June 1, 1948. L. P. FRIEDER ET AL 2,442,682

MECHANICAL RELEASE

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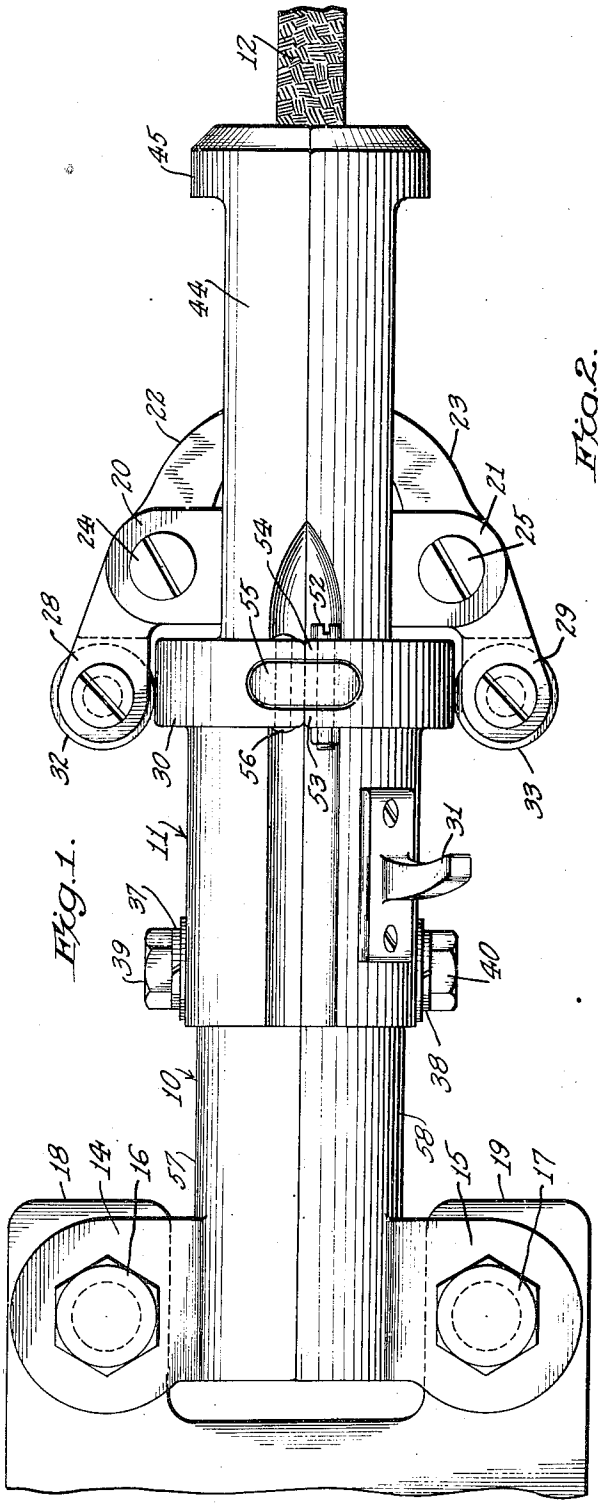


Fig. 1.

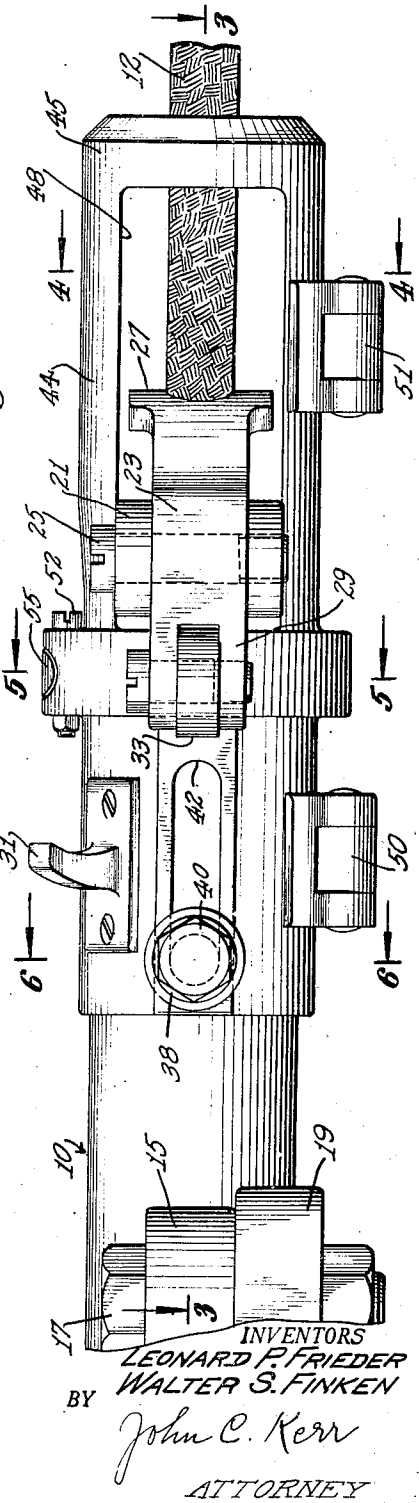


Fig. 2.

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Fig. 3.

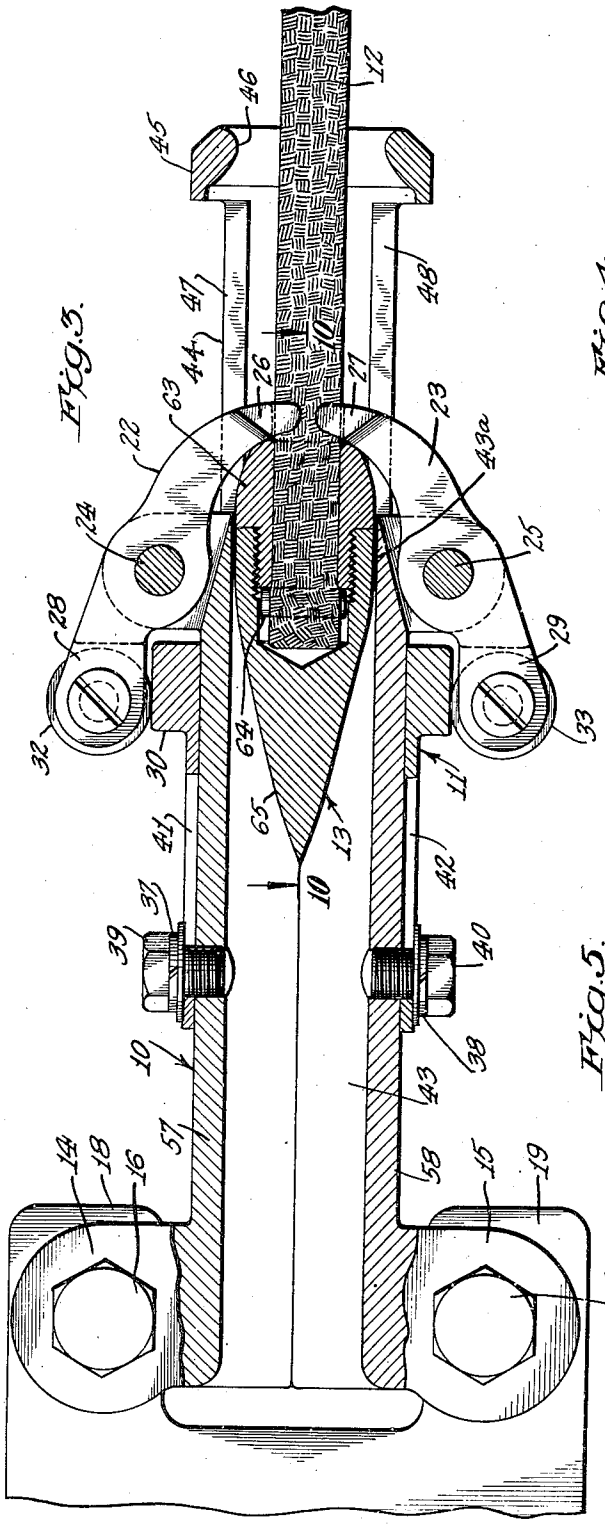


Fig. 4.

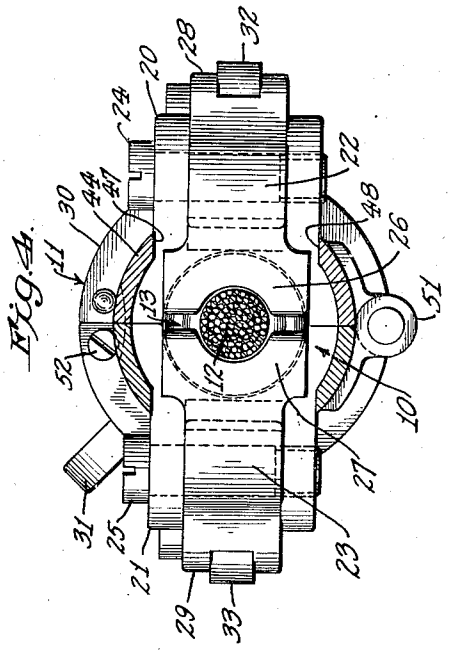
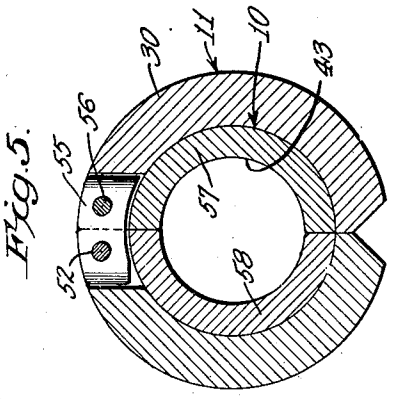


Fig. 5.



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Fig. 7.

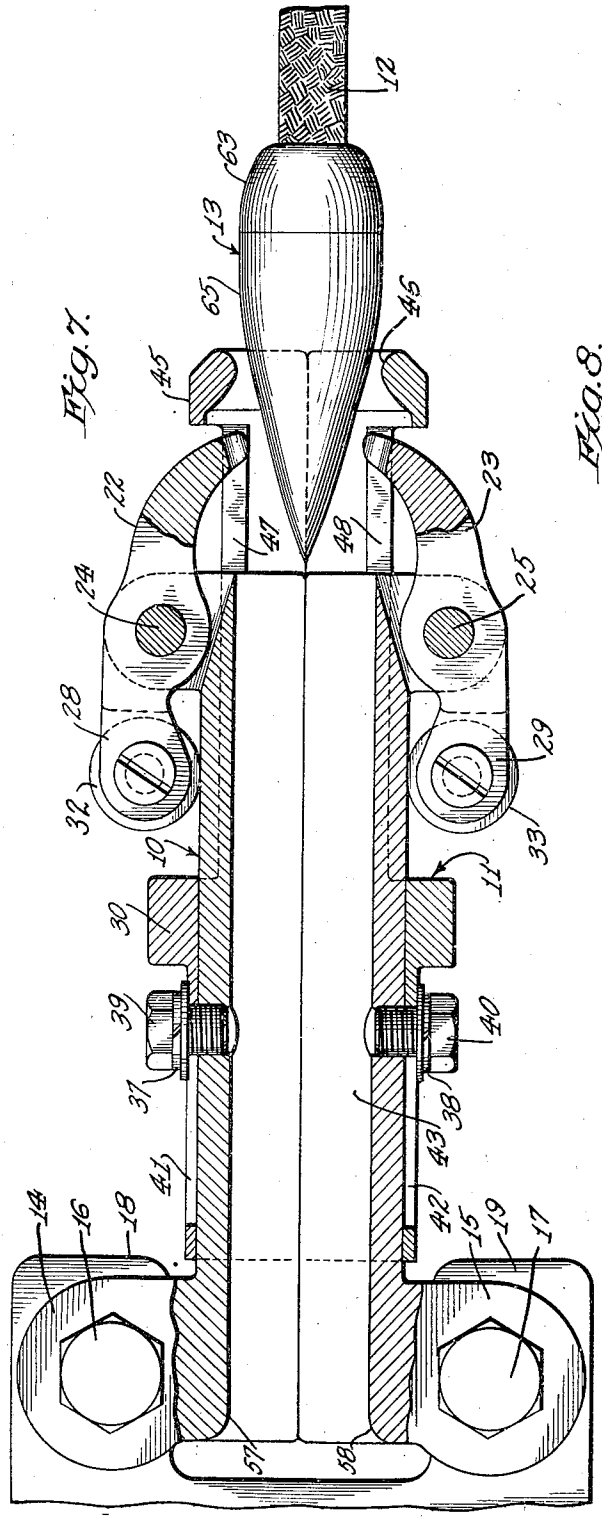


Fig. 8.

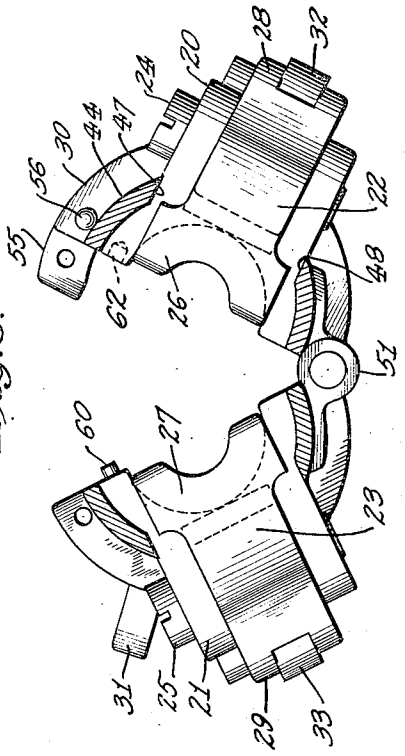
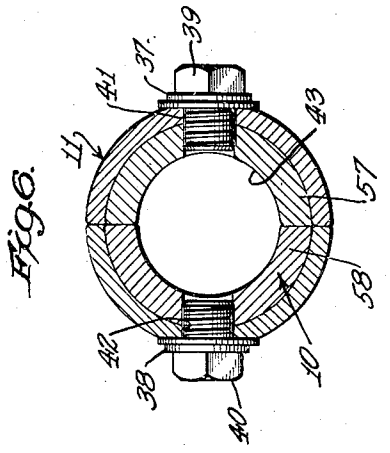


Fig. 6.



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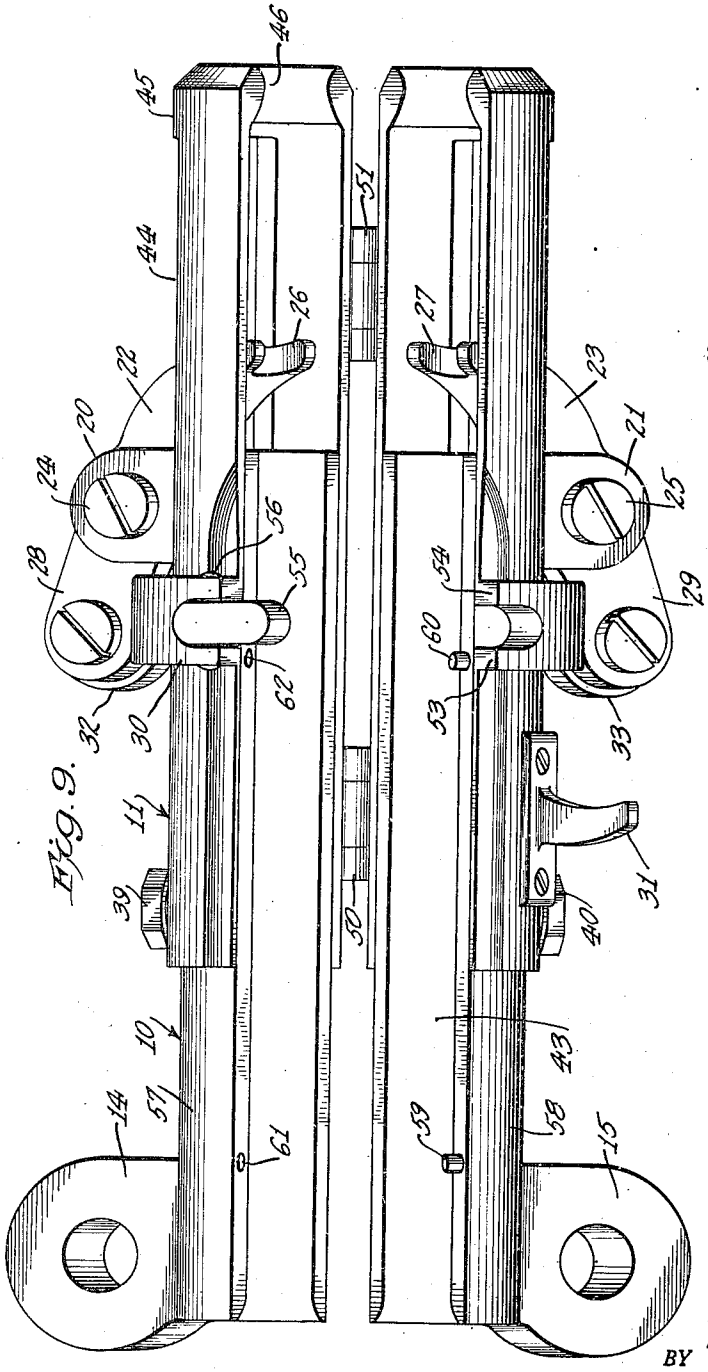


Fig. 9.

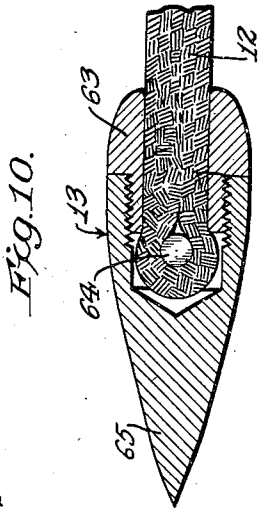


Fig. 10.

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UNITED STATES PATENT OFFICE

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MECHANICAL RELEASE

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Application December 6, 1944, Serial No. 566,944

7 Claims. (Cl. 280—33.15)

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This invention relates to mechanical releases and it is a purpose of the invention to provide a device so constructed and arranged to connect oppositely pulling elements and to effect their immediate separation at the will of an operator, or as the result of the external application of force on the device. An application of the invention is for towing a glider. In this capacity the device is attached to a glider and releasably engages a bob on a tow line.

Another object of the invention is to provide a device for towing a target and for effecting the release of a used target and its replacement by a new target. For attaining this object the device is adapted to be opened for applying it about a cable fastened to a towing airplane and to slide along the cable and replace a like mechanical device and assume the function of towing a new target.

Further and other objects of the present invention will be hereinafter set forth in the accompanying specification and claims and demonstrated by the drawings which show by way of illustration a preferred embodiment and the principle of our invention and what we now consider the best mode in which we have contemplated applying that principle. Other embodiments of the invention employing the same principle may be used and structural changes made as desired by those skilled in the art within the spirit of the appended claims and without departing from the present invention.

In the drawings,

Fig. 1 is a side view of a mechanical release employing the principles of the present invention;

Fig. 2 is a view of the mechanical device illustrated in Fig. 1 turned 90° on its axis;

Fig. 3 is a longitudinal section of the mechanical device taken on line 3—3 of Fig. 2;

Fig. 4 is a cross-section on line 4—4 of Fig. 2;

Fig. 5 is a cross-section on line 5—5 of Fig. 2;

Fig. 6 is a cross-section on line 6—6 of Fig. 2;

Fig. 7 is a sectional view similar to that shown in Fig. 3 with the mechanical bob-engaging means displaced to non-engaging positions;

Fig. 8 is a sectional view taken on the plane of line 4—4 of Fig. 2, but with the halves of the device separated;

Fig. 9 is a longitudinal view of the device opened as in Fig. 8;

Fig. 10 is a longitudinal section through a bob.

It is very important in the operation of gliders that release means be provided between the glider and the towing plane whereby the glider may be

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instantly released at the will of the operator. The connecting and releasing device of the present invention includes two principal members 10 and 11 which are displaceable in respect to each other for effecting the immediate release of a tow line 12. Member 10 is provided with means for attaching the member to a glider and it also carries adjustable mechanical means which are engageable with a bob or other device 13 fastened to the tow line 12. This member transmits the pull between the tow line and glider.

The means for attaching the member 10 to a glider may be variously formed and in the embodiment of the device illustrated in the drawings consists of a pair of lugs 14, 15, extending from one end of member 10 and having openings therein for receiving bolts 16, 17, which are fastened to a stanchion or brackets 18 and 19 carried by the glider. The other end of member 10 is provided with pairs of lugs 20, 21 by which the mechanical means for engaging the bob is supported.

The mechanical bob-engaging means comprise a pair of levers 22, 23, each lever being supported for pivotal movement upon bolts 24, 25 passing through the pairs of lugs 20, 21, respectively. These levers are arranged to pivot in a diametrical plane and are provided with jaws 26, 27 capable of being moved towards and away from each other. In their most advanced position towards each other, they engage a bob 13 secured to and by which the tow line 12 is held fast. The jaws are preferably crescent-shaped to engage a large area of the bob.

Levers 22 and 23 are provided with arms 28, 29, respectively, which cooperate with member 11 for holding the jaws in bob-engaging position when member 11 is in the position relative to member 10 shown in Figs. 1, 2, 3 and 4. Member 11 is carried by and is slidable with respect to member 10 and is provided with a flange or shoulder 30 which is integral therewith and adapted to underlie the arms 28 and 29 of the levers for restraining them against movement from their bob-engaging positions.

Member 11 is provided with a finger piece 31 by which the glider pilot may retract member 11 to the position shown in Fig. 7 for releasing the levers from their locked position and to effect release of the tow line. In order to facilitate the disengaging operation anti-friction means is provided between the levers and shoulder 30 in the form of rollers 32, 33, carried by arms 28 and 29, respectively.

So as to prevent unintentional displacement of

member 11 with respect to member 10, means coacting between the two members are provided which have the effect of holding the two members in set positions relative to each other. This result is attained by spring washers 37, 38 which are held in place by screws 39 and 40, respectively, engaged in member 10. The shanks of these screws pass through elongated slots 41, 42 which determine the length of travel of member 11 over member 10. When member 11 is in lever-locking position, as shown in Figs. 1, 2, 3 and 4, the screws engage one end of the elongated slots 41 and 42. The spring washers 37 and 38 effect a frictional drag against the unintentional displacement of member 11 with respect to member 10, but it will be understood that the tension provided by the spring washers is adjustable and is set so as to provide not any more restraining force than can be easily overcome by an operator applying force to finger piece 31. Immediately upon displacing member 11, jaws 26 and 27 are expanded as a result of the lateral forces exerted upon the jaws by the bob under the influence of the pull of the tow line.

It is convenient to construct members 10 and 11 as sleeves, and preferably with a central bore 43 having a diameter sufficiently great to accommodate the passage therethrough of a bob, although for glider towing purposes it is advantageous that the forward end of member 10 be hollowed at least to such a degree as to contact the greatest girth of the bob as at 43a, Fig. 3. The bob is thereby held from lateral movement, and the effect of the jaws 26 and 27 is to bear axially on the bob almost entirely.

Sleeve member 11 is extended forwardly of the jaws a distance at least as great as the permissible length of travel of member 11 relative to member 10 and its forward end is provided with a nose 45 with a rounded annular opening 46 whereby the angular deflection of the line 12 is limited. Cricumstances sometimes make it desirable that the pilot of a towing plane be able to cast off a tow and this may be accomplished by providing the pilot of the towing plane with a weighted messenger that can be placed on the tow line and allowed to slide down towards the tow. When the messenger strikes nose 45 the levers 22 and 23 are released from their bob-engaging positions and the tow is cast off.

Projection 44 is provided with a pair of openings 47, 48 through which the levers of jaws 26 and 27 extend. The parts may be constructed of metal, such as steel, or of such other material as will provide the required strength.

While the mechanical release so far described is well suited for disconnecting gliders from a tow line, the invention illustrated in the drawings is embodied in such a form as to be useful for towing a target and for replacing a device holding a target being towed. For serving in this capacity the two sleeve members 10 and 11 are separable into two sections and have central bores of sufficient diameter for enabling the passage therethrough of a bob or other similar device attached to a tow line. The device may be opened, as shown in Figs. 8 and 9, to be placed about a towing line extending rearwardly from an airplane. Hinges 50 and 51 are attached to the two sections of the outer sleeve 11. When the device is closed, the two sections of the outer sleeve member are locked together by a bolt 52, which passes through holes in lugs 53, 54 in one of the sections of sleeve member 11 and a hole in tongue 55 which is supported by a pin 56 carried by the other section of sleeve member 11, Figs. 1 and 2.

Each section 57, 58, of the inner sleeve member 10 is fastened to its adjacent outside section of outside sleeve member 11 by means of the screws 39 and 40, respectively, Fig. 3. It will be appreciated that the inside sections 57 and 58 may be independently displaced longitudinally of the sections of the outside sleeve member 11 when the device is open. In order to bring these sections into proper registry with each other for closing the device, pins 59 and 60 and registering holes 61 and 62 are provided.

When this device is employed for towing a target, the device is held by the bob 13 in the manner illustrated in Fig. 3. The target is attached to lugs 14 and 15 by means of lines engaged in the eyes in lugs 14 and 15. After the target has been shot away by gun fire or has been so damaged as to render it useless, it becomes desirable to cast it off without reeling in the tow line. An operator in the airplane selects another device to which a new target is attached. The static line of the package containing the new target and the supporting line of the new target are secured to the eyes in lugs 14 and 15. This device is opened in the manner illustrated in Fig. 9, placed about the tow line with its nose 45 in the direction of the anchored end of the tow line, and then closed and locked in closed position, by means of bolt 52. Before releasing the device and its attached target, the operator sees that sleeve 11 is extended to the position shown in Figs. 1, 2 and 3 so that the jaws 26, 27 of levers 22, 23 are held in bob-engaging position. The compression in springs 37 and 38 is adjusted to the extent necessary to hold sleeve 11 in extended position during the descent of the device along the tow line, and care is taken to make sure that the compression will not prevent sleeve 11 from being displaced by another similar device or messenger in a subsequent target-releasing operation. The device is then allowed to slide down the tow line. When it strikes the nose 45 of the device carrying the used target it will cause displacement of sleeve 11 of the latter device and free its levers 22 and 23 from bob-engaging position. The released device will then be cast off with its used target and the replacing device will assume its position with its levers in engagement with the freed bob. Upon the arrest of the substitute device the static line frees the wrapped target which is thereafter towed by its sustaining cord.

The bob illustrated in the drawings consists of a member 63 having a bore through which the tow line 12 passes. The tow line is secured to member 63 by a pin 64. A cap 65 is in threaded engagement with member 63 and encloses the loop at the end of the line and at the same time prevents displacement of pin 64 axially of itself and from disengaging relation with the loop.

What is claimed is:

1. A mechanical release for holding and releasing a bob attached to a line comprising engaged inside and outside members slidable with respect to each other, the outside member being in the form of a sleeve having a portion extending beyond one end of the other member, means coacting between said members for limiting the sliding movement of said outside sleeve member in the direction of its extending portion, a pair of levers pivotally mounted oppositely each other on said inside member, said levers having arms movable through openings in said outside sleeve mem-

ber and jaws on said arms movable towards and away from each other as the levers are pivoted, means on said outside member for holding said jaws towards each other in bob-engaging position when said members are located with respect to each other by said first-named movement-limiting means, means cooperating with said members for providing resistance to their relative movement, and means carried by said inside member for fastening the same to an anchor.

2. A mechanical release for holding and releasing a bob attached to a line, comprising members engaged for linearly sliding with respect to each other, one of said members carrying a pair of levers pivotally supported opposite each other, said levers being symmetrically placed about the common longitudinal axis of said members and having jaws for engaging a bob located with its axis on the longitudinal axis of said members, means on the other of said members for releasably holding said levers with said jaws disposed towards each other in bob-engaging position when said members are so set with respect to each other as to locate said holding means in contact with said levers, and means frictionally cooperating between said members for normally preventing relative sliding movement of said members while holding said levers in bob-engaging position but permitting relative sliding movement thereof to automatically release said levers from bob-engaging position by application of external force upon one of said members to effect sliding of one of said members from its set position relative to the other member and the accompanying release of said levers whereupon the bob is immediately freed.

3. A mechanical release for holding and releasing a bob attached to a line, comprising members engaged for sliding linearly with respect to each other, a pair of levers pivotally supported opposite each other on one of said members, said levers having jaws symmetrically disposed at opposite sides of the longitudinal axis of said members when engaging a bob and adapted to be spread apart by the camming action of the engaged bob unless said levers are restrained in a bob-engaging position, means on the other of said members for holding said levers with said jaws disposed towards each other in a bob-engaging position, and means frictionally cooperating between said members for preventing unintentional displacement of said members with respect to each other whereby said members are held against displacement for holding said levers in bob-engaging position and said frictionally operating means may be overcome and said members displaced to release said levers for releasing the bob as a result of application of an external force on one of said members along the axis of support of said bob.

4. A mechanical release for holding and releasing a bob attached to a line, comprising a load-carrying member, a sleeve mounted thereon for longitudinal displacement along said load-carrying member, a pair of levers pivotally mounted on said member and disposed with jaws symmetrically located with respect to the axis of said member for engaging a bob when said jaws are in their position of closest approach, means on said sleeve for holding said levers and jaws in bob-engaging position whereby said bob is releasably held by said jaws, said means being slidable with said sleeve for effecting release of said levers, and means frictionally cooperating with said member and said sleeve temporarily to hold them against

unintentional displacement relative to each other and to permit relative displacement of said sleeve over said member to release said levers from bob-engaging position upon application of force applied externally to said sleeve in a direction longitudinally of its axis.

5. A mechanical release for holding and releasing a bob attached to a line, comprising a pair of sleeves, one of said sleeves being inside the other and having a bore of suffiicent diameter to permit the passage of a bob, lever means mounted on said last-named sleeve for engaging a bob centrally disposed with respect to its bore, means carried by the other of said sleeves for holding said lever means in bob-engaging position when said sleeves are in a predetermined position with respect to each other and whereby said lever means are relieved from restraint of movement from bob-engaging position when said sleeves are displaced from such predetermined position with respect to each other, and means opposing unintentional displacement of the sleeve members from such predetermined position with respect to each other, said last-named means being adapted to be overcome to permit relative displacement of said sleeve members as a result of the application of external force upon one of said sleeve members.

6. A mechanical release for holding and releasing a bob attached to a line, comprising a pair of telescoping sleeves slidable with respect to each other unless restrained, the inner of said sleeves having a bore to accommodate a bob for passage therethrough and said sleeves being composed of sections separable on lines extending longitudinally of the sleeves so that the sleeves may be opened to receive a line attached to a bob and closed to encompass said line, means for holding said sections together in the form of sleeves, a pair of levers oppositely mounted for pivotal movement on one of said sleeves, said levers being provided with jaws for engaging a bob centrally located on the axis of said sleeves, means on the other of said sleeves for holding said levers and jaws in bob-engaging position against the separating effort of said bob acting to spread said jaws, and means cooperating with said sleeves for restraining unintentional displacement of said sleeves with respect to each other and responsive to impact on one of said sleeves to permit relative displacement of said sleeves to release said levers from bob-engaging position.

7. A mechanical release for holding and releasing a bob attached to a line, comprising a pair of inside and outside sleeves slidable longitudinally with respect to each other, said inside sleeve having a bore to accommodate the passage of a bob longitudinally therethrough, each of said sleeves being composed of two sections connected together and longitudinally separable whereby the sleeves may be opened for the insertion of a line within the bore of the inner sleeve, means retaining adjacent inside and outside sections of said sleeves in nested relationship when the sleeves are parted, means for holding said sleeves in telescoping relationship when said sections are joined as sleeves, mechanical means carried by said inside sleeve and provided with movable jaws for engaging a bob centrally disposed with respect to the bore of said inside sleeve, means on said outside sleeve for engaging said mechanical means to hold said jaws in bob-engaging position against the spreading action of a bob engaged by said jaws, and means cooperating with both of said sleeves for preventing unintentional displacement of said sleeves with respect to each other and

adapted to permit displacement of said outside sleeve with respect to said inside sleeve as a result of impact upon the outside sleeve to release said movable jaws from bob-engaging position.

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