United States Patent [19]

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[11] **3,777,477**

[45] **Dec. 11, 1973**

[54] **SELF-LOCKING FOR LOOP CHAINS**

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[22] Filed: **Nov. 26, 1971**

[21] Appl. No.: **202,131**

[30] **Foreign Application Priority Data**

Aug. 7, 1971 Italy 12856 A/71

[52] **U.S. Cl.** **59/93**

[51] **Int. Cl.** **F16g 15/04**

[58] **Field of Search** 59/93, 86, 85; 294/75

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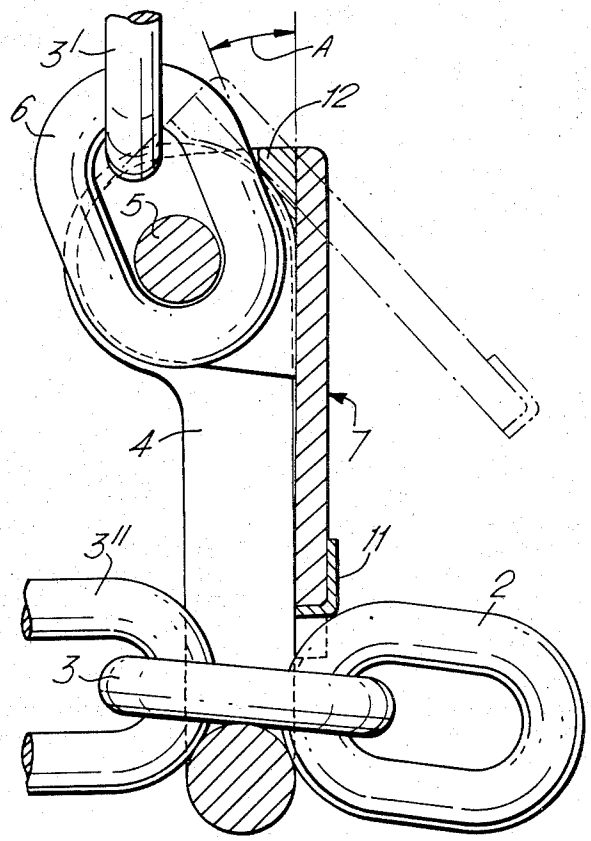
[57] **ABSTRACT**

A simple but effective device for holding a chain looped around a bundle of elements in a tightened condition. A catch element is associated with an eyelet which is disposed at one end of the chain and through which the other end is passed. The catch is automatically shifted as the chain passes through the eyelet to reduce the size of the loop but moves back to a latching position to prevent the chain moving through the eyelet to enlarge the loop.

6 Claims, 5 Drawing Figures



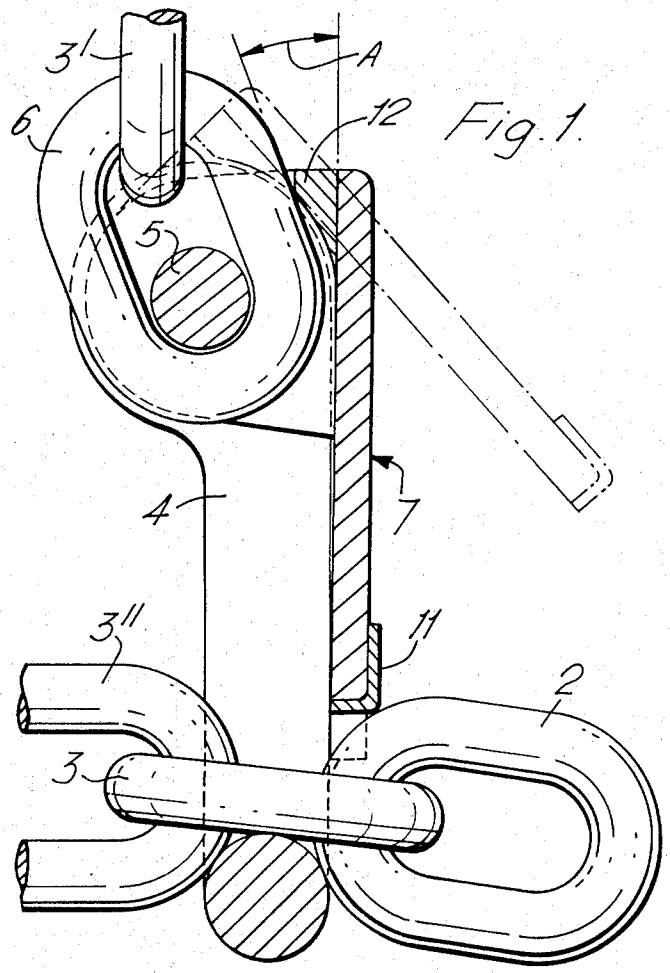


Fig. 1.

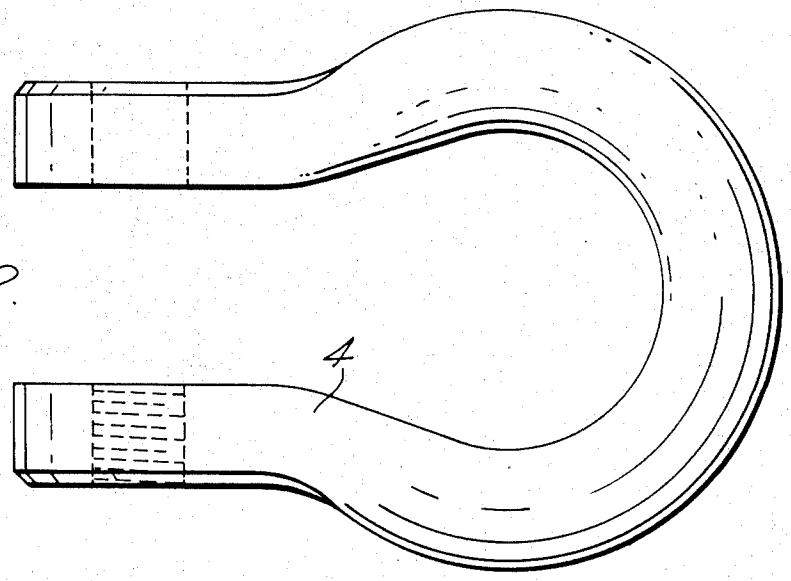


Fig. 2.

Fig. 3.

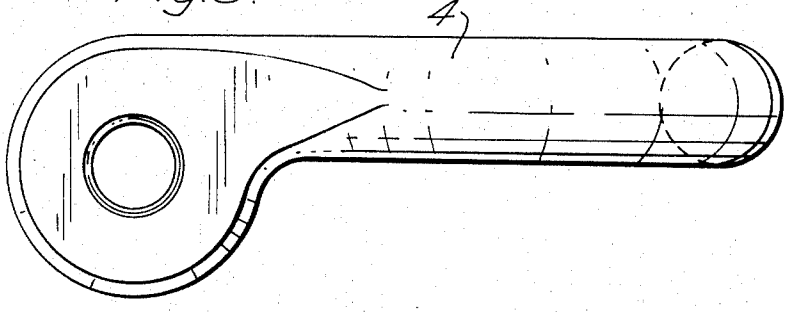


Fig. 4.

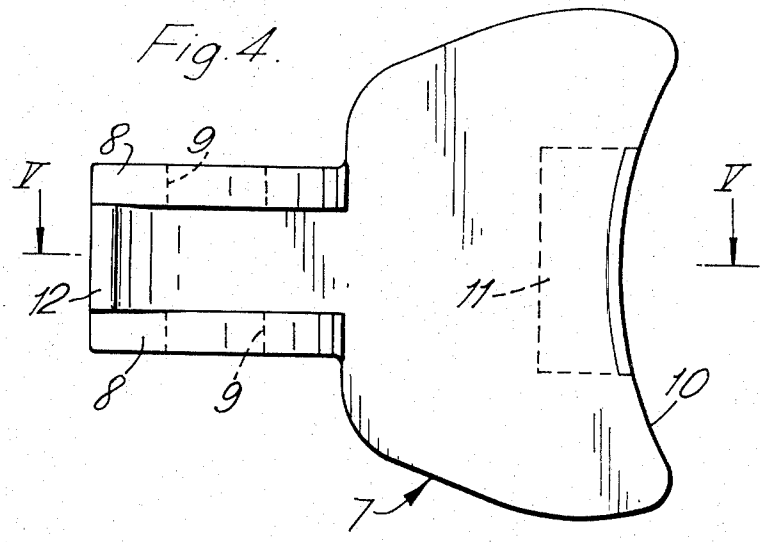
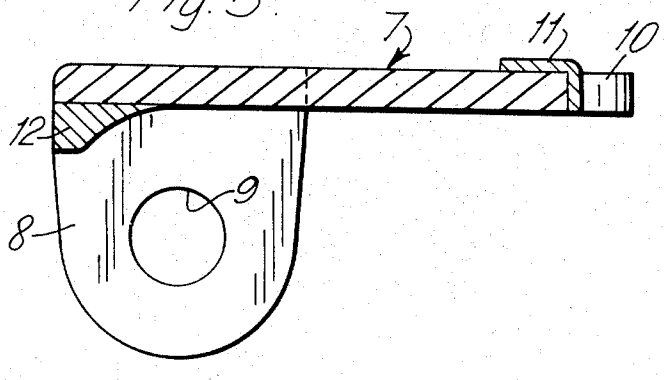


Fig. 5.



SELF-LOCKING FOR LOOP CHAINS

The present invention consists of a self-operating device for locking loops in chains.

It is known that for handling, through suitable lifting means, a bundle of elongated elements, such as iron sections, it is common to use a chain which at one end thereof is provided with an eyelet and the other end of which is passed around the bundle and through the eyelet and attached to a lifting mechanism.

Under the pulling action exerted by the lifting mechanism, the chain runs through the eyelet so that the loop is tightened around said bundle of elongated elements and during their handling the wieght of the bundle holds the loop tight.

It is obvious that when the bundle is put down, the force which keeps said loop tightened is removed. In these circumstances if the bundle of elongated elements is to be lifted and put down several times for various reasons, each time the bundle is put down on a support surface the loop formed by the chain gets loose.

Therefore, a relative movement of the elongated elements forming the bundle occurs and for this reason the bundle may reach the final step of the carrying in dangerous conditions and anyhow in a changed condition.

Techniques presently used to avoid this difficulty have involved either manually operable locking elements or the use of separate tying means to hold the elements of the load in the desired relationship. The time loss, Inconvenience and cost of such techniques is clearly undesirable.

The present invention has as its object the provision of a lifting device which is operable to allow the device to be tightened around a load and held in that tightened condition automatically.

An embodiment of the present invention is shown in the accompanying drawings, in which:

FIG. 1 shows partly in section the device of this invention;

FIGS. 2 and 3 show a side and front view respectively of one of the components of the device of FIG. 1; and

FIGS. 4 and 5 are front and sectional views respectively of another component of the device of FIG. 1.

In the drawings, a chain 1 is shown only in part, as are shown an end link 2 which is to be caught by the hook of a lifting means, e.g., a crane, and the intermediate links 3; it is to be noted that the intermediate links 3' and 3'' are connected by other intermediate links, not shown, and forms the loop tightening the bundle of elongated elements, not shown, in combination with shackle 4 which acts as the eyelet of said loop.

Said shackle 4 is nothing but an end link closed by a bolt 5 which is removable and further fixable in position of locking for instance by threading; therefore, said bolt 5 has the function of fixing the end link 6 to said bracket 4. Around said bolt 5 is articulated also the blocking or latching plate 7 provided with ears 8 in which bores 9 are formed for the passage of bolt 5. The profile of said plate is arbitrary but for a good operation the length thereof is such that when plate 7 rests against plate 4, a chain link 3 lying in a plane perpendicular to the projection plane of FIG. 1 may pass between the lower edge 10 of the plate and the adjacent edge of the shackle but such a link lying in the plane of FIG. 1 may not pass. The right position and length of plate 7 is to this purpose clearly shown in FIG. 1 illustrating that the presence of plate 7 prevents the chain 1 from running leftwards, that is to the direction which would cause the loop formed by links 3 to become loose.

The lower edge 10 of plate 7 may be suitably curved and reinforced in its central portion by a small plate 11 of hard material.

It is clear in FIG. 1 that when the end 2 of the chain is pulled rightwards, that is to the direction which causes a tightening of said loop, plate 7 will rotate in counterclockwise direction so as to allow the links of chain 1 to pass freely. However, said rotation in counterclockwise direction of plate 7 is obtained by overcoming the lever action exerted by the end back link 6 against a tooth or abutment 12 arranged on the edge of plate 7 which is near pin 5 and shaped such that it does not touch said link 6 only when the latter is with its longitudinal axis perpendicular to the resting plane of bracket 4.

However, it is clear that when chain 1 forms a loop tightened around the bundle of elongated elements to be carried, the longitudinal axis of the various links 3, as well as the longitudinal axis of bracket 4 will tend to form a polygonal shape, whose maximum outer angle of the various sides will depend on the bundle of minimum diameter which is to be tightened by the loop chain. Therefore, the projection of tooth 12 from plate 7 will be such that the minimum angle (A) which may be formed between the longitudinal axis of the link 6 and the resting plane of plate 7 is greater than the above minimum angle.

In such a way, when chain 1 is arranged as a loop around a bundle of elongated elements, link 6 will tend always, by striking against tooth 12, to keep plate 7 adhering to bracket 4. In such a way chain 1 will be prevented from running, within shackle 4, leftwards with respect to FIG. 1, i.e., in to the direction to open the loop.

The operation of the claimed locking is the following: the end front portion 2 of chain 1, after passing around the bundle of elongated elements, not shown, is inserted into the eyelet formed by shackle 4 and hooked to the lifting means. At the other end, said chain is fixed articulated to bracket 4 by means of the end link 6 and the bolt 5. When said lifting means enter operation, chain 1 is stretched and the blocking plate 7 brushes with its free edge 10 the chain running within shackle 4 rightwards with respect to FIG. 1, that is to the direction corresponding to the tightening of the loop formed by said chain 1.

During said running of chain 1 within shackle 4, said blocking or latching plate 7 is subject to a rocking motion with a frequency equal to a half of the number of links which will pass through bracket 4 per unit of time.

As soon as the bundle of elongated elements is tightened by the loop formed by the chain, plate 7 is pushed by link 6 against shackle 4 through said abutment 12 and therefore chain 1 is prevented from running leftwards even when the pulling action on end 2 of chain 1 by said lifting means is removed.

Obviously, the tightening degree of the bundle of elongated elements varies not continuously, and exactly the loop perimeter varies in length in intervals equal to the length of one link of the chain.

It is to be understood that the invention is not limited to the examples shown, but it is intended to cover all modifications and equivalents within the scope of the appended claims.

What we claim is:

1. A lifting device comprising a chain for encircling a load, an eyelet at one end of said chain through which the opposite end of the chain is passed to form a loop and latch means pivoted to said eyelet, said latch means being movable between a first position to allow said eyelet end of the chain to run through the eyelet in the direction to tighten the loop and a second position to prevent passage of the chain through said eyelet in the direction to loosen said loop, said latch means comprising an abutment element cooperating with a link of said chain at said one end next to said eyelet whereby the latch means is urged towards said second position.

2. A lifting device as claimed in claim 1 wherein said eyelet comprises a shackle including a bolt passing through said link of said chain and said latch means is pivoted on said bolt.

3. The device as claimed in claim 2 wherein said latch means is provided with a pair of lugs through aligned holes of which said bolt passes.

4. A device as claimed in claim 3 wherein the latch means comprising a slate, the edge of said plate opposite said bolt having a concave shape.

5. A device as claimed in claim 2 wherein the latch means comprising a plate, the edge of said plate opposite to said bolt being as provided with a wear resistant insert.

6. A lifting device comprising a chain for encircling a load, an eyelet at one end of said chain through which the opposite end of the chain is passed to form a loop, said eyelet comprising a shackle having a bolt passing through the last link of said one end of said chain, a latch member pivoted on said bolt and movable between a first position to allow said opposite end of said chain to run through the eyelet in the direction to tighten the loop and a second position to prevent the passage of the chain through said eyelet in the direction to loosen said loop, said latch member having an abutment element at an end thereof adjacent to said bolt and cooperating with the link through which said bolt passes to limit movement of said latch means from said second position to said first position.

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