comes to a stop if this rotation is too great.

NOTE: A number of pilots erect a tripod under the tail of a parked sailplane to reduce the possibility of wind damage. This is quite effective and neither hard to do nor heavy to carry in the sailplane.

If the craft has a high, short wing there is a sizable jolt as the wing falls over after a normal landing. If one goes to the opposite extreme, a low wing or midwing for a small ship it is pretty hard to keep the tips off the ground at take-off unless there is sufficient dihedral to permit several degrees of rotation. For a good number to start with, 7° of roll before touching the tip skid is adequate and the leveled tips should be approximately three feet above the deck. Ailerons should not drag even if the wing is bent by contact with the ground. Also the wing should be high enough so that, tail and tip down, the trailing edge is not almost dragging the ground. This last condition, by the way, is alleviated slightly by "gulling" the wings, a very pretty feature of early sailplanes, but usually expensive to do. The horizontal tail's tip should clear normal hazards when the wing tip and tail are down. Eight inches would be safe. The down elevators should clear comfortably.

LANDING GEAR

There are three main classes: (1) skid only, (2) nose skid with wheel near c.g., and (3) wheel well ahead of c.g. with no skid at all at the nose.

A retractable wheel is often desirable, but no damage should occur if the glider is landed "wheels up."

Ships with skids only are often made easier to move by using a dolly for ground handling and for take-off; the dolly being dropped by the pilot when he is about 30 feet up. This prevents it from bouncing up to the tail surfaces, but the drop sometimes damages the dolly and calls upon the instincts of a caddy in the ground crew member chosen to find it in the rough. But there are advantages to this scheme, most obviously: the glider is lighter, cleaner aerodynamically, simpler to construct and to maintain. Disadvantages are equally obvious: less control of landing-run, harder to handle without a dolly (before crew arrives), noticeably more fussing in the field and it is harder to find willing crews or to keep them.

Normal American design uses the fixed main gear at or near the c.g. plus a nose and tail skid. If the wheel is somewhat *more* forward of the c.g., ground looping tendencies increase and the skid is used so little that its value is difficult to justify, for it does cost and weigh something. If the wheel is quite close to but ahead of the c.g., the craft sits "tail down" with crew on board but shows virtually no tendencies to either ground loop or wallow if drifting when landing. The nose skid can then be used effectively when necessary, but it receives noticeably less wear than if the nose is usually down with the crew on board at rest, as occurs when the wheel is aft of the c.g. If the wheel is too far aft, the craft is clumsy and heavy during take-off, and control of landing roll-out is impaired. Under these last conditions a nose wheel set into or even supplementing the nose skid has obvious advantages (and disadvantages of weight and complexity).

"Conventional" geared airplanes have been with us for many years. Some sailplanes are designed with the same wheel — c.g. relationship: where they use one forward wheel with no nose skid at all, but with a good tail skid or wheel. Provided one is not a novice pilot and has an effective rudder, such a combination is acceptable. There is a considerable chance that the sailplane will swap ends on landing, just as conventional geared powered planes do if drifting when they touch down. The farther forward the wheel is located the heavier the tail end is for ground handling. This is alleviated by a tail wheel.

Tail wheels, whenever used, should swivel and be about 5" diameter and about 1½" wide. Anything smaller or non-swivelling is often trouble in mud or sand. The caster should work well. This feature helps to ease maneuvering of gliders in hangars.

Another problem occurs in gear design when a sharply upswept skid contacts the ground at a point too near the c.g. Under this condition a ludicrous activity follows: As soon as the skid touches, the greater friction causes the sailplane to rock forward on the curve of the skid—decelerating the glider abruptly and usually raising its wheel clear of the ground. Then the ship rocks back