Hand-lever nut opener with an empty-lever parking pin

Apply light hand leverage to one suitable dry thin-shell nut held in a shallow wooden seat. A positive removable pin parks the empty lever above the loading space, and a fixed stop limits its lowest travel.

Capacity and fit

One nut no more than 1 1/2 in (38.1 mm) in its largest dimension, selected for light hand cracking. The fixed closed gap is 1/2 in above the anvil top and 5/8 in above the shallow seat bottom. No proven nut-hardness/force capacity; hard black walnuts, stones and seeds requiring heavy force are outside scope.

Limits

Use eye protection. Transparent side panels are supplemental fragment screens, not certified impact guards. Keep hands out of the anvil/stop zone whenever the parking pin is withdrawn.

Hand pressure only at the grip x=13 to 17 1/4 in. No hammer, power drive, handle extension, body weight or forced operation with the parking pin inserted. Stop at wood movement, cracking, loose hardware or a shell that will not yield with light pressure.

Clamp the base to a sound bench. Load only with the empty lever positively pinned open; remove the pin only after fingers/tools are clear. Raise and re-pin before clearing fragments.

Use clean close-grained uncoated hardwood for nut-contact parts. This original device has no food-sanitation, force, durability or physical cracking validation; keep kernels away from splinters and inspect/clean contact faces.

Finished component envelope

20 x 8 x 6 3/4 in / 508.0 x 203.2 x 171.4 mm (x, y, z). Solid-part envelope; operating sweep and loose purchased accessories excluded. Axes: x left-right, y front-back, z up.

Cut list - actual dimensions

Part / quantity	Finished L x W x T / material
P01 / Base / 1	20 x 8 x 3/4 in / 508.0 x 203.2 x 19.0 mm. Exterior plywood, measured actual thickness as listed; seal cut edges outside plant-contact surfaces
P02 / Pivot cheek / 2	6 x 3 1/2 x 1 1/2 in / 152.4 x 88.9 x 38.1 mm. Straight hardwood, milled actual 3 1/2 x 1 1/2 in section; 6 in stands vertical
P03 / Lever / 1	16 x 1 1/4 x 3/4 in / 406.4 x 31.8 x 19.0 mm. Straight-grained hardwood, actual 1 1/4 x 3/4 in section, on edge
P04 / Anvil / 1	2 3/4 x 2 3/4 x 2 3/4 in / 69.8 x 69.8 x 69.8 mm. Clean close-grained hardwood, milled actual 2 3/4 in cube
P05 / Travel stop / 1	3 1/4 x 2 1/2 x 1 1/2 in / 82.5 x 63.5 x 38.1 mm. Straight hardwood; actual 2 1/2 x 1 1/2 in section; 3 1/4 in stands vertical
P06 / Transparent side screen / 2	12 1/4 x 6 x 1/8 in / 311.1 x 152.4 x 3.2 mm. Measured actual 1/8 in polycarbonate; do not substitute brittle acrylic
P07 / Screen standoff / 2	6 x 1 1/2 x 3/4 in / 152.4 x 38.1 x 19.0 mm. Straight hardwood, actual 1 1/2 x 3/4 in section; 6 in stands vertical

Hardware and consumables

- Fourteen #8 x 2 in wood screws: 4 pivot cheeks, 4 anvil, 2 stop, 4 screen standoffs; all driven up through base.

- One 3/8-16 x 5 1/2 in (139.7 mm) partially threaded hex bolt, two outer 1/16 in washers and one locking nut no taller than 3/8 in. Smooth unthreaded shank must span the lever bearing area, at least the first 3 in from under the head.

- Two nylon spacers: 1/4 in long, 3/4 in maximum OD, at least 25/64 in ID; two internal 1/16 in washers. Total interior spacer/washer material is 5/8 in, leaving 1/8 in running clearance beside the 3/4 in lever in its 1 1/2 in gap.

- Parking pin: one smooth 1/4 in-diameter steel rod cut to 6 in (152.4 mm); two crossholes 7/64 in diameter, 3/16 in from each end; two 3/32 in cotter pins. Deburr all holes and ends.

- Eight #6 x 3/4 in screws and eight smooth 1/16 in washers for the polycarbonate screens. Two bench clamps.

Tools

Tape measure and combination square; Pencil, clamps and safety glasses; Saw with wood blade; drill/driver and piloting bits; 120- and 180-grit abrasive; 25/64, 9/32, 7/16, 5/16 and 7/64 in bits; Forstner 3/4 in bit and depth stop; fine metal saw/file; polycarbonate-safe drill setup.

Fastener direction and joint schedule

- All fourteen 2 in base screws cross 3/4 in plywood and enter upright hardwood 1 1/4 in. Screens use 3/4 in screws through 1/8 in polycarbonate plus 1/16 in washers, entering wood 9/16 in.

- External pivot grip stack is 4 7/8 in before the nut. With a 5 1/2 in bolt and nut no taller than 3/8 in, at least two 1/16 in-pitch threads must project. Internal stack leaves 1/8 in free running space; do not close it by distorting cheeks.

Build sequence

01. Select straight sound hardwood and reject splits/knots in cheeks, lever or anvil. Cut all actual stock sizes. Keep contact parts clean and uncoated; the example is not intended to break very hard shells.

02. Mark both 6 in cheek faces with length measured from their bottom: pivot center length=3 7/8, width=1 3/4 in; parking center length=4 5/8, width=2 3/4 in. Clamp cheeks together and drill matched 25/64 and 9/32 in holes through their 1 1/2 in thicknesses.

03. On the 16 x 1 1/4 in lever face mark the main hole (1, 5/8) and parking hole (2 1/4, 5/8) in. Drill the matched diameters through its 3/4 in thickness. Keep faces parallel; round grip edges only beyond local x=11 3/4 in.

04. Stand cheeks at x=1/2, y=1 3/4 and 4 3/4 in on the base. Their inside y faces must stay exactly 1 1/2 in apart. Fasten each from below with two 2 in screws at x=1 1/4 and 3 1/4 in, y=2 1/2 or 5 1/2 in. Points enter 1 1/4 in.

05. Cut the anvil cube and bore its 3/4 in-diameter seat only 1/8 in deep at top center. Smooth the rim. Mount at x=4 7/8, y=2 5/8 in with four upward screws at x=5 3/8, 7 1/8 in, each y=3 1/8, 4 7/8 in.

06. Mount the stop at x=9, y=2 3/4 in. Its top must be z=4 in exactly. Two upward screws at x=9 3/4, y=3 1/4 and 4 3/4 in keep it clear of the nut and grip zones.

07. Install two screen standoffs at x=11 1/4, y=1 3/4 and 4 3/4 in. Use two upward screws per block at x=11 5/8, y=2 1/8, 2 7/8 or 5 1/8, 5 7/8 in. All four post tops reach z=6 3/4 in.

08. Cut polycarbonate screens and drill the listed pivot/parking holes over backing, using maker-suitable speed and no forcing. Drill screw clearances at local x=1/2 and 11 1/8, z=1 and 5 in. Deburr without scratching; fasten lightly to cheeks/standoffs through washers with eight short screws.

09. Assemble the pivot through outer washer/screen, cheek, internal washer, 1/4 in spacer, lever, 1/4 in spacer, internal washer, cheek/screen and outer washer. The spacer/lever stack totals 1 3/8 in in a 1 1/2 in gap. Tighten the locking nut without pulling the cheeks inward; confirm free lever movement and smooth shank contact.

10. Cut and file the 6 in parking rod. Drill its two 7/64 in crossholes 3/16 in from the ends, retaining the rod in a drill vise while drilling. Fit one cotter before use; the second is the removable retainer after insertion. No burr may enter the wooden holes.

11. Raise the EMPTY lever until its parking hole aligns with both cheek holes. The intended angle has cos=4/5 and sin=3/5, about 36.87 degrees; the 1 1/4 in hole spacing projects 1 in horizontally and 3/4 in vertically. Insert the pin through both screens/cheeks/lever and secure the second cotter.

12. With no nut present, confirm the pin cannot slip out and the lever stays parked without hand support. Remove the pin with the grip controlled, lower slowly and verify the stop contacts before the lever enters the 1/2 in top gap. Re-pin before touching the anvil.

13. Clamp the base independently at its far corners. With the lever pinned open, place one compatible small nut in the shallow seat and remove fingers/tools. Hold only the grip, withdraw the pin and apply light steady pressure. Stop if the shell does not yield; never increase leverage with an extension.

14. Raise, re-pin and verify retention before removing fragments or a kernel. Inspect all wood, bolt fit and screens after the first trial. A trial is required of the builder; no successful cracking or force capacity has been claimed here.

Acceptance checks

- Cheek inner gap remains 1 1/2 in; pivot turns without binding or exposed thread bearing on the lever.

- Empty parking alignment is x=3 1/4, z=5 3/8 in; both retainers remain outside the screens. Never apply downward force while parked.

- Closed lever rests on the stop at z=4 in. Anvil top z=3 1/2 in and seat bottom z=3 3/8 in leave 1/2 and 5/8 in gaps respectively.

- Screens have buried short screws and no cracks. Base is clamped; hands remain out of the nut/stop zone whenever the pin is out.

Use

- Work one compatible thin-shell nut at a time with light hand force. Hardness varies; use appropriate purchased equipment when more force is needed. Keep kernels away from shell chips/wood damage and clean the contact area after each session.

Care

- Empty and brush the seat with the lever pinned. Inspect bolt holes, wood splits, loose stops and screen cracks before every session. Replace worn parts; do not reinforce a failed lever with an improvised extension.

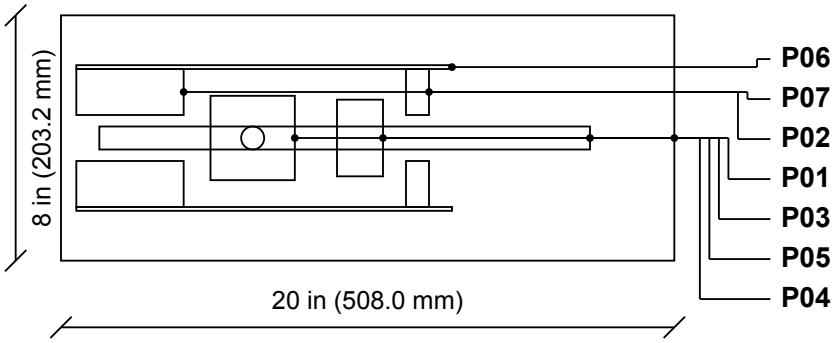
Primary context sources

Iowa State University Extension and Outreach: How to Harvest, Crack, and Store Black Walnuts. Nut-shell hardness and separate harvest/drying context. This original light hand lever is not intended for hard black-walnut shells and has no tested cracking capacity.

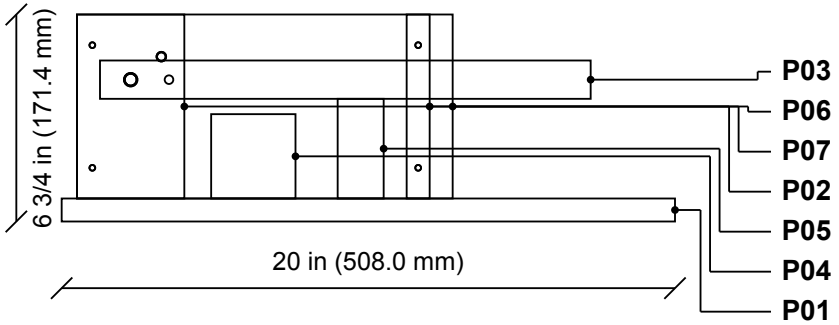
OR-008 / ASSEMBLY VIEWS

Combined tags mark coincident profiles. Repeated members share one callout. P-numbers match the cut list.

PLAN / x-y



FRONT / x-z

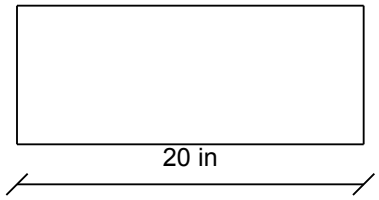


Geometry is schematic orthographic projection. Working clearances and fastener directions are specified in the text.

No scale measurement from this sheet. Use written dimensions. Unbuilt original design.

OR-008 / CUT AND MACHINING 1

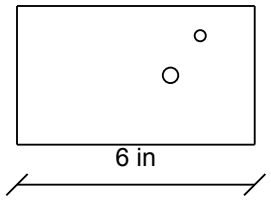
Face view: length horizontal, width vertical. T = actual thickness. Square cuts unless stated.



P01 Base / qty 1

20 x 8 x 3/4 in / 508.0 x 203.2 x 19.0 mm

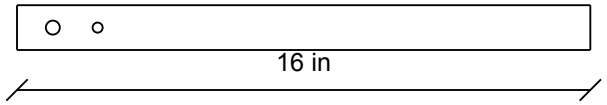
No openings or angled cuts; break exposed edges with sandpaper.



P02 Pivot cheek / qty 2

6 x 3 1/2 x 1 1/2 in / 152.4 x 88.9 x 38.1 mm

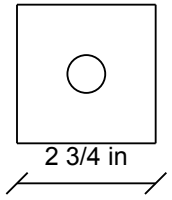
On length-z / width-x face: pivot (3 7/8, 1 3/4) in, diameter 25/64 in; parking (4 5/8, 2 3/4) in, diameter 9/32 in.



P03 Lever / qty 1

16 x 1 1/4 x 3/4 in / 406.4 x 31.8 x 19.0 mm

Face holes at (1, 5/8) in dia 25/64; (2 1/4, 5/8) in dia 9/32. Round grip beyond local x=11 3/4 in.



P04 Anvil / qty 1

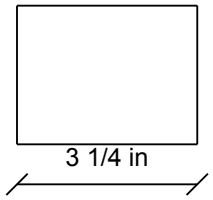
2 3/4 x 2 3/4 x 2 3/4 in / 69.8 x 69.8 x 69.8 mm

Top face center (1 3/8, 1 3/8) in: 3/4 in diameter shallow seat, 1/8 in deep; not a through bore.

Dimensions in inches control; metric equivalents are in the cut list. Hole locations are measured from the stated face corner.

OR-008 / CUT AND MACHINING 2

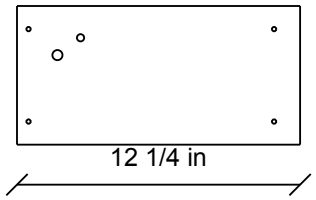
Face view: length horizontal, width vertical. T = actual thickness. Square cuts unless stated.



P05 Travel stop / qty 1

3 1/4 x 2 1/2 x 1 1/2 in / 82.5 x 63.5 x 38.1 mm

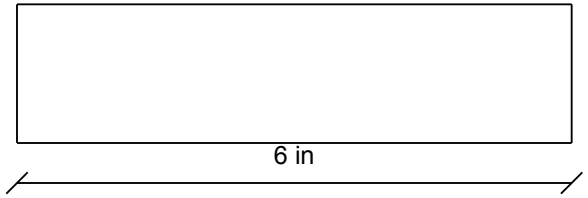
No openings or angled cuts; break exposed edges with sandpaper.



P06 Transparent side screen / qty 2

12 1/4 x 6 x 1/8 in / 311.1 x 152.4 x 3.2 mm

Pivot hole local (1 3/4, 3 7/8) dia 7/16; parking (2 3/4, 4 5/8) dia 5/16. Four screw holes at x=1/2, 11 1/8; z=1, 5 in.



P07 Screen standoff / qty 2

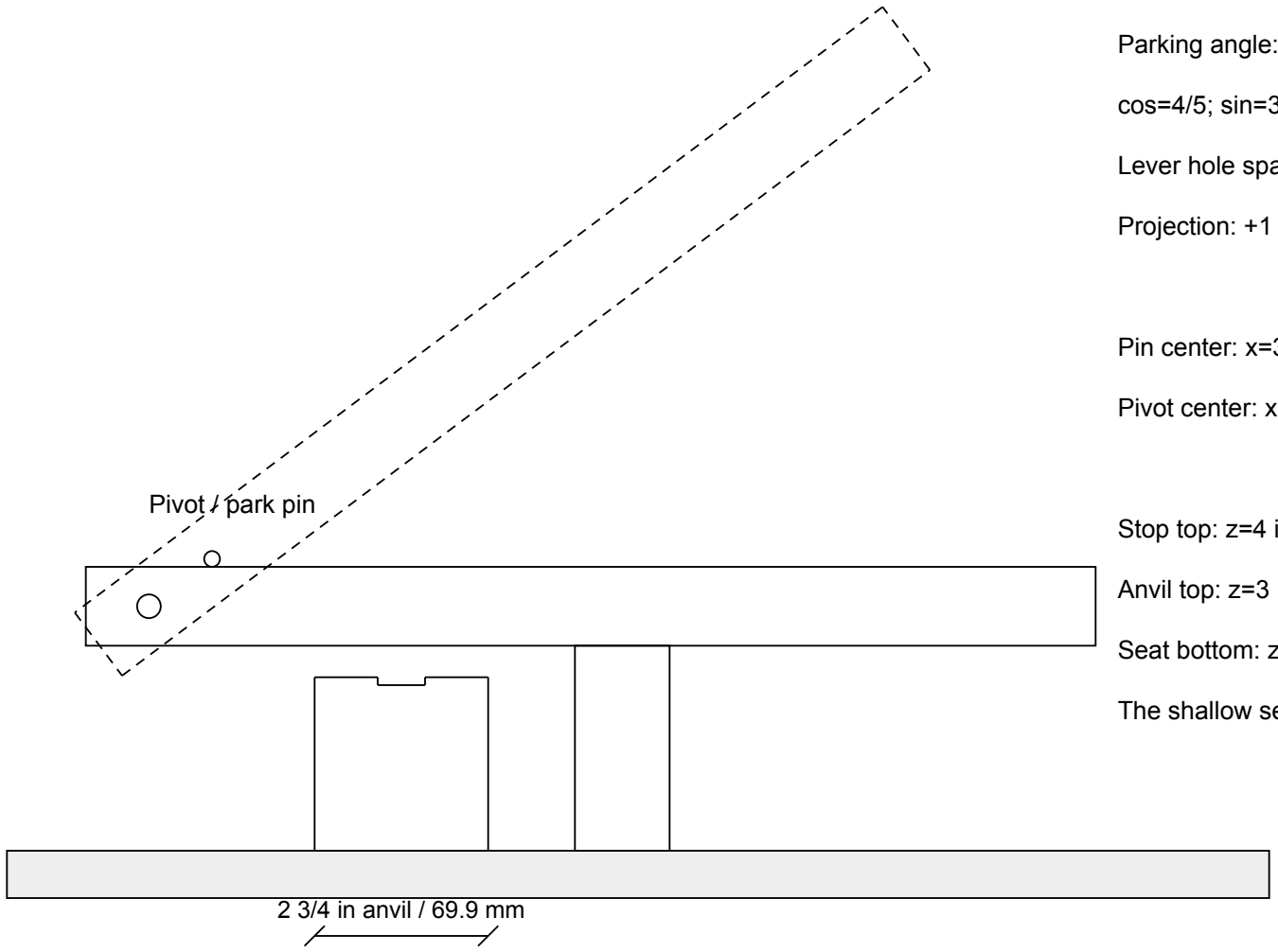
6 x 1 1/2 x 3/4 in / 152.4 x 38.1 x 19.0 mm

No openings or angled cuts; break exposed edges with sandpaper.

Dimensions in inches control; metric equivalents are in the cut list. Hole locations are measured from the stated face corner.

OR-008 / CLOSED STOP AND PINNED-OPEN GEOMETRY

Central x-z section at y=4 in. Cheeks/screens are outside this cut plane. Dashed lever is parked EMPTY.



Parking angle: 36.87 degrees.

cos=4/5; sin=3/5.

Lever hole spacing: 1 1/4 in.

Projection: +1 in x, +3/4 in z.

Pin center: x=3 1/4, z=5 3/8 in.

Pivot center: x=2 1/4, z=4 5/8 in.

Stop top: z=4 in.

Anvil top: z=3 1/2 in.

Seat bottom: z=3 3/8 in.

The shallow seat is 1/8 in deep.

Hands clear before withdrawing the pin. Grip only x=13 to 17 1/4 in. No hammer, body weight, extension or tested force rating.