May 12, 1942. L. S. ADAMS 2,282,920

AIRPLANE PICK-UP AND DELIVERY APPARATUS

Filed Oct. 8, 1938 3 Sheets-Sheet 1

Fig. 1.

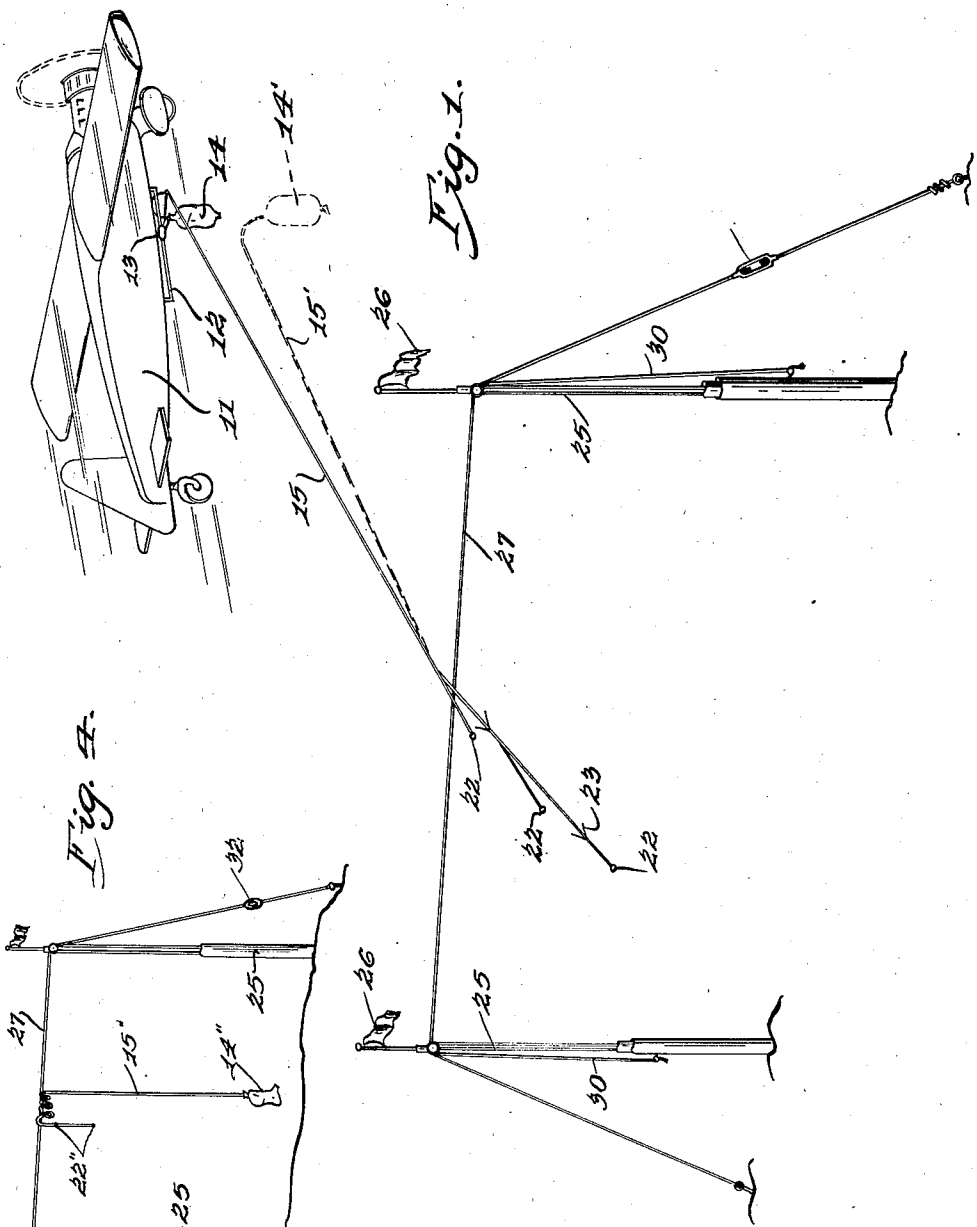


Fig. 2.

Inventor

Lyttle S. Adams

By Emery Booth Holcombe & Miller

Attorneys

May 12, 1942. L. S. ADAMS 2,282,920

AIRPLANE PICK-UP AND DELIVERY APPARATUS

Filed Oct. 8, 1938 3 Sheets-Sheet 2

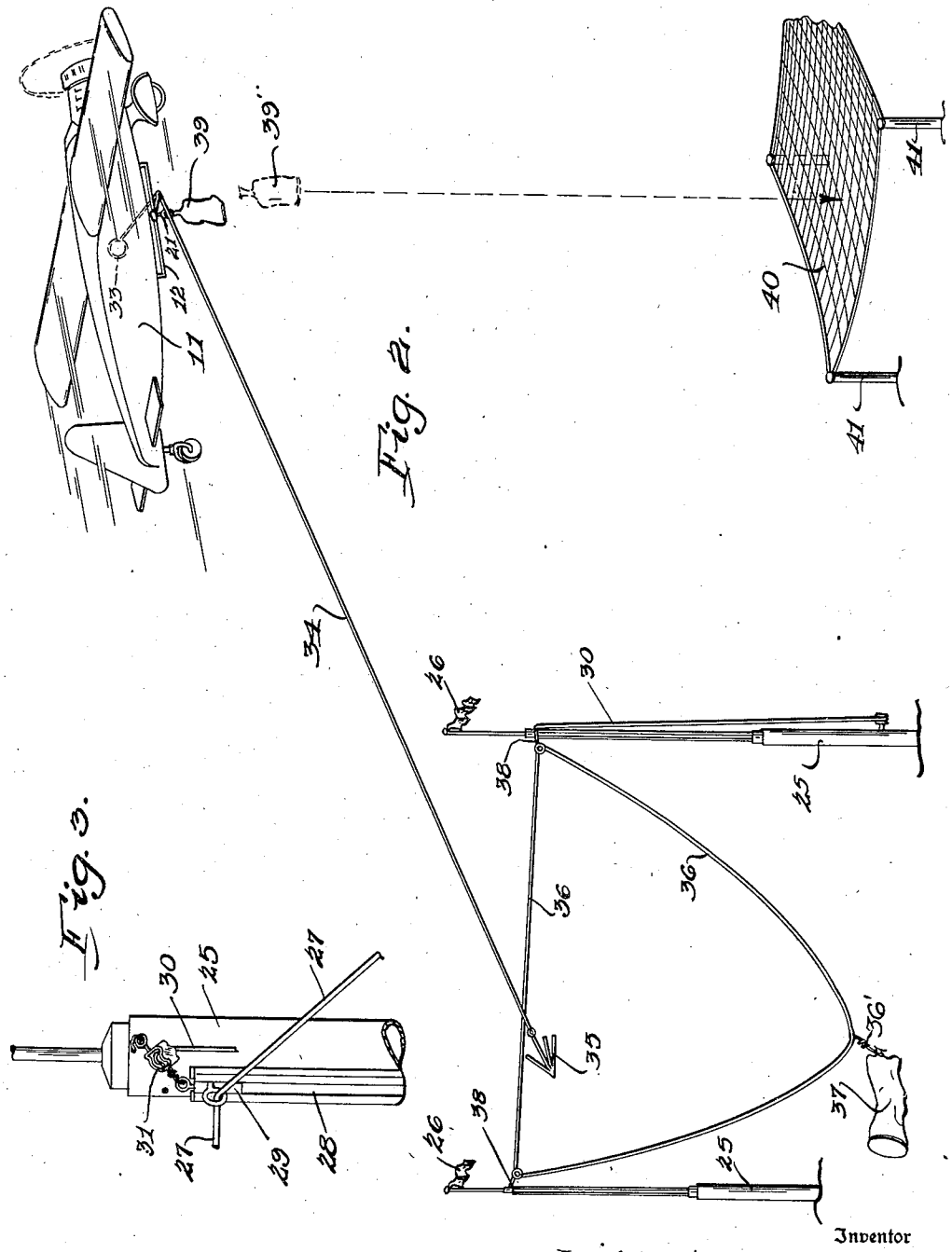


Fig. 2.

Fig. 3.

Inventor

Lyttle S. Adams

By Emery Booth Holcombe & Wills

Attorneys

May 12, 1942. L. S. ADAMS 2,282,920

AIRPLANE PICK-UP AND DELIVERY APPARATUS

Filed Oct. 8, 1938 3 Sheets-Sheet 3

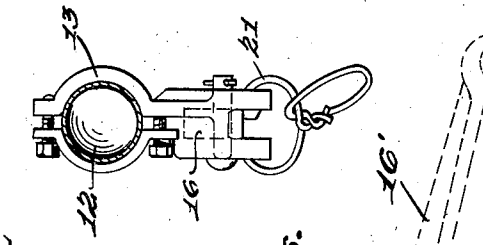


Fig. 6.

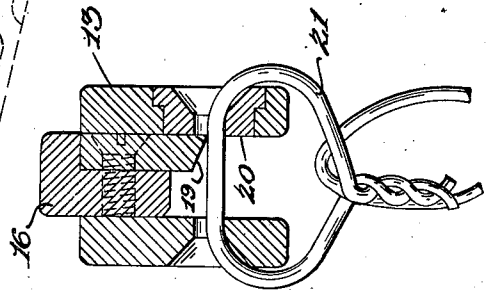


Fig. 8.

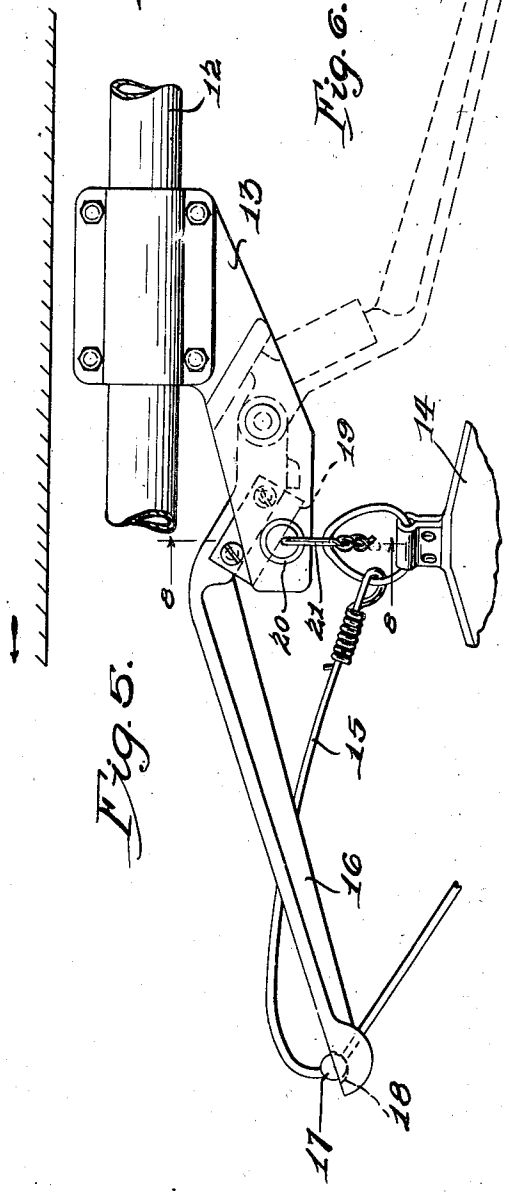


Fig. 5.

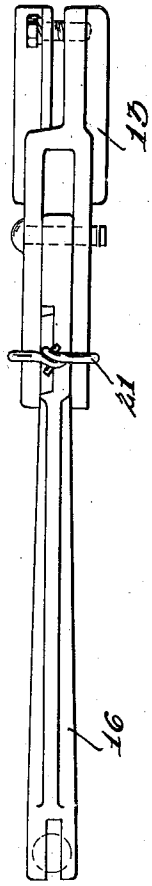


Fig. 7.

Inventor

Lyttle S. Adams

By Cumming Booth Holcombe & Miller

Attorneys

Patented May 12, 1942

2,282,920

UNITED STATES PATENT OFFICE

2,282,920

AIRPLANE PICKUP AND DELIVERY APPARATUS

Lytle S. Adams, Irwin, Pa., assignor to All American Aviation, Inc., a corporation of Delaware

Application October 8, 1938, Serial No. 234,017

13 Claims. (Cl. 258—1)

This invention relates to improvements in airplane pick-up and delivery apparatus for enabling airplanes to deliver and receive mail bags, express pouches and other articles while in flight, and aims to simplify the construction of such devices and make their operation more certain.

The invention comprises means for suspending the bag or other container for the load under the plane whence it may be dropped at the proper time by a pull on a cable that is trailed below the plane and fitted with a grapple or other means on its trailing end for engaging a suitable tripping device, such as an elevated wire or other not too rigid high object at the delivery point.

The invention may be used if desired with a loop carrier of the general type illustrated in my Patent No. 2,075,690, issued March 30, 1937, for Article deposit and pick-up apparatus for airplanes, or similar devices, thereby enabling a load to be picked up from the ground at the same time as another load is dropped from the plane.

Further advantages and details of the invention will appear in connection with the following description of the illustrative apparatus shown in the accompanying drawings, wherein

Fig. 1 is a schematic representation of an airplane fitted with the invention passing with its suspended load over a cross tie tripping means supported on spaced poles;

Fig. 2 is a similar view showing a loop carrier spread between spaced poles in position to be picked up and a net for receiving the load released from the plane, the upper end of the cable in this form of the invention being carried into the plane and arranged to be paid out and retracted instead of being attached to the bag or other load container;

Fig. 3 is a side elevation of the top part of a loop or cross tie supporting pole, illustrating a form of elevating and securing means for a loop or cross tie;

Fig. 4 is a view to smaller scale of an elevating and holding means for a carrier loop; showing a cable and bag suspended therefrom after having been dropped from a plane;

Fig. 5 is a side view of an airplane fixture for supporting the suspended load and trailing cable;

Fig. 6 is an end view and Fig. 7 a bottom view of the same with the bag and cable removed; and

Fig. 8 is a cross-section on the line 8—8 in Fig. 5, drawn to an enlarged scale.

In the apparatus shown in Figs. 1, 4 and 5, the plane 11 has a lengthwise extending support 12 in the form of a hollow tube securely fastened beneath its fuselage, upon which is clamped a combined load support and cutter unit 13 in the most advantageous position for exerting the minimum disturbing effect upon the longitudinal stability of the plane when the mail bag 14 or other load is released.

The cable 15, one end of which is attached to the bag and the other end trails behind, has an intermediate portion or bight passed over the end of the cutter arm 16, as shown in Fig. 5, and supported thereby by means of a split ball 17 or other stop member secured to the cable in the bight and which is received in a depression or recess 3 in the bifurcated extremity of the cutter arm when the latter is in its normal operating positions. The cutter arm is provided with a knife 19 near the end which is pivoted to the cutter support 13, which knife cooperates with an annular cutting die 20 through which the tie wire loop 21 passes as shown in Fig. 8. In the normal position of the cutter arm shown in full lines in Fig. 5, this tie wire supports the arm and bight of the cable, but when the tie wire is severed by a pull on the cable, the arm swings to the position shown in dotted lines, thereby releasing the cable.

The extremity of the cable carries one or more balls 22, grapples 23, or like members for causing the end of the cable to wrap itself around any wire, pole or other like article with which it may come into contact, whereupon the pull on the cable becomes too great for the tie wire loop 21 to withstand, and it shears apart, permitting the cutter arm to swing down and disengage the ball 17 and cable 15, and freeing the bag 14 to which the end of the cable is secured.

The ground station is provided with two spaced poles 25 at the tops of which are flags 26, for guiding the aviator, and between which there is stretched a cross tie 27 or other suitable tenuous tripping device for entangling and holding the end of the trailing cable 15. The poles are advantageously fitted with slideways 28 in which blocks 29 are slidably mounted, and hoist lines 30 passing over pulleys 31 are provided for raising and lowering them when it is desired to change the position of the cross tie. A turnbuckle 32 or other suitable tensioning device may be provided for taking up unnecessary slack in the cross tie 27.

The instant the trailing end of the cable 15 strikes the cross tie 27 or other tripping member spread between the tops of the poles 25, it wraps around the tie member and exerts a strong pull on the cutter arm 16, causing the latter to sever

the wire loop 21 which supports the bag from the cutter unit 13, permitting the bag 14 and cable 15 to drop as indicated in Fig. 1 at 14' and 15', respectively. The height of the poles and length of the cable 15 are such that the end 15'' of the cable to which the bag is connected will swing clear of the ground when the bag is released, thus preventing it from making violent contact with the ground, as shown at 14'' in Fig. 4. The cross tie may then be lowered and the bag and cable removed without danger of injury.

In the device illustrated in Fig. 2, the plane is provided with a reel 33, upon which the upper end of the cable 34 is wound, or other suitable means are provided in the plane for paying out and drawing up the cable at will, and the trailing end of the cable is provided with a grapple 35 for engaging the carrier loop 36 spread between the two poles 25 and to which is attached by a suitable connection 36' the mail sack 37 or other load container to be picked up. The blocks 29 are provided with releasable means for holding the loop, such as light tie wires or cords 38 which readily break when the loop is jerked loose by the cable or grapple engaging it.

The bag 39 to be delivered is suspended from the support 13 by means of a wire loop 21 as shown in Fig. 5. The cutter arm carries a knife 19 which cooperates with an annular knife 20 mounted in one side member of the cutter unit, and through which the tie wire loop 21 passes, to sever the wire and release the load when the cable is pulled, as in the device shown in Fig. 1. On the ground in alinement with the position and direction of movement of the plane when the bag is released is a strong rope net 40 for catching the bag or other load, the net being supported on posts 41 or other suitable means at a sufficient height above the ground to prevent the load from hitting the ground when dropped into the net. The released bag 39' is shown in Fig. 2 descending toward the net 40.

The bight of the cable 34 which is looped over the end of the cutter arm 16 is provided with a ball 17 or other means for suspending the cable from the arm in its operating position but this does not prevent the cable from being reeled into the plane to elevate the loop 36 and bag 37 to the point where the latter can be taken aboard.

Thus the apparatus illustrated in Fig. 2 may be operated to pick up one load and drop another at the same point without bringing the plane any closer to the ground than is necessary to enable the trailing end of the cable (which may be paid out from twenty-five to fifty feet) to contact the elevated bight of the loop, which may be twenty-five or more feet above the ground.

The apparatus is simple and sturdy in its design and construction and the cutter and bag holder occupies very little space below the airplane, being disposed between the landing wheels. It may readily be adapted to any locality suitable for flying at fifty feet or so above the ground, and used for all of the purposes for which airplane pick up and delivery apparatus have been found advantageous.

I claim as my invention:

1. A load supporting and releasing device for aircraft provided with a fuselage comprising a body member adapted to be secured beneath said fuselage, a frangible load suspending member supported from said body member, an arm pivoted to said body member carrying a cutter knife near its pivoted end and having a bifurcation at its free end adapted to receive a cable, a die on said body member cooperating with said cutter knife, said die providing a support for said frangible load suspending member, a cable trailing below said fuselage and passing through said bifurcation, and a stop on said cable for engaging said arm whereby a pull on said cable causes pivotal movement of said arm to sever said frangible member.

2. A load supporting and releasing device for apparatus of the character described comprising a body member adapted to be secured beneath a fuselage, an arm pivoted to said body member carrying a cutter near its pivoted end and having its free end adapted to receive a cable, a die on said body member cooperating with said cutter, said die being of annular form seated in a conforming recess in said body and providing a support for a frangible load suspending member, and a spaced encircling support on said body in axial alinement with said annular die for said load suspending member, said cutter being disposed between said supports.

3. An airplane article handling system comprising an airplane provided with load suspending and releasing means including a frangible support for the load carried by said airplane and a trailing cable for contacting with ground apparatus, said means also including a cutter knife adapted to sever said frangible support and a movable actuator for said cutter knife, both carried by said airplane, and means upon said actuator for detachably engaging said cable to suspend the cable from the airplane, whereby when said cable contacts said ground apparatus it moves said actuator to sever said frangible support and detach said load and free said cable from the airplane.

4. An airplane apparatus comprising a fuselage and disconnectable means for suspending a load to be delivered beneath the fuselage, said means including a severable member connected to the fuselage, a cable having an end adapted to be trailed below the fuselage, a cutting device adjacent to said severable member and supported by the fuselage for severing said severable member, said cutting device comprising a knife operably mounted thereon and a movable arm for operating it, disengageable means connecting said arm and cable for supporting the latter adjacent to the fuselage while permitting the free end of said cable to trail below the fuselage, and means at the free end of said cable to enable it to engage a contact member crossing its line of flight above the ground, said movable arm operating upon engagement of the trailing end of the cable with said contact member to sever said severable member and release the load and cable.

5. An airplane pick and and delivery apparatus comprising a fuselage, means for suspending a load to be delivered beneath the fuselage, said suspending means including a severable member, a cable connected to the fuselage and having a free end adapted to be trailed below the fuselage, a cutting device supported by said fuselage adjacent to said severable member for severing the latter, said cutting device being supported from the fuselage and having a movable arm for operating it, disengageable means connecting said arm and cable for supporting the latter adjacent to the fuselage while permitting the free end of said cable to trail below the fuselage, and means at the free end of said cable to enable it to engage a loop member supported above the ground and attached to a load to be picked up, in com-

bination with a ground tackle comprising an elevated support for said loop member, and an elevated receiving member for said load to be delivered, said elevated support and receiving member being in spaced relation and said movable arm operating upon engagement of the trailing end of the cable with the loop member to sever said severable member and release the load at a definite time with relation to the position of the load with respect to said receiving member.

6. An airplane apparatus comprising a fuselage and disconnectable means for suspending a load to be delivered beneath the fuselage, said means including a severable member connected to the fuselage and a cable attached to the load and adapted to be trailed below the fuselage, a cutting device supported from the fuselage for severing said severable member, said cutting device comprising a movable arm for operating it, disengageable means connecting said arm and cable for supporting the latter adjacent to the fuselage while permitting the free end of said cable to trail below the fuselage, and means at the free end of said cable to enable it to engage a contact member crossing its line of flight, the shock thereby caused operating said arm and disengaging said cable therefrom in combination with a ground tackle comprising an elevated support and a transverse contact member carried thereby spaced above the ground sufficiently to be engaged by said trailing cable at a point short of its free end spaced from said severable member a distance less than the height of said transverse contact member above the ground, whereby said cable and load are suspended above the ground when released from the airplane.

7. An airplane apparatus comprising a fuselage and disconnectable means for suspending a load to be delivered beneath the fuselage, said means including a severable member connected to the fuselage and a cable attached to the load and adapted to be trailed below the fuselage, a cutting device supported from the fuselage for severing said severable member, said cutting device comprising a movable arm for operating it, disengageable means connecting said arm and cable for supporting the latter adjacent to the fuselage while permitting the free end of said cable to trail below the fuselage, and means at the free end of said cable to enable it to engage a contact member crossing its line of flight, the shock thereby caused operating said arm and disengaging said cable therefrom, in combination with a ground tackle comprising an elevated support and a transverse contact member carried thereby spaced above the ground sufficiently to be engaged by said trailing cable at a point short of its free end spaced from said severable member a distance less than the height of said transverse contact member above the ground, and means for raising and lowering said transverse contact member operable from the ground.

8. An airplane apparatus comprising a fuselage, means for suspending a load to be delivered beneath the fuselage, said suspending means including a severable member connected to the fuselage and a cable attached to said load at one end and adapted to be trailed below the fuselage, a cutting device supported by the fuselage for severing said severable member, said cutting device comprising a knife operably mounted thereon and a movable arm for operating it, disengageable means connecting said arm and cable for supporting the latter adjacent to the fuselage while permitting the free end of said cable to trail below the fuselage, and means at the free end of said cable to enable it to engage a contact member crossing its line of flight, in combination with a ground tackle comprising an elevated support and a transverse contact member carried thereby spaced above the ground sufficiently to be engaged by said trailing cable at a point short of its free end, whereby upon engagement of the trailing end of the cable with the ground tackle the shock thereby caused will operate said arm and cutting device to sever said severable member and disengage said cable from said arm, thereby releasing the load and cable from the fuselage.

9. An airplane article handling system comprising an airplane provided with load suspending means carried thereby in combination with a frangible support for the load connected to said suspending means and a trailing cable for contacting with ground apparatus, said system also including a movably mounted cutter knife positioned adjacent to and adapted to sever said frangible support to disconnect the load from said suspending means and a pivoted arm supported from the airplane and operatively connected to said cutter knife, and means at the free end of said arm for detachably engaging said cable to suspend it from the airplane, said means operating to disengage said cable when said arm is operated to actuate said cutter, whereby when said cable contacts said ground apparatus it operates said arm to actuate said cutter and thereby disengages said cable from said arm.

10. An airplane article handling system comprising an airplane provided with load suspending means carried thereby in combination with a frangible support for the load and a trailing cable for contacting with ground apparatus, said load suspending means including an annular cutting die through which said frangible support is disposed and a movably mounted cutter knife positioned adjacent thereto and adapted to sever said frangible support, a movable cable supporting arm carried by said load suspending means and operatively connected to said cutter knife, and means at the free end of said arm for detachably engaging said cable to suspend it from the airplane, whereby when said cable contacts said ground apparatus it operates said arm to actuate said cutter and thereby disengages said cable from said arm.

11. An aircraft pick-up and delivery apparatus comprising a fuselage, a cable operatively connected to the fuselage at one end, means on said fuselage for suspending and disconnecting a load to be delivered beneath the fuselage, said means operating to release the load upon actuation of said cable, means for releasably connecting said load suspending means with said cable to support the cable while permitting the free end of said cable to trail below the fuselage, said releasing means releasing said cable upon actuation of the latter by pulling on its free end, and means at the free end of said cable to enable it to engage a loop member supported above the ground and attached to a load to be picked up, in combination with a loop member as aforesaid, ground tackle comprising an elevated support for said loop member and an elevated receiving member for said load to be delivered, said elevated support and receiving member being in spaced relation, and said cable supporting and load suspending means operating automatically upon engagement of the trailing end of the cable with the loop member to free the cable from said load

suspending means and release the load at a definite time with relation to the position of the load with respect to said receiving member.

12. The system for discharging articles from an aircraft while in flight utilizing a suspended cable which comprises an aircraft, a short cable adapted to trail below said aircraft, means for releasably suspending an intermediate part of said cable from said aircraft with a free end trailing behind, said non-trailing suspended part of the cable being connected to said article, and a second connection between said article and the aircraft, said second connection including a part releasable by a pull on said cable, together with a receiving line spaced across the line of flight a distance above the ground not less than one-half the length of said short cable, whereby when said cable contacts with said receiving line, said cable and article will be released from the suspending means and second connection, respectively, and said cable will wind about said receiving line and be secured thereto by its own inertia thereby checking said article without shock.

13. The system for discharging articles from an aircraft while in flight utilizing a cable suspended therefrom which comprises an aircraft, a short cable adapted to trail below said aircraft, quick responsive releasable means for suspending an intermediate part of said cable from said aircraft with a free end of said cable depending therefrom and an article attached to its other end, a receiving line spaced above the ground across the path of flight of said aircraft with a clear space of substantial height above and a space not less than one-half the length of said cable below it, whereby said aircraft may be operated in such a manner as to bring said free end of said depending cable into contact with said receiving line whereupon said cable and the attached article will be released from the aircraft and said free end of said cable will wind about said receiving member and said article will come to rest in said clear space.

LYTLE S. ADAMS.