

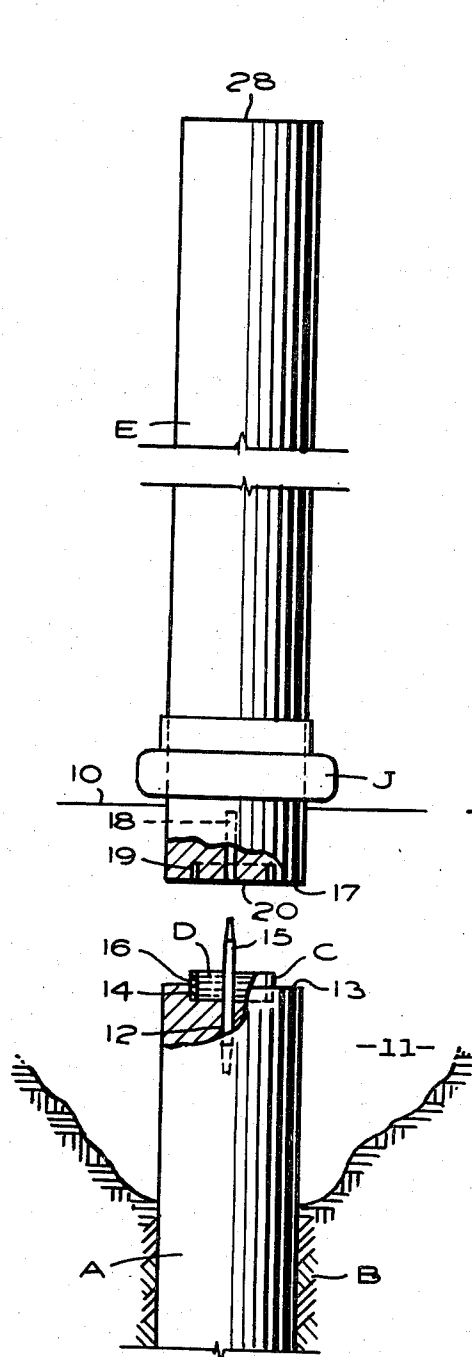
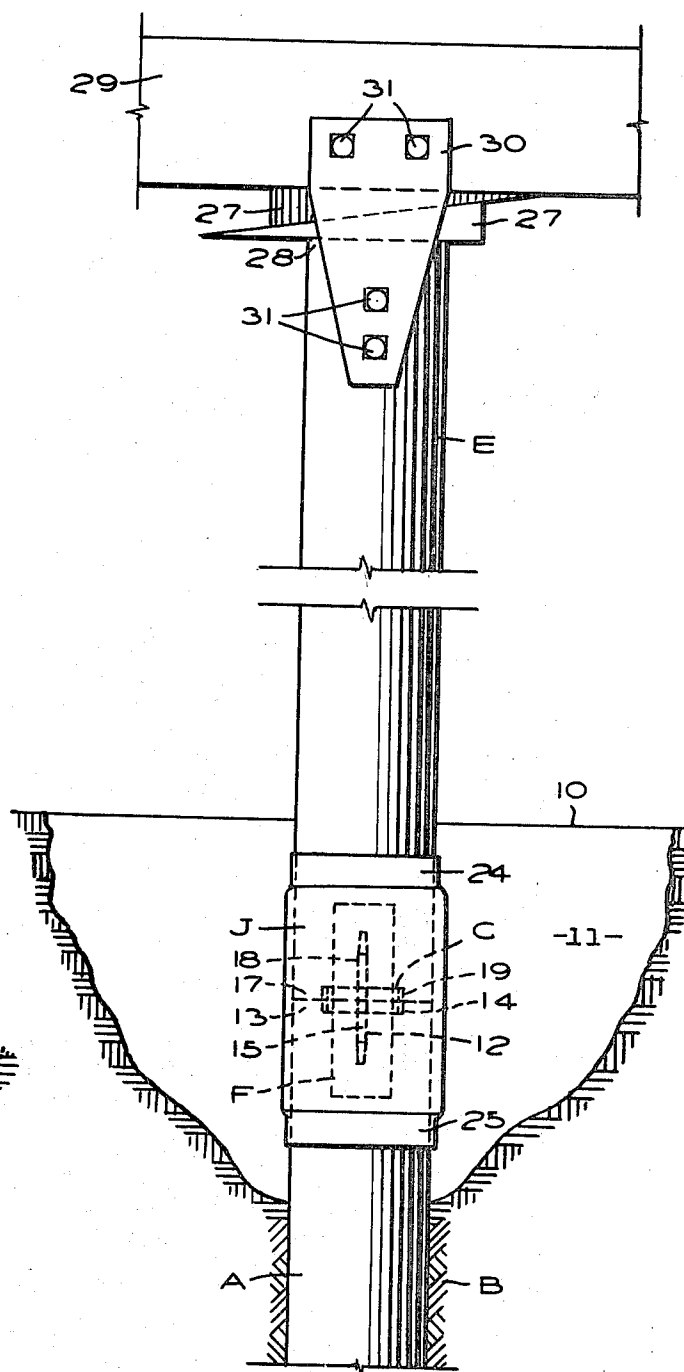
March 13, 1973

E. R. DE ROSA
METHOD AND APPARATUS FOR SPLICING REPLACEMENT
PILE SECTION TO PILE STUB

3,720,068

Filed April 12, 1972

2 Sheets-Sheet 1



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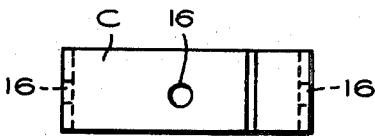


FIG. 3.

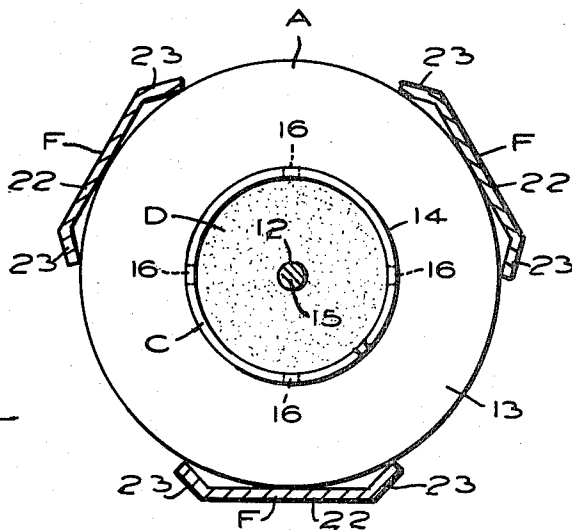


FIG. 5.

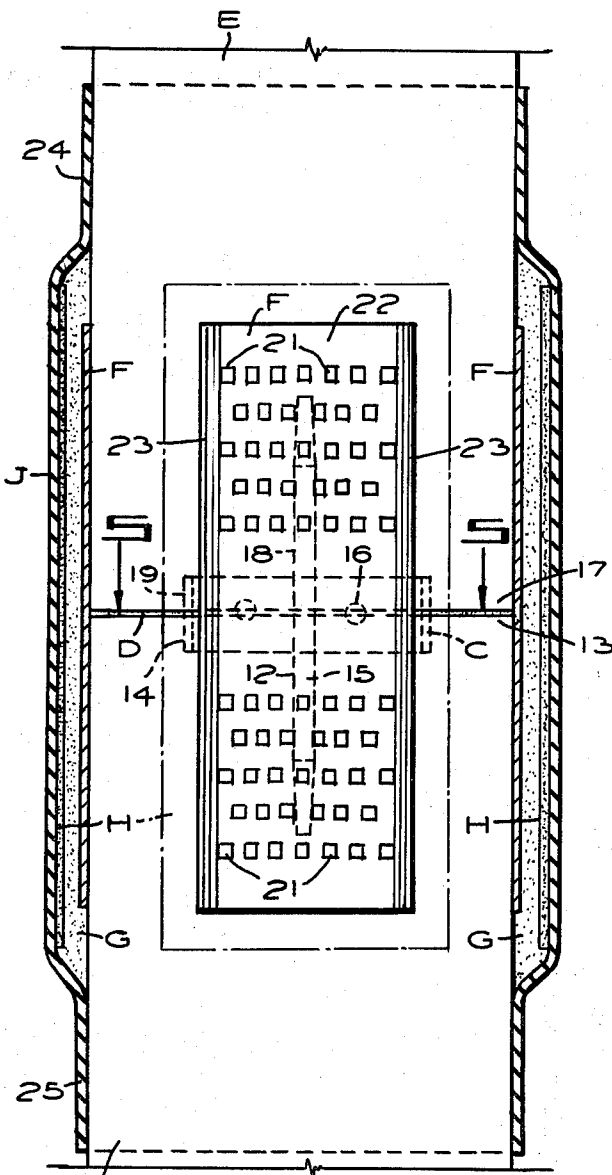


FIG. 4.

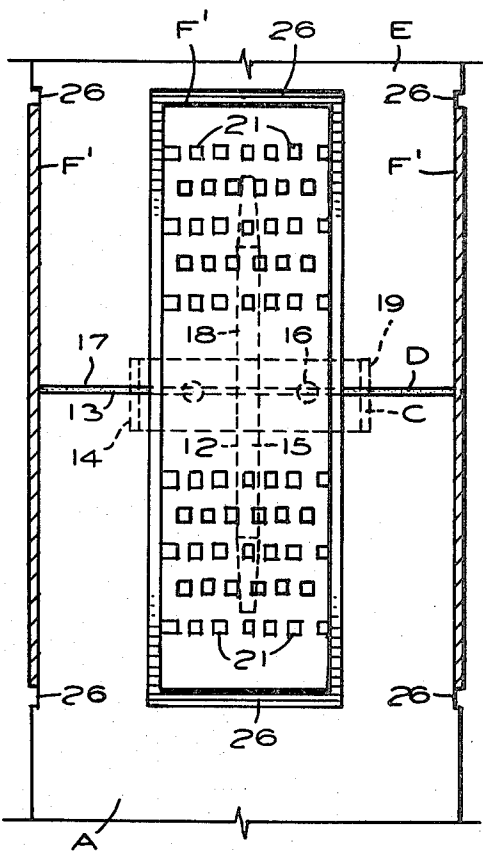


FIG. 6.

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METHOD AND APPARATUS FOR SPLICING REPLACEMENT PILE SECTION TO PILE STUB

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9 Claims

ABSTRACT OF THE DISCLOSURE

Method and apparatus for splicing replacement pile section to pile stub, wherein the replacement pile section is moved into axial alignment with respect to the pile stub so that the former will be mounted on the latter, with a waterproof adhesive being placed therebetween to provide a bonded joint. Moreover, a plurality of connector plates are nailed to the replacement pile section and the pile stub to overlap the joint, and layers of waterproof mastic are placed over the connector plates; and then felt, or the like, is disposed over the mastic to protect a resilient tubular boot from damage by the nail heads when the boot is subsequently rolled over the joint.

SUMMARY

It is a well known fact that piles used under docks and trestles are subject to deterioration due to marine life, and part of the piles must be replaced from time to time, while still utilizing the stub piles that remain in the mud or underwater.

An object of this invention is to provide a method and apparatus whereby replacement pile sections may be readily mounted on and strongly connected to the pile stubs, requiring the minimum amount of labor while reducing substantially the cost of the repairs.

Briefly speaking, replacement pile section is moved into axial alignment with respect to the stub pile and the former is lowered on the top of the latter, with waterproof adhesive being used to bond them together at the joint. Then a plurality of connector plates are nailed to both the replacement pile section and the pile stub so as to overlap the joint. Subsequently, waterproof mastic is placed over the exterior surfaces of the connector plates and nail heads. Felt, or the like, is disposed over the mastic and finally a resilient tubular boot is applied over the mastic, the boot being protected by the felt from damage by the nail heads.

Other objects and advantages will appear as the specification proceeds, and the novel features of the invention will be pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the invention, reference should be made to the accompanying drawings, forming part of this specification, wherein:

FIG. 1 is an elevational view disclosing a replacement pile section prior to being moved into final position relative to a pile stub, parts being shown in section;

FIG. 2 is an elevational view showing the replacement pile section connected to the pile stub;

FIG. 3 is a side view of a sleeve ring that is used for holding the waterproof adhesive and spreading the latter between the adjacent ends of the replacement pile section and pile stub;

FIG. 4 is a fragmentary elevational view of the adjacent ends of the replacement pile section and pile stub secured together by connector plates, with the waterproof mastic, felt and boot being shown in section;

FIG. 5 is a horizontal sectional view taken along the

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plane 5—5 of FIG. 4, prior to the waterproof mastic, felt and boot being applied over the joint; and

FIG. 6 is a fragmentary elevational view showing a modified form of connector plate.

While only the preferred embodiments of the invention have been shown, it should be understood that various changes, or modifications, may be made within the scope of the appended claims without departing from the spirit thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIG. 1, an existing pile has been cut off so as to remove a deteriorated upper section that has been damaged by marine life, leaving a pile stub A which extends downwardly into the ground B. This pile stub remains in good condition, since it is disposed below the mud line 10 and is thus protected from the marine life. However, in many cases, the existing pile may still be in good condition above the mud line; accordingly, the existing pile would be cut off at an appropriate point below or even above the water line.

Prior to cutting off the existing pile below the mud line 10, the mud around the pile should be jetted out to leave a sunken cavity 11 surrounding the pile stub A. Then an axial bore 12 is drilled in the top 13 of the pile stub A, and a special cutter head is used for making an annular groove 14 in the pile stub in concentric relation with the bore 12, the bore 12 being used as a guide. Then a split sleeve ring C is inserted into the groove 14 and a drift pin 15 is inserted into the bore 12 with this pin projecting above the top 13 of the pile stub A as disclosed in FIG. 1.

At this time a suitable waterproof adhesive D, such as epoxy, is placed in the confines of the sleeve ring C, as shown in FIG. 1. Subsequently this adhesive is forced out through holes 16 in the sleeve ring for spreading over the top 13 of the pile stub A and the bottom 17 of a replacement pile section E to form a bond therebetween.

The replacement pile section E has bore 18 drilled upwardly thereinto from its bottom 17, and this bore is used as a guide for the special cutter head in forming an annular groove 19 that is disposed concentrically relative to the bore 18, this groove being formed in the bottom 17 of the replacement pile section. Grooves 14 and 19 are dimensioned to register with one another.

As the replacement pile section E is moved into position for mounting on the top 13 of the pile stub A, the drift pin 15 is inserted into the bore 18 and thus this pin serves to guide the replacement pile section into proper position on the pile stub. During the final movement of the replacement pile section on the pile stub, the core 20 on the bottom of the replacement pile section E which is disposed within the confines of the annular groove 19 (see FIG. 1) is made to fit into the sleeve ring C, thus forcing the waterproof adhesive D through the holes 16 for spreading over the adjacent ends 13 and 17 of the pile stub A and replacement pile section E, respectively, bonding them together.

As illustrated in FIGS. 4 and 5, a plurality of connector plates F are arranged in abutting relation with the replacement pile section E and the pile stub A to overlap the joint therebetween, and these plates are secured in place by nails 21. Each of the connector plates F has a flat body 22 that is arranged to be disposed tangentially against the exterior surfaces of the pile stub A and the replacement pile section E, while angular marginal flanges 23 abut the pile stub and replacement pile section.

Referring now to FIG. 4, it will be seen that layers of waterproof mastic G are placed over the exterior surfaces of the connector plates F to cover heads of the nails 21 and these plates, thus preventing the nail heads and plates from being corroded by the action of water.

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Strips of felt H, or the like, is disposed over the waterproof mastic G to protect a resilient tubular boot J from being damaged by the nail heads when the boot is applied over the joint between the pile stub A and the replacement pile section E. The waterproof mastic G may be spread over the felt H, or the like, prior to the latter being applied to the connector plates F. It will be noted by the dot-dash lines in FIG. 4 that the strip of felt H is somewhat larger than the connector plate F over which it is applied, projecting above, below and to both lateral sides of the plate.

As to the resilient tubular boot J, it may be made from neoprene, or the like, and it may be placed around the pile stub A or the replacement pile section E, with the boot being rolled upon itself as shown in FIG. 1. It is preferred that the boot be placed initially around the replacement pile section E, since this may be done before the latter is moved into the water and will save underwater work by the diver. As shown in FIGS. 2 and 4, the boot J is unrolled so that it will be disposed over the joint between the pile stub A and the replacement pile section E, enclosing the connector plates F, waterproof mastic G and felt H, or the like. The boot has upper and lower portions 24 and 25, respectively, that embrace the replacement pile section and the pile stub.

In the modification shown in FIG. 6, the connector plates F' are somewhat more narrow than the connector plates F previously described and are flat so that they may be placed against flat surfaces 26 that are chiseled into the exteriors of the adjacent ends of the pile stub A and the replacement pile section E. Otherwise the procedure and structure in FIG. 6 are identical with that previously described, and like reference numbers and letters have been applied to corresponding parts of the two embodiments. It will be understood that waterproof mastic G, felt H, or the like, and the resilient boot J will be used in FIG. 6 of the drawings.

In FIG. 2, wedges 27 have been shown as being driven between the top 28 of the replacement pile section E and an existing pile cap 29 disposed above the replacement pile section to force the latter downwardly against the pile stub, and then one or more brackets 30 and lag screws 31 are used for securing the replacement pile section E to the pile cap. The weight of the replacement pile ordinarily is sufficient to force it down against the pile stub.

I claim:

1. In the method for splicing replacement pile section to pile stub, the steps of:

- (a) disposing a resilient tubular boot around one of the piles, with the boot being rolled upon itself;
- (b) moving the replacement pile section into axial alignment with respect to the pile stub so that the former will be mounted on the latter, placing a bond the replacement pile section to the pile stub;
- (c) abutting a plurality of connector plates against the replacement pile section and the pile stub to overlap the joint therebetween, and nailing these connector plates to the replacement pile section and the pile stub;
- (d) placing layers of waterproof mastic over the exterior surfaces of the connector plates to cover heads of the nails and these plates;
- (e) and unrolling the boot so that it will be disposed over the joint and enclose the connector plates and waterproof mastic, with upper and lower portions of the boot tightly embracing the replacement pile section and pile stub, respectively.

2. The method for splicing replacement pile section to pile stub, as set forth in claim 1;

- (f) and in which felt, or the like, is disposed over the waterproof mastic to protect the boot from being damaged by the nail heads when the boot is unrolled over the joint.

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3. The method for splicing replacement pile section to pile stub, as set forth in claim 2;

- (g) and in which the waterproof mastic is spread over the felt, or the like, prior to the latter being applied to the connector plates.

4. The method for splicing replacement pile section to pile stub, as set forth in claim 1;

- (f) and in which annular grooves are fashioned in the bottom and top of the replacement pile section and pile stub, respectively, these grooves being arranged to register with one another when the replacement pile section is moved into position on the pile stub;

- (g) inserting a sleeve ring into the annular groove in the top of the pile stub with the sleeve ring projecting thereabove, the sleeve ring having a series of holes therein;

- (h) placing the waterproof adhesive in the confines of the sleeve ring, the bottom of the replacement pile section having a core disposed to fit into the sleeve ring and force the waterproof adhesive through the holes of the sleeve ring for spreading over the adjacent ends of the replacement pile section and the pile stub when the former is lowered relative to the latter.

5. The method for splicing replacement pile section to pile stub, as set forth in claim 4;

- (i) and in which axially aligned bores are formed in the bottom and top of the replacement pile section and pile stub, respectively;

- (j) and inserting a drift pin into the bore of the pile stub to project upwardly therefrom, this drift pin being disposed to enter the bore in the replacement pile section to guide the latter into final position on top of the pile stub.

6. The method for splicing replacement pile section to pile stub, as set forth in claim 5;

- (k) and in which the grooves in the pile stub and replacement pile section are disposed concentrically around the bores in the pile stub and replacement pile section, respectively.

7. In the apparatus for splicing replacement pile section to pile stub, wherein a replacement pile section has its bottom mounted on the top of a pile stub to form a joint therebetween:

- (a) annular grooves in the bottom and top of the replacement pile section and pile stub, respectively, these grooves registering with one another, a sleeve ring inserted into the annular groove in the top of the pile stub and projecting into the annular groove in the bottom of the replacement pile section, waterproof adhesive disposed in the sleeve ring and part of this adhesive being forced through holes in the sleeve ring by a core on the bottom of the replacement pile section that has entered the sleeve ring, and this forced out adhesive providing a bond between the replacement pile section and pile stub at the joint therebetween;

- (b) a plurality of connector plates abutting against the replacement pile section and the pile stub to overlap the joint, these connector plates being nailed to the replacement pile section and pile stub;

- (c) layers of waterproof mastic covering the exterior surfaces of the connector plates and heads of the nails;

- (d) and a resilient tubular boot disposed around the replacement pile section and pile stub and extending over the joint, the boot enclosing the connector plates and waterproof mastic.

8. The apparatus for splicing replacement pile section to pile stub, as set forth in claim 7;

- (e) and in which felt, or the like, is interposed between the waterproof mastic and the boot to protect the latter from being damaged by the nail heads.

9. The apparatus for splicing replacement pile section to pile stub, as set forth in claim 7;

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(e) and in which wedges are driven between the top of the replacement pile section and an existing pile cap disposed above the replacement pile section to force the latter downwardly against the pile stub.

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U.S. Cl. X.R.

52—585; 61—54; 287—20.92 L, 127 E