Aug. 16, 1960 L. F. DEGENER 2,948,940

SELF-LOCKING DETACHABLE CLAMP

Filed July 1, 1957

FIG. 1

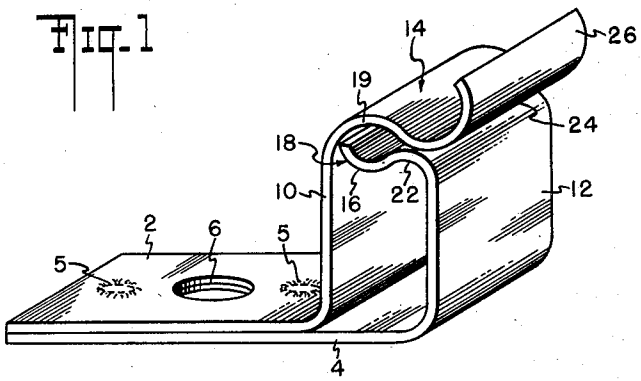


FIG. 2

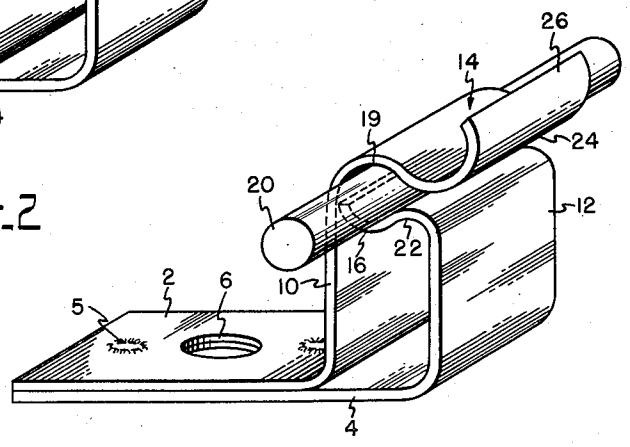
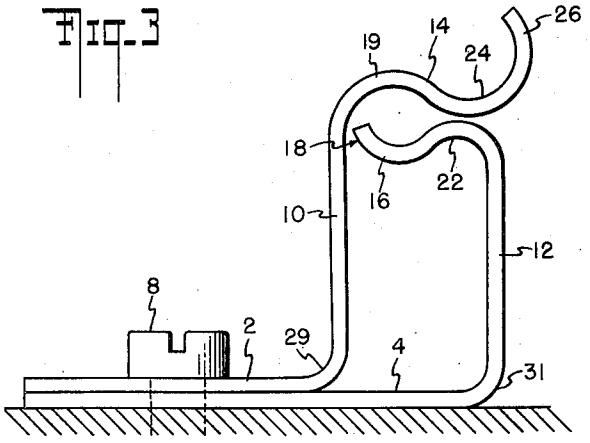


FIG. 3



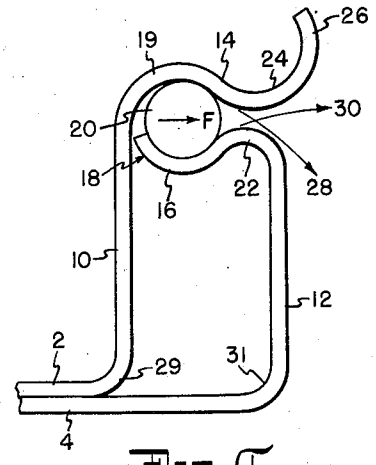
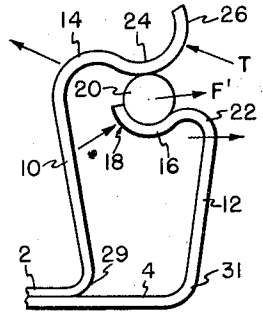


FIG. 4

FIG. 5



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SELF-LOCKING DETACHABLE CLAMP

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2 Claims. (Cl. 24—257)

This invention relates to small spring clamps for detachably mounting small diameter rods, tubes or cables on a fixed base. To attach such an element to my improved clamp, all that need be done is to force it between the two spring jaws of the clamp but once in position the element is firmly held against vibration and cannot be released by pulling or pushing on the element, my clamp being so designed that any attempt to remove the element from its jaws by direct force causes the jaws to more tightly grip the element. However, the element may be released readily with one hand by pressing backwardly the upper part of the spring clamp while pulling the element outwardly. The clamp is so designed that it will not chafe the element or open, even when subject to severe vibration, and will continue to operate satisfactorily even at temperatures as high as 800°.

Referring to the drawings showing a preferred form of the invention,

Fig. 1 is a perspective view of my spring clamp with no supported element therein;

Fig. 2 is a similar perspective view showing the position of the two parts or jaws after the element to be clamped has been inserted by pressing the element between the upper and lower spring jaws;

Fig. 3 in a side elevation of my clamp as mounted on a support;

Fig. 4 is a similar view showing the supported element in place and showing the action of the locking forces involved in case a force is exerted on the element to pull it out of the clamp; and

Fig. 5 is a similar view showing how the element may easily be released by pressing upwardly and rearwardly on a tab on the upper jaw and pulling outwardly on the element.

My spring clamp preferably comprises resilient strip metal parts or small plates 2 and 4 securely fastened together as by spot-welding 5 to form a unitary flat base portion which is also preferably provided with a hole 6 so as to be fastened to the support as by screw 8. Each clamp includes flat substantially parallel middle portions 10 and 12 which extend in angular relation to the base portion. The bent end portions of the clamp are provided by complementary S-shaped sections 14 and 16 which are located in relatively overlying and underlying spaced relation between the middle portions 10 and 12, as shown in Fig. 1. The lower S-shaped bent portion 16 provides an outer pocket or jaw 18 whose concave inner surface grips or engages the element 20 to be supported. It also provides a knee 22 extending toward the upper jaw 19 formed by the S-shaped bent portion 14. Similarly, the upper jaw 19 of the clamp is provided by the concave inner surface of the overlying bent end portion 14. Portion 14 of the clamp includes an extending knee 24 adjacent knee 22 and a releasing end tab 26. The base portion of the clamp is preferably provided by connected resilient strips of different length arranged in overlapped relation. The curves and spacings of the bent

end portions are not critical, however, since elements varying considerably in diameter may be effectively held by my clamp. The respective locking and gripping parts of the improved clamp are provided by a first part consisting of the middle portion 10 extending angularly from the base 2 and the S-shaped bent end portion extending angularly from the middle portion having a concave inner gripping surface adjacent the middle portion and a convex inner locking surface that is spaced from the middle portion 10. The second locking and gripping part of the clamp includes a second middle portion 12 extending angularly from the base 4 in spaced substantially parallel relation to the middle portion 10. This part further includes an S-shaped bent end portion that extends angularly from the middle portion 12 having a convex outer locking surface adjacent the middle portion 12 underlying the convex inner locking surface of the first bent end portion and a concave outer gripping surface spaced from the middle portion 12 underlying the concave inner gripping surface of the first S-shaped end portion. The locking and gripping action of the clamp is obtained by the cooperative arrangement of the spaced middle portions with the S-shaped end portions where particularly the underlying end portion substantially spans the space between the parallel middle portions and is shorter than the lengthwise dimension of the middle portion 12.

When my clamp is not in use, the two jaws 18 and 19 are spaced apart a lesser distance than the diameter of the smallest element to be supported, the two knees are almost, if not, touching, and the middle portions 10 and 12 are substantially parallel and perpendicular to the base portion. One of the jaws 18 of the improved clamp includes the concave outer surface of the bent end portion 16. The other of the jaws 19 includes the concave inner surface of the bent end portion 14. The end portion 14 of the clamp extends from the middle portion 10 across the spacing between the parallel middle portions 10 and 12 and beyond the middle portion 12.

To insert element 20 in the clamp, all that need be done is to push it between the two knees 22 and 24, as shown in Fig. 2. This forces knee 24 upwardly, flexing the middle portion 10 slightly to the left, and at the same time knee 22 is forced downwardly to the right until the element snaps into place between the jaws, as shown in Figs. 2 and 4.

When so secured, the clamped element cannot be released from the jaws by any direct pull or by vibration, since if any attempt is made to move the element out of the jaws (to the right in Fig. 2), it would only cause the jaws to grip it tighter. This is because when such a force F is exerted on the element the upper S-shaped bent portion 14 tends to be flexed in a direction of the arrow 28 about bend 29 in middle portion 10, thus tending to move the knee 24 downwardly about bend 29 as a pivot. At the same time, force F exerts a force in the direction of the arrow 30 upon the lower jaw 18, thus causing it to grip the element more tightly because the middle portion 12 is rotated slightly clockwise about bend 31, lifting the knee 22.

However, the element may be readily released with the fingers of one hand when desired. This is preferably accomplished by pressing the thumb upwardly and to the left against the releasing tab 26 (see arrow T) and at the same time pulling the element 20 to the right with the fingers (arrow F'). As shown in Fig. 5, this readily releases the element since it flexes the middle portion 10 and the S-shaped bent portion 14 counterclockwise about bend 29, thus raising the knee 24 and pushing it to the left beyond the element 20. This action, plus the force F', tends to force the lower S-shaped bent portion 16 downwardly, bending the portion 12 somewhat clockwise

about bend 31 so that the element readily passes between the separated two knees 22 and 24. The releasing tab 26 at the end of the overlying S-shaped bent end portion 14 extends beyond the middle portion 12 of the clamp.

While I have described my improved clamped for general use, it is especially adapted for clamping in place tubular fire detector elements on the bulkheads of aircraft and ships, used to provide automatic fire detection. My clamp is especially suitable for such uses since it will withstand high temperatures without impairment of its gripping properties, will not chafe the element, and furnishes a positive lock for such element which never can release, except by the manual releasing action described.

While I have described my invention in its preferred embodiments, it is to be understood that the words which I have used are words of description rather than of limitation and that changes within the purview of the appended claims may be made without departing from the true scope and spirit of my invention in its broader aspects.

What is claimed is:

1. A self locking clamp of resilient strip material having a flat base, a first locking and gripping part having a middle portion extending angularly from the base and an S-shaped bent end portion extending angularly from the middle portion having a concave inner gripping surface adjacent the middle portion and a convex inner locking surface spaced from the middle portion, a second locking and gripping part having a middle portion

extending angularly from the base in spaced substantially parallel relation to the first middle portion and an S-shaped bent end portion extending angularly from the second middle portion having a convex outer locking surface adjacent the second middle portion underlying the convex inner locking surface of the first S-shaped end portion and a concave outer gripping surface spaced from the second middle portion underlying the concave inner gripping surface of the first S-shaped end portion, the second S-shaped end portion substantially spanning the space between the parallel middle portions and being shorter than the lengthwise dimension of the second middle portion.

2. A clamp of the character claimed in claim 1, in which the end of the first S-shaped bent end portion extends beyond the second of the middle portions.

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