Jan. 28, 1958 J. H. FOX 2,821,069

COMPOSITE WOOD AND CONCRETE PILE

Filed Nov. 7, 1955

Fig 1.

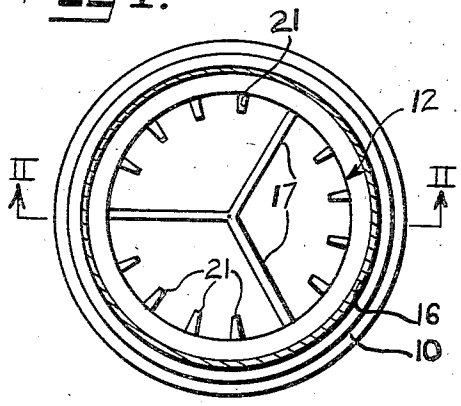


Fig 3

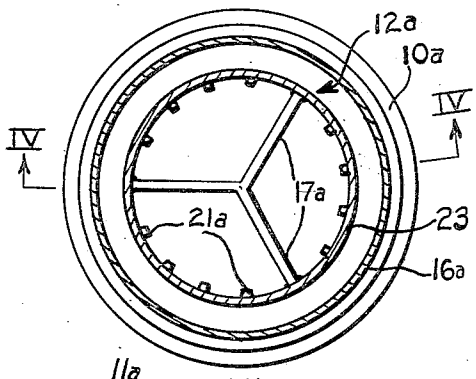


Fig 2.

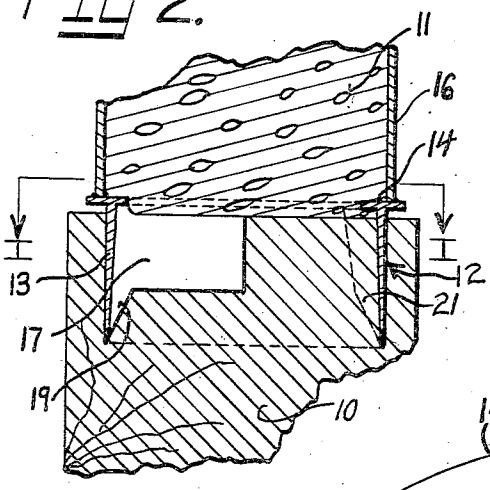
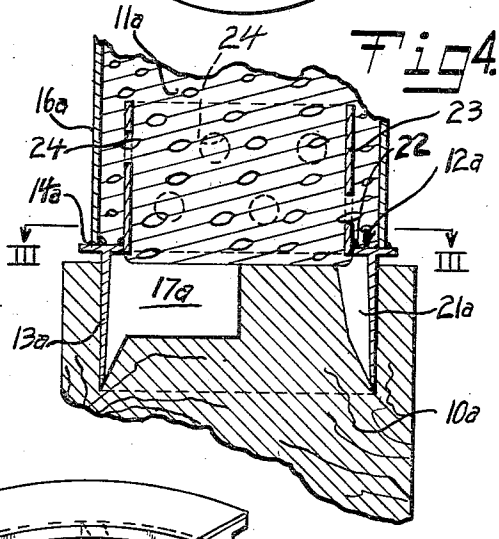


Fig 4.



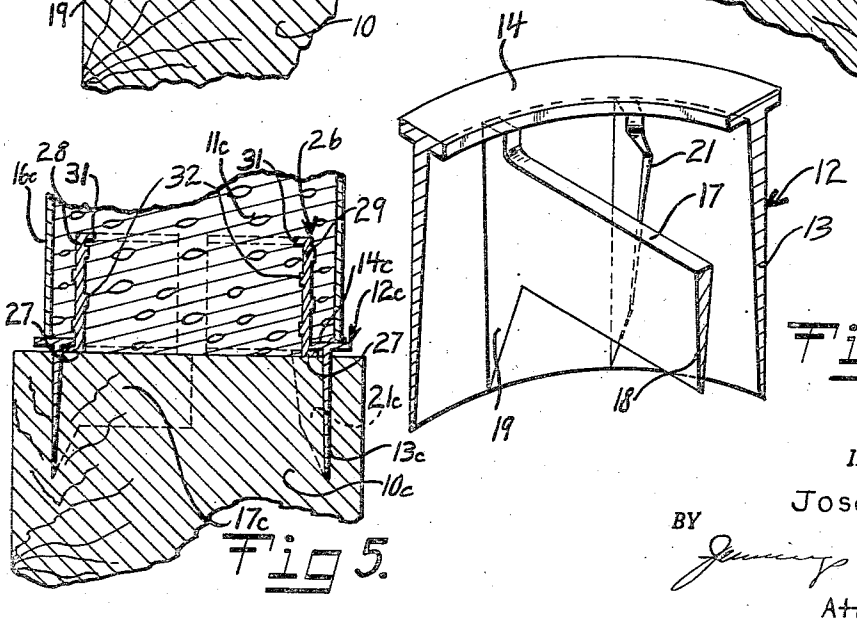


Fig 6.

Fig 5.

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COMPOSITE WOOD AND CONCRETE PILE

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12 Claims. (Cl. 61—53)

This invention relates to a composite wood and concrete pile in which a cast steel wedge member is driven down into the wood section and has joined thereto a metal shell which is filled with concrete and is an improvement over that disclosed in my previously filed applications, Serial No. 383,788 now Patent No. 2,782,606, filed October 2, 1953 and entitled Composite Wood and Concrete Pile; Serial No. 455,139, filed September 10, 1954 and entitled Composite Pile; and Serial No. 456,752, filed September 17, 1954 and entitled Composite Wood and Concrete Pile and Connector for the Same.

The primary object of my invention is to provide a composite pile of the character designated which shall include improved means for connecting the concrete portion of the pile to the wedge member which is forced downwardly into the wooden section.

A further object of my invention is to provide a composite pile of the character designated which shall include a bonding member which is attached to the upper portion of the wedge member and projects upwardly in spaced relation to the outer shell that surrounds the concrete, whereby the concrete completely surrounds the bonding member except for the connection between the member and the wedge member thus rigidly joining the wedge member to the interior of the concrete section.

Heretofore in the art to which my invention relates, difficulties have been encountered in anchoring the concrete section to the wooden section of the pile due to the fact that no effective reinforcing means has been provided for permanently anchoring the concrete to the wedge member which is driven down into the wood section, the principle connection between the wedge member and the concrete section being the connection between the outer shell and the wedge member. Accordingly, should the outer shell rust away, the concrete section is no longer connected to the wedge member by a reinforcing member.

Briefly, my improved composite pile comprises a sleeve-like wedge member projecting downwardly into the wooden section and having an upper portion in the form of a relatively flat ring which forms with the sleeve-like member a substantially T-shaped wedge member, as viewed in cross section. The inner portion of the ring extends inwardly of the wedge member whereby concrete may flow around and beneath the same thus anchoring the wedge member to the concrete section. An outer cylindrical shell is secured to the outer portion of the ring for receiving the concrete. To add further strength to the pile and to anchor the inner portion of the concrete section to the ring, I attach the lower end of an inner sleeve or bonding member to the inner portion of the flat ring. The inner bonding member thus projects upwardly within and in spaced relation to the outer shell whereby the bonding member is completely imbedded within the concrete section with the exception of the contact point between the bonding member and the wedge member. The bonding member may be provided with suitable openings or projections for engaging the concrete whereby it is rigidly anchored within the concrete.

Composite piles embodying features of my invention are illustrated in the accompanying drawing forming a part of this application, in which:

Fig. 1 is a sectional view taken along the line I—I of Fig. 2, the concrete being removed for the sake of clarity;

Fig. 2 is a sectional view taken along the line II—II of Fig. 1;

Fig. 3 is a sectional view showing a modified form of pile construction and taken along the line III—III of Fig. 4, the concrete being removed for the sake of clarity;

Fig. 4 is a sectional view taken along the line IV—IV of Fig. 3;

Fig. 5 is a vertical sectional view showing a further modification; and,

Fig. 6 is an enlarged fragmental isometric view of the wedge member.

Referring now to the drawing for a better understanding of my invention, I show a composite pile embodying a lower wooden section **10** and an upper concrete section **11**. The concrete and wooden sections are connected to each other by my improved wedge member indicated generally at **12**. The wedge member **12** embodies a sleeve-like portion **13** having a relatively flat annular ring **14** secured to the top thereof and projecting inwardly and outwardly of the sleeve-like portion. The ring member **14** may be formed integrally with the sleeve like portion **13** and forms therewith a substantially T-shaped wedge member, as viewed in cross section. Secured to the outwardly projecting portion of the ring member **14** is a cylindrical shell **16** for receiving the concrete.

Connecting inner portions of the wedge member **12** are inwardly extending wedge members **17**. As shown in Fig. 6, the wedge members **17** are relatively flat and are tapered toward the lower portion thereof as shown at **18**. As shown in Fig. 1, the wedge members **17** are radially directed inwardly and are connected to each other adjacent the center of the wedge member **12**. The main portion of each wedge member **17** does not extend the full length of the sleeve **13** and is preferably provided with a downwardly tapered portion **19** which is connected to the lower portion of the sleeve **13**, as shown.

Inwardly extending projections **21** are provided on the inner surface of the sleeve **13** between the inwardly extending wedge members **17** in position to move into the wooden section as the wedge member **12** is driven downwardly.

Referring now to Figs. 3 and 4 of the drawing, I show a slightly modified form of pile construction which embodies a wooden section **10***a* and a concrete section **11***a*. A wedge member **12***a* having a sleeve portion **13***a* and an annular flat ring **14***a* at the top thereof is secured to the lower end of a cylindrical shell **16***a*. The wedge member **12***a* is similar in all respects to the wedge member **12**. The annular flat ring portion **14***a* extends inwardly and outwardly of the sleeve portion **13***a* to form a substantially T-shaped wedge member, as viewed in cross section. The shell **16***a* is secured at its lower end to the outwardly projecting portion of the ring portion **14***a*. The wedge member **12***a* is also provided with inwardly extending wedge members **17***a* and inwardly extending projections **21***a* which are similar in all respects to the wedge members **17** and projections **21**, shown in Figs. 1, 2 and 6.

Secured to the inwardly extending portion of the ring **14***a*, by any suitable means such as by welding at **22**, is the lower end of an inner bonding member **23** which may be in the form of a sleeve or other suitable construction so designed as to permit complete imbedment of the bonding member in the concrete section of the pile. In actual practice, I find that a metal sleeve member having perforations **24** therein is satisfactory in every respect. The perforations **24** receive the concrete, as shown in Fig. 4, whereby the bonding member is anchored wholly within the confines of the concrete section **11***a*. As shown in Fig. 3, the bonding member **23** is substantially concentric with the outer shell **16***a* whereby the concrete surrounds the entire outer surface of the bonding member.

In Fig. 5 I show a further modification of my invention comprising a wooden section **10***c* and a concrete section **11***c*. A wedge member **12***c*, having a vertical sleeve portion **13***c* and an annular flat ring **14***c* at the top thereof, is secured to the lower end of a cylindrical shell **16***c*. The wedge member **12***c* is thus substantially T-shaped as viewed in cross section and is also provided with inwardly extending wedge members **17***c* and projections **21***c* which are similar to wedge members **17** and projections **21**.

Positioned inwardly of the wedge member **12***c* is a vertically extending bonding member **26** having outturned flanges **27** at the lower end thereof disposed to engage beneath the inwardly extending portion of the ring **14***c*. The bonding member **26** is divided into sections **28** and **29** which are separated from each other a distance to permit the flanges **27** to pass beneath the ring **14***c*, as shown. The interlock of the flanges **27** beneath the inwardly extending portion of the ring **14***c* thus attaches the bonding member **26** to the wedge member **12***c*. Preferably, inturned flanges **31** are provided at the upper ends of the sections **28** and **29** and projections **32** are provided on the vertical walls of the bonding member **26** in position to engage the concrete whereby the bonding member is anchored firmly therein.

From the foregoing, it will be seen that I have devised an improved composite pile in which the concrete section is secured rigidly to the wooden section by means other than the outer shell for receiving the concrete. By providing the inwardly extending portion on the flat ring, the concrete flows beneath the same thereby locking the concrete section to the wedge member. Also, by providing the inner bonding member which is attached to the inwardly extending portion of the ring, together with perforations or projections for engaging the concrete, the wedge member is rigidly connected to the interior of the concrete portion. This is of particular value due to the fact that should the outer shell rust away, the concrete is still rigidly joined to the wedge member by the inner bonding member.

While I have shown my invention in several forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. In a composite pile embodying a lower wooden section and an upper section of concrete, the improvement which comprises, a cylindrical shell mounted on top of the wooden section for receiving concrete, a sleeve-like wedge member projecting downwardly into the wooden section, an annular ring secured to the top of said wedge member and extending inwardly thereof and bonded within said upper section of concrete, and means securing the lower end of said shell to said ring with the inwardly extending portion of said ring positioned inwardly of said shell.

2. In a composite pile embodying a lower wooden section and an upper section of concrete, the improvement which comprises, a cylindrical shell mounted on top of the wooden section for receiving concrete, a sleeve-like wedge member projecting downwardly into the wooden section, an annular ring secured to the top of said wedge member and extending inwardly and outwardly thereof with the inwardly extending portion of said annular ring bonded within said upper section of concrete, and means securing the lower end of said shell to said annular ring.

3. In a composite pile embodying a lower wooden section and an upper section of concrete, the improvement which comprises, a cylindrical shell mounted on top of the wooden section for receiving concrete, a sleeve member projecting downwardly into the wooden section, a relatively flat ring connected to the top of said sleeve member and extending inwardly and outwardly thereof

to form with said sleeve member a substantially T-shaped wedge member as viewed in cross section with the inwardly extending portion of said ring bonded within said upper section of concrete, and means securing the lower end of said shell to the outwardly extending portion of said ring.

4. A composite pile as defined in claim 3 in which inner portions of the wedge member are joined by inwardly extending wedge members.

5. A composite pile as defined in claim 4 in which the inwardly extending wedge members are radially directed toward the center of the first mentioned wedge member and are connected to each other adjacent said center.

6. A composite pile as defined in claim 5 in which inwardly directed projections are provided on the inner surface of the first mentioned wedge member between the inwardly extending wedge members in position to move into the wooden section as the wedge members are driven downwardly.

7. In a composite pile embodying a lower wooden section and an upper section of concrete, the improvement which comprises a cylindrical shell mounted on top of the wooden section for receiving concrete, a sleeve like wedge member projecting downwardly into the wooden section, an annular ring at the top of said wedge member and extending inwardly and outwardly thereof, means securing the lower end of said shell to the outwardly extending portion of said ring, and a sleeve-like bonding member positioned inwardly of said shell and bonded within said upper section of concrete with its lower end secured to the inwardly extending portion of said annular ring.

8. A composite pile as defined in claim 7 in which the bonding member secured to the inwardly extending portion of the annular ring is substantially concentric with the cylindrical shell.

9. A composite pile as defined in claim 7 in which perforations are provided in the bonding member for receiving concrete whereby the bonding member is anchored firmly within the concrete.

10. A composite pile as defined in claim 7 in which projections are provided on the bonding member in position to engage the concrete whereby the bonding member is anchored firmly within the concrete.

11. In a composite pile embodying a lower wooden section and an upper section of concrete, the improvement which comprises a cylindrical shell mounted on top of the wooden section for receiving concrete, a sleeve-like wedge member projecting downwardly into the wooden section, an annular ring at the top of said wedge member and extending inwardly and outwardly thereof, means securing the lower end of said shell to the outwardly extending portion of said ring, a bonding member formed of sheet material positioned inwardly of said wedge member and extending upwardly within said concrete, outturned flanges at the lower end of said bonding member disposed to engage beneath the inwardly extending portion of said ring whereby the bonding member is attached to said wedge member.

12. A composite pile as defined in claim 11 in which the bonding member is divided into sections which are spaced from each other a distance to permit the outturned flange to pass beneath the inwardly extending portion of the ring.

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