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MEANS FOR AUTOMATIC TIGHTENING OF FASTENING HOOPS

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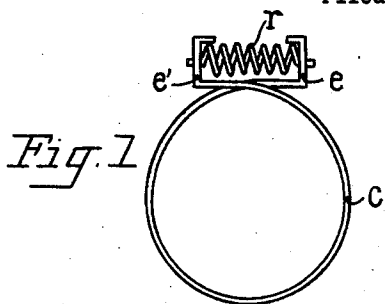


Fig. 1

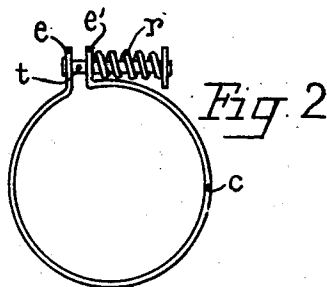


Fig. 2

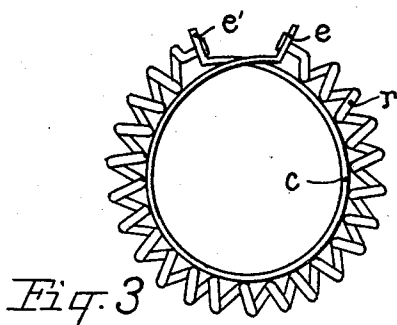


Fig. 3

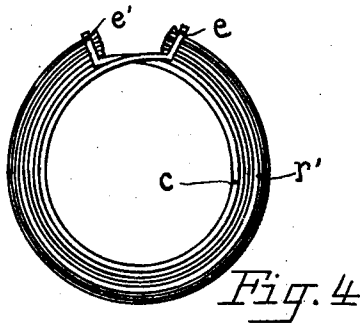


Fig. 4

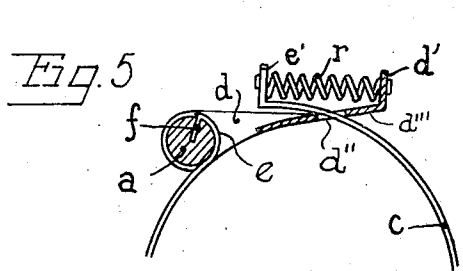


Fig. 5

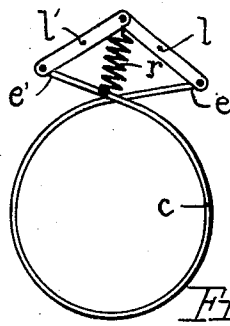


Fig. 6

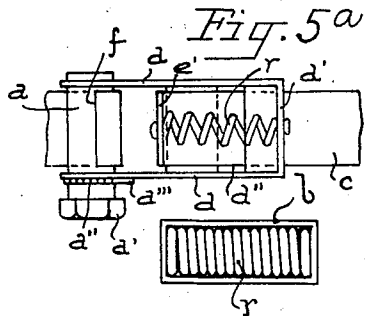


Fig. 5a

Fig. 7

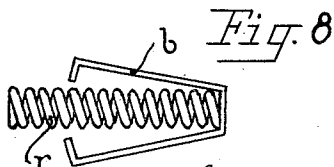


Fig. 8

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MEANS FOR AUTOMATIC TIGHTENING OF FASTENING HOOPS

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The present invention relates to an automatic tightening device acting either alone or in combinations with the ordinary tightening means and having the purpose, especially, to ensure a permanent contact and to prevent any play, between the hoop and the object fastened by it.

This tightening device is constituted by elastic means (spring, india-rubber and so on) acting upon both extremities of the hoop, so as to distance them if they are crossing themselves, and to draw them nearer to each other if they are not crossing themselves.

The invention will be better understood in the course of the following description referring to the drawing appended, which illustrate, in the way of examples, a few embodiments of the subject-matter of the invention.

Fig. 1 illustrates a device for a hoop with extremities crossing themselves, a compression spring distancing them from each other;

Fig. 2 represents a hoop with a spring drawing its two extremities closer to each other;

Fig. 3 illustrates a hoop with crossed extremities kept apart from each other by means of a spring surrounding the hoop;

Fig. 4 shows a similar embodiment, the spring being replaced by an india-rubber strip;

Fig. 5 represents an embodiment for amplifying the tension;

Fig. 5^a is a detail plan of the same.

Fig. 6 shows another embodiment permitting the amplification of tension;

Fig. 7 illustrates a device or element for instantaneous tightening, tensioned and previous to its introduction between the hoop-extremities, and

Fig. 8 shows the same after introduction.

According to the first embodiment, the tightening device is constituted by a spring r removing from each other the two extremities e, e' , crossing each other, of the hoop or strip c .

According to the second embodiment—Fig. 2—the extremities e, e' , do not cross themselves and the spring r guided by a bolt t

draws, on the contrary, the said extremities toward each other.

In both these embodiments the springs work as compression springs but they could obviously act in the way of draw-springs, as shown in Fig. 3, where the spring surrounds the hoop and tends to distance the two hoop-extremities.

The spring r can be replaced by any other elastic means such as india-rubber strings. In this way the fore-cited embodiment could be modified according to Fig. 4, the two extremities e, e' of the hoop being according to this modification removed from each other by an india-rubber rope r' surrounding the hoop c .

The tightening means in accordance with the invention may be of the form shown in Figures 5, 5^a, which I will now describe. A substantially U-shaped frame d has at its closed end a bottom portion d''' and an outstanding cross bar d' . Said bottom portion has an opening d'' through which one end portion of the band c slidably passes, said band having at said end an out-turned portion e' . A coiled spring r is arranged between the members d' and e' and its ends are fastened thereto. The sides of the frame d at the open end of said frame are provided with bearings in which a winding pin a is mounted for rotation. The end e of band or collar c is secured by any suitable means to the pin a so that said end may be wound on said pin when the latter is turned. As here shown said end of the band or collar has an inwardly turned portion f which is fitted in a corresponding radial slot in the pin. Any suitable means may be provided to prevent casual reverse rotation of the pin. For the purposes of this specification a ratchet wheel a'' is provided on the pin and the frame is provided with a pawl a''' for engagement with the ratchet wheel. The pin is also here shown as provided with a non-circular head a' so that it may be readily turned as by means of a suitable wrench.

When the device is in position on the tube to be tightened, the axis a is rotated to wind up the part e several turns therearound, whereby the spring r is fully compressed

and a perfectly tight joint is effected by the collar *c*.

If the collar gives for some reason, the compensator spring *r* takes up the play because it is disposed in series with the tightening device actuated by turning the pin *a*.

The spring *r* thus acts on the end *d'* of the device *d* and on the end *e'* spreading them apart to increase the tightening of the collar and provide automatic take up for play in case of partial loosening.

To give powerful and always equal tightening and even and increasing pressure, the tightening means may be obtained by the use of lever arms to amplify the tension. The spring *r* can thus work under tension on both arms *l* and *l'* (Fig. 6) connected to the extremities *e* and *e'* of collars *c*. The spring is secured at one end to the point of articulation of these arms or levers, is fixed, at the other part, to one of the branches of the hoop. On the relative length of these arms or levers can depend a determined amplification of the spring tension, in such manner that notwithstanding the decreasing tension of the spring a constant tightening or even increasing tightening power (depending solely on the length of the arms) is obtained, whose intensity is greatest at the last moment of tightening, viz. near the stretched position of these two arms.

This embodiment represents hence the application of a half-parallellogram completed by the extremities of the hoop itself.

This amplification of power is obviously at the expense of the length of the lever arm, viz. that when the arms are, at the end of the stroke, near the horizontal position (never completely realized), the displacement of the hoop-extremities is very small but the effort enormous.

By this expedient the drawback common to the preceding embodiments is dispensed with.

It goes without saying that the spring, instead acting as a draw-spring extension—could be disposed so as to act as compression—or traction-spring, which is only a question of detail, the final result being always the same.

The amplification of the power could be obtained also by means different from said levers, for example by a cam of an appropriate design; the example represented has been chosen simply by its simplicity to show what the inventive idea consists in, which admits very manifold deviations from this example.

In order to obtain an instantaneous tension of the hoop, use can be made of elastic bodies tensioned previously and maintained in this position by any suitable contrivance, so as to be freed from the latter after their insertion into the hoop and at the moment

of tightening the same, so as to develop at this moment only and automatically the necessary tightening effort.

Fig. 7 shows diagrammatically only the spring *r* compressed by a ligature of any kind *b* whose sectioning (Fig. 8) permits escaping of the spring.

It is of course possible to replace the spring by an india-rubber block, eventually armed, and to use as ligature, screws, pins, studs, pawls, dogs, fusibles and so on.

The different contrivances cooperating for the same purpose can be employed either alone or in combinations, either among themselves or with other already known means so as to obtain an automatic tightening instantaneously or an automatic and regular tightening action annihilating all possibility of play and so on.

It is of course possible to effect tightening by several elastic and parallel means disposed between the extremities of the hoop which may be of any known kind and may surround the part to be fastened, once or several times.

What I claim, is:

1. In combination with a tightening band forming a hoop and having its ends crossed and extending in opposite directions, elastic means between the extremities of said band, and arranged on the outer side of the hoop, to move them in the required directions to reduce the diameter of the space encircled by the band and tighten said band around an object that may be in said space.

2. In combination with a tightening hoop, two links articulated to each other and with their free ends to the extremities of the band forming the hoop, and elastic means attached at one part to the articulation of said links and at the other part to said hoop.

3. A tensioning band as claimed in claim 1, including two interconnected links connected to the ends of the band and arranged opposite the points of intersection of the band and coacting with the ends of the band to form a parallelogram which is maintained under tension by a spring extending from the point of intersection of the ends of the band to the opposite corner of the parallelogram.

In witness whereof I affix my signature.
JEAN PAUL MARIE MALLEVILLE.