

United States Patent

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2,454,557 11/1948 Jacobson..... 285/332
2,522,195 9/1950 Richardson 285/331
3,107,107 10/1963 Guarnaschelli..... 285/332

FOREIGN PATENTS

11,890 2/1896 Switzerland..... 285/332

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[54] ARRANGEMENT FOR ALIGNING AND CONNECTING SECTION OF CYLINDRICAL MEMBERS

7 Claims, 3 Drawing Figs.

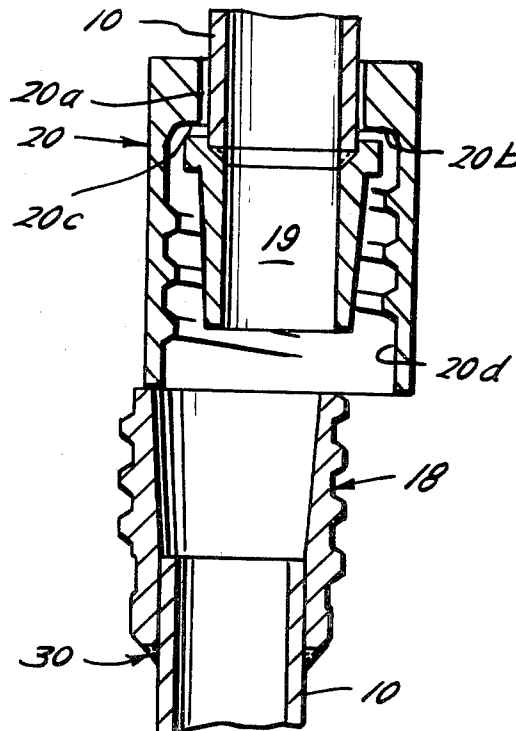
[52] U.S. Cl..... 173/131,
285/332
[51] Int. Cl..... E02d 5/28
[50] Field of Search..... 173/131;
285/90, 332, 331, 386

[56] References Cited

UNITED STATES PATENTS

570,890 11/1896 Baird..... 285/332

ABSTRACT: An arrangement including a connecting sleeve whereby adjacent sections of cylindrical members such as columns, casing, piling, casons, and other cylindrical members may be readily connected together and then driven into the earth from a location on land or from a fixed structure in a water-covered area or floating structure such as a floating platform, barge, structure, or ship. The aligning and connecting sleeve enables adjacent cylindrical sections or members to be readily aligned and connected together for subsequent driving into the ground.



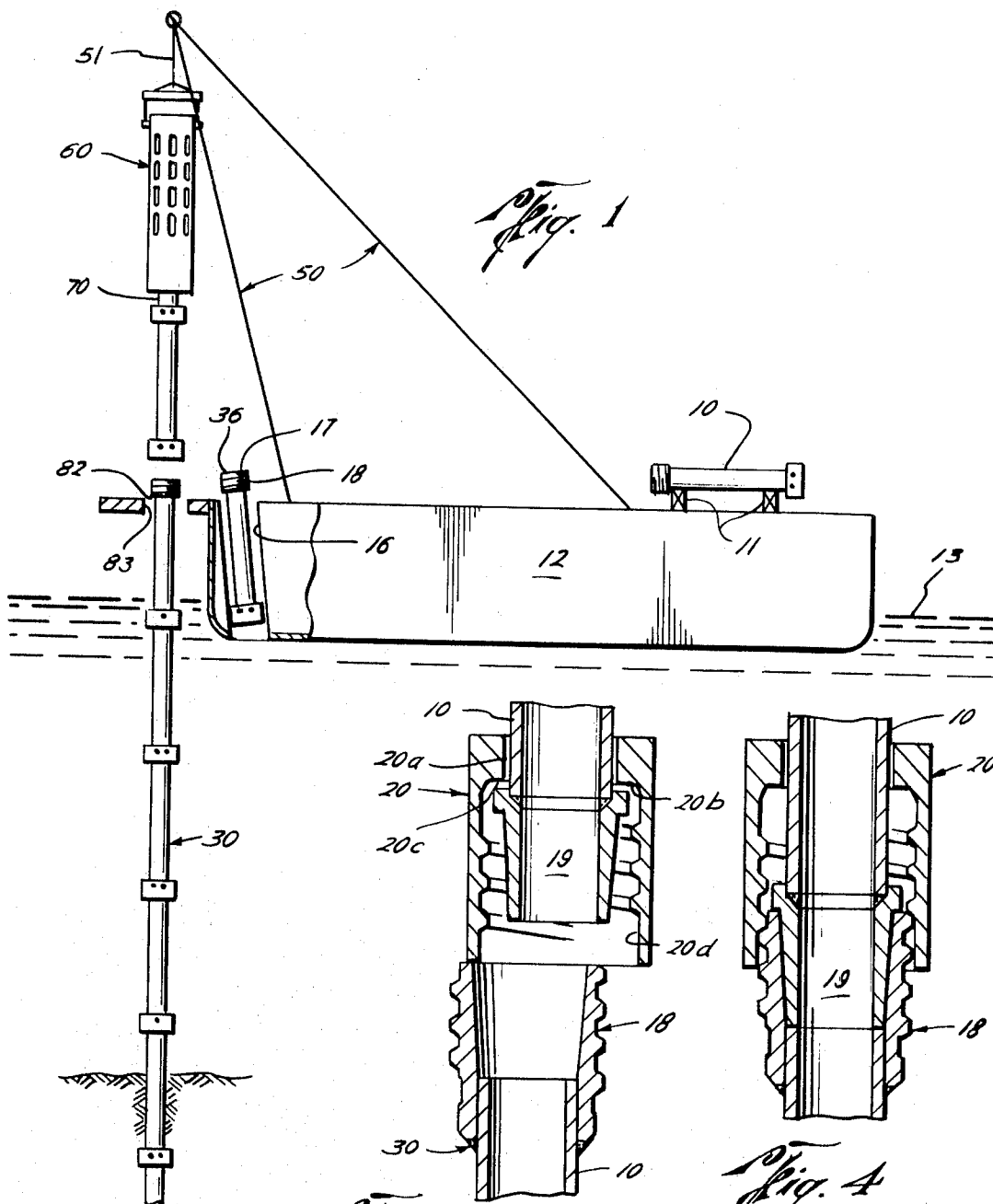


Fig. 2

Fig. 4

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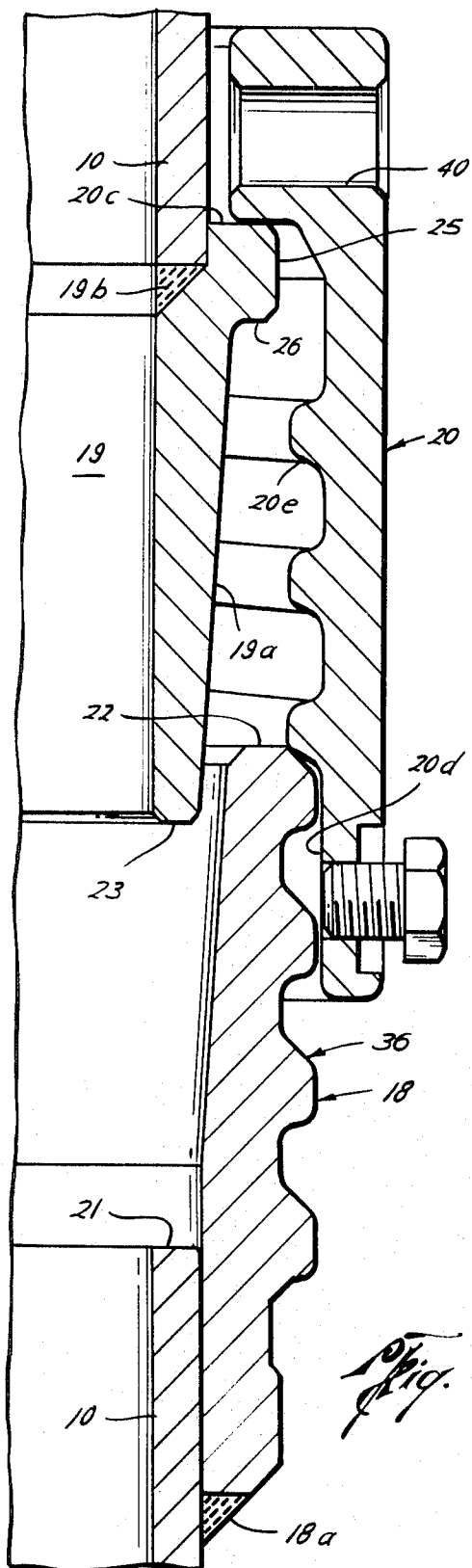


Fig. 3

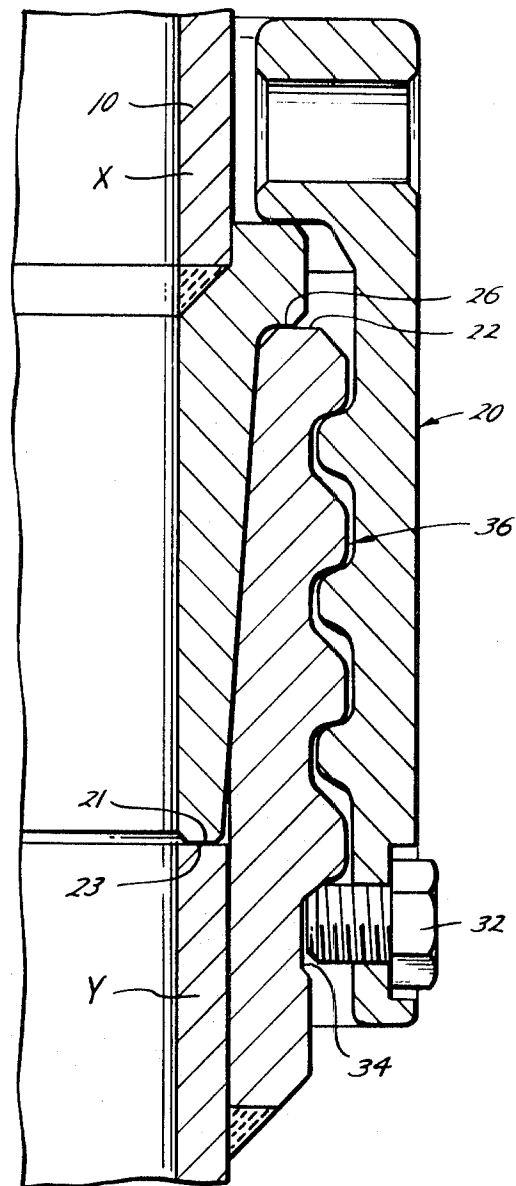


Fig. 5

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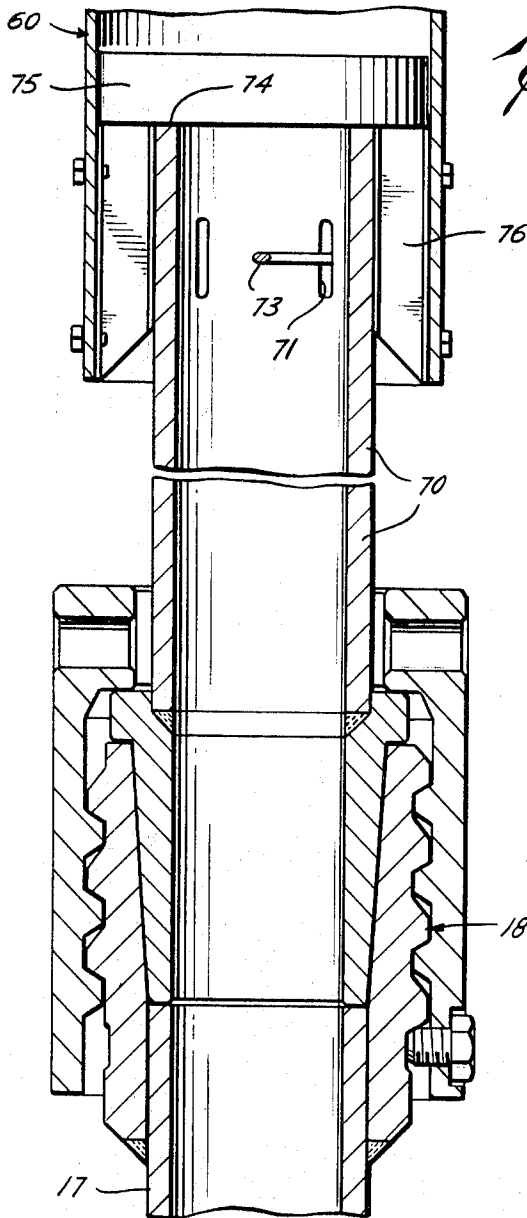


Fig. 6

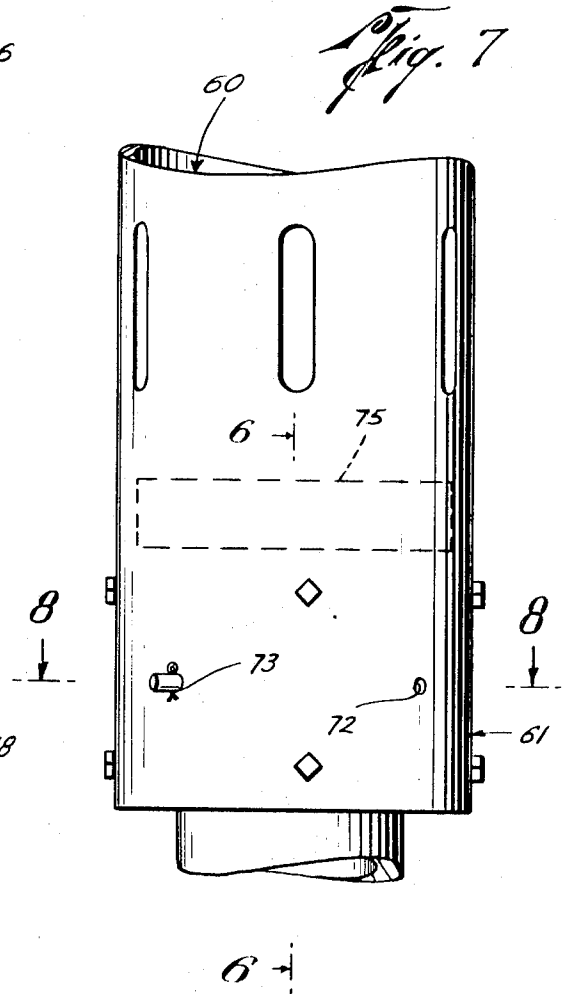


Fig. 7

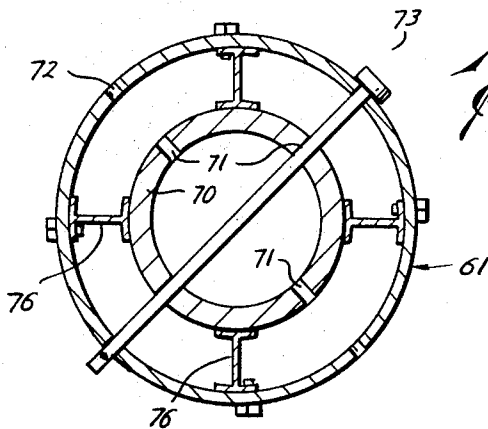


Fig. 8

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ARRANGEMENT FOR ALIGNING AND CONNECTING SECTION OF CYLINDRICAL MEMBERS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The field of the present invention relates to aligning and connecting adjacent sections of cylindrical members to enable them to be driven into the earth in a water-covered area or on land.

More specifically, it relates to a unique arrangement for enabling the adjacent sections to be quickly aligned and connected together to form a continuous member that is to be driven into the ground.

2. Description of the Prior Art

Driving casing, cassions, piling, or other cylindrical members into the earth has been long employed in the mining, construction, salvage, and petroleum industries. In such operations, sections or lengths of the members to be driven are added successively in end to end relation as the piling is driven into the ground to form a continuous pile, cassion, casing, or other cylindrical conductor.

The sections or lengths are usually connected, one at a time, to the portion that has been driven into the earth by means of collars or by means of welding of the adjacent sections or lengths together.

Where no attempt is to be made to retrieve the driven column of cylindrical members, slip-on collars may be used for connecting adjacent sections or lengths of cylindrical members together.

Threaded collars can be and have been used to connect or join adjacent cylindrical members together in such operations. Heretofore, this has in some instances necessitated rotating the entire section or length that is being attached relative to the portion of the cylindrical members that have already been driven into the ground. This operation is time consuming and can under adverse circumstances be difficult. For example, it can be appreciated that exact alignment between the section being added and the string of sections already driven is necessary to avoid cross threading at the threaded connection and subsequent problems including misalignment resulting therefrom. In some situations, proper alignment is difficult and time consuming even where the driving of the cylindrical members is to be accomplished from the land surface of the earth, or from stable barges located in sheltered or placid waters. Also, as the section being added is lowered for connection, it is not always possible to stop downward movement of the section at the desired level for proper connection. In such event, the section being lowered may strike the upstanding part with which it is to be joined thus jamming the weight of the section against the upstanding part, or the section may swing against the upstanding part which may damage either the section or the upstanding part or portion with which the section is to be joined.

It can be appreciated that alignment problems may increase where it is desirable to drive cylindrical members into the earth in submerged areas from various floating structures such as vessels, barges, or ships. It can be appreciated that under some circumstances the floating vessels may be moved somewhat, or even violently, depending upon wave action, currents, tides, surges, and the wind.

SUMMARY OF THE INVENTION

The present invention aids in overcoming some of the problems attendant with aligning and connecting tubular sections or cylindrical members together where such is to be accomplished in water covered areas that may be subject to possible vertical and/or horizontal motion of the vessel caused by the water and wind.

More particularly the arrangement includes, in addition to a desired configuration on the ends of the cylindrical members, an aligning and connecting sleeve which is carried on the stabbing end of the cylindrical member which is to be stabbed and connected with the portion or string of the cylindrical

members that are projecting upwardly from the ground into which they have been driven and above the surface of the water. The aligning and connecting sleeve enables the cylindrical member which is to be added to the string and then driven into the ground to be more readily aligned with the portion of the string which has already been driven into the ground and the connecting sleeve may be moved to engage the end of the string and then the stabbing end of the cylindrical member may be engaged with the upwardly projecting threaded end of the string. Such arrangement requires only the rotation of the entire section and also includes a means for locking the sleeve after it has been threadedly connected with the upwardly projecting end of the string so that during subsequent impacts to drive the added cylindrical member into the ground, the sleeve will not become disengaged.

One of the objects of the present invention is to provide a cylindrical member constructed and arranged to aid in aligning and connecting the cylindrical member with similar sections or lengths of cylindrical members whereby they may be driven in water-covered areas.

A further object is to inhibit damage either to a member or to the upstanding string of members with which the member is being joined or connected.

Another object is to provide an arrangement for connecting a member to a string of members, wherein the member being connected may strike or hit against the upper end of the string without necessarily damaging either the member or the upper end of the string of members.

Yet a further object is to support a connecting sleeve on a member to be lowered into position for connecting with a string of members, so that relative movement between the connecting sleeve and member may occur should the sleeve strike the end of an upstanding cylindrical member with which the sleeve and member on which it is supported is to be connected.

Still a further object is to provide an arrangement to accommodate positioning and alignment of a member relative to the upper end of one or more members when the connecting part of the member and the member or members with which the member is to be joined are in end to end abutting relationship.

More particularly, a tapered bowl is formed on one end of the cylindrical sections, or members, and a stabbing tapered pin is provided on the other end of each of the sections, or members, which is adapted to be fitted within the tapered bowl. The end of the cylindrical members or sections which carries the stabbing tapered end is provided with a shoulder for supporting a connecting sleeve thereon which extends downwardly around the tapered end and is spaced radially relative to the tapered end. The connecting sleeve may be aligned with the upper end of the string of members which has been aligned with the upper end of the string of members which has been previously driven into the ground, and the connecting sleeve and cylindrical member on which it is supported then lowered so that the tapered stabbing pin is seated within the bowl whereupon the connecting sleeve may be rotated to connect the two adjacent members together.

This enables large diameter and/or heavy tubular members to be aligned and connected more readily even when operating in adverse conditions such as high winds, or when operating from a floating structure which may be subject to surface motion or winds.

Another object of the present invention is to provide a connecting sleeve for adjacent cylindrical members which sleeve aids in aligning the member to be added with the portion of the string which has been driven into the ground.

Still another object of the present invention is to provide an alignment and connecting sleeve on one end of a cylindrical member which is to be added to a string of cylindrical members which has been successively connected in end-to-end relation and driven into the ground, which alignment and connecting sleeve may be moved relative to the cylindrical member on which it is supported so as to initially telescope over the upwardly projecting end of the cylindrical members

previously driven into the ground so that the cylindrical member being added may thereafter more readily telescope into the upwardly projecting portion of the string and the sleeve rotated to connect them together.

Another object of the present invention is to provide an alignment and connecting sleeve for cylindrical members of a particular configuration which includes lock means to lock the sleeve in position after it has been rotated to connect the cylindrical members together.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic illustration showing a barge with a rack thereon for supporting sections, or lengths, of cylindrical members and a well means in the barge or vessel to support one of the sections in position for lifting and connecting into the section. The drawing also shows a plurality of cylindrical members that has been engaged and driven into the ground with one of the cylindrical members of the present invention elevated and ready to be lowered, aligned, and connected with the upwardly projecting end of the string which has been driven into the ground in a water-covered area;

FIG. 2 illustrates in sectional view, and somewhat diagrammatically, the upper end of the string of members shown in FIG. 1 which has been previously driven into the ground with the members to be added thereto immediately thereabove along with the connecting sleeve;

FIG. 3 is a partial sectional view, but somewhat similar to FIG. 2 in that it shows the aligning and connecting sleeve lowered over the upwardly projecting end of the string prior to telescopically abutting the ends of the cylindrical members;

FIG. 4 shows the relationship of the cylindrical member to be added to the string to the upwardly projecting string after it has been telescopically abutted therein;

FIG. 5 shows the relationship of the cylindrical members and the aligning and connecting sleeve after the connecting sleeve has been moved to its final, locked position to retain the cylindrical members engaged;

FIG. 6 is a sectional view of the lower portion of a conventional diesel hammer with a form of an adapter for use with the present invention;

FIG. 7 is an elevational view of the lower portion of a hammer prior to connecting the adapter thereto; and

FIG. 8 is a sectional view on the line 8—8 of FIG. 7.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Attention is first directed to FIG. 1 of the drawings wherein a cylindrical member constructed in accordance with the present invention is represented generally by the numeral 10 and is shown as being supported on a rack 11 on the barge or vessel 12 which is floating in the water 13. A well or opening within the vessel as illustrated at 16 is provided for receiving one of the sections 17 of the present invention whereby the sections may be moved from the pipe rack 11 one at a time to the well 16 for subsequent lifting and connecting into the string as will be described in greater detail.

Each of the cylindrical members which is to be connected together in end-to-end relation is provided with a tapered bowl represented generally by the numeral 18 formed on one end of the cylindrical member and a tapered stabbing end 19 formed on the other end of the cylindrical member. As illustrated in FIG. 2 of the drawings, an aligning and connecting sleeve represented generally by the numeral 20 is carried on the end of the cylindrical member adjacent the tapered end 19 to aid in aligning the tapered end 19 for being received within the tapered bowl 18 on the end of an adjacent section.

As more clearly illustrated in FIG. 3 of the drawings, the tapered bowl 18 may be a separate annular member which is secured to the cylindrical member 10 by suitable means such as the annular weld 18a. Similarly, the aligning and connecting sleeve 20 is carried on the annular flange 25 formed adjacent the end of the cylindrical member 10 and may be formed on the tapered pin 19 which may also be a separate annular

member which is then secured to the other end of the cylindrical member 10 by suitable means such as the annular weld 19a.

This arrangement provides a shoulder 21 which in effect is one end of the cylindrical member 10 adjacent the inner end of the taper on the bowl 18 and a shoulder 22 which is the outer end of the tapered bowl 18. Similarly, the end 23 of the tapered end 19 provides a shoulder as does the radially projecting flange 25, such shoulder being designated by the number 26 thereon for engaging and abutting on the shoulder 22 formed on the outer end of the bowl 18 when the adjacent cylindrical members are telescoped together as shown in FIG. 5 of the drawings. Thus, when any impact is imparted to the upper end of the cylindrical member 10 which has been added to the string, it is directed downwardly therethrough and into the string of connected sections of pipe represented by the numeral 30 in FIG. 1 of the drawings to drive them into the ground.

In order to aid in retaining the aligning and connecting sleeve 20 engaged as shown in FIG. 5 of the drawings, at least one nut and preferably a plurality of circumferentially spaced nuts, one of which is shown at 32, is threaded through a threaded opening in the aligning and connecting sleeve 20 for engaging the lowermost thread formed on the tapered bowl 18 to aid in retaining the sleeve in threaded engagement as the blows are delivered to the upper end of the cylindrical member being added to the string.

If desired, a circumferentially extending recess 34 may be provided beneath the threaded surface referred to generally by the numeral 36 on the outer surface of the tapered bowl 18 so that the ends of the nuts 32 may fit thereinto.

It will be noted, as better illustrated in FIG. 2, that the aligning and connecting sleeve 20 is provided with an opening 20a which is somewhat larger in diameter than the outer diameter of the tubular member on which it is to be received, and a shoulder 20b formed on the inner end of the aligning and connecting sleeve 20 is adapted to rest on the shoulder 20c formed by the upper end of the radially projecting annular flange 25 formed on the tapered end 19 as shown in the drawings.

It will also be noted that the aligning and connecting sleeve 20 while depending downwardly to surround the tapered end 19, is also radially spaced therefrom to provide ample clearance for initially engaging the lower end of the aligning and connecting sleeve 20 about the upper end of the tapered bowl 18.

In this regard, attention is directed to FIG. 2 of the drawings wherein the aligning and connecting sleeve 20 on the lower end of cylindrical member 10 is shown as resting on the upwardly projecting end of the string 30 to which the section having the connecting and aligning sleeve is to be added.

It can be appreciated that when the section or length of tubular member is being lowered to be added to the string, it is not always possible to stop the downward movement of the section to be added at the exact, desired level. Thus, if the sleeve 20 contacts the upper end of the upwardly projecting string 30, the string 30 is supporting only the weight of the sleeve 20 and not the entire weight of the length of cylindrical member to be added. Therefore, some additional downward movement of cylindrical member 10 may occur without deleterious effect. Also, even with the aligning sleeve 20 resting on the upper end of the string, it can be moved or pushed to the position of FIG. 3 since only its weight and not the entire weight of the section is resting on the upper end of the string 30.

It can be appreciated that when driving large diameter or heavy tubular members in water-covered areas, the vessel from which the operations are being conducted may be subjected to wind as well as wave action, thus causing some difficulty in properly aligning the members for connection.

The construction and arrangement of the sleeve 20 is such that it provides a portion 20d which is unthreaded at its lower end, and in view of the fact that the opening 20a is somewhat

larger in diameter than the outer surface of the cylindrical member upon which the sleeve 20 is carried, it may be moved about even though relative movement, both vertical and horizontal, is occasioned between the member 10 being added into the string 30 of members 10 which has been previously connected together to form the string 30. Under such conditions, or generally even when there is no substantial relative movement caused by wind or wave action, the aligning and connecting sleeve is first positioned relative to the tapered bowl 18 as illustrated in FIG. 3 of the drawings so that the unthreaded portion 20d is telescoped over the threaded surface 36 formed on the exterior of the tapered bowl 18. Once the relationship of FIG. 3 is established, the member 10 which is being added may then be lowered so that the annular tapered surface 19a may be guided into the tapered bowl 18 to abut the ends 26, 22, 21, and 23, respectively.

Circumferentially spaced openings 40 are provided adjacent the upper end of the connecting and aligning sleeve 20 so that the sleeve 20 may then be rotated by engaging any suitable means therein to rotate the sleeve to lock the tapered end 19 in the tapered bowl 18. A lock means in the form of the nuts 32 may then be moved inwardly to engage beneath the lowermost thread formed on the bowl 18 and engaged within the recess 34 to prevent disengagement of the locking sleeve 20 as impacts are delivered to the upper end of the member 10.

It can be appreciated that suitable conforming threads 20e are formed on the inner surface of the aligning and connecting sleeve 20 for engaging with the threaded surface 36 formed on the exterior of the tapered bowl 18 as previously described.

In use of the present invention, a suitable frame arrangement as represented generally by the numeral 50 is provided on the vessel or barge 12, and a suitable power source is provided for raising and lowering the hammer represented by the numeral 60 by means of the cable 61 which extends upwardly over a sheave (not shown) at the upper end of the frame 50. The hammer 60 is provided with an adapter, as will be described, for engaging with the threaded surface 36 on the tapered bowl 18 on the cylindrical member 17 within the well 16 whereby it can be elevated to the position illustrated by the numeral 70 in FIG. 1 of the drawings.

Attention is first directed to FIG. 7 wherein the lower portion of a hammer 60 used in such operations is referred to generally by the numeral 61.

In FIG. 6, an adapter 70 is provided with slots 71 which may be aligned with openings 72 and a rod 73 inserted therethrough as also shown in FIG. 8. The upper end 74 of the adapter 70 abuts the element 75 through which blows are delivered to the adapter 70, section 17, and string 30 when they are connected. The hammer 60 is of well-known construction and forms no part of the present invention.

The adapter 70, after connection with the hammer 60, may be threadedly engaged with the section 17 in the well 16 to enable it to be elevated as shown in FIG. 1. The adapter is actually a portion of one of the cylindrical members which has the stabbing end 19 and connecting and aligning sleeve 20 carried thereon as shown in FIG. 6. It can be appreciated that the adapter 70 will be of the same diameter as the section 17 and the string 30 to which it is to be added.

Guide shoes 76 are mounted in the lower end 61 of hammer 60 as well known in the art to accommodate cylindrical members of different diameter.

One of the advantages of the present invention is that it eliminates the necessity of rotating an entire section of a cylindrical member to threadedly engage it with the upper end 82 of the string 30 as previously described.

Also, as previously noted, if the sleeve 20 hits the upper end 82 of string 30 as a section 17 is being added, only the weight of the connector sleeve 20 is rested on the upper end, thus reducing the possibility of damage to the section 17 being added, or to the upper end of the string 30. Furthermore, once the sleeve has been moved, or aligned so that it drops around the upper end of the string 30 as shown in FIG. 3, subsequent misalignment due to wave or wind action is lessened.

Thereafter, the connector sleeve 20 may be rotated to lock the section being added with the upper end of the string 30, and then the hammer 60 operated by means well known in the art to drive the string 30 further into the ground.

Also, this arrangement enables the blow from the hammer 60 to be delivered from the adapter directly to the string 30 since all shoulders between the section 17 which is added and the string 30 are abutted after the new section is joined in the string 30 as described.

The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and various changes in the size, shape, and materials as well as in the details of the illustrated construction may be made without departing from the spirit of the invention.

What is claimed is:

1. An arrangement for aligning and connecting elongated members to be driven into the earth comprising:

- a tapered bowl formed on one end of the elongated members to be connected together;
- threads formed on the exterior of said bowl;
- a tapered end formed on the other end of the elongated members for seating within said tapered bowl of an adjacent elongated member;
- an annular shoulder formed on the elongated member adjacent the inner and outer ends of said bowl;
- an annular shoulder formed on said tapered end for abutting said shoulder on the outer end of said bowl when the tapered end is seated within said bowl and engaged against said shoulder at the inner end of said bowl;
- an additional shoulder formed adjacent said tapered end and projecting outwardly therefrom;
- an aligning and connecting sleeve resting on said additional shoulder, said connecting sleeve surrounding said tapered end and spaced radially therefrom; and
- threads formed on the inner surface of said sleeve for engaging with the threads on said bowl to maintain said annular shoulders in abutting relationship for transmitting a driving force through the connected elongated members.

2. The invention of claim 1 wherein said sleeve includes openings therein whereby said sleeve may be engaged and rotated to threadedly engage adjacent cylindrical members together.

3. The invention of claim 1 wherein said tapered bowl is formed in a separate annular member and secured to said cylindrical member by welding and wherein said aligning and connecting sleeve is an annular member having an opening through which said cylindrical member extends and wherein said tapered end is a separate annular member secured to said cylindrical member by welding after said sleeve is placed on said cylindrical member.

4. The invention of claim 1 including means for locking said sleeve on said bowl when they are engaged.

5. The invention of claim 4 wherein said lock means includes at least one nut threaded through said sleeve for engaging beneath said threads formed on said bowl to retain said sleeve in threaded position thereon.

6. The invention of claim 4 wherein said lock means includes a circumferential groove in said bowl into which said nut may be engaged.

7. An adapter for connection with a hammer to deliver a blow longitudinally of an elongated member including:

- means for releasably engaging the adapter with the hammer;
- means for releasably engaging the adapter with an elongated member to which a hammer blow is to be delivered; and
- said adapter including:
 - a tapered portion formed adjacent one end thereof for fitting in a tapered bowl on the elongated member;
 - a shoulder formed adjacent said tapered end and projecting radially therefrom;
 - an additional shoulder formed on said tapered portion, each of said shoulders abutting the elongated member; and

4. an aligning and connecting sleeve resting on said radially projecting shoulder for maintaining said shoulders in engagement with the elongated member to deliver a blow longitudinally of the elongated member.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,616,866 Dated November 2, 1971

Inventor(s) KEES M. VERHEUL and HOWARD I. LORENZ

It is certified that error appears in the above-identified patent
and that said Letters Patent are hereby corrected as shown below:

On the cover page, after "7 Claims", change "3" to --8--.
On the cover page, after "Attorney - Jack W." change
"Hyden" to --Hayden--.

Signed and sealed this 18th day of April 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents