

Dec. 11, 1945.

LE ROY S. JESSEN

2,390,538

TOW TARGET RELEASING DEVICE

Filed Oct. 6, 1944

3 Sheets-Sheet 1

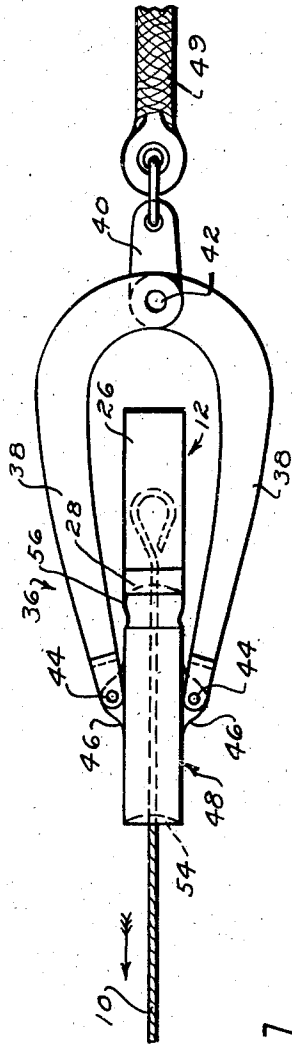


Fig. 1.

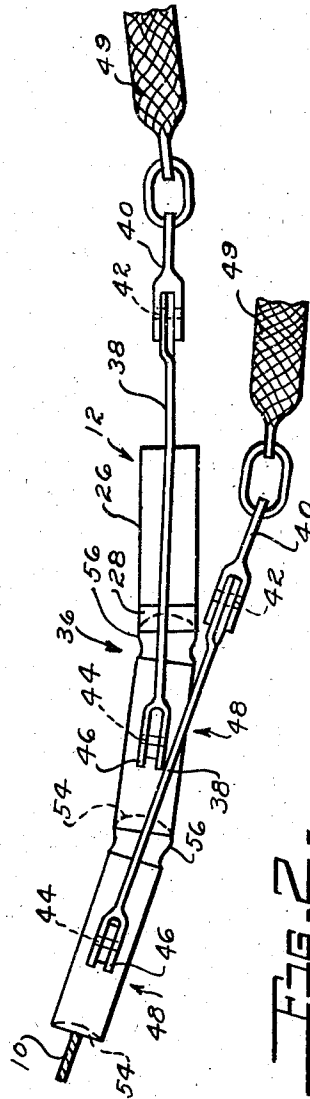


Fig. 2.

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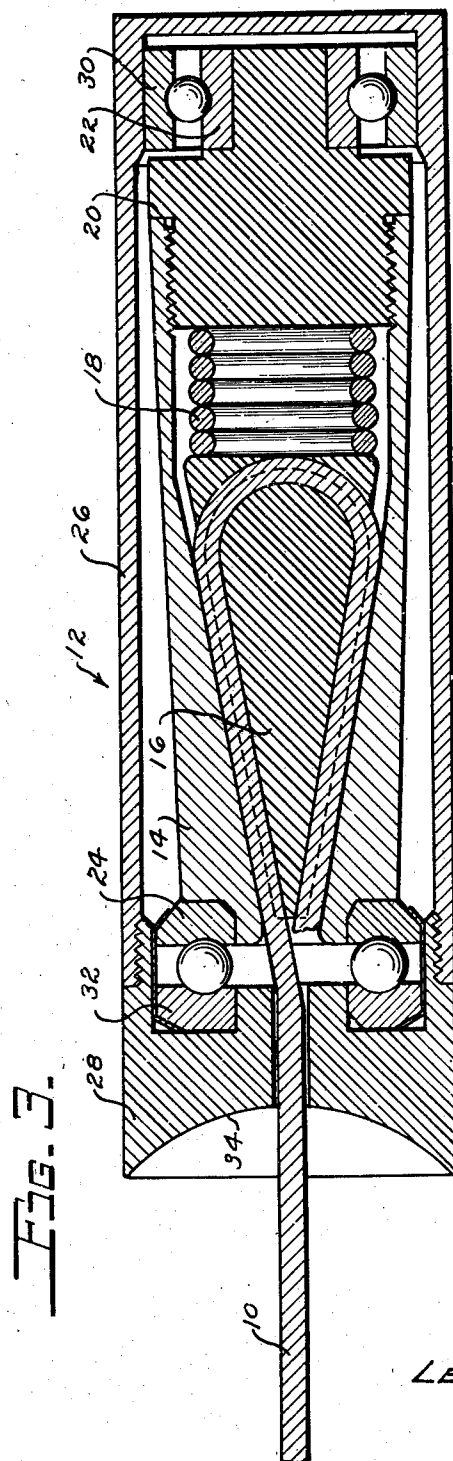
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3 Sheets-Sheet 2



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FIG. 4.

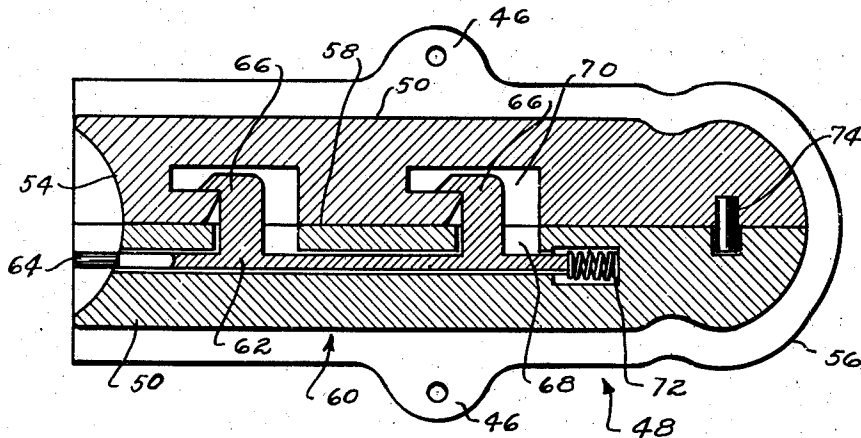


FIG. 5.

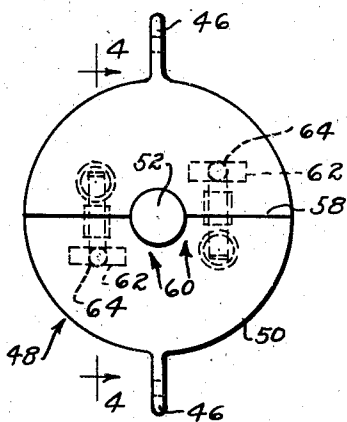
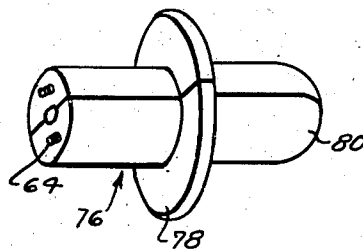


FIG. 6.



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TOW TARGET RELEASING DEVICE

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Application October 6, 1944, Serial No. 557,538

5 Claims. (Cl. 273-105.3)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to tow target releasing devices in which a target is supported on the end of a tow line, kept there for a time, then released at will and replaced by another when the first has served its purpose, all while the tow line remains fully extended.

In this kind of device there is usually some form of obstruction at the free end of the cable which serves to arrest and retain the target anchor which would otherwise pass over the end of the cable, together with means on the target being sent out to cause the first to be released.

An object of this invention is to provide a simple, inexpensive and effective device whereby any one of a series of targets which is being towed at the end of the tow line of a towing plane, may be released therefrom and dropped, after being subjected to practice fire, the arrangement being such that upon launching of any subsequent target, the impact of its arrival at the end of the cable always releases the anchor of the target which is to be dropped.

One of the difficulties in a device of this character is that the tow line, due to its natural twisted construction, untwists under load, and retwists when the load is removed. Since the resistance of the target may impose a load of approximately three hundred lbs. and the cable in current use untwists approximately one turn per ft. per hundred lb. load, a three thousand ft. cable may untwist as much as nine thousand turns in the period of time which it takes to reel it out. If the cable is unreeled from the tow plane with the first target attached thereto, and no provision has been made to take care of this condition, the entire assembly consisting of the target and its attaching means spin and gyrate extensively. A reverse condition is, of course, encountered as the cable is reeled back in, the retwisting being at times at such speed that an ordinary swivel cannot keep up with it, whereupon the entire releasing mechanism at the end of the cable beats the air, whipping in a circle and endangering the tow plane itself. This trouble is particularly pronounced as the last target of a series is released from the end of the cable by sending out a releasing weight which is much lighter than a complete target, thus suddenly greatly reducing the load on the cable.

It is therefore another object of the invention to provide the obstruction or anchor retaining

means on the end of the cable with a swivel mechanism which can readily take care of any untwisting and retwisting condition which may occur with substantially no tendency to turn the target with it.

Inasmuch as the release of any one target from the end of the tow line is accomplished by the shock of arrival of the next target of the series, it is appropriate that the unloading of the cable by the release of the one target should be exactly coincident with the loading of the cable by the arrival of the next, for otherwise a considerable turning of the swivel in one direction or the other may take place either because the loads of both targets are momentarily applied together or momentarily both removed.

It is therefore another object of the invention to so construct and arrange the anchor releasing mechanism that removal of the load of the released target is exactly coincident with the application of the load of the arriving target.

Since the swiveling action must take place between the load and the cable, and the shock of receiving the load of one target arriving at the release mechanism of the other is considerable, it is another object of the invention to provide means for modifying the impact of the arriving target on the swivel.

Other objects and advantages will become evident as the invention is further described with reference to the drawings, wherein:

Fig. 1 is a top plan view of the invention with one tow target attached.

Fig. 2 shows a second tow target arriving at the end of the tow line and releasing the first target.

Fig. 3 is a longitudinal axial section through the target retainer which contains the releasing mechanism.

Fig. 4 is a longitudinal off-center section through the anchor release the section being taken at 4-4 of Fig. 5.

Fig. 5 is an end view of the anchor release viewed from the right.

Fig. 6 shows a split weight which may be used instead of the regular anchor release for releasing the last target of a series.

Like reference characters refer to like parts throughout the several views.

Referring now to the drawings, a towing cable 10 is unwound from a suitable reel in a towing plane. Neither the towing plane nor the reel are shown, since they do not form any part of the invention. The free end of the cable 10 is securely clamped in a swivel unit 12 which is shown in detail in Fig. 3 and comprises an outer clamp-

ing member 14 with conical bore and an inner clamping member 16 in the form of a cone somewhat smaller than the bore, the cone having a longitudinal groove for the cable extending completely around the cone, the groove being less in depth than the diameter of the cable. The cone 16 is forced into clamping position by a coil spring 18, the reaction of which is taken by a threaded plug 20 which is screwed into the end of the outer clamping member 14.

At one end the inner race 22 of an antifriction bearing is supported by a hub of the plug 20 while at the other end one member 24 of a thrust bearing is mounted on a hub of the cable clamping member 14. A swivel housing 26 surrounds the entire swivel mechanism, the forward end of the housing being completely closed by the screw plug 28 except for the central opening through which the cable 10 extends. The outer bearing race 30 is supported in the housing 26 while the member 32 of the thrust bearing is carried on the hub of the plug 28. The forward end of the plug 28 is concave as at 34 to better receive the impact of the rounded end of the anchor release 48.

Each tow target is provided with a releasable anchor 36 which comprises a pair of bent arms 38 (see Fig. 1) hinged together and to a link 40 by a hinge pin 42, the free ends of the arms being hinged by pins 44 to the ears 46 of the anchor release 48 which is shown in detail in Figs. 4 and 5. A short length of shock cord 49 may advantageously be interposed between the link 40 and the target although if desired the link 40 and the cord 49 may both be eliminated and the anchor arms 38 connected directly to the target.

Referring to Figs. 4 and 5, an anchor release 48 has a cylindrical body portion 50 with central opening 52 through which the cable 10 passes freely. The forward end of the anchor release is concave as at 54 and the rearward end is correspondingly convex as at 56.

In order to facilitate mounting the release 48 of an anchor 36 on the cable 10, the release is divided into equal halves on the line 58, and latches 60 are provided to hold the halves together, one of the latches being shown in longitudinal section in Fig. 4 and both in the end view Fig. 5.

A latch 60 consists of a latch bar 62 of rectangular cross section with the forward end rounded as at 64, the rounded end projecting through the concave surface 54. Two hook members 66 extend laterally from the bar 62 through slots 68 in the one half into undercut pockets 70 in the other half. Springs 72 normally hold the latches in the locked position shown until the convex end 56 of the anchor release of a target being sent out strikes the rounded ends 64 of the latch on the anchor release of a target which is to be dropped. Dowels 74 may be provided to maintain alignment of one half of the release with the other.

The two halves of the anchor release 48 are carried, one half on each bent arm of the anchor 38, a pair of the arms being provided on each target, whereby the anchor release on the target being launched always strikes and splits the anchor release on the target being dropped. However, when the last target is to be released and there are no more targets available to be sent out, an anchor release 76, which is not attached to a target or to the anchor 36 of a target, is sent out to release the last target. On such a weight

it may be advisable to provide a flange 78 or some form of vanes instead of the ears 46 in order that the anchor release may attain sufficient speed to operate the latches 60 on the last target when it is to be released.

The rearward end of the release 76 is convex at 80 to the same degree and for the same reason that the release 48 is convex at 56.

The mechanism shown is operated substantially as follows:

The tow line 10 may preferably be reeled out with the first of the series of targets attached as seen in Fig. 1, attachment being effected by bringing the two bent arms 38 of the anchor 36 together forward of the swivel unit 12 and latching the two halves of the anchor release 48 by pressing them together around the cable.

When the first target has been subjected to practice fire it is ready to be dropped, and releasing is accomplished by bringing together the bent arms 38 of the anchor 36 of the next target and latching the two halves of the anchor release 48 around the tow line 10, then allowing the relatively moving air to take the target back until the convex end 56 of the second anchor release 48 strikes the concave end 54 of the first and thus presses the projecting ends 64 of the latches 60 and allows the halves of the anchor release 48 of the first target to separate, whereby the first target is dropped and the second takes its place.

The reason for making the forward and rearward ends of the split anchor release 48 respectively concave and convex will be apparent from an inspection of Fig. 2, where it may be seen that a convex end 56 and a concave end 54 necessarily come together with the axis of the two weights at a slight angle.

By appropriately proportioning the spring 72 in the latch mechanism, the shock of engagement of the second anchor release 48 with the first may be minimized. The inclusion of the length of shock cable 49 further reduces the shock of engagement.

Having described my invention, I claim:

1. For use in releasably connecting a tow target to the free end of a tow cable so that it may be released by impact of a weight sent rearward on the tow cable, the improvement which consists of a target retainer carried on the rear end of said cable, an anchor secured to said target, said anchor comprising two curved arms hinged together and secured to the target at one end, the curved arms extending around the retainer beyond its forward end, an anchor-release in two parts adjacent the forward end of said retainer and hinged one part to each arm at the forward ends of the arms, and a latch associated with said anchor-release, said latch comprising engaging means on the one part, engaging means on the other part for engaging the first said engaging means to latch the two parts of the anchor-release together, and a latch operating part at the forward end of said anchor-release, adapted to be engaged by said weight to disengage said latch, whereby said target is released from said cable.

2. For use in releasably connecting a tow target to the free end of a tow cable so that it may be released by impact of a like target sent rearward on the tow cable, the improvement which consists of a target retainer carried on the rear end of said cable said retainer having an inner part clamped to said cable and an outer part which rotates freely on said inner part, an anchor secured to said target, said anchor comprising two curved arms hinged together and secured to the

target at one end, the curved arms extending around the retainer beyond its forward end, an anchor-release in two parts adjacent the forward end of said retainer and hinged one part to each arm at the forward end of the arms, and a latch associated with said anchor-release, said latch comprising engaging means on the one part, engaging means on the other part for engaging the first said engaging means to latch the two parts of the anchor-release together around the cable, and a latch operating part at the forward end of said anchor-release, adapted to be engaged by said like target and unlatched, whereby the first said target is released from said cable.

3. For use in releasably connecting a tow target to the free end of a tow cable so that it may be released by impact of a like target sent rearward on the tow cable, the improvement which consists of a target retainer carried on the rear end of said cable said retainer having an inner part clamped to said cable, a housing surrounding said inner part, and anti-friction bearings for rotation of said inner part within said housing, an anchor secured to said target, said anchor comprising two curved arms hinged together and secured to the target at one end, the curved arms extending around the retainer beyond its forward end, an anchor-release in two parts adjacent the forward end of said retainer and hinged one part to each arm at the forward ends of the arms, a latch within said anchor-release, a latch operating part extending from the forward end of said anchor-release, said latch comprising engaging means on the one part and engaging means on the other part adapted to engage the first said engaging means to hold the parts of said anchor-release latched together around the cable, said operating part being adapted to be engaged by said like

target, whereby the said two parts of said anchor release may separate and said target be released from said cable.

4. For use in releasably connecting a tow target to the free end of a tow cable so that it may be released by impact of a like target sent rearward on the tow cable, the improvement which consists of a target retainer carried on the rear end of said cable, an anchor secured to said target, said anchor comprising two curved arms hinged together and secured to the target at one end, the curved arms extending around the retainer beyond its forward end, an anchor-release in two parts adapted to surround the cable adjacent the forward end of said retainer and hinged one part to each arm at the forward ends of the arms, the forward and rearward ends of said anchor-release being respectively concave and convex, whereby impact of one of said anchor releases is received uniformly by the other when their axes are at a slight angle one with the other, a latch associated with said anchor-release, said latch comprising engaging means on the one part, engaging means on the other part for engaging the first said engaging means, and an operating part extending through the forward concave end of said anchor-release, said latch being adapted to normally hold the parts of said anchor-release latched together around the cable, and said operating part being adapted to be engaged by said like target and the latching thereby unlatched, whereby the two parts of said anchor-release may separate and said target be released from said cable.

5. The structure defined in claim 4 with a short length of shock cable connecting the anchor to the target.

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