

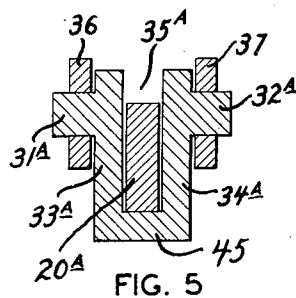
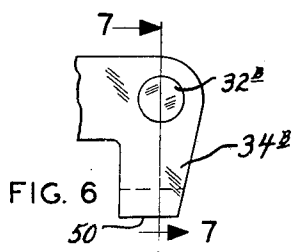
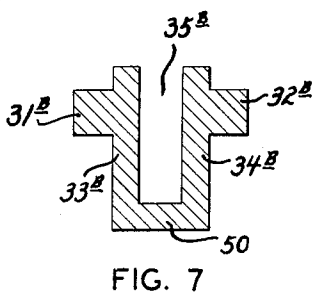
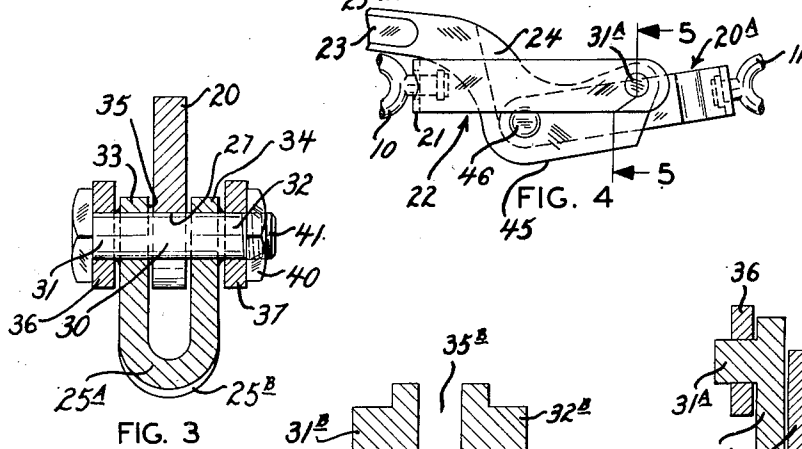
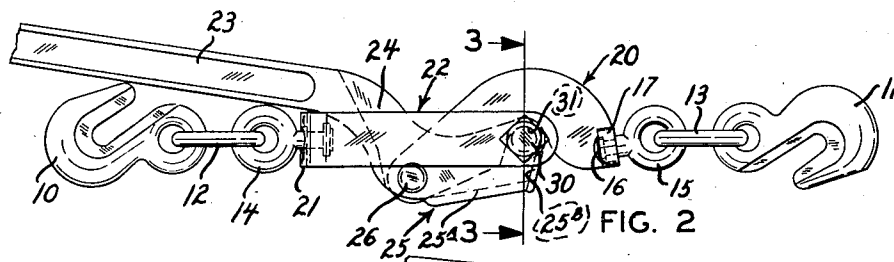
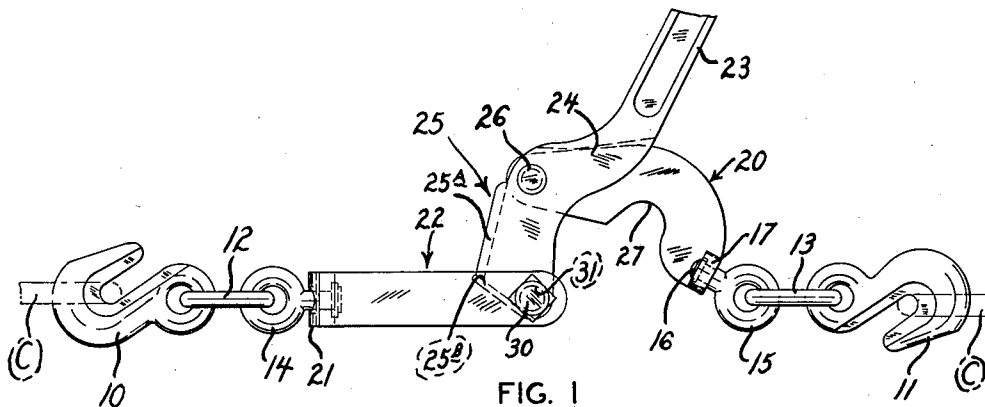
March 14, 1950

V. S. DURBIN ET AL

2,500,488

LOAD BINDING DEVICE

Filed April 30, 1947



INVENTORS
VOTAW S. DURBIN
ROBERT T. DURBIN
BY *Robert T. Durbin*
ATTORNEY

UNITED STATES PATENT OFFICE

2,500,488

LOAD BINDING DEVICE

Votaw S. Durbin, Webster Groves, and Robert T.
Durbin, St. Louis County, Mo.

Application April 30, 1947, Serial No. 744,808

4 Claims. (Cl. 254—78)

1

This invention relates to load binding devices, and more particularly to toggle type tensioning apparatus in a broad sense, of those types in which a handled lever is employed with various linkage elements for tightening a chain, cable, or the like, as in securement of elongate loaded articles, for example, pipe, well casing, poles, logs and the like, on cars, trucks or vehicles, whereby to prevent shifting of the load in transit. The enumeration of fields of usage is intended as exemplary and not as exhaustive.

Load binders of the general type and for the general purpose contemplated, have long been in use but have frequently failed under stress due to yielding of certain of their parts under extreme loading. More commonly, such failures are due to spreading of the normally parallel furcations or wall elements forming a mouth, the furcations heretofore having been as far as is known, structurally united only in a region remote from the zone of major load application thereto, are subjected to disastrous spreading tendencies. This, as has been realized by users of these devices, is probably the most prevalent single cause of their failure. It is accordingly a major objective of the invention to provide against the noted spreading tendencies, and to enable binders otherwise characterized by good design and metallurgy, to resist without failure a substantially greater loading than heretofore possible.

Yet another object of the invention is attained in a novel feature of construction by virtue of which there is provided a defined stop structure limiting relative movements of certain of the pivoted parts of the binder when in operative position. In the example to be disclosed, this result is accomplished by provision for abutment of a mouth bridge by a pivoted tongue element when the two are in their operative or load-carrying relation.

Further objects of the invention consist in the provision of improvements rendering tensioning devices of this general class more efficient for their intended purposes, and with the added provision of greater durability of strength, as well as longer life.

The foregoing and numerous other objects and advantages will more clearly appear from the following detailed description of certain preferred embodiments of the invention, particularly when considered in connection with the accompanying drawing, in which:

Fig. 1 is a side elevation of a load binder in

2

partly released or open position, and embodying certain of the present improvements;

Fig. 2 is a side elevational view similar to Fig. 1, and showing the same structure in an operative or tensioned relation of its parts;

Fig. 3 is an enlarged sectional elevation, the sectional portions being considered as viewed along line 3—3 of Fig. 2;

Fig. 4 is a fragmentary side elevation of the mouth portion, tongue and clevis of a somewhat modified form of structure;

Fig. 5 is an enlarged sectional view as taken in staggered planes, along line 5—5 of Fig. 4;

Fig. 6 is a fragmentary side elevational view of the outer end of the mouth of a still further modified form, and

Fig. 7 is a sectional view as taken along line 7—7 of Fig. 6.

Referring now by characters of reference to the drawing, certain of the major elements of the present structure, included for completeness and illustration of operation, are or may be of known construction, but it may be indicated for fullness of disclosure that a chain, certain lengths of which are indicated at C, will usually be employed to embrace with the aid of the binder, a load of poles, logs, pipe or the like. Obviously also the device may be used with the chain, as for the lifting of loads or other general tensioning purposes where movement is required only through a relatively restricted range. A pair of chain-engaging hooks 10 and 11 are each shown as provided with adjacent links, these being indicated at 12 and 13 respectively, each of these links being permanently secured to and through the aperture of an eye bolt or swivel such as 14 engaging the link 12, and 15 engaging the link 13. In Figs. 1 and 2, the eye bolt 15 is shown as pivotally connected, in the manner of a swivel through a head portion 16 operating in a socket 17 therefor, formed as a part of a tongue member generally indicated at 20. Similarly, the eye member 14 is connected for a swivel movement through the bridge portion 21 of a clevis, and the latter generally indicated at 22.

The actuating lever of the device includes a handle portion proper which may be of any suitable length, indicated at 23, one end of which is connected as through an angular offset 24, to a bifurcate mouth-forming portion generally indicated at 25. Assuming, as is preferred in the present example, that the handle structure be formed as a malleable casting, the furcate portion 25 will constitute an integral extension of portions 24 and 23.

3

The tongue 20 has its end opposite the eye bolt 15, pivotally connected as through a pin 26 at a substantial depth within the mouth formed by portion 25. It will be noted that in the form of Figs. 1 and 2, the tongue 20 is of a substantially deep arched construction, the arched shaping thereof resulting from a substantial recess, indent, or relieved portion 27 inwardly of what may be considered the lower margin of the tongue, and the purpose of which will hereinafter more clearly appear.

In Figs. 1 and 2, the tongue 20 being arranged to extend and work between the furcations of the mouth 25, external pivot means are to be provided near the opposite extremity of the mouth furcations. In the present example such a pivot may consist of a hardened bolt or pin 30 extended through apertures 31 near the outer end of the mouth, and projecting externally of the furcations sufficiently to extend through similar openings (Fig. 3) in the free ends of the arms of clevis 22. The pin may, if desired, be welded in place or if threaded, may serve to receive a nut or the like and secured in any convenient or desired manner against axial displacement from its assembled position.

The manner of usage of devices of the kind herein disclosed will be readily apparent to those skilled in the art, but it may be noted, merely for completeness, that with the chain C brought around the load in snugly embracing relation thereto, and with the hooks 10 and 11 engaging the chain, the handle 23 is initially positioned as far to the right (Fig. 1) as possible, and the chain tensioned by movement of the handle to the left (Fig. 1) to bring it to a position such as shown by Fig. 2. The relative positions of the hook 11 in Figs. 1 and 2, will indicate the substantial tensioning effect incident to the aforesaid movement of the handle 23. Incident to such movement, it will have appeared that the elements 20, 25 and 22 serve as a toggle linkage; that the toggle thus constituted is first brought to a "centered" relation and thereafter brought to a slightly over-centered relation, as will best appear from Fig. 2, wherein the line of pull connecting the eye elements 14 and 15, lies somewhat above the pivot 26. Thus the tension through the device will tend to maintain the binder in locked or operative position, requiring further opposite movement of the handle to open the binder or bring it to released position.

As hereinbefore generally referred to, in case a furcate structure such as that formed by the arms and the mouth 25, is subjected to an external loading in a general direction lengthwise thereof, extreme loads will result in a tendency of the furcations to diverge, this effect being most pronounced in the region of the axis of pivot 30 about which the mouth and clevis are relatively displaceable. After numerous experiments it has been found that a structural bridge between the furcations forming the mouth, will enable the device to resist substantially greater loading, without noticeably resulting in the spreading tendency above referred to. Such a structural bridge is provided by the pin 30 of the present example, such a pin providing not only pivot portions 31 and 32 externally of the furcations proper 33 and 34 which form the mouth 35 therebetween, but also providing a distinct bridge portion across the mouth, as continuations of the pivot studs or trunnions outside of the mouth. It is best seen from Fig. 3 that the arms of the clevis indicated respectively at 36 and 37, engage

4

the pivot parts 31 and 32 in a manner which would tend, but for the bridge, to spread the furcations or wall members 33 and 34 under high loading. In this form of structure, a nut 40 is employed for retaining the pin 30 in place and the external threads at 41 may be deformed to prevent unthreading actions of the nut. The arrangement described is best possible in a combination using the arched tongue 20 heretofore noted. It will now readily appear that with the toggle linkage comprised of the several pivotally connected elements, in locked position, the bridge or tying central portion of pin or bolt 30 will be abutted by the recessed region 27 immediately beneath the highest or deepest part of the arch of tongue 20.

Although the pin or bolt 30 will in many cases serve adequately to prevent spreading of the jaws or furcations 33 and 34, further assurance against this effect may optionally be attained by forming an integral bridge across the furcations as shown at 25A. This bridge is of tapered or sloping depth internally, being of greatest depth opposite the clevis axis, whence it becomes more shallow toward the pivot member 26. An opening may be left at the rear of the bridge to accommodate the heel of the tongue 20, as shown by Fig. 1. The fixed form of the bridge, and the spacing of the furcations are still further assured by a reinforcing rib such as at 25B, Figs. 1 and 2.

A somewhat modified form accomplishing virtually the same result is shown by Figs. 4 and 5. In this modification, the major elements such as the handle proper and the clevis are or may be the same as heretofore described, and their operative and pivotal relations virtually the same, so as to require no further description. A difference is, however, noted in that in this case, trunnions or pivot-forming ears are indicated at 31A and 32A, these being formed integrally with the sidewall portions 33A and 34A, being the furcations defining the mouth 35A therebetween. A tongue 20A may in this case be of a straight or linear formation, without an arch or indent, and may be formed of a flat strip stock of suitable gauge. In this structure the mouth is provided with an integral arch consisting of a pocket of substantial length, comprised of the portions 33A, 34A and a relatively elongate bridge 45. This bridge, similar to bridge 25A, is of increasing depth or height, progressing from a point just inwardly of the plane of the pivots 31A and 32A, rearwardly toward the tongue pivot 46 of this structure. It will now have appeared that any tendency of extreme loads to spread or cause divergence of the side elements 33A and 34A, will be resisted by the relatively heavy and rugged bridge 45, in fact the whole arched jaw structure. Furthermore, it will appear that the lower margin (Fig. 4) of the tongue 20A will abut over a substantial portion of its length, the inner surface of the bridge 45 of the arch, thus providing a definite abutment and a positive stop for the tongue when in locked position.

A further minor modification of the general principles of structure heretofore described, is shown by Figs. 6 and 7 wherein the mouth bridge is restricted to a more narrow tie piece at the extreme free end of the mouth 35B formed by furcations 33B and 34B. In this case the metal of the furcations is brought downwardly a substantial distance, preferably as an integral part of the casting forming the furcations and the mouth, to form a U-shaped or arch structure integral

5

therewith. A bridge piece 50 serves as a sturdy integral connection between portions 33B and 34B, and with integral trunnions or ears 31B and 32B serving to receive the apertured free ends of the arms of the clevis in pivoted relation thereto. In this form, as will appear from the section of Fig. 7, the bridge or tying structure in the form of the U-shaped or arched portion 33B, 50 and 34B, is located substantially in the transverse plane containing the pivot axis constituted by ears or trunnions 31B and 32B. It will now appear without further detailed explanation, that similarly to the showing of Fig. 5, a so-called straight or rectilinear tongue may be employed, and that with the parts in operative position, such tongue will abut the inner surface of the bridge 50 providing a definite stop therefore incident to movement of the parts into loaded or tightened position.

Although the invention has been described by making a particularized reference to a preferred form and a few selected modifications thereof, the detail of description is to be understood solely in an instructive and not in any limiting sense, numerous variants being possible within the scope of the claims hereunto appended.

We claim as our invention:

1. In a load binder, an elongate lever including a handle and a furcate end forming a mouth between the furcations thereof, a tongue pivoted to the lever substantially inwardly of the mouth, pivot members projecting externally of the furcations near the outer end of the mouth, connections externally of the mouth, to said pivot members, and a tension piece connecting the furcations in a zone substantially outwardly beyond the tongue pivot.

2. In a load binder, a lever having a furcate end with a mouth between the furcations, a tongue pivoted to the lever at a distance inwardly of the mouth, pivot-forming members projecting externally of the furcations near their outer ends, a further connecting piece engaging said pivot-forming members, the lever, tongue and connecting piece constituting a toggle-type linkage, and a bridge constituting a cross connection between

6

the furcations of the lever, and adapted to be abuttingly engaged by the tongue when the parts of the binder are in operative position, with the linkage elements brought slightly beyond a centered relation of said linkage.

3. In a load binder, a handle having spaced furcations at one end, a tongue pivoted at a distance substantially inwardly of the free ends of said furcations, pivot elements projecting outwardly of the furcations near their free ends, the furcations being characterized by a portion of substantially U-shaped transverse section in the general region of said outer pivots, the bridge of the U-shaped portion serving as a tension piece to resist spreading of the external pivots under extreme loads, and load connections from said external pivots.

4. In a load binder of a type including an operating lever provided with a mouth at one end, formed by spaced side walls, a tongue pivoted to the lever and operating across the mouth, a clevis connection externally of said side walls near their outmost ends, an arch structure formed integrally with said side walls, and extending along margins of the walls between the ends thereof, the arch structure being of increasing height or depth proceeding inwardly of the clevis connection, the tongue being of substantially rectilinear construction and under load, being received between said side walls and adapted to abut the internal surface of said arch structure.

VOTAW S. DURBIN.
ROBERT T. DURBIN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
323,445	Pangborn	Aug. 4, 1885
1,538,412	Stacy	May 19, 1925
1,636,638	Jenkins	July 19, 1927
1,911,194	Jenkins et al.	May 30, 1933
1,950,923	Johnson	Mar. 13, 1934
2,422,001	Durbin	June 10, 1947