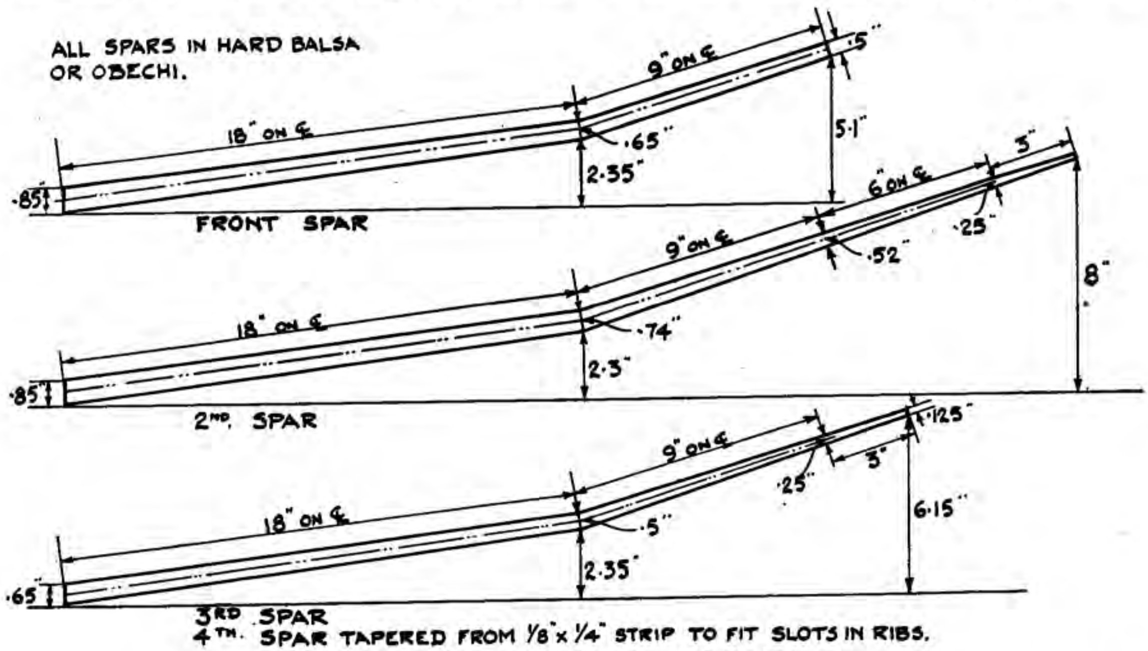
1st INSTALMENT OF MR. VINCE BENTLEY'S 72-in. SPAN PETROL MODEL

THE "CLOUD-DOZER"

THIS month brings the first instalment of the building instructions for the six feet span duration model "Cloud-Dozer," and we start with the wing. The ribs come first, so start off by drawing out all the ribs full size, plotting them out by any of the usual methods from the ordinates given on the plan. Cut out two of each rib and half rib from ⅛-in. thick medium balsa sheet, with the exception of rib No. 1, which should be cut from ¼-in. thick hard sheet, and faced on one side with 1-mm. ply, firmly cemented under pressure, being very careful to stand a certain amount of handling during assembly before the joint strengthening pieces are fitted. Having prepared the spars and allowed setting time for the joint, cement them into the slots of the root ribs, and follow up by sliding on all the half ribs and full ribs up to, but excepting, the rib at the dihedral break joint. Now fit the dihedral joint strenghtening pieces and bind them temporarily with tape or rubber to hold them tight while the cement hardens, and then slip on the remaining ribs up to the tip.

With the framework held lightly over the

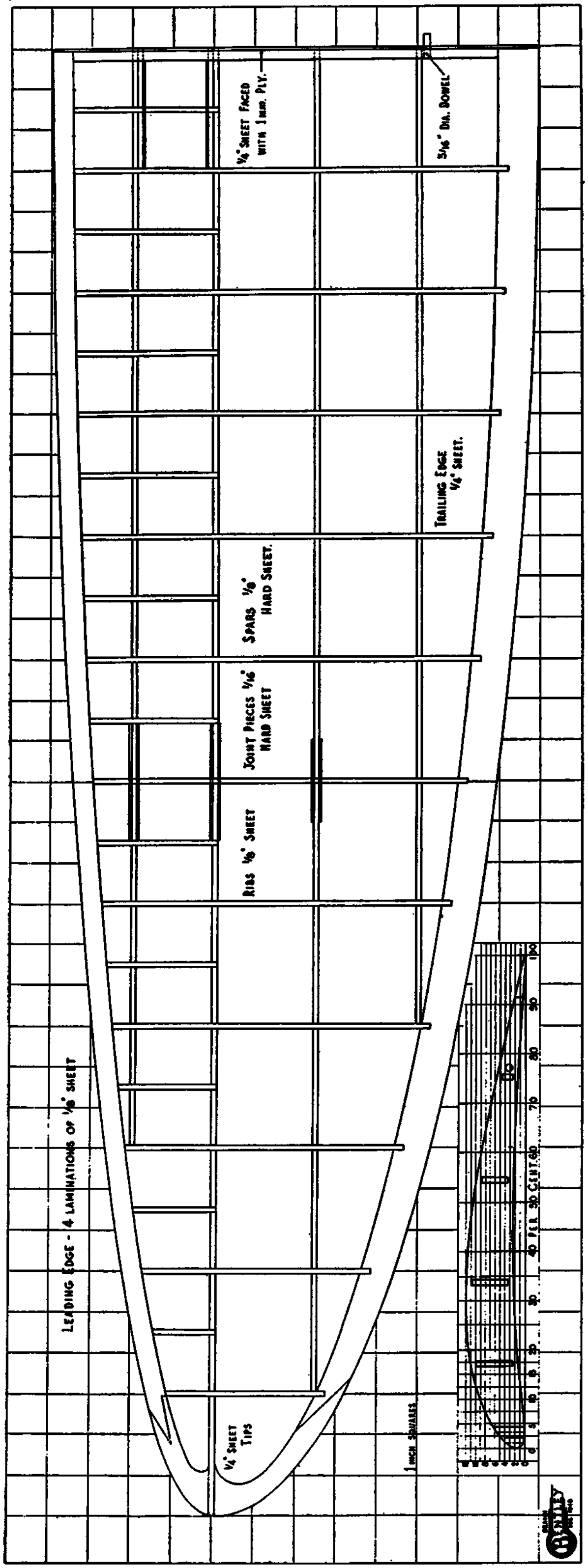


The wing spars showing their dimensions and dihedral angles.

to make one right hand and one left hand. Sand each pair of ribs so that they are true pairs, and if you want your finished framework to have a showroom appearance, sand both sides of each rib smooth also.

Cut the spars from hard ⅛-in. sheet balsa, or if you have no balsa hard enough, use obechi, and carefully trim the tip dihedral joints so that they fit together exactly at the correct dihedral. Cement the inner and outer components of each spar together as a butt joint strong enough

plan, or by any other method of working with which you are familiar, space out and set all the ribs correctly and run cement around all spar-to-rib joints, with the exception of the rib which fits at the dihedral joint. This one will have to be left loose until the joint pieces are firmly set and the binding can be removed. While the cement is setting, cut out the trailing edge shapes from ¼-in. medium balsa, also the two wing-tip shapes, and carve or sand the edges to the rough tapered section required.



Mark out all rib positions on the trailing edges, cut out the slots (I used one of those handy little "Eclipse" miniature hack-saws), and fit them into place on the ends of the ribs. Satisfy yourself by "eyeing" the framework, that they are set correctly before applying cement to each joint.

The leading edge is built up of four laminations of $\frac{1}{8}$-in. medium balsa sheet cemented in place one by one and held by pins. *Do* allow ample material for sanding to a correct shape when making this laminated leading edge, as it is so easy to think you are saving time and material by reducing the width of the laminations, only to find, when you start sanding, that you have not allowed quite as much as you would have liked.

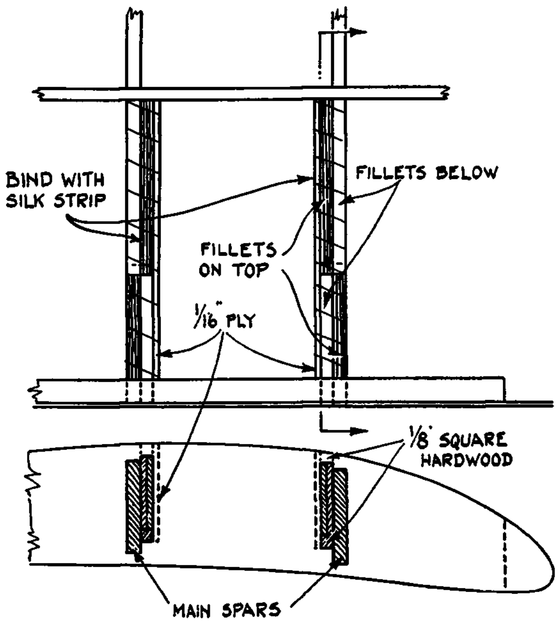
Finish the structure proper by fitting and cementing the tip pieces and finish sanding all over. The jointing spars for the centre joint, on the original, were made from two laminations of very hard $\frac{1}{16}$-in. sheet balsa (18 lb./cu. ft.) and the boxes were built around them in position with the two wing halves securely bound together by the root ribs to maintain the correct dihedral. The drawings explain the wing boxes better than any amount of description so follow them carefully when you do this part. To facilitate removal when set, the joint spars were smeared well with castor oil, and this little trick has proved quite successful even in subsequent use, as the oil seems to have expanded the wood very very slightly to make an excellent fit, while the surface of the wood, impregnated as it is with the oil, is slippery, and this all results in an easy but solid sliding joint. The complete wing structure of the original weighs 7 ounces uncovered.

A final word, please, about cements and cementing. I have found Rawlplug Durofix, very slightly thinned down with thinners, an excellent cement for heavy model work, but it has to be used correctly. When laminating any heavily stressed parts, and especially in all cases of ply to ply, or ply to balsa, it is essential to coat both surfaces thinly with Durofix and allow it to dry; then apply another coat to each surface, bring them into contact, press and rub them together, and finally leave them to set under pressure. In the case of large surfaces, the cement is not set hard right in the centre for some 72 hours, so bear this in mind when working.

On normal balsa to balsa joints, such as ribs to spar, it is quite adequate to run a fairly liberal fillet of Durofix around the joint, and when it is dry you will find that it has soaked well into the wood and formed a really sound fixture. I have found that one coat is also sufficient in the case of the balsa to balsa laminations on the leading edge, but, of course, the double application method is the safer method.

The Tailplane

The Cloud-Dozer's tailplane follows the wing fairly closely in design, but construction will be found to be many times easier and quicker.

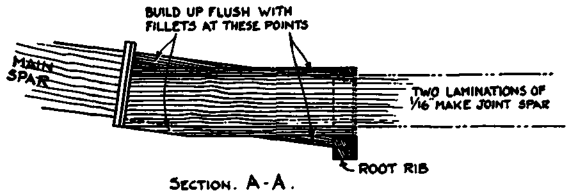


Wing joint box details.

Begin by cutting out two of each rib and half-rib from medium, ⅛-in. sheet balsa, sanding each pair together to ensure that they are alike. Don't forget our previous tip for that exhibition finish on the framework by sanding the *face* of the ribs smooth also. After the ribs come the spars, which follow my usual practice for tail-plane spars, being perfectly straight along the top edge with the necessary taper incorporated in the bottom edge, which, to my mind, makes a much better-looking tail. Slide the ribs on to the spars in pairs, commencing with the two root ribs and working outwards. Check the assembly for accuracy over a full-size plan, and cement all joints well with Durofix or normal balsa cement. Follow up by cementing all the half-ribs to the front spar and whilst the cement is setting, trace out the trailing edge shapes on a sheet of medium, 1/16-in. balsa, cut them out and slot them ready to fit in place on the ribs. Cut out the tip shapes from the same material and strip off three lengths of ⅛-in. medium balsa, each ⅜ in. wide, for the leading edge laminations. When the framework is set, fix the trailing edge and the rear tip piece in position using Durofix ; and the first leading-edge lamination together with the front tip piece, using ordinary balsa cement. Use ordinary cement also for the second and third laminations and make sure that you squeeze them well into contact with each other. Cover the centre section just across the two root ribs with 1/16-in. soft balsa, top and bottom, and finish off by sanding all over to correct shapes. As on the wing, a fair amount of the trailing and leading edges can be cut away with the knife as a preliminary to sanding.

Tail Trim

On highly-powered models such as the Cloud-Dozer, where take-off and climb take place at high speeds, a large angular difference in the incidence of wing and tail will result in looping, therefore we must have only a small difference, about 2 deg. If such a small difference in setting is used on the normal type of model and the centre of gravity is adjusted so that it glides perfectly, it is found that the high speed under power results in the tailplane contributing more than a fair share of lift and therefore forcing the model into a nose-down position. On the high-pylon, mounted wing type, the high centre of drag position caused by having the wing so high, counteracts the nose-down tendency, and as both the latter and its counteraction are each dependent upon the speed of the model, there exists a happy state of stability. It may sound like two wrongs making a right, but until it can be proved in practice that the theoretically more efficient mid-wing type will outclimb and outglide others, I think we would

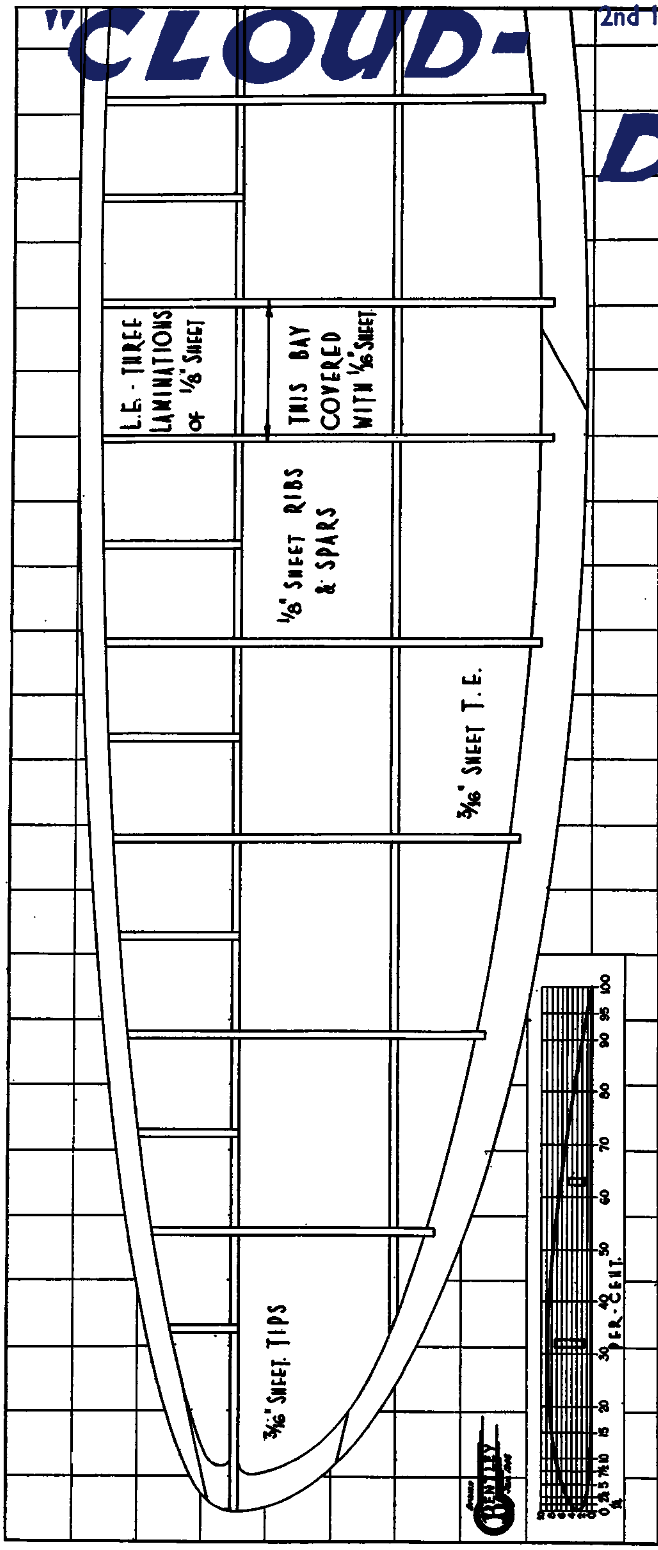


Fillets used to build up either spar or boxes to each other in readiness for binding.

do best to rely on the well-tried high-parasol type for our duration power models. The forward position of the wing allows a long moment arm with a comparatively short fuselage length and also allows the use of a small fin, both desirable features, the one for stability and the other for minimum drag. Full size prints of all the ribs, and plans of the wing and tail-plane are available for those who require them, at 1s. per print, from the Editorial Offices.

2nd INSTALMENT OF MR. VINCE BENTLEY'S 72-in. SPAN PETROL MODEL

"CLOUD-DOZER"



WE publish this month the tailplane drawing, which was referred to in our April issue. This will enable you to proceed with its construction on the lines described, remembering that the rib section is a modified Clark "Y," having its vertical ordinates reduced to 75 per cent.

The fuselage shape merely follows accepted lines for efficient streamlining, and has the minimum permissible value of cross-sectional area. Its construction will be clear from the drawings which are being provided.

Topic of the Month

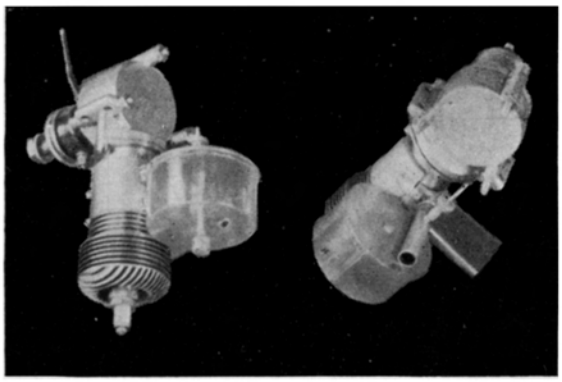
In the old workshop we have again got around to the old bone of contention—contest rules. Find yourself a vacant place on the bench—that's right, mind the razor-blades—and just listen to what Harry Austwick, of Halifax, sent me in the day's post. Harry, for the benefit of those who don't know him, can always be relied upon to have some very definite views on model aeronautical subjects, and if you are fortunate enough to get him to talk about them, you are lucky indeed, as he always talks clear, unpadded common sense and you will leave him with the feeling that you are a little wiser. Harry would be very sorry to have pure duration contests becoming popular in this country, saying that he doesn't think there are sufficient flying grounds here where power models could be released to make durations of three minutes or more and yet be either in sight of the timekeepers or over ground suitable for safe landing without damage to property. This safety of landing without causing damage, cannot be stressed too much, he thinks, as if care is not taken, the movement may be faced with severe restrictions. He considers that power modelling should not develop into a battle of "auxiliary gliders," which is, in effect, what the pure duration contest boils down to, but should rather be directed towards judging the qualities of the model as a petrol-driven job. Harry puts forward the following suggestions on which to work in formulating national rulings for power models: —

1. 1 sq. ft. wing area minimum per 1 c.c. of motor capacity.
2. Minimum wing loading of 14 ozs. per sq. ft.
3. Models to be timed for motor run and glide.
4. Total flight to be regulated to 100 sec. with a motor run of 25 sec.
5. Motor runs *over* 25 sec. to disqualify the flight.
6. Any excess of glide time to lose 1 point for each sec. excess.
7. Points to be awarded for take-off as follows :—
   - 5 points for clean take off. 1st attempt.
   - 2 points for clean take-off. 2nd attempt.
   - 0 points for clean take-off. 3rd attempt.

   No fourth attempt allowed.

Well, there you have it! Those are Harry Austwick's ideas on new model power contest rules and whilst I agree with quite a number of his points, two outstanding factors still remain; one being that if we become faced with an International contest sponsored by U.S.A., it is a hundred to one that, like it or not, we shall have to fly duration types of the most competent standard. The other factor is that contests of the limited time type such as Harry suggests serve to strangle scientific aerodynamical advancement as far as efficiency is concerned. It is agreed that a model can be built to fulfil the conditions of the contest and that, in doing so, it will reflect the skill of the designer, builder, and flyer in no mean way, but . . . what further aim has the designer after he has once achieved that goal? Surely, all the glory will go to the flyer who can spend most time in practising the known conditions of the contest.

All this boils down to the question : By setting out the contest rules, what are we aiming to judge, the competence of the flyer or the cleverness of the designer? Looking at both sides of the question, I think we should accept both, but that we should differentiate between them. The average model enthusiast who flies for the joy of flying only can be counted on to favour matching his *competence* against his fellows, whilst the enthusiast who flies his models, and designs them to see exactly how much he can get out of them, aiming for ever-increasing design efficiency, will favour matching his *designing and trimming* skill against his fellows. Hence, this calls for two distinct types of contest. We must cater for all tastes, and the latter is the type we shall be most likely to meet in any international contest other than the Bowden, which, unfortunately, is not sufficiently international to tempt large entries.



The engine of "Cloud-Dozer" is a "Gold Seal." The photograph shows the plastic tank described in the February issue.

However, if more of you would follow Harry's example by writing to me about your views, we should have a far better idea of the general feeling, and therefore of what we should do to satisfy it. Think it over and let us have your views at our next bench gossip.

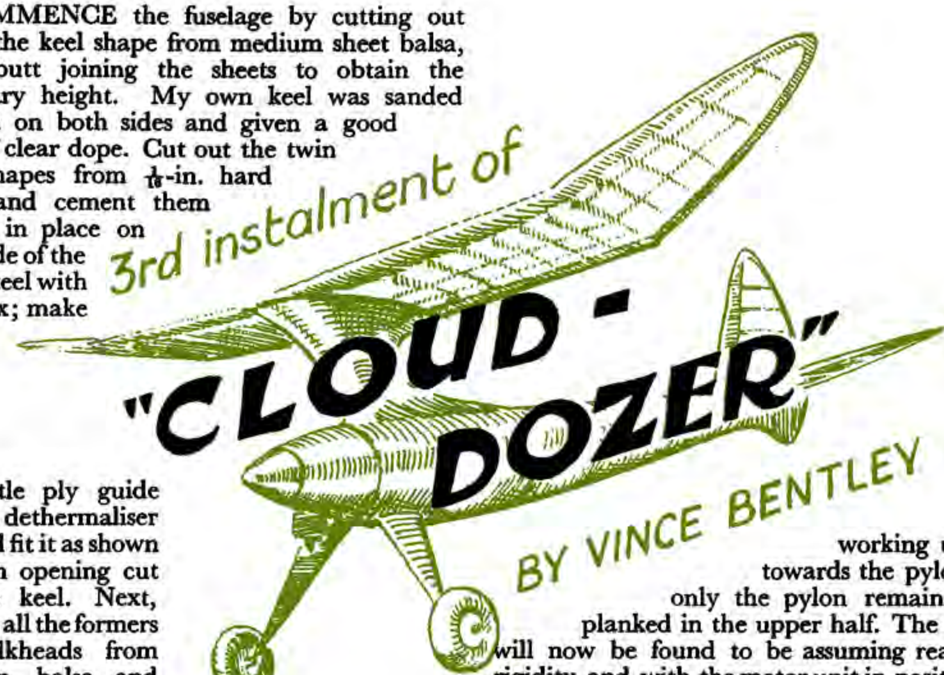
The whole matter is most interesting and well worthy of careful consideration by all petrol fans. It must not be allowed to rest until we are actually faced with the problem of entering such a contest.

Motor Unit

In designing the motor unit I have taken a leaf out of Harry Austwick's book, and used rolled paper-tube conduits wherever possible to carry the electrical wiring. Actually, I have taken it further than Harry, who has only adopted the idea of his detachable unit, leaving the fuselage wiring as usual. On the "Cloud-Dozer," whose motor unit is detachable (but not "knock-off-able"), I have used conduits as far as possible from terminal to terminal, and I think I shall be rewarded by a more foolproof electrical system. Incidentally, I have heard recently of *single*-strand wire being advised for petrol model ignition systems! Single-strand wire is not flexible enough and is too prone to fracture through vibration, so never use it ; always use multi-strand flexible wire.

3rd instalment of "CLOUD-DOZER"

BY VINCE BENTLEY



COMMENCE the fuselage by cutting out the keel shape from medium sheet balsa, butt joining the sheets to obtain the necessary height. My own keel was sanded smooth on both sides and given a good coat of clear dope. Cut out the twin keel shapes from $\frac{1}{16}$-in. hard balsa and cement them firmly in place on each side of the main keel with Durofix; make the little ply guide for the dethermaliser rod and fit it as shown over an opening cut in the keel. Next, cut out all the formers or bulkheads from medium balsa and build up the front bulkhead as shown, using Durofix for laminating. At this point it is best also to build up the motor mount bulkhead and ensure that it fits the front bulkhead correctly, after which the latter can be cemented in place on the keel and followed up by cementing all the other bulkheads, down to the beginning of the twin keel, using regular cement. Fit the $\frac{1}{8}$ square hardwood stringer between the bulkheads at the dethermaliser position ; make up the fixed dethermaliser pull rod guide as shown, cement this between the twin keels, cut out and fix the under fin base, and follow with the $\frac{1}{4}$-in. hard balsa tail-plane platforms. Now fit the formers to the twin keels immediately beneath the tail-plane platform.

During the periods of waiting for cement to set, finish the construction of the motor mount bulkhead and battery box unit, which should be well sanded and given several coats of clear dope until the surface is hard and polished all over. Use fine sandpaper between each coat of dope.

Make and fit the dethermaliser pull rod from 16 s.w.g. piano wire and make sure it works freely in its tube-guides.

Commence the planking of the fuselage by fitting two master planks, one at each side, taking care that the keel is dead straight before the cement is set. Continue planking, fitting planks alternately to each side and working upwards towards the pylon until only the pylon remains to be planked in the upper half. The fuselage will now be found to be assuming reasonable rigidity and with the motor unit in position, the 1 mm. ply steady on No. 5 bulkhead should be fitted, after which planking of the lower portion can be completed.

The fitting of planks at the tail, below the platform, will be found to be tricky, but a little patience, assisted by steam-forming the planks where necessary will result in a good job. The vertical grain side pieces can then be fitted to each side of the under fin, and the little window cut out for access to the dethermaliser pull rod.

Next, turn your attention to the pylon and fit the three laminations forming the wing platform. At the same time cut out two extra platform shapes from $\frac{1}{8}$ medium balsa, which will eventually be cemented to the underside of the wing to correspond with the pylon top. Bend and fit the two 16 s.w.g. wire stirrups to the front and rear of the pylon and continue the planking from where it was left off, working upwards always, until the underside of the wing platform is reached. Right at the base of the pylon, at the front, where it sweeps round to the front bulkhead, I used two small blocks of balsa instead of planks. It will be necessary to steam-form most of the planks for the pylon, and I must warn you that it is the trickiest job on the fuselage ; use your own initiative in doing it as it is useless trying to describe the procedure, which, in any case, may not suit your own particular way of working.

The fuselage is now complete, ready for sanding down smooth and fitting the dethermaliser lever. The cut out for the removable dethermaliser timer unit should not be made until the unit is ready and at hand to ensure a snug fit.

The dethermaliser lever assembly is fully explained by the drawings, but very great care should be taken to ensure that, in the closed position, the pull-rod slides easily into the locking tube *without* the use of any oil.

Special Fuels

Quite a lot has appeared recently in American magazines, about the use of special fuels in improving motor performances, and a little has been seen in the British model press, but I would like to issue a timely warning, especially for the great many modellers who are or will be using petrol motors for the first time. The search for better and better motor performances has been stimulated by the rapidly rising popularity of control line flying in which speed is the major criterion in winning contests, and naturally, those enthusiasts who have got the most out of their efforts by development of more efficient 'planes, next turn to their motors in their quest for faster, faster, ever faster models.

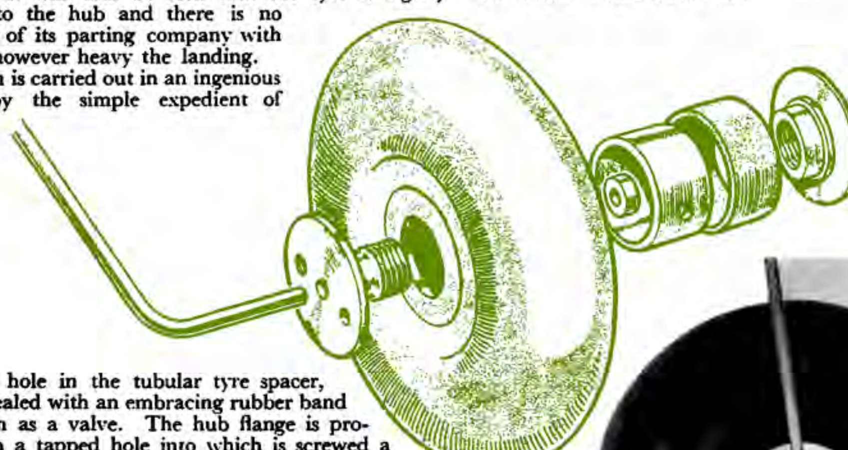
In any case, a reliable motor is more than half the battle in the usual free-flight contest ; special fuels and special adjustments mean increasing difficulty in starting and handling ; don't be one of those who " sit " a contest out tinkering with your motor all day, it is easy enough to be so without the assistance of " Super " fuels, etc. !

AN ATTRACTIVE BRITISH AIRWHEEL

We have recently had the opportunity of examining some airwheels, which have been placed on the market by Messrs. H. Rider and Son, of Wentworth Road, London, N.W.11, under the name " Riderwheels," which are not only attractive, but exceptionally well designed and constructed.

The wheels consist of a flanged hub on which is firmly clamped a moulded tyre by a flanged outer hub nut and a tubular spacer between the tyre rims to maintain their spacing. It will thus be seen that the tyre is rigidly clamped to the hub and there is no possibility of its parting company with the hub, however heavy the landing.

Inflation is carried out in an ingenious manner by the simple expedient of drilling a hole in the tubular tyre spacer, which is sealed with an embracing rubber band to function as a valve. The hub flange is provided with a tapped hole into which is screwed a special pump adaptor for inflation purposes. Air forced into the centre of the hub by the pump, lifts the rubber band off the spacer and inflates the tyre, but immediately the pump pressure is released the rubber band again seals the tyre effectively.



Attachment of the wheel to the axle is also simple and efficient, and is carried out by means of a special washer (supplied), which is soldered on to the end of the axle and sandwiched between the wheel hub and the flanged hub nut to form a concealed stop, retaining the wheel on the axle and leaving the outer side of the wheel free from any projection.

The standard wheels are 3½ in. in diameter and drilled to take 10 S.W.G. axles (0.128 in.), but sufficient metal has been provided to allow the hub and stop washer to be drilled out to take 7 S.W.G. axles (0.176 in.).

An important feature is the fact that provision is being made by the manufacturer for spares to be available for servicing, so that the useful life of a pair of these wheels should be extensive.

The Type " A " wheels (3½ in. diameter) are priced at 17s. 6d. complete, with key for tightening the hub, and pump adaptor, and are excellent value for the money. They compare more than favourably with the best American wheels available.

Purely Petrol—

CLOUD-DOZER

by R. V. BENTLEY

MOTOR unit, fin, dethermaliser, and one or two minor items, are yet required to complete the "Cloud Dozer." The motor unit will vary slightly according to the make of motor used, and the drawing shows the arrangement for the Ohlsson Gold Seal. My original intention to use paper conduits has been abandoned in favour of running connections through the motor-bulkhead by means of 6-B.A. brass screws and nuts, all wiring terminating in terminal tags which are held on the screws, and this arrangement has proved quite good in practice, as there is no passage through which fuel and oil can be driven through to the rear of the motor and into the fuselage. The running of the high tension lead through an aluminium tube has not proved detrimental in any way, as its position is reasonably remote from any other earthed metal parts. A cowling over the motor, although not essential, finishes a model off nicely, and I have had considerable success in the past with built-up paper cowlings, made by carving out a wooden block to the shape required, but $\frac{1}{16}$ in. less all over than the finished cowling size, and building up the cowling over the block with small strips of paper, using clear, full strength dope as the binding medium. The first covering of paper strips should be stuck down to the block with liberal quantities of vaseline in order to ease the removal of the cowling when complete. A paper cowling made in this fashion, about $\frac{1}{16}$ in. thick, is exceptionally strong, and a good final finish can be obtained by continued sanding and doping until all the " 'umps and 'ollers " have been sanded away.

The Fin

The fin is made simply from medium hard $\frac{3}{16}$-in. sheet, sanded to airfoil shape, and cemented into a slot cut into the upper sheet balsa covering of the tailplane. The movable trimmer is cut off and re-fixed by means of a thin celluloid hinge as shown.

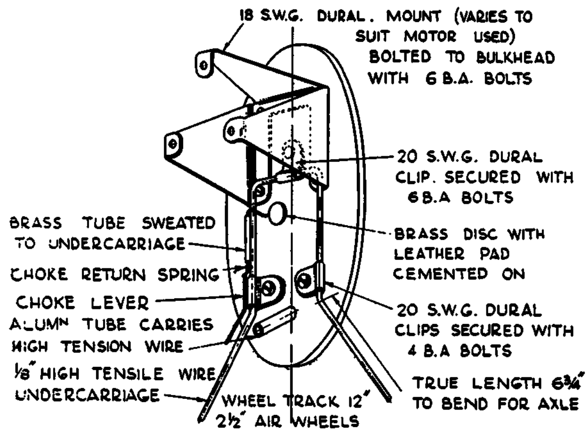
The Dethermaliser

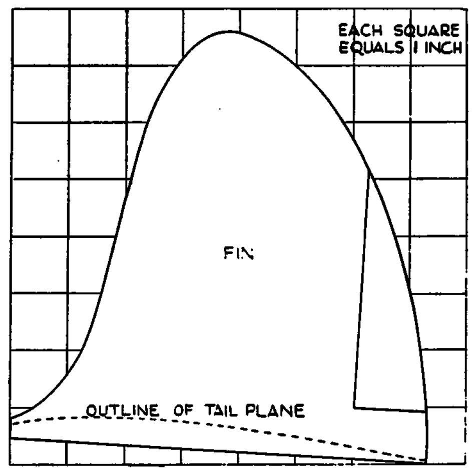
The dethermaliser unit may vary according to whether the timer is home-made or a purchased commercial job, and the drawing shows all necessary details. When fitting the original into the fuselage, I cut the opening in the planking to a suitable shape, inserted the unit and built up the filling-in pieces directly on the unit, sanding the whole lot with the fuselage.

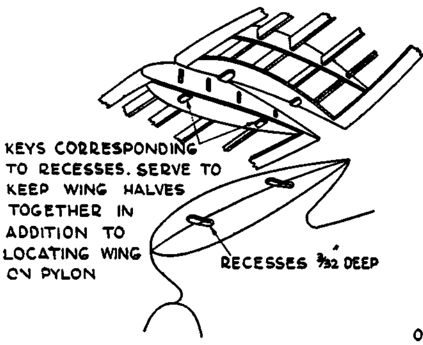
Fixing the Platform-pieces

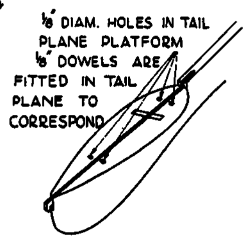
Before covering, there is one more little job to do on the wings, which is the fixing of the platform-pieces, to correspond with the pylon top, and which we cut out from $\frac{1}{8}$-in. sheet at the same time as we made those for the pylon. These pieces are let in to the undersurface of each wing according to the sketch, and finish flush with the undersurface. The centre section of the top surface is also to be given a balsa covering to withstand the pressure of the rubber retaining bands when the wing is attached to the pylon. Locating recesses and keys, which also serve the purpose of holding the wing halves together, are cut in the pylon top and cemented to the wing respectively as indicated, and dowel pins and holes at the tailplane attachment, as shown, complete the model and make it ready for covering. The fuselage of the original was covered with a single covering of Jap tissue, well doped down with full strength dope, as was the fin, while the wings and tailplane were double covered with red Jap tissue, water shrunk between coverings, and given three coats of dope on completion. The fuselage and fin were finished silver, using four coats of silver dope brushed on and sanded smooth each time, finishing with a very carefully-brushed coat of the same silver dope slightly thinned with thinners, followed, when dry, contact with petrol and the finish remains tacky indefinitely.

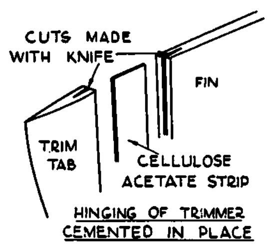
The propeller used on the original is 13 in. diameter and 9 in. pitch, with a blade

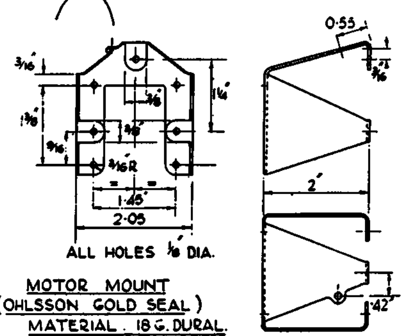


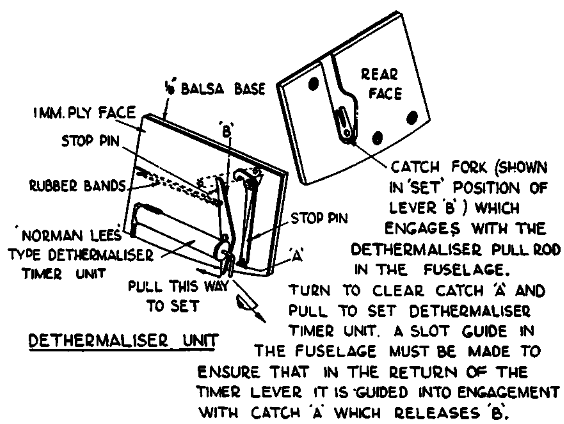




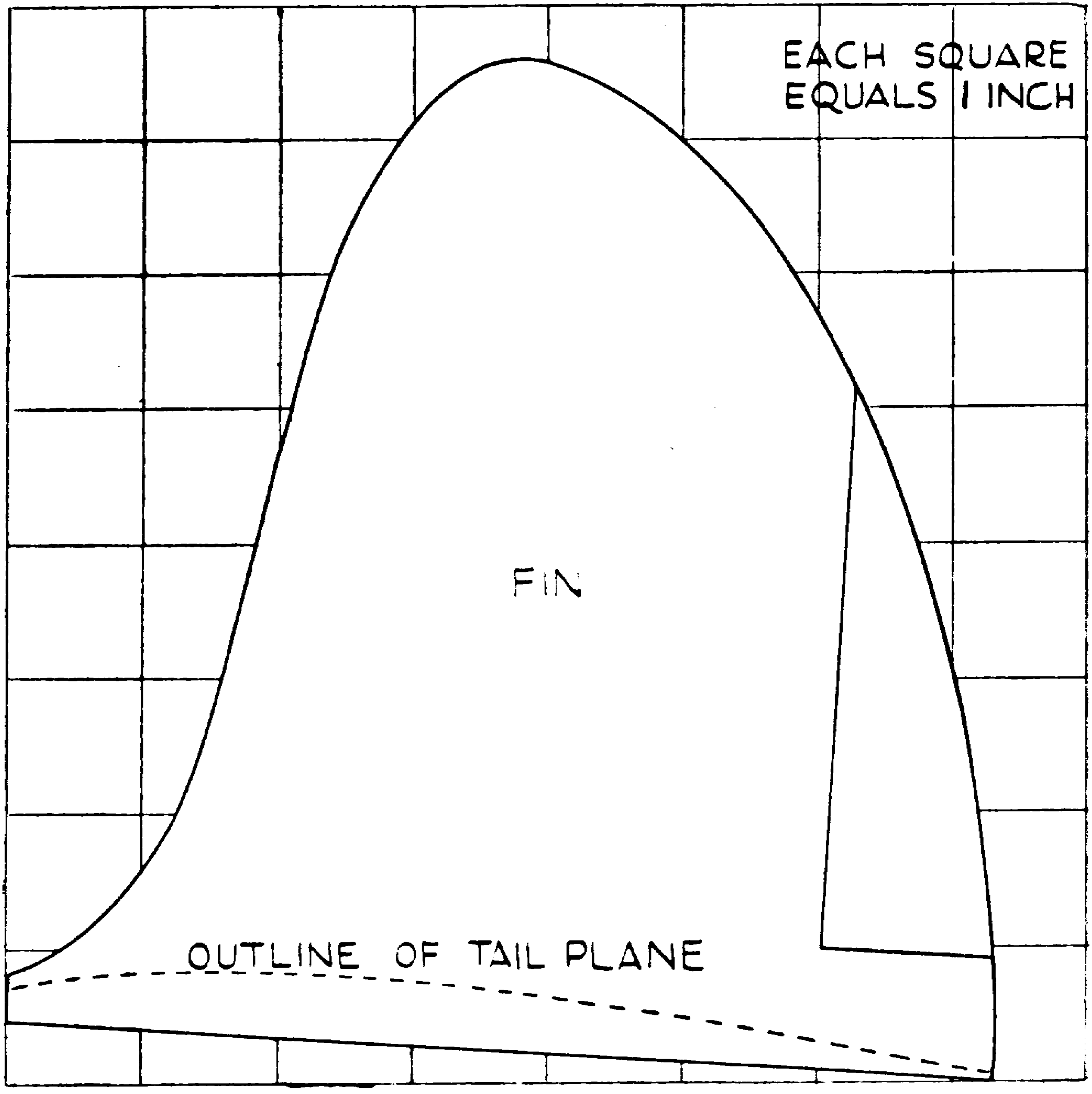








with a carefully-brushed coat of clear Chinese lacquer. I have found the usual high-gloss finish sold in the model shops rather unsatisfactory, as it appears to be softened slightly by 1 1/16 in. wide, carved rather thinner than is usual in order that it will break itself rather than damage the engine in the event of crashing.


EACH SQUARE
EQUALS 1 INCH
FIN
OUTLINE OF TAIL PLANE