E. A. GARRATT.

METAL PILING.

APPLICATION FILED JULY 30, 1910.

1,007,089. **Patented Oct. 31, 1911.**

2 SHEETS—SHEET 1.

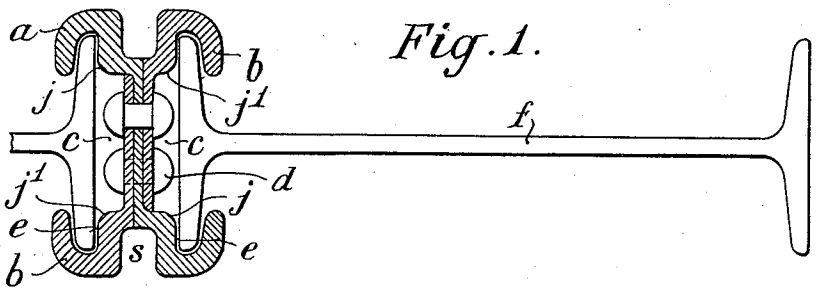
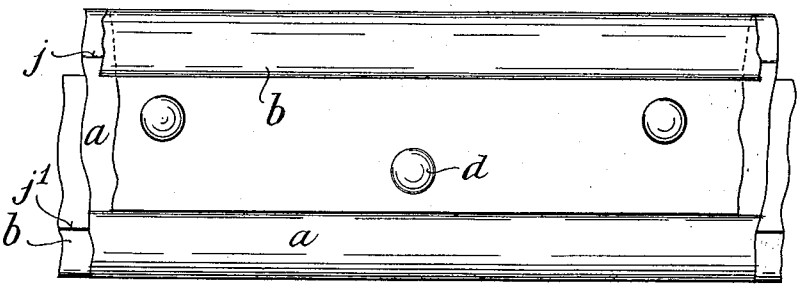


Fig. 1.

Fig. 2.



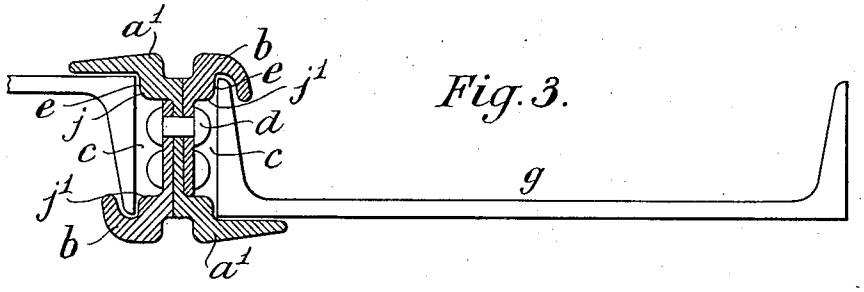
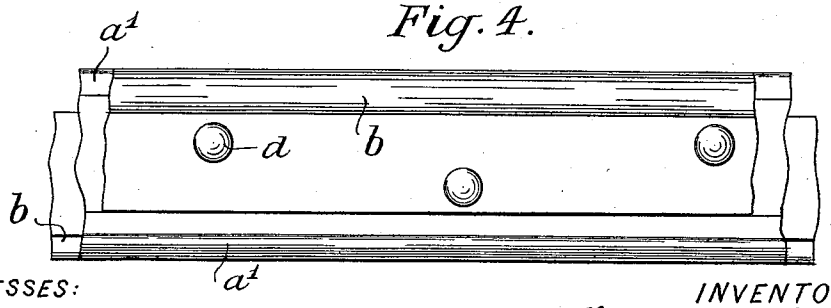


Fig. 3.

Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

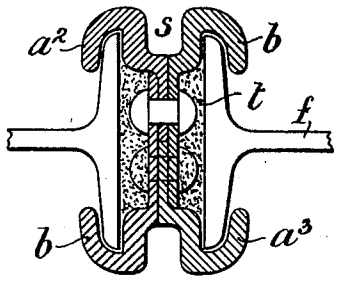


Fig. 6.

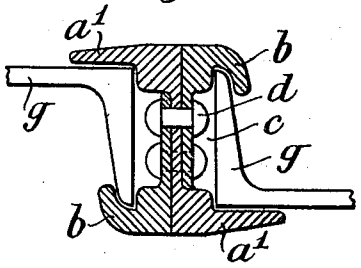


Fig. 7.

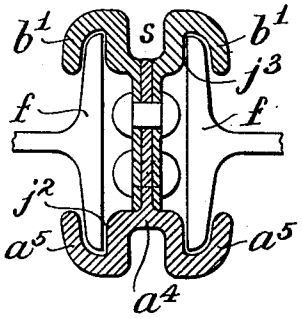


Fig. 8.

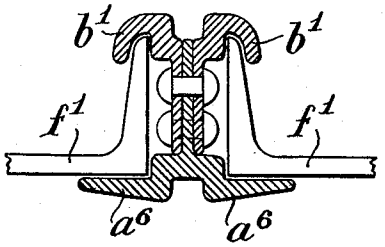
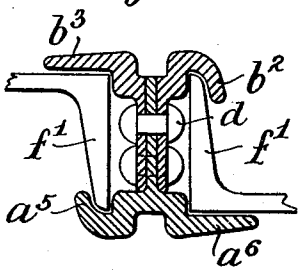


Fig. 9.



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UNITED STATES PATENT OFFICE.

ERNEST ALBERT GARRATT, OF LONDON, ENGLAND.

METAL PILING.

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Application filed July 30, 1910. Serial No. 574,606.

To all whom it may concern:

Be it known that I, ERNEST ALBERT GARRATT, of 78 Gracechurch street, in the city of London, England, have invented certain new and useful Improvements in Metal Piling, of which the following is a specification.

This invention relates to metal sheet piling, and in particular to interlocking members of the clutch type, that is to say in which the interlocking member has claw-like flanges bent over more or less parallel to the transverse axis of the member, (*i. e.* the axis transverse to the run of the piling) so as to embrace the flange or flanges of I-bars, channels or bars of other section forming the piling, to act as guides for the same in driving and to form therewith when driving the wall of piling. It has been proposed to construct interlocking members of this type of two channels riveted back to back and having their flanges turned around to embrace the flanges of I-bar piles, but such members involve practical difficulties. The rivets must not project beyond the inner face of the channel, since a smooth face must be provided throughout the length for guiding and seating the I-bar. Consequently the rivet holes have to be double countersunk, which weakens the interlocking member and necessitates the employment of very thick material therefor, besides adding to the cost. Also there is a straight path for the passage of water through the joint between the two channels, so that leakage is very liable to occur. Moreover the flanges of the interlocking member have to be bent around by special rolling operations which render the manufacture expensive. In the specification of previous British Patent No. 6212 of 1907 is described an invention whereby these disadvantages were in part overcome by the employment of an interlocking member produced in one piece by bending around the flanges of a bar of approximately I section so as to embrace the flanges of the intermediate members. Such interlocking members however still necessitate special rolling operations for bending around the flanges and require very careful and skilful manufacture.

Now according to the present invention I produce interlock clutches by the combination with a bar having a web transverse to the run of the piling and rolled with hooks or flanges on opposite sides of elements of hook or flange section riveted to the web of the said bar on the opposite sides, this web and the hooked or flanged elements riveted thereto being formed with shoulders adapted to serve as abutments for the flanges or transverse faces of the piling bars that are embraced by the flanges or hooks of the clutch, and projecting on both sides to such an extent that without any countersinking the heads of the rivets may be flush with or behind the said shoulders of the web and elements riveted thereto, the arrangement being such that there are at least two hooks proper, *i. e.*, incurved hooks one on each side of the mid web of the clutch, for embracing transverse flanges of the piling members proper. The hooks or flanges (or it may be the hook and flange rolled on the opposite lateral faces of the member having the transverse web may be at the same end of the transverse web or at opposite ends thereof, but in any case the web and the elements riveted thereto will be formed with shoulders in the manner before described. The interlock clutch may for example be produced by the combination of a bar of double hook section, having its hooks at opposite ends of the mid web, with bars of hook section riveted thereto, the mid web of the double hook bar being joggled or formed with shoulders so as to form a seating for the hook-section bars to be riveted thereto, which latter bars are also joggled or formed with shoulders, which together with those of the double hook bar form an abutment on each side of the clutch for the flanges or transverse faces of the piling bars embraced by the hooks or flanges of the clutch, and at the same time provide a recess of sufficient depth that the rivet heads without countersinking may lie flush with or behind the said shoulders.

The middle web of the compound interlocking member will consist of three thicknesses riveted together strongly without any necessity for countersinking and while still presenting unobstructed guiding and seating faces for the piling members proper and also without involving the presence of a straight path for water between the riveted joint. Further by the said construction a space can be provided between the interlocking clutch and the piling members it embraces, so that the surface on which the piling members proper slide is diminished thus reducing friction in driving. Also into the space thus provided a grouting or packing of cement, concrete or other suitable sub-

stance may be run or introduced. Moreover, owing to the simple form of the elements of the interlocking member, this can be produced without any necessity for special bending operations for turning the edges. A strong mid web is obtained without necessity for employing thick material, and indeed owing to the three thicknesses of the mid web, lighter material can be used. Any thickness of interlock element can be used, and the thickness of metal can readily be varied according to the particular point where strength is required. Further owing to the absence of requirement for special bending operations on the edges, the hooks can be constructed to embrace and overlap the flanges of the piling member to any desired extent.

By altering the transverse distance apart of the rivets within certain limits, the depth of the clutch, *i. e.* its transverse width, can be increased or diminished, this being often of advantage in practice.

In some cases the middle member having the transverse web may be made in halves or parts, so that it consists of two bars having their transverse web portions placed together and riveted between the other elements in the manner above described, the arrangement still being such as to provide for the two shoulders and the recess at each side of the mid flange. This construction presents the advantage that the depth (transverse width) of the clutch can be varied by altering the transverse pitch apart of the rivets, while still preserving the symmetry of the clutch.

The hooks of one or more of the elements of the clutch may simply project as flanges relatively to the transverse axis of the clutch member, as for example for embracing piling members of channel section, or be otherwise suitably formed to suit piling bars or other section, and such variations of form are included in the term "hook-section" or "double hook-section."

The accompanying drawings illustrate by way of example the application of the invention in connection with piling bars of I and channel section.

Figure 1 is a transverse section of the clutch member applied to I bar sheet piles; Fig. 2 is a side elevation of this clutch member; Fig. 3 is a transverse section of the clutch member applied to channel bar sheet piles, and Fig. 4 is a corresponding side elevation of this clutch member. Fig. 5 is a transverse section of a modification in which the middle member of the clutch consists of two parts, and showing a filling of concrete run into the space between the clutch and the piling bars. Fig. 6 is a transverse section of another modification. Figs. 7, 8 and 9 are similar sections showing three further modifications.

Referring to Figs. 1 and 2 a is the bar of double hook section joggled at j j to receive and seat on each side bars b b of hook section joggled at j' j' so that the shoulders of these joggles together with those of the joggles j j combine to provide an abutment for the flanges of the piling bars f embraced by the hooks and at the same time to provide a recess c on each side of such depth that the elements a and b can be riveted together without any countersinking and without the heads of the rivets d projecting beyond the said shoulders. At the same time an adequate guide is provided for the flanges of the piling bars f by the inner faces e e of the hooks which embrace the same, while the friction in driving is diminished owing to the reduced area of these guiding faces and there is no straight path for water to pass through the interlocking clutch member. Grouting or packing material may be introduced into the spaces c if desired as shown for example at t in Fig. 5.

Referring to Figs. 3 and 4 the construction is the same as in Figs. 1 and 2 except that the hooks a' of the double hook member are formed at right angles to the transverse axis of the clutch member so as to embrace the back and shoulder of the piling member g of channel section, while the joggle hooks b embrace the flanges of the channel piling bars, which are driven facing in opposite directions alternately.

The element of double hook section may as before mentioned consist of two parts disposed with their straight or mid limbs in alinement so as in effect to form a double hook element and riveted between the elements of single hook section b b. Such a construction is shown in Fig. 5, a^2, a^3, representing the two-part double-hook member.

In Figs. 1 to 4, gaps or grooves s are left owing to the shape of the hooks. This may be of advantage in some cases, but the hooks may be of such section as to fill these spaces and abut back to back at these points, the hook bars being rolled with suitable shoulders as before. Such a construction is shown in Fig. 6.

It will be understood that the particular shape of the elements of the clutch member may be varied in accordance with the shape of the piling members that they are to embrace and that the invention may be applied to piling bars of other than I or channel section.

The middle bar of the compound clutch may be rolled with hooks or flanges or with a hook and a flange on the respective sides of the mid web and at the same end of the mid web, the section being such as to provide the said shoulders on the opposite sides of the mid web for coöperation with similar shoulders rolled in the elements riveted to the middle member as before mentioned.

Such constructions are shown respectively in Figs. 7, 8 and 9. In Fig. 7 the middle bar a^4 is rolled with hooked flanges a^5 a^5 on each side of the mid-web and at the same end of the mid-web, the section being such as to provide shoulders j^2 j^2 on the mid-web for coöperation with similar shoulders j^3 j^3 rolled in the elements b' b' riveted to the mid-web. f f are I-piling bars engaged by the hooked flanges. The construction shown in Fig. 8 is similar to that of Fig. 7, except that the hooks a^6 a^6 of the mid-web extend at right angles to the web. f' f' are channel bars embraced by the clutch. The construction of Fig. 9 is again similar, except that the mid-web is rolled with a hooked flange proper a^5 and a right angle hook a^6, the element b^2 riveted to the mid-web being rolled with a hooked flange proper and the riveted element b^3 being rolled with a right angle hook. f' f' are channel bars engaged by the clutch member.

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

1. An interlock clutch for sheet metal piling, comprising in combination a bar having a web transverse to the run of the piling and rolled with hooks on opposite sides, elements of hook section riveted to the web of the said bar on the opposite sides, this web and the elements of hook section riveted thereto being formed with shoulders adapted to serve as two abutments on each side for piling bars embraced by the hooks of the clutch, said shoulders projecting on both sides, whereby without countersinking the heads of the rivets do not extend out beyond the said shoulders of the web and of the elements riveted thereto, the arrangement being such that there are at least two incurved hooks one on each side of the mid web of the clutch, substantially as and for the purpose specified.

2. An interlocking clutch for metal sheet piling bars, comprising the combination of a shouldered double hook member having its hooks on opposite sides, with elements of shouldered hook section riveted thereto on the respective sides and seated in the spaces left at the respective sides by the shoulders of the first member, the outer faces of the riveted portions of the said elements lying behind the shoulders of the said member and elements whereby a recess adapted to accommodate rivet heads is provided at each side of the web of the compound clutch, the hooks of the compound clutch member projecting laterally on both sides substantially as described.

3. An interlocking clutch for metal sheet piling bars, comprising the combination of a shouldered double hook member having its hooks on opposite sides and ends of the section, with elements of shouldered hook section riveted thereto on the respective sides and seated in the spaces left at the respective sides by the shoulders of the first member, the outer faces of the riveted portions of the said elements lying behind the shoulders of the said member and elements whereby a recess adapted to accommodate rivet heads is provided at each side of the web of the compound clutch, the hooks of the compound clutch member projecting laterally on both sides, substantially as described.

4. An interlocking clutch for metal sheet piling bars, comprising the combination of a two shouldered double hook member comprising two parts in transverse alinement and having its shoulders and hooks on opposite sides, with elements of shouldered hook section riveted thereto on the respective sides and seated in the spaces left at the respective sides by the shoulders on the said two part member, the outer faces of the riveted portions of the said elements lying behind the said shoulders, whereby a recess adapted to accommodate rivet heads is provided at each side of the web of the compound clutch, and the hooks of the compound clutch member projecting laterally on both sides, substantially as described.

5. An interlocking clutch for metal sheet piling bars, comprising the combination of a two shouldered double hook member comprising two parts in transverse alinement and having its shoulders and hooks on opposite sides and ends of the section, with elements of shouldered hook section riveted thereto on the respective sides and seated in the spaces left at the respective sides by the shoulders of the said two part member, the outer faces of the riveted portions of the said elements lying behind the said shoulders whereby a recess adapted to accommodate rivet heads is provided at each side of the web of the compound clutch, and the hooks of the compound clutch member projecting laterally on both sides, substantially as described.

6. An interlocking clutch for metal sheet piling bars, comprising the combination with a two shouldered double hook member having its hooks on opposite sides, of two elements of shouldered hook section riveted thereto on the respective sides and seated in the spaces left at the respective sides by the shoulders of the first member, the shoulders of the clutch components on the respective sides being approximately in transverse alinement and the outer faces of the web portions of the shouldered hook elements lying behind said shoulders, whereby a recess adapted to accommodate rivet heads is provided at each side of the web of the compound clutch, the hooks of the compound clutch member projecting laterally on both sides, substantially as described.

7. An interlocking clutch for metal sheet

piling bars, comprising the combination with a two shouldered double hook member having its hooks on opposite sides, of elements of shouldered hook section riveted thereto on the respective sides and seated in the spaces left at the respective sides by the shoulders of the first member, the outer faces of the riveted portions of the shouldered hook elements lying behind the shoulders of the clutch components whereby a recess adapted to accommodate rivet heads is provided at each side of the web of the compound clutch, hooks of the compound clutch projecting laterally on both sides and being adapted to embrace flanges of piling bars, substantially as described.

8. An interlocking clutch for metal sheet piling bars, comprising the combination of a two shouldered double hook member having its hooks on opposite sides, with two elements of shouldered hook section riveted thereto on the respective sides and seated in the spaces left at the respective sides by the shoulders of the first member, the outer faces of the riveted portions of the shouldered hook elements lying behind the shoulders of the clutch components, whereby a recess adapted to accommodate rivet heads is provided at each side of the web of the compound clutch, the hooks of the compound clutch projecting laterally on both sides and two of them on opposite sides being directed approximately at right angles to the transverse axis of the clutch whereby to embrace the backs of channel piling bars, the other hooks of the member being adapted to embrace flanges of the piling bars, substantially as specified.

9. An interlocking clutch for metal sheet piling comprising a plurality of superposed parts greater than two having sheet piling engaging means, connected together, said parts having projecting shoulders formed thereon and said engaging means projecting beyond said shoulders.

10. An interlocking clutch for metal sheet piling comprising a plurality of superposed webbed parts greater than two having sheet piling engaging means, connected together, said parts having projecting shoulders formed thereon and said engaging means projecting beyond said shoulders.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

ERNEST ALBERT GARRATT.

Witnesses:
KENNETT A. BARRINGER,
ROBERT MILTON SPEARPOINT.