

**Extracts from *Stick and Rudder, An Explanation of the Art of Flying*  
by Wolfgang Langewiesche 1944**

THE SILVER CHAIN

The so-called “elevator” is really the airplane's speed control, or, if you want to state it accurately, its Angle of Attack control. This shows how you can keep yourself from stalling or spinning in!

Stalls and spins are caused by having too low a speed or—what is practically the same thing—too high an Angle of Attack. All right, simply do not move the stick into the position where it will force the airplane to fly at stalling speed (or at stalling Angle of Attack). Simply do not let that hand creep back. For an airplane cannot stall and cannot spin unless the stick is held back in the stalling position! Remember this simple fact. It is of the utmost importance for every pilot; unless the stick is in the stalling position, an airplane cannot stall and hence cannot spin. Stalling position of the stick in most airplanes is nearly all the way back if the power is off, and perhaps about two-thirds back if the power is on. Just what it is in your airplane it is very much your business to find out.

Now from this you might easily get the idea that to keep yourself from stalling and spinning in all you'd have to do would be to buy 10 cents' worth of wire and tie the stick loosely to some structural part of the airplane; so that regardless of how confused or panicky you might become in some emergency, you simply could never pull the stick farther back than so far—say to the position for 15 degrees Angle of Attack or say a speed of 10 m.p.h. Above stalling speed. Thus, you might think, the airplane would be rendered unstallable. This would then solve one of the biggest problems of aviation, the terrific death rate from accidents, since most fatal accidents involve a stall. And it would also cut out much tedious training—all the practice of stalls and spins. You might think you had a big idea there!

THE FOOLPROOF AIRPLANE

The strange thing is that you would be right! Ten cents' worth of wire will make any airplane unstallable, will solve one of aviation's biggest problems, and will simplify flight training enormously. “Restriction of controls” is an important new trend in aviation. It is the main principle of all the simplified, “family” or “foolproof” airplanes—a simple, mechanical stop somewhere in the control system that makes it impossible for the pilot to pull the stick back far enough to stall the airplane. The actual engineering of such a control restriction is not quite simple. It has been explained above that in the average airplane a given back position of the stick will bring the airplane nearer the stall when the power is on than it will when the power is off—because the propeller blast hits the control surfaces. Hence a stick restricted so that with power off it could barely not stall the airplane might nevertheless stall it while the power is on. On the other hand, a stick so restricted that even with power on it can't stall the airplane would with power off be so ineffectual that the pilot might not ever be able to slow the airplane up for a reasonable landing. Hence, the airplane must be so designed that power will not change its “trim”. This is done in one of the “foolproof” airplanes by mounting the power plant so that it pulls 10 degrees downward as well as forward.

Another complication; when an airplane is even only near the stall. Misuse of rudder or ailerons—without further pull back on the stick—can bring on a stall on one wing, and hence a spin. Thus the designer must make sure rudder and ailerons won't be misused. He must either abolish the rudder altogether, as has been done in some airplanes, or he must connect the rudder mechanically with the aileron control so as to make misuse of the rudder impossible; or he must put some mechanical stop also into the rudder and aileron systems.

But that, too, is only a matter of 10 cents' worth of wire. If you tied all three controls down so that none of them could be moved very far, you would still have perfectly sufficient control for all ordinary flying except perhaps three-point landings and steep sideslips; and at the same time you would have a "foolproof" airplane, incapable of spinning. There are several makes of airplanes, built to this formula and "characteristically incapable of spinning", now in use.

One expert pilot says that before he will let his wife fly, he is going to buy her a pretty silver "safety chain" and fasten it to her ship's stick. Actually it may not be a good practice to make changes on your airplane's controls, and it might be of doubtful legality, since a license is issued to a ship "as is". But the best place to put that safety chain is in your own mind. If you can't foolproof your own airplane, you can foolproof your own mind. Just remember that an airplane cannot stall or spin unless the controls are set for stalling and spinning; and keep that hand from creeping back.