CHAPTER 15

MODEL ACCESSORIES

WHEN the painting of an exhibition model has been completed, many builders make the mistake of considering it a finished job. They forget the necessary accessories which often mean the difference between first and second honors. A fighting plane requires machine guns quite as much as a peace plane requires license numbers. Bombs hanging under a bombing plane are quite as important as the proper insignia painted on its wings and fuselage.

Many finely constructed models have failed to take first honors at meets because the builder failed to complete his job by adding details.

COCKPITS. On all exhibition models with cockpits cut out, an instrument board, windshield, rudder bar, joy stick, and seat should be added. If you do not intend to do this, leave the model without a cockpit.

Fig. 87 shows four of these additions. Most of them can be purchased, but they are so simple to build that any model builder should make his own. The *instrument board* of a built-up model is usually located on the upper portion of the fuselage former situated directly in front of the cockpit. On solid scale models, it is located on the forward wall of the cut-out portion, which forms the cockpit. The dimensions of this should be taken and the instrument board drawn on paper to size. This is done by drawing circles on the paper, adding pointers, divisions, etc., and then filling in around the circles with black ink, as shown. This is then cut out and glued in place in the cockpit.

A *joy stick* can be sandpapered down from a match or balsa stick, and set in a small hole made in the floor of the cockpit. The *seat* is made of two pieces of 1/16″ or 1/32″ sheet balsa. Cut the seat out and bend a piece of balsa to fit its back curve. When dry, this is shaped and cemented in place. Three balsa sticks are cut for legs and cemented in position to the under side of the seat. The *rudder bar* is cut from sheet balsa, as shown.

When assembling these parts in the cockpit, the rudder bar should be attached first. This is placed in front of the instrument board and in the center of the floor board. It is pivoted on a model pin thrust through its

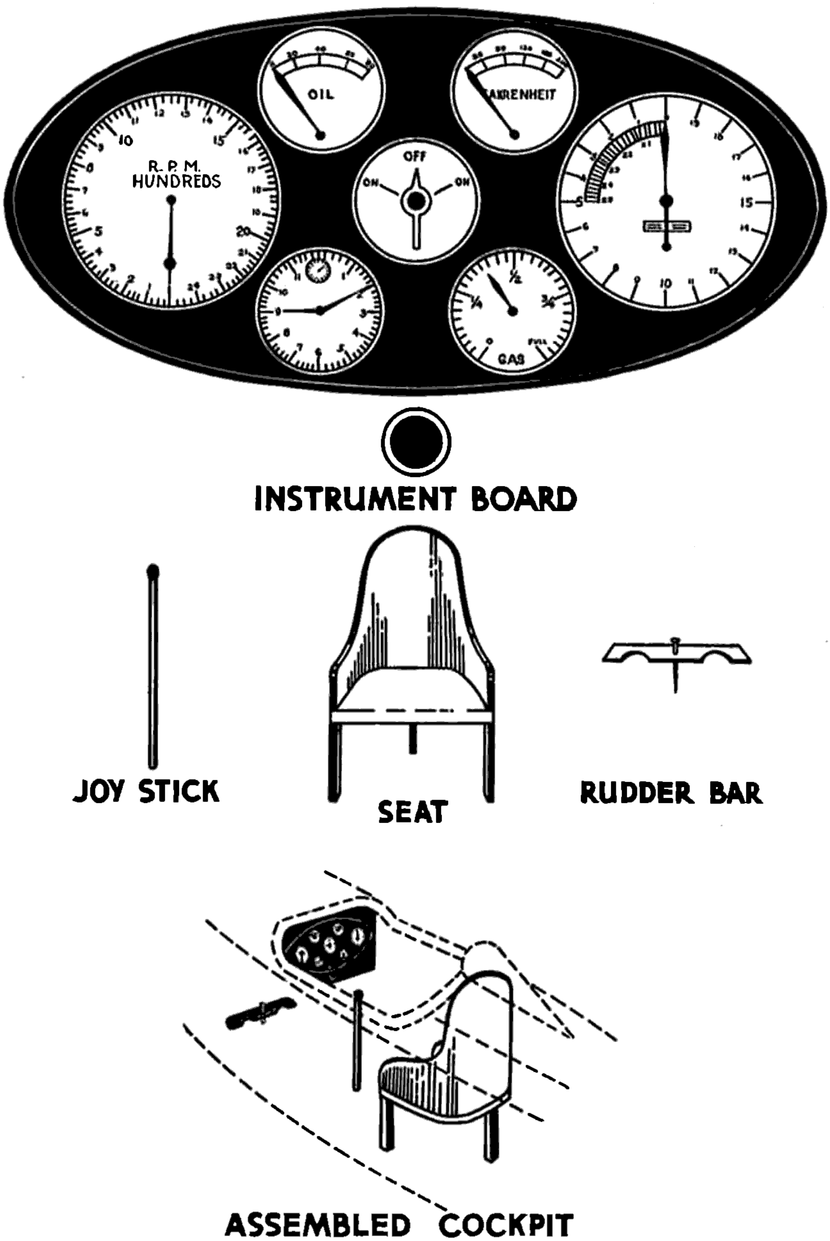


FIGURE 87. COCKPIT ACCESSORIES

center, as shown. This is followed by the instrument board, which is glued into position.

The seat should be painted before it is placed in the cockpit. As the majority of these are made of aluminum, give it two coats of aluminum paint. When dry, apply cement to the ends of each leg and also to the back. Place in position, and press the back of the seat against the back wall of the cockpit. The joy stick is added last. This may be painted black, brown, or white, as you wish. It is then placed in a shallow hole cut for it halfway between the edge of the seat and the instrument board. Make this hole in the floor board in line with the pin of the rudder bar, coat the end of the stick with cement and hold in place until dry. *Cushion seats* can be added for passenger planes, if you wish, by cutting cloth and gluing it to the seat bottom.

Study the assembled cockpit, as shown in Fig. 87, so that no mistakes will be made when assembling is done. If an additional touch is desired, the sides and floor of the cockpit may be painted any natural wood finish, or if the plane is metal, a coat of aluminum paint will give a realistic effect.

Windshields of various designs can be made from isinglass or sheet celluloid. The former is recommended. Most windshields do not require an edging, but when this is necessary one should be shaped from 1/64″ split bamboo which can be glued to the edge of the isinglass or celluloid. (See Fig. 88, "Cockpit Edging.")

MISCELLANEOUS. In Fig. 88 will be seen a number of interesting model accessories. Ideal *head rests* may be made from an upholstery tack, as shown. *Exhaust pipes* are easily made from soda straws cut to length, or if they require painting, short lengths of brass, copper, or aluminum tubing may be used. With the advent of *corrugated* metal planes, many builders have experienced trouble obtaining realistic effects. If balsa wood has been used, a strong comb can be used to get the corrugated effect of metal. Place a straight block of wood against the fuselage, and using this as a guide for straight lines, press the teeth of the comb into the soft balsa as it is drawn over the surface. The model is then painted with aluminum paint.

The *edge of cockpits* can be given a finished appearance by adding spectacle tubing, which can be purchased at any optician's shop. Cut a straight line along its length severing the tubing on one side. Apply cement to the inside of the tubing and force it over the edge of the cockpit. (See Fig. 88.)

BOMBS. Bombs are cut from balsa blocks and small fins of paper are cemented to their ends, as shown. From No. 5 or 6 piano wire, bend a small hook and cement it to the bomb as its balancing point. This is then hung

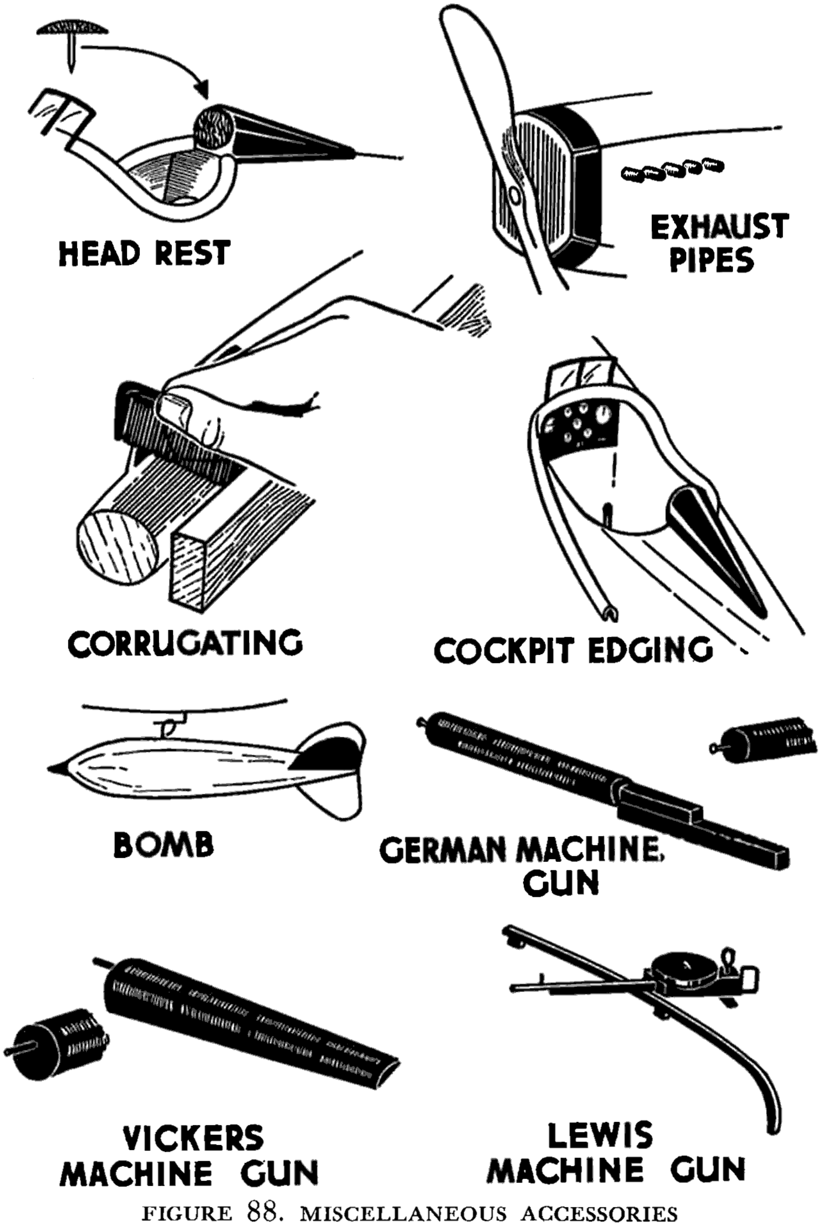


FIGURE 88. MISCELLANEOUS ACCESSORIES

on a small hook of the same wire cemented to the center bottom of the fuselage. When the plane climbs, the hook holds the bomb in place, but when it dives, the end of the holding hook points down and the bomb slides off. A model pin can be thrust into the nose of the bomb to act as a weight. The head is cut off, allowing the pin to protrude about 1/4".

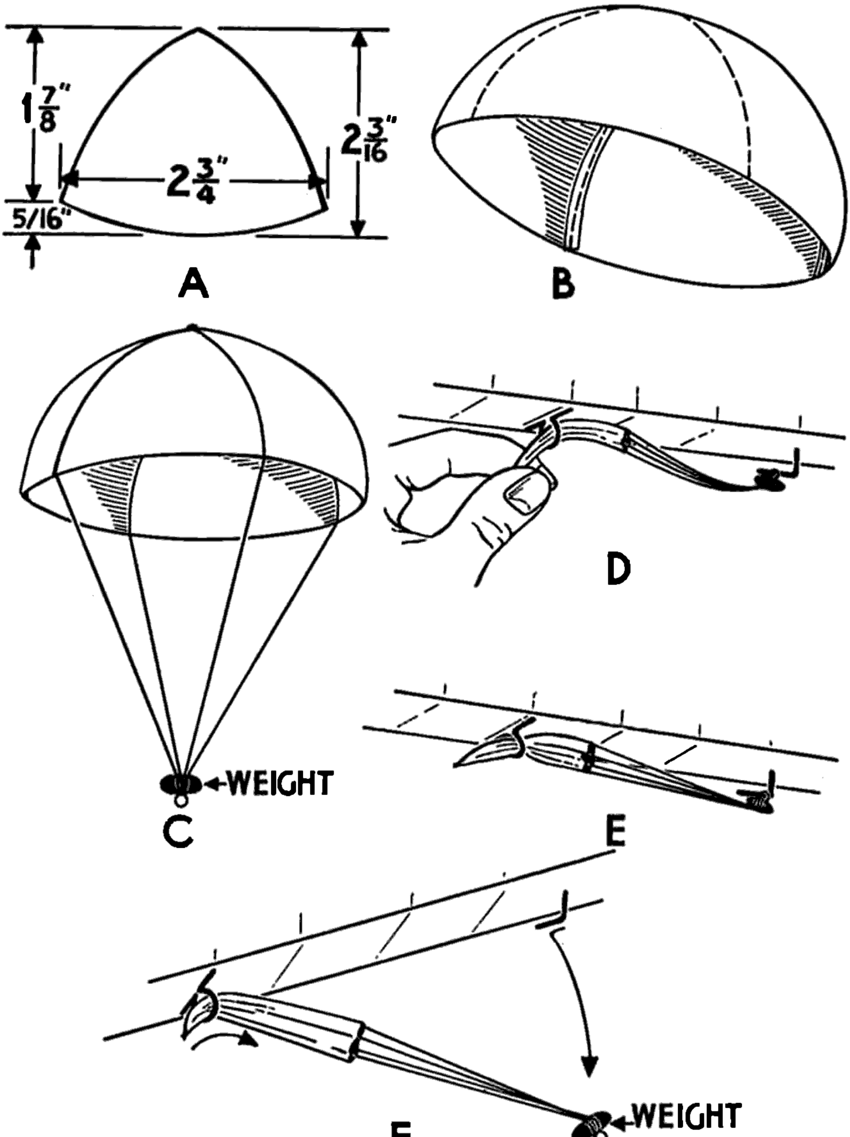
MACHINE GUNS. The three machine guns shown represent those most commonly used on War models. The German gun is used on all Fokker, Albatross, and Rumpler War planes. It is constructed of two pieces of balsa wood. The first piece is the barrel to which is cemented a standard to hold it off the fuselage. Small ventilation grooves are cut around the barrel, and the entire gun painted black. A small pin is used as the barrel, as in Fig. 88.

The Vickers gun consists of a round length of balsa wood with ventilation slots cut at intervals around it. A pin barrel protrudes from its end. As the majority of these guns extended from inside the cockpit to the outside top of the fuselage, they should be tapered, as shown, to obtain this effect. When cemented to the top of the fuselage just in front of the cockpit, they appear to pass through the top into the cockpit. They are painted black.

The Lewis machine gun is the father of them all. On some models this is placed in the observer's or gunner's cockpit. When used in this position on a model, it is mounted on a swivel mount.

For the S.E.5 in Chapter 49, the Lewis gun is mounted on a swivel mount extending from the top of the fuselage in front of the cockpit to the top of the upper wing. See the photographs of this model. A small square length of balsa wood represents the stock of the gun, while another cemented to it at an angle is the handle grip. A round piece of sheet balsa is cemented to the top of the stock to represent the bullet drum, and two large pins represent the barrel. A piano wire sight is added, and a wire handle on the end of the stock is used for directional handling. Another wire handle is added to the top center of the drum, completing the gun which is then painted black. The swivel is made of split bamboo, bent to form, and cemented to the top of the fuselage and the top of the wing with small elevation blocks placed under it to keep it raised off the surface of the wing.

PARACHUTES. Fig. 89 shows the making and attaching of a workable parachute. Four Japanese silk pieces, shown in A, are cut to shape. These are called "gores." Their edges are then sewed together with a running stitch, as shown in B. Silk thread should be used for the sewing as well as the shroud lines. The shroud lines are those running to the weight from the parachute.



MODEL PARACHUTE

FIGURE 89

These lines should be equal in length, meeting directly under the peak of the parachute, where they are tied to any weight sufficient to create a fall. BB shots, small dress weights, or any other type of weight can be used, as shown in C.

A unique method of assembling the parachute to the model is shown in D. A small length of piano wire is bent and attached to the under side of the fuselage or motor stick, so that its protruding portion will be parallel to the fuselage. Another piano wire part is then bent something on the order of a can hook, as shown. This should be just large enough to allow the parachute to be pulled through it, as shown in E, while the weight is attached over the first wire by means of a small wire loop made around the parachute weight.

While the model is flying level or while it is climbing, the apparatus will stay in the position as in E, but when the model glides down, the weight will slide off its hook and pull the silk through its hook, which will open the parachute, as shown in F. When assembling the model, hold it in the hand and point the nose down. If the assembly is correct, the weight will leave its hook, drag the silk through the forward hoop, and fall.

Every builder of exhibition models should have a number of dealers' catalogues handy, so that he can be familiar with the various accessories offered. These can then be copied and made by the builder or bought from dealers.

CHAPTER 16

THE ART OF FLYING MODELS

WHILE the builder may have designed and constructed an excellent flying model, there still remain four important steps to master before he can hope to make it fly to the best of its ability. These are proper wing adjustment, tail unit inspection, winding, and launching.

If the wing of a flying model is not correctly located on its fuselage, the model will stall or dive, either of which is disastrous to good flight. If the rudder and elevator are not perfectly straight and correctly located, the model may fly straight when circular flight is desired, or it may stall, dive, fly one wing low, side-slip, or do any number of undesirable things, any of which may ruin its flying possibilities.

If its motor is wound too much, the rubber will break, or if too few winds are given it, the motor will fail to give the propeller its maximum number of turns, which will cut down the model's endurance or speed in the air. The last of these four steps is one often given the least attention and yet it often proves to be the most important. If a model is poorly launched, its chances of a good flight are greatly lessened. As in real flying, the most ticklish and important part of any flight is the take-off, so do not handicap your model by a careless launching.

GLIDING METHOD OF WING ADJUSTMENT. The importance of proper wing location cannot be stressed too greatly. The wing location on a model can be found through an application of aerodynamics, as is done in real planes, but that would require such an amount of calculation for each model that the builder of today relies on the gliding method for obtaining this information. Its results are sure, while its method is simple.

When a model is being given this test, it must be complete with propeller and motor. If any accessories, such as bombs, parachutes, etc., are to be carried in flight, these, too, must be attached in place on the model before it is given the gliding test.

The model is then held between the fingers of the right hand at approximately its balancing point, with its nose pointing slightly down. It is launched with a slight forward motion of the forearm, and its performance

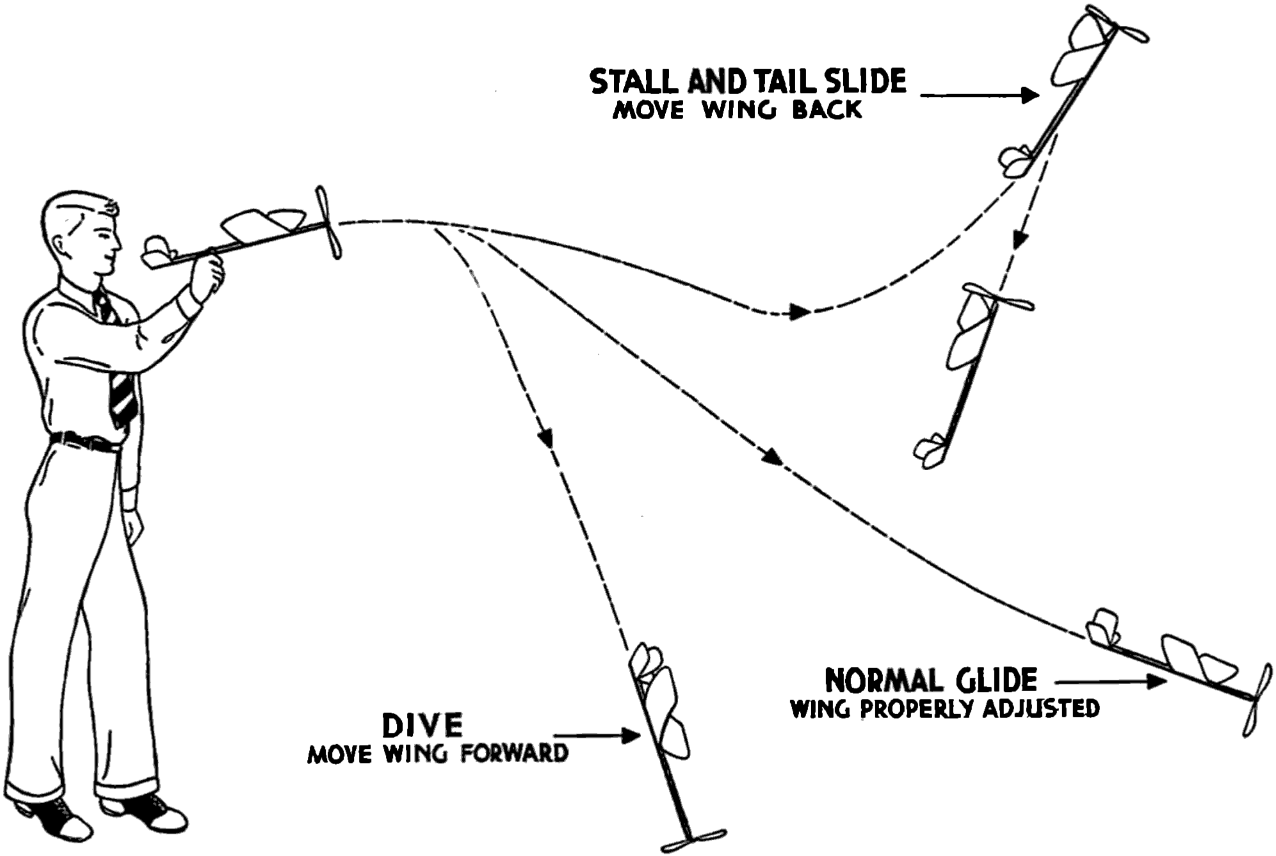


FIGURE 90. GLIDING METHOD OF WING ADJUSTMENT

carefully noted. In Fig. 90 are shown the three possible results of this test. If the model stalls, it indicates the wing is too far forward and must be brought back along the fuselage. After each adjustment, the model is again glided. If it should dive, the wing is too far back and must be brought forward along the fuselage. When a long, even, straight glide has been obtained, the wing location is correct. Mark the point on the fuselage. This mark will enable the builder to find the correct location quickly after the model has been dismantled, or in case it should strike an object in flight and its wing fly off. It is sometimes found that a new elevator or rudder, or a repair to a motor stick, will make a great difference in the location of the model's wing, so the model should be tested each time it is to be flown. Study Fig. 90 carefully and memorize its details, so that the adjusting of a wing becomes second nature.

TAIL UNIT INSPECTION. The elevator and rudder, which the author refers to as the model's tail unit, require attention before flight. On speed models, where straight, fast flights are required, inspect the rudder to see that it is perfectly straight in line with the motor stick, top stringer of the fuselage, or an imaginary line running fore-and-aft through the center of the fuselage. The elevator must be inspected to see that it forms right angles with the rudder, and that its main spars, if straight, are at right angles with the motor stick.

If the model is an indoor flyer, its rudder must be offset, as shown in Chapter 33, or, if a boom is not used and the rudder is attached directly on the motor stick, it must be slightly warped to one side, so that the model will fly in circles. Indoor models must be made to fly in circles, or they will travel the length or width of the room, strike a wall, and crash. As the rudder twist is increased, the circles of flight will become smaller.

If balsa and tissue construction has been used, breathing on the rudder will soften the structure enough to allow it to be bent a slight amount each time. If a heavy construction is used, the bend in the rudder must be built in.

WINDING. There are two methods of winding a motor. For models carrying light rubber, the hand method is used, but for all contest models, twin-stick pushers, and all others carrying heavy motors, a winder is used.

HAND WINDING. Hold the model in the left hand and with the right index finger twist the propeller around in the opposite direction from which it turns when in flight. The usual right-hand propeller turns clockwise when viewed from the rear, so it must be wound in the opposite direction, or counter-clockwise. Many methods have been propounded to calculate the breaking point of rubber motors, but none of these calculations can be counted on at all times. For this reason, the author recommends the winding of rubber by feel alone. When the rubber feels as if it had no more elasticity left, cease winding. Do not be afraid of breaking a few rubber motors, as it is in this way only that the proper feel of rubber can be learned.

WINDERS. These may be purchased from any model supply house, or they can be easily made. If purchased, the handle of the winder can be improved by adding a pistol grip, as in Fig. 91. Two wood sides are cut

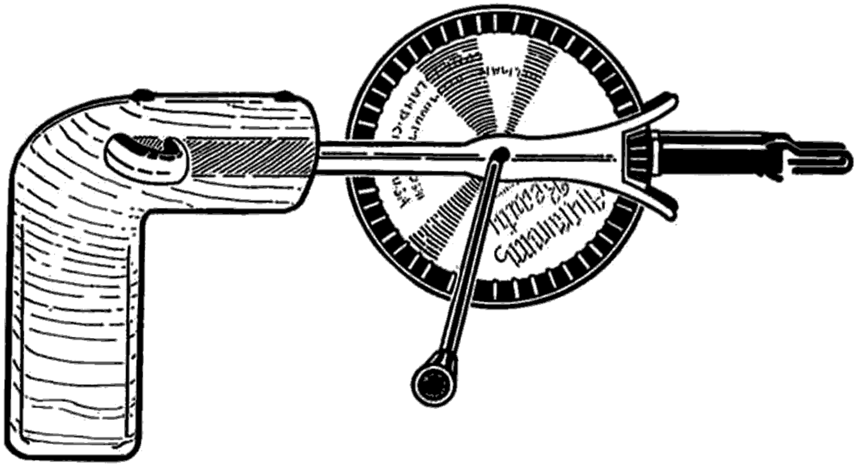


FIGURE 91. COMMERCIAL WINDER WITH HOMEMADE PISTOL GRIP

to shape and fitted to each side of the original handle. These are nailed or cemented together, and wood filler is used to fill in the wide space between the handle and the pistol grip. The assembly is then sandpapered until perfectly smooth. The handle can then be stained, painted, or left the natural shade of the wood.

The home-made winder, while not as strong as the manufactured article, is, nevertheless, strong enough for all average winding purposes. An egg-beater from your nearest five-and-ten-cent store can be quickly converted into a perfect winder, as in Fig. 92. With a hack saw, cut the extensions of the beater, as in A. The center core rod of each of these extensions is cut shorter than the stirring arms, as seen in B.

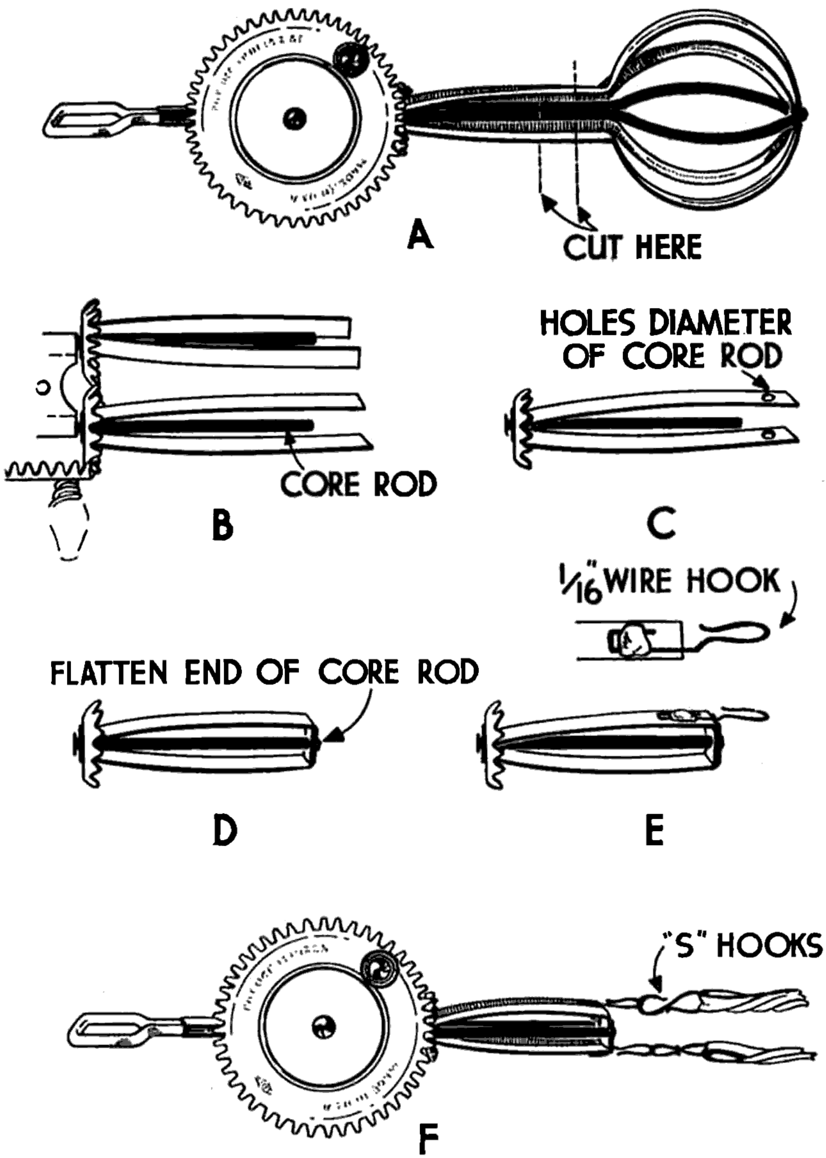
Two holes must now be drilled. These are drilled through the stirring arms close to their ends and must be the same diameter as the core rod, as in C. The ends of the stirring arms are bent over so that their holes fit over the end of the rod, as in D. The end of the rod is now flattened with a ball-pein hammer, or the arms are soldered in place on the rod. While C, D, and E show only one extension assembly, both of these extensions must be treated in the same way. Hooks are bent from $\frac{1}{16}''$ diameter wire, and soldered to the arms of the extension assemblies, as in E. Bend these two hooks, as shown in the enlarged illustration, and solder them in place, one on each extension arm. If you have no soldering outfit, your nearest carpenter, roofer, or hardware store will be able to do this for you.

The completed winder is shown in F. The great advantage of such a winder is that it can wind twin motors at one time, and insure both motors having an equal number of turns. It can also be used on single motors by attaching the hook of only one extension arm. As the two arms of the winder rotate in opposite directions, they are especially adaptable to twin pusher motors whose propellers turn in opposite directions. (See Chapter 9, "Right and Left Hand Propellers.")

To obtain the maximum number of turns possible in a rubber motor, the rubber should be stretched while being wound. For ordinary use, a motor can be stretched four times its own length. In other words, if the strands were 12″ long, they could be stretched to 48″ long and then wound. For contest work, where every second counts, this could be increased to 60″ with the motor used here as an example, or five times the motor strand length. Stretching rubber beyond that point is not recommended, as the rubber quickly reaches a point where its elasticity is lost.

When using a winder, two people are required. One holds the propeller shaft while the other handles the winder. The process is simple. Measure the length of your rubber strands. Unhook the rubber from its end hook, while your friend holds the propeller shaft firmly in his hand. Walk away from him a distance of four or five times the length of the strands, stretching the rubber as you proceed. Attach the rubber to the winder with the usual "S" hook. When reaching the proper distance, start winding the rubber, slowly walking toward your friend as you wind. Some experts prefer to wind the motor tight, then take a step toward their holder, wind again, take another step, and so on until the motor is fully wound.

This is all right for the expert but is not recommended to the novice. When the motor feels as if it could not stand another turn, stop winding! The end of the motor is then transferred from the hook of the winder to the end hook, while the propeller is carefully held. The model is then ready for launching. Always wind a rubber motor just before flight, as wound rubber quickly becomes "dead" when left under strain. Rest the rubber at least ten minutes between flights, so that it will have a chance to



EGG-BEATER WINDER

FIGURE 92

regain its energy. Many builders favor the prewinding of a motor. By "prewinding" is meant the winding and running of a motor before actual flight tests.

It is true that second windings are usually the most efficient, but as a model should be tested by actual flight just before being used in contests, the necessary winding of the motor for this test will serve quite as well.

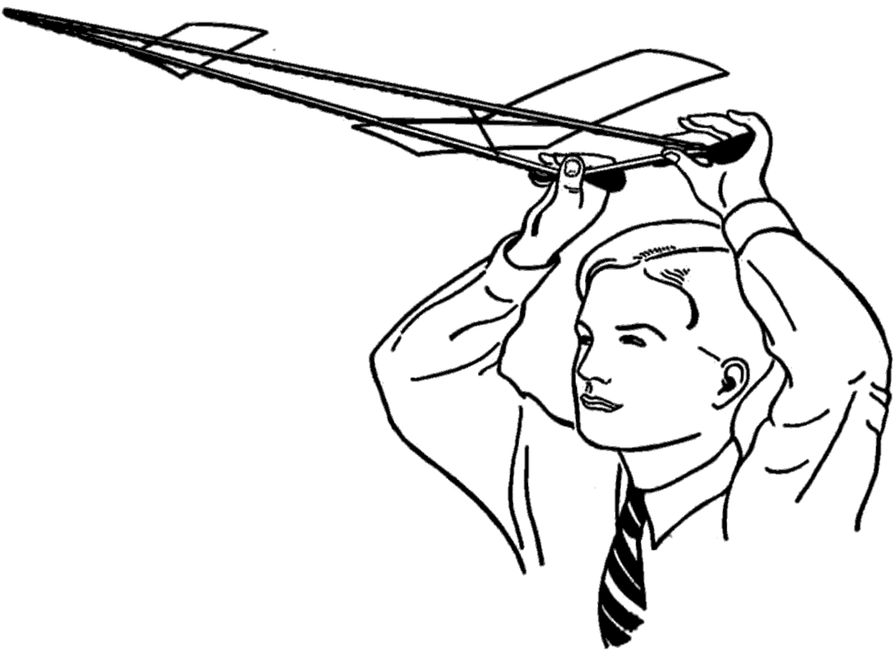


FIGURE 93. CORRECT LAUNCHING OF ENDURANCE TWIN-PUSHER

When prewinding a motor, never give it its full amount of turns. Save this for the judge's stop watch!

LAUNCHING. Every model requires individual launching. There can be no set rules governing all models. By this, we mean that each model will present different problems when being launched. Some models will prove best when facing a wind, others will give their best performance when no wind whatever is noticeable, while still others will show best with the wind on their tails. Some models must be launched slightly down, others with one wing slightly up, while still other models require other and different treatment.

The builder must determine the idiosyncrasies of his model by repeated launching, but there are certain fundamental laws governing every model launching which he should learn.

CORRECT LAUNCHING OF ENDURANCE TWIN PUSHERS. In Fig. 93 is shown the most common position used for launching a twin-stick pusher. The thumb and index finger of each hand grasp the beams of the A-frame just in front of the propellers which rest in the palms of the hands, as shown. This keeps the propellers from moving, and allows the launcher to release his model by simply opening his fingers. The model is held with its nose slightly raised and the propellers parallel with the ground.

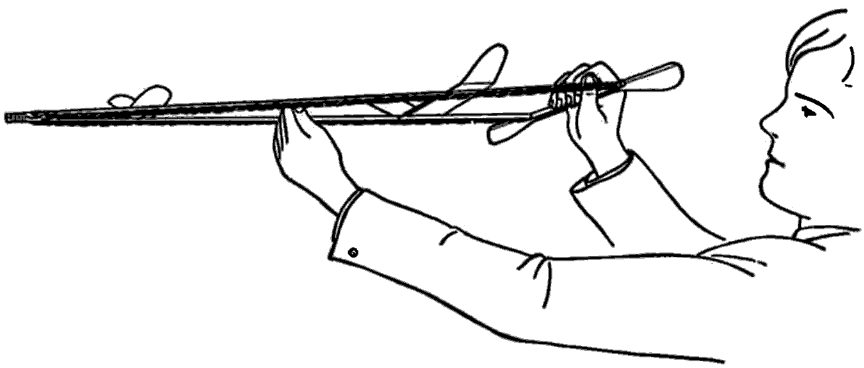


FIGURE 94. CORRECT LAUNCHING OF SPEED TWIN-PUSHER

The majority of builders launch their models from a position above their heads, but this is a question of choice. Some prefer to launch near the ground, getting down on one knee to do so, but this method is seldom used. The position shown in the illustration is the most popular today, but each builder should decide this question for himself from actual trials with his model.

The greatest consideration in launching a twin pusher is to be sure that both hands are released simultaneously, and that if any forward push is given the model, both hands are brought forward with equal strength, so that the model will not be launched with one propeller ahead of the other.

CORRECT LAUNCHING OF SPEED TWIN PUSHERS. Without a doubt, the most difficult model to launch properly is the speed twin pusher. In the first place, its propellers have been wound by such a strong motor that real strength is required to hold them before launching. In the second place, the action of a speed model is that of a bullet rather than an airplane, so that it will travel in a straight line in the direction in which it is facing when launched. Nothing can change its course. Wind currents have no effect on such a model, so the secret of launching a speed plane is to be able to hold its propellers and at the same time launch it in a dead straight line. This requires a hold on the propellers that can be released without jarring or moving the model. Fig. 94 shows the proper way to launch such a model. The hand is doubled loosely around the rear brace

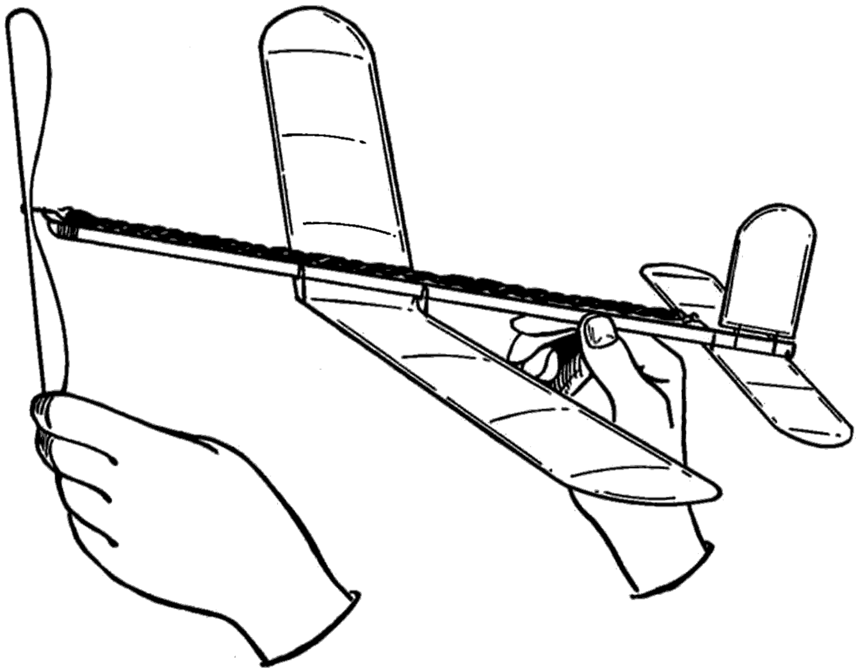


FIGURE 95. CORRECT LAUNCHING OF SINGLE STICK TRACTOR

of the A-frame, with the inner blades of the two propellers held in the palm of the hand, which is pushed against the brace. The other hand holds the model by its forward brace.

The model is then raised to eye level, so that the launcher can aim it at a distant point and at the same time see that the A-frame is perfectly parallel with the ground. When ready to release, the right hand is quickly opened wide, which releases the powerful propellers, and the left hand is dropped, sending the model on its arrow-like dash down the course. The builder must remember that he is holding in his hand a model capable of traveling a mile a minute, which is the speed that won the famous Barney Oldfield his reputation as a dare-devil automobile racer. You are not strapped into a seat with a powerful motor in front of you and four great wheels to carry you along, but actually holding in your two hands a machine that is able to break half the world's records in the days of that famous racer.

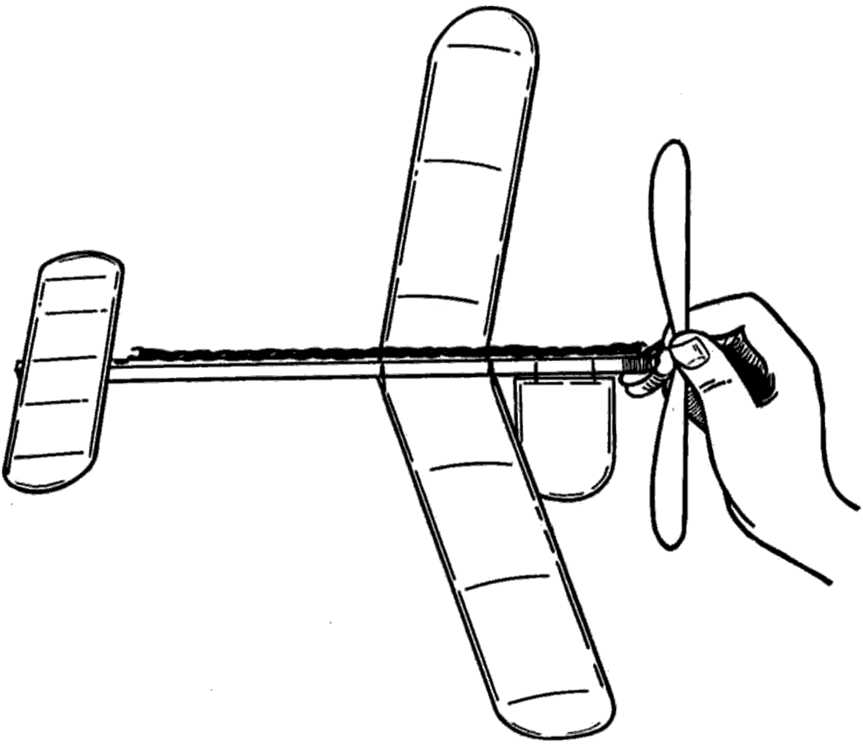


FIGURE 96. CORRECT LAUNCHING OF SINGLE STICK PUSHER

It is capable of producing a speed equal to the Twentieth Century Limited, so be careful!

CORRECT LAUNCHING OF SINGLE-STICK TRACTOR. When launching a single-stick tractor, the left hand holds the tip of one of the propeller blades, while the right hand holds the stick between the main wing and the elevator with finger and thumb. This is shown in Fig. 95. The model is given a slight forward push with the right hand, while the left releases the propeller. Such models may be launched with their nose slightly tilted up, or the entire motor stick can be held parallel with the ground.

CORRECT LAUNCHING OF SINGLE-STICK PUSHERS. Single-stick pushers, if small, can be easily launched with one hand. Hold the hub of the propeller between the thumb and index finger, which should also extend over the propeller bearing, as shown in Fig. 96. The middle finger rests under the motor stick and supports it. The launching consists of bringing the forearm forward and releasing the model. If the model is a large one, the left hand should be used to steady and support it at the front. Place the

FIGURE 97. CORRECT LAUNCHING OF R.O.G. MODEL

thumb and forefinger under the motor stick between the main wing and the elevator, and drop the hand away as the model is released by the right hand.

CORRECT LAUNCHING OF R.O.G. MODEL. In Fig. 97 is shown the correct position for launching any rise-off-ground or rise-off-snow model, whether it is a stick or fuselage model. The launcher gets down on one knee, places his left thumb and index finger over the tip of one blade of the propeller to keep it from turning. The right hand holds the trailing edge of the rudder in the same manner. No forward motion should be applied to an R.O.G. or R.O.S. model. It should simply be released, whereupon it will race across the ground and rise on its own power. The danger of applying forward motion to such a model is that the force may not be perfectly centered, in which case the model will start with one wing low or in another direction than that desired. Giving forward motion to such a model while on the ground causes more "ground loops" than anything else.

Another interesting method is shown in Fig. 98. This is especially good when racing with R.O.G. or R.O.S. models. Instead of holding the tip of

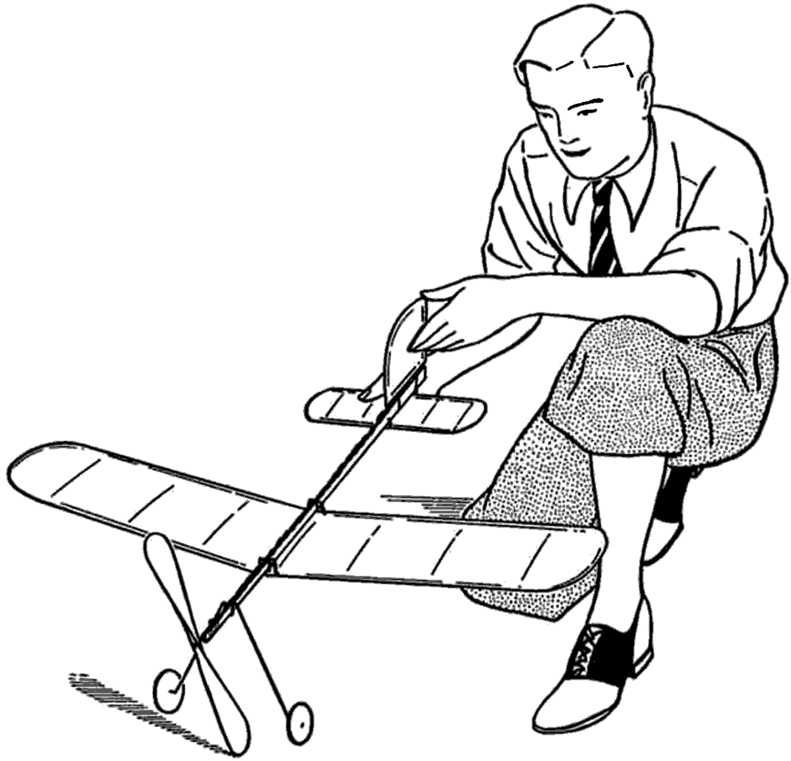


FIGURE 98. NOVEL METHOD OF LAUNCHING R.O.G. MODEL

the propeller, the tail of the model is raised sufficiently to allow the tip to touch the ground, which keeps it from turning. When ready to launch the model, simply drop the tail to the ground. This releases the propeller and the model is launched.

The reader must remember that these facts on the launching of models are gained through experimentation only, and that in this manner he, too, must learn and constantly improve until perfection has been gained.