United States Patent [19]

Ratcliff et al.

[11] **3,842,426**

[45] **Oct. 15, 1974**

[54] **LATCHING OVER-CENTER TYPE LOAD BINDER**

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[52] **U.S. Cl.** **254/78**

[51] **Int. Cl.** **B66f 3/00**

[58] **Field of Search** 254/77, 78, 79; 280/179; 105/369

[56] **References Cited**

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Assistant Examiner—Robert C. Watson
Attorney, Agent, or Firm—Flehr, Hohbach, Test, Albritton & Test

[57] **ABSTRACT**

An improved over-center type latching load binder having improved self-locking and variable mechanical advantage characteristics in conjunction with binding a load. The binder operating lever includes a curved bearing surface over which a clevis member engageable with a load hold down element is ridable during movement of the lever between a load unbinding position and a load binding position. A second clevis engageable with a second load hold down element includes latching structure for maintaining the lever in a load binding position. The lever further includes a hook portion at one end thereof for positively urging, under safe operating conditions, the first mentioned clevis from the load binding position when it is desired to release a load so that danger of operator injury due to "flying" of the lever during unbinding is obviated.

13 Claims, 7 Drawing Figures

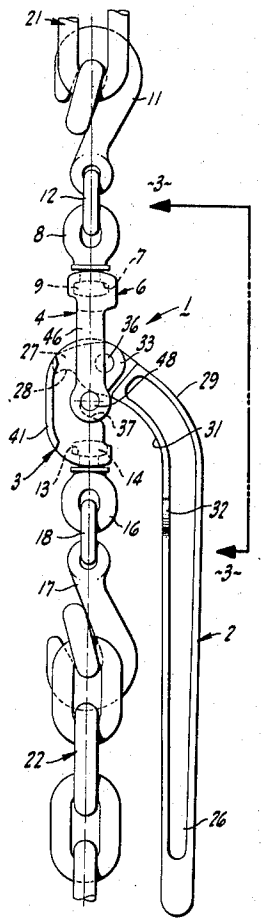


FIG-2

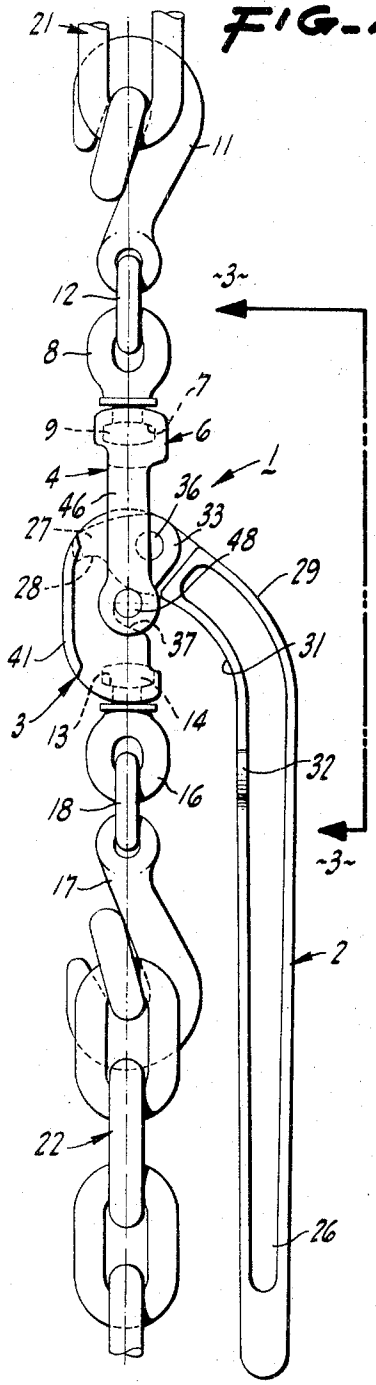
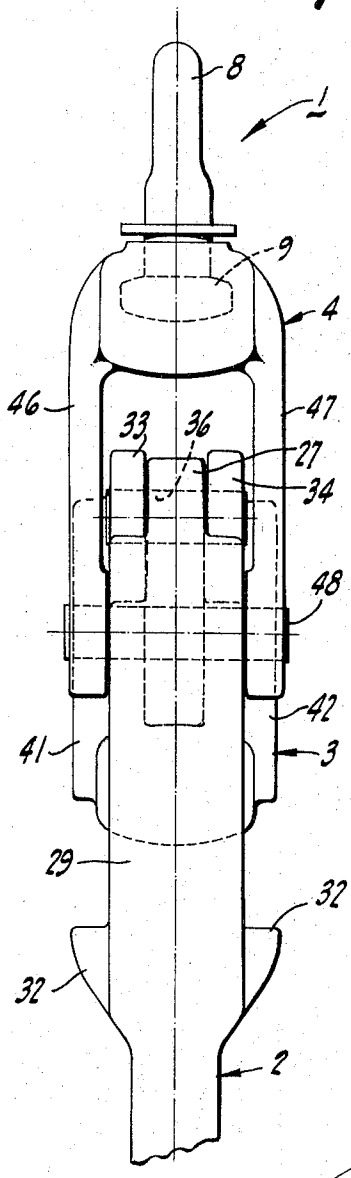


FIG-3



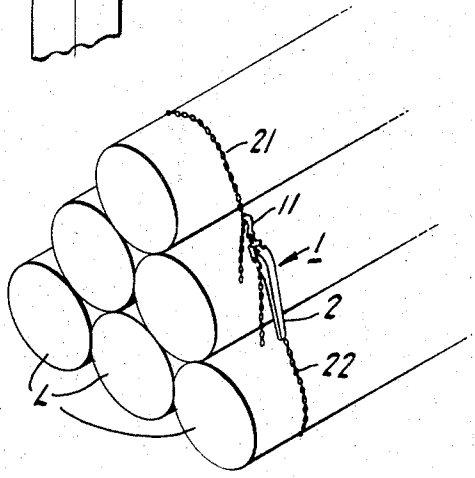


FIG-1

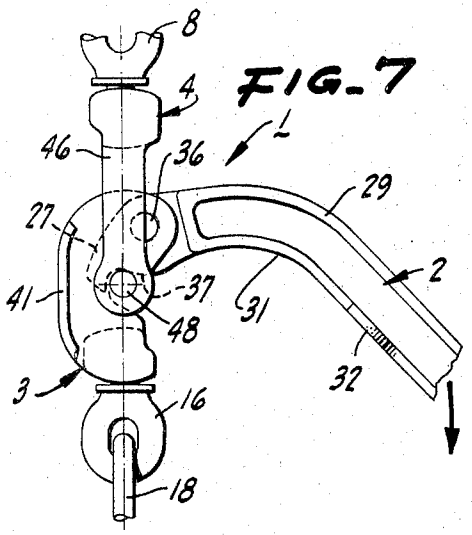


FIG-7

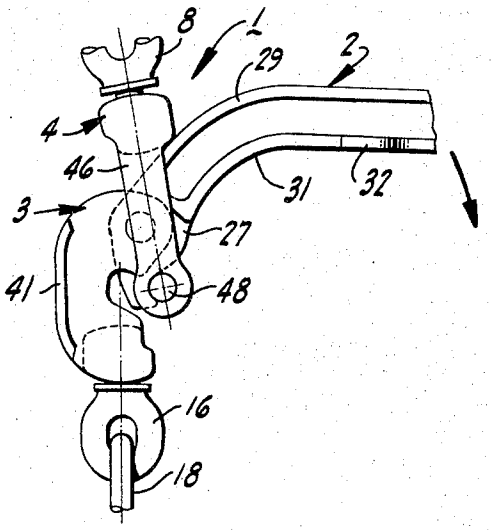


FIG-6

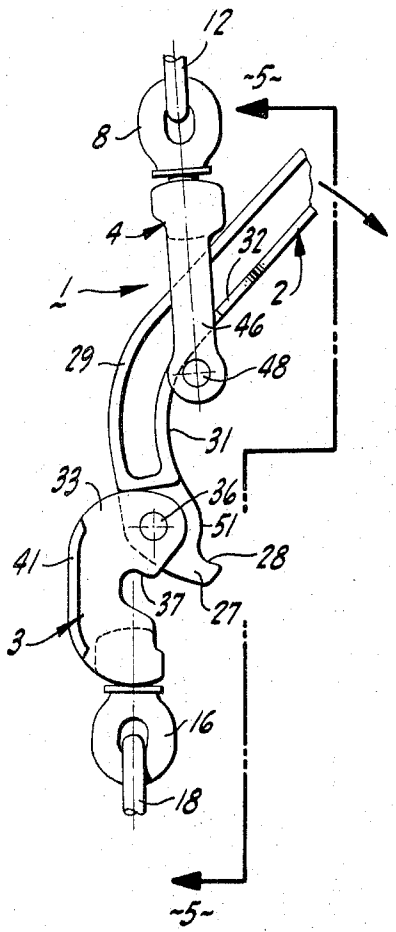


FIG-4

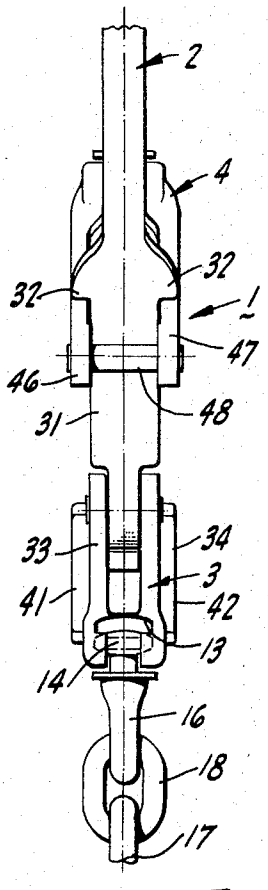


FIG-5

LATCHING OVER-CENTER TYPE LOAD BINDER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to the field of devices for binding a load. More particularly, this invention relates to the field of over-center type load binders which utilize an operating lever having a generally off-set of dog leg configuration, with which two members to be connected with load hold down elements are operatively connected. The operating lever is movable between first and second positions for selectively binding or unbinding a load secured to the load hold down elements by suitable means, such as grab hooks or equivalent members swivelly attached to the binder.

In the embodiment illustrated, the members connected with the operating lever comprise clevis structures movably connected with the lever in straddling relationship at predetermined locations thereof. The load binder of this invention may be utilized in any environment where prior known over-center type binders have been employed heretofore.

The field of this invention particularly relates to improved over-center type load binders having improved safety characteristics combined with variable mechanical advantage features in conjunction with movement of an operating lever from an open or load unbinding position towards a closed or load binding position, and visa versa. In that regard, this invention relates to the field of over-center type load binders which are imparted with improved operating characteristics and safety features which are effective during load binding and unbinding to assist the operator in reducing his energy output and to produce enhanced safety during both binding and unbinding of a load secured by the binder.

The improved load binder of this invention is particularly well adapted for securing together or tensioning load hold down elements positioned around the load on a supporting platform. That is, the load binder of this invention is intended, among other uses, to bridge the gap between the ends of load hold down elements which are positioned to extend around the load to be sustained upon or bound to a load supporting surface. However, other utilizations in which over-center type load binders have been used heretofor are also contemplated within the purview of the desirable environments in which the subject binder may be employed.

2. Description of the Prior Art

Over-center type load binders have been widely known and generally utilized for a many years. By way of illustration, conventional over-center load binders of the type commonly utilized heretofor are disclosed in the U.S. Pats. to Williams No. 2,089,679 dated Aug. 10, 1937 and Stacy No. 1,538,412 dated May 19, 1925. Certain shortcomings in such long known types of conventional over-center load binders have been rectified within recent years by patented improvements thereto, and in pending applications, such as the improvements detailed in Ratcliff U.S. Pat. No. 3,271,007 dated Sept. 6, 1966; Ratcliff U.S. Pat. No. 3,395,892 dated Aug. 6, 1968; Ratcliff U.S. Pat. No. 3,591,141 dated July 6, 1971; and pending Ratcliff et al. U.S. application Ser. No. 187,467 filed Oct. 7, 1971.

However, such prior known conventional over-center load binders, including those embodying recent

improvements as noted, do not incorporate or utilize therein the combined improved operating and safety features disclosed and claimed herein which impart variable mechanical advantage features and positive latching features to the particular over-center type binder construction of this invention. While the improvements in the noted Ratcliff patents and application include features which impart greatly enhanced safety characteristics and improved operating features to over-center load binders in comparison to conventional over-center load binders of the type in use for many years prior to their development, such improved patented binders do not incorporate therein the combined specific and novel features of this invention. In that regard, while Ratcliff U.S. Pat. No. 3,591,141 incorporates therein a latching structure for maintaining an over-center binder in the over-center load binding position, and while Ratcliff application Ser. No. 187,467 discloses therein structure for imparting variable mechanical features to an over-center load binder, such patent and application do not possess the combined improved characteristics or the particular structural details for providing such characteristics disclosed herein.

It should be understood, of course, that the Ratcliff patents and application noted hereinabove are substantial improvements over the prior art known before their development, and that the particular features emphasized herein have been specifically designed as additional specific improvements over the prior art, including the Ratcliff patents noted, which further enhance effective and safe over-center load binder characteristics and constructions.

The present invention retains the basic simplified construction of conventional over-center load binders of the type known for many years and adds thereto improved structural features and operating mechanisms in combinations heretofor unknown. That is, the general configuration and structural features recognized by and long accepted by users of over-center load binders in the trade are retained by the subject binder while at the same time providing improved characteristics and safety features noted at a cost which is generally competitive with conventional over-center load binders of the type long known.

Additionally, the present invention has improved characteristics over known variable mechanical advantage producing devices such as the chain tightener device shown in Smith U.S. Pat. No. 1,523,565 dated Jan. 20, 1925. While there are certain general similarities between the chain tightener of the Smith patent and the subject load binder of this invention, a basic distinction between Smith and the subject load binder resides in the fact that Smith does not disclose an over-center type binder in which an operating lever may be moved at least to a dead center position to effect positive holding of a load sustained thereby. That is, the operating lever in the Smith patent never reaches, or passes through and beyond, a dead center position in the manner characteristic of over-center type load binders generally and of the present invention specifically. Thus the improved features for which over-center type load binders have long been recognized is missing from Smith.

As a result, for the same reasons the present invention distinquishes structurally and functionally from the patents and application set out hereinabove, the same

also distinquishes structurally and functionally from the chain tightener construction shown in the Smith patent.

In that connection, the improved features of the present invention are provided by an improved operating handle construction and cooperable first and second clevis members which straddle portions of the operating lever in various operating positions of the lever. In that connection, the operating lever is defined by an off-set or dog leg portion which includes a curved bearing surface over which one clevis member is ridable during movement of the operating lever between an open or load unbinding position and a closed or load binding position, and visa versa. The other clevis is provided with latching structure which maintains the first mentioned clevis in a locked position when the operating lever is moved to the load binding position.

Furthermore, the operating lever desirably is provided at an end thereof with a specially contoured hook portion designed to physically urge the first mentioned clevis from locking engagement with the other clevis when it is desired to unbind a load. In that connection, the hook portion in the illustrated embodiment desirably is spaced a substantial distance from the latched clevis when the binder is in the load binding position so that the operating lever may be moved a substantial distance from the load binding position before a load may be unbound. That is, the lever may be moved through a substantial distance so that the operator of the binder will be in a much more safe position before load unbinding is effected so that the safety of the operator is enhanced and the danger of injury characteristic of conventional over-center load binders may be eliminated or substantially minimized.

In basic operation the present binder is analogous to that of conventional over-center binders long known in the art so that no specific dexterity or change in operating functions need be learned by an operator utilizing the binder of this invention.

Thus, the drawbacks of prior known conventional overcenter load binders are overcome by the present invention in a structure which retains the basic advantages for which conventional over-center binders have been long accepted, namely, ease of operation, low cost, durability and simplicity, coupled with strength and comparative light weight. As a result, one man operability is retained while at the same time improved operating and safety features are incorporated into the subject binder.

SUMMARY OF THE INVENTION

The present invention relates generally to an improved device for binding a load or tensioning a load hold down element, and more particularly to an over-center type load binder in which an operating lever is movable from an open or load unbinding position to a closed or load binding position in which the operating lever moves essentially into a dead center position during such load binding. More particularly, this invention relates to an over-center type load binder having improved safety means incorporated therein, combined with positive latching and variable mechanical advantage features heretofor unknown in an over-center type load binder.

Still more particularly, the present invention relates to an over-center type load binder defined by three principal operating components, namely: (1) an elongated operating lever including an off-set or dog leg portion interposed between a manually graspable handle portion and a load releasing hook portion at its opposite end; (2) a first clevis member pivotally connected with the operating lever adjacent the hook portion end thereof; and (3) a second clevis member movably connected with the operating lever and ridable over the off-set portion thereof.

Means are operatively connected with the two clevis members to permit the same to be operatively engaged with load hold down elements to be drawn together or tensioned when the binder is moved to the load binding position. Such means may take various forms but in conformance with the construction of the conventional over-center load binders well accepted in the trade, such means in the illustrated embodiment comprise structures defined by grab hook members connected by swivels with the binder clevis members.

Improved operating and safety features are imparted to the subject binder by providing a generally arcuate bearing surface over which one of the clevis members rides during load binding and unbinding; latching structure for positively locking the clevis members together and maintaining the same in the latched position when the operating lever is in the load binding position; and structure on the operating lever defined by a hook portion thereof for positively urging the clevis members out of engagement under controlled safety conditions when it is desired to unbind a load.

The curved bearing surface provided on the operating lever off-set portion is designed to impart variable mechanical advantage features to the binder which facilitates operation thereof under safer operating conditions and with less operator effort then heretofor required in conventional load binders. Also, the latching structure which holds the clevis members in the the load binding position, coupled with the unlatching hook portion on the operating lever, are designed so that initial movement of the operating lever from the load binding position under load binding conditions may be effected whereby the lever may be initially moved a substantial distance towards the load unbinding position; thus the lever may be positioned generally away from the body of the operator when load release begins so that danger of the lever "flying" against the operator's body in the manner well known with conventional over-center load binders is substantially minimized if not completely eliminated. Such lever flying characteristics of conventional binders frequently and commonly has resulted in serious personal injury to, and even death of, operators utilizing conventional binders.

The safety and improved operating characteristics of the present binder makes the same particularly attractive for use because dangerous lever flying is minimized because initial movement of the lever is under full control of the operator until the lever has reached the over-center position at which location flying would normally occur with a conventional binder. However, by the time the operating lever has reached that position, the lever has been positioned by the operator generally out of alignment with the main portion of the operator's body or head so that the danger of operator injury due to subsequent lever flying is obivated. That is, any tendency of the lever to fly, as noted above, comes when the operator has moved the lever to a position in which he is pushing the lever away from his body rather than

drawing the lever towards him as in conventional over-center binders.

Additionally, the subject binder components have been designed so that the danger of damage due to excessive wear has been minimized without sacrificing strength, durability, simplicity or low cost.

The variable mechanical advantage feature of this binder permits the operator to bind a load more tightly with the same effort required by prior conventional binders, or to bind a load with equal tightness compared to a conventional binder with lesser effort. Additionally, because the subject binder preferably utilizes two clevis members mounted in straddling relationship with respect to the operating lever, tension on the load hold down elements is applied in generally a straight line direction so that no side draft or lateral movement of the binder components is encountered as the load is being bound.

Thus, the improved operating and safety features of this invention are imparted into an improved construction of a type heretofor unknown in the over-center type load binder art.

From the foregoing it should be understood that objects of this invention include the provision of an improved over-center type load binder which combines in a single binder improved operating and safety features heretofore unknown; the provision of an over-center type load binder which possesses improved safety features in conjunction with variable mechanical advantage features which facilitate utilization thereof during load binding and unbinding; the provision in an over-center type load binder of improved latching means for positively holding a binder in the load binding position; the provision of improved structure in conjunction with an operating lever of a load binder for positively urging a binder from the load binding position towards the the load unbinding position without endangering the safety of the operator; and the provision of an over-center type load binder which retains the basic characteristics of conventional overcenter binders while imparting thereto improved safety and operating features.

These and other objects of the invention will become apparent from a study of the following detailed disclosure in which references is directed to the appended drawings.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a generally schematic view showing the subject binder employed to hold a series of cylindrical objects, such as logs, in place on a load supporting surface.

FIG. **2** is a side elevational view of the subject binder with the operating lever thereof shown in the closed or load binding position with the binder components thereof positively latched in such a position.

FIG. **3** is a rear elevational view of a portion of the binder taken in the plane of line **3—3** of FIG. **2.**

FIG. **4** is a side elevational view of the subject binder illustrating the same in the open or load unbinding position.

FIG. **5** is a rear elevational view of a portion of the binder taken in the plane of line **5—5** of FIG. **4.**

FIGS. **6** and **7** are side elevational views of the subject binder illustrating the sequence of movement thereof as the operating lever is moved from the open or unbinding position towards the closed or load binding position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In keeping with the aforementioned advantages which make over-center type load binders attractive to users, the binder of this invention, generally designated **1,** is simple in construction and comprises a minimum number of operating components formed of sturdy metal, such as steel. Because of the construction of the components thereof as will be described hereinafter, the same may be made by utilizing comparatively inexpensive fabricating procedures, such as forging or casting.

The illustrated embodiment is defined by three principal operatively interconnected components, namely an elongated manually operable operating lever **2** which is preferably H-shaped in cross section to minimize its weight, a first or lower clevis member **3** movably connected to the operating lever at a predetermined location as will be described, and a second or upper clevis member **4** also movably connected with the operating lever in a manner to be described.

The first and second clevis members mentioned each includes means associated therewith by which the binder may be operatively connected with load hold down elements in a known fashion. In that regard, as best seen in FIG. **2,** the embodiment illustrated utilizes conventional grab hook and swivel structures for engaging the binder with load hold down elements. That is, at its free end **6** the upper clevis **4** is formed with an internal socket **7** in which a link **8** having an enlarged rounded end **9** is swivelly received. In that connection, while various procedures and structures may be utilized for interconnecting the link **8** with the clevis **4,** a simplified and improved procedure in that regard is illustrated in Ratcliff U.S. Pat. No. 3,656,797, dated Apr. 18, 1972. At its opposite end, link **8** is connected with a conventional grab hook **11** by an intermediate chain link **12.**

The free end of the lower clevis member **3** is similarly provided with an internal socket **13** in which is received an enlarged rounded end **14** of a link **16** so that link **16** is swivelly connected with clevis member **3.** A conventional grab hook **17** is connected with link **16** by an intermediate chain link **18.**

The grab hooks **11** and **17** are provided so that the binder may be selectively engaged with predetermined portions of opposed load hold down elements, generally designated **21** and **22** respectively. In the embodiment illustrated such load hold down elements comprise lengths of coil chain to predetermined links of which the respective grab hooks may be engaged in known fashion as seen in FIG. **2.**

FIG. **1** shows the binder **1** in an illustrative load binding environment in which the respective grab hooks of the binder are engaged with the load hold down elements **21** and **22** positioned around the load being bound. Such load, for purposes of illustration, comprises a stack of logs L positioned on a load supporting surface such as a logging trailer (not shown) and held in place thereon by the hold down elements **21** and **22** extending therearound. The load binder **1** bridges the gap between adjacent ends of the load hold down elements by engagement of the grab hooks with preselected links of the load hold down elements so that tension may be applied to the same to prevent shifting of

the load when the operating lever 2 of the binder is moved to the over-center load binding position.

As noted previously, the respective hold down elements may be defined by lengths of coil chain or by short sections of coil chain secured to metal cables or the like in known fashion. Other types of load hold down elements obviously may be employed if preferred and the subject binder may be similarly provided with structures for contacting such other load hold down elements other than the grab hooks noted without departing from the spirit of this invention.

It should be understood that the operating lever is manipulated in the fashion well known wiht over-center load binders to move the same between the open or load unbinding position shown in FIG. 4 to the closed or load binding position shown in FIG. 2, and visa versa. As shown by FIGS. 2 and 7, when the operating lever is in the load binding position it is essentially in the dead center location; that is, the center lines of the respective clevis members 3 and 4 are in substantial alignment with each other as noted by the dotted line in such figures. As a result, when the binder is under load conditions, tension is applied to the clevis members in generally a straight line direction, rather than angularly or in an offset direction as in conventional overcenter binders. In that connection, when the grab hooks 11 and 17 are connected with the respective load hold down elements 21 and 22, tension is applied to the hold down elements by drawing the two clevis members 3 and 4 towards each other as the operating lever is moved toward the dead center position. So long as the operating lever remains in the load binding position, tension is maintained on the load hold down elements to preclude the load from shifting as a result of the generally straight line relationship of the binder components. In that regard, as will be discussed hereinafter, the improved latching structure incorporated into the subject binder positively maintains the binder in the dead center load binding position shown in FIG. 2.

It should be understood that the improvements to conventional over-center binders imparted by this invention reside in modifications made to the construction of the operating lever and the clevis members as will be described.

As seen in FIG. 2 the operating lever includes a graspable handle portion 26 at one end thereof and a curved hook portion 27 at its opposite end, the latter being defined by a reduced thickness tongue having a curved recess 28 therein for the purpose to be described. Interposed between and interconnecting the graspable handle portion 26 and the hook portion 27 is an offset, generally curved or dog leg portion 29 designed to impart variable mechanical advantage features to the binder as noted previously. The offset lever portion includes a curved bearing surface which, in the embodiment illustrated, is defined by a curved edge 31 of the offset portion. Such edge 31 is generally arcuate in configuration and terminates in a short generally straight section adjacent recess 28 as perhaps best seen in FIG. 4. Such edge thus defines a surface over which a portion of the upper clevis member 4 is ridable during movement of the lever between the load binding and unbinding positions.

As perhaps best seen in FIG. 3, the operating lever is further provided with means for limiting movement of the clevis member 4 on the operating lever and such means comprises opposed flanged sections or tabs 32 formed at opposite sides of the lever at one end of the bearing surface 31.

As perhaps best seen from FIGS. 3 and 4, the lower clevis member 3 is pivotally mounted in straddling relationship on the hook end portion 27 of the operating lever adjacent to the recess 28 therein. In that connection, clevis member 3 includes a pair of laterally spaced arms 33 and 34 which straddle the tongue defining the hook end portion of the lever.

A pivot pin 36 extends through the lever tongue through a bore provided therein and such pin is press fitted or otherwise secured in such tongue. Opposite ends of the pin project into bores provided in the spaced clevis arms 33 and 34. Such clevis arm bores are slightly larger in diameter than the diameter of the pin 36 so that the clevis member 3 may pivot freely about the axis of such pin during movement of the operating lever between the open and closed positions.

As best seen in FIG. 4, the lower clevis member 3 further includes structure for latching or locking the binder in the closed essentially dead center position. In that regard, such latching structure includes detent recesses formed in each of the clevis arms 33 and 34, such recesses being identified by reference numerals 37. A portion of the upper clevis member 4 is selectively receivable in such detent recesses 37 as will be described.

The lower clevis member 3 further includes a stop shoulder structure thereon adjacent said detent recesses for limiting movement of the upper clevis member 4 when the binder is in the load binding position. Such stop shoulder structure comprises a pair of elongated ribs 41 and 42 extending generally longitudinally of the clevis member 3 along the edge portions thereof opposite from said detent recesses 37.

The upper clevis member 4 also is movably connected with the operating lever 2 in straddling relationship relative to the same. In that regard, such upper clevis member comprises a pair of opposed arms 46 and 47, the lateral spacing of which exceeds the width of the curved dog leg portion 29 of the operating lever as well as the lateral spacing of the arms 33 and 34 of the lower clevis member 3. Thus, when the binder is in the load binding position seen in FIGS. 2 and 3, the upper clevis 4 straddles both the lower clevis 3 and the operating lever hook portion 27.

The upper clevis member 4 is operatively maintained in engagement with the operating lever by means of a pin 48 which extends laterally through bores formed in the arms 46 and 47 of the upper clevis member 4. Such pin is permanently secured in and extends transversely between the clevis arms 46 and 47 in any suitable fashion, such as by utilizing cotter pins or split ring connectors adjacent oposite ends thereof (not shown). However, preferably, such pin is free to rotate within the bores formed in the clevis arms so that movement of the clevis member 4 over the curved bearing surface 31 of the operating lever may be facilitated.

In that regard, it will be seen from FIGS. 4 and 5 that the pin 48 is intended to roll over and move along the generally arcuate bearing surface 31 provided in the operating lever 2. Thus, as the operating lever is moved clockwise or downwardly in the direction of the arrows shown in FIGS. 4, 6 and 7, the lever moves from the load unbinding position towards the load binding position. During such movement, the pin 48 and the upper clevis 4 ride over the bearing surface until the operat-

ing lever reaches the dead center position shown generally in FIG. 7. During such movement a variance in the amount of mechanical advantage is produced which works in the operator's favor to facilitate load binding with minimum effort. That is, the movable contact between the upper clevis 4 and the operating lever results in variance in the mechanical advantage produced by such movement of the lever so that load binding is facilitated.

When the operating lever is in the dead-center position shown in the FIG. 7, continued movement of the lever from that position toward the fully closed position shown in FIG. 2 permits pin 48 of the upper clevis 4 to move into the detent recesses 37 provided in the opposed arms 33 and 34 of the lower clevis 3. As noted from FIG. 4, such recesses 37 are positioned generally in line with the end of the curved bearing surface 31 so that continued movement of the lever from the FIG. 7 position to the FIG. 2 position results in urging of the pin 48 into the detent recesses. The hook end portion of the operating lever is provided with a somewhat enlarged or bulbous portion 51 adjacent the recess 28 in such hook portion. Such bulbous portion assists in urging the pin 48 into the latching position as the lever reaches the dead center position.

Also, as noted from FIG. 4, because the detent recesses 37 in the clevis member 3 are somewhat undercut relative to the mouth thereof, the pin 48 drops into such recesses under the tensioning effects of the load being bound by the binder. Thus, the pin 48 and the clevis member 4 therewith are positively latched or locked in the load binding position seen in FIG. 2.

The tension applied to the binder by the load being bound maintains the binder in such position until the pin 48 is physically urged out of engagement with the detent recesses 37. Referring again to FIG. 7, it will be noted that when the operating lever 2 is moved from the FIG. 7 position towards the FIG. 2 position, the same may move freely in that pin 48 has already entered the recesses 37 and the load is sustained thereby. When in the fully closed position shown in FIG. 2, the binder operating lever is in close proximity to the load hold down element 22 and will remain in that position under the effects of gravity. However, if desired, some additional securing means, such as wire or elastic band, may be passed around the load hold down element and the operating lever to keep the same from vibrating. Such additional securing means is not required, however, because the secure latching engagement between the detent recesses 37 and pin 48 will prevent vibration from moving the binder lever inadvertently from the fully closed load binding position shown in FIG. 2.

When it is desired to unbind a load, it is merely necessary tp pivot the operating lever 2 in a generally counterclockwise or upward direction from the position seen in FIG. 2. Such movement may be effected through a substantial distance, approximately 60° in the embodiment illustrated as noted by comparing FIGS. 2 and 7, until the recess 28 formed in the hook portion 27 of the operating lever contacts the pin 48 latched in the recesses 37 of the lower clevis member 3.

Such initial movement of the operating lever is effected through such substantial distance so that the operator of the binder may place his body in a position of safety relative to the operating lever at the time the lever is positioned to release the load. That is, while initial movement of the lever may be effected by the operator pulling the lever towards himself, by the time the lever reaches the FIG. 7 position, the operator is in effect standing behind or out of the path of movement of the lever so that continued movement thereof is effected by pushing the lever away from his body, rather than pulling the same towards his body. Such positioning adaptability imparts the important safety features to this invention so that at the time the load is ready to be unloosed, the lever is generally out of a position in which it can strike the operator and injure him.

When the lever during unbinding reaches the FIG. 7 position, continued movement of the same in the counterclockwise direction causes the tongue of the hook portion of the lever to engage clevis pin 48. Such movement results in the tongue physically urging the pin 48 from latching engagement with the detent recesses 37 so that the load bound by the load binder can be released. Any tendency of the operating lever to fly under such conditions is counteracted by the fact that by the time the load is free to be unbound the operator of the binder has removed his body from a position of danger as noted hereinabove so that the problems of safety which are inherent with conventional over center load binders are obviated by the present invention.

It should be noted from FIG. 2 that the center of the recess 28 in the hook end portion of the lever and the center of the detent recesses 37 are spaced substantially equidistant from the pivot axis of the lower clevis member as defined by pivot pin 36. Thus secure mating interengagement between the tongue on the lever end and the pin 48 of the upper clevis is insured when the lever is to be moved to release a load.

Thus, it will be understood that a simple to operate yet highly effective and improved load binder is provided hereby which includes maximum safety features coupled with a binder which imparts variable mechanical features to its construction so that minimum manual effort is required to effect maximum load binding.

While the preferred embodiment illustrated and described herein utilizes clevis members mounted in conjunction with the operating lever in straddling relationship relative thereto, it should be understood that the reversal of such an arrangement by means of which the lever end is provided with a clevis configuration mounted in straddling relationship with respect to the other components of the binder also may be utilized. Such a reversal of parts would respond to the novel concepts of this invention without departing from the novel scope hereof.

Having thus made a full disclosure of this invention, reference is directed to the appended Claims for the scope of protection to be afforded thereto.

We claim:

1. An over-center type latching load binder comprising

A. an operating lever having an offset portion at one end thereof and a manually graspable handle portion at the other end thereof,

B. a first clevis member pivotally connected with said lever adjacent said one end thereof, including

1. structure thereon for operatively connecting said binder to a first load hold down element,

C. a second clevis member operably connected with said lever and movable between predetermined positions along said offset portion, whereby variable mechanical advantage features are imparted to said binder as the same is moved between an open or

load unbinding position and a closed or load binding position, said second clevis member including

1. structure therein for operatively connecting said binder to a second load hold-down element;

D. said lever having a curved bearing surface in said offset portion thereof over which said second clevis member rides during load binding and unbinding,

E. a pin operatively connecting said second clevis member with said lever which is ridable over said bearing surface thereon as said lever moves between said load unbinding and binding positions,

F. latching structure on said first clevis member with which said pin is engageable as said lever is moved into the dead-center position during load binding, and

G. means on said lever engageable with said pin to positively urge the same from engagement with said latching structure when said lever is moved from said load binding position toward said load unbinding position,

1. said means comprising a tongue at the end of said lever which is opposite said handle portion,

2. said tongue normally being spaced from said pin when said pin is engaged with said latching structure so that said lever may be moved a substantial distance from said load binding position toward said load unbinding position before said tongue engages said pin to positively urge said pin out of engagement with said latching structure.

2. The binder of claim **1** which further includes

H. stop shoulder structure on said lever adjacent one end of said bearing surface with which said second clevis member is engageable when said binder is in said load unbinding position.

3. The binder of claim **1** in which said latching structure on said first clevis member includes

1. a detent recess formed in such clevis member generally in line with the end of said curved bearing surface when said lever is in said load binding position,

2. said recess receiving said pin therein when said lever is in said load binding position and thereby positively precluding inadvertent movement of said binder from such load binding position.

4. An over-center type latching load binder having improved operator safety and variable mechanical advantage features comprising,

A. an elongated operating lever comprising

1. a manually graspable handle portion at one end thereof,

2. a hook portion at the other end thereof, including a curved tongue thereon,

3. an intermediate offset portion interposed between said handle portion and said hook portion which includes a curved bearing surface along an edge thereof, and

4. stop shoulder structure adjacent one end of said curved bearing surface which is spaced from said hook portion,

B. a first clevis member pivotally connected with and straddling said lever adjacent said hook portion,

C. structure operatively engaged with said first clevis member for releasably connecting said binder with a first load hold down element,

D. a second clevis member movably connected with and straddling said lever offset portion, including

1. a pin extending through said second clevis member and ridable on said curved bearing surface as said lever is moved between an open or load unbinding position and a closed or load binding position, whereby variable mechanical advantage features are imparted to said binder,

E. structure operatively engaged with said second clevis member for releasably connecting said binder with a second load hold down element,

F. positive latching structure formed on said first clevis member generally in alignment with the other end of said curved bearing surface when said lever is in said load binding position, comprising

1. a detent recess in which said pin of said second clevis member is engageable when said lever is moved essentially into a dead center position in which said second clevis member moves into straddling relationship with said first clevis member,

G. said lever hook portion tongue being spaced from said pin in said detent recess when said lever is in said load binding position so that said lever may be moved a substantial distance from said load binding position toward said load unbinding position before said tongue comes in contact with said pin whereby said lever may be safely positioned away from the body of the operator of said binder before the load sustained by said binder may be released, such release being effected by said tongue physically urging said pin from engagement with said detent recess as movement of said lever toward said load unbinding position is continued so that said second clevis member may ride over said lever curved portion until the same contacts said stop shoulder structure.

5. The binder of claim **4** in which each said structure operatively engaged with each of said clevis members for connecting said binder with said hold down elements includes a grab hook swivelly engaged with its respective clevis member.

6. The binder of claim **4** in which said first clevis member further includes

1. stop shoulder structure thereon adjacent said detent recess for limiting movement of said second clevis member as the same moves into straddling relationship with said first clevis member when said lever is moved into said load binding position.

7. The binder of claim **4** in which said curved bearing surface is defined by a generally arcuate section which leads into and terminates with a generally straight section adjacent said lever hook portion.

8. The binder of claim **4** in which said hook portion includes a curved recess therein contoured generally in conformance with the outer configuration of said pin so that secure engagement therebetweeen may be effected when it is desired to move said lever from said load binding to said load unbinding position.

9. The binder of claim **8** in which the center of said detent recess of said first clevis member and the center of said recess of said lever hook portion are spaced substantially equidistant from the pivot axis of said first clevis member on said lever.

10. An over-center type latching load binding comprising

A. an elongated operating lever including

1. a manually graspable handle portion at one end thereof,
2. a hook portion at the other end thereof terminating in a curved tongue, and
3. an intermediate offset portion between said handle portion and said hook portion,

B. a first clevis member pivotally connected with and straddling said lever adjacent said hook portion,

C. structure operatively engaged with said first clevis member for releasably connecting said binder with a first load hold down element,

D. a second clevis member movably connected with and straddling said lever offset portion,

1. a pin extending through said second clevis member and movable therewith as said lever is moved between an open or load unbinding position and a closed or load binding position,

E. structure operatively engaged with said second clevis member for releasably connecting said binder with a second load hold down element,

F. positive latching structure formed on said first clevis member comprising

1. a detent recess in which said pin of said second clevis member is engageable when said lever is moved essentially into a dead center position in which said second clevis member moves into straddling relationship with said first clevis member,

G. said lever hook portion tongue being spaced from said pin in said detent recess when said lever is in said load binding position so that said lever may be moved a substantial distance from said load binding position toward said load unbinding position before said tongue comes in contact with said pin whereby said lever may be safely positioned away from the body of the operator of said binder before the load sustained by said binder may be released, such release being effected by said tongue physically urging said pin from engagement with said detent recess as movement of said lever toward said load unbinding position is continued so that said second clevis member may ride over said lever curved portion until the same contacts said stop shoulder structure.

11. The binder of claim **10** in which each said structure operatively engaged with each of said clevis members for connecting said binder with said hold down elements includes a grab hook swivelly engaged with its respective clevis member.

12. The binder of claim **10** in which said hook portion includes a curved recess therein contoured generally in conformance with the outer configuration of said pin so that secure engagement therebetween may be effected when it is desired to move said lever from said load binding position to said load unbinding position.

13. The binder of claim **12** in which the center of said detent recess of said first clevis member and the center of said recess of said lever hook portion are spaced substantially equidistant from the pivot axis of said first clevis member on said lever.

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