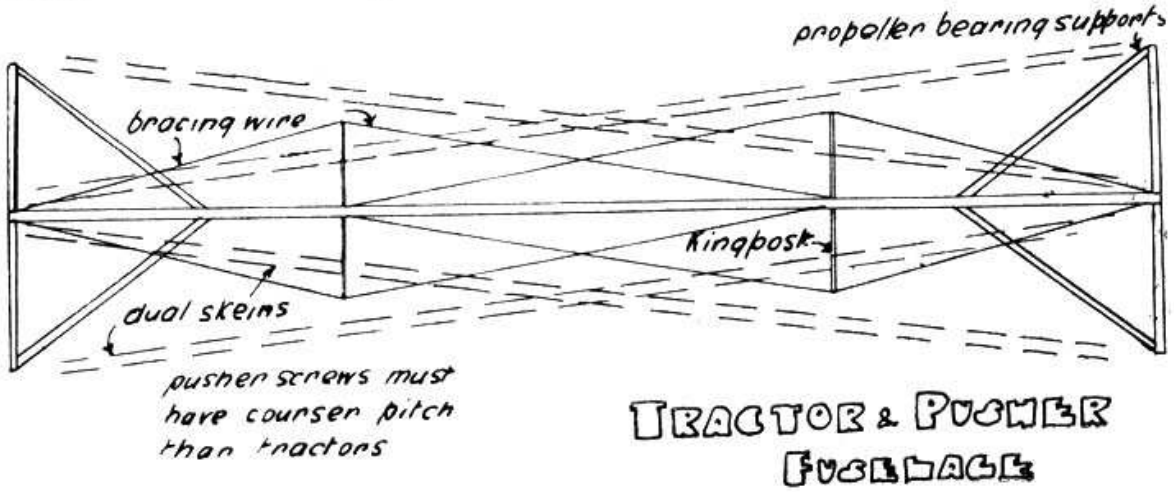
MODEL AEROPLANES

By F. J. Camm, M.Ae.S.

Combined Tractor and Canard

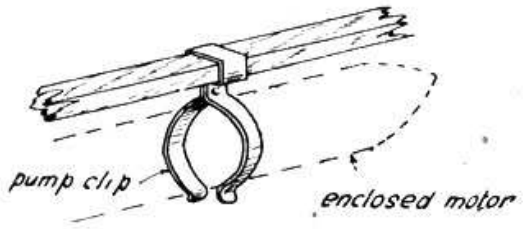
One sees so much of the conventional canard and tractor that one wonders whether any reader has tried a combination of the two types; it would be an interesting experiment. One thing, however, should be borne in mind—the pusher screws should be made slightly coarser in pitch, as they will be working in the slip stream of the tractor screws. The illustration shows a fuselage for such a machine, which needs to be well braced to resist the end-pull and tension of the skeins of elastic. It scarcely needs mentioning that great care should be given to the *weight* of the elastic used; each skein should be carefully weighed to ensure uniformity in this respect.



TRACTOR & PUSHER FUSELAGE

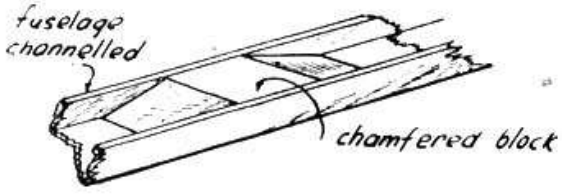
Independent Rubber Motor

An ingenious method of attaching the rubber motor *independently* of the fuselage, so that torque or twist on the latter are eliminated, is shown by the appended sketch. By this means the elastic is entirely enclosed in a tube, which possesses the added advantages of wiping out the considerable air resistance of the ordinary exposed vibrating skein, and also of preserving the appearance of the machine by preventing the lubricant from splashing over the silk.



Independent Rubber Motor.

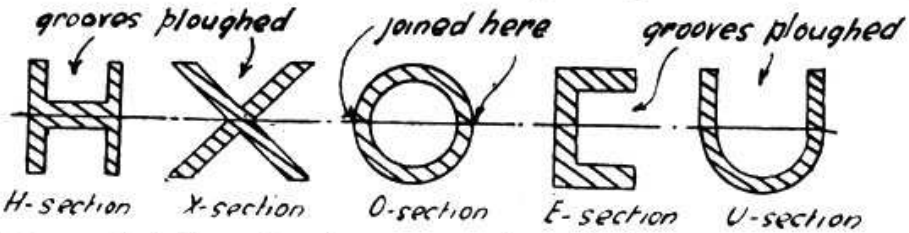
Also it saves a damaged hand should the skein break during the winding operation. They are made by wrapping thin spruce sheet round a former consisting of a length of circular section wood or a piece of tube, lapping and gluing the edges. A piece of brown paper must be folded round the former to prevent any glue that may percolate through the seam from sticking the spar to it. A streamline or conical spar could also be built in this way by suitably shaping the former. If a lathe is available the ends of the spar could be spun from aluminium to a suitable shape to complete the continuity of the curve. Yet another, and not so well-known, method of building hollow tubes is to use a paper-covered former as before, and folding brown paper round until a tube of suitable thickness is obtained. Each layer of paper would require to be coated with very thin glue. Although a tube thus made is on the heavy side, it is immensely strong. This form of motor is suited to scale models, for by using, say, three skeins of rubber transmitting their power by gearing to the screw, a comparatively short rubber drive



Packing for Channelled Spars.

could be used, so that the centre of gravity of the model lies, approximately, at the same point as in its prototype.

Some model flyers favour aluminium tube for longerons, but, although it possesses the essential quality of lightness, its strength is inferior to that of an ordinary wooden spar, and so is not to be recommended. Duralumin, or magnalium tube would better combine lightness with strength.



The form of spar which the writer favours is the streamline, with a flat face on the top to provide a suitable surface on which to secure the wings, and a semi-circular bottom. Although difficult and tedious to construct, they amply repay one for the time and trouble spent. I have seen models possessing such a spar dive vertically from sixty feet without breakage. It is worthy of note that when a spar does break as the result of a dive it nearly always does so at a point a third the length of the machine from the front of it. Hence the spar should be tapered both fore and aft from this point, so that this tendency is reduced as far as possible.

Channelled and Hollow Spars

The illustration shows sections of wood as used on model aeroplanes. Their use is almost entirely restricted to fuselage members or main spars. It would obviously be unnecessary to fit hollow or channelled wing spars, since the head resistance of the smallest practicable hollow spar is much in excess of piano wire or thin plane edging which is in vogue at the present time, this alone counteracting the many advantages accruing from their use. But for main spars and longerons they present a far more scientific job than the ordinary solid spar, braced on the cantilever principle with fine steel wire, for the reason that they can be made of much larger cross section than the solid spar for the same weight, and consequently stronger. The general method of construction is to cut a groove in the edge of a board of suitable wood with a plough, a tool made for the purpose. Or, if this latter is not obtainable, a gauge line should be run along each edge of the board and the wood carefully chiselled away, until the groove is of the required depth. This grooved edge of the board can then be sawn from it to suitable dimensions, two of these spars, which would be of U-cross section, being required for each hollow spar. They should be planed quite true, the grooved edges being planed away slightly on the ends to obtain a slight taper on the finished spar; each edge can then be thinly glued, the edges being cramped to one another by temporary string binding. If any holes or mortises are to be cut in the finished spar small wooden distance pieces should be glued in the channels at the points where it will be necessary to cut the spar, the length of the distance piece being made from three to four times that of the slot. Or the channels could be left solid at these points. The appended sketch shows how to pack open channels; a chamfered block is pinned and glued at the required location.

However, piercing the spar is to be avoided if possible.

Another method of making a rectangular hollow spar is to cut a deeper groove in the edge of the board and then to glue a thin strip over the open side. A spar made by the latter method, however, is not nearly so strong as one made by the former, the thin strip, especially in the case of single screw ungeared models, having a tendency to twist off under the torque resulting from the skein of rubber. Another form of hollow spar is the H section. This type could be much improved by closing the channels with a silk tape binding. Apart from the strength imparted to the spar by so doing, it would thus be possible (if twin gearing is used) to totally enclose the skeins of rubber (hence eliminating the resistance which would exist with the exposed vibrating skeins) by so constructing the gearing that the skeins pass through the tubes formed by the tape and channels. The same applies to the X-section spar sometimes used; and if yellow Japanese silk tape is used for the binding and afterwards finished with two thin coats of coach varnish, the result is a spar that will be unaffected by dampness and of a rather pleasing appearance.