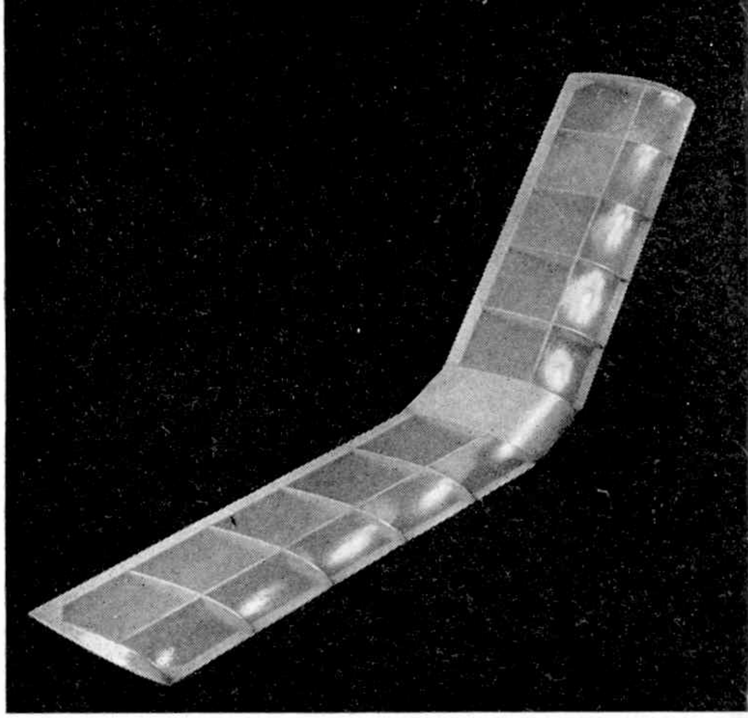
Aeromodelling by **John Atkinson**

Tissue covering technique

Wrinkled tissue spoils the looks of a good model aeroplane! John Atkinson shows you how to obtain a perfect finish for your craft . . .



How MANY times have you enviously admired a beautifully covered model at a flying meeting or exhibition? One's own efforts so often fall far short of such perfection and yet there is really nothing very difficult in achieving a smooth, wrinkle-free finish. It is only a matter of taking extra care and, most important of all, *not rushing* the job! Once the structure is complete, I know it is a temptation to attempt to complete the covering in the shortest possible time, in order to get the model into the air. However, *do* try to resist it, for you will only be dissatisfied with the end result and wish that you had taken more time.

Besides producing a much better looking model, a good wrinkle-free covering job also considerably increases the model's strength. Flying performance benefits too; a smooth finish being far more efficient than a rough one. There are, of course, one or two 'tricks of the trade' which will simplify this important final constructional stage and these I will try to deal with in the article.

The quality of the finished job is determined long before the first tissue is applied to the framework—the correct preparation of the uncovered airframe being perhaps the most important single factor in achieving covering perfection.

Preparation of the Frame

The first job is to go over the whole frame with fine sandpaper. Flour-paper is best for this, as it is sufficiently smooth to avoid rubbing away too much wood, thus distorting vital shapes and, at the same time, it has sufficient 'cutting power' to remove any irregularities of contour. Examine the structure carefully for small blobs of cement that may be sticking up; these must be carefully cut off.

When you are satisfied that the frame is perfectly smooth, give all the outside parts (those that will be in contact with the tissue covering) a coat of Sanding Sealer. This will, when dry, leave the wood with a rough surface, since it brings up the top fibres, but at the same time it also fills in the balsa wood pores. Next, use the flour-paper again, to give the frame a silky smooth surface with *no* sharp projections.

Model aircraft covering tissue is especially made for the job. The best known brand in Great Britain is Modelspan, which may be bought in a variety of colours and in two grades—lightweight and heavyweight. Free flight models of up to about two feet wingspan generally use the lightweight grade, larger ones can be covered with the stronger heavyweight and sometimes silk or nylon.

The majority of control-line models use heavyweight tissue or nylon, all except the really small aircraft, where weight must be carefully 'pruned'.

There are many ways of actually attaching covering materials to the framework, but the easiest is by means of special tissue paste or one of the dextrine pastes such as Grip-fix.

Never try to cover a double curvature with *one* tissue panel. Such a situation often occurs at wingtips, the upper surface of which should be covered with a separate piece of tissue. By trying to pull the main wing covering tissue down to the tip, wrinkles are almost invariably introduced. The same applies where a dihedral break occurs. A new panel is needed wherever such a contour change takes place.

For a typical wing, you will need four pieces of tissue on its 'upperside'—one for each tip and one for each main panel—and two for its 'underside' which, usually being flat, needs no additional tip pieces.

Cut out your tissue panels a little oversize and note, when doing so, that one side of the tissue is slightly smoother than the other. The smooth side is the outside.

Spread a thin layer of paste over the outline of the framework—not on the ribs—and lay the tissue carefully in place. Gently press it down, easing it outwards, to achieve an overall even tension. The aim is not so much to stretch it *tight*, as to get it *smooth and even.*

When the whole frame is covered and the adhesive is dry, spray the tissue with water. A scent spray or an artist's cheap fixative spray is ideal. Don't soak the tissue, just dampen it. The covering will now sag alarmingly, but don't be dismayed, for as the tissue dries it will tighten up to a drumlike surface.

Never attempt to hasten the drying out process by applying artificial heat, this can later result in a slackening of the covering or a warped model.

Doping your model

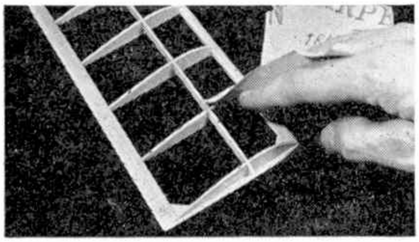
Clear, shrinking dope is next brushed on to the taut tissue. This adds a lot of strength to the covering and fills in the many tiny pores in the tissue. Clear dope has tremendous shrinking power and, as it dries, will tend to distort the framework, unless it is pinned down to a flat surface. Pack the tissue-covered component clear of the surface on which you are working with small pieces of balsa to prevent the dope from sticking. Leave the covered frame pinned out for at least an hour—or longer if you can. Two coats of clear dope are normally required to achieve a good finish.

If you wish to colour dope the model, now is the time to do it. Colour dope has no shrinking powers and so it *must* be applied over a base coat of clear dope. However, bear in mind that it does add a lot of weight to a small model and, wherever possible, should be avoided, if maximum flying performance is required.

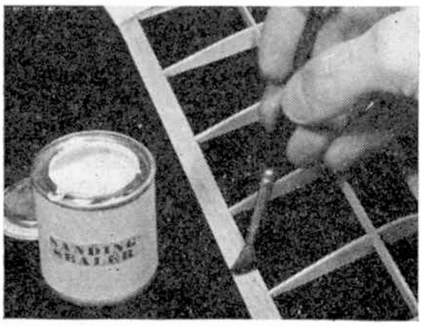
Always use the same type and make of both colour and clear dope. *Never* use different makes as they frequently interact and ruin a good covering job.

If your model is engine-powered, the dope will need to be 'fuel-proofed', the reason being that it is often attacked by engine fuel ingredients. Fuel-proofing is easy to carry out, as the proofer is merely a special kind of clear varnish which is brushed over the entire model. Particular attention must be paid to the engine bay, as it is always soaked with fuel.

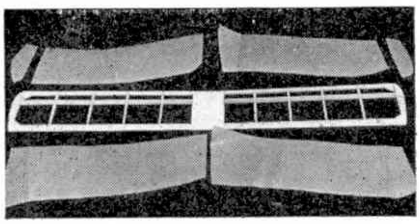
Some new types of colour dope are fuel-proof in themselves and require no further treatment. One of the best of these new colour dopes is Keil Kraft ethylrate dope. Butyrate dopes and some plastic enamels are also fuel-proof, but have certain disadvantages and are often difficult to apply. If you carry out all the work described here, you should have a perfectly finished model aircraft.



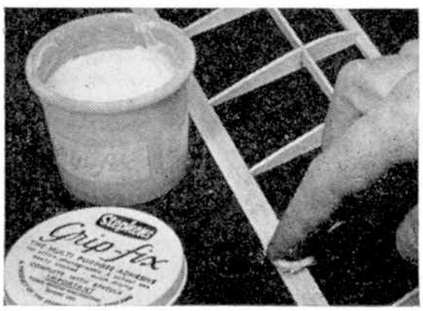
Remove the surface roughness of the balsa airframe with flour-paper. This will avoid any bad patches showing on the finished work.



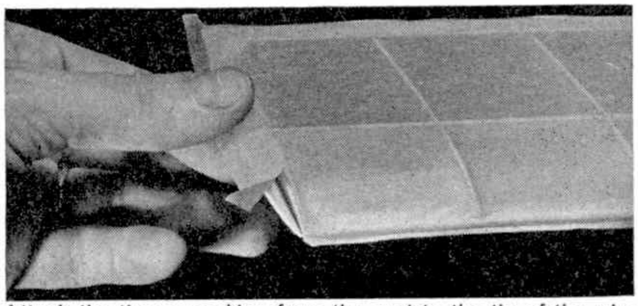
Next give the whole frame a coat of sanding sealer. When it is dry, remove any further roughness by once again using flour-paper.



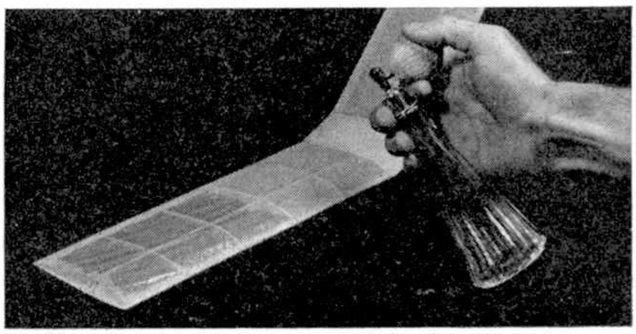
Cut covering tissue panels slightly on the large side. As tissue has a slight 'grain', it should run along the wing from root to tip.



When applying the adhesive, spread it thinly over outline of wing—not on the tissue itself. Grip-fix paste is ideal for most jobs.



Attach the tissue working from the root to the tip of the wing, gently easing it taut with the thumbs. Aim at getting an even covering and not a really tight job. Also, use separate pieces of tissue for tips of wings and other curves.



Next, when the adhesive is completely dry, spray the tissue covering with water. A scent spray is the ideal tool. Make sure you handle the model very carefully at this stage.

When the tissue is dry apply shrinking dope with a broad, soft brush, working quickly. As the dope has a very strong shrinking action, pin down drying framework to stop warping.

the voyage of HMS Bounty

by Ian R. Stair

Slightly 'imaginative' contemporary art which, nevertheless, is full of true atmosphere. (Mansell Collection)

THE exploration of the South Seas makes most exciting reading and the ship model maker who is inspired by these stories can be thankful that contemporary draughts of many of the ships have been preserved and it is possible to model them with a fair degree of accuracy.

The 'Endeavour', Capt. Cook's first ship, is perhaps the best known. It is available as a plastic kit and the late Harold Underhill prepared a set of drawings which will satisfy the most exacting model builder.

Equally famous is the 'Bounty', the subject of this month's drawing. Unfortunately, it is famous for the mutiny rather than the equally interesting voyage it undertook.

Towards the end of the 18th century the number of slaves in the West Indies had greatly increased and it was thought that the breadfruit would provide an easily grown source of food for them. The 'Bethia', a merchant ship, was bought by the Navy and was converted to take the breadfruit plants from the South Seas to the West Indies. Armed with four carriage guns and ten swivels she was renamed the 'Bounty'. The great cabin was fitted out to carry young plants and the original drawings (draughts) give details of the racks which held the 629 pots.

Capt. William Bligh, then a lieutenant, was chosen to command the 'Bounty'. He had been with Capt. Cook on his last voyage and therefore had experience of the Pacific, in addition to being a first class sailor and navigator.

The 'Bounty' sailed from Spithead on December 23, 1787, and was beset by fierce gales as far as Teneriffe, reached on January 6. During this rough weather the beer was lost and much food damaged, this later caused some discontent among the ship's company.

After five days the damage to the ship had been repaired and she sailed in fine weather. Staten Island off Tierra del Fuego was sighted on March 23, and again they were faced with severe storms. On April 22, Bligh abandoned the attempt to round the Horn and turned to cross the South Atlantic. By this time a quarter of the crew were on the sick list.

Even in this situation Bligh's interest in navigation was enough to make him spend a few days looking for the island of Tristan da Cunha, the exact position of which had not been fixed at this date.

Unable to find it, he carried on and sighted Table Mountain, Cape Town, on May 22. As this last part of the voyage had been in good weather the crew were now pretty fit again. After leaving Cape Town the 'Bounty' did not anchor again until she arrived at Adventure Bay, Tasmania, the uneventful trip across the Indian Ocean taking just over seven weeks. Sailing on September 4 and passing south of New Zealand, they sighted Tahiti on October 25. The first part of the expedition had been completed successfully, but for 'Bounty', it was almost the end of her time at sea.

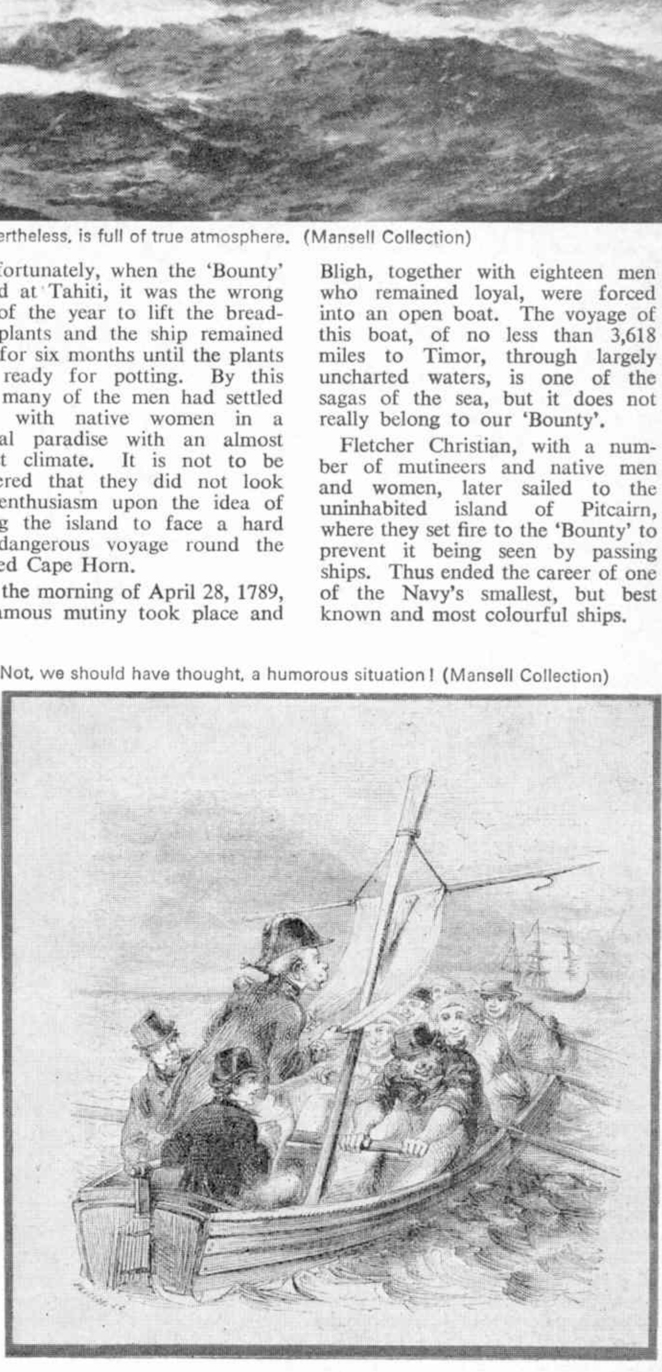
Capt. William Bligh has often been portrayed as a hard tyrant; he was a strict disciplinarian certainly, but judged by the standards of the day, he was unusually fair and just in his dealings with his subordinates. He was most proficient in all branches of seamanship, and did not spare himself to ensure the safety of the ship, and the well-being of the crew. However, it does appear that there was something in his character which aroused opposition in many people he came in contact with. This is, perhaps, not surprising, as efficient people are often irritating and demanding.

Unfortunately, when the 'Bounty' arrived at Tahiti, it was the wrong time of the year to lift the breadfruit plants and the ship remained there for six months until the plants were ready for potting. By this time, many of the men had settled down with native women in a tropical paradise with an almost perfect climate. It is not to be wondered that they did not look with enthusiasm upon the idea of leaving the island to face a hard and dangerous voyage round the dreaded Cape Horn.

On the morning of April 28, 1789, the famous mutiny took place and Bligh, together with eighteen men who remained loyal, were forced into an open boat. The voyage of this boat, of no less than 3,618 miles to Timor, through largely uncharted waters, is one of the sagas of the sea, but it does not really belong to our 'Bounty'.

Fletcher Christian, with a number of mutineers and native men and women, later sailed to the uninhabited island of Pitcairn, where they set fire to the 'Bounty' to prevent it being seen by passing ships. Thus ended the career of one of the Navy's smallest, but best known and most colourful ships.

Not, we should have thought, a humorous situation! (Mansell Collection)



Another means of communication, to individuals directly, of course, is via the printed word in newspapers, books, and magazines. All these have to be printed by special machines. In Britain, William Caxton set up his press near Westminster Abbey in 1476. The first improved machine for speed and cheapness was that invented by Konig in 1811. In this particular machine the paper was applied to the forme by means of a revolving cylinder which held the paper in its passage across the type. This introduction of the impression cylinder proved a much quicker way of printing. Since that time there has been a stream of inventions and developments of new processes and machining for better and faster printing.

More than 1,000 patents were granted to Thomas A. Edison, a well-known American inventor, (1847–1931). He not only brought out a number of improvements in telegraphy but invented the electric or incandescent lamp, the phonograph, the kinetoscope (or forerunner of cinematography) besides one of the first electric locomotives. The first typewriter to be put to practical use was invented by Charles Thurber in 1843. It was followed by that of A. E. Beach in 1856 for printing embossed letters for the blind. Later, Sholes produced a machine which was embodied in the American Remington of 1874. Many other types of machine followed. During 1827, John Walker, a chemist of Stockton-on-Tees sold what he called 'Friction matches', about the development of which there is an article in this magazine.

Inventions and discoveries, both big and small, are now in great demand. Space projects and electronics have produced their share. Not long ago, as an example, the Americans were seeking a material harder than steel. A British inventor discovered how to make this and it was soon sold.

Perhaps the most famous scientist of early times was Leonardo Da Vinci of Italy (1452–1519) who discovered the laws of optics, gravitation, friction, heat, and light, and foresaw invention of the helicopter and the parachute. Certain writers have also added to scientific knowledge. Jules Verne of France, wrote "Five Weeks in a Balloon", "Twenty Thousand Leagues under the Sea", "Around the World in 80 Days", also "From the Earth to the Moon". (1870–1873) H. G. Wells, a British writer wrote: "The Time Machine", "The War of the Worlds", "The First Men in the Moon", and certain short stories. Both these authors showed remarkable foresight and undoubtedly caused scientists to think about the possibilities of their ideas.

As readers will readily appreciate—*MECCANO* means: "A SET OF MINIATURE PARTS FROM WHICH ENGINEERING *MODELS* CAN BE CONSTRUCTED". (Concise Oxford Dictionary). All kinds of Models have been constructed, including Fair-ground Engine, Eiffel Tower, Optical Telescope, etc. Usually, inventions or discoveries come from those interested in certain trades or professions, or subjects as Chemistry, Physics, General Science, and Electronics etc. Another important point about this work is that a *drawing* of a *MODEL* is essential, showing all parts in proper perspective as Plan, End Elevation, Side Elevation etc. Books on this subject covering Machine Drawing, and Workshop Drawing are available from various publishers.

A Working Model Rowing Boat

A simple electric-powered rowing skiff which draws a crowd wherever it appears.

By Philip Connolly

This full-size plan originally appeared ten years ago in 'Model Maker' and we have had many requests to reprint it.

PERHAPS one of the most amusing model boats to watch on the water is a working rowing boat. This little 10 in. model will run off $1\frac{1}{2}$ v. and with 3 v. battery the man really does work hard.

The motor used is a Kako 01 bolted to the front seat with two cells from a Bijou battery under the rear seat. These can be disguised by covering them with boxes and the people in the boat. The motor draws a current of under $\frac{1}{2}$ amp and this should give quite a long running time. Miniature accumulators such as Deacs could be used if they are available, and would give a still longer run.

As the heart of the boat is the motor and gearbox, the construction of this will be described first. The gears needed are a 40 : 1 worm and pinion set, a 10 tooth and a 30 tooth pinion. These are all nylon gears made by Ripmax. The worm gear can be fixed to the motor shaft by tinning the shaft with solder, and pushing the gear on while the shaft is still hot. Alternatively epoxy resin or any impact glue could be used. Cut out the two halves of the gearbox and drill the holes in the motor baseplate 8 B.A. clearance size. The centres for the $\frac{3}{32}$ in. holes are shown with crosses. These should be drilled as accurately as possible to prevent the gears from binding. Bend both parts of the gearbox along the dotted lines to give the shapes shown in the sketches. Fit the gears on $\frac{3}{32}$ in. brass shafting into the gearbox. Solder or bolt the two parts of the gearbox together making sure that when the motor is held on the baseplate the worm gear engages the pinion. This is not very critical as the baseplate can be bent or the motor packed up with washers to obtain the best alignment.

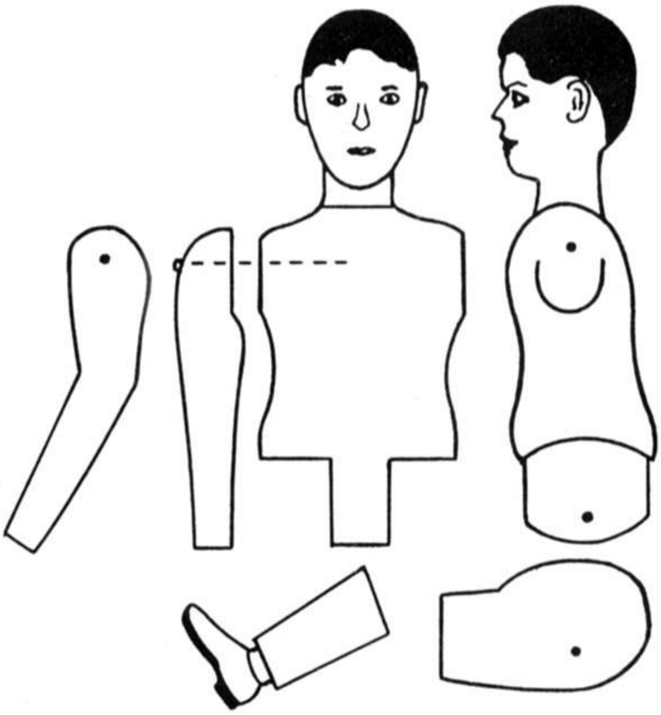
The shaft with the 30 tooth gear has cranks soldered on either side of the gearbox. These are made from tinplate and 8 B.A. bolts.

Hull Construction

The model is built almost completely from $\frac{1}{16}$ in. balsa. Cut out the keel, deck pieces and bulkheads and glue them together inverted on a building board. B1 and B4 should be packed up $\frac{3}{32}$ in. and B2 and B3 $\frac{3}{16}$ in. above the board. This is to give the correct sheer. As the bulkheads have to be cut away almost completely, it helps to cut along most of the dotted line shown on each bulkhead before assembly. Glue the keel support in at the bow and cut out the two bottom skins. Fit these on together using a rubber band over them at the bow as well as pins to hold them in place. When thoroughly dry remove the model from the board, and cut out two side skins. These are almost as shown on the side view of the boat. They may be given a curve by steaming, or, if the wood is soft, by rolling a piece of $\frac{1}{2}$ in.–1 in. dowel over one side of them. Fit the side skins and sand the hull down gently. It should now be tissue covered with lightweight Modelspan, doping this on with aircraft dope. Now remove the centres of the bulkheads.

Bolt the motor and gearbox to the front seat, which is best made from $\frac{3}{32}$ in. balsa as this is slightly more rigid. The rear seat and footrest can be made from $\frac{1}{16}$ in. balsa. Paint the inside of the boat and glue two seats into the hull together with the gearbox and motor.

The oars are made from $\frac{1}{8}$ in. dowel with $\frac{1}{32}$ in. ply blades. The size of the blades could possibly be increased, if the gearbox is well made, and this would increase performance considerably. The rowlocks are shown in the sketch. Two pieces of $\frac{1}{8}$ in. sq. hardwood or $\frac{1}{8}$ in. dowel are needed for each rowlock. Drill a $\frac{1}{32}$ in. hole in each piece to take the T-shaped bearer. A $\frac{1}{32}$ in. hole also has to be drilled in each oar in the same plane as the blades. The position of this hole is shown approximately on the plan, but its exact position should be marked from the particular model. The screw eyes on the end of each oar slide over the two 8 B.A. bolts, and the hole for the T-piece should be positioned such that the screw eye neither slides off the bolt or binds against the other end. The T-shaped bearers can be made from $\frac{1}{32}$ in. brass or steel split pins. Push the pins through the holes in the oars, separate the ends and bend them as shown on the plan. An alternative method is to use a dressmaking pin, and solder a second pin to it to form the T-shape. The head of the pin is again used to stop the oar coming off. The $\frac{1}{8}$ in. sq. rowlocks fit into two holes cut in the deckpiece.

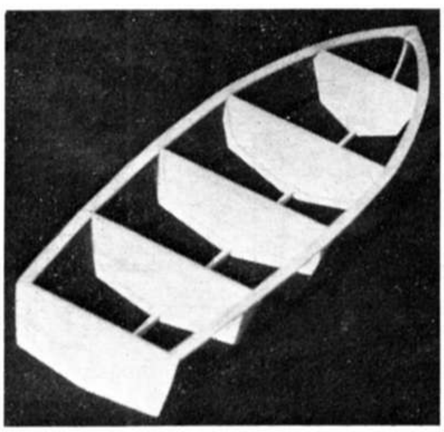


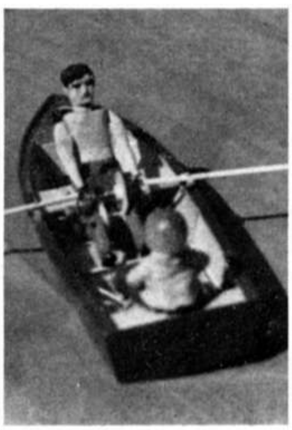
Figures

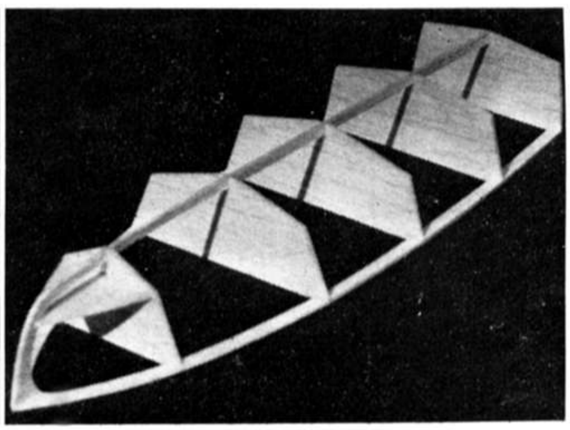
The approximate shape of the oarsman is shown in the diagram. Carve the head on the end of a block of balsa $\frac{3}{4}$ in. sq., being careful not to make it too small. The body is also carved from block balsa and hinges at the thighs. Glue the thighs to the front seat, making sure that the body is free to pivot about the pin. The feet are glued to the $\frac{1}{16}$ in. balsa footrest and rest against the edge of the gearbox. The arms pivot at the shoulders, again using pins, and are loosely tied to the ends of the oars with thread. Paint the figure, making sure no paint is allowed to stick the joints. The girl in the back seat was made from a little doll, but she could be made in the same way as the oarsman. Her legs and dress cover the batteries under the rear seat.

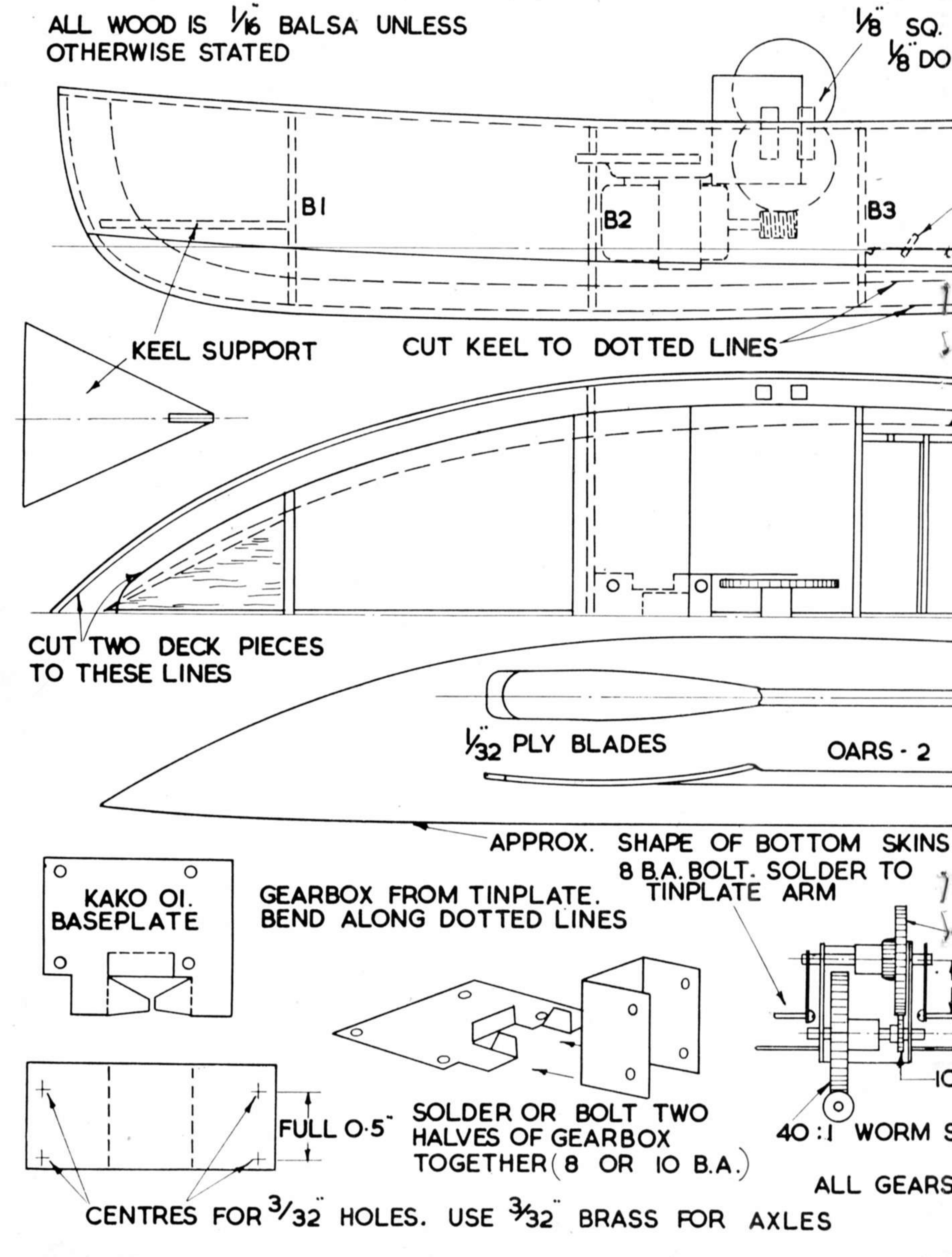
A box under the forward seat hides the front of the electric motor. The switch consists of a pin on one of the motor leads. This is pushed between the cardboard case of the battery and the battery itself to make contact, the other wiring all being soldered in place.

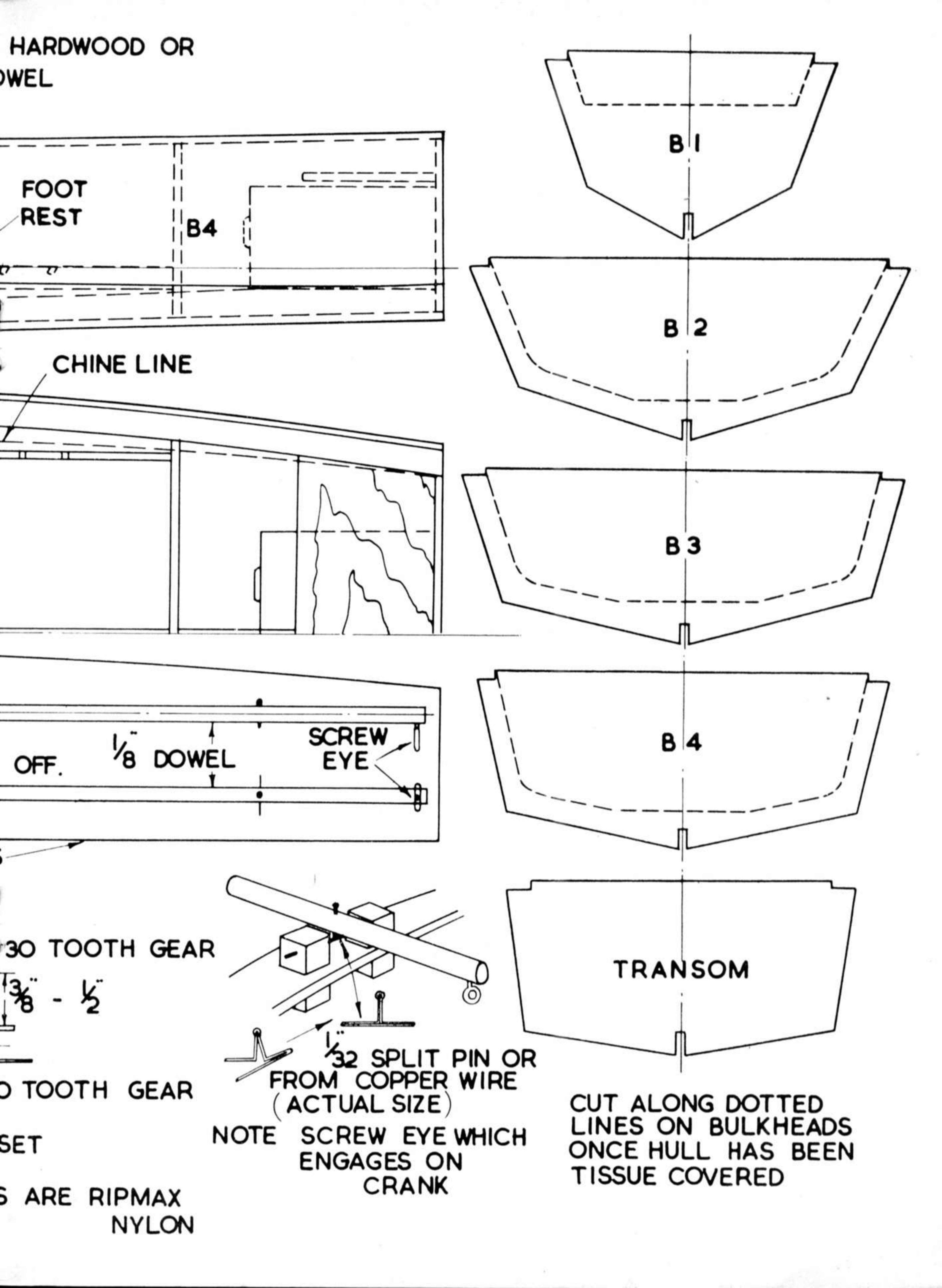
In conclusion, make the gearbox and the joints free, and you will have a boat which although not fast is interesting to watch, especially in the neighbourhood of other moored models.








ALL WOOD IS 1/16" BALSA UNLESS OTHERWISE STATED
1/8" SQ.
1/8" DO
B1
B2
B3
KEEL SUPPORT
CUT KEEL TO DOTTED LINES
CUT TWO DECK PIECES TO THESE LINES
1/32 PLY BLADES
OARS - 2
APPROX. SHAPE OF BOTTOM SKINS
8 B.A. BOLT. SOLDER TO TINPLATE ARM
KAKO 01. BASEPLATE
GEARBOX FROM TINPLATE. BEND ALONG DOTTED LINES
FULL 0·5"
SOLDER OR BOLT TWO HALVES OF GEARBOX TOGETHER (8 OR 10 B.A.)
40 : 1 WORM S
IO
ALL GEARS
CENTRES FOR 3/32" HOLES. USE 3/32" BRASS FOR AXLES


HARDWOOD OR
OWEL
FOOT
REST
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S ARE RIPMAX
NYLON
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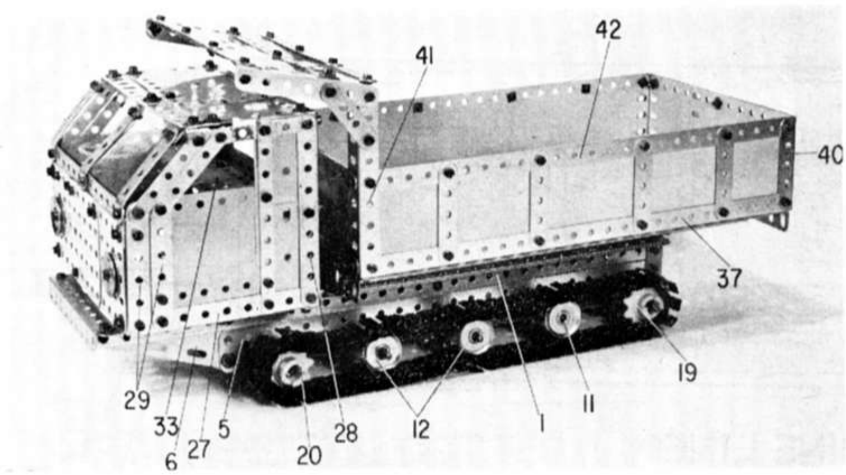
FROM COPPER WIRE
(ACTUAL SIZE)
NOTE SCREW EYE WHICH
ENGAGES ON
CRANK
B 1
B 2
B 3
B 4
TRANSOM
CUT ALONG DOTTED
LINES ON BULKHEADS
ONCE HULL HAS BEEN
TISSUE COVERED

A caterpillar-track cross-country vehicle based on the full-size Flextrac-Nodwell FN110



Making use of the Meccano Caterpillar Track Pack, this ruggedly appealing model follows the layout of the Flextrac Nodwell type FN110 vehicle, which can take almost any surface in its stride.

Tracked for Tough Terrain

SAYS 'SPANNER' OF THIS ADVANCED MODEL

SLEEK, intricate and streamlined models are very appealing in their place, and I am among the first to appreciate them, but now and again I really do like to see a big, chunky, "monster". Some people might regard such models as ugly, yet I often think they have their own particular beauty—in an aura of brute strength and power!

Featured here is a model which undoubtedly falls into the latter category. Tracked for tough terrain, it is based on a Flextrac-Nodwell type FN110—a rugged cross-country vehicle designed to carry loads over the worst kind of ground from rocky wastelands to muddy swamps, or treacherous ice-fields. The real thing, in fact, will climb gradients in excess of 60 degrees and can manage a 30 degree side-tilt without any trouble. It can be fitted with various tracks to meet "any conditions" and already has an impressive record of operational successes in many countries behind it to prove its capabilities.

From the Meccano modeller's point of view it is an ideal vehicle, not only because its rugged shape lends itself perfectly to reproduction in Meccano, but also because its tracked characteristic offers an excellent opportunity for using Meccano Caterpillar Track Pack. Needless to say, this is what our model-builder has done—with very realistic results. The model runs well and also incorporates working steering, controlled by a steering wheel instead of the more usual lever-steering found on most tracked vehicles. We do not know the system used on the real FN110, by the way, but the average tracked vehicle is steered by braking one or other track, while allowing the non-braked track to drive the vehicle round. Our system relies on a simple but effective gearing system, as will be seen.

Chassis

The chassis is built up from two 15½ in. compound angle girders 1, each consisting of a 12½ in. and a 4½ in. Angle Girder. These compound girders are connected together at their forward ends by a 4½ in. Angle Girder and, at their rear ends, by a 3½ × 2 in. Double Angle Strip 2, each securing Bolt in the latter case also holding a 1½ in. Strip 3 in position. Bolted between Strips 3 at each side are two further 3½ × ½ in. Double Angle Strips 4, the securing Bolts also fixing a 12½ in. Flat Girder 5 in place. The forward ends of Girders 5 are connected by another 3½ × ½ in. Double Angle Strip, each securing Bolt in this case helping to hold in place a 3½ × 1½ in. Triangular Flexible Plate 6 which is also bolted to compound girder 1. Counting from the rear end, Flat Girders 5 are further connected through their sixth, ninth, fourteenth and sixteenth holes by four more 3½ × ½ in. Double Angle Strips, arranged as shown and numbered 7, 8, 9 and 10 respectively. Note that the Bolts fixing Double Angle Strips 7 and 8 in place also fix a Double Bent Strip to the outside of each Flat Girder, while the Bolts securing Double Angle Strip 9 help to fix a strengthening 1½ in. Strip between the insides of the Flat Girder and compound girder 1 at each side. Held by Collars in the Double Bent Strip and the Flat Girder is a free-turning 2 in. Rod carrying a 1 in. Pulley 11 which will serve as an "idler" wheel for the tracks. Further idlers are provided by additional 1 in. Pulleys 12, fixed on two 6 in. Rods journalled in Flat Girders 5.

Now bolted to Double Angle Strips 9 and 10 is a Motor-with-Gearbox, output shaft rearwards and set in the 60:1 ratio. A 1½ in. Strip 13 is added to the shaft, followed by a ¾ × ¾ in. Pinion. This Pinion is in constant mesh with a 50-teeth Gear Wheel 14 fixed on a 6½ in. Rod, free to slide in the centre holes of Double Angle Strips 7 and 8 and lower Double Angle Strip 4, as well as in the lower hole in Strip 13. Stops to prevent the Rod sliding so much that Gear 14 disengages with the ¾ × ¾ in. Pinion are supplied by two Collars, one fixed on the rear end of the rod and the other between Double