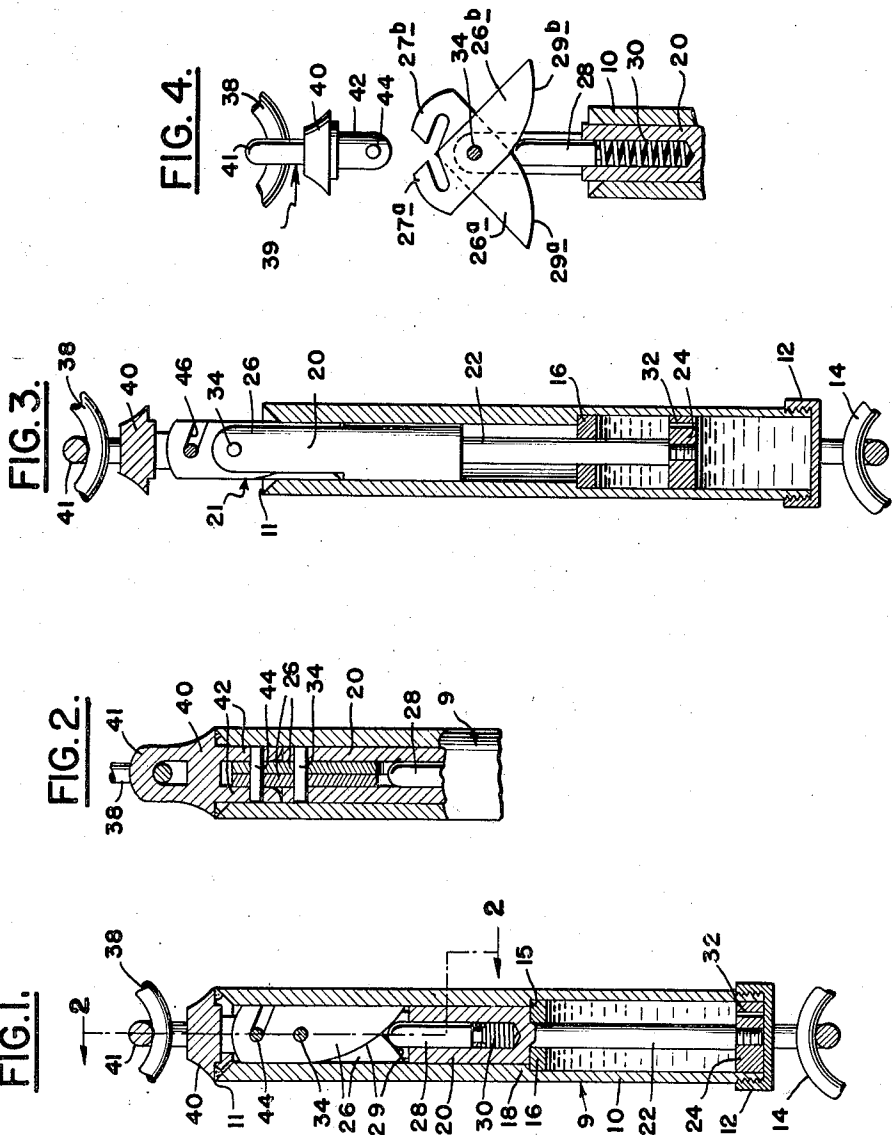


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DELAYED RELEASE MECHANISM

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DELAYED-RELEASE MECHANISM

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1

This invention relates to an automatic release coupling device. More specifically it relates to a coupling device for suspending a load from a parachute.

The coupling unit used as a link in the suspension system between a parachute and its load must continuously maintain a coupled condition until the load is deposited on the earth and it must uncouple as soon as this condition is reached. Accordingly, it must be so constructed that it will neither release due to the abrupt force created by the opening of the parachute and the oscillatory conditions attendant thereto, nor by the force created by the weight of the load as it descends. However, after this sequence of forces has occurred and upon relaxation of the force due to the weight of the load as upon the load contacting the earth, the coupling unit must disconnect immediately.

An object of this invention is to construct a coupling device which will satisfy the foregoing conditions with unfailing reliability.

Another object is to provide a coupling unit which by virtue of being sealed is not subject to internal corrosion.

Other objects are to provide an automatic releasing coupling unit which is small and rugged in construction, compact in shape, and light in weight.

The invention further resides in the novel construction, combination, and arrangement of parts of the coupling unit hereinafter described and specifically pointed out in the claims.

These and additional objects of the invention will become more apparent from a further consideration of the description and drawings.

Fig. 1 is a vertical sectional view of the device in its fully assembled form.

Fig. 2 is a vertical sectional view of the releasing portion of the device taken on line 2—2 of Fig. 1.

Fig. 3 is a vertical sectional view of the device after an abrupt force has initiated its action and a smaller force has been active for some time.

Fig. 4 is a vertical sectional view of the connect-disconnect mechanism in the disconnect condition.

The device consists essentially of a barrel assembly 9, a plunger assembly 21, including a connect-disconnect mechanism, and a plug assembly 39 part of which is the closure for one end of the barrel.

The barrel assembly comprises a barrel 10 having a first end, and a second end. The edge of the first end is internally chamfered so that the sur-

2

face of the chamfered portion meets the external surface of the barrel in a thin edge as shown at 11. The said second end of the barrel is closed as by a cap 12 secured to the barrel by threads or the equivalent. Attached to the cap is a terminal or load supporting ring 14. The internal surface of the barrel provides two cylinders, the first of which extends about three fifths the length of the barrel (although this distance is not critical) from the said first end and a second cylinder of greater diameter than the first cylinder which extends from the end of the first cylinder to the said second end of the barrel. The ledge 15 is formed at the adjacent ends of the cylinders due to the difference in diameters. A washer or annular ring 16 having an outside diameter slightly less than that of the second cylinder is inserted therein and pressed against the ledge 15 to form a cylinder head. The diameter of the aperture in this cylinder head is of a size which will be presently apparent.

The plunger assembly comprises a connect-disconnect assembly 21, a piston 24 having a perforation 32 therein, and a piston rod 22.

The connect-disconnect assembly 21 comprises a rod 29 having a cylindrical outer surface, and a bifurcated portion at one end and on the second end an axial bore extending partially therethrough. Pivotaly secured between the arms of the bifurcated portion by a transverse pin 34 are a pair of opposed tong members 26a and 26b, having at their one end opposing inclined hooks 27a and 27b, and at their other end opposed cam surfaces 29a and 29b. Located within the axial bore of the rod 29 is a spring 30 and a push rod 28. The normal action of the push rod as it is urged outwardly by the spring is to spread the cam portions of the tongs, thereby spreading the opposed hooked ends apart.

Attached to the said second end of the rod 29 is one end of a piston rod which carries at its other end a piston 24 having a small metered perforation 32 therein.

The piston rod 22 has a snug sliding fit in the opening provided therefor in the cylinder head 16.

The space provided in the cylinder 10 between the cap 12 and the cylinder head 16 is substantially filled with oil in order to delay or snub the motion of the piston during the operation of the device.

The plug assembly 39 comprises a plug portion 40, a bifurcated portion 42 having a transverse pin 44 therethrough which engages with the hooks on the tong members of the plunger and an eye portion 41. The plug 40 is machined to fit the

3

first end of barrel 10 and is provided with a thin edge which when the plug is assembled to the barrel is contiguous with the thin edge at the said first end of the barrel. The eye portion is provided as a terminal to permit the securing of a rope or chain thereto.

The automatic release coupling consists of the three subassemblies, in joined relation. The plunger assembly is inserted in the barrel, with the piston 24 immersed in the oil in the lower cylinder. The transverse pin 44 of the plug assembly is engaged by the hooks 27a and 27b of the tong members as the tong members are compressed in order to be telescoped into the barrel. The assembly is secured in its telescoped condition and maintained in assembled hermetically sealed condition by solder applied to the contiguous thin edges of the plug and barrel.

In operation, the device is secured between a parachute and a load. Upon release, the parachute is first caused to open in the manner well known in the art. The resistance of the air to the motion of the parachute tends to cause an abrupt deceleration, possibly with attendant oscillations. The momentum of the load causes a considerable tensile stress to be applied to the coupling and this ruptures the solder seal and thereby accomplishes the first step in the sequence of steps directed to the final releasing of the device. The device cannot open at this time as a result of the occurrence of a relaxation of tension which may occur as a result of oscillations or jerking. During the period of normal descent, the plunger assembly is slowly withdrawn against the snubbing action of the piston 24.

Eventually the tong members are completely withdrawn, from the barrels, but the weight of the load and the slope of the hooks 27a and 27b act to prevent the tongs from opening. When the descent of the load is checked as when it comes to rest on the earth or water, its weight no longer provides a force acting against the inclined hooks of tong members 26a and 27b, and the same are now free to open under the influence of the spring actuated push rod 28. The hooks 27a and 27b are now withdrawn and pin 44 of plug assembly 39 is released. The parachute is now completely released from the load.

Thus is shown an automatic release coupling that is waterproof, foolproof, compact and positive in action.

What is claimed is:

1. In an automatic coupling device for preventing the premature release of a load suspended from a parachute, the combination of two telescoping members, one of which is connected to said parachute, the other to the load, frangible tensile sealing means retaining said telescoping members in a nested position and capable of severance upon initial shock load, a restriction in one of said telescoping members, fluid retained within said telescoping members in cooperative snubber relation with said restriction and passing therethrough after the load is first applied to the parachute, stop means for limiting the outward movement of said telescoping members, and positive disengaging means in a non-releasable position when said telescoping members are nested, and in an operable position when the telescoping members are in their extended position, said means disengaging upon the removal of the force of gravity.

4

2. In an automatic releasing coupling, a housing assembly comprising a barrel having a first and a second cylinder therein, a plunger assembly telescoping into said barrel and having piston means at one end and hook means at the other end, said piston means containing a metering aperture and resting in said second cylinder, said second cylinder containing a fluid to retard movement of said piston, means to confine the motion of said piston to said second cylinder, and plug means secured to the end of said first barrel and hermetically sealing the same, said hook means engaging said plug means.

3. An automatic releasing coupling comprising housing means having a terminal at a first end, removable plug means secured by a frangible sealing means in a second end, coupling means telescoping into said housing and releasably attached to said plug means, and reciprocating means provided in said coupling means for urging said coupling means to disengage said plug means when said plug means is withdrawn from said housing.

4. In an automatic releasing coupling, a barrel assembly, a plunger assembly and a plug assembly, said barrel assembly including a smaller cylinder and a larger cylinder separated by a perforated washer, said larger cylinder closed at an outer end by a cap, and substantially filled with fluid, said plunger assembly including a perforated piston housed in said larger cylinder and free to move relative thereto within the limiting confines of said perforated washer and said cap, a piston rod secured at one end to said piston and at the other end to a tong assembly, said tong assembly including inclined hook portions and cam portions, said cam portions engaging a spring actuated push rod whereby the arms of said tong members are urged apart, said hooks engaging pin means on said plug assembly to prevent the separation thereof, and frangible sealing means securing said plug assembly to the open end of said smaller cylinder, said tong members being restrained from opening by the walls of said smaller cylinder when in housed position and restrained from opening by the pin of said plug means when the plunger means are partially withdrawn from the housing means by tension on the plug means, and whereby said tong members are automatically opened by said push rod when said tension is relaxed, thereby opening the hook means and releasing the plug means.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
431,741	Enggren	July 8, 1890
1,027,481	Huff	May 28, 1912
1,507,706	Miller et al.	Sept. 9, 1924
2,061,083	Niemi	Nov. 17, 1936
2,131,445	Lawton	Sept. 27, 1938
2,270,317	Larson	Jan. 20, 1942
2,356,920	Drescher	Aug. 29, 1944
2,386,932	Cooper	Oct. 16, 1945

FOREIGN PATENTS

Number	Country	Date
118,090	Australia	Feb. 2, 1944