



How to Build a Pedal Boat

By John Rogers

THIS streamlined pedal boat skims the water on a two-footpower engine—not as fast as horsepower, but a lot cheaper. Its payload: one youngster. Its size: less than five feet long and only 48 pounds overall. It even boasts power brakes (just back-pedal) and a full reverse shift (back pedal harder).

Ready-made water bikes come as high as \$100 to \$300, but you can build this one for the price of a piece of plywood and some standard bicycle parts. If a lake or ocean isn't handy, it's small and light enough to run in a swimming pool, stream or the nearest duck pond. The one-piece hydroplane-style hull looks sharp and is easy to build.

What you need. One 4'-by-10' sheet of $\frac{1}{4}$ " marine or exterior-grade fir plywood takes care of the top and bottom planking and the housing for the paddle wheel. This size is usually available on order; if not, use smaller plywood sheets, but make the bottom out of one length

for tightness and piece the top deck where joints won't matter.

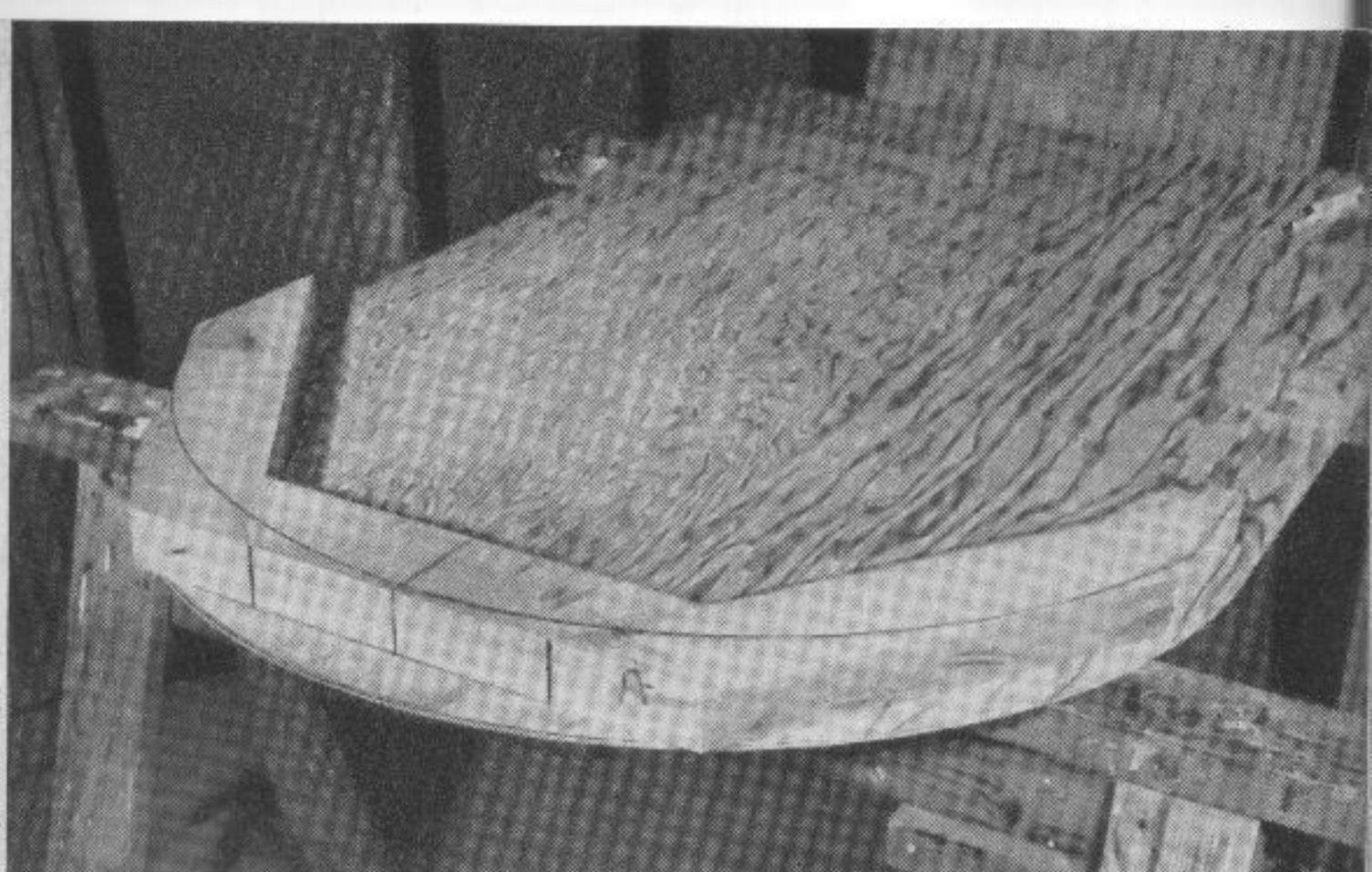
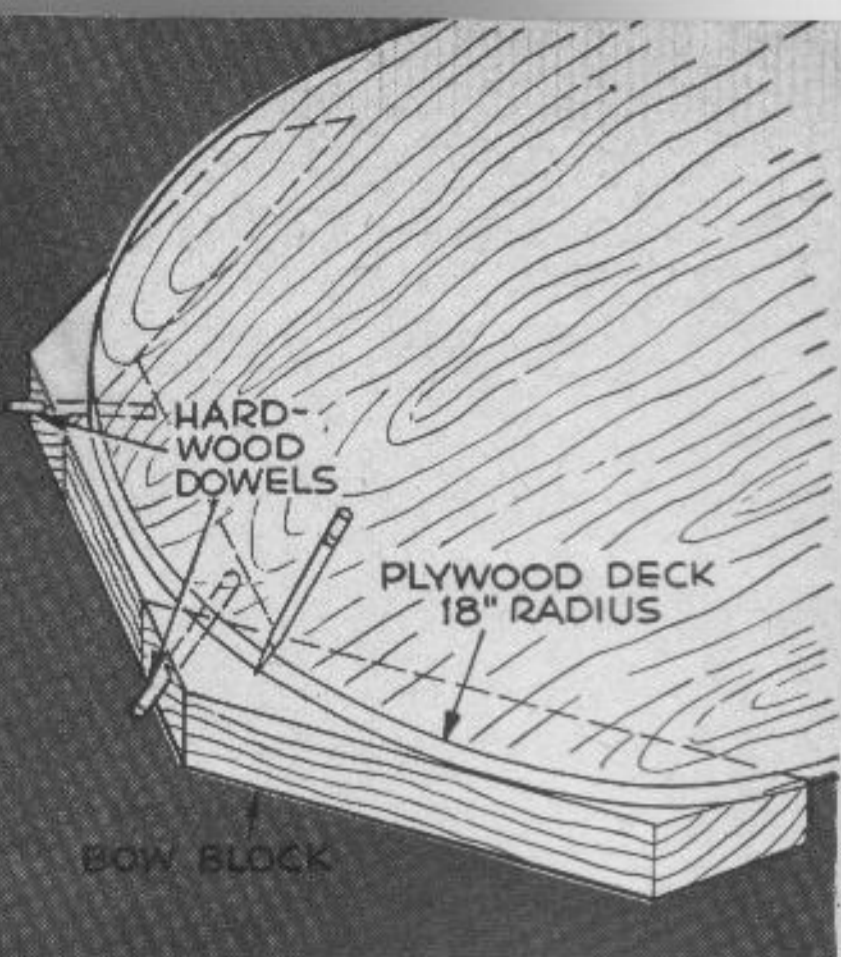
Frames and side members are $1\frac{3}{4}$ "-by- $\frac{3}{4}$ " white pine. The transom crosspiece is $1\frac{3}{4}$ " by $1\frac{3}{4}$ ". The bow block is made up of three $1\frac{3}{4}$ "-by- $3\frac{1}{2}$ " strips, cut and glued as shown.

All dimensions are actual. To save sawing, you can substitute stock one-by-twos and two-by-fours for the frame, but I prefer to rip my own because they come out cleaner and more accurate.

Shaping the bow. Cut the bow curve in the top deck first, using an 18" radius to provide a 36"-wide semicircle. Now, using the deck as a template, trace the bow curve onto the glued-up bow block.

The frame is assembled with waterproof glue and $1\frac{1}{2}$ " No. 8 flathead plated screws. Plated screws are rust resistant and are much cheaper than brass screws.

When the frame is complete, place it top side up and apply marine mastic seam compound to the bow block, sides, transom and the interior frames around the paddle-wheel well. This will insure a



SMARTLY CURVED BOW BLOCK is made up of three pieces of 1 $\frac{3}{4}$ "-by-3 $\frac{1}{2}$ " pine, glued and pinned together with hardwood dowels. To

shape the block, first cut the 18"-radius curve in the plywood deck, then trace this curve onto the block, as shown in the sketch at left.

waterproof joint between the frame and the plywood planking.

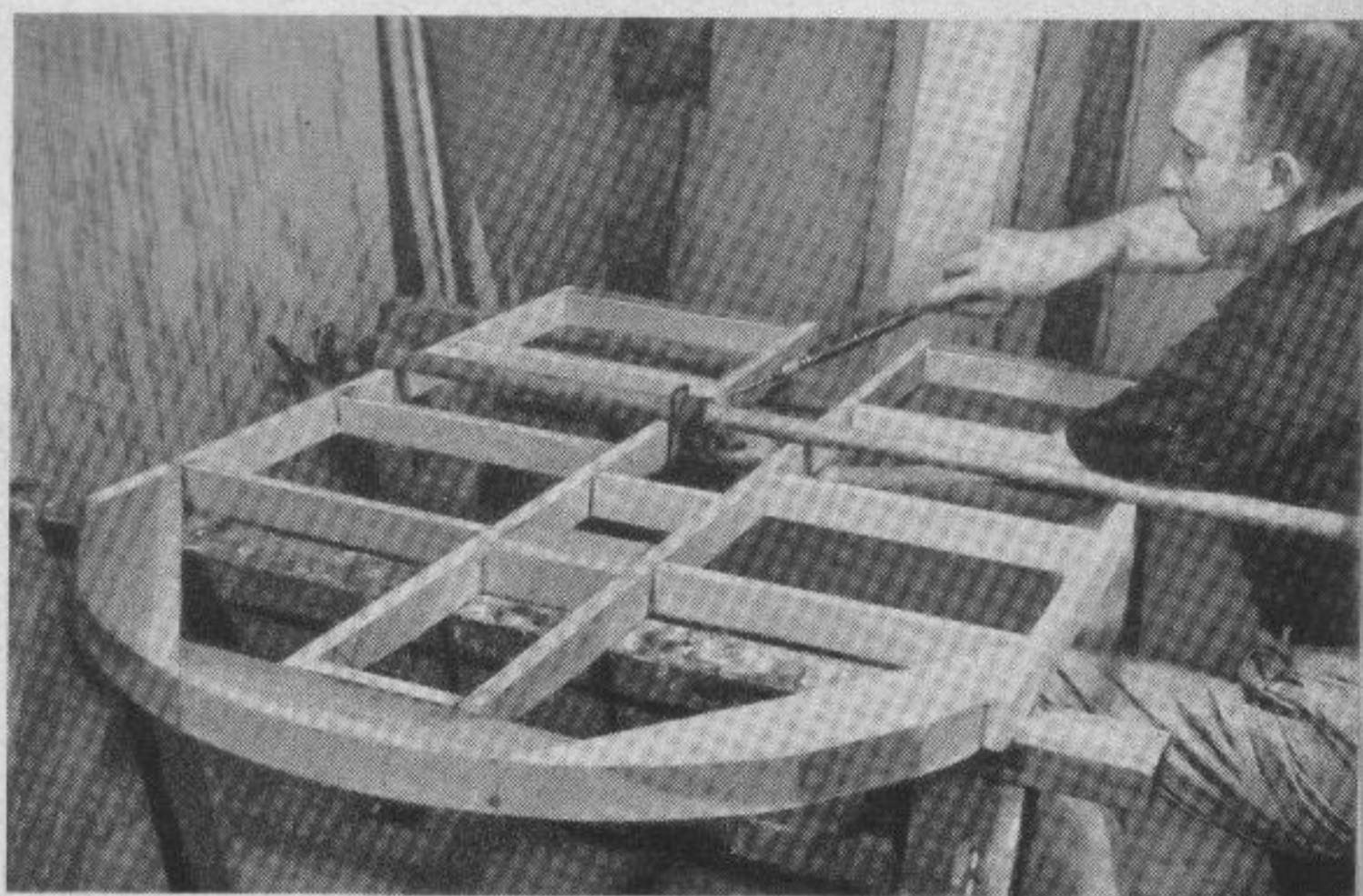
Attach the top deck first, then turn the frame over and plane off the bottom of the bow block so that it tapers forward to a thickness of $\frac{3}{4}$ " at the extreme front center. This gives the bow a smart upward flare and keeps it from dragging in the water.

The plywood bottom is then attached in the same manner as the deck. Allow a little extra length in the bottom for the curve in the bow.

Rigging the drive. After much pro and conning, I decided on a chain drive instead of a direct drive. This lets you step down the drive ratio, making it easier for youngsters to pedal. It also permits a smaller paddle wheel and a lower seating position because you don't have to raise the wheel high enough to hitch the pedals directly to its axle.

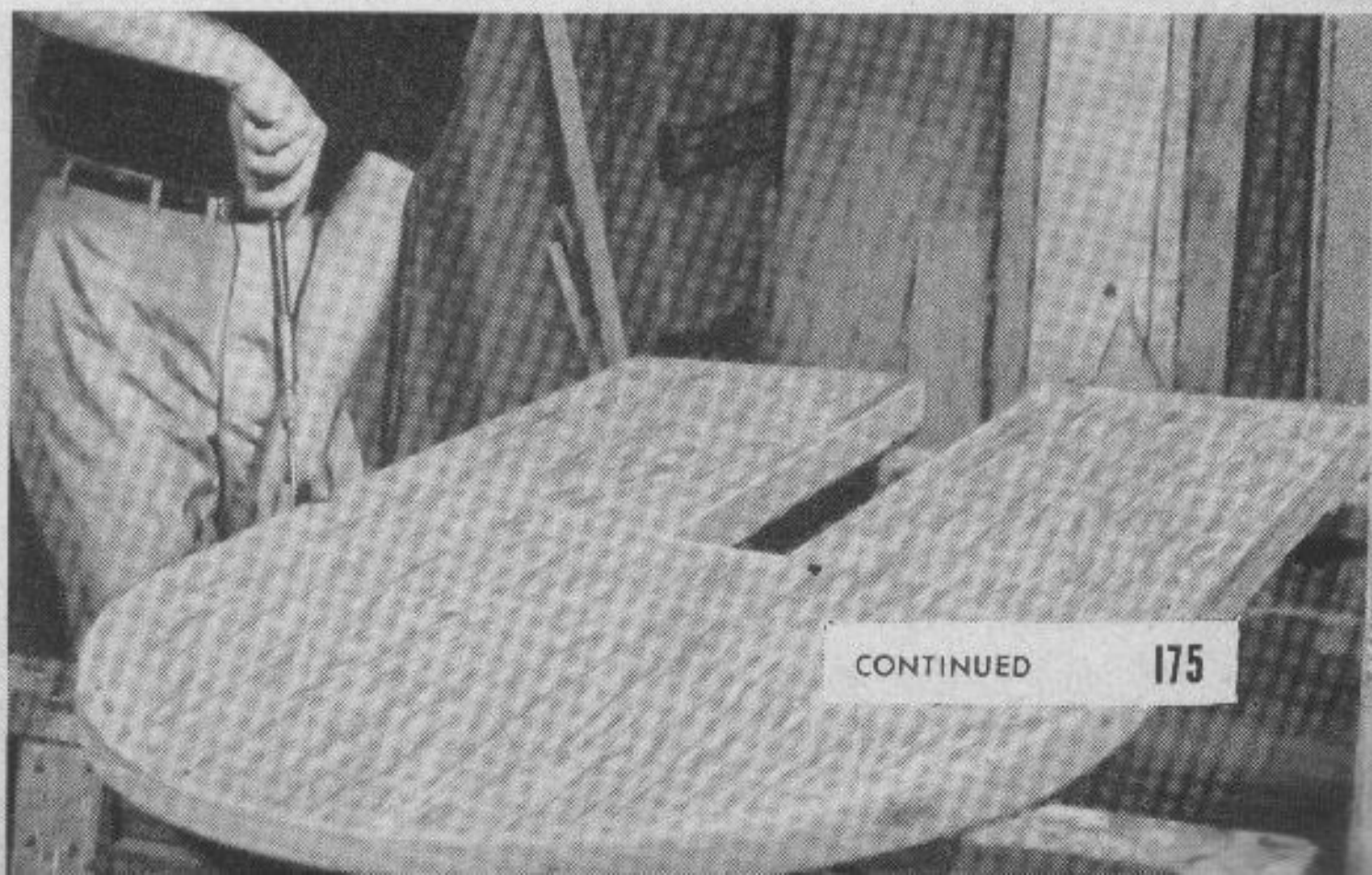
I experimented with several sizes of sprockets to find the best ratio, then settled on a 12-tooth sprocket for the pedal shaft and an 18-tooth sprocket for the paddle-wheel shaft. This combination gives you a step-down of 1 : 1 $\frac{1}{2}$

You can use bicycle chain



ALL FRAMEWORK except the bow block and stern pieces is $\frac{3}{4}$ "-by-1 $\frac{3}{4}$ " pine (or stock one-by-twos). Use waterproof glue at the joints and 1 $\frac{1}{2}$ " No. 8 flathead plated screws. If a jig- or band-saw isn't handy, you can rough-cut the bow curve with a straight saw, then follow by planing and sanding it to exact shape.

PLYWOOD DECKING is fastened to the frame with 1" No. 6 flat-head plated screws, spaced 2" apart along the edges and every 6" on internal frames. For a professional touch, align all screw slots fore and aft. Plane off bottom of bow block to an upward-flaring taper before attaching the plywood bottom.



How to install a simple chain drive to give your water bike a

and sprockets, but as these come only in special sizes, it's usually easier to buy standard machine sprockets and chain. These can be obtained from local suppliers or ordered through hardware stores, from companies like the Boston Gear Works.

Ask for sprockets to fit a $\frac{1}{2}$ " shaft. Roller chain, which must match the pitch of the sprockets you buy, is sold by the foot. Five feet will give you a few extra links to play with in adjusting the length. Also buy one master connecting link to join the ends of the chain.

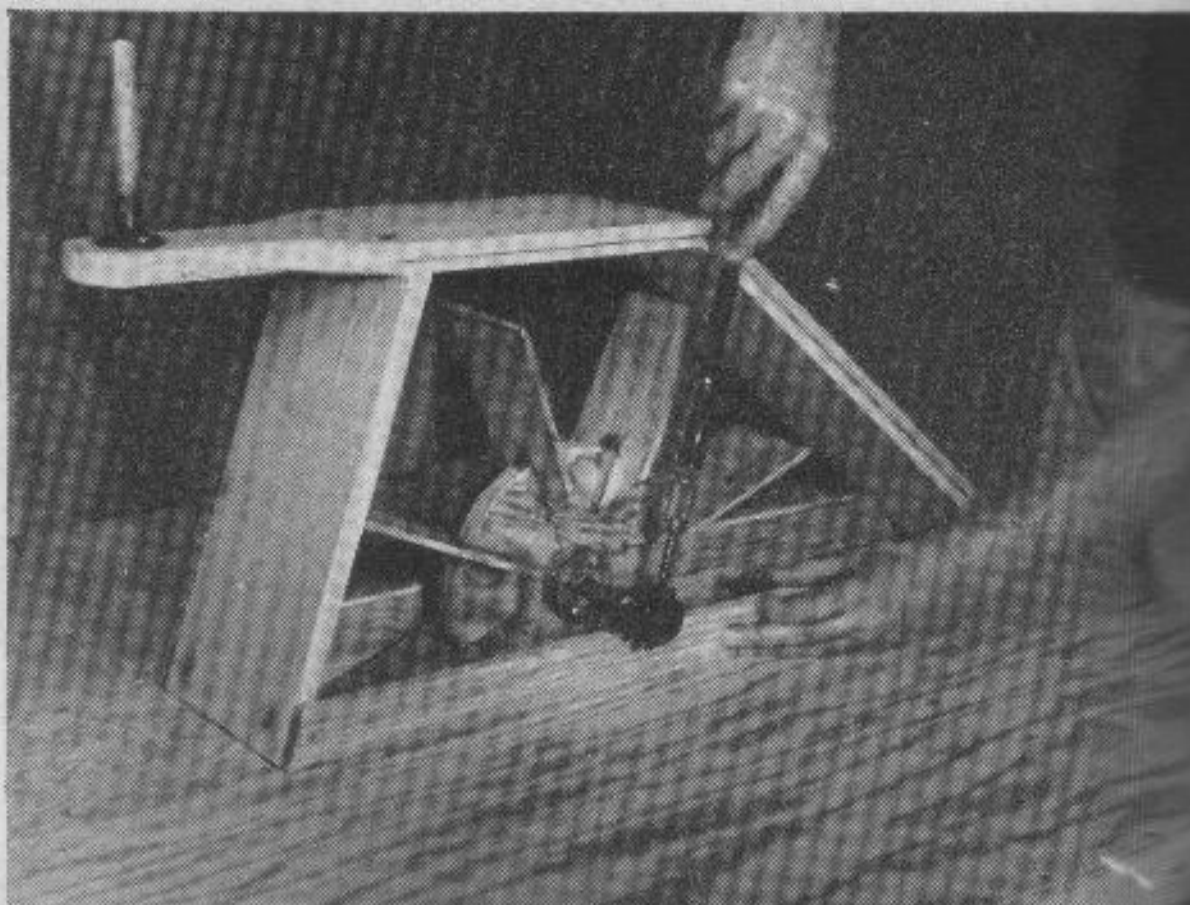
Mounting the paddle wheel. Line up the paddle wheel carefully in the exact center of the well and mark the positions for $\frac{1}{2}$ " pillow blocks, which provide bearings for the wheel's axle. Actual installation of the wheel itself can be done later up through the bottom of the well.

Mount the 18-tooth sprocket on the paddle wheel by means of its setscrew. The 12-tooth sprocket is then slipped on the pedal shaft and carefully lined up with the paddle-wheel sprocket.

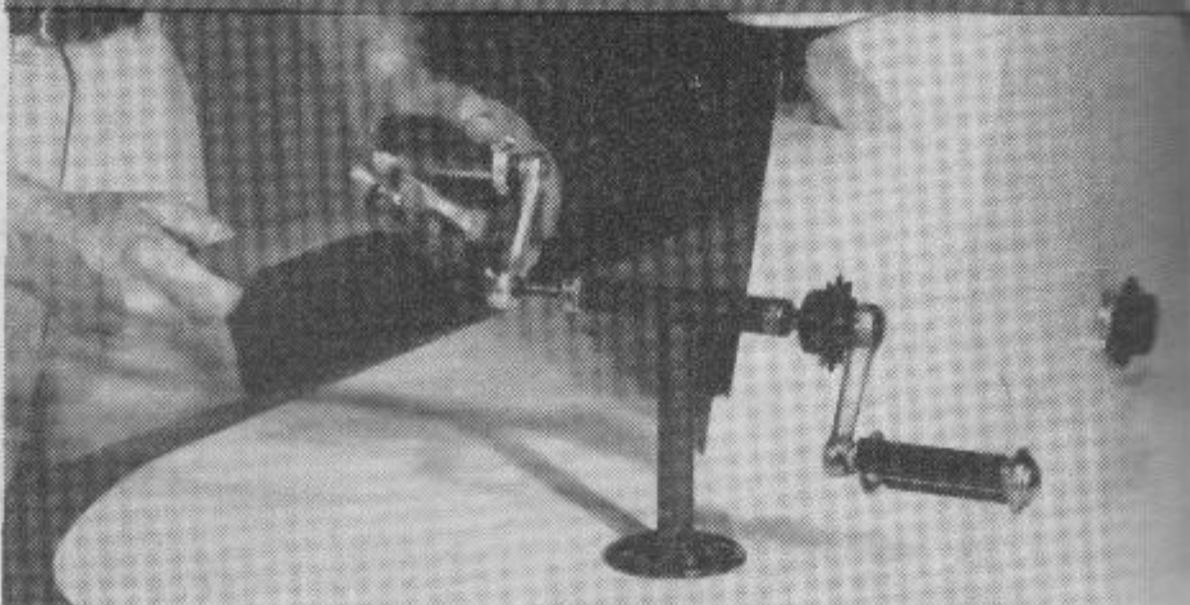
Try the chain on the sprockets before permanently mounting the pedal support. It should run freely with a little slack but no slop. Add or remove links until length is approximately right, then make fine adjustments by moving the pedal shaft forward or back slightly.

Steering. A pipe-flange mount is bolted to the seat board to serve as a bearing for the steering column. Handlebars can be taken from an old bike or you can make up your own from pipe or electrical conduit as I did.

A short crank arm is bolted or welded to the lower end of the steering column at right angles to the handlebars. A con-



PADDLE WHEEL, hidden neatly under seat, is made of $\frac{1}{4}$ "-plywood blades glued into slots in a wood disk. Its $\frac{1}{2}$ " axle rides in two $\frac{1}{2}$ " pillow blocks, available at most hardware stores. Seat braces are 6"-wide boards held by two side rails that support the pillow blocks.

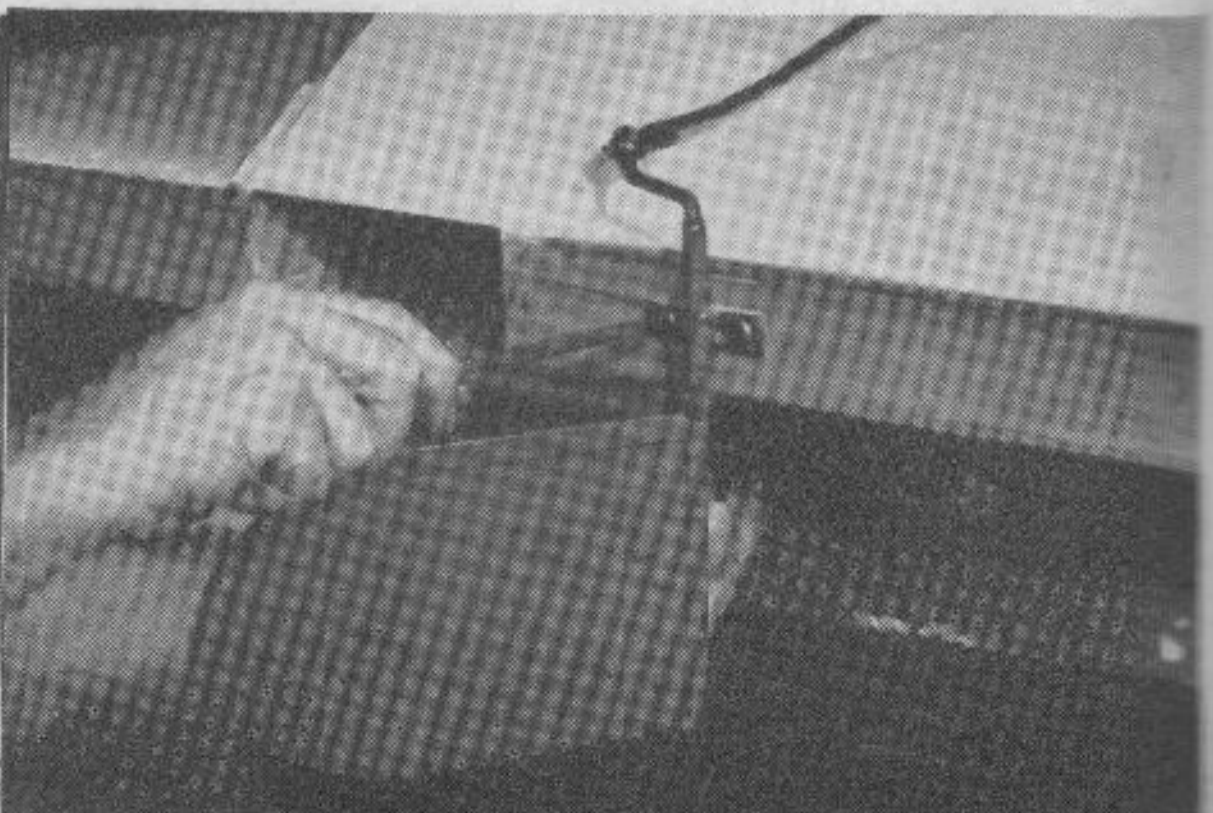
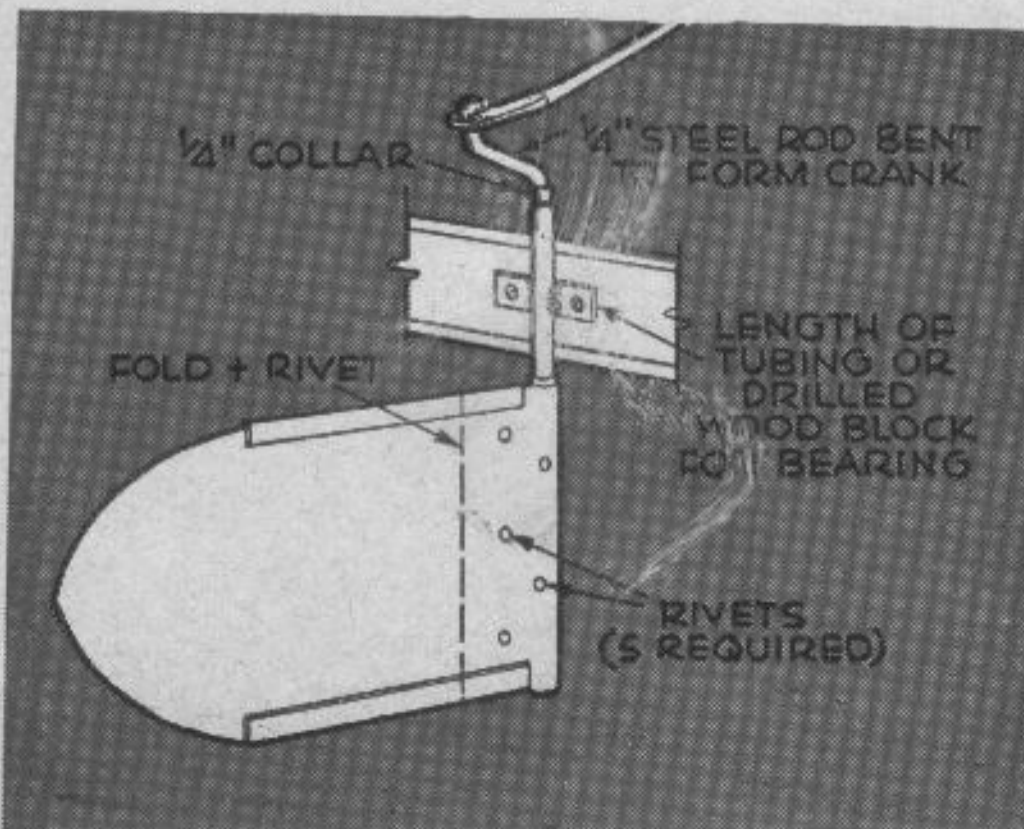


necting rod of tubing or solid steel rod then runs from the crank on the steering column to a similar crank on the rudder assembly. The rod is drilled at the ends and held with cotter pins.

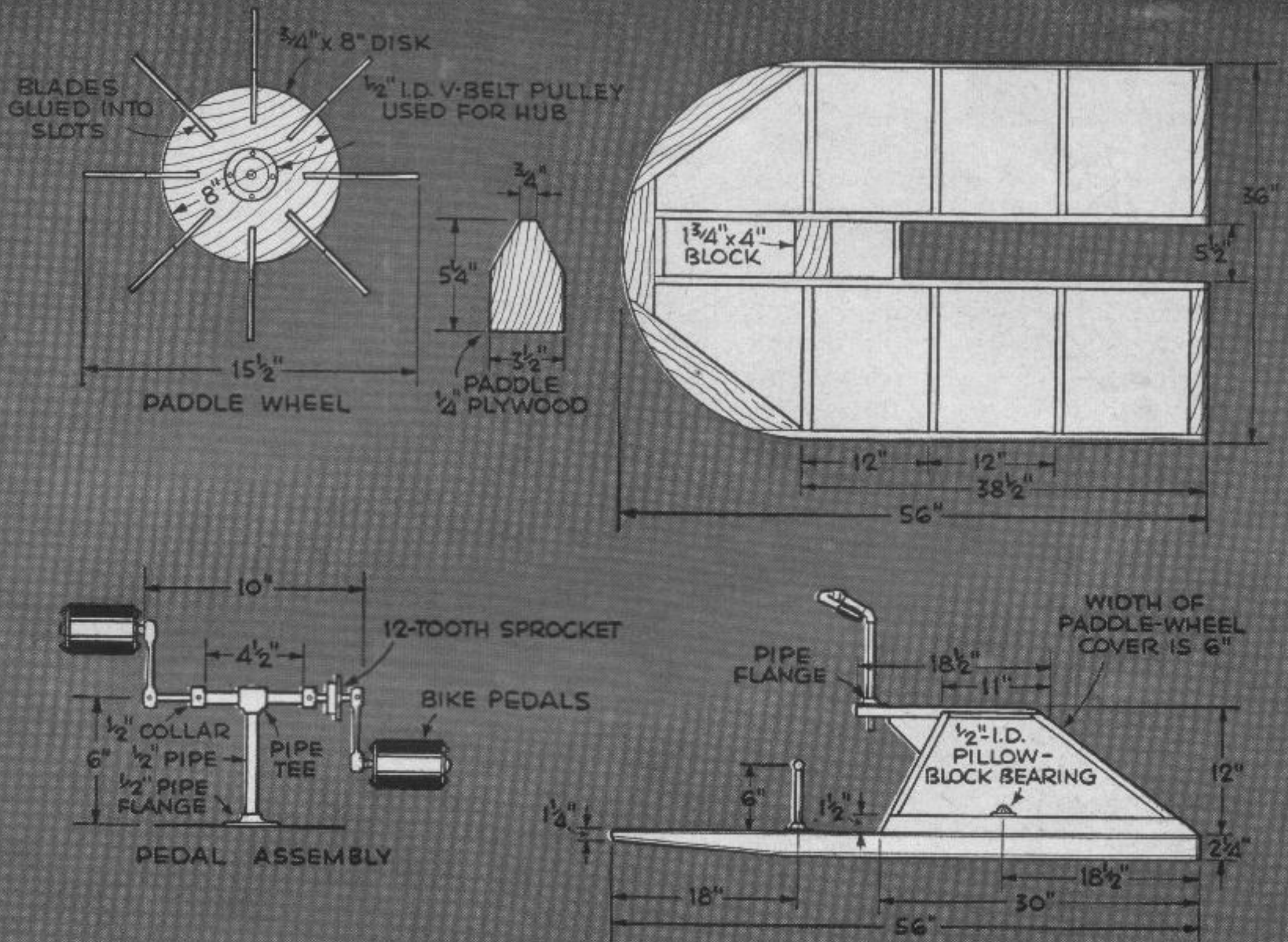
Note that the rudder is mounted off-center to the right. This is necessary to

Handlebars are hooked to a rudder to steer the boat

RUDDER IS MOUNTED OFF-CENTER so that its control rod runs in a straight line to the steering crank on the handlebars. Rudder shaft is $\frac{1}{2}$ "



real "geared-down" transmission that's easy for kids to pedal



STANDARD BIKE PEDALS are pinned to a 1/2" shaft that runs through a T-shaped support made of 1/2" pipe. A pipe tee can be substituted for the welded joint used at left. Small 12-tooth sprocket on pedals and 18-tooth sprocket on paddle give an easy-pedaling 1:1 1/2 step-down.

permit its crank arm, which points 90 degrees to the left, to line up with the steering arm, which points 90 degrees to the right. Reversing the cranks co-ordinates the handlebars with the rudder, which turn in opposite directions.

The finished craft easily supports my

steel rod bent to form a crank arm at top. Control rod can be tubing or solid rod flattened at ends and drilled to fit over the crank. Home-

nine-year-old. For heavier riders, you can increase hull thickness to 3 1/2" and add a foot to the width, which can still be done using standard 4'-wide plywood.

I finished the bottom and sides in clear varnish and painted the top a dazzling white enamel with red trim.

made handlebars of pipe or conduit, as shown below, may actually be easier to rig than bike handlebars that come in odd sizes.

