A Portable, Human-Powered Lathe

Designed and Built by Scott Lewis

Illustrations by David Heim
The Frame

Headstock post. Space posts 140mm apart
Notch 25mm deep
Notch as needed to give clearance around flywheel brackets
Spindle hole 25mm dia.
Holes 6mm dia. for bearing
Frame brace. Length is approximate
Front view
Side view
Lathe bed
Front view
Side view
Tailstock post
Frame base
Frame brace. Length is approximate
140mm
122cm
89mm
74cm
34cm

152mm
89mm
122cm
168cm
140mm
64mm
44mm
44mm
228mm
64mm
100cm
168cm
140mm
44mm
89mm
89mm
Brackets to support dead center are shown on page 8. One bracket is threaded and one drilled out to make it easy to align the tailstock rod.
The Flywheel Assembly

Bicycle wheel axle mounts to brackets bolted to headstock posts

51cm BMX bicycle wheel

Inner rim. 66cm outside dia., 61mm inside dia., 13mm thick

Outer rim, 19mm thick

Divider, 25mm x 25mm x 102mm long. Trim for tight fit between wheel and inner rim

After assembly, turn a slight crown on rim to help hold drive belt in place.

Bicycle wheel axle mounts to brackets bolted to headstock posts

51cm BMX bicycle wheel

Inner rim. 66cm outside dia., 61mm inside dia., 13mm thick

Outer rim, 19mm thick

Divider, 25mm x 25mm x 102mm long. Trim for tight fit between wheel and inner rim

After assembly, turn a slight crown on rim to help hold drive belt in place.
The Headstock

53cm

25mm

114mm

64mm

1x8tpi threading

This end can be reverse-threaded to hold a grinding wheel

Pulley. Attaches to headstock shaft with hose clamps

Turn a slight crown on pulley to hold drive belt

Bearing bolts to headstock posts.

Center pulley over flywheel

183mm approx.

76mm

64mm

114mm

53cm

Cutaway view of spindle shaft and pulley
The Belt Guard and Belt Tensioner

Belt tensioner pivots on rackets on headstock posts, held by bolts that also hold bearings.

Belt guard held in place by brackets bolted to headstock posts.

Belt guard side

Front view

Side view

Belt guard cover

Belt guard cleat (Attaches to frame braces)

Holes 6mm dia.

Belt tensioner arm

Belt tensioner roller bracket

Belt tensioner roller

Holes 6mm dia.
The Pedals and Chair

Cranks, pedals, and chainwheels salvaged from old bicycle. Frame members cut down and welded to bracket that is bolted to pedal support board. Height to center of crank, approx. 229mm.

Chainwheels: 28 teeth 38 teeth 48 teeth (Largest wheel not used)

Drive sprocket at flywheel: 70mm dia., 16 teeth

Seat & back rest

Chair base

Bolt holes 6mm dia.

Pedal support

Chair seat support

Chair back support

Width 140mm

Height 87cm

82mm

251mm

102mm

56cm

Chair base block

Chair base

Chain tensioner stop block 2, bolted to pedal support board

Block and wedge adjust chain tension

Chain tensioner stop block 1, screwed to frame base

Chainwheels:

28 teeth

38 teeth

48 teeth

(Largest wheel not used)

Drive sprocket at flywheel:

70mm dia., 16 teeth

Seat support cleat

356mm

140mm

46cm

19mm

100mm

61cm

32cm

89mm

140mm

216mm

89mm

202cm

89mm

550x450
Brackets and Other Hardware

Headstock bearing from Princess Auto (www.princessauto.com) Part no. 3870185

Tailstock bracket. 19mm nut welded to plate. Leave 1 nut threaded, drill out the other, to make it easier to align dead center.

Tensioner/guard bracket

Flywheel bracket

Holes 6mm dia.

Dead center

Toolrest bracket

13mm square tube welded to bracket

19mm threaded rod

Coupler nut sharpened to point

Banjo locking bar. 13mm threaded rod, with nuts attached.

Flat bar welded to rod

Handle to suit welded to rod

38cm approx.
<table>
<thead>
<tr>
<th>Part</th>
<th>Qty.</th>
<th>Length</th>
<th>Width</th>
<th>Thickness</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tailstock post</td>
<td>1</td>
<td>88cm</td>
<td>89mm</td>
<td>38mm</td>
<td></td>
</tr>
<tr>
<td>Lathe bed</td>
<td>2</td>
<td>168cm</td>
<td>140mm</td>
<td>38mm</td>
<td></td>
</tr>
<tr>
<td>Headstock post</td>
<td>2</td>
<td>122cm</td>
<td>89mm</td>
<td>89mm</td>
<td></td>
</tr>
<tr>
<td>Frame base</td>
<td>3</td>
<td>122cm</td>
<td>89mm</td>
<td>38mm</td>
<td></td>
</tr>
<tr>
<td>Frame brace</td>
<td>6</td>
<td>100cm</td>
<td>89mm</td>
<td>38mm</td>
<td>Length approximate. Cut angled ends to fit</td>
</tr>
<tr>
<td>Tailstock</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Center section</td>
<td>1</td>
<td>46cm</td>
<td>140mm</td>
<td>38mm</td>
<td></td>
</tr>
<tr>
<td>Outer section</td>
<td>2</td>
<td>140mm</td>
<td>140mm</td>
<td>38mm</td>
<td></td>
</tr>
<tr>
<td>Wedge</td>
<td>1</td>
<td>23cm</td>
<td>38mm</td>
<td>38mm</td>
<td></td>
</tr>
<tr>
<td>Toolrest &amp; banjo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Banjo upper arm</td>
<td>1</td>
<td>36cm</td>
<td>114mm</td>
<td>38mm</td>
<td></td>
</tr>
<tr>
<td>Banjo lower arm</td>
<td>1</td>
<td>114mm</td>
<td>114mm</td>
<td>38mm</td>
<td></td>
</tr>
<tr>
<td>Flywheel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer rim</td>
<td>2</td>
<td>66cm</td>
<td>66cm</td>
<td>19mm</td>
<td>Cut out inner circle so rim overlaps bicycle rim</td>
</tr>
<tr>
<td>Inner rim</td>
<td>2</td>
<td>66cm</td>
<td>66cm</td>
<td>13mm</td>
<td>Cut 1-in. ring</td>
</tr>
<tr>
<td>Dividers</td>
<td>6</td>
<td>102mm</td>
<td>25mm</td>
<td>25mm</td>
<td>Length approximate; cut to fit</td>
</tr>
<tr>
<td>Belt tensioner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belt tensioner arm</td>
<td>1</td>
<td>56cm</td>
<td>133mm</td>
<td>38mm</td>
<td></td>
</tr>
<tr>
<td>Belt tensioner roller bracket</td>
<td>2</td>
<td>89mm</td>
<td>38mm</td>
<td>6mm</td>
<td>Can be plywood, MDF, or metal</td>
</tr>
<tr>
<td>Belt tensioner roller</td>
<td>1</td>
<td>76mm</td>
<td>51mm</td>
<td>51mm</td>
<td></td>
</tr>
<tr>
<td>Belt guard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belt guard side</td>
<td>2</td>
<td>86cm</td>
<td>89mm</td>
<td>19mm</td>
<td></td>
</tr>
<tr>
<td>Belt guard cover</td>
<td>1</td>
<td>83cm</td>
<td>133mm</td>
<td>19mm</td>
<td>Plywood</td>
</tr>
<tr>
<td>Belt guard cleat</td>
<td>1</td>
<td>32cm</td>
<td>38mm</td>
<td>38mm</td>
<td></td>
</tr>
</tbody>
</table>