Aug. 13, 1946. G. A. TINNERMAN 2,405,912

DETONATOR CLAMP

Filed Aug. 26, 1942

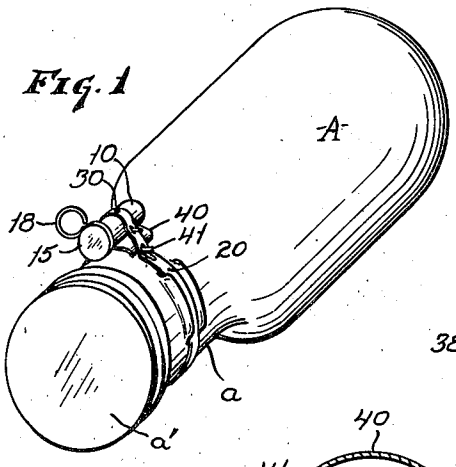


FIG. 1

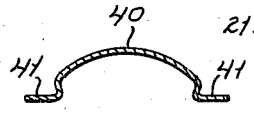


FIG. 7

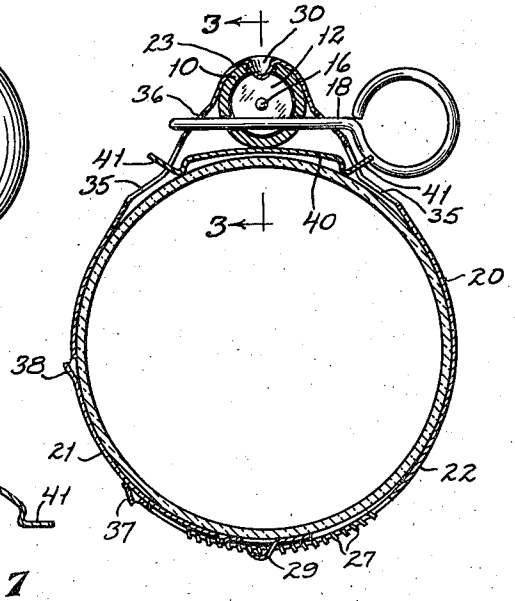


FIG. 2

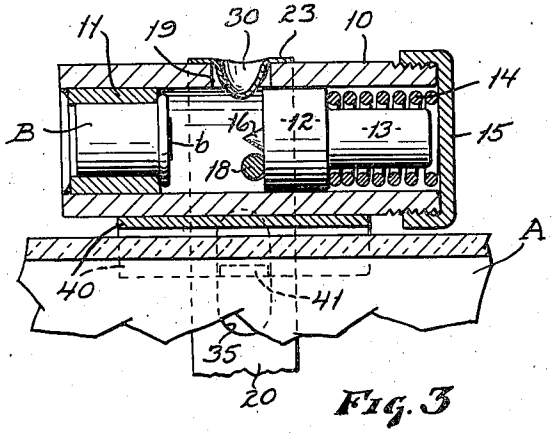


FIG. 3

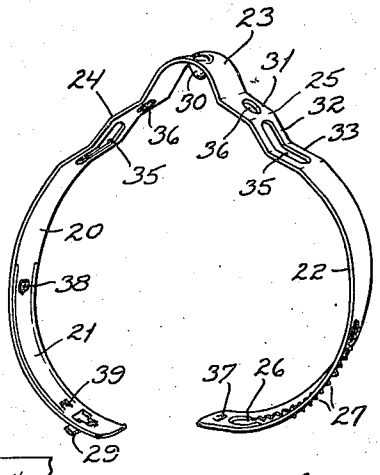


FIG. 4

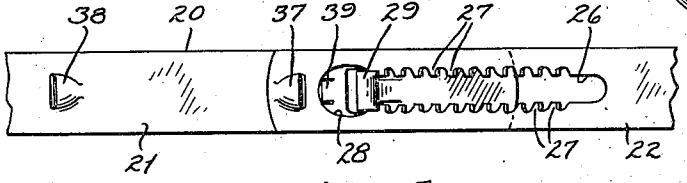


FIG. 5

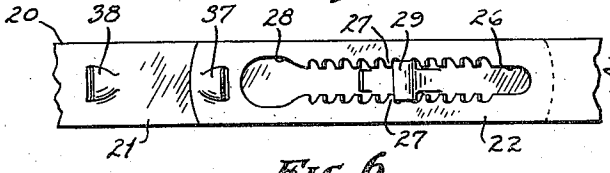


FIG. 6

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DETONATOR CLAMP

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2 Claims. (Cl. 24—20)

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This invention relates to a U-shaped clamp adapted to hold one article against the exterior of another, the crown of the clamp embracing one of the articles and the legs of the clamp engaging opposite sides of the other article, and the end portions of the legs overlapping each other and being secured together in adjusted relationship to clamp the two articles. My clamp is especially well adapted for holding an automatic igniting device in proximity to a frangible container for combustible material, in such manner that fracture of the container will release the igniting device to set fire to the material.

One object of the invention is to provide such a clamp of simple and efficient form which may be readily applied to the articles and will efficiently embrace and clamp each to the other though one of the articles may be materially smaller than the other.

Another object of the invention is to provide a clamp which may be readily applied to a container and an adjacent automatic igniter and will retain the igniter in an inactive condition but will immediately release the operating device of the igniter when the container is ruptured.

The container may readily be a bottle or jar of thin glass or other readily frangible material, and the igniter may be a detonator having a tubular carrier for a cartridge and a connecting spring pressed firing pin therefor. In such case the clamp coacts with the hammer carrying the firing pin to hold it cocked but ineffective while the body of the clamp embraces the glass bottle. Accordingly if the bottle contains an inflammable fluid and is thrown against an obstruction which breaks the bottle, this action releases the detonator so that the hammer is no longer constrained and the released hammer brings the firing pin into engagement with the cartridge to discharge it and ignite the liquid.

My invention is illustrated in a preferred form in the drawing and is hereinafter more fully explained and the essential novel features are summarized in the claims.

In the drawing Fig. 1 is a perspective of a container and a detonator held together by my clamp; Fig. 2 is a cross section through the detonator, the clamp, and the container; Fig. 3 is a longitudinal section through the detonator and adjacent parts, as indicated by the line 3—3 on Fig. 2; Fig. 4 is a perspective of the clamping member in its idle condition; Fig. 5 is a development of the two end portions of the clamp in a temporarily connected position; Fig. 6 is a similar development illustrating the final or locked

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position of the two end portions of the clamp; Fig. 7 is a sectional view of a spring retaining member in its unapplied form, Fig. 2 showing this member as applied to the container.

In Figures 1, 2 and 3, A indicates a glass or other readily frangible container shown as having a reduced neck *a*, and a suitable closing cap *a'*. My clamp holds the detonator or igniter in cocked condition against the exterior of the neck *a*, as about to be described.

The detonator, as shown in the Figures 1, 2 and 3, comprises a tubular barrel 10, having an internal bushing 11 forming a seat for the cartridge B. Slidable in the bore of the tube 10 is a cylindrical hammer 12 having a reduced extension 13. Surrounding this extension is helical compression spring 14 which seats against a cap 15 screw-threaded on the barrel. The hammer is provided on its face with a firing pin 16. When the hammer is released, this pin strikes the percussion cap *b* of the cartridge and discharges the cartridge.

A safety pin 18 is shown as extending across the bore of the barrel in front of the hammer to retain the hammer in idle position with the spring 14 compressed, but when this safety pin is withdrawn the hammer, unless restrained by other means, is projected by the released spring 14 to effect the firing. My clamp provides such other restraining means, as will be apparent from the following description.

The main member 20 of my clamp comprises a single strip of comparatively thin spring sheet metal bent into a U-form preferably the form shown in Fig. 4. As there shown, the clamp has two arcuate end portions 21 and 22, a central arched crown portion 23 and two intermediate portions 24 and 25 connecting the legs of the crown portion with the adjacent ends of the side portions respectively. This division into "portions" is for convenience of the description, as the device is a single integral piece of material.

In the end portion 22 I provide a slot 26 and form teeth 27 on opposite sides thereof, these teeth being tipped into inclined position so that their edges distant from the end of the clamp are higher than their edges adjacent to the end. Near the end of the clamp, the slot 26 is enlarged at 26.

On the other end portion 21 of the clamp, I provide a projecting stud 29 of T form with the shank narrower than the width of the slot 26 and the head wider than that width but narrower than the width of the enlargement of the slot 28. The result is that the T-head may be readily passed through the opening 28 and then as the

clamp is collapsed the head will slide over the ratchet teeth 27 and by engaging a pair of opposite teeth will hold the ends of the clamp together in whatever adjustment is required, and may thus clamp the igniting device to the container.

The crown 23 of the clamp is provided with an inward projection 30, which may be made by distorting the metal inwardly as shown. This projection, when the clamp is in place about the detonator, extends through an opening 19 in the detonator shell into a position in front of the hammer 12 and thereby retains the hammer in idle or cocked position after the safety pin 18 is withdrawn.

As shown, the intermediate portions 24 and 25 of the clamp are bent slightly outwardly from the end of the legs of the crown for a short distance, indicated at 31, then slightly inwardly for a short distance, at 32, then again outwardly at 33, beyond which these intermediate portions join the side portions 21 and 22. This reverse bending enables the clamp legs to be slightly extended by tension on the ends of the legs, so that if the clamp should be a trifle loose when the T-stud 29 reaches the last pair of teeth 27 it would naturally engage, a further force will stretch the clamp to enable the stud to engage the next pair of teeth.

When the detonator is being clamped about the neck of the container I prefer to place a yielding member, shown as an arched leaf spring 40, between the container and detonator. This spring has projecting end portions 41 which extend through slots 35 cut in the intermediate regions 32 and 33 of the clamp. The clamping member 20 thus normally retains the spring 40 in place and holds the detonator against the spring with the shoulders of the spring bearing against the container.

As shown in Fig. 2 the projection 30 of the clamp extends into the detonator and stands in front of the hammer, and the safety pin 18 is also in position, extending through openings 36 in the regions 31 of the clamp and intermediately through openings in the detonator barrel to stand in front of the hammer.

It results that the clamp and spring effectively lock the detonator in position on the container without danger of cracking the container. Also the clamp projection is in position to hold the hammer idle after the safety pin 18 is withdrawn.

After the safety pin 18 has been withdrawn the hammer remains in the cocked position ready for use of the article, but immediately upon the container being fractured the leaf spring 40 is released and ejected by its own resilience, and the detonator is released from the clamp, freeing the hammer 12. The spring 14 of the detonator thereupon projects the hammer to bring the firing pin against the cartridge cap and discharges the cartridge, igniting the inflammable material spilled by the breaking container.

To apply the clamp most readily to the container, I provide a lug 37 on the endmost region of the end portion 22 and a lug 38 extending outwardly from the end portion 21 some distance back from the T-head 29. When a suitable clamping tool (which may for instance be similar to a pair of pliers) is applied to these two lugs, the end portion 21 is rapidly projected under the end portion 22 while both are about the container to cause the T-head to travel along the ratchet teeth and come to rest in engagement with a pair of teeth. If this does not make the clamp sufficiently tight a greater pressure by the tool will slightly stretch the legs, due to the kinked formation described, so that the T-head will engage the next pair of teeth. Thus the clamp becomes snugly applied to the container and the detonator, with the interposed spring constrained.

A convenient procedure is to apply the detonator shell empty within the clamp crown; then place the spring against the detonator with its ends extending through the slots 35 of the clamp, and then place the clamp about the neck of the container. The ends of the clamp are then forced across each other by the application of the tools to lugs 37 and 38 until the clamp snugly embraces the container neck and flattens the arched leaf spring. Either before or after such application the container may be filled with inflammable liquid and its cap applied to seal the liquid within it.

At a convenient stage in the procedure, the cap 15 of the detonator is removed and the spring and hammer taken out. The cartridge is then put in place on its seat; the safety pin inserted; the hammer and spring replaced, and the cap screwed into position. The device is then ready for use upon the withdrawal of the safety pin 18.

This clamp may be applied to containers of various diameters, due to the range of adjustment provided by the slot 26 and the set of ratchet teeth, any of which may coact with the retaining lug 29, and a very tight engagement may be made without danger of injuring the container, by reason of the interposed spring 40 and the stretchable character of the clamp legs.

It will be seen from Fig. 5, that I have provided an additional lug 39 on the end portion 21 of the clamp which by contacting with the end of the slot enlargement 26 may hold the clamp temporarily closed. This is a convenient feature, which may be used if it is desired to place the clamp by moving it endwise of the container over a bead at the edge of the neck. Otherwise, the legs are separated in making the application, and such separation enables the clamp to be passed across an object of any size which it may embrace due to the resilience of the legs.

My clamp is devised for economical construction and may be made by simple cutting and stamping operations from a ribbon of spring steel.

The device is quickly applied and when in place effectively holds the detonator in position and ready for action. When the container so equipped is thrown against an object it is fractured, spilling the contents and releasing the detonator, whereupon the cartridge is automatically discharged to ignite the inflammable material.

I claim:

1. A clamp for holding a comparatively small object against a comparatively large object comprising a strip of sheet material of substantially U-shape with the ends overlapping, and the intermediate portion forming a crown, interlocking ratchet means on the two end portions to hold the device closed in various positions, the side portions of the U being inwardly directed adjacent the crown to define two adjacent regions, one smaller than the other, and said side portions adjacent the junction of the two regions being provided with openings, and a leaf spring extending across the junctions of the two regions and having projections at its ends occupying the openings.

2. A clamp for holding a comparatively small object against a comparatively large object comprising a strip of sheet material of substantially U-shape with the ends overlapping and the in-

termediate portion forming a crown, means on the two end portions to hold the device closed in various positions, the side portions of the U being inwardly directed adjacent the crown to define two adjacent regions, one smaller than the other, and said side portions adjacent the junction of

the two regions being provided with openings, and a leaf spring extending across the junctions of the two regions and having projections at its ends occupying the openings.

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