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P. W. PENN

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POSITIVE GRIP LIFTING TOOL

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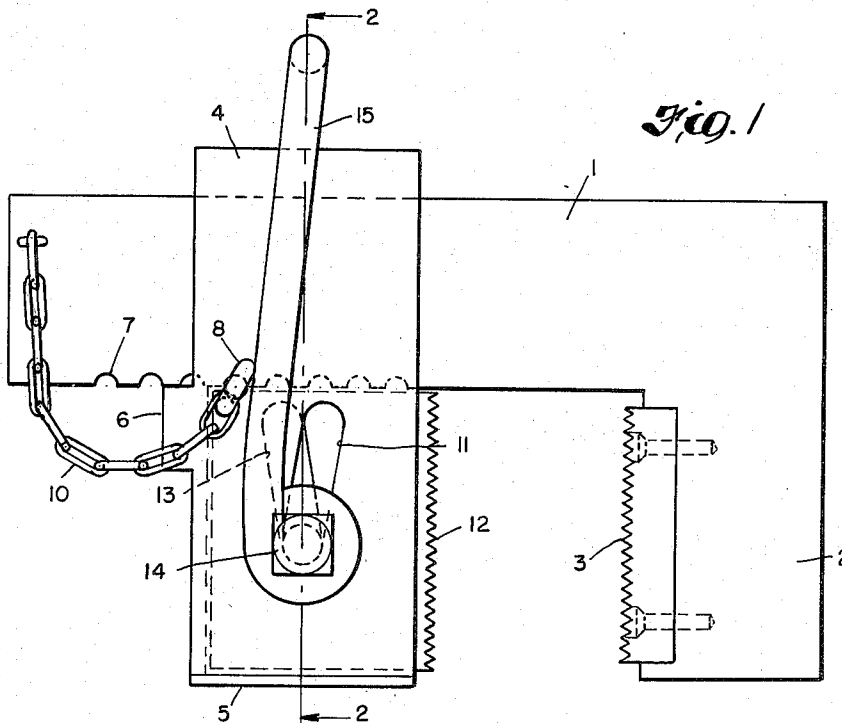


Fig. 1

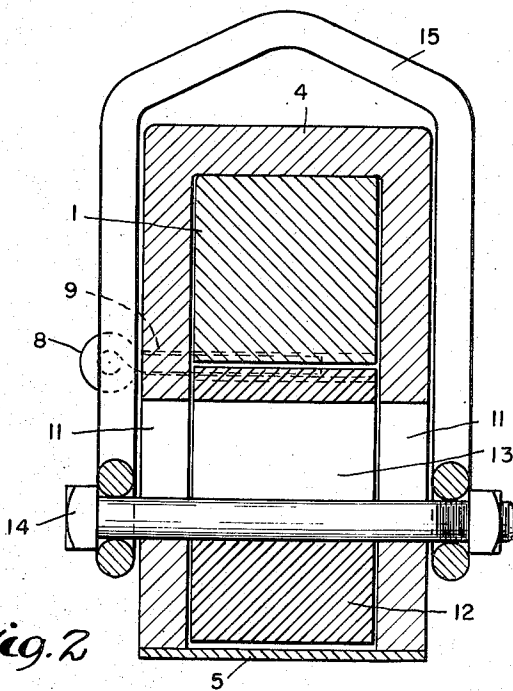


Fig. 2

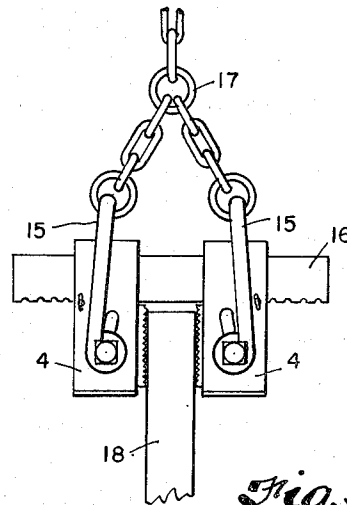


Fig. 3

INVENTOR.
PENN W. PENN
BY
Oberlin & Limbach
ATTORNEYS.

UNITED STATES PATENT OFFICE

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POSITIVE GRIP LIFTING TOOL

Penn W. Penn, Ravenna, Ohio

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12 Claims. (Cl. 294—103)

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This invention relates as indicated to a positive grip lifting tool and, more particularly, to a device adapted automatically to clamp the work when lifted and to release such work when again lowered to rest.

In foundries, steel mills, machine shops and the like it is often desired to lift and transport very heavy and unwieldy objects which are not provided with any convenient means for gripping the same. Some objects include large sections of heavy steel plate, coils of steel strip, large bushings and many similar articles. Powerful cranes are usually available to perform the actual lifting operation but the various expedients which have commonly been employed to obtain a grip upon the article to be lifted have been far from satisfactory. In some cases chains are passed about and under the article and in other cases large C-clamps are employed. When any of these common expedients are used, there is danger of slippage and accident, particularly when handling the very heavy objects of some tons weight which must frequently be lifted.

It is therefore a primary object of my invention to provide a simple lifting tool adapted actively to grip the work during the lifting operation but readily to release the same when the work has again been deposited upon a supporting surface.

A great deal of coiled steel strip is shipped by truck and when as occasionally happens such trucks overturn or the coils are otherwise accidentally deposited on the ground it has usually been necessary to tunnel thereunder to permit a chain to be secured thereto for their recovery. It is therefore another object of my invention to provide a lifting tool adapted firmly to grip spaced parallel surfaces of articles of this type.

Another object of my invention is to provide such tool wherein the active gripping pressure thereof upon the work will automatically increase with the weight being lifted.

Other objects of my invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

Fig. 1 is a side elevational view of one embodiment of my invention;

Fig. 2 is a vertical sectional view taken along the line 2—2 on Fig. 1; and

Fig. 3 is a view on a reduced scale showing a modified embodiment of my lifting tool.

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Referring now more specifically to such drawing and especially Figs. 1 and 2 thereof, the embodiment of my invention there illustrated comprises a bar or rail 1 having an offset portion 2 carrying a fixed serrated jaw 3 on the inner face thereof. Adapted to be adjustably positioned along rail 1 is a jaw holder 4 of inverted U-shape reinforced by a thin bottom plate 5 welded to the legs of such U. A lug or shoulder 6 on holder 4 engages the underside of rail 1 and provides extra bearing surface thereagainst. Such under surface of the rail is transversely grooved as at 7 to receive a locking pin 8 inserted through an aperture 9 in holder 4 and thereby adapted to lock such holder in desired position along the rail. A retaining chain 10 may be secured to such pin and rail, both to prevent loss of the pin when withdrawn and also to prevent escape of holder 4 beyond the end of the rail.

The two sides of jaw holder 4 are provided with corresponding slots 11 therethrough, such slots being inclined somewhat from the vertical. A movable jaw member 12 is inserted within holder 4 and provided with a cam slot 13 passing through corresponding to slots 11 except that it is inclined in the opposite direction. A lifting pin 14 is passed through such slots 11 and 13 and has pivotally secured thereto a yoke or clevis 15 for the purpose of lifting the entire tool.

In use, the tool will be placed with the work-piece to be gripped between jaws 3 and 12 and holder 4 will be moved as far as possible toward jaw 3 where it will be locked in position by means of locking pin 8. When the tool is now raised by means of clevis 15, lifting pin 14 will be caused to ride upwardly in slots 11 and 13, thereby camming jaw member 12 to the right as viewed in Fig. 1. The heavier the weight to be lifted, the greater will be the upward lifting force which must be applied to clevis 15 and accordingly the greater will be the force with which jaw 12 is cammed toward jaw 3.

Referring now more particularly to Fig. 3 of the drawing, there is there illustrated a modified embodiment of my invention wherein, instead of providing a rail with a fixed offset jaw, a straight rail 16 is employed upon which two opposed movable jaw holders 4 are mounted. The two respective clevises 15 may be connected to a single lifting ring 17. The construction not only affords a balanced arrangement but also each of the jaws is caused actively to engage and bear against the work-piece 18.

It will be apparent from the foregoing that various other modifications within the scope of this invention are possible and may be employed if desired. Thus, for example, only one of the slots 11 or 13 need be inclined to provide a camming action. However, by inclining both such slots in opposite directions, the degree of

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incline need not be as much and the parts work more smoothly. I have employed a lifting tool of the type described weighing only 21 pounds to lift articles weighing in excess of 2,000 pounds and such tool has proved very useful in the handling of the large bushings used in rubber calenders and the like. For lifting some large articles which can only be gripped off center, I have employed pairs of my new lifting device positioned to grip opposite sides or edges of the article. With a lifting tool of this type weighing approximately 100 pounds I am able to lift loads of nine tons or more and this without any danger of slipping and accident. As previously explained, the heavier the load lifted, the stronger will be the clamping action.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A lifting tool comprising a rail, two jaw holders mounted on said rail for movement therealong, means adapted to lock each of said holders in selected adjusted position on said rail, a jaw member movably carried in each of said holders for movement toward and away from each other, a cam slot through each said jaw member inclined to the face of such jaw, a corresponding cam slot in each said holder but inclined in the opposite direction, a lifting pin through each of said jaw members and respective jaw holders, and a clevis bridging said rail and secured to the ends of each of said pins.

2. A lifting tool comprising a rail, two jaw holders mounted on said rail for movement therealong, means adapted to lock each of said holders in selected adjusted position on said rail, a jaw member movably carried in each of said holders for movement toward and away from each other, a lifting pin through each of said jaw members and respective jaw holders, and cam means on said jaw members and holders engaged by said pins and operable by a lifting force applied thereon to urge said respective jaw members toward each other.

3. A lifting tool comprising two spaced jaw holders, opposed jaw members mounted in said respective holders for movement toward and away from each other, and cam means on said holders operable upon application of a lifting force thereon to reciprocate said jaw members toward each other.

4. A lifting tool comprising two opposed jaw members mounted for reciprocation toward and away from each other, slots in each of said jaw members, corresponding slots in such mounting means therefor, at least one of said slots in each said jaw member and corresponding mounting means being inclined relative to the jaw face of said member, and lifting means engaged in each of such sets of slots, whereby, upon application of a lifting force thereon, said reciprocable jaw members will be urged toward each other.

5. A lifting tool comprising two spaced jaw holders, opposed jaw members mounted in said respective holders for reciprocation toward and away from each other, slots through each of said jaw members and respective holders, said slots in said jaw members being similarly inclined relative to the respective jaw faces and said slots in said holders being similarly inclined in the opposite direction, and a lifting pin

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through said slot in each said jaw member and corresponding holder, said slots in said respective holders being inclined toward each other in the direction of lifting pull, whereby, upon application of a lifting pull on said pins, said jaw members will be urged toward each other.

6. A lifting tool comprising a rail, a fixed jaw member on said rail and laterally offset therefrom, a jaw holder movable along said rail toward and away from said fixed jaw, means adapted to secure said holder in selected position along said rail, a jaw member carried in said holder opposed to said fixed jaw and mounted for reciprocation toward and away therefrom, a slot through said reciprocable jaw member, a slot through said holder, at least one of said slots being inclined relative to the jaw face of said reciprocable jaw member, and a lifting pin passing through said slots, whereby, upon application of a lifting force thereon, said reciprocable jaw will be urged toward said fixed jaw.

7. A lifting tool comprising two opposed jaw members, at least one of which is mounted for movement toward the other, a cam slot through said movable jaw member inclined to the face of such jaw, a corresponding cam slot in such jaw member mounting but inclined in the opposite direction, and a lifting pin through said slots, whereby, upon application of a lifting pull on said pin, said movable jaw member will be urged toward the other said jaw member.

8. A lifting tool comprising two opposed jaw members, at least one of which is mounted for movement toward the other, a slot through said movable jaw member, a corresponding slot in such jaw member mounting, one of said slots being inclined to the face of such jaw and to said other slot, and a lifting pin through said slots, whereby, upon application of a lifting pull on said pin, said movable jaw member will be urged toward the other said jaw member.

9. A lifting tool comprising two opposed jaw members, at least one of which is mounted for movement toward the other, cam means on said movable jaw member, cooperating cam means on the mounting means therefor, and lifting means passing through said movable jaw member and mounting means engaging both said cam means and operative upon application of a pull thereon to urge said movable jaw member toward the other said jaw member.

10. A lifting tool comprising a rail, a fixed jaw member on said rail and laterally offset therefrom, a jaw holder movable along said rail toward and away from said fixed jaw, means adapted to secure said holder in selected position along said rail, a movable jaw member carried by said holder opposed to said fixed jaw and mounted for straight line reciprocation toward and away therefrom, a cam slot through said reciprocable jaw member inclined to the face thereof, a corresponding cam slot in said jaw holder but inclined in the opposite direction, and a lifting pin through said slots operative, upon the application of a lifting force thereon, to urge said reciprocable jaw member toward said fixed jaw member.

11. A lifting tool comprising a rail, a fixed jaw member on said rail and laterally offset therefrom, a jaw holder movable along said rail toward and away from said fixed jaw, means adapted to lock said holder in selected position along said rail, a jaw member carried by said holder opposed to said fixed jaw and mounted for straight line reciprocation toward and away therefrom, a lifting pin through said jaw holder

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and reciprocable jaw, and cam means on said jaw holder and reciprocable jaw engaged by said pin and operative by a lifting force applied thereon to urge said reciprocable jaw toward said fixed jaw.

12. A lifting tool comprising two opposed jaw members, one of which is mounted for straight line movement toward the other, a cam slot through said movable jaw member, a cam slot through such jaw mounting, at least one of said slots being inclined relative to the jaw face of said movable jaw member, and a lifting pin through said slots operative, upon application of a lifting pull on said pin, to urge said movable jaw member toward the other said jaw member.

PENN W. PENN.

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