May 26, 1942. S. T. McLELLAN 2,284,006

PLATE CLAMP OR GRAPPLE

Filed June 13, 1941

Fig. 1.

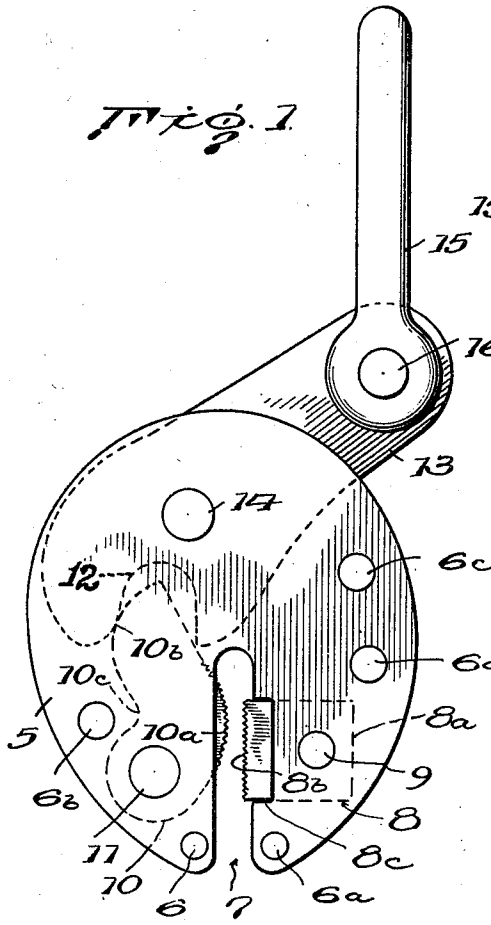


Fig. 2.

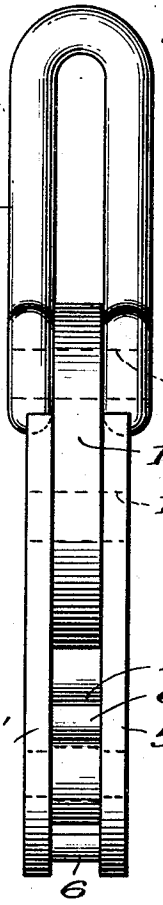


Fig. 3.

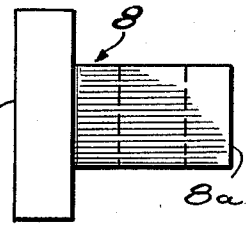


Fig. 4.



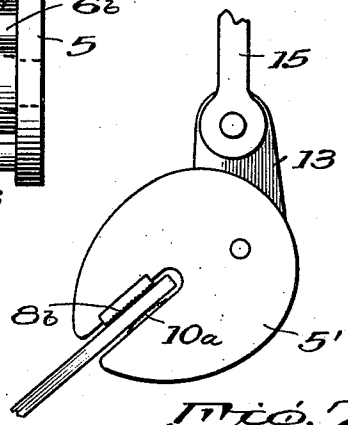


Fig. 7.

Fig. 5.

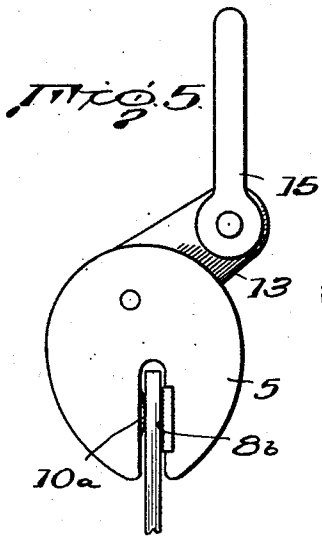
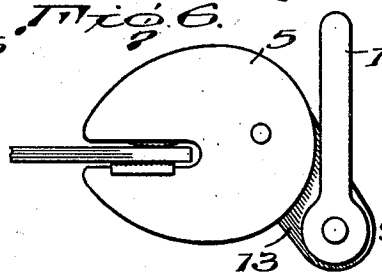


Fig. 6.



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PLATE CLAMP OR GRAPPLE

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Application June 13, 1941, Serial No. 397,959

7 Claims. (Cl. 294—104)

This invention relates to a lifting clamp or grapple for facilitating the handling of relatively heavy plate stock, angle shapes, beams and the like.

In the handling of steel plate and the like by means of a grapple it is desirable that the grapple be capable of engaging and/or releasing the material in various positions, from the horizontal to the vertical, and it is also desirable that the gripping force exerted on the material being lifted be in proportion to or greater than the weight of the material; and it is an object of the present invention to provide a lifting clamp or grapple which will meet these requirements.

Another and more specific object of the invention is to provide a grapple particularly adapted for handling plate and analogous shapes utilizing a cam-shaped gripping jaw and a coacting fulcrum member operating to exert a positive and tenacious grip on the plate throughout the lifting and carrying operation.

Another object is to provide a grapple of the type specified incorporating a relatively few working parts which are well housed and protected from damage through use and abuse and wherein side play and bending and shearing are substantially eliminated.

A further object is to provide a lifting clamp or grapple which is safe in handling and may be easily and quickly applied and disengaged.

A still further object of the invention is to provide a lifting clamp or grapple which is of simple construction and therefore low in cost of manufacture and which at the same time is relatively light in weight yet unusually rugged and possessed of great strength and capable of withstanding high overloads.

The foregoing and other objects and advantages of the invention will become apparent in view of the following description taken in conjunction with the drawing, wherein:

Fig. 1 is a view in side elevation of a lifting clamp or grapple embodying the features of the invention;

Fig. 2 is an elevation at right angles to Fig. 1;

Fig. 3 is a detail of the stationary jaw;

Fig. 4 is a detail of one of the pivot members for the moving parts;

Figs. 5, 6 and 7 are views similar to Fig. 1, showing the improved clamp or grapple in different plate-carrying and releasing positions.

Referring to the drawing in detail, the device comprises a housing made up of opposed plates 5 and 5' connected in fixed spaced relation by a series of rivets or studs 6, 6a, 6b, 6c and 6d. These plates are formed with a jaw recess 7 providing a space for the edge of the plate or other object to be lifted.

A stationary jaw 8, note Fig. 3, is provided and has a shank portion 8a mounted between the plates 5 and 5' along one edge of the recess 7, and a jaw portion 8b inserted in a recess 8c formed in the plates at this point. This jaw may be made in whole or in part of hardened steel with a roughened or knurled gripping surface. The shank portion 8a is formed with a hole or bore for insertion of a rivet or stud 9 and whereby the stationary jaw is firmly yet removably secured in position.

A movable jaw 10 having a roughened and hardened gripping surface 10a is interposed between the plates 5 and 5' opposite the stationary jaw 8, the said movable jaw being mounted by means of a pivot member or stud 11 which is preferably constructed as shown in Fig. 4. This pivot member 11 (as well as certain other pivot members hereinafter referred to) has its opposite ends reduced in diameter, so that during the assembling operation the plates 5 and 5' may be inserted over these reduced ends until they abut the shoulders 11a provided by the enlarged diameter of the central portion of the stud.

The movable jaw 10 has a cam-shaped free end 10b adapted to engage in a jaw recess 12 formed in an actuator consisting of a fulcrum member 13 extending at an angle to the movable jaw. This fulcrum member is mounted between the plates 5 and 5' by means of pivot pin or stud 14 which is preferably of the same construction as the pivot member 11 for the movable jaw 10. The outer end of the fulcrum member 13 projects beyond the housing plates 5 and 5' and has pivotally connected thereto a yoke-shaped link 15, pivot member 16 for said link being also of the same construction as the pivot members 11 and 14.

The movable jaw is preferably formed with a recess 10c adapted to engage the stud or rivet 6b when the jaw is in retracted position, the said stud thus providing a stop for the jaw.

In operation, the grapple is usually carried by a crane hook engaged in the link 15, the edge of the plate or other object to be lifted being received in the jaw space 7. When the pull comes on, the actuator or fulcrum member 13 is rocked or rotated anticlockwise as viewed in Fig. 1, thereby causing the movable jaw 10 to clamp the plate firmly against the stationary jaw 8, the gripping force increasing in direct relation to the weight of the plate being lifted. To release

the plate, the latter may be brought to a position of rest or supported until the fulcrum member 13 reverses itself or retracts sufficiently to release the grip of the movable jaw.

Figure 5 illustrates how a plate may be carried or suspended in a substantially perpendicular position.

In certain instances, it is convenient to release the plate when it attains a substantially horizontal position of rest and Figure 6 illustrates how the grapple may be handled when it is desired to deposit a plate in this manner, the lowering movement being from left to right. Figure 7 shows the position of the grapple when it is desired to release a plate at an angle of substantially 45°. In this instance the movement is from right to left with respect to the plate, the fulcrum member 13 releasing the movable jaw 10 when the plate, coming to rest on its supporting surface, attains an angle of substantially 45°.

It will thus be seen that the improved plate clamp or grapple will pick up steel plate in any position from the horizontal to the vertical and lower the plate back to a horizontal position; and by reversing the position of the grapple, the plate may be picked up from the horizontal to the vertical and dropped or released from an angle of approximately 45°. In actual service, it has been found that the gripping power of the grapple is at least four times the weight of the plate being lifted and has withstood overloads as much as 300%.

The parts of the improved grapple are relatively few in number and may be easily manufactured. In assembling the parts of the grapple, the housing plates 5 and 5' with the stationary jaw, movable jaw and actuator or fulcrum member mounted on their pivots, may be brought together and the rivets 6—6[d] applied to hold the plates in definite spaced relation.

The grapple has marked durability and safety with relatively few wearing surfaces. The manner in which the plates 5 and 5' are mounted with respect to the movable parts ensures the elimination of side play, and bending of the pivot members and shearing is practically impossible. The working parts are fully protected by the housing plates so that there is little chance of damage from use or abuse. The grapple is not only capable of lifting plates but will operate equally well with angles, beams, sheet piling and the like having a portion engageable in the jaw space 7.

It will be understood that certain minor changes in construction and design of the improved lifting grapple may be made without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. A grapple comprising a pair of plates fixed in definite spaced relation and constituting a housing, said housing plates having a jaw recess therein to receive the edge of a plate or like object to be lifted, a movable jaw pivotally mounted between the housing plates adjacent said recess, one end of said jaw being cam shaped, a fulcrum member also pivotally mounted between said housing plates and having a jaw at one end engaging the cam portion of the movable jaw, and a suspension link pivoted to the opposite end of the fulcrum member.

2. A grapple for lifting plate and analogous material comprising cover plates connected in definite spaced relation, said cover plates being formed with a recess defining a jaw space for an object to be lifted, a movable jaw pivotally mounted between said cover plates adjacent said space, one end of said jaw being free and having a cam-shaped contour, a fulcrum member also pivotally mounted between said cover plates and having a jaw engaging the cam-shaped extremity of the movable jaw, and a suspension link connected to said fulcrum, said fulcrum extending at an angle to the movable jaw.

3. A grapple for lifting plate and like material comprising cover plates connected in definite spaced relation, said cover plates being formed with a recess providing a jaw space for the edge of an object to be lifted, a stationary jaw fixed between the cover plates at one side of said space and a movable jaw pivotally mounted between said cover plates in opposed relation to the fixed jaw, said movable jaw being provided with a cam-shaped free end, a fulcrum member pivoted adjacent said movable jaw and having a recessed extremity into which the cam portion of the movable jaw projects, said fulcrum member extending at an angle with respect to the movable jaw and whereby when a pull is exerted on the fulcrum member the movable jaw is actuated into gripping relation with respect to the fixed jaw, and a suspension link pivotally connected to the outer end of the fulcrum member.

4. A grapple comprising cover plates connected together in definite spaced relation providing a housing, said cover plates being formed with a recess defining a jaw space for the edge of an object to be lifted, a fixed jaw having a shank portion inserted between said cover plates and a jaw portion proper overlying the edges of the cover plates on one side of said jaw space, a movable jaw positioned between said cover plates on the opposite side of said jaw space and having its one end journaled on a pivot member fixed to said cover plates, the intermediate portion of the movable jaw being provided with a gripping surface in opposed relation to the stationary jaw, the end of the movable jaw opposite its pivoted end being cam-shaped and projecting free, a fulcrum member pivoted between said cover plates and having a recessed extremity engaging the cam-shaped end of the movable jaw, said fulcrum member occupying a position at an angle with respect to the movable jaw and whereby when a pull is exerted on the fulcrum member the movable jaw is cammed against the object being lifted, and a suspension link pivotally connected to the opposite extremity of the fulcrum member.

5. A grapple comprising a pair of cover plates, means connecting said plates in fixed spaced relation providing a housing, said cover plates being formed with a recess defining a jaw space for the edge of an object to be lifted, a fixed jaw at one side of said jaw space and a movable jaw at the opposite side of said jaw space, means pivotally mounted said movable jaw comprising a pivot member having its opposite ends reduced in diameter and its intermediate pivoting portion enlarged in diameter forming shoulders against which the opposed cover plates abut, the intermediate portion of the movable jaw being provided with a gripping surface and the unpivoted end of the movable jaw being cam-shaped, a fulcrum member pivotally mounted between said cover plates and extending at an angle to said movable jaw and formed with a recess at one end into which the cam-shaped end of the movable jaw projects, and a suspension link con-

nected to the opposite end of said fulcrum member.

6. A grapple comprising a supporting member formed with a recess defining a jaw space for the edge of an object to be lifted, a fixed jaw at one side of said jaw space and a movable jaw pivoted to said supporting member at the opposite side of said jaw space, the one end of said movable jaw projecting free, and a fulcrum member also pivoted to said supporting member and having one end engaging the free end of the movable jaw, said fulcrum member extending at an angle to said movable jaw and whereby when a pull is exerted on the fulcrum member the movable jaw is cammed against the object being lifted.

7. A grapple for lifting steel plate and like objects comprising a supporting member formed with a recess defining a jaw space for receiving the edge of an object to be lifted, a fixed jaw at one side of said jaw space and a movable jaw pivoted to said supporting member at the opposite side of said jaw space, said movable jaw being mounted for limited free movement about its pivot, and a fulcrum member also pivoted to said supporting member and having one end engaging said movable jaw, said fulcrum member extending at an angle to said movable jaw and whereby when a pull is exerted on the fulcrum member the movable jaw is cammed against the object being lifted.

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