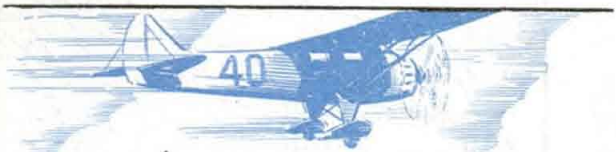
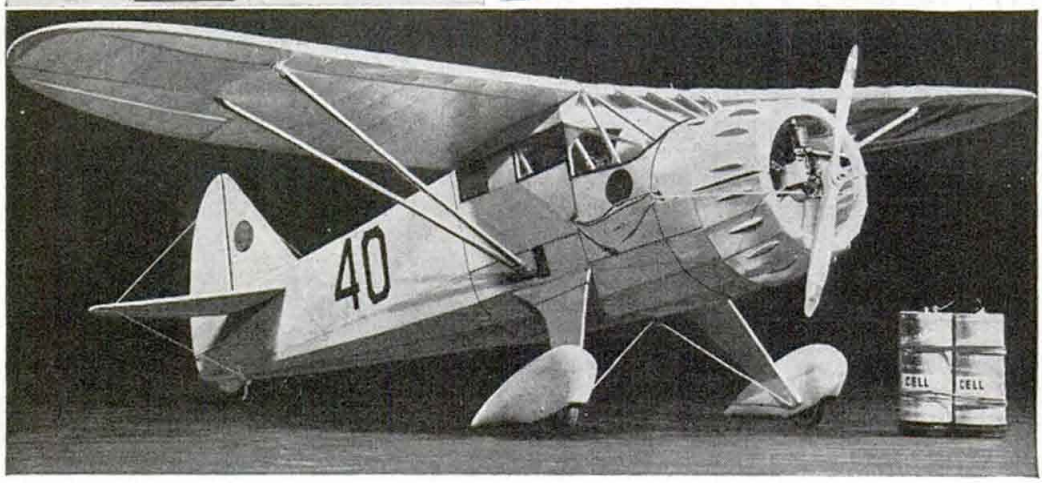
Model GAS-DRIVEN



by JOE OTT



Here's an exact scale model of a famous racing monoplane, "Mister Mulligan," winner of the Bendix Trophy and the Thompson Trophy races at the 1935 National Air Races. Recently the original speed plane set a new record in flying from Chicago Airport to Floyd Bennett Field on Long Island in 2 hours, 45 minutes. The model is scaled down to a wingspread of 66 in., and is driven by a tiny single-cylinder gasoline motor swinging a 15-in. propeller at 3,000 r.p.m. Under good flying conditions the model will attain a speed of approximately 18 m.p.h. The total weight of the model ship ready to fly is 3½ lbs., or 56 ounces

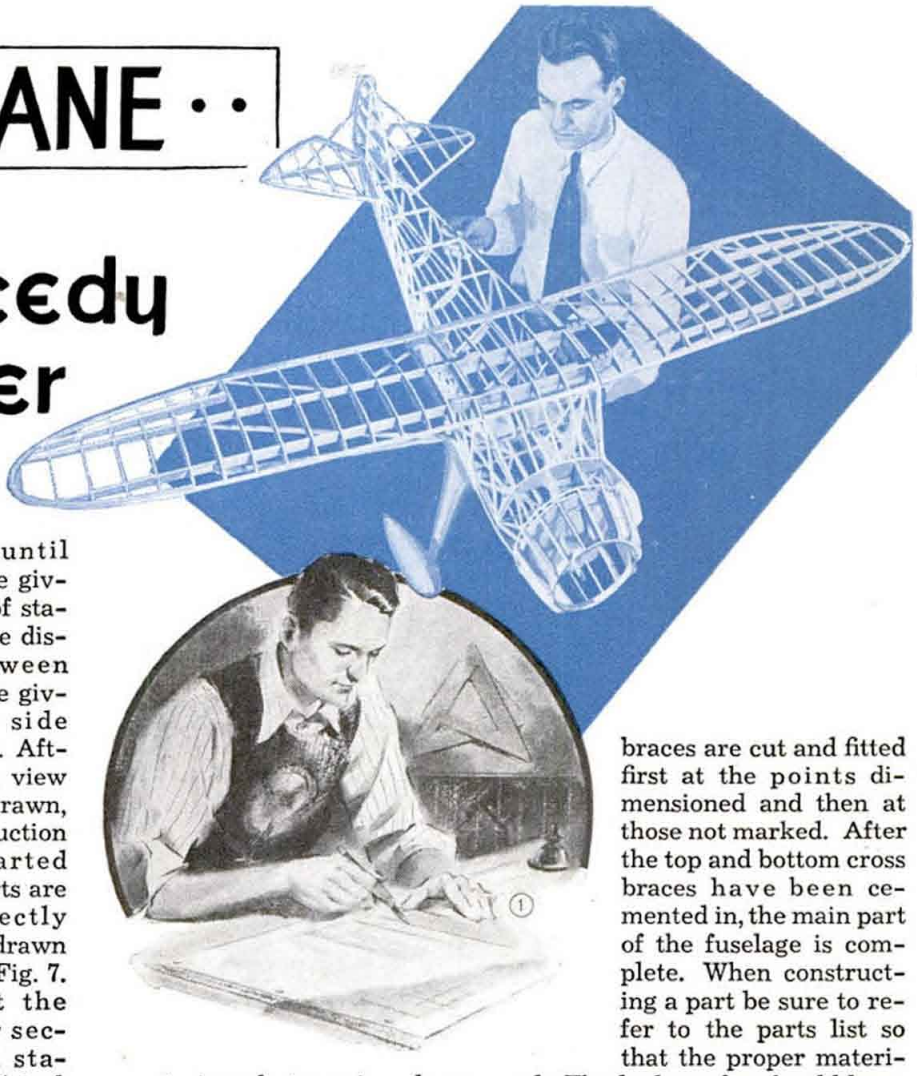
Part I—Fuselage Framework and Landing Gear

ALTHOUGH it was a great thrill to fly your first rubber-band model plane, it's nothing compared to the realism of flying a gas-driven model! Midget gasoline motors that develop from ⅛ to ⅕ hp. will fly readily a 5 to 8-ft. plane weighing up to 5 lbs. The average cost of the motor is about $15.00 and all the materials needed to build the model of "Mister Mulligan" cost around $3.00.

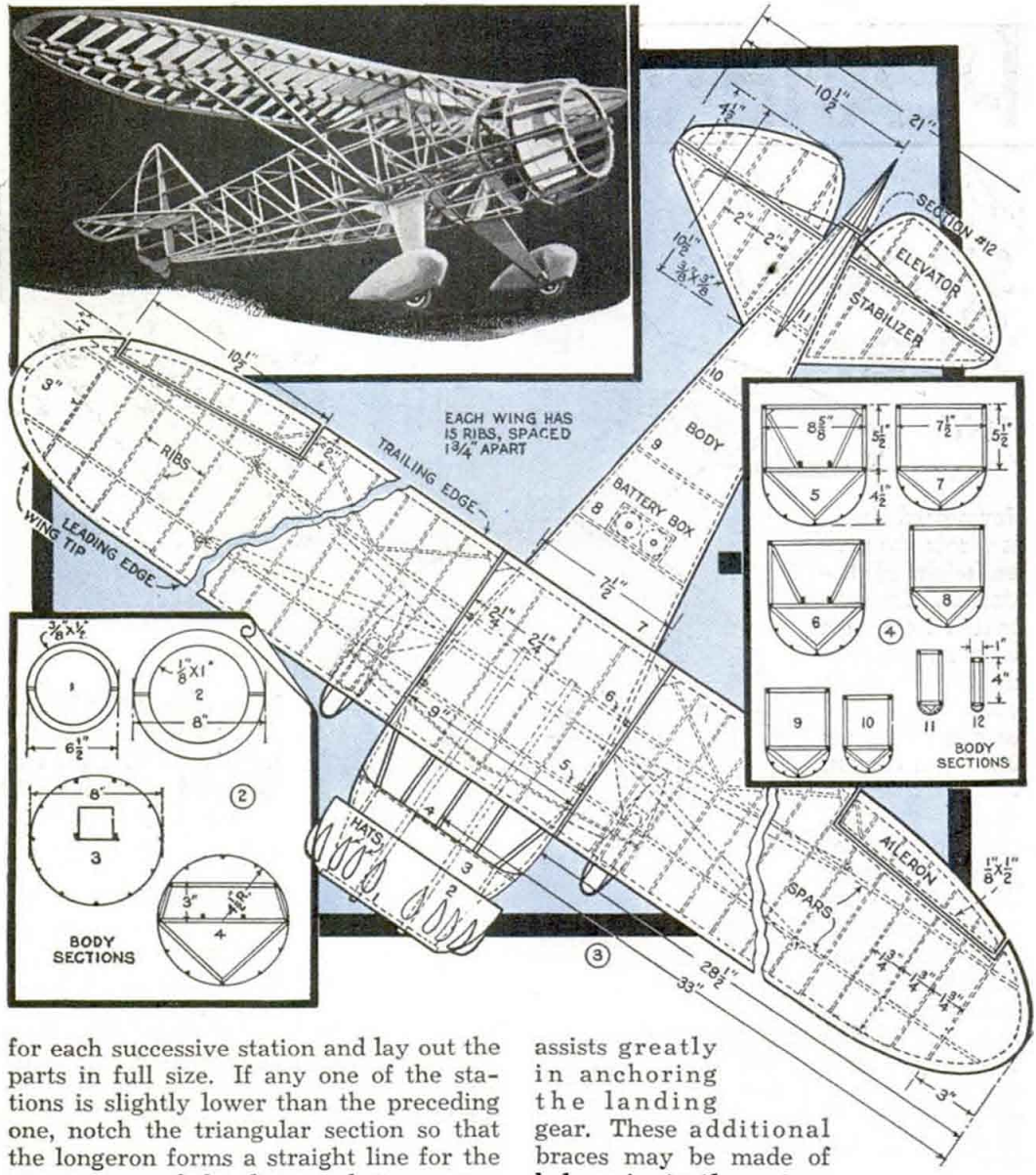
Before proceeding with any of the details, it's a good idea to become familiar with the entire general construction of the model. When the actual construction is started, go thoroughly and completely in detail over the particular unit being assembled. Then lay out in single lines a full-size drawing of the fuselage, landing gear and tail wheel as in Fig. 1.

Fuselage: Looking at Figs. 2, 3, 4, and 8, begin with the center line which is the bottom longeron and which is the main longitudinal member in the body. One body height is given in the cross sections at station 5. This height continues through stations 6 and 7. From here through to station 12 there is a gradual taper above the center line. The top longeron tapers

PLANE ·· is speedy flyer

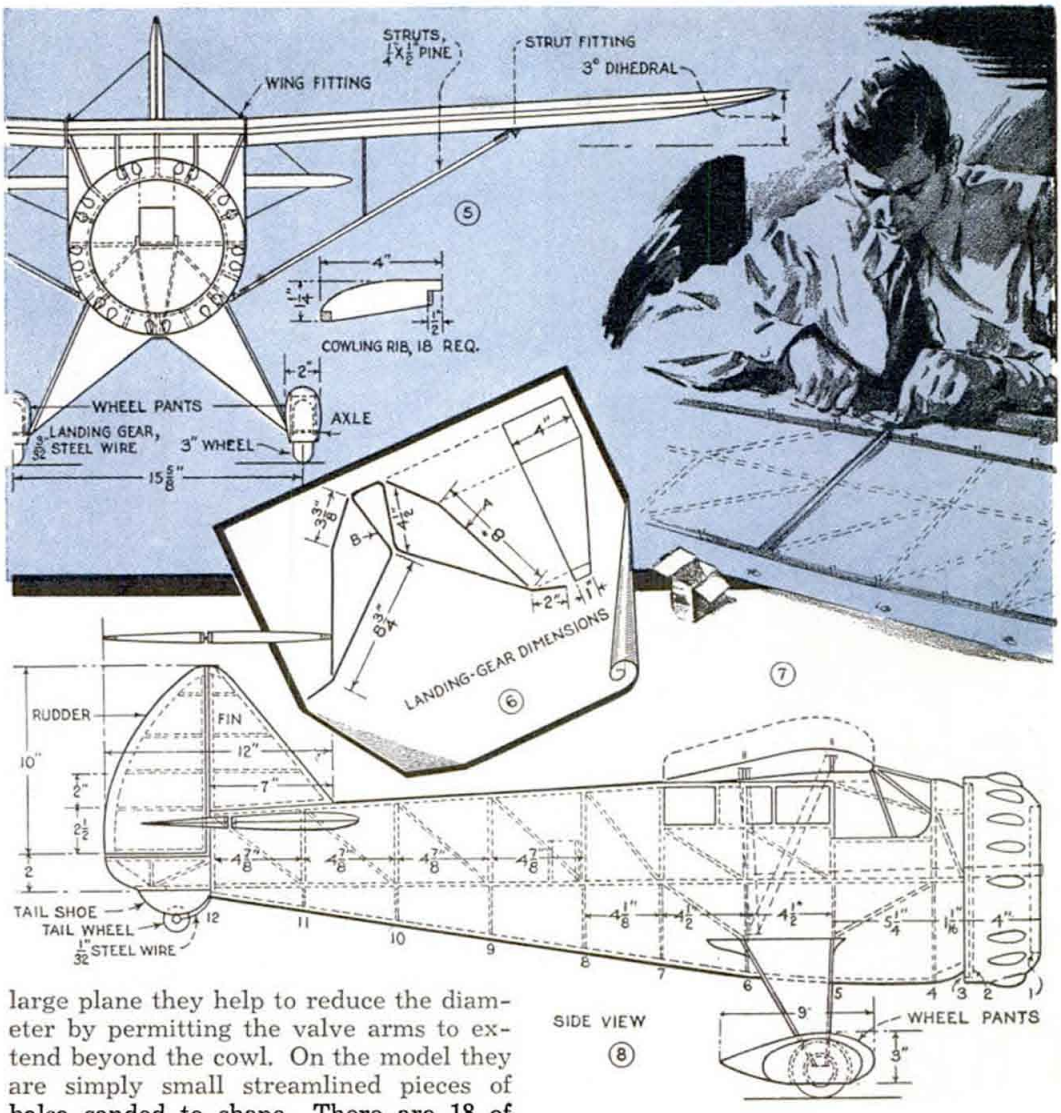


downward until it meets the given height of station 12. The distances between stations are given in the side view, Fig. 8. After the side view has been drawn, the construction can be started and the parts are placed directly over the drawn lines as in Fig. 7. Note that the heights for sections from stations 8 to 11 incl., are not given but must be checked on the full-size layout. The top and bottom longerons are placed in position, working directly over the center of the lines. Pin the longerons in place. When the uprights are fitted between the longerons they will tend to force the longerons against the pins, firmly holding them in position. Two sides exactly alike are constructed, one directly over the other, and separated with wax paper. This done, you make a full-sized layout of the top of the fuselage. Check the top dimensions at stations 5, 7 and 12. Draw the lines tangent to these dimensions, permitting the rest to fall in line. After the two sides are dry, place them right side up and pin in a similar manner to the board as specified for the side view. The cross braces are cut and fitted first at the points dimensioned and then at those not marked. After the top and bottom cross braces have been cemented in, the main part of the fuselage is complete. When constructing a part be sure to refer to the parts list so that the proper materials are used. The body so far should have been constructed entirely from bass wood or sugar pine. Sand all pieces before cutting to exact length. Balsa wood can be used throughout for the construction, but for the additional few ounces of weight, pine or bass wood gives greater strength and resiliency. From the bottom longeron to the extreme bottom of the fuselage the construction will be 1/16-in. sheet balsa and 1/8-in. balsa bracing, with a center piece of pine or bass running the full length from station 4 to 12. Note that a triangular section is built up underneath each station and small semi-circular pieces are added to complete the circular shape of the underside. At points not dimensioned, check the distance across the lower cross brace, then draw a circle equaling this diameter



for each successive station and lay out the parts in full size. If any one of the stations is slightly lower than the preceding one, notch the triangular section so that the longeron forms a straight line for the greater part of the distance between stations 6 and 12 and a slight gradual curve between stations 4 and 6. The motor supports, which are ¼ by ½-in. pine, should be fitted in on top of the bottom cross braces between the two lower longerons. The distance between these supports will depend entirely upon the motor selected. After the motor mounts have been placed, check the views of the model and note that the triangular braces from the top station 5 to the motor brace are added on each side. An additional triangular brace is placed between stations 4 and 5, which assists greatly in anchoring the landing gear. These additional braces may be made of balsa. A similar triangular brace is also placed on each side of the fuselage from the top down at station 6. This brace helps to eliminate side sway when the wings are in place. Additional bracing can be added by cementing small gussets in the corners on the main longerons at stations 4 to 7 inclusive. A gusset is a small flat triangular piece of balsa usually joining an upright, a cross brace and a longeron.

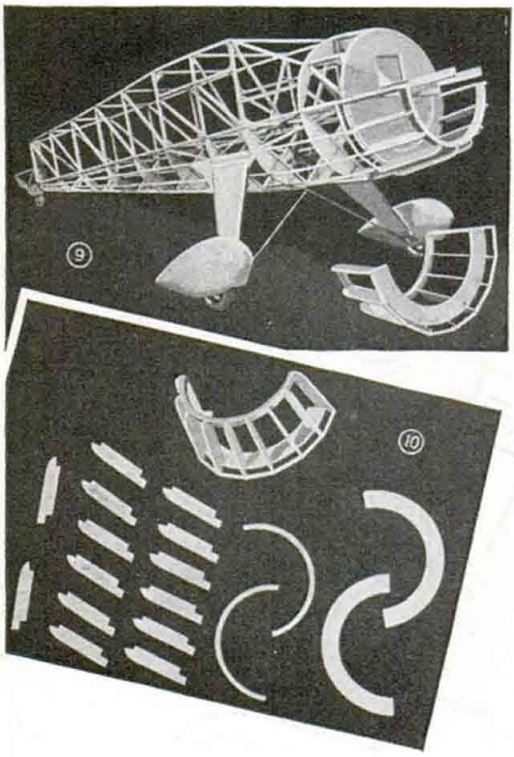
Motor Cowl: The small wooden streamlined sections cemented on top of the motor-cowl covering are hats and on the

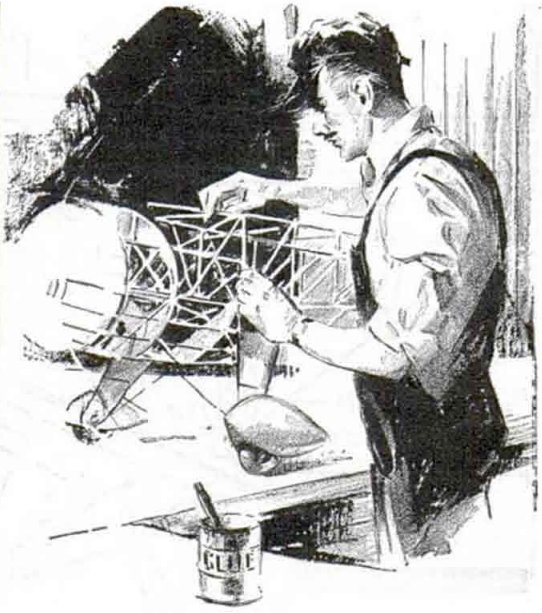


large plane they help to reduce the diameter by permitting the valve arms to extend beyond the cowl. On the model they are simply small streamlined pieces of balsa sanded to shape. There are 18 of these, equally spaced in pairs.

Stations 1 and 2 give the diameters and the cross-sectional sizes of the rings required for the motor cowl. Note in Figs. 9 and 10 that the front part of the body at stations 2 and 3 has a wall completely constructed of balsa wood. There is a small opening leading directly from station 3 to station 4 under the front of the windshield as in Fig. 2. This is a hot-air vent and is covered with balsa on all sides except the top. When the motor is entirely enclosed the hot air escapes through this vent. The motor cowl is constructed of two rings which are sawed from large flat sections of balsa, cemented together and assembled with 18 cowling ribs. The cowling is assembled in two halves. The lower half is firmly cemented in position and is a part of the body. The top half is loose and is held in place by rubber bands and removes in a jiffy, permitting complete examination and checking of the motor, the gas tank and the spark coil.

Landing Gear: The landing gear, Figs. 5 and 6, is constructed of 3/32-in. steel wire. The unit visible in the side view, Fig. 8, is made in one piece, but note that you must have a right and left unit. The center section is also made in one piece and continues through the wheel pants. The landing-gear frame is filled with 1/8-in. balsa sheeting and is attached to the motor mounts between stations 5 and 6, where it





is braced in a triangular fashion to the front and rear of the longerons. The braces run from the motor mount to the landing gear at station 5 on both sides. At the rear they run between stations 6 and 7. The center piece fitted directly underneath the fuselage is held together by a rubber band, the strength of which may be increased or decreased until the proper spring action is secured. Wheel pants are carved from balsa to the size given in Figs. 5 and 8. The wheels used are 3 in. in diameter, and from ½ to 1 in. wide. You can use either pneumatic or solid wheels.

Rear Fuselage: The tail wheel is placed in a small shoe at the rear of the fuselage, the mounting being constructed from two pieces of balsa cemented to the rear of the body. A 1/32-in. wire passes through the center of the wheel and back to the upright at station 12. The wheel is 1 in. in diameter and is turned from hardwood. The small rigid section directly above the tail wheel is cemented in position and conforms to the general shape of the rudder. The width of the body at station 12 is 1 in., and the rudder rib at the lower end should conform.

(To be continued)

MATERIAL LIST

FUSELAGE	DIMENSIONS	NO. PIECES
Longerons, cross braces and uprights	5/32 x 5/32 x 42 in.	12 pine or basswood
Cross braces	5/32 x 5/32 x 42 in.	12 balsa
Motor supports	¼ x ½ x 18 in.	2 pine or basswood
Body formers	1/16 x 2 x 24 in.	6 balsa
Stringers	⅛ x ⅛ x 42 in.	12 balsa
MOTOR COWL		
Circular ring—front cut to shape	⅜ x ½ in.	1 set balsa
Circular ring—rear cut to shape	⅛ x 1 in.	1 set basla
Cowling ribs	1/16-in. sheet 3 x 24 in.	1 balsa
LANDING GEAR		
Bracing and axle	10 ft. of 3/32-in. piano wire	1 steel
Wheels	½ x 3 in. diameter	2 hardwood
Tail wheel	3/16 x 1in. diameter	1 hardwood
Wheel pants (cores)	¾ x 4 x 10 in.	2 balsa
Wheel pants (covers)	⅛ x 3 x 7 in.	4 balsa
Landing-gear struts	⅛ x 4 x 7 in.	2 balsa