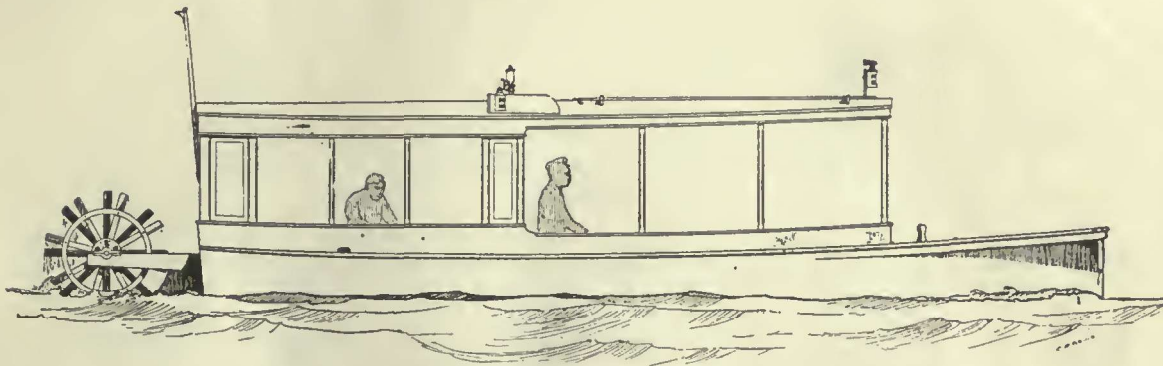


How to Build A Stern Wheeler

BY C. G. DAVIS



THERE are hundreds of places on the shallow lakes and rivers throughout this country where the sea-going motorboat would be hard aground most of the time, and where only such boats can be used as are designed to navigate the shallow places.

When Eastern designers turn out a Florida cruiser they consider that they have designed a shallow draft boat; but while they consider 36 inches shallow, the places we have in mind would float only 12 inches and in some spots not even that much, places where a man can remove his footgear, roll up his trousers and walk ashore at almost any point.

The enjoyable sensations that make a boat ride so attractive to the people along the seacoast, where motorboating is carried on on a large scale, is all the more of a novelty and all the more enjoyed by those who have never or seldom been on the water on anything other than a log raft. Think what a novelty such a craft would be to a community whose rules of the road could be summed up in two words, "nigh" and "off," or "gee" and "haw." I can just imagine such a crowd with a man at the wheel chewing the end of a dry straw, shouting as he meets another boat, "Gee there! gee!" Why should such a man adopt an unknown vocabulary and say starboard or port? The Government inspector would never come around in such localities to see if the boat had her full equipment of side lights, bow and stern lights, fog horn, bell and life preservers. Who would want a life preserver when the water is only knee deep to a child? And the moo of an old cow in a lot would be as good a lighthouse fog horn as would be needed if the cow was only tied so she'd stay in one place.

There are many disadvantages that the deep water sailor has to contend with that would be unknown on the waters where this stern wheeler could navigate, and no doubt other novel conditions would crop up—a cow might be cooling herself in the brook and in that case a blast of the whistle might be of use to scare her out of the way. Now that small gasoline motors have been perfected and have come into such use on the farm, the man who runs that motor and understands the operation of it could also run the one in the boat; and for that matter the same motor could turn the churn, saw the wood and be put in the boat to drive it as needed. We deep-sea dogs always speak of a boat as she or her, but we're not going to impregnate the fresh, sweet, drinkable water with salty terms, so shall call her "it."

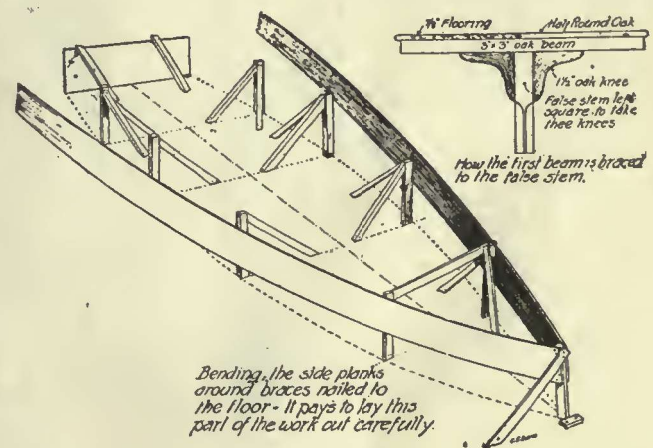
The boat we have selected as being most suitable for such work is one where the hull of the boat is 25 feet long by 7 feet wide, and only sinks 7 inches deep in the water. Including the stern wheel the total length amounts to 29 feet 6 inches.

Any amateur who has never seen a boat would be able to construct a boat this size. Every difficult feature in boatbuilding has been purposely done away with, and any one who can build a box can build it. Two 16-inch planks, 25 feet 6 inches long, 1 inch thick, will make the bottom part of the two sides, and two more the same length, 18 inches deep, will make the top part.

First of all get out an oak stem-piece, 2 feet $\frac{1}{2}$ -inch long, beveled off like a wedge, as shown in the detail plan of it on the drawing; then make the transom, as the after end of the box is called, out of 2-inch oak. The shape of this transom is also drawn out, 5 feet 8 inches long by 2 feet 1 inch wide. Nail the lower plank of the sides to the stem so that they make a large Y-shape.

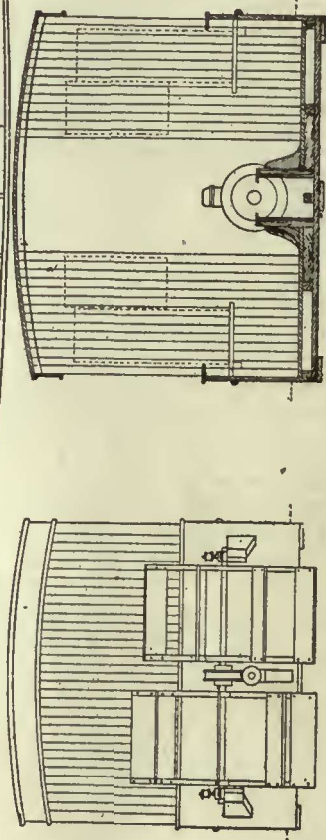
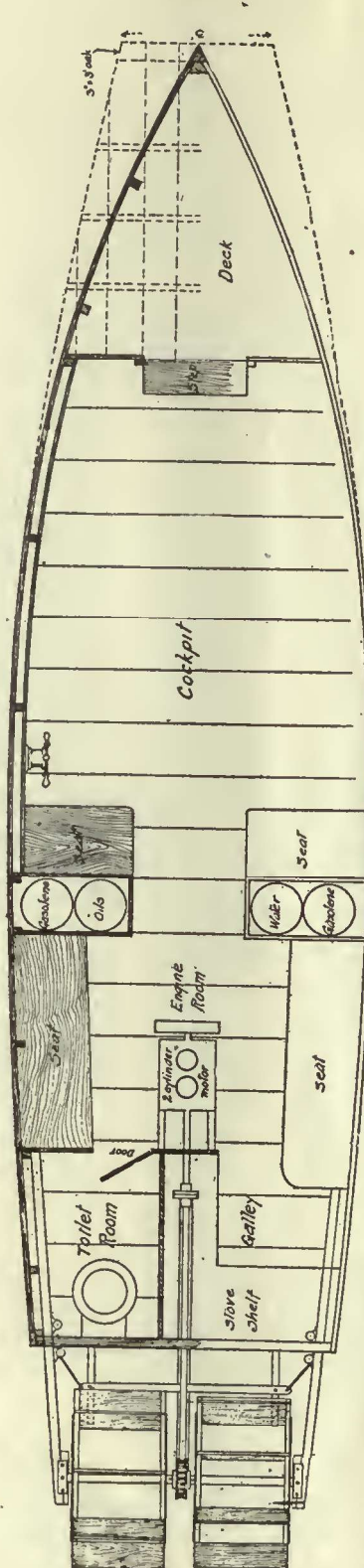
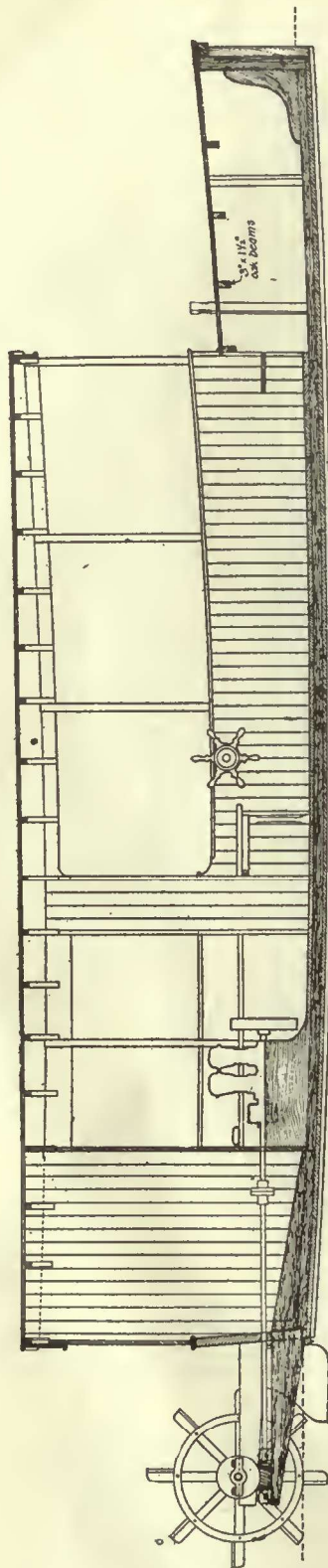
The greatest difficulty in building such skiffs is to get both sides alike and not to have her lopsided, one side flattened and the other bulged out more.

To guard against this, build her on the wooden floor of a barn or shed, so that you can stretch a chalk line and so get a true center line to work by. Square across from this line, where the transom is to go, and measure out the



various widths as given at 5-foot intervals and put up-rights, braced strongly, so that when you bend the side planks around them they will not collapse. The measurements for cutting the shape on the bottom of the lower side planks is shown on the next page.

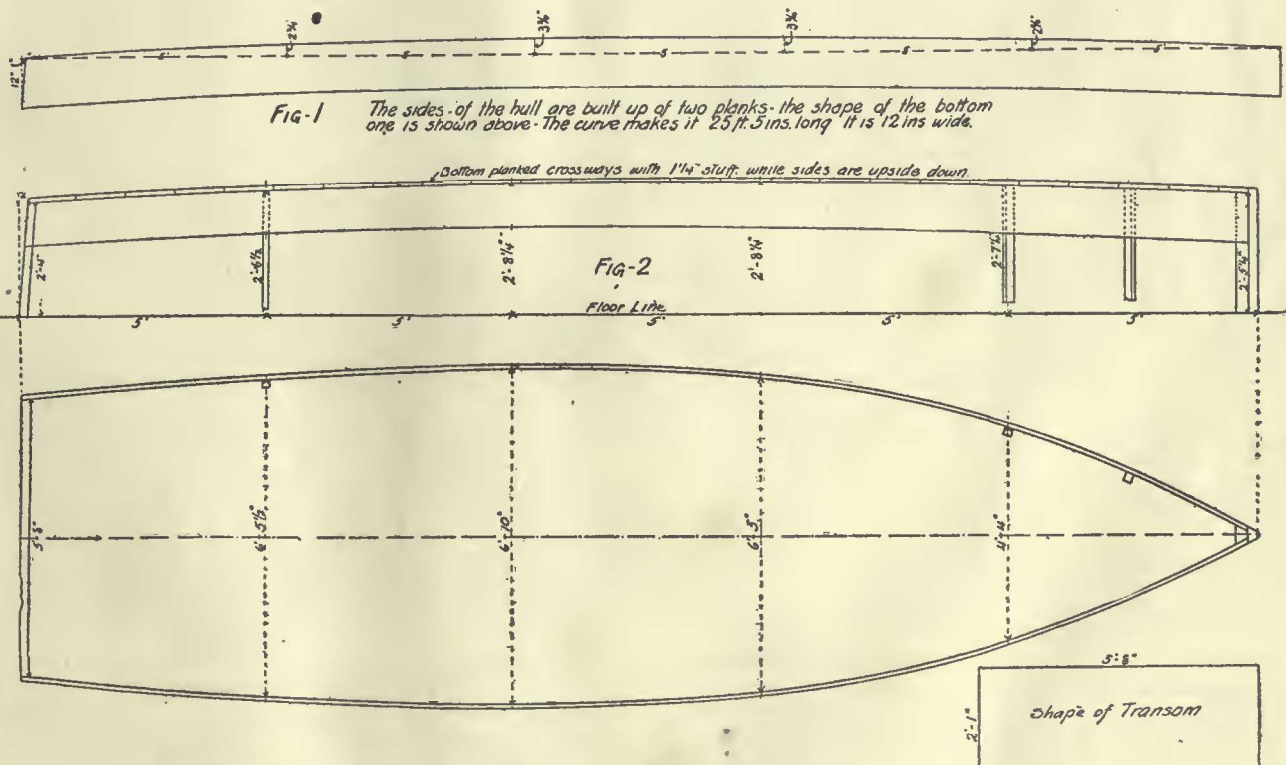
When the two side planks are nailed to the stem, brace the latter securely to the floor so the boat is bottom up, and bend the two sides in together around the upright braces until they touch the ends of the transom, which you should take particular pains to see is exactly square across to the center line.



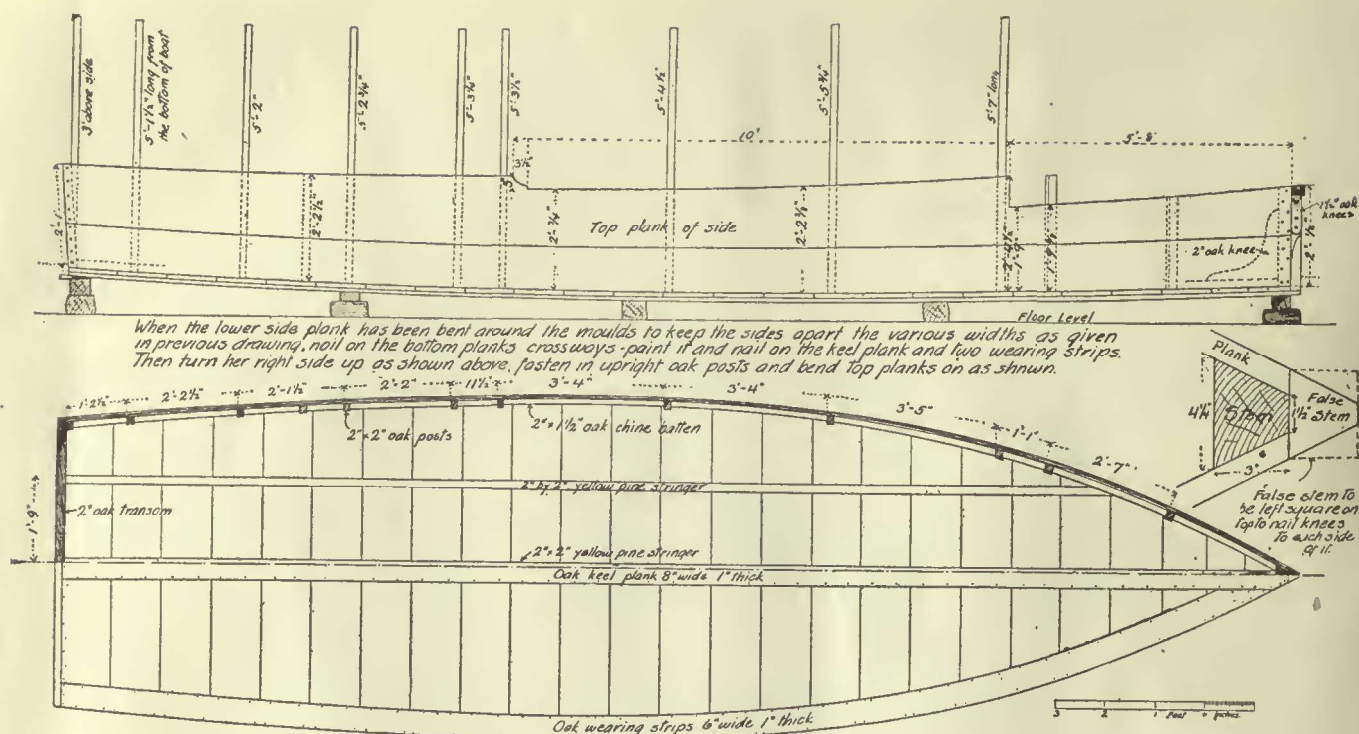
PLANS OF A STERN WHEELER FOR USE ON SHALLOW WATERS

When these side planks are fastened at each end and while the sides are held in true shape, nail a strip of oak, 1½-inch thick and 2 inches deep, so it comes just flush with the edge of the side planks to give a better nailing

The jogs cut in the top edge of the tcp plank on the



To stiffen the bottom planking nail three 2-inch yellow pine stringers forward and aft, which means from front to back in nautical lingo—one right down the middle of the boat and one on each side, leaving a space of 18 inches between them. These should be nailed from the underside of the bottom planks, as they being of pine or cedar, are thinner and softer wood, and the nails, by going



into the harder wood last, will hold stronger than if nailed from above into the soft planking.

If the boat leaks at all, and to keep your feet dry from any rain water that may be in the boat, a flooring can be laid crossways resting on these three stringers and the chine battens at the edges of the sides. To strengthen the corner forward where the stem joins the bottom, as that gets all the ramming up against the shore in making landings, cut a 2-inch thick knee and nail it securely to both batten and inside edge of the stem.

A false stem is then fitted to the real stem. The ends of the side planks and face of real stem can be trued up with a sharp plane, so that the false stem makes a perfect joint—to insure water tightness calk the seams where the sides and stem meet and paint them. The false stem can be pointed off sharp for about one foot up from the bottom. It should be left square from there up, so two small oak knees can be bolted to it to steady the 3-inch by 3-inch deck beam that sets on top of the false stem and against the real stem's face.

Three other beams should then be notched into the top of the side planks, as shown in the plans, to carry the platform deck forward, which is really the front porch, as it were, the place where everybody enters the boat. The platform itself, of about $\frac{3}{8}$ -inch stuff, is then laid fore and aft over these beams.

The second frame from the bow is to be left sticking up through the deck to form a "hitching post."

To build the roof top, first get out the bands that run around the top ends of the upright posts. These should be of quarter sawed oak about $\frac{5}{8}$ to $\frac{3}{4}$ -inch thick, 4 inches deep over the forward cockpit and increased to 7 inches in depth around the after cabin part. The bands across the ends are the same depth and will have to be sawed to shape out of wide planks to get the arch shape, which not only sheds the water as a roof should, but in appearance is far better than flat beams. The beams which go across from side to side are 3 inches in depth by $1\frac{1}{4}$ inches thick, of oak, and have an arch up of 4 inches. It takes considerably more wood to cut out these curved beams

and many men will be tempted to use flat ones, but if this is done the side supports should be carried up higher, so as to give more headroom under the roof.

Nail the ends of the beams to the oak bands and be careful first to bore a hole for the nail or you may split the beam and make a shaky roof.

Over these beams lay a thin roof of $\frac{3}{8}$ -inch or $\frac{1}{2}$ -inch tongued and grooved pine, with the smooth side down paint the top and then stretch wide thin cloth, such as sheeting, over it tacked fast around the edges and laps and then give that two or three thin coats of paint. Cover the edges of the cloth where it is turned over and tacked into the edge of the pine top, with a half round oak moulding about $\frac{3}{4}$ of an inch wide.

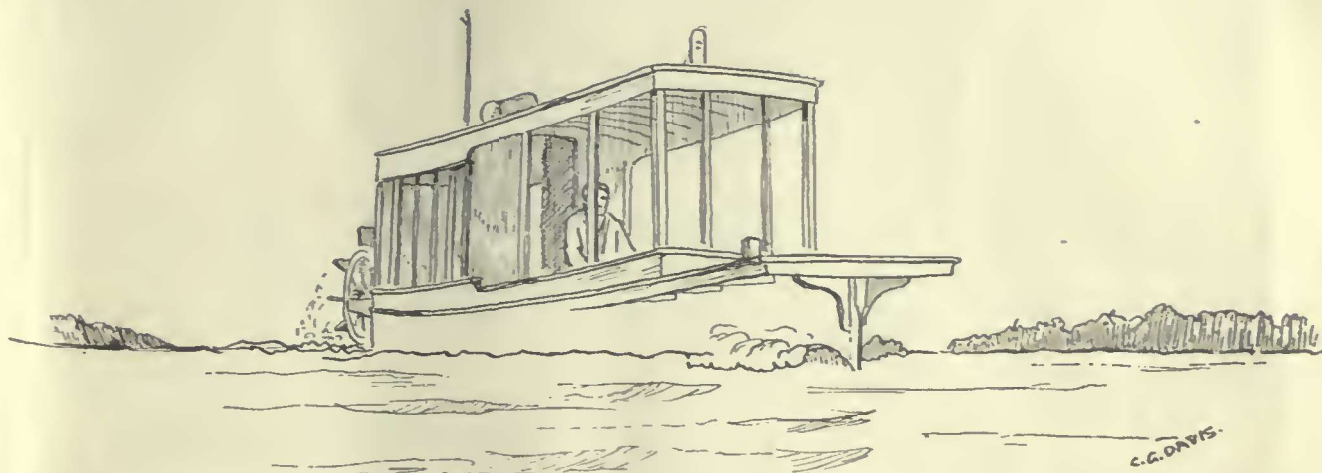
It will add to the appearance of the roof if you also screw or brad on a $\frac{1}{2}$ -inch half round oak moulding even with the lower edge of the bands. A similar effect is produced on the top edge of the side planks of the boat by nailing on a cap about $\frac{3}{4}$ -inch thick if it is neatly rounded over on both the inside and outside edges. This cap will be wider because it has to span from the side planks over to and cover up the upper edges of the vertical staving in the cockpit.

This staving and all the bulkheads can be of the same kind of wood, about $\frac{1}{2}$ -inch pine, in narrow widths, with its edges tongued and grooved.

An enclosed toilet room is shown built in at the after end. The space opposite may be used as a sort of galley, where simple meals can be cooked on an oil stove.

An arrangement of seats is shown which an owner may change to suit his own ideas. My idea is to leave the forward cockpit practically clear of everything so chairs can be used for seats as they are more comfortable and allow of a change of position when desired.

Two partial bulkheads separate the engine-room, which is aft from the forward part of the boat, and, besides providing a space to carry the gasoline tanks, cylindrical steel or copper boiler shaped ones, and also water coolers, it serves to somewhat deaden the engine noises.



Part II

THE motor installation is simple enough with room to get all around and at the motor, which is set on top of two 3-inch oak beds that are nailed to the floors and braced at each end, particularly at the flywheel end, by two oak knees, which distribute the strain and materially steady the motor against rocking, and yet they need not come so far above the floor as to be stumbling blocks for people passing by it.

The axle of the sternwheel is high enough to enable you to set the motor on a level base, but before you set the motor make your paddle wheel and all its gear, and from this you can get the proper height to set your motor.

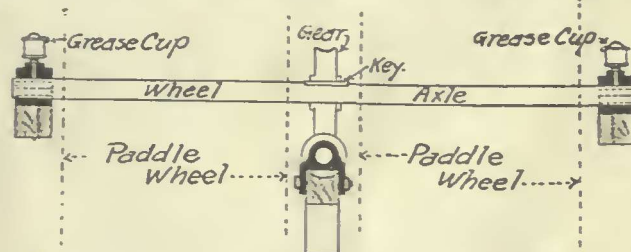
To carry the paddle wheels bolt a yellow pine beam 2 inches by 6 inches, 7 feet long, against the inner face of the frames, through a hole chiseled through the transom, so they extend out back of the transom 3 feet. Their outer ends can be lightened up a little by tapering them to a depth of 4 inches at the after end. Rivet on a block slightly wedge-shaped so that its inner face stands fore and aft. This gives a broader landing for the bearings of the paddle wheel shaft. Another stout bearer of yellow pine 8 inches deep by 3 inches thick is mortised through the transom in the center, so it lands right on top of the floor of the boat and to which it is nailed. It is tapered down in height as it goes forward until it is the same depth as the 2 by 2 inch keelson in the center at the after end of the engine. It also tapers up on the after end until it is only 3 inches by 3 inches. This bearer carries the shaft bearings where the worm wheel works into a gear wheel keyed to the paddle wheel shaft or axle.

This worm and gear wheel you will have to buy, and it should be a 4 to 1 gear; that is, for four revolutions of the shaft from the motor the axle of the paddle wheel will turn over once. This, at 300 revolutions and 25 per cent. slip, will give a speed of about 8 miles an hour.

The outer end of the motor shaft will turn in two bearings bolted to the outer end of the central beam, one just in front of and one just back of the worm gear, with ball bearing washers between to reduce the friction caused by the thrust that will come upon these bearings when going ahead or backing. The bearings for the axle of the wheel

should be fitted with grease cups on top, and be careful to see that the axle bearings are perfectly level so the wheel will not be lop-sided.

Various other means are sometimes employed for driving the paddle wheel. Some use a sprocket-wheel set-off on one end of the axle, with a sprocket chain connection to a smaller wheel on the end of the motor shaft with the motor set so it extends crossways in the boat. This is a very simple method of transmitting the power, but its objections are the difficulty experienced in taking up the



Arrangement of bearings for axle of the stern wheel and end of shaft.

slack of the chain which soon becomes loose, and the fact that the chain, if it breaks, goes to the bottom of the river and leaves the boat helpless. With the chain transmission the wheel is made in one piece and the paddles are much larger, and for that reason cause more vibration than the method we have shown. Here the paddle wheel is made in two parts, with the transmission gear in a straight line back of the motor. The middle of the wheel axle being supported at the level gear and both ends, makes a steadier running wheel and, what is of far more importance to the smoothness of the boat's running, is the fact that the wheel by being in two sections with the paddles set one slightly in advance of the other the shock of the paddle hitting the water is only half as severe as it would be with one wide paddle board clear across, and its action always having one or two paddles submerged all the time.

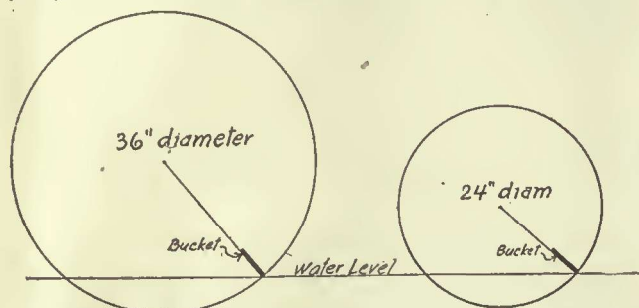
This is an important feature of sternwheel propulsion,

for if one bucket is just coming out and another just entering, the load on the engine is at that moment very light, and then heavy the next minute as the bucket goes under, producing a jerky effect on the motor and gears.

Another point to be observed in sternwheel propulsion is to have the paddle wheel as large as possible, so that as the paddles come down into the water the boards, or buckets as some call them, will not come down so as to slap the water with a shock, but will dip in as near edge-wise as possible.

The wheel in this particular boat is 3-feet 6-inches in diameter, there being eight arms bolted at the center to a circular iron plate 10 or 12 inches in diameter about $\frac{1}{4}$ -inch thick, with a heavy hub that fits on the 2-inch axle, and to which it is fastened by means of an iron key driven into a slot cut half out of the axle and half out of the hub. The arms may be braced out near the buckets by means of an iron hoop bolted to each arm or by oak braces jammed between each arm.

Both wheels may be exactly alike, but when you cut the keyways to hold them on the axle cut one so it sets the



A comparison between a 36" and a 24" diameter paddle wheel - both to dip 4" shows to how much better advantage the bucket on the larger wheel hits the water - less slap and more push.

paddles or buckets about 6 inches in advance of those on the other wheel.

As paddle wheels throw considerable water, they are often partly covered by a shield to keep it from flying about. This, in our case, is taken care of by building up the after end of the boat with a staved up partition that

can be made removable all in one piece or in sections to enable you to get at the paddle wheel and rudders whenever any adjustment may be necessary there, and yet it will be tight enough to keep out any water that may splash up against it.

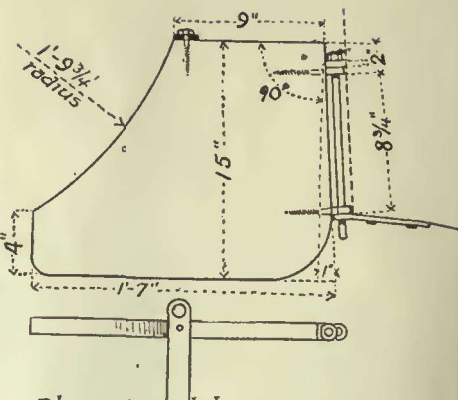
The paddle wheel is kept back from the hull for the reason that the wheel works much more efficiently if it is just on the crest of the stern wave, which will be about where we have located it at the speed she will usually make.

The buckets or paddles should be of hardwood, 21 inches long by 6 inches wide and from $\frac{5}{8}$ to $\frac{3}{4}$ of an inch thick, fastened to the paddle wheel arms by two 5-16-inch carriage bolts into each arm. They should be made as interchangeable as possible, and one or two extra paddles always carried on board to replace any that may be smashed by coming in contact with a piece of driftwood. If all the holes are bored the same distance apart a new paddle already bored for the bolts can be substituted in a few moments.

The steering gear consists of two oak rudders 13 inches long by 12 inches deep, with their after ends cut so as to clear the paddle wheels, hinged to the oak transom, so they drop 3 inches below the bottom and set in 10 inches from the sides so that they will not project beyond the sides when turned around to an angle of 45 degrees.

The rudders are hinged by means of two eye bolts bolted through the transom, as shown on the plans, and two eyebolts or iron straps, about 1 inch wide and $\frac{1}{8}$ -inch thick bolted to the sides of the rudders, and bent around their forward edge so as to form loops, with an iron bolt about $\frac{3}{8}$ -inch in diameter dropped through them. The upper eye or loop in the rudder, coming just under the eye in the stern, prevents the rudder lifting, and the lower eye, being just above the one in the stern, prevents the rudder dropping. This is as simple and yet as effective a style of rudder hanging as you can get.

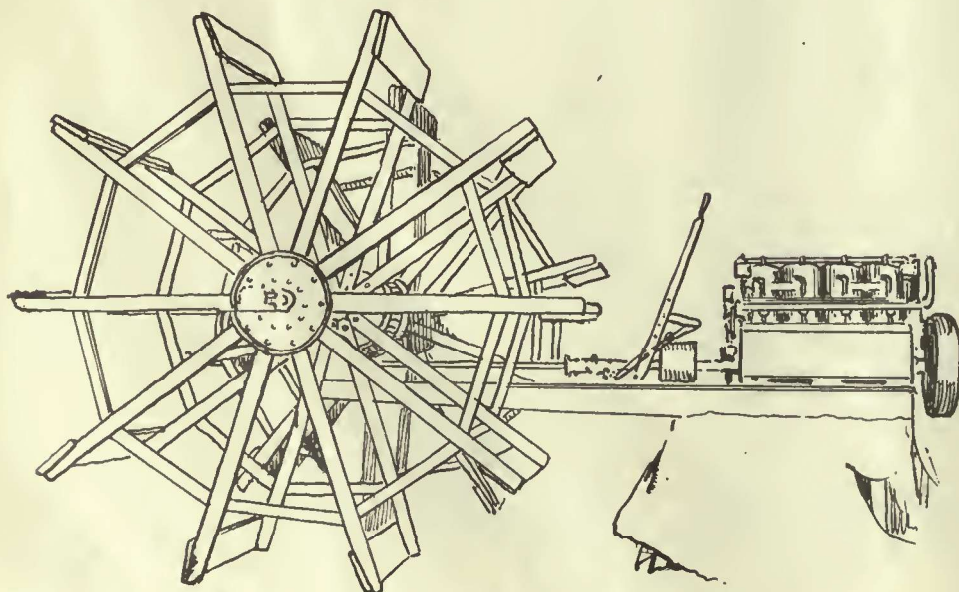
By linking the after edge of both rudders together with a flat iron bar 4 feet long, 1½ inches wide and about 3-32 of an inch thick the wheel ropes which lead forward



Plan of rudders for Stern Wheeler.



Two styles of rudder hangers - a strap and a screw-eye.



over pulleys or sheaves can be shackled into holes drilled through the outer ends of this bar, and then lead forward to the steering wheel on the lefthand side, so a person can sit on the short seat built just forward of the partition and steer in comfort.

By fitting wire netting screens around the after end of the boat between the roof stanchions, sleeping quarters

can be had free from gnats and mosquitoes, and the forward part protected by curtains tacked to the roof band and arranged to roll up when not needed or dropped to keep off the hot sun.

Such a boat will afford a lot of pleasure to a man and his family on waters where an ordinary motorboat could not go at all.