Oct. 6, 1953 J. C. RENFROE 2,654,631

OPEN LOCKING PLATE LIFTING CLAMP

Filed May 27, 1952

Fig. 1.

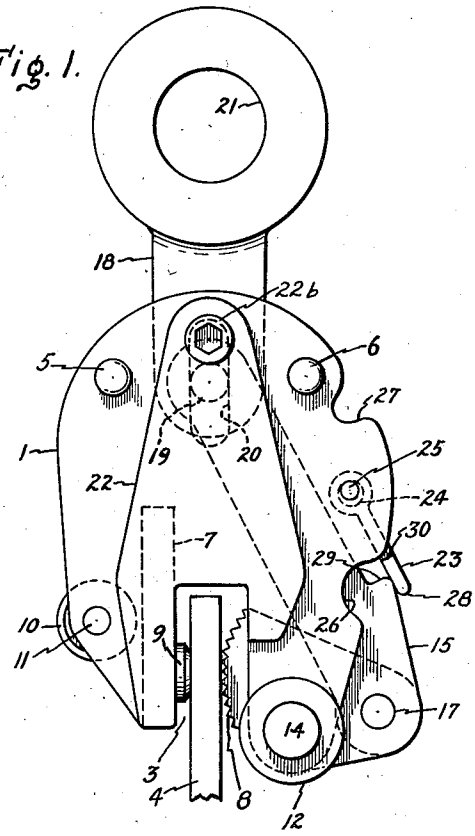


Fig. 2.

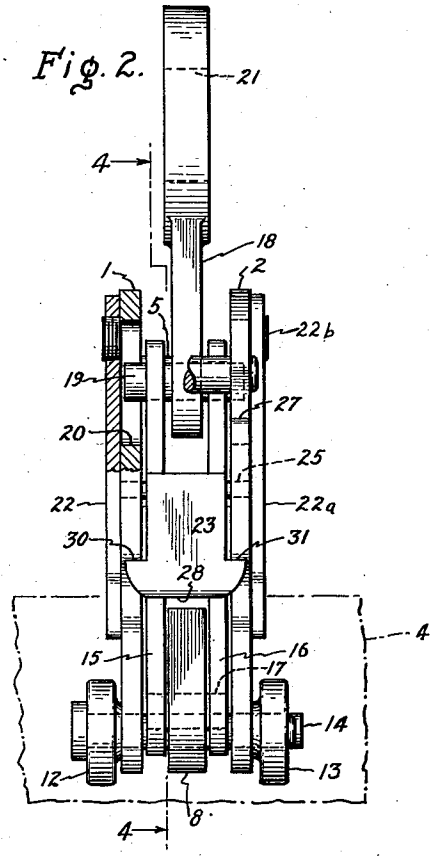


Fig. 3.

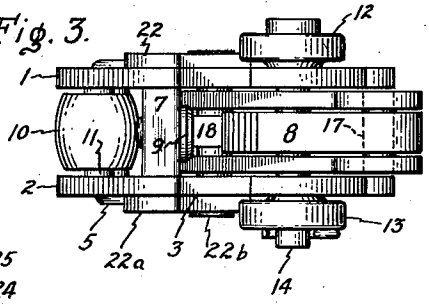
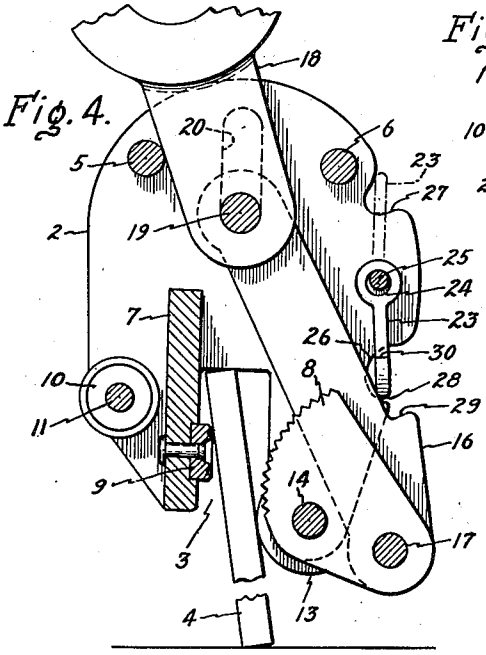


Fig. 4.



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OPEN LOCKING PLATE LIFTING CLAMP

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4 Claims. (Cl. 294—104)

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My invention relates to improved steel plate lifting clamps, and more particularly to means for selectively locking the movable jaw of a plate lifting clamp in open position.

A general object of my invention is to improve plate lifting clamps of the type comprising a self-actuating clamping jaw.

A more specific object of my invention is to provide simple means in a plate lifting clamp selectively positionable to lock the movable jaw in open position automatically and alternatively positionable in an inactive position.

Locking devices to lock the clamping jaw open have been heretofore provided, in plate lifting clamps of the general type involved herein, but such locking devices have ordinarily utilized springs or sliding bars, or both, and such elements are expensive and may protrude and be subject to damage and injury to operating personnel. An important object of this invention, accordingly, is to provide a locking arrangement which will be sure in action, easily operated, simple and of inexpensive construction.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing, in which Fig. 1 is a side view of a clamp in accord with my invention; Fig. 2 is an end view and Fig. 3 a bottom view of the clamp of Fig. 1; and Fig. 4 is a sectional view of the clamp as seen in Fig. 1 with a side wall removed to disclose the internal mechanism.

Corresponding elements of the clamp are identified with like numbers in each figure of the drawing.

As seen in Figs. 1, 2 and 3, the clamp comprises a pair of parallel spaced side walls 1 and 2 having a vertical slot 3 formed at the bottom edges in position to receive a plate, such as plate 4, to be clamped and lifted. Body rivets 5 and 6 serve to hold the side walls in parallel spaced position, and a web 7 is welded in place between the side walls to assist in this respect. In operation, a plate 4 is gripped between the plate-engaging teeth of pivotally mounted jaw member 8 and the ridged surface of a stationary jaw member 9 carried by web 7.

A crowned roller 10 is supported between the side walls by a shaft 11, in a position behind web 7 and stationary jaw member 9, and the

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surface of this roller protrudes from the wall edges, as clearly seen in Fig. 1. Rollers 12 and 13 are provided outside of walls 1 and 2, being carried by shaft 14, and the surfaces of these rollers extend into the slot 3 to prevent contact between a plate 4 and the edge of the side walls adjacent the plate-receiving slot 3.

Jaw member 8 is pivotally supported on shaft 14 for actuation by a pair of links 15, 16. Pin 17 connects the links to jaw member 8, and it will be a apparent that upward motion of the links serves to pivot jaw member 8 into clamping position, and that falling of the links retracts or opens the jaw member.

Clevis 18 is pivotally attached to the links by a transverse clevis pin 19 having ends disposed in respective vertical slots 20 formed in the side walls. Crane hook receiving eye 21 is formed at the upper end of the clevis.

Clevis pin 19 is retained in position by external wall plates or pads 22 and 22*a* welded to plates 1 and 2, respectively. These pads further serve to prevent the fingers of workmen from damage in slots 20 and prevent the entrance into the slots of any external objects which might interfere with the normal operation of the clamp. Plugs 22*b* are screwed into round apertures through pads 22 and 22*a*, and these apertures are aligned with slots 20 and positioned to permit the clevis pin 19, upon removal of plugs 22*b*, to be driven out of the clamp for inspection or replacement as desired. Plugs 22*b* preferably lie flush with the inner pad surfaces and do not interfere with the sliding of clevis pin 19 in the slots, and the plugs protrude externally not more than a very small distance to prevent catching of the plugs on persons or external objects. For similar reasons it may be desirable to bevel the edges of the pads 22 and 22*a*.

In order that body member 8 may be locked in an open position, a T-shaped pawl 23 is loosely supported, by means of an oversized bore 24 through the base of the pawl, on a shaft 25 which extends between the walls. An indentation 26 in the wall edges below shaft 25 permits the head portion of the pawl to swing by gravity inwardly, toward a vertically downward position, against the links 15 and 16 without interference from the walls, and a notch 27 above shaft 25 provides a trap in which the head of the pawl may be engaged by manually positioning the head portion therein. An upwardly extending protuberance is formed at the entrance to notch 27 over which the pawl arms must be lifted, to trap the pawl or to remove the pawl from the trap.

The head portion of the pawl comprises an edge 28 adapted to engage in notches in links 15 and 16 defined by shoulders 29. The head further comprises surfaces 30 and 31, formed under the arms of the T and engageable in the trapping notch 27.

Operation of the clamp is best understood by a comparison of Figs. 1 and 4. The clamp is shown in Fig. 4 in open lock condition, the weight of the clamp being supported by plate 4. The weight of clevis 18 and of the links has caused the jaw member 8 to open as shown in Fig. 4, and the plate 4 is loosely engaged in slot 3. As further seen in Fig. 4, the head of pawl 23 has fallen into notches 26, in which position the end surface 28 of the pawl will engage shoulders 29 of the links upon a slight upward motion of the links. Accordingly, if clevis 18 is lifted by a crane hook, the jaw member 8 cannot close against plate 4 because the engagement of surface 28 with shoulder 29 prevents substantial upward motion of link 16. The position of pawl 23 indicated by full lines in Fig. 4, accordingly, represents an open lock condition of the clamp.

If it were desired to have the clamp grip plate 4 as clevis 18 was raised, pawl 23 would be manually rotated about shaft 25 into the upward position indicated by broken lines in Fig. 4. In this upward position, the arms of the pawl have been raised over the slight upward protuberance at the entrance to trap 27. It is possible to raise the pawl member to cause its head to enter the trap over the entrance protuberance because of its loose support on shaft 25. It will be obvious that the head of pawl 23 will remain in trap 27 until the pawl is manually lifted sufficiently for the arms to clear the entrance to the trap. If the pawl is removed from the trap at a time when jaw 8 is in closed or gripping position, the pawl will fall against the edges of links 15 and 16 as shown in Fig. 1, and the pawl will become effective automatically thereafter when the plate being lifted is set down and the lift on clevis 18 is released. The clamp and pawl as seen in Fig. 1, accordingly, are in pre-set automatic locking condition, and it will be understood that, with the pawl in the pre-set automatic locking position indicated in Fig. 1, it will operate automatically into the open lock position of Fig. 4 as the plate being lifted is set down and as the weight of the clamp is transferred from the crane hook to the plate.

If it is desired that the clamp should not lock open automatically upon setting down of the load, the pawl is manually positioned in inactive position in the trap, as indicated by the broken lines of Fig. 4, to place the clamp in non-locking condition.

While I have shown only certain preferred embodiments of my invention by way of illustration, many modifications will occur to those skilled in the art, and I therefore wish to have it understood that I intend, in the appended claims, to cover all such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a plate lifting clamp comprising a pair of spaced parallel side walls slotted at the bottom to receive a plate, means connecting said walls to each other, a gripping jaw member pivoted to said walls and engageable with a plate in said slot, a lifting clevis, said walls having aligned slots and said clevis being movable in said slots, a link connected between said clevis and an off-center portion of said jaw member to pivotally close said jaw member upon lifting of said clevis and link and to pivotally open said jaw member upon lowering of said clevis and link, said link having an upwardly open notch, a loosely mounted pawl pivotally mounted on said clamp normally hanging freely against said link, said notch being positioned and proportioned to receive said freely hanging pawl member upon opening of said jaw member, said walls having a notched trap for said pawl member for locking said jaw member in open position remote from said link, said pawl member being selectively manually rotated from its lower link engaging position to its upper position for engagement in said trap and removable therefrom to hang against said link in said lower position.

2. In a plate lifting clamp comprising a pivotal jaw member and an upwardly and downwardly movable actuating link for closing and opening said jaw; an automatic locking pawl, side walls, means for pivotally supporting said pawl from said walls, said walls having a trap for said pawl, said side walls having aligned upper slots and a clevis slidable in said slots, means connecting said clevis to said link, means connecting said walls to each other in spaced relationship, said trap being generally above said means to retain said pawl out of engagement with said link, said pawl being manually positionable in said trap to inactivate said pawl and selectively manually removable therefrom into active automatic locking condition, and a shoulder on said link positioned so as to be automatically engaged by said pawl in said active condition upon opening of said jaw member to lock said jaw member against closing, said walls having aligned lower slots opening downwardly, said jaw being mounted in said walls for movement with plate gripping position in said lower slots.

3. In a plate lifting clamp, a pair of parallel spaced side walls slotted to receive a plate to be lifted, means connecting said walls to each other, a stationary jaw and a pivotally mounted jaw in said slot to grip said plate, a movable clevis, said walls having aligned slots and said clevis being movable in said slots, a pair of parallel links connecting between said clevis and pivotal jaw, said links being arranged to actuate said pivotal jaw in accord with motion of said clevis and links, open locking means comprising a normally freely hanging pawl pivotally mounted on said clamp resting on said links and shoulders on said links positioned to be engaged by said pawl upon opening of said pivotal jaw for locking said jaw in open position, and disabling means on said clamp for holding said pawl out of contact with said shoulders comprising means to retain said pawl in a position remote from said links, and in a position where its link engaging portion is above the pivot of said pawl.

4. In a plate lifting clamp, in combination, a pair of spaced parallel side walls, means connecting said walls to each other, a pivotal plate-clamping jaw member mounted between said walls, a clevis having a lower portion between said walls, a clevis pin extending laterally through said lower portion, said side walls having substantially vertical slots receiving respective ends of said pin, a pair of links pivotally connected to said pin at respective sides of said clevis and inside said walls, said links being pivotally connected to an off-center portion of said jaw member to operate said jaw member in response to movement

of said pin in said apertures, a shoulder on each said link, a pawl mounted for free swinging motion on said walls and engageable with said shoulders to lock said jaw member in open position, and disabling means on said clamp for holding said pawl out of contact with said shoulders comprising a trap into which said pawl may be manually moved and selectively from which said pawl is manually removed, said trap being located above said link shoulders whereby to hold the shoulder engaging portion of said pawl above said shoulders when in inoperative position being effective to retain said pawl in position away from said shoulders, said walls having aligned lower slots opening downwardly, said jaw being mounted in said walls for movement with plate gripping position in said lower slots.

JOSEPH C. RENFROE.

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