Aug. 27, 1935. L. I. FINCKE 2,012,424

TOY AIRPLANE

Filed Sept. 27, 1933

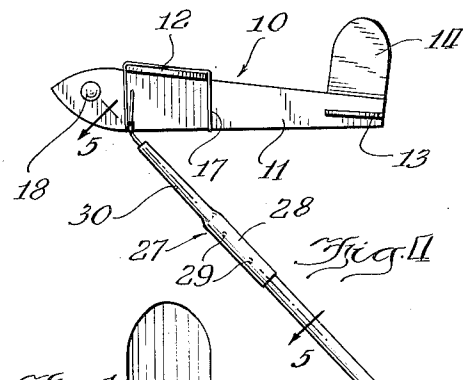


Fig. 4

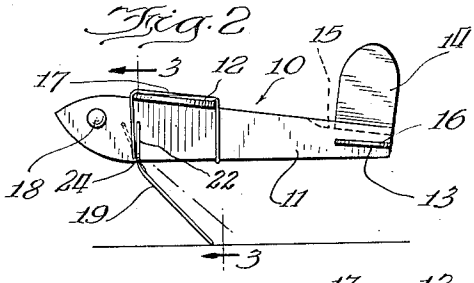


Fig. 2

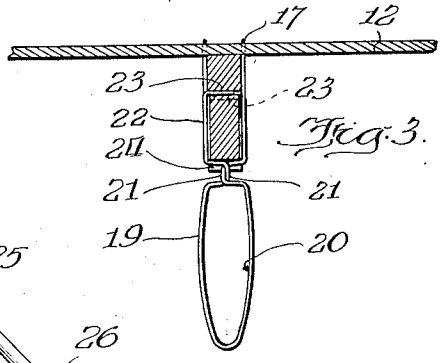


Fig. 3

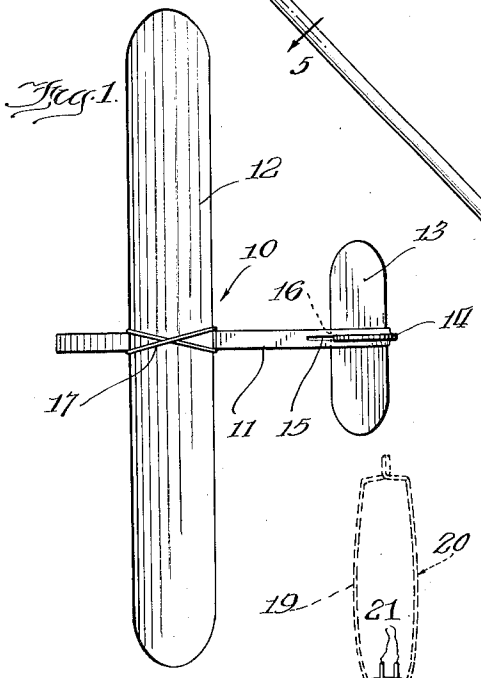
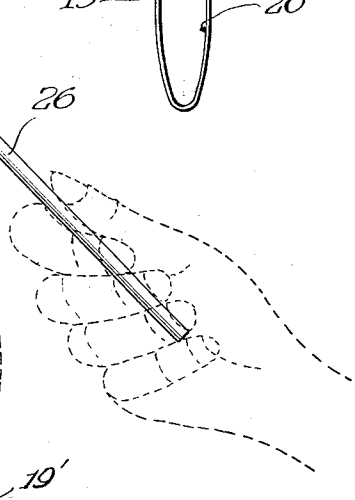


Fig. 1



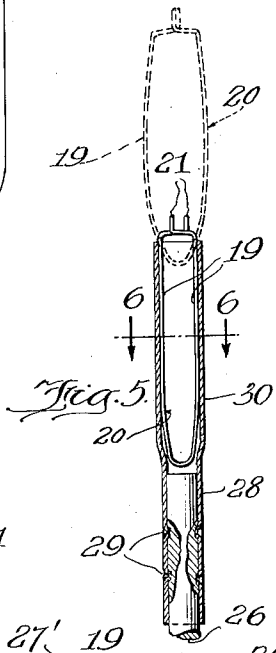


Fig. 5

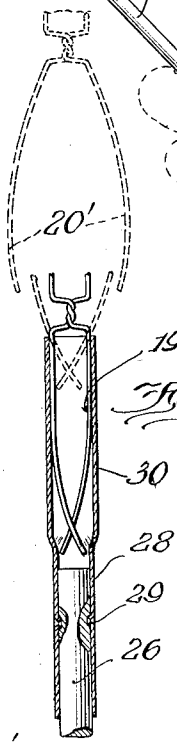


Fig. 7



Fig. 6

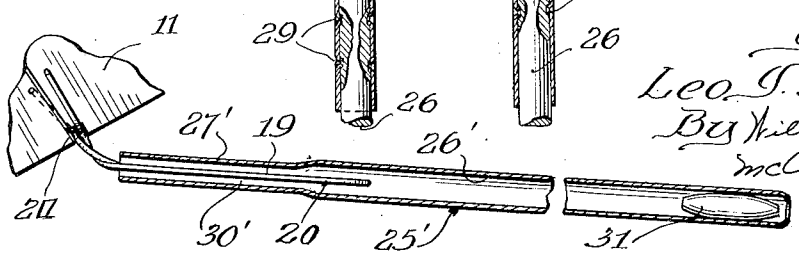


Fig. 8

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TOY AIRPLANE

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13 Claims. (Cl. 46—50)

My invention relates to toy airplanes and is chiefly concerned with an improved method and apparatus for throwing a plane, whereby the plane may be thrown easily with considerable speed and accuracy and adjustability of direction.

Another feature is the overcoming, in part at least, of the frictional drag of the throwing member when the plane separates from it.

Another feature of the throwing apparatus is that it also serves as a landing skid whereby the speed of the plane is checked before the wings come in contact with the ground, whereby the wings are partly protected against breakage by impact in landing.

The foregoing, together with further objects and features of my invention are set forth in the following description of specific embodiments thereof and illustrated in the accompanying drawing, wherein:

Fig. 1 is a plan view of the plane apart from the throwing stick;

Fig. 2 is a side elevation of the plane of Fig. 1;

Fig. 3 is a vertical transverse section through the fuselage taken along the line 3—3 of Fig. 2 looking rearwardly;

Fig. 4 is a side elevation of the plane similar to Fig. 2 but showing the throwing stick applied thereto;

Fig. 5 is a plan section on enlarged scale of the plane-carried wire element inserted in the socket of the throwing stick, which may be considered as taken on the line 5—5 of Fig. 4;

Fig. 6 is a transverse section taken on the line 6—6 of Fig. 5 and looking rearwardly;

Fig. 7 is a view similar to Fig. 5 but showing a modified form of wire member; and

Fig. 8 is a longitudinal vertical section of a modified form of throwing stick.

The toy plane 10 per se is of well known construction and includes a fuselage 11, a front wing 12, a tail plane 13, and a rudder 14. The rudder may be conveniently mounted in a rudder slot 15, the tail plane in a tail plane slot 16 and the front wing may be applied, for most economical manufacture, by the simple expedient of a rubber band 17. Especially where balsa wood is employed, the nose of the fuselage may be weighted with a shot 18.

The plane-carried portion 19 of the throwing apparatus is preferably formed from spring wire and is in the form of a hairpin shaped shank 20 depending obliquely from the fuselage beneath the wing and secured thereto by means of crossed off-sets 21 in the legs of the wire continuing upwardly to lateral fuselage-embracing portions 22 and terminating in in-turned ends 23 pressed into the fuselage. The wire is preferably set into a slot 24 on the bottom edge of the fuselage to anchor the wire against turning about the in-turned ends 23.

Apart from the throwing function of the wire 19 which will presently be described, the shank 20 of the wire forms an effective landing skid for the plane. Since the spring wire is resilient, the plane may land without shock, and the retarding drag of the skid will slow down the speed, generally by the momentum of the plane, forcing the nose downwardly, so that the airplane is practically stopped before the fragile wings strike the ground. In this way the wings are in general protected from breakage in landing. The wire also holds the tail plane up off the ground so there is less danger of its catching on projections and being injured.

The remaining portion of the throwing apparatus is a throwing stick 25, which comprises a wood shaft 26 having a socket fitting 27 at the outer end, having a hosel 28 into which the shaft is inserted and retained by prick punches 29. The outer end of the fitting 27 presents an open-ended socket 30 flattened into oval cross-section. It is into this socket that the shank end 20 of the wire 19 is inserted, as shown in Fig. 5. The dotted line position of the wire shank 20 in Fig. 5 shows its normal contour. The sides of the shank portion are squeezed together somewhat to insert it into the socket, whereby the wire exerts a considerable friction against the lateral edges of the socket.

In throwing the plane, one end of the stick is held in the hand and thrown from an upper position, as by movement of the forearm and a snap of the wrist down to a little above a horizontal position,—the position shown in Fig. 4. While the throwing stick is being swung to the position of Fig. 4, the tendency of the plane to fly off the stick is resisted by the friction of the wire within the socket. But by the time the stick has reached the position of Fig. 4, and the stick is stopped against further movement, the momentum of the plane is sufficient to overcome the friction of the wire shank 20 and pull it out of the socket. One of the outstanding advantages of the frictional retention between the socket and the shanks in the throwing apparatus for the airplane is that if the operator does not swing the throwing stick with sufficient speed there is not enough centrifugal force built up to overcome the friction and free the airplane. On the other hand, if there is sufficient speed in the swing to

build up the necessary centrifugal force to overcome the frictional retention there is, in all probability, sufficient speed imparted to the airplane for satisfactory flight. Since toy airplanes of the type illustrated are usually so made that they will return to the operator, this feature of my invention practically insures that either a successful flight will be made or the airplane will not be discharged at all. This eliminates the annoyance of the operator having to walk some distance to pick up the airplane which would otherwise have been discharged with insufficient speed for flight.

The arrangement of this throwing apparatus so that the socket and shank pull apart in the direction of an acute angle to the direction of flight has many advantages. If the throwing stick for the toy airplane were to follow the construction of the prior art where a projectile is discharged from a shank and socket connection with the throwing stick in the same direction as the direction of flight, the momentum imparted to the airplane would be only that developed by the centrifugal force of the swing. There would be no movement imparted to the airplane directly by the arcuate swing because, in so far as the actual swing was concerned, the movement of the airplane would be at right angles to the direction of flight. In other words, there would be no component of the swing in the direction of flight. With the airplane connected with my throwing stick to separate therefrom in a direction at an angle to the direction of flight, the momentum in the direction of flight imparted to the airplane by the centrifugal force would, it is true, not be quite so great, other factors being equal. This is because only a component of the full centrifugal force would be applied to propelling the airplane in the direction of flight. But, on the other hand, with my device the movement of the swing of the airplane, which is arcuate about the operator's wrist or elbow as a center, has a substantial component in the direction of flight. The direction of flight component of the swinging movement is added to that of the centrifugal force. The sum of these two components is greater than would be the full centrifugal force in the instance of the shank and socket separating in the direction of flight. I, therefore, achieve by my arrangement a greater impetus to the airplane in the direction of flight than would be achieved by an application of the prior art projectile throwing arrangement to a toy airplane.

Where the previously discussed advantage of the frictional retention of the airplane with the throwing stick is combined with this last discussed feature of the direction of separation being at an acute angle to the direction of flight, it will be seen, even though the entire centrifugal force were expended upon overcoming the friction of the shank within the socket, there would still be ample impetus to the plane for successful flight due to the direction of flight component of the swinging movement of the airplane.

My invention has the further advantage that in the swinging of the airplane by the throwing stick, the wings are traveling through the air at an angle of 45 degrees, more or less, to the direction of swing and the air offers a resistance or reaction to the wings which tend to withdraw the shank from the socket, thereby lessening the amount of centrifugal force which must be expended upon overcoming the friction between the socket and the shank for releasing the airplane for flight.

There is a certain loss of momentum of the plane due to its having to overcome the friction of the wire in the socket. This momentum is, to a certain extent, reimparted to the plane by so arranging the spring wire constituting the shank 20 that as it finally emerges from the socket 30, the spreading apart of the legs of the wire shank adjacent its end, by virtue of the inherent resiliency of the spring wire, gives a cam-like action between the shank legs and the mouth of the socket, pushing or springing the shank forwardly.

If desired the friction may be increased by giving the inside walls of the socket 30 more of a frictional surface, as by a coat of dull paint. The frictional characteristic may also be predetermined—and adjustably—by setting the legs of the shank closer together for lesser friction, or spreading them apart for greater friction. This is done by bending the wire beyond its elastic limit. For use by smaller children it is generally advisable to bend the shanks of the wire closer together to reduce the friction. The normal spacing of the legs of the shank, which they assume after withdrawal from the socket, is limited by the crossing of the offset portions 21. Another function of the crossed offset portions is to prevent a spreading apart of the legs of the wire shank from pulling the lateral fuselage-embracing portions 22 of the wire apart. Thus, the portions 22 always snugly embrace the fuselage and, together with the slot 24, anchor the wire rigidly upon the fuselage, except for the inherent resilient flexibility of the wire.

As the throwing stick comes to its final position before the wire is withdrawn from the socket, the continued monentum of the plane tends somewhat to tip the plane downwardly. Offsetting this tendency, there is a slight upward tilt given the plane in the final withdrawal of the wire from the socket. Because the wire leaves the socket ordinarily before the stick has reached its final down movement, there is some slight down pressure on the socket tending to push the far end of the wire shank 20 downwardly. As the air has considerable resistance against the front wing, the front wing acts somewhat as a fulcrum about which the plane is slightly tilted by the final engagement of the wire in the socket after the wire has been withdrawn far enough to permit a vertical swinging of the wire in the socket.

With the particular design of plane here shown, there is a tendency to elevate the plane at high speeds. Consequently the plane when discharged from the throwing stick at high speed will describe an inside loop, after which, with lesser speed, it will glide more or less horizontally. It is not necessary, however, that the throwing stick be swung through a strictly vertical plane, if the plane through which it is swung is tilted somewhat the airplane will be banked and describe a horizontal circle.

In Fig. 7 I have shown a modified form of wire 19' where the legs 20' of the shank are not hairpin shape, but are divergent with free ends. As shown in the primary and secondary dotted line positions of Fig. 7, the normal contour assumed by the legs may be such as to give even more of a camming effect and, therefore, a greater forward spring as the wire leaves the socket. This form also has the advantage that the spread apart lower ends of the legs of the wire shank give the plane an opportunity to make a three-

point landing, further protecting the wings against damage by impact with the ground.

In Fig. 8 I have shown a modified throwing stick which may cooperate with a wire shank in the form of either Fig. 5 or Fig. 7. In this form the throwing stick 25' is a single piece of tubing comprising a shaft 26' flattened as at 27' at one end to form a socket 30'. An inertia ball or slug 31 is mounted within the tube and free to reciprocate therein, being confined by the flattening at the end 27' and by a convenient inturning of the opposite or handle end. At the start of the throw, while the stick is held more or less vertically, the slug has gravitated to the handle end of the throwing stick. As the stick is swung sharply toward the horizontal, centrifugal force throws the slug toward the socket end of the stick where it is calculated to impact the end of the shank 20, when the stick reaches its final release position, pushing or knocking the shank out of the socket and imparting enough momentum to the shank end and hence to the plane to offset in whole or in part the loss of momentum otherwise required to overcome the friction between the shank and socket. In fact, if the slug be of sufficient weight, the momentum imparted to the plane may be more than enough to overcome the friction, and thus add to the resulting momentum of the departing plane. If the ball or slug 31 is tightly cammed against the flattened socket end of the tube, when it has completed its outward movement, it is automatically dislodged by the insertion of the wire shank 20 for the next throwing of the plane.

It will be observed in all of the forms herein disclosed that the connection between the shank and socket is one which prevents relative rotation of the stick and plane, whereby greater accuracy of control is afforded than in those types of throwing devices heretofore employed using a stick with a cord interposed between the plane and the stick.

I prefer to place the shank on the plane and the socket on the stick, rather than the socket on the plane and the shank on the stick, because for most constructions the shank may more conveniently be made light in weight as, for instance, by using the wire shank shown, while the socket member tends to be heavier.

In the airplane shown, the center of gravity comes beneath substantially the mid-point of the front wing. The wire shank is anchored to the fuselage slightly ahead of this point. Thus, taking into account the flexibility of the wire, the throwing stick imparts a pull rather than a push to the plane, which tends to stabilize the plane, as against the tendency to "shimmy" in throwing it.

While I have thus described these specific embodiments of my invention, I contemplate that many changes and substitutions may be made without departing from the scope or spirit or my invention.

I claim:

1. The combination with a toy airplane, of a throwing device therefor comprising a shank portion, a socket portion for receiving the shank portion for non-rotatable longitudinal reciprocation therein, and a throwing stick, one of the portions being carried by the airplane and the other being carried by the stick at the end thereof, the shank portions being slid apart by the momentum of the airplane resulting from the swinging of the stick.

2. The combination with a toy airplane, of a throwing device therefor comprising a shank portion, a socket portion for receiving the shank portion for non-rotatable longitudinal reciprocation therein, and a throwing stick, the shank portion being carried by the airplane and the socket portion being carried by the stick at one end thereof, the shank being pulled from the stick by the momentum of the airplane resulting from the swinging of the stick.

3. The combination with a toy airplane, of a throwing device therefor comprising a shank portion, a socket portion for receiving the shank portion, and a throwing stick, the shank portion being carried by the plane and depending from the underside thereof, and the socket portion being carried by the stick at one end thereof, the shank being pulled from the stick by the momentum of the airplane resulting from the swinging of the stick.

4. The combination with a toy airplane comprising a fuselage, a front wing and a tail wing, of a shank depending from the fuselage below the front wing and constituting a landing skid, and a throwing stick having a socket at its outer end for slidably receiving the shank frictionally to retain the latter, said frictional retention being releasable by the momentum imparted to the plane by the swinging of the stick, the shank being non-rotatably received in the sleeve and non-rotatably mounted upon the airplane, whereby the airplane is precluded from turning with reference to the throwing stick.

5. The combination with a toy airplane comprising a fuselage, a front wing and a tail wing, of a shank depending from the fuselage below the front wing and constituting a landing skid, and a throwing stick having a socket at its outer end for slidably receiving the shank frictionally to retain the latter, said frictional retention being releasable by the momentum imparted to the plane by the swinging of the stick, the shank being non-rotatably received in the sleeve and non-rotatably mounted upon the airplane, whereby the airplane is precluded from turning in reference to the throwing stick, the shank comprising a hairpin-shaped wire having its closed end fitting into the socket.

6. The combination with a toy airplane comprising a fuselage, a front wing and a tail wing, of a shank depending from the fuselage below the front wing and constituting a landing skid, and a throwing stick having a socket at its outer end for slidably receiving the shank frictionally to retain the latter, said frictional retention being releasable by the momentum imparted to the plane by the swinging of the stick, the shank being non-rotatably received in the sleeve and non-rotatably mounted upon the airplane, whereby the airplane is precluded from turning in reference to the throwing stick, the shank comprising a pair of spaced wires having their free ends outermost, whereby the shank affords a two-point contact when serving at a landing skid.

7. The combination with a toy airplane comprising a fuselage and a wing, of a wire member comprising a hairpin-shaped shank member depending obliquely from the fuselage, the inner ends of the legs of the hairpin-shaped shank crossing each other and extending upwardly laterally to embrace the respective sides of the fuselage and terminating in ends extending into the fuselage, whereby the shank portion is fixedly anchored to the fuselage, and a throwing stick

having a socket at one end for non-rotatably slidably receiving the shank portion, the legs of the shank portion exerting a spreading action against the socket frictionally to retain the shank in the socket but releasable by the momentum given the plane by the swinging of the throwing stick.

8. The combination with a toy airplane comprising a fuselage and a wing, of a wire member comprising a hairpin-shaped shank member depending obliquely from the fuselage, the inner ends of the legs of the hairpin-shaped shank crossing each other and extending upwardly laterally to embrace the respective sides of the fuselage and terminating in ends extending into the fuselage, whereby the shank portion is fixedly anchored to the fuselage, and a throwing stick having a socket at one end for non-rotatably slidably receiving the shank portion, the legs of the shank portion exerting a spreading action against the socket frictionally to retain the shank in the socket but releasable by the momentum given the plane by the swinging of the throwing stick, said anchoring of the shank to the fuselage being forwardly of the center of gravity of the airplane.

9. The combination with a toy airplane, of a shank member protruding therefrom, and a throwing stick having a socket for receiving the shank portion and retaining it under friction but releasable by the momentum given the airplane by the swinging of the stick, a runway extending longitudinally of the throwing stick, a weight slidable therealong and adapted at the outer end of its travel to contact the shank and drive it out of the socket, the weight being driven to the socket end of the stick by the swinging of the stick, whereby the impact imparted to the shank by the weight offsets in part at least the loss of momentum of the airplane in withdrawing the shank from the socket.

10. The combination of a throwing stick comprising a tube flattened at one end to form a socket and having a weight slidable longitudinally of the tube, of a toy airplane having a shank portion protruding therefrom and adapted to be received in said socket, said weight, when the stick is swung, passing outwardly through the tube under centrifugal force to impact the socket member and aid in driving it from the socket.

11. The combination with a toy airplane and a throwing stick therefor of an engaging device between the throwing stick and the airplane comprising a shank portion, and a socket portion for receiving and slidably mounting the shank portion, one of the portions being carried by the airplane and the other being carried by the stick at the end thereof, said device including friction means for frictionally retaining the shank portion in the socket portion against withdrawal by momentum of the airplane less than that required for its minimum flying speed but releasable under a greater momentum than the airplane, whereby it is practically insured that if the frictional retention is overcome to discharge the airplane, the airplane will be discharged at the minimum flying speed.

12. The combination with a toy airplane, of a throwing device therefor comprising a shank portion, a socket portion for receiving the shank portion for nonrotatable longitudinal reciprocation therein, and a throwing stick, one of the portions being carried by the airplane and positioned obliquely to the plane of flight thereof and the other being carried by the stick at the end thereof, the shank and socket portions being slid apart by the momentum of the airplane resulting from the swinging of the stick.

13. In a toy airplane, which is to be used with a throwing stick having an end socket, the combination comprising a fuselage, a front wing, a tail wing and a shank depending from the fuselage below the front wing, said shank constituting a landing skid and being adapted to be frictionally received in said end socket, said shank being releasable from said end socket as said friction of the shank is overcome by the momentum imparted to said airplane by the swing of said throwing stick.

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