W. M. HENCH.

LIFTING CLAMP.

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Fig. 1.

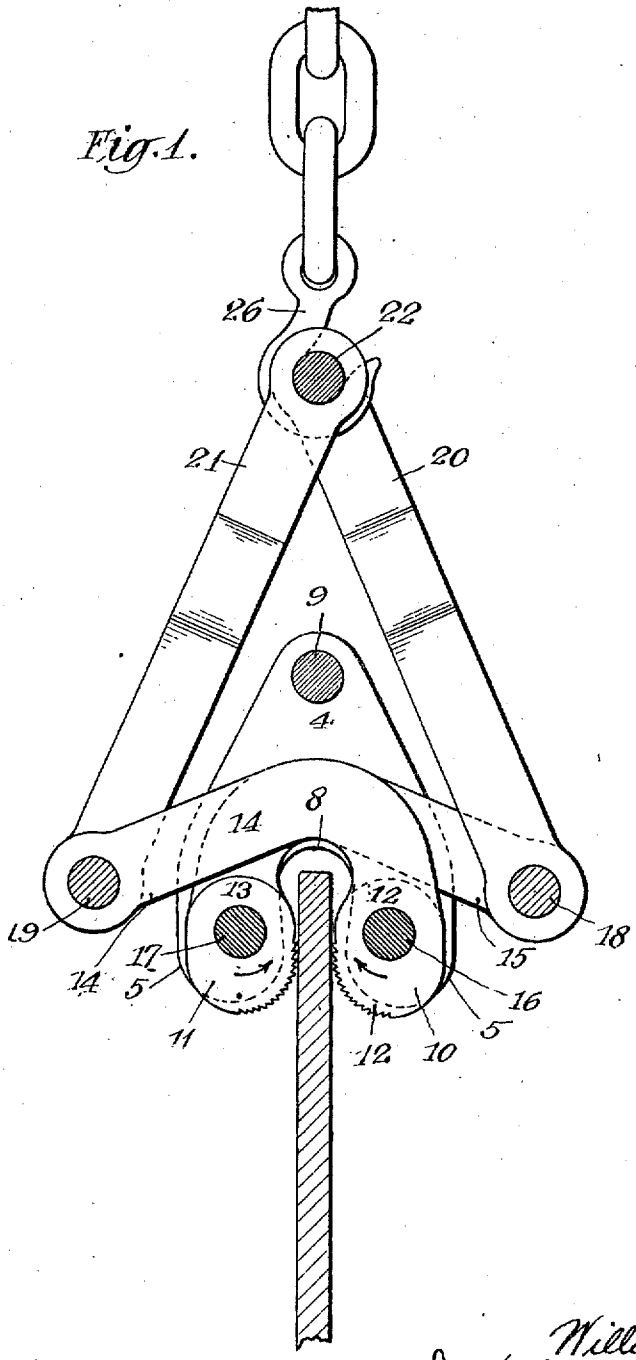
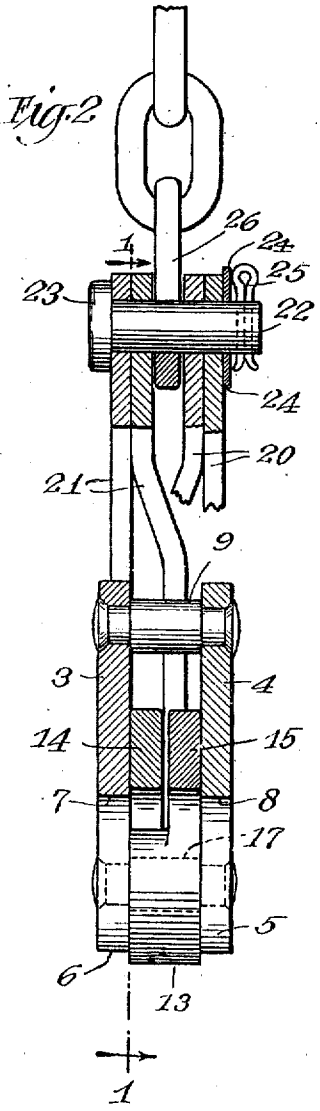


Fig. 2



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LIFTING-CLAMP.

1,369,807. Specification of Letters Patent. Patented Mar. 1, 1921.

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To all whom it may concern:

Be it known that I, WILLIAM M. HENCH, a citizen of the United States, residing in East Orange, New Jersey, have invented certain new and useful Improvements in Lifting-Clamps, of which the following is a specification.

My invention relates to clamps used for gripping and lifting comparatively heavy sheet metal plates or slabs such as are used in ship yards, boiler works and structural steel fabricating plants and the like.

One of the objects of the invention is to provide a lifting clamp having a double grip. Another object is to construct the clamp so the jaws will exert an upward gripping action on the work being lifted. A further object is to construct a clamp which is lighter in weight and at the same time safer to operate than the clamps in common use. A still further object is to provide a clamp symmetrically constructed of duplicate parts not requiring rights and lefts. Other objects will be apparent from the following description and the appended claims.

In the drawing illustrating one embodiment of my invention, Figure 1 is an elevation of my improved clamp the front cheek plate being sectioned off as indicated by line 1—1 of Fig. 2;

Fig. 2 is a sectional plan taken centrally of Fig. 1 and viewed from the right.

Heretofore lifting clamps of this general character have been made of heavy forgings having one fixed jaw and one pivoted jaw provided with an outwardly extending arm connected by various link or toggle mechanisms to the tackle of the hoisting means. The objection to this construction is that heavy forgings are required to give the parts sufficient strength, the shearing stress of the entire weight is sustained by one pivot pin of the single clamp jaw and the gripping action of the movable jaw is downward which causes the clamp to slip on the work when first taking hold.

With the improved double grip clamp herein shown the above objections are overcome and a lighter and safer clamp is produced. The clamp consists of duplicate cheek plates 3 and 4 each having two downwardly extending ears 5 and 6 forming central crotches 7 and 8 into which the work being lifted may extend.

The cheek plates 3 and 4 are joined at the top by the shouldered rivet 9 as shown in Fig. 2. The gripping jaws 10 and 11 are duplicates and consist of toothed bosses 12 and 13 of substantially elliptical shape and integral curved arms 14 and 15 which extend over the top of and beyond their complementary oppositely mounted bosses.

Shouldered rivets 16 and 17 pass freely through the bosses of the jaws 10 and 11 and form eccentric pivots therefor as shown. The width of the bosses 12 and 13 is slightly less than the distance between the shoulders of the pivots 16 and 17 and the width of the arms is slightly less than half the thickness of the bosses as shown in Fig. 2 thus permitting the jaws to work freely between the plates and the arms to overlap each other without interference.

At their free ends the arms 14 and 15 are connected by suitable pivots 18 and 19 to the supporting links 20 and 21 which are joined at their upper ends by a sustaining pin 22, having a head 23 and being provided with a washer 24 and a cotter pin 25 to hold it in place.

The clamp as a whole is sustained by the pin 22 which may be engaged by a hook 26 or the like of any suitable hoisting device, such as chain-block, derrick or over head crane.

The lifting clamp shown and described is symmetrical in construction and, as the gripping jaws are both movable the working stresses are equally divided among the parts located on either side of a vertical center line. With this construction it is possible accurately to analyze the forces acting on the different working elements and calculate the fiber stresses and necessary sectional areas at different parts of the various elements to give the required strength.

With clamps not symmetrically constructed it is impossible to so accurately distribute the stresses equally among the various elements, and therefore they have to be made of heavy forgings which adds to the dead weight lifted by the hoisting device and also to the difficulty of handling by workmen.

My improved clamp being symmetrical hangs plumb from the supporting tackle, can be lowered directly over the work and easily and quickly engaged therewith.

The depending members or ears 5 and 6

form the crotch described with a closed top and bring the pivot pins 16 and 17 down below the upper edge of the plate to be lifted and approximately in line with the clamping jaws and the latter are cam-shaped on their inner faces so that they exert a very powerful pinching effect on the work. The operating arms 14 and 15 which operate the jaws extend upward and across the plane of the plate so that the cam-shaped jaws are moved inward and upward with respect to their pivots when the clamp is lifted. It is this feature which makes the clamp particularly safe against slipping as the tackle is raised and gradually lifts the operating arms 14 and 15 to the final clamping position.

The arms 14 and 15 extend across the top of the crotch and are limited in their downward movement by striking the hubs of the opposite clamping jaws. That is, the arm 14 strikes the hub or boss 13 of the opposite jaw and the arm 15 strikes the hub or boss 12; and when the arms rest on these bosses they extend slightly above the closed top of the crotch. This facilitates the quick release of a plate after it has been transported by the clamp and lowered to the desired position. If the arms were in position to be struck by the top of the plate when the clamp is first dropped on the same this operation would cause the arms to be pressed up by the plate and the clamping jaws to bite into the same before any tension is put on the lifting tackle, and would subsequently prevent the lowering of the arms to a point where the jaws would entirely free the plate. With the arrangement shown the clamp will drop freely onto the plate and the jaws will not bite into the latter until the tackle is lifted, and when the plate is to be released there is abundant room for lowering the arms sufficiently to entirely withdraw the jaws from the plate.

While I have described with great particularity of detail certain embodiments of my invention, yet it is not to be understood therefrom that the invention is restricted to the particular embodiments disclosed. Various other modifications in detail or in the arrangement of the parts may be made by those skilled in the art without departing from the invention as defined in the following claims.

What I claim is:—

1. A lifting clamp including a cheek member having depending arms forming a deep narrow crotch between them into which the work is introduced, clamp arms having toothed gripping jaws formed thereon extending across the top of said crotch and pivoted below the top of said crotch to the depending arms of said cheek members so that an upward motion of the clamp arms will cause an inward and upward movement of the gripping jaws, and links each connected at one end to a free end of one of said clamp-arms and at the other end to an overhead pin, said cheek member being supported entirely from said clamp-arms and the latter being supported entirely from said links, so that the entire clamp hangs freely from a supporting tackle engaging said overhead pin and when lowered on the work causes the work to hold up the jaws and the cheek member and thus to cause the opening of the jaws.

2. A lifting clamp including cheek plates 3 and 4 having depending arms forming a crotch into which the work extends, hook shaped arms 14 and 15 extending across the top of said crotch and having toothed gripping jaws formed thereon, links 20 and 21 connected overhead by a sustaining pin 22 and pivoted to the free ends of said hook shaped arms, said arms 14 and 15 being supported entirely from said links 20 and 21 so that the lowering of the jaws on the work tends to hold up the arms 14 and 15 and consequently the cheek plates and thus to open the gripping jaws when the clamp is lowered on the work the parts being so arranged that the suspension members will act when supporting a load to give an upward movement to the arms 14 and 15, and an inward and upward movement to said gripping jaws so as to exert an upward clamping pressure on the work.

In witness whereof I have hereunto signed my name.

WILLIAM M. HENCH.