May 12, 1931. G. A. GUYER 1,805,086

PILING SPACER

Filed Feb. 15, 1930

Fig. 1.

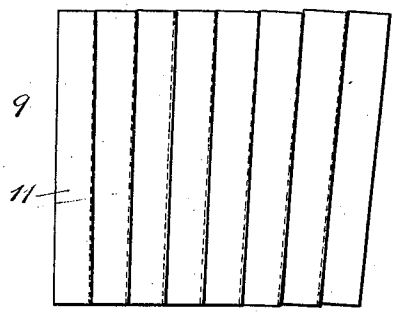


Fig. 2.

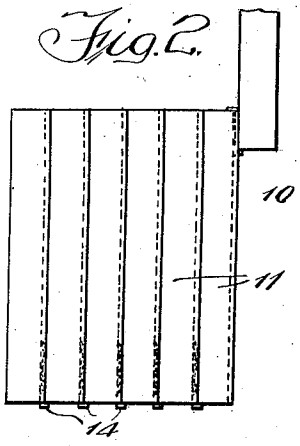


Fig. 3.

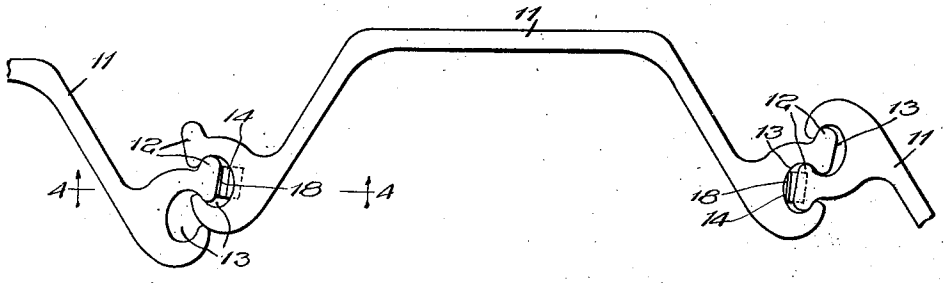


Fig. 4.

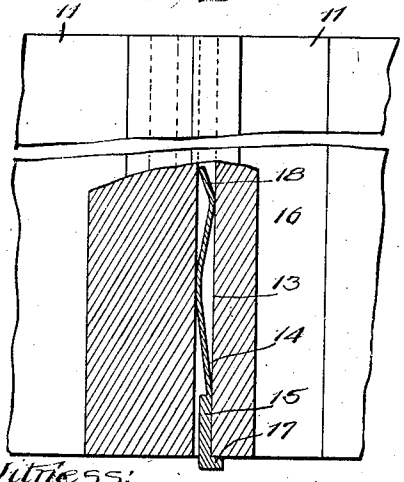


Fig. 6.

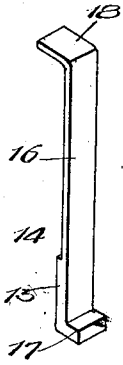
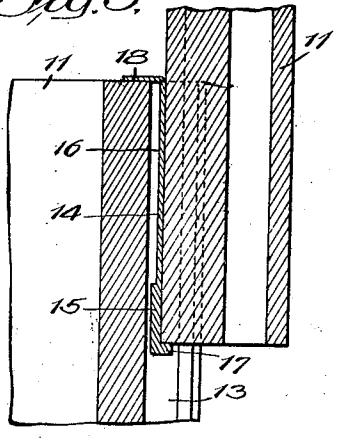


Fig. 5.



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Patented May 12, 1931 1,805,086

UNITED STATES PATENT OFFICE

GEORGE A. GUYER, OF CHICAGO, ILLINOIS

PILING SPACER

Application filed February 15, 1930. Serial No. 428,741.

My invention relates to steel sheet piling, and more particularly it relates to improved means for maintaining the verticality of the individual sheet piling when driven in interlocking relation to form a wall.

Still more particularly it relates to an improved spacing device for use in driving such interlocking piling to compel each piling section, as it is driven, to take and remain in vertical parallel relation to the sections previously driven.

It is well known to those familiar with the art that in driving sheet piling sections, one at a time, to form a wall, there is a tendency of the section to draw ahead at the top and to squeeze in at the bottom by reason of the soil pressure. Each section, as driven, is thereby inclined outwardly at the top relative to the next adjacent section, so that after a few sections are driven, the inclination is so great as to require correction if the sections are to be maintained substantially vertical. Various schemes and attempts have been heretofore made to maintain substantial verticality of such sections. In some cases, the desired result has been obtained by providing a tapered section having its narrow end at the top, the difference in width of the top and bottom ends being sufficient to compensate for the total accumulated inclination to the vertical. The tapered sections are driven at intervals, determined by the amount of inclination of the last driven section. The manufacture of such tapered sections is expensive and their driving requires more time than for the normal straight piling section.

Various attempts have been heretofore made to maintain the desired verticality of steel sheet piling. In some cases wedges have been driven upwardly from beneath the piling section into the clearance space between such section and the last driven section. Such a wedge operates successfully to prevent the squeezing in action of the particular section being driven providing it remains in position throughout the driving operation. Since the bottom of the section being driven is frequently inaccessible, this is objectionable for the reason that excavation has to be made in order to properly position such a wedge. Another objectionable feature is that such spacers thus driven from below are held suspended entirely by their wedging action and for this reason are frequently released by the concussion of the driving hammer in case a pocket or open space in the soil is encountered. A spacer thus suspended having once dropped out of position, no longer functions and the further driving of the section is necessarily completed with nothing to prevent the objectionable squeezing in action at the bottom of the section.

The invention contemplates an improved spacing device operable to be positioned from above in the clearance space of the ball and socket connection of two adjacent interlocking sheet piling sections. The spacer is so constructed as to be suspended from the top of the pile section adjacent the one being driven. One of such spacers is required for each section. Following the initial driving operation, such spacers are no longer suspended from the top of the adjacent section, but are carried downwardly with the section being driven and each device functions as a spacer, moving with and holding the bottom of the section being driven at a fixed predetermined distance from the next adjacent section. The resiliency of the device causes it to be held in fixed relation to the section being driven and thereby secures it against falling out of position, regardless of the amount of concussion resulting from the hammer strokes or the strains to which the sections are subjected in the driving process. The device thereby holds the bottom of the section throughout the entire driving opera-

tion at a fixed distance relative to the next adjacent section.

An object of the invention is the provision of pile spacers of the kind described, operable for use with interlocking steel or other sheet pile sections, whereby said sections are maintained in parallel relation when driven to form a wall.

Another object of the invention is the provision of a device of the kind described which, having once been placed in operative position between two pile sections, will follow the driven section throughout its entire travel and is secured against dropping and falling when pockets are encountered.

A further object of the invention is the provision of a device of the kind described, which is simple, compact, inexpensive to manufacture, and suitable for its intended purpose.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts,

Fig. 1 is a diagrammatic view of a piling wall illustrating the tendency of the bottom of the sections to pack together and to spread at the top;

Fig. 2 is a diagrammatic view of a piling wall wherein the tendency of the bottom of the sections to squeeze together has been prevented by the use of devices embodying my invention;

Fig. 3 is a view to a larger scale showing typical ball and socket joints forming interlocking connections between adjacent pile sections;

Fig. 4 is a view illustrating one of the devices comprising my invention in position between and near the bottom of two piling sections, the driving of which has been completed;

Fig. 5 is a view illustrating the device suspended in position ready for the initial operation of driving a pile section; and

Fig. 6 is a perspective view of the device.

Referring now more particularly to the drawings, the numeral 9 generally designates a wall made up of a plurality of steel sheet piling sections 11 driven one by one, in interlocking relation without the use of any device for maintaing the verticality of the sections. The numeral 10 generally designates a wall made up of a plurality of steel sheet piling sections 11 likewise driven in interlocking relation but with a spacing device 14 comprising my invention so positioned as to cause the section being driven to remain parallel to the next adjacent section with which it is interlocked.

Each edge of a section 11 is provided with two projections, one of which designated by the numeral 12 forms an outer enlarged bell shaped section. The other projection 19 designated by the numeral 19 is curved and spaced away from the section 12 to form a socket 13 as best shown in Fig. 3. The sections 11 are interlocked by positioning the projection 12 of one section in the socket 13 of the other and the projection 19 of said other section in the socket 13 of the first mentioned section. The connection, as thus shown, possesses all of the advantages of a ball and socket joint with sufficient clearance space in the interlock for ease of driving and pulling. Contact between the bell shaped projection 12 and the walls of socket 13 is made by lines rather than by surfaces, so that wedging action when the piling section is driven or pulled is prevented and maximum strength is secured for the wall in both lateral and longitudinal directions. The socket or packing space 13 thereby provided is usually large enough to provide a clearance space for the interlocking portions of two adjacent sections 11. The soil pressure tends to force the bottom of the section 11 inwardly against the adjacent section the full amount permitted by the clearance space, and correspondingly pulls the top of the section outwardly so that a section driven without a spacing device will be inclined to the section with which it is interlocked the maximum permitted by the clearance. This tendency of the driven section to squeeze in at the bottom is prevented by suspending my spacing device 14 from the top end of the section last driven in the clearance space 13, as a preliminary to the driving operation as is best shown in Fig. 5.

The device 14 is shown as of integral construction, but it may be made of separate pieces properly assembled to form a unitary structure. As shown, the device 14 comprises a relatively thick bottom spacer member 15 and an upper relatively thin longitudinally extending supporting member 16. The upper end of the supporting member 16 is extended rearwardly to form a lateral member 18, which rests upon the upper edge of the last driven pile section 11.

Both the supporting member 16 and the lateral member 18 are sufficiently thin that pressure resulting from contact therewith of the lower end of the pile being driven forces the member 18 into the inclined position and the member 16 into the curved position shown in Fig. 4. The spacer member 15 has a thickness slightly less than the maximum clearance space so that a section 11 next to be driven can be placed in position as shown in Fig. 5 with its lower end resting

upon a shelf 17 projecting from the spacer member 15 in a direction opposite to that of the lateral member 18. The distance from the free end of the lateral member 18 to the opposite face of the longitudinally extending member 16 is preferably slightly greater than the thickness of the clearance space in which the spacer member 14 is positioned, so that the device will not be lost accidentally by dropping through the clearance space 13, before the driving operation is started.

Since the pile section 11 rests upon the shelf member 17, the driving operation will carry with it the device 14 and by pulling upon the supporting member 16 will cause the lateral member 18 to bend relative to the member 16. Since the member 16 is relatively thin, it is easily distorted laterally and the continued driving operation will cause it to take a position substantially as shown in Fig. 4.

As a result of the distortion of the members 16 and 18, they have a plurality of points of sliding contact with the adjacent pile previously driven which prevent the device from dropping out of the clearance space 13 in which it is positioned, should pockets be encountered in the soil. The resiliency of the members 16 and 18 hold them against displacement relative to the pile section being driven during its travel downwardly. The device 14 is intended for a single driving operation.

No attempt is made to recover the device after the driving of a pile section is completed since its simplicity of construction makes it inexpensive to manufacture and adapts it as an article intended for a single operation.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence, I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. A unitary device of the kind described comprising a relatively thick spacer member, a relatively thin longitudinally extending supporting member and a lateral member projecting from the device, the thickness of the spacing member being less than the distance from the free end of the lateral member to the opposite face of the device.

2. A unitary device of the kind described comprising a relatively thick spacer member, a longitudinally extending supporting member and a lateral member projecting from the supporting member, the length of the lateral member combined with the thickness of the supporting member exceeding the thickness of the spacer member.

3. A unitary device of the kind described comprising a relatively thick spacer member, a relatively thin longitudinally extending supporting member, a lateral member connected with the free end of said supporting member, the length of said lateral member being greater than the thickness of said spacer member.

4. A unitary device of the kind described, comprising a relatively thick spacer member, a relatively thin longitudinally extending supporting member projecting from one end of said spacer member, a lateral member projecting from the supporting member, the length of said lateral member being greater than the thickness of the spacer member and a lateral projection forming a shelf on said spacer member.

5. A unitary device of the kind described, comprising a relatively thick spacer member, a relatively thin longitudinally extending supporting member projecting from one end of said spacer member, a lateral member projecting from the supporting member, the length of said lateral member being greater than the thickness of the spacer member and a lateral projection forming a shelf on said spacer member, said lateral projection being on the opposite side of said device from the lateral member.

6. A pile straightening device for positioning in the clearance space between two interlocking steel sheet piling sections, said device comprising a spacer member having a thickness slightly less than the width of said clearance space, and a relatively thin longitudinally extending supporting member adapted to suspend said spacer member from the top of one of said sections.

7. A pile straightening device for positioning in the clearance space between two interlocking steel sheet piling sections, said device comprising a spacer member having a thickness slightly less than the width of said clearance space, a relatively thin longitudinally extending member from which said spacer member is suspended and a lateral member projecting from said longitudinally extending member into engagement with the end face of one of said sections, and a member projecting from the spacer member into cooperative engagement with the lower end face of the other section for the purpose described.

8. A pile straightening device for positioning in the clearance space between two interlocking steel sheet piling sections, said device comprising a spacer member having a thickness slightly less than the width of said clearance space, a relatively thin longitudinally extending member from which said spacer member is suspended and a relatively thin lateral member projecting from

said longitudinally extending member into engagement with the end face of one of said sections, and a relatively thick member projecting from the spacer member into cooperative engagement with the lower end face of the other section for the purpose described.

In witness whereof, I hereunto subscribe my name this 10th day of February, A. D. 1930.

GEORGE A. GUYER.