31a and

31b will form one complete circle in close contact with the pipe, when the split collars 10a and 10b are consolidated, as will be detailed later.

Embracing fasteners 40a and 40a or 40b and 40b are integral with each bracket 30a or 30b. Each fastener 40a and 40b is so elastic that it will return to its home position, whether bent inwardly or outwardly.

The embracing fasteners 40a of one of split collars 10a have their ends chamfered to provide guide edges 43a facing outwards. Protrusions 41a formed on the fastener ends are located near the guide edges. The embracing fasteners 40b of the other collar 10b have their ends also chamfered to provide guide edges 43b facing inwards. Apertures 41b formed in the fastener ends are located near the guide edges. An extremity of each fastener of one of the split collars 10b protrudes away from the fastener so as to provide a wide tongue 42b. Those tongues may be gripped by a user with his fingers so that the split collar 10b can be held by him to facilitate the assembling and disassembling of the split collars 10a and 10b. Such tongues may alternatively be formed on the other split collar 10a or on both the split collars 10a and 10b.

The protrusions 41a and the apertures 41b are formed as the connectors described hereinbefore.

In operation, the split collars 10a and 10b will at first be arranged such that their embracing fasteners 40a

and 40b face one another, with the guide edges 43a and 43b thereof contacting one another. As one split collar 10b is forced towards the other 10a, ends of its fasteners 40b will be guided along the edges 40a of the other split collar 10a so as to expand, until elastically restoring their natural position when said ends snap over the protrusions 41a. Thus, end portions of the former fasteners 40b come into contact with those of the latter fasteners 40a, wherein the protrusions 41a fit in the respective apertures 41b. The fasteners 40a and 40b connected to one another in this way will cause the half flanges 20a and 20b to have their upper faces in flush with each other.

To disengage the split collars 10a and 10b from each other, the upper fasteners 40b of one collar will be lifted away from the lower ones of the other collar so as to remove the apertures 41b off the protrusions 41a and pull those split collars in opposite directions.

The mortar supporter may be used in a manner shown in Fig. 7, wherein mortar 6 is poured in and hardens within an annular cavity 5 appearing between the opening 2 and the pipe 3 inserted therethrough. In detail, this cavity is defined between the inner periphery of the opening 2 formed in an interstory slab 1 and the outer periphery of said pipe.

Initially, the split collars 10a and 10b will be placed on the pipe 3 and be connected one to another to

clamp the pipe at any convenient height thereof. The inner edges 21a and 21b of half flanges 10a and 10b, as well as the inner faces of brackets 30a and 30b, are of a contour matching the outer periphery of the pipe 3. Thus, said inner edges and the elastic contacts 31a and 31b on said inner faces will be brought into close and compressed contact with the pipe's outer periphery. Thanks to the resiliency of those elastic contacts 31a and 31b, the fasteners 40a and 40b cooperate to firmly embrace the pipe 3 between them, to thereby protect it from freely slipping.

Subsequently, a proper bar or the like may be used to push the half flanges 20a and 20b upward to raise the mortar supporter along the pipe 3. The mortar supporter will thus be positioned at a height where the lower face of annular cavity 5 in the interstory slab 1 is located.

If many pipes are gathered close to each other, then the mortar supporter being fixed to one of them would possibly have its half flange 20a and/or 20b interfering with the others. In such an event, an outer periphery of said half flange or flanges may be broken off along the breakable grooves 25a and 25b formed in them, in order to avoid interference. Due to this feature, the present mortar supporter is useful even for crowded pipes in one slab.

The lower end of cavity 5 around the pipe 3 will in

this manner be stopped with the mortar supporter whose half flanges 20a and 20b construct a complete disc, so that the mortar 6 poured in the cavity is prevented from dripping. The elastic contacts 31a and 31b formed in this embodiment along the inner circular edges of said flanges 20a and 20b are compressed against the pipe 3, thereby more perfectly preventing the dripping of unhardened mortar.

When the mortar 6 has hardened in the cavity 5, the fasteners 40b of one of split collars 10b will be opened to disengage the protrusions 41a from the apertures 41b. The split collars 10a and 10b will then be separated from each other and removed from the pipe 3.

The lower face of a block of hardened mortar 6 will always be smooth, by virtue of the smooth upper faces of the half flanges 20a and 20b. The mortar supporter will never be damaged or broken in any way, so that the mortar supporter can be used many times to lower construction cost.

The mortar supporter described above, consisting of one-piece-molded split collars by thermoforming a resin, can not only be produced efficiently and inexpensively but also is lighter in weight to facilitate the mounting thereof on and dismounting thereof from the pipe 3. Flexibility of such a mortar supporter made of the resin will protect the pipe from being scratched.

If the mortar supporter is tinted with substantially

the same color as the interstory slab, the half flanges 20a and 20b of this supporter fixed on the pipe 3 will not be distinguishable from the adjacent concrete surface. Since the diffused reflection of light beams incident upon the satin-finished rough lower faces of said flanges will render them much less distinguishable, the mortar supporter may be left on the pipe, without causing any unpleasant or unnatural feeling.

It will be understood that more protrusions 41a may be formed on and longitudinally of each embracing fastener 40a at regular intervals, as shown in Fig. 6B, or more apertures 41b engageable with the protrusions may be formed likewise in the other fasteners. Alternatively, many such protrusions as well as many apertures may be formed on or in different fasteners such that any of the protrusions can engage with any of the apertures to absorb any small difference in diameter between the pipe and the coupled fasteners.

Further, the connectors possessed by the fasteners 40a and 40b in the present invention may be a combination of protrusions 141a and 141b engageable with each other, as shown in Fig. 6C. In another modification shown in Fig. 6D, a lug 241a is formed on one fastener 40a, with a hole 241b fittable on said lug being formed in the other fastener 40b. In still another modification shown in Fig. 6E, both the mating fasteners 40a and 40b have rivet holes 341a and 341b, through which a rivet such as 'push-

rivet' 345 is inserted to connect those fasteners one to another. It may also be possible to employ in combination any different connecting mechanisms shown in Figs. 6A - 6E for each fastener.

It is a matter of course that a plurality of connecting members shown in Figs. 6C - 6E can be formed in a row longitudinally of each fastener 40a and/or 40b, in order to be capable of absorbing the difference in diameter as mentioned above.

[Second Embodiment]

Figs. 8 to 17 illustrate a mortar supporter provided in a second embodiment of the present invention. As seen from those Figures, elastic contacts 31a and 31b in this embodiment are of a shape entirely different from those in the first embodiment.

The elastic contacts 31a and 31b in this embodiment are a number of narrow tongue-shaped lugs 32a and 32b, respectively. Those tongue-shaped lugs 32a or 32b do form four horizontal rows disposed one above another, and are arranged at regular intervals in each row.

A rib 33 is formed on and centrally of each tongue-shaped lug, on its upper or lower face, as seen in Fig. 17.

Each of lower thin ears 24a and 24b located at one ends of half flanges 20a and 20b has a central aperture 25a or 25b. Correspondingly, each of upper thin ears 23a and 23b located at the other ends of half flanges 20a

and 20b has a central lug 26a or 26b engageable with the central aperture.

Vertical end edges of fasteners 40a possessed by one of split collars 10a are chamfered to provide guiding ends 43a. Three apertures 41a are opened through each fastener, behind but close to the guiding edge. Vertical end edges of other fasteners 40b possessed by the other split collar 10b are likewise chamfered to provide guiding ends 43b. Three lugs 41b respectively engageable the apertures 41a are formed on the outer surface of each fastener, behind but close to the guiding edge.

The other features of the mortar supporter in the second embodiment are similar to those in the first one, so that the reference numerals are allotted to corresponding portions and members to abbreviate description thereof.

This mortar supporter is also used to clamp a pipe 3, by connecting its split collars 10a and 10b placed on the pipe one to another. The connecting operation is however easier in this case, because one of the lugs 26a and 26b on the upper thin ears 23a and 23b possessed by the half flange 20a or 20b of one split collar may be fitted in the corresponding aperture 25a or 25b formed in the lower thin ear of the other split collar so as to serve as a pivot. Namely, the split collars 10a and 10b can be pivoted towards each other, around the lug (for example 26a) engaging with the aperture (for exam-

ple 25b), whereby the other lug 26b readily comes into engagement with the other aperture 25a. The lugs 41b on the fasteners 40b of one split collar will simultaneously come into engagement with the apertures 41a formed in the other split collar's fasteners 40a, thus facilitating the connection of those split collars 10a and 10b one to another.

The bar or the like will be used to raise along the pipe 3 the mortar supporter whose split collars 10a and 10b have been merged and which has to be located close to and beneath the annular cavity 5.

Then, this cavity will be filled with mortar 6, and if necessary, the supporter's split collars 10a and 10b may be disassembled and removed from the pipe 3 after the mortar have hardened.

When dismounting the mortar supporter off the pipe, the wide tongues 42b will be gripped with the operators's fingers to flex inwards the fasteners 40b of the split collar 10b. The lugs 41b will thus be disengaged from the apertures 41a to easily disconnect those split collars from each other.

The elastic contacts 31a and 31b in the second embodiment consist of the narrow tongue-shaped lugs 32a and 32b, respectively. Each tongue-shaped lug 32a and 32b will properly flex to closely contact the pipe 3, whereby the brackets 30a and 30b come into a tight contact with the pipe's outer periphery. Consequently,

the inner circular edges of each half flange 20a and 20b is compressed against the pipe 3, thereby more perfectly preventing the dripping of unhardened mortar and more firmly attaching the mortar supporter to the pipe not to slip off.

Further, the tongue-shaped lugs 32a and 32b jutting obliquely and downwards are advantageous in that they will never be bent erroneously upwards but surely be flexed downwards to assure a smooth and perfect contact of the pipe with the split collars 10a and 10b being attached thereto.

The central rib 33 formed integral with and longitudinally of each tongue-shaped lug 32a and 32b can render them extremely thin but sufficiently strong and moderately elastic.

It is naturally possible to modify the connectors in the second embodiment to be any of those shown in Figs. 6B - 6C.

The elastic contacts are not restricted to those as shown in the above embodiments, but may comprise for example a plurality of lugs each having an acute end.

The half flange 20a or 20b, the bracket 30a or 30b and the fasteners 40a and 40a or 40b and 40b may either be integral with each other as exemplified above, or be formed as separate members bonded one to another.

In summary, the elastic embracing fasteners of the split collars disposed on the pipe and facing one another

will be combined with each other by detachably locking the connectors one in another. In this state of the fasteners secured on the pipe, one flange will be located in one of semicircular spaces around the pipe, with the other flange being located in the other semicircular space. Thus, the lower end of the annular cavity will surely be stopped with flanges, in order to prevent the mortar from dripping onto the lower story from the cavity that will be formed around the pipe inserted in the opening through the slab.

The pairs of the split collars can thus be tightened easily with the connectors to clamp the pipe. Since the split collars are made of a resin, they may be manufactured efficiently and inexpensively to be lighter in weight and so flexible that the pipe is protected from scratch.

The mortar supporter provided herein can be reused many times, because its split collars will not be damaged when separated from the pipe by unlocking the connectors, after mortar has hardened. The split collars can be produced by molding a plastics efficiently and economically at a lowered cost.

The flat and smooth surfaces of the flanges will give the hardened mortar a clean lower face.

In addition, the grooves formed in the lower face of each half flange are useful in that the half flanges on the adjacent pipes are protected from interfering with

one another at their outer peripheral portions, because the outer peripheral portions can be broken off along the grooves. Thus, a plurality of the present mortar supporters can be attached to a group of crowded pipes arranged close to each other.

If the elastic contacts are formed on each bracket, then the elastic contacts can be brought into a tight engagement with the pipe's outer periphery, whereby each split collar is firmly fixed on the pipe in such a state that the mortar will not drip and the supporter will not slip down.

In a case wherein the elastic contacts are a number of narrow tongue-shaped lugs, they will be depressed elastically so as to ensure a well-balanced circumferential contact of the brackets with the pipe's outer periphery, thereby causing the half flanges to more tightly and firmly engage with the pipe in such a state that the mortar will never drip and the supporter will never slip down.

In a further preferable case wherein the tongue-shaped lugs jut obliquely and downwards, they will surely be flexed downwards and pressed against the pipe's outer periphery, thus preventing any defective attachment of this mortar supporter to the pipe.



What is claimed is:

1. A mortar supporter consisting of a pair of split collars made of a resin and each comprising:

a half flange having a semicircular inner edge so as to support mortar;

a bracket perpendicularly and downwardly extending from the half flange;

elastic embracing fasteners integrally and perpendicularly extending from the bracket; and

connectors each formed at an end of each embracing fastener so that when the split collars are placed on a pipe the elastic fasteners are detachably combined with each other by means of the connectors and secured to the outer periphery of the pipe.

2. A mortar supporter as defined in claim 1, wherein the half flanges have in their lower faces a plurality of breakable grooves such that outer peripheral portions of the half flanges can be broken off.

3. A mortar supporter as defined in claim 1 or 2, wherein the bracket has elastic contacts protruding from the bracket's inner face so as to engage with the pipe's outer periphery.

4. A mortar supporter as defined in claim 3, wher-



ein each elastic contact is a number of narrow tongue-shaped lugs.

5. A mortar supporter as defined in claim 3 or 4, wherein each tongue-shaped lug juts obliquely and downwards from the inner face of the bracket.