

Oct. 30, 1956

R. C. HOY ET AL

2,768,418

CLAMP

Filed May 6, 1955

3 Sheets-Sheet 1

Fig. 1.

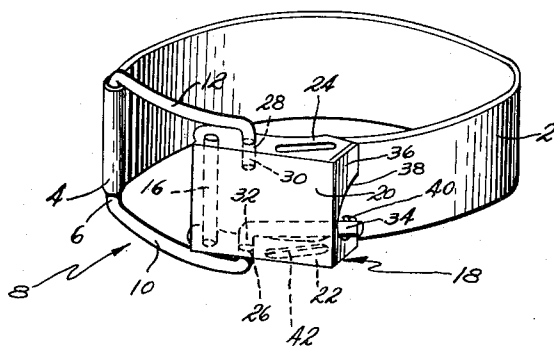
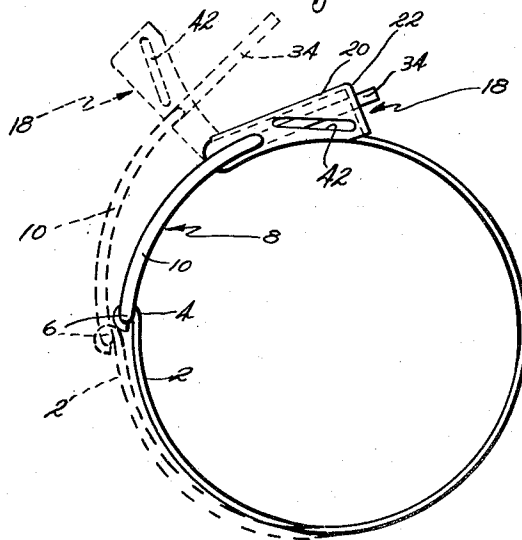


Fig. 2.



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Fig. 3.

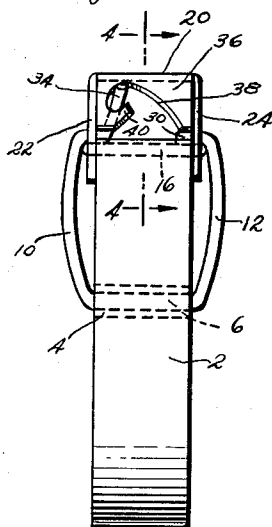


Fig. 4.

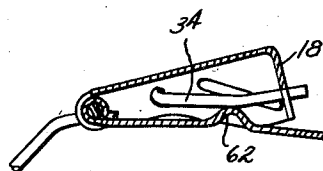
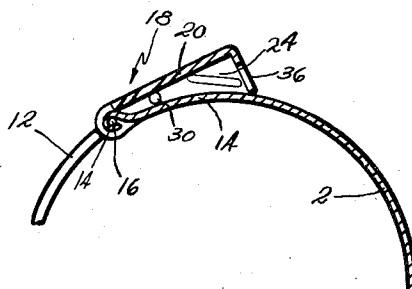


Fig. 5.

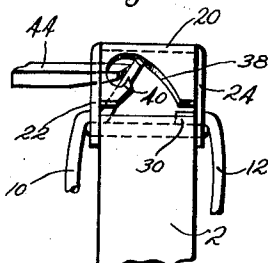
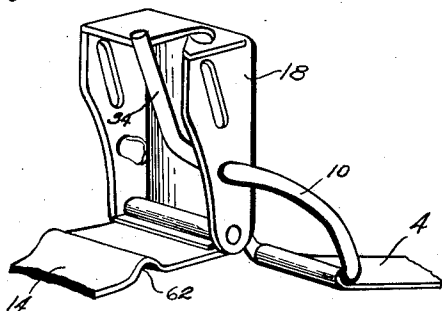


Fig. 9.

Fig. 8.



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Fig. 6.

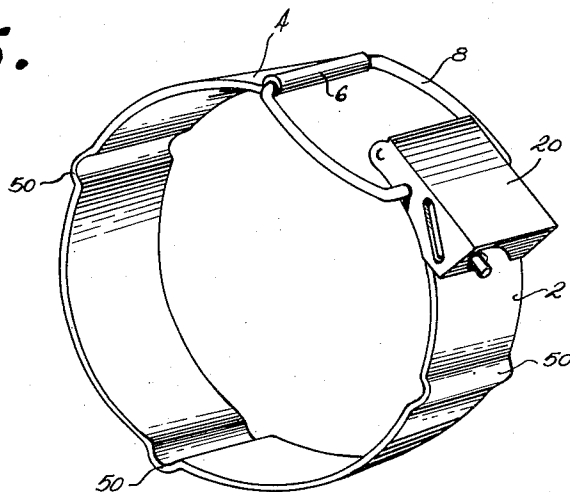
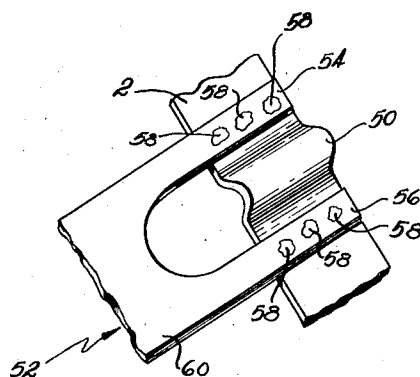


Fig. 7.



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Application May 6, 1955, Serial No. 506,529

10 Claims. (Cl. 24—270)

This invention relates to clamps and in particular to the kind of clamp which is in strap form and has an over-center locking lever provided with a safety catch for pulling together, and locking, the ends of the strap.

There are several forms of the specified kind of clamps, both those with safety catches and those without. The disadvantage of the latter is that they may accidentally open. In the existing safety-catch type, the design is in many cases expensive to make because of a multiplicity of parts, and in other cases the safety catch is difficult to operate.

It is the general purpose of this invention, therefore, to provide a clamp of strap form having an over-centering lever to tighten the clamp and which is equipped with an easily and cheaply made safety catch, the latter being easily operated, and yet fool-proof against accidental opening, with a tension member connecting the lever and the rest of the clamp.

Among the several objects of the invention, therefore, may be noted the provision of a clamp having a combined tightening and locking lever thereon which is economical to make, simple to operate, and has a minimum of moving parts; the provision of a clamp of the above class in which the lever is provided with a positively operating, easily operated, safety catch; the provision of a lever-tightening clamp having a tension member between the lever and the rest of the clamp; the provision of a clamp of the last named class having a safety catch which is made as an integral part of the tension member therefore leading to economy of manufacture; the provision of a lever and safety catch structure for a clamp in which the safety catch is relatively free from accidental opening yet may be opened easily by deliberate action on the part of the user; and the provision of clamps of the aforementioned types in which additional spring means is incorporated in the clamp for tensioning purposes. Other objects and advantages will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, arrangement and manipulation of parts which will be exemplified in the structures hereinafter described, and the scope of which will be indicated in the following claims.

In the accompanying drawings, in which the invention is illustrated:

Fig. 1 is a perspective view of one embodiment of the invention, the locking lever being closed;

Fig. 2 is a side view of the Fig. 1 embodiment, showing by means of full and dotted lines, respectively, the lever in closed and open position;

Fig. 3 is an elevation of the Fig. 1 embodiment, given to show in greater detail certain features of the safety catch;

Fig. 4 is a cross-section of a portion of the Fig. 1 embodiment taken in the direction of sight lines 4—4 on Fig. 3;

Fig. 5 is a view (similar to Fig. 3) of a portion of the

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clamp and lever, to show how the safety catch may be released;

Fig. 6 is a perspective view of another embodiment of this invention;

Fig. 7 is a fragmentary view of a portion of still another embodiment, similar to Fig. 6, but different in certain details as shown; and

Figs. 8 and 9 are perspective and cross-sectional views, respectively, of a fragmentary portion of still another embodiment, Figure 8 showing the locking lever in opened position, and Figure 9 showing the locking lever in closed position.

Similar reference characters indicate corresponding parts throughout the drawings.

Referring now to Figs. 1 and 2, there is shown a clamp in the form of a band or strap 2 made of, for example, steel or brass. One end 4 of the band is turned over as shown to receive the pintle 6 of the tension member indicated generally by numeral 8, this tension member being made of steel or hard drawn brass wire, for example, and being somewhat U-shaped. Member 8 has the two elongated members or legs 10 and 12 as shown. Legs 10 and 12 are made bowed (see Fig. 3) in order to give resilience to the clamp as will be explained below.

The other end 14 of the band is turned over as shown to receive the pin 16, the latter being anchored near one end of lever 18. Lever 18 is stamped or formed from a single piece of metal and has the top plate 20 and the side flanges 22 and 24. Pin 16 is riveted in place between the side flanges in customary manner, and the fit of end 14 on pin 16 is loose enough to permit the lever to rotate thereon.

Flanges 22 and 24 are provided with the pivot holes 26 and 28 respectively and through hole 28 is inserted the bent-over pivot end 30 of leg 12 which anchors the lever 18 rotatably to this leg of the member 8. Through the other hole 26 extends the elongated formed end of leg 10, this end having a bend (preferably a right angle) in it to form the pivot portion 32 (corresponding in function to pivot end 30) and then a further bend to form the safety catch arm 34 which lies between the aforesaid flanges.

Lever 18 is provided with a detent, in this instance being the end flange 36 which is cut away, as shown, to form the hook-shaped slot 38 and the actual safety catch hook or detent 40. When the lever is in the closed position shown, the end of safety catch arm 34 rests in the detent 40. This is clearly shown in the elevation of Fig. 3, and it is seen that this holds the lever down in line with the tension member 8.

When the clamp encircles an object and the lever 18 is pushed down, the safety catch arm 34 will snap into the detent 40. The tension in the clamp will now tend to pull the normally bowed legs 10 and 12 straight, and such pulling will exert a force tending to move the arm 34 toward wall 22, and hence holding the arm in the detent. Thus the lever 18 cannot be lifted upward to release the tension in the band. In order to open the lever, it is first necessary to lift or slide the safety arm 34 away from wall 22 and thus off the detent 40. To this end, a slot 42 is provided in flange 22, as shown, and it is to be noticed that slot 42 is placed diagonally in the flange. Because of this, its direction crosses the direction of the arm 34, and a piece of flat metal 44 (for example, the blade of a screw driver) will strike the arm 34 to push it, when inserted in slot 42. This operation is illustrated in Fig. 5, wherein the arm 34 is shown partially released. Upon complete release of the safety catch arm, the lever 18 will move to the position shown in dotted lines in Fig. 2, thus releasing the tension member 8 and loosening the clamp for removal.

It will be observed that the placing of the holes 26 and 28 ahead of the pintle 16 will enable the clamp to

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be placed loosely on its object, and then tightened by snapping the lever down to the closed position. The bowed shape of legs 10 and 12 enables the member 8 to act as a tension member, these legs straightening under the pull of lever 18, the resiliency of tension member 8 gives resiliency to the clamping action, and also enables the clamp to fit articles that may differ somewhat in size. It is obvious that the lever 18 may be very cheaply made on automatic stamping presses, and that the tension member 8 can likewise be cheaply made. Assembly is simple, since in the entire clamp there are only three parts, viz, the band 2, the tension member 8, and the lever 18. As indicated, the parts can be made out of metal, such as steel or its alloys, or brass; or, with slight modifications entirely within the scope of the invention, out of molded plastics. For example, band 2 and lever 18 could be of plastic while member 8 could be spring wire.

Turning now to Fig. 6 for a second embodiment of the invention, it is there seen that the embodiment is the same as that shown in Figs. 1-5, except that in this instance, spring means 50 are provided in the band. Three such spring means have been shown by way of example, but it is obvious that only one may be used if desired, or two, or more than three. In each instance, the spring means comprises a loop of material being bent out of the band material itself. Here, only half-circles (in cross section) have been shown, but if desired the loops may be shallower or deeper, that is, for example, one quarter circle in cross-section, or three-quarters of a circle in cross-section.

It may be found desirable to stiffen one or more of said loops 50, and in Fig. 7 is shown one way of doing this. The U-shaped members 52 of sheet metal (for example) are provided with the legs 54 and 56. These legs spraddle the loop 50 as shown and are welded or riveted firmly in place, as at the places 58, welding being preferred. The tab 60 of the member may, if desired, be used as a mounting means for holding the clamp to a support, etc. In action, it will be found that the legs of the member 52 will give or "spring" slightly when they are pulled away from each other. This stiff resiliency of each member 52 is imparted to the loop 50 in each instance, thus making more controlled the amount of resilience of the clamp as a whole.

Referring now to Figs. 8 and 9, there is shown still another embodiment. In this instance, means have been provided for positively causing the safety catch arm 34 to engage its detent in the event the clamp is used around something which is of such a diameter as not to tension the clamp very much. In such a case, it may be found that the catch 34 may not snap into its detent automatically.

Therefore, to insure that it does so, a raised projection is provided on the band to strike the catch arm and force it into place. In the embodiment shown, this projection is made as a loop 62 in the band, this being positioned in respect to the lever 18 and catch arm 34 as shown. When the lever is closed, loop 62 will strike the catch arm 34, and force it up and into its detent, as shown in Fig. 9. It is to be noted, therefore, that the loop 62 can be one of the spring means or loops 50 described for the previous embodiment, and this is the preferred construction.

In view of the above, it will be seen that the several objects of the invention are achieved, and other advantageous results obtained.

As many changes could be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings, shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. A clamp comprising a flexible band, a lever, and a catch member connecting the band and the lever; said lever comprising a top plate having side flanges, and a

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detent at one end; means fastening said band by one end thereof to said lever at the end thereof remote from said detent; said catch member comprising a pair of elongated members fastened in substantially parallel relationship by one end of each to the other end of said band; one of said members being longer than the other; the other end of the shorter of the said elongated members being rotatably fastened to one of said flanges between the ends of said lever; the longer of said elongated members being bent inwardly to pass through a pivot hole in the other flange opposite the point of attachment of said shorter member, said longer member being again bent toward said detent to lie along said lever between said flanges, and being adapted to engage said detent.

2. A clamp comprising a flexible band, a lever, and a combined catch and tension member connecting the band and lever; said lever comprising a top plate having side flanges and an end flange at at least one end, said end flange being provided with a detent; said band having one end fastened to the other end of said lever; said tension member comprising a pair of bowed elongated members of resilient material having one end of each attached to the other end of said band; a first other end of one of said resilient members being rotatably fastened to one of said side flanges at a point between the ends of the lever; a second other end of the other of said resilient members being bent inwardly and passing through a pivot hole in the other of said side flanges at a place opposite the place where said first other end is attached and extending lengthwise along said lever between said side flanges, said second other end being adapted to engage said detent; and means for releasing said second other end from said detent.

3. A clamp comprising a flexible band, a lever, and a combined catch and tension member connecting the band and lever; said lever comprising a top plate having side flanges and an end flange at least one end, said end flange being provided with a detent therein; said band having one end rotatably fastened to the other end of said lever; said tension member comprising a pair of bowed elongated members of resilient material having one end of each rotatably attached to the other end of said band; a first other end of one of said resilient members being rotatably fastened to one of said side flanges at a point between the ends of the lever; a second end of the other of said resilient members being bent inwardly and passing through a pivot hole in the other of said side flanges at a place opposite the place where said first other end is attached and extending lengthwise along said lever between said side flanges, said second other end being adapted to engage said detent; at least one of said side flanges being provided with a slot therethrough at the end of the flange nearest said end flange, said slot being inclined at an angle to the length of said second end near said detent.

4. A clamp comprising a flexible band, a lever, and a combined catch and tension member connecting the band and lever; said lever comprising a top plate having side flanges and an end flange at at least one end, said end flange being provided with a recess therein forming a detent; said band having one end rotatably fastened to the other end of said lever; said tension member comprising U-shaped member of spring wire having two legs joined by a bend; said bend being rotatably attached to the other end of said band; one of said legs being rotatably fastened by its end to one of said side flanges at a point between the ends of the lever; the other of said legs being bent inwardly and passing through a pivot hole in the other of said side flanges at a place opposite the place where the other leg is attached and extending lengthwise along said lever between said side flanges, the end of said other leg being adapted to engage said detent; and means for releasing said last named end from said detent.

5. A clamp comprising a flexible band, a lever, and a combined catch and tension member connecting the

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band and the lever; said lever comprising a top plate having edge portions folded at right angles thereto to form dependent side flanges and an end flange at at least one end, said end flange being provided with a hook-shaped slot therein to form a detent; a pintle extending across said lever at the other end thereof between said side flanges, with one end of said band rotatably folded around said pintle to fasten the band to the lever; said tension member comprising a U-shaped member of spring wire having a short leg, a long leg, and a bend connecting said legs, each of said legs being bowed, with the other end of said band rotatably folded around said bend to fasten the band to said tension member; the end of said short leg being bent at an angle to the leg and being inserted in a first pivot hole provided in one side flange between the ends of said lever; the long leg of said tension member being also bent at an angle to the leg at a point intermediate its length and being inserted in a second pivot hole in the other side flange opposite said first pivot hole, said lever being thereby rotatably fastened to said tension member; said other leg being again bent so as to lie inside said lever between said side flanges, and being adapted to engage said detent; and means, comprising a slot in one of said flanges, for disengaging said other leg from said detent.

6. A clamp comprising a flexible band, a lever, a combined catch and tension member connecting the band and lever, and spring means in said band and stretchable lengthwise of the band; said lever comprising a top plate having side flanges and an end flange at at least one end, said end flange being provided with a detent; said band having one end fastened to the other end of said lever; said tension member comprising a pair of bowed elongated members of resilient material having one end of each attached to the other end of said band; a first other end of one of said resilient members being rotatably fastened to one of said side flanges at a point between the ends of the lever; a second other end of the other of said resilient members being bent inwardly and passing through a pivot hole in the other of said side flanges at a place opposite the place where said first other end is at-

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tached and extending lengthwise along said lever between said side flanges, said second other end being adapted to engage said detent.

7. The clamp of claim 6 in which said spring means comprises one or more loops of the material of said band bent outwardly of the plane thereof where said loop is formed.

8. The clamp of claim 6 in which said spring means comprises one or more U-shaped loops of the material of said band bent outwardly of the plane thereof where said loop is formed and extending across the entire width of the band.

9. The clamp of claim 6 in which said spring means comprises one or more curved loops of the material of said band bent outwardly of the plane thereof, and at least one U-shaped member lying substantially in the plane of said band where a loop occurs and having its legs straddling a loop and fastened to said band.

10. A clamp comprising a flexible band, a lever, and a combined catch and tension member connecting the band and lever; said lever comprising a top plate having side flanges and an end flange at at least one end, said end flange being provided with a recess therein forming a detent; said band having one end rotatably fastened to the other end of said lever; said tension member comprising a U-shaped member of spring-wire having two legs joined by a bend; said bend being rotatably attached to the other end of said band; one of said legs being rotatably fastened by its end to one of said side flanges at a point between the ends of the lever; the other of said legs being bent inwardly and passing through a pivot hole in the other of said side flanges at a place opposite the place where the other leg is attached and extending lengthwise along said lever between said side flanges, the other end of said other leg being adapted to engage said detent; a projection on said band positioned to strike said other end when said lever is pushed toward the band thereby to force said other end into said detent; and means for releasing said last named end from said detent.

No references cited.