A LOW COST KICKWHEEL

Leonard M. Smith

With the costs of pottery equipment rising prohibitively, even the basic necessities are becoming a stumbling block to both the amateur and professional potter when setting up a workshop. For this reason, when I was setting up my first workshop, as I couldn't afford a new wheel, either electric or kick, and there were none available second-hand, I decided to build one. I looked at the available wheels and designs and eventually I incorporated their best features into the simplest design I could envisage building myself. The cost, using all new materials, was $50 and it took me two days to assemble once I had collected the materials. Using second-hand wood and parts, the cost can be halved.

Features of the design that appear with this article are:

A simple, but stable, triangular wooden frame.
A cast concrete flywheel.
A home-made wheelhead.
A simple cam and kick bar mechanism requiring only one simple weld.

Following are step-by-step construction instructions, which, although plainly detailed, presuppose a small amount of handy-person knowledge.

THE FRAME

Materials: 3—25 in. x 3 in. x 3 in. hardwood legs; 6—32 in. x 3 in. x 1 in. hardwood braces; 6—33 in. x $\frac{5}{16}$ in. or $\frac{3}{8}$ in. mild steel rods (threaded both ends); 12—$\frac{5}{16}$ in. or $\frac{3}{8}$ in. nuts, and spring washers; 12—5 in. x $\frac{3}{8}$ in. bolts plus nuts and washers to suit.

Before I start, the dimensions of the timbers, excluding their lengths, can be varied to suit the available materials, e.g. 4 in. x 4 in. legs, D.A.R. timber, etc., although it would be preferable if the above dimensions were treated as minimums and dressed timber will give a better finish.

The three legs are cut to length then each leg has four galleries cut in it to accept the cross braces, which have also been cut to length. The galleries should be a close fit but not tight; $\frac{1}{16}$ in. clearance is acceptable. To work out the depth of the galleries I drew a plan of the legs in position, to scale, measured the depth of the cuts, marked this on the legs, then cut them with a saw and chiselled the unwanted timber out. Three-inch nails are now used to tack the frame together, one per joint. The frame is now aligned, checking that all angles are equal. Two $\frac{3}{8}$ in. holes are drilled diagonally through each joint and the $\frac{3}{8}$ in. bolts passed through them. When all bolts are in position they can be tightened.

The tie rods can be either $\frac{5}{16}$ in. or $\frac{3}{8}$ in. mild steel rods. They are cut to length and threads cut on each end with a die of appropriate size and thread type. Holes are then drilled in each leg to accept the rods, as per the plan, then the nuts and washers placed on each end and the whole tightened up. Now we have a strong, stable frame.

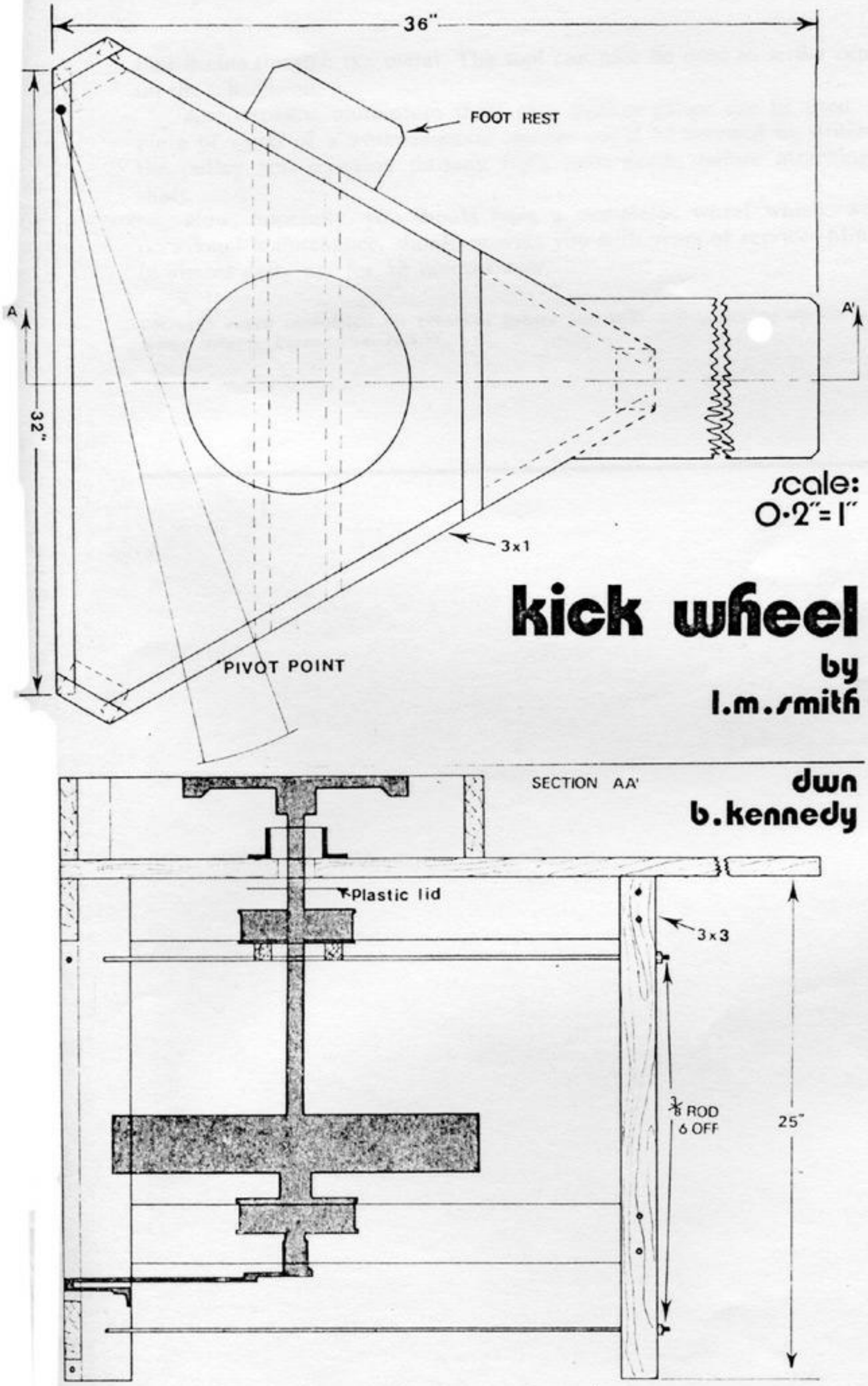
THE BEARING SUPPORTS

Materials: 4—4 in. x 1 in. hardwood; screws, approximately 8.

The plans aren't clear on the dimensions of the bearing support beams, but 4 in. x 1 in. or 3 in. x 1 in. will suffice. Place them in position on the frame, mark them with a pencil and cut them to length. Now screw them into position with two screws each end.

wheel head
1" MILD STEEL SHAFT
LID
FLANGE BEARING
NOT TO SCALE;
cast concrete flywheel
1" I.D. PIPE
pressed metal flange unit bolted to frame cross bars
1 in. bearing
CAM
kick bar
3/8 in. bolts, nylon l in'd


KICK BAR

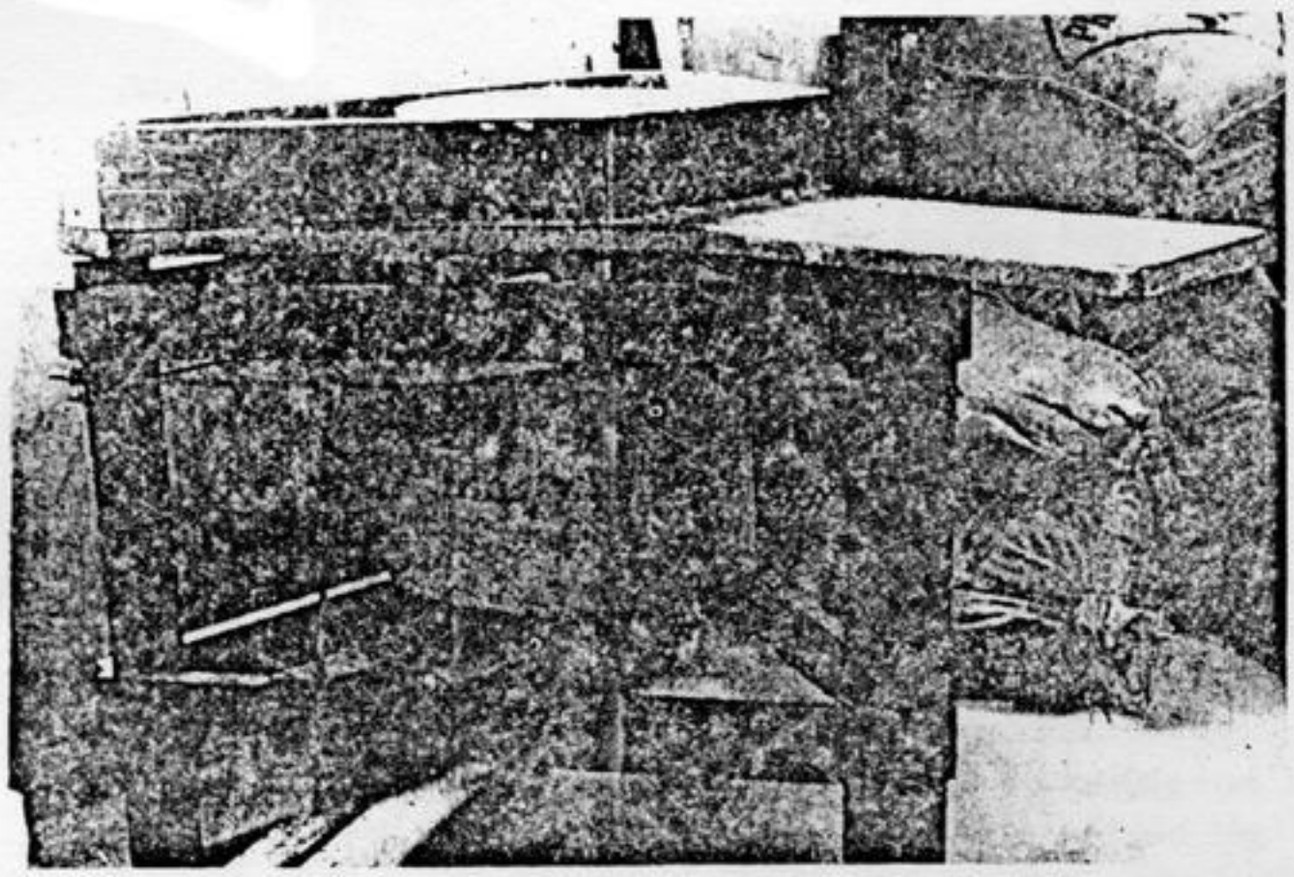

36"
FOOT REST
A
A'
32"
3x1
PIVOT POINT
scale:
0·2"=1"
kick wheel
by
l.m.smith
SECTION AA'
dwn
b.kennedy
Plastic lid
3x3
3/8 ROD
6 OFF
25"

THE TOP BOARD AND PAN

Materials: 1 box 2 in. screws; 1 sheet 3 ft. x 3 ft. pyneboard; approximately 10 ft. —4 ft. x 1 in. softwood; and wood screws.

The pyneboard sheet is cut to the shape of the top board, as per the plan, including the seat, in one piece. It can then be placed in position and securely screwed into the three legs. The side boards of the pan area are cut by placing them in their position and marking them, then sawing. The pan can then be assembled, screwed together, then screwed to the top board.

The frame is now ready for a coat of stain then clear lacquer; this is essential to waterproof the tray area. A margarine container should be attached around the shaft hole; after it has been drilled it will stop any water going down the shaft and ruining the bearings.



Prototype wheel in daily use.

THE FLYWHEEL

Materials: 1 bag Sacrete (complete concrete mix); 10 in—1 in. i.d. water pipe threaded both ends, 1 in. flange to suit; 2—$\frac{3}{8}$ in x 1$\frac{1}{2}$ in. bolts and nuts.

A suitable mould to cast the flywheel is a plastic garbage bin, but anything between 12 in. x 18 in. in diameter will do; a hole can be dug into the ground if you like, as it isn't essential that it be perfectly symmetrical, although it should be as close as you can make it. I cut the top off a plastic garbage bin (12 in. down) and placed it over a waste piece of board with a 1$\frac{1}{2}$ in. hole cut at its centre. I made up a cross frame to hold the water pipe in position so that it is centralised and vertical. The water pipe must first be cut in half and each threaded end screwed into the flange. At each end of the pipe a nut is welded to it over a drilled $\frac{3}{8}$ in. hole; these will be the lockscrews.

With the pipe in position the Sacrete can be mixed as per the directions on its pack and put into the mould. The next day it will be ready for assembly.

THE RUNNING GEAR

Materials:

The main shaft	—	23 in. x 1 in. mild steel shaft.
The bearings	—	1 in. i.d. pressed metal flange units, the type with two holes for the bolts.
The cam	—	3 in. x 1 in. i.d. water pipe with a nut and bolt welded on as a lockscrew.
		3¼ in. x 1 in. x ¼ in. flat steel bar welded to base of water pipe.
The extension	—	9 in. x 1 in. x ¼ in. flat steel bar.
The connecting rod	—	4 in. x 1 in. x ¼ in. flat steel bar.
The kickbar	—	36 in. of 1½ in. angle iron.
The rod or chain	—	19 in. approximately of 5/16 in. rod or light chain.
		6 x 1¼ in. x ⅜ in. bolts, nuts and washers.
		4 x 2 in. x ¼ in. bolts, nuts and washers.

Assembling: The two bearings are located on the top and bottom supports, as per the plan, so that the shaft is centralised and vertical. The flywheel is rested on the bottom bearing and the shaft passed through the top bearing the flywheel, then the bottom bearing. The bearing bolts can now be tightened. The shaft is located half an inch below the top edge of the pan and the bearing collars locked into position on the shaft. The flywheel locknuts can now be tightened on the shaft also.

In my prototype wheel I drilled ⅜ in. holes through the cam, etc., and put ⅜ in. bolts through them, giving a metal-to-metal contact that works quite will if kept well oiled, but you can buy teflon tubing of ¼ in. bore and ⅜ in. o.d. and press it into the ⅜ in. holes then use ¼ in. bolts to connect them. Although these are more efficient bearings, I haven't found them necessary yet, so if you use the ⅜ in. bolts you can always opt for the teflon bearings later.

The cam has a ⅜ in. hole drilled 2½ in. from the centre of the shaft. The extension, ⅜ in. holes at 8 in. centres and the connecting rod 3 in. from the middle of the kickbar. The connecting rod can be located on the kickbar, its position marked, then either welded or bolted into position. The kickbar is bolted to the frame so that it swings freely. If special locknuts aren't available, a second nut tightened against the first will act as a locknut. The whole cam assembly can now be bolted together with a washer on either side, i.e. one below the head and one above the two nuts and one in between the two bars. The first nut is tightened until it just grabs then brought back one quarter turn. Then the second nut is locked against the first. The pivot point on the frame is drilled and a ⅜ in. bolt attached so that a 3/16 in. rod or light chain can be taken from it to the kickbar so that the kickbar can swing freely in an arc. The whole assembly should turn freely when kicked and run on when the bar is released.

THE WHEELHEAD

Material: 1—12 in. or similar A section aluminium pulley with a 1 in. bore; 1 sheet 12½ in. x 12½ in. 16-gauge iron plate or aluminium, or 12 in. diam. 1 in. water-resistant wood; 1 tube instant Araldite; 1 tile cutter.

A wheelhead can be bought, but as these cost $15-$20 it is cheaper to make one. The 12 in. pulley is locked in position on the top of the shaft. The iron plate is then Araldited to the pulley so that it overhangs ½ in. each side. When the glue is dry the wheel is kicked so that the wheelhead rotates and the tungsten carbide-tipped tile cutter brought into contact with its surface at 12 in. diam. so

that it cuts through the metal. The tool can now be used to scribe centring rings on the wheelhead.

Alternatively, aluminium sheet of a thicker gauge can be used, or a thick piece of wood of a water-resistant species could be screwed by drilling holes in the pulley and screwing through from underneath, before attaching it to the shaft.

Now, hopefully, you should have a completed wheel which, with oil and occasional maintenance, should provide you with years of service. Mine has been in almost daily use for 12 months now.

LEONARD SMITH completed his ceramics course last year and is setting up his pottery at the Kings School, Parramatta, N.S.W.