Oct. 12, 1926. 1,602,851

H. E. S. HOLT

DEVICE FOR LOADING MAIL BAGS OR OTHER LOADS TO AIRCRAFT

Filed Feb. 13, 1925 4 Sheets-Sheet 1

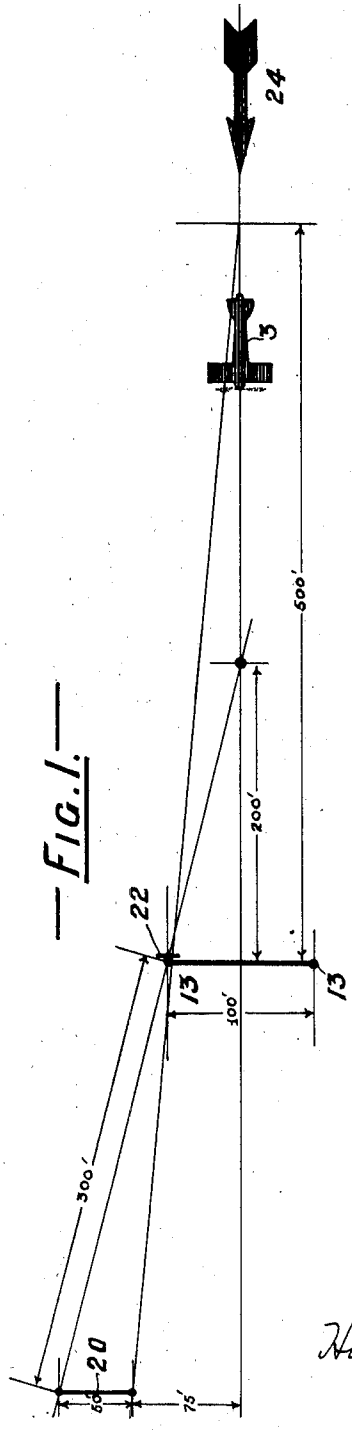


FIG. 1.

Inventor
Harold Edward Sherwin Holt
By
B. Singer, Atty.

Oct. 12, 1926. 1,602,851

H. E. S. HOLT

DEVICE FOR LOADING MAIL BAGS OR OTHER LOADS TO AIRCRAFT

Filed Feb. 13, 1925 4 Sheets-Sheet 2

FIG. 6.

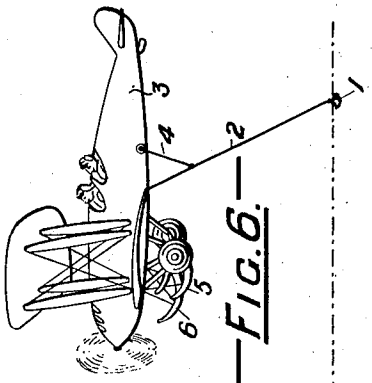


FIG. 2.

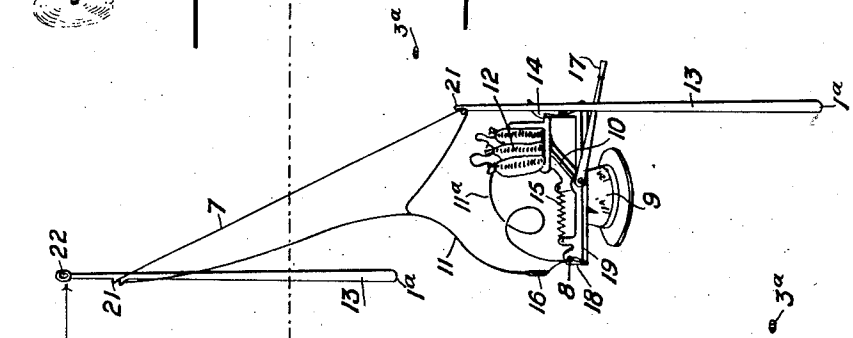
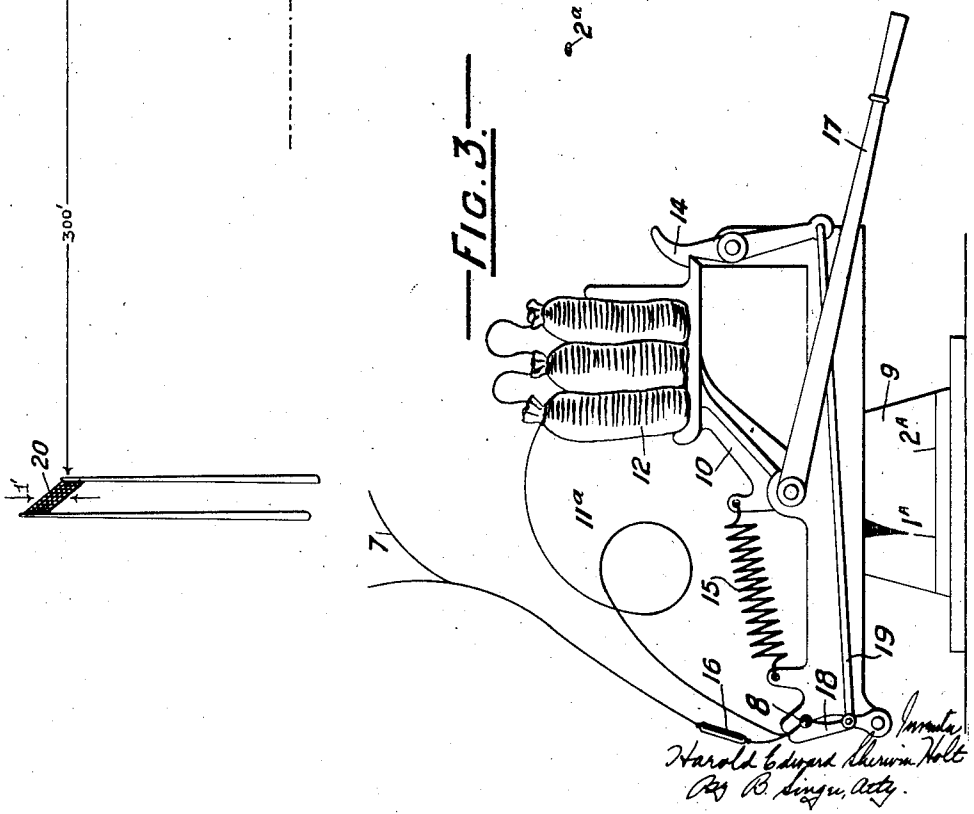


FIG. 3.



Inventor
Harold Edward Sherwin Holt
By R. Singer, Atty.

Oct. 12, 1926. 1,602,851

H. E. S. HOLT

DEVICE FOR LOADING MAIL BAGS OR OTHER LOADS TO AIRCRAFT

Filed Feb. 13, 1925 4 Sheets-Sheet 3

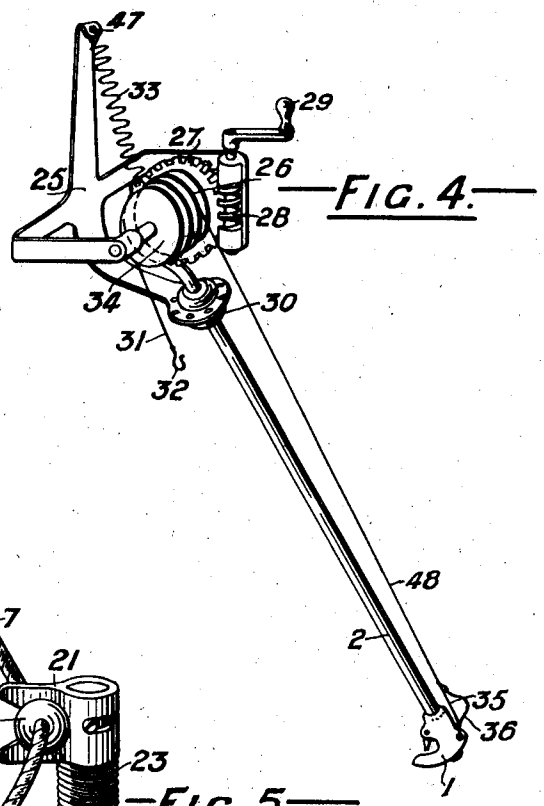


FIG. 4.

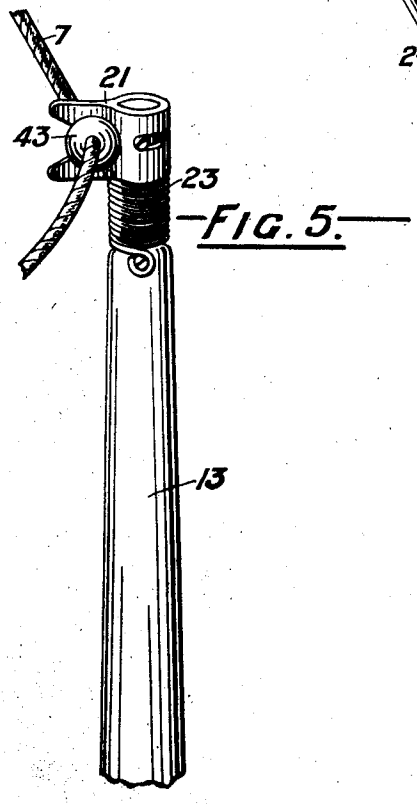


FIG. 5.

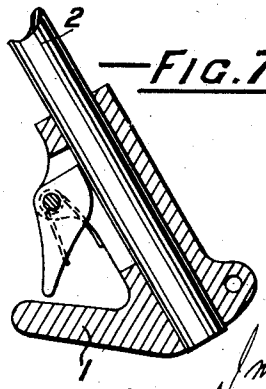


FIG. 7.

Inventor
Harold Edward Sherwin Holt
By
B. Singer, Atty.

Oct. 12, 1926. 1,602,851

H. E. S. HOLT

DEVICE FOR LOADING MAIL BAGS OR OTHER LOADS TO AIRCRAFT

Filed Feb. 13, 1925 4 Sheets-Sheet 4

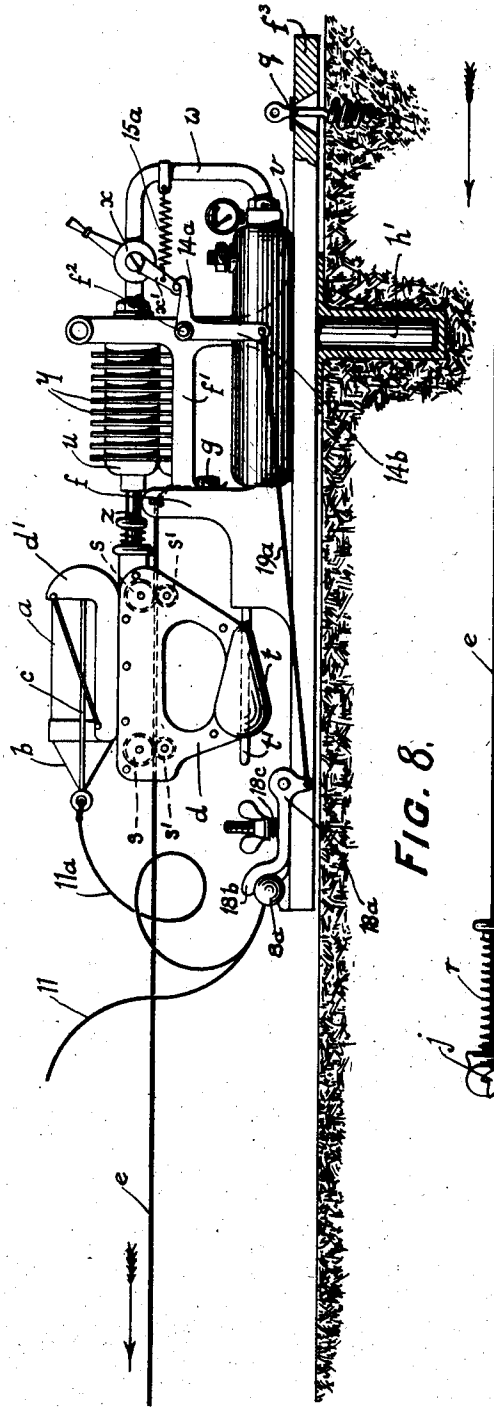


FIG. 8.

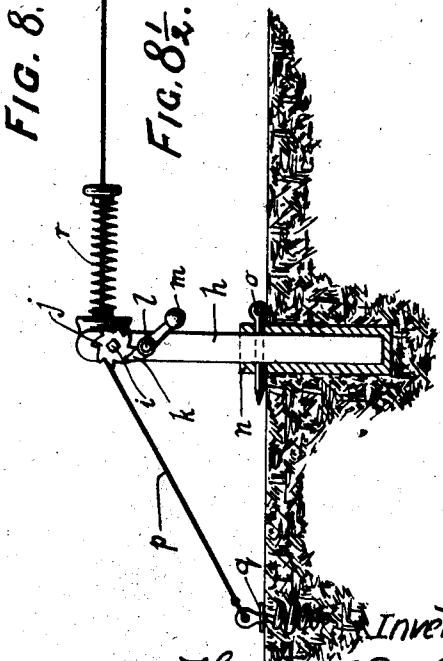


FIG. 8½.

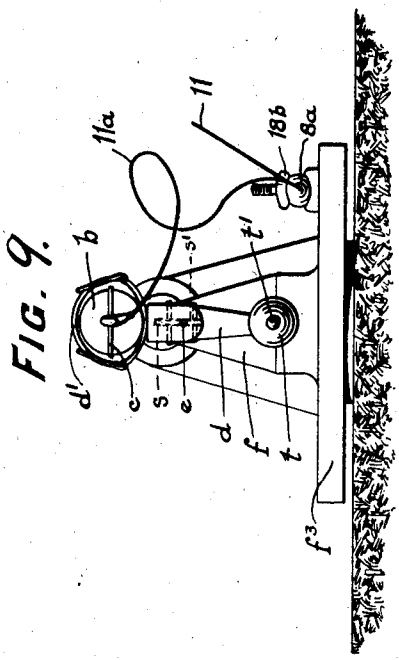


FIG. 9.

Inventor
Harold E. S. Holt
by B. Singer atty

Patented Oct. 12, 1926. 1,602,851

UNITED STATES PATENT OFFICE.

HAROLD EDWARD SHERWIN HOLT, OF FARNBOROUGH, ENGLAND.

DEVICE FOR LOADING MAIL BAGS OR OTHER LOADS TO AIRCRAFT.

Application filed February 13, 1925, Serial No. 8,966, and in Great Britain February 20, 1924.

This invention for improvements in or connected with the loading of mail bags or other loads on to air-craft has for its object to enable mail bags and other parcels or petrol containers to be picked up by travelling air-craft without stopping, from a support on the ground.

According to this invention a bar or rod is suspended from the air-craft and carries a coupling hook which is capable of being moved along the bar by suitable winding gear and is adapted to engage a loop of wire cable or the like attached to the mail bags or other load and suspended on poles or other supporting means at a convenient height for the engagement of the hook. Means released by the pull on the wire loop are also provided for projecting the load forward when the coupling takes place for reducing the shock due to the inertia of the load.

In the accompanying drawings which illustrate apparatus employed for taking up a load from the ground:

Fig. 1 is a diagram illustrating the coupling loop and the arrangement in plan of sighting devices on the ground employed for the guidance of the pilot.

Fig. 2 illustrates diagrammatically the loading apparatus on the ground and also part of the sighting apparatus in elevation.

Fig. 3 is a side elevation of a loading platform and its adjuncts drawn on a larger scale.

Fig. 4 is a perspective view of the coupling and winch mechanism on the aircraft.

Fig. 5 is a detail view of the head of one of the poles which support the coupling cable.

Fig. 6 is a conventional side elevation of an aeroplane on a small scale equipped with the improved coupling mechanism.

Fig. 7 is a sectional detail view of the coupling hook.

Fig. 8 is an elevation partly in section of a preferred embodiment of the projection.

Fig. 8½ is a detail of the means for tensioning the cable.

Fig. 9 is a detail and elevation of the same.

In a practical form of the invention as applied to an apparatus for loading from the ground the suspended bar 2 carrying the hook 1 consists of a metal bar suspended from a spherical socket 30 on a bracket 25 fixed to the fuselage of the air-craft 3, the upper end of the bar being extended above the socket 30 in curved form as shown in dotted lines and attached to a spring 33 which is connected at 47 to the bracket 25 and co-operates with a short rope 4, Fig. 6, to maintain the bar 2 at a predetermined angle when in use. When out of use however, the spring 33 may be detached and the bar 2 swung up and secured under the fuselage out of the way.

A winch 26 mounted on the aforesaid bracket and operated by worm gear 27, 28 and handle 29 controls a length of cable 48 partly wound on the winch barrel and attached to the coupling hook 1 which has a sleeve or socket capable of sliding on the suspending bar or tube 2 and can be caused to travel up and down on the said bar or tube by suitably operating the winch.

By this means the hook 1 after being engaged with the wire loop 7 attached to the load 12 can be moved up the suspending bar to enable the wire loop 7 to be coupled by a hook 32 with a short wire rope 31 attached to a second winch barrel or drum 34 conveniently operated by a reverse movement of the winch handle 29 and by which the mail bags or other load can be brought up close under the floor of the fuselage where they are secured.

In the event of undue strain being put upon the cable 48 through the imposition of too heavy a load or through the hook 1 fouling or engaging in some object on the ground, a safety device consisting of a breaking cord 35 is provided which on breaking permits of a lengthening of the cable to such an extent by the taking up of the slack portion at 36 that the hook can slide off the bar and disengage itself automatically.

As shown in Fig. 8, the load is enclosed in a light metal case *a* of cylindrical form with a conical cap or lid *b* and strengthened with longitudinal stays *c*. The said case *a* is supported in a frame *d'* on a wheeled carrier or trolley *d* adapted to run on a wire rope *e* or other suitable guide path or track.

The wire rope *e* is attached at one end to a frame *f* by means of a bolt *g* and at the other end to a standard *h* provided at a suitable distance from the said frame. In order to tension the wire rope *e* a suitable winding gear is provided on the standard *h*, comprising a drum having a shaft with a squared end *i* on which is keyed a ratchet

wheel j, the teeth of which are adapted to engage with a pawl k pivoted at l and provided with a weighted arm m.

When it is desired to make the wire rope e taut, a suitable handle is attached to the shaft i of the drum on which said rope is wound and rotated until the required tension has been produced in the rope. The weighted arm m of the pawl ensures the engagement of the detent k with the ratchet wheel j thus preventing any undesired slackening of the rope e.

The standard h is supported in a socket n which is provided at a suitable orientation from the frame f to agree with the direction of the wind. A pin o may be provided to secure the standard in said socket and stays p anchored at q to provide additional support for the standard in order to counteract the force due to the tension in the rope e.

A buffer spring r is provided at the end of the rope e which is attached to the standard h and serves to reduce the impact between the carrier d and the said standard.

The said carrier d has grooved wheels s, s' of which the upper pair s are adapted to run on the upper surface of the rope e and the lower pair s' run on the under side of said rope. This arrangement ensures that the carrier d will not be displaced from the rope e at the moment of impact.

A further safe-guard against swaying of the carrier is provided at t, t' comprising a weight t secured to the lower portion of the carrier and adapted to run on a rod t' on the frame f during the period of acceleration of the said carrier.

This acceleration is brought about by means of air pressure acting in an air tube or gun u. The air under pressure is supplied from a pressure cylinder v by way of the pipe w and the valve x to the cylinder of the gun u.

The said gun cylinder u is preferably provided with gills or heat radiating fins y and is firmly supported on a bed f' on the frame f.

A piston running in said cylinder u is secured to a rod z extending through the end of the cylinder and adapted to rest in contact with the carrier d during its outward movement under the action of the air pressure.

The compressed air is automatically supplied to the cylinder u so that the carrier d will receive its acceleration shortly before the casing a is dragged forward by the cable 11, 11^a attached to the wire loop 7 when the latter is engaged by the hook 1 on the aeroplane.

The valve x is normally held in the closed position against the action of a spring 15^a by a catch 14^a forming one arm of a bell crank lever pivoted at f^2 on the frame f. The other arm 14^b of the said lever is connected by means of a rod 19^a with a pivoted trigger lever 18^a normally held by the ball 8^a in such a position that the valve x is retained in the closed position by the catch 14^a.

The said ball 8^a is attached to the cable 11, 11^a, the portion 11^a of the cable being slack and of such length as to ensure the operation of the projecting device before the action of the pull from the aeroplane on the load.

The apparatus operates as follows:—

The aeroplane picking up the load flies over the loop 7 so that the hook 1 carried by the aeroplane engages with the said loop (Fig. 3).

The cable 11 then becomes tautened and the ball 8^a is jerked from its position thus causing the end 18^b of the trigger lever 18^a to rise slightly against the action of the spring 18^c.

This movement of the trigger lever is transmitted by the rod 19^a and the bell crank lever arm 14^b to the catch 14^a which is thus disengaged from the valve operating lever x'. The valve x is then immediately opened by the action of the spring 15^a and compressed air is admitted to the interior of the cylinder u.

The piston and the rod z are forced outwardly and impart a high velocity to the carrier d impelling the said carrier along the wire rope e.

Meanwhile the slack portion 11^a of the cable attached to the loop 7 has been taken up and the aeroplane exerts a pull on the case a, but as the carrier d together with its load have attained their maximum speed of projection before this takes place, the shock produced will be greatly lessened.

The apparatus may be adapted for operation in any direction to conform to the direction of the wind at the time of loading.

For this purpose the entire projecting apparatus and the frame f are carried on a platform f^3 which is adapted to rotate about the pivot h', being anchored in position as shown at q'.

A number of sockets n may be provided on the circumference of a circle having the pivot h' as centre so that the standard h may be secured in that socket which will give the wire rope e the required direction.

As shown in Fig. 3, the load 12 to be taken up is placed on a suitable support forming part of a projector which may operate under the influence of a powerful spring 15 to project the load in a forward and upward direction.

In this connection it is to be understood however, that the spring or air pressure apparatus illustrated in Fig. 3 is shown by way of example only, and I may employ other types of projecting apparatus operated by air pressure or explosives.

For example the load may be enclosed in a light metal case of cylindrical form with a conical cap or lid and projected either into the air or along a horizontal or inclined guide path or track with or without the intervention of a wheeled carrier or trolley. By the use of the light metal case, air resistance is reduced and the load is steadier when being hauled up into the aeroplane. The case is preferably projected by air pressure from a comparatively long air tube or gun the object being to cause the load to attain its maximum speed as gradually as possible so as to avoid excessive shock and possible damage thereto.

For the protection of the metal case it may be enclosed in a heavier outer metal case while being discharged, said outer case being arranged to fall away and descend to the ground as soon as the aeroplane begins to pull on the inner case which is attached to the cable.

The projector illustrated in Fig. 3 is formed in part by a lever 10 pivoted on a turn table which can be turned to set the projector in any direction. In the load-supporting position the projector is held, in the arrangement illustrated in Fig. 3, against the tension of the spring 15 by a trigger lever or catch 14 which is actuated to release the projector by the pull of a cable 11, 11^a, connected with the wire loop and with the load 12, the portion 11^a of the cable being normally slack as shown and of such length that the load shall have time to attain its maximum speed of projection before being taken up by the aircraft. The release takes place soon after the loop 7 becomes engaged by the hook 1 on the aeroplane, and may be effected through a ball 8 on the cable 11 acting on a lever 18 connected by a rod 19 with the trigger lever or catch 14. A suitable shock absorber 16 may be inserted in the cable 11 if required.

The wire loop 7 for the engagement of the hook 1 on the aeroplane is suspended in forwardly projecting bifurcated lugs 21 between two poles 13 at a suitable height, the upper half of the loop being stretched tightly between the poles to prevent sagging. For this purpose two steel or other balls 43 are attached to the cable at such a distance apart and engaged by the bifurcated lugs 21 which are mounted on the tops of the poles and capable of turning to a limited extent about the vertical axes of the poles, being connected with torsion or other springs 23 which tend to turn the lugs outwards and thus stretch the portion of the loop between the balls. When the hook on the aeroplane engages the stretched upper portion of the loop the resulting tension thereon will pull the bifurcated lugs inwards against the action of their springs and the balls will slide off.

The supporting poles may be any desired height and a series of sockets 1^a, 2^a, 3^a, for same are arranged round the projector so that the position of the poles may be changed to suit the direction of the wind.

In order to prevent any possibility of the wire loop getting round the wheels of the aeroplane, should the latter descend too low for example, light duralumin guards 5, 6, Fig. 6, may be attached to the under carriage in front of the wheels. For the guidance of the pilot when picking up the load a large indicating arrow 24 is put down according to the direction of the wind. The aeroplane comes behind the arrow and gets its horizontal alignment from same. In order to get the vertical height of the wire loop a sighting device is provided consisting of a black disc 22 Fig. 1, with a white center on one of the poles and at the rear of this, say about 300 feet, is stretched a strip of fine black net 20. The pilot gets the disc in line with the strip of black net as soon as he has passed over the arrow and the disc appears to be travelling along the net strip as the aeroplane approaches the wire loop. The disc and net are so adjusted in width that the disc appears to be larger than the net and shows above and below it.

I claim:—

1. Apparatus for loading mail bags and other loads on air craft in flight, comprising a cable arranged to be attached to a load, an air craft carried hook to engage said cable, means to impart an initial impulse to the load to reduce the shock to the air craft due to the inertia of the load and controlling means for said impelling means actuated by the cable, to cause the impelling means to operate, when the hook is engaged with the cable and pulls thereon.

2. Apparatus for loading mail bags and other loads on air craft in flight comprising a flexible element arranged to be attached to a load, a hook to engage said cable, an air craft carried bar on which said hook is movable, means to draw the hook upwardly on the bar, means to impart initial impulse to the load to reduce the shock to the air craft due to the inertia of the load, and controlling means for said impelling means actuated by the cable when the hook is engaged therewith and pulls thereon.

3. Apparatus for loading mail bags and other loads on air craft in flight, comprising a cable arranged to be attached to the load, an air craft carried hook to engage said cable and projecting means for the load to impart initial movement to the load when the hook is engaged with the cable and in the direction of movement of the air craft to reduce the shock to the air craft due to the inertia of the load.

4. Apparatus for loading mail bags and

other loads on air craft in flight, comprising a cable arranged to be attached to the load, an air craft carried hook to engage said cable and projecting means for the load to impart initial movement to the load when the hook is engaged with the cable and in the direction of movement of the air craft to reduce the shock to the air craft due to the inertia of the load, said projecting means including a load carrier and means to guide the same.

5. Apparatus for loading mail bags and other loads on air craft in flight, comprising a cable arranged to be attached to the load, an air craft carried hook to engage said cable and projecting means for the load to impart initial movement to the load when the hook is engaged with the cable and in the direction of movement of the air craft to reduce the shock to the air craft due to the inertia of the load, said projecting means including a load carrier and a guide track element therefor.

6. Apparatus for loading mail bags and other loads on air craft in flight, comprising a cable arranged to be attached to the load, an air craft carried hook to engage said cable and projecting means for the load to impart initial movement to the load when the hook is engaged with the cable and in the direction of movement of the air craft to reduce the shock to the air craft due to the inertia of the load, said projecting means including a load carrier and pressure actuated means to impart movement to the load carrier.

7. Apparatus for loading mail bags and other loads on air craft in flight, comprising a cable arranged to be attached to the load, an air craft carried hook to engage said cable and projecting means for the load to impart initial movement to the load when the hook is engaged with the cable and in the direction of movement of the air craft to reduce the shock to the air craft due to the inertia of the load, said projecting means including a wheel load carrier, a supporting track element therefor and means to stabilize the carrier during its movement on said track element.

8. Apparatus for loading mail bags and other loads on air craft in flight comprising a cable arranged to be attached to a load and provided with a loop, an air craft carried hook to engage said loop, projecting means for the load to impart initial impulse thereto and controlling means for said projecting means, said controlling means being connected to the cable and arranged to start the projecting means in operation when the cable is drawn taut by the air craft carried hook.

9. In apparatus of the class described, an air craft carried bar, a hook movable on the bar, a drum, a cord thereon connected to the hook and means to operate the drum to wind up the cord and thereby raise the hook.

In testimony whereof he has affixed his signature.

HAROLD EDWARD SHERWIN HOLT.