

Fold Away Workbench by Tony Ashgrove

Can a Garage function as both a workshop and a garage?

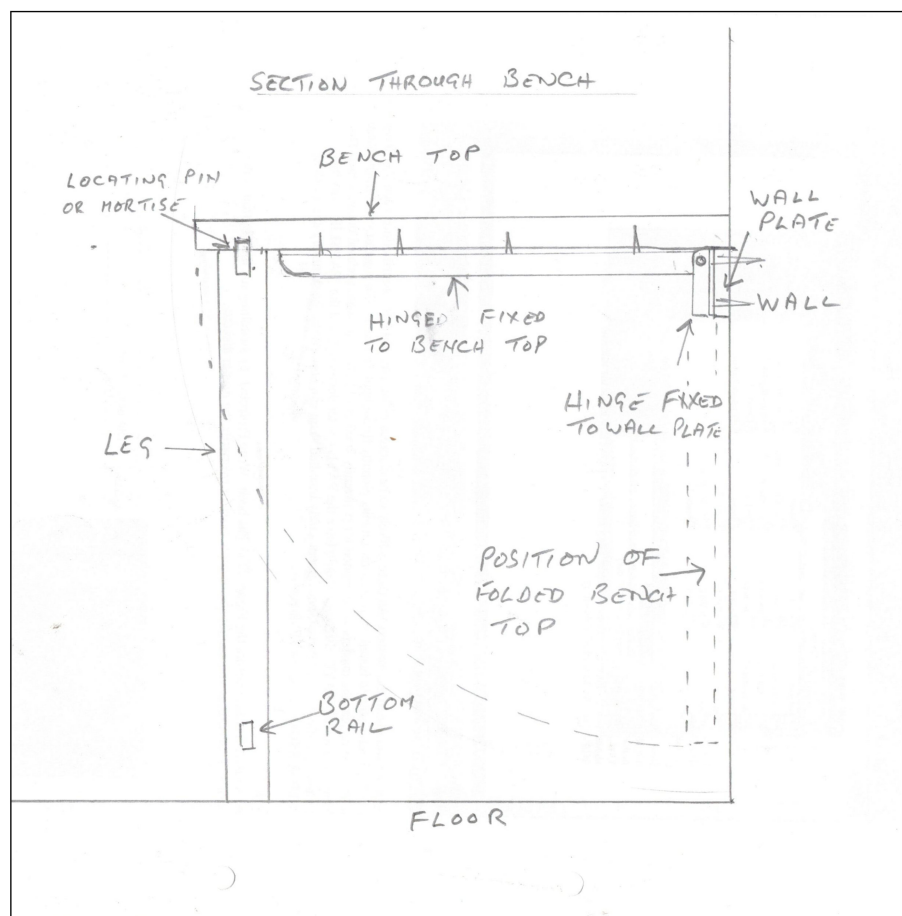
I have faced this conundrum many times, my solution... try to make a bench that can disappear....
So without the bench you have a garage and with the bench erected you have a workshop!
Workmates are OK but too small for most jobs and trestles are not rigid enough.

I would suggest you view this as how I solved the problem and not one that you must follow religiously, but rather as a conceptual solution, but applying the principle to your situation, you too can achieve your goal. I have included some simple un-scaled sketches to accompany the dialogue.

In principle, you make a bench top the size that suits your location, this is hinged on one of it's long edges to your wall with a set of legs that are either free standing or hinged that support the other long edge. If you decide to fold it down when not in use, the maximum width cannot be greater than the distance between the underside and the floor, but if folded up against the wall this width restriction does not apply.

If you have a structural wall you can hinge a drop-down bench top from that wall. The wall gives a solid fixing for the bench so rigidity is not a problem. So when you need your bench, just move the car, lift up the bench top and slide the legs under. When you're finished, slide out the legs and let the top hinge down against the wall and you have your garage back.

You can make the bench top, legs and hinges without the need for specialist tools.



Things to consider,

1. What hinges are you going to use?
 - Shop bought Hook (Pintle) and Band as used on a garden gate.
 - Heavy duty Tee Hinges (firstly consider how are you going to fix the screws!)
 - Home made Angle Iron two piece hinge, this allows you to maximise the size for extra security.
2. Are you going to fix the hinges direct to the wall, or first fix a timber wall plate which allows for more precision in the hinge fixing position as you are screwing/bolting into wood, not drilling into masonry.
3. How will it operate?

- The top can fold up or down against the wall when not in use. Folding down limits your maximum width, the distance from the centre of the hinge to the edge cannot be more than the distance from the centre of the hinge to the floor
- Folding up might mean you cannot reach to 'latch' the top into the 'park' position safely, so a side latch will be required
- How will you **fix** the legs in use? I just use gravity with small timber strips to form a small wall to stop the legs from moving. You can hinge the legs to the top, but it increases the overall weight! If legs are hinged, the fulcrum point for the top against the wall may need to be brought out from the wall to allow the top to hinge down. A mortise and a dowel pin are sketched for information

Tools required

Obviously the more comprehensive your toolbox is the easier it will be to fabricate, the minimum tools are,

1. Hacksaw to cut the 'angle iron'
2. Drill and bits one to drill holes for screws 3/16", 4mm or similar, one 1/2" for the pivot pin, 12mm or similar,
3. Wood saw to cut 30mm thick planks
4. Screwdriver to **fit** your screws
5. Masonry drill to **fit** wall plugs
6. Wood drilling bits and chisels to make 3/4" mortices (router alt)
7. Tenon saw or similar to cut tenons
8. Sash Cramps 30" opening to hold top when glueing, or some 6mm rope (Spanish Windlass)

The materials are a suggestion they can be substituted with other sizes and materials, you will have to decide what sizes you are going to need, these are a suggestion for a 72" bench 30" high, and home made hinges

1. Wall back plate (optional), 1 required, timber 1" x 5" x 72"
2. Legs, 2 required, timber 3" x 3" x 30"
3. Top Bar, 1 required, timber 1.25" (2" alt) x 5" x 60"
4. Bottom bar, 1 required, timber 3" x 2" x 60"
5. Braces, 2 required, timber 1 x 1.5" x 38"
6. Top, 5 required, timber 1.25" x 6" x 72", or a suitable thick plywood or worktop (I would avoid a 'Chipboard' top, **fixings** don't hold in it)
7. Wall hinges, 2 or 3 required, Steel angle (Aluminium Alt) 2" x 2" x 4"
8. Strap hinges, 2 or 3 required, Steel angle (Aluminium Alt) 2" x 2" x 26"
9. Hinge pins, 3 required, steel bolts with heads removed, or threaded bar, 1 off 4", 1 off 3.5" and 1 off 3" x 1/2" Whit thread (metric 12mm), Alternate round bar welded
10. Nuts and washers for bolts/studding 6 required, unless welding round bar
11. Screws and wall plugs to **fix** the wall plate to wall, or if wall hinge is being fastened direct to wall suitable screws min 9 required.
12. Screws to **fix** wall hinges to wall plate min 9 required
13. Screws to **fix** strap hinge to underside of bench top length dependant on bench top thickness, number dependant on how many holes drilled min 12 length 1" to 1.25" check

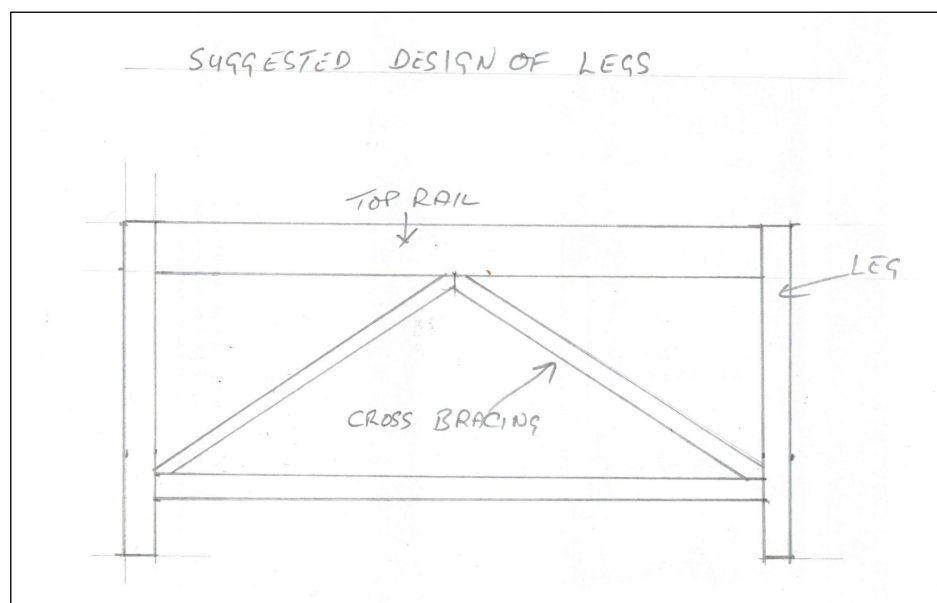
Overview

We are using the same principal as a garden gate that uses a Hook and Band (gudgeon and pintle) hinge but not operating in the vertical plane but rather in the horizontal plane. The legs only support the front and they can sit in a shallow mortice under the bench top for location and stability, alternately you can use a short dowel, we are using some



'angle iron' steel or aluminium for both the wall fixing and long hinge, the 'pin' can be in either the wall plate or strap hinge, it can be bolted in or welded, you will see they vary in length so they engage one at a time to simplify the erection, a stop pin can be put into one of the main pins to stop the top from being accidentally pushed off the 'hinges' the weight of the top ensures it sits on the legs securely and I have never needed to add additional security.

When not needed, you lift the front of the bench top just enough to clear the legs, angle move the top of the legs towards you then lower the bench top, and it will pivot around from a horizontal to vertical



position and be parallel to the wall approx 3" from the wall, the legs can be stored in any orientation where ever you have space. To erect, get the legs in the correct orientation sitting close to the bench top, lift up the bench top to just past horizontal and put the legs under, move the legs until they locate in the mortice and let the top drop into the shallow mortice, ensure they approximately vertical , the bench is now useable.

Construction

You firstly need to decide on the actual size of the bench top and the working height, this will dictate the material sizes, we have based the sized quoted on 30" height with a 30" x 72" bench top.

Firstly fabricate the legs, we have used 3" square timber the top rail is 5" x 1.25" and is slotted into a 1" wide mortice in the leg, based on 5" wide timber, the mortice needs to be 4" long and started 1" from the end, and needs to be 1" min deep, if you make it 5" wide it is open at the top and loses strength.

The leg does not extend to the front edge of the top but rather be set in 1" or so, likewise the width of the leg assembly is 8" less than the bench top so the legs are set in 4" from the bench ends

The bottom rail is morticed into the legs, again 1" wide, 3" long and 1" min depth is fine.

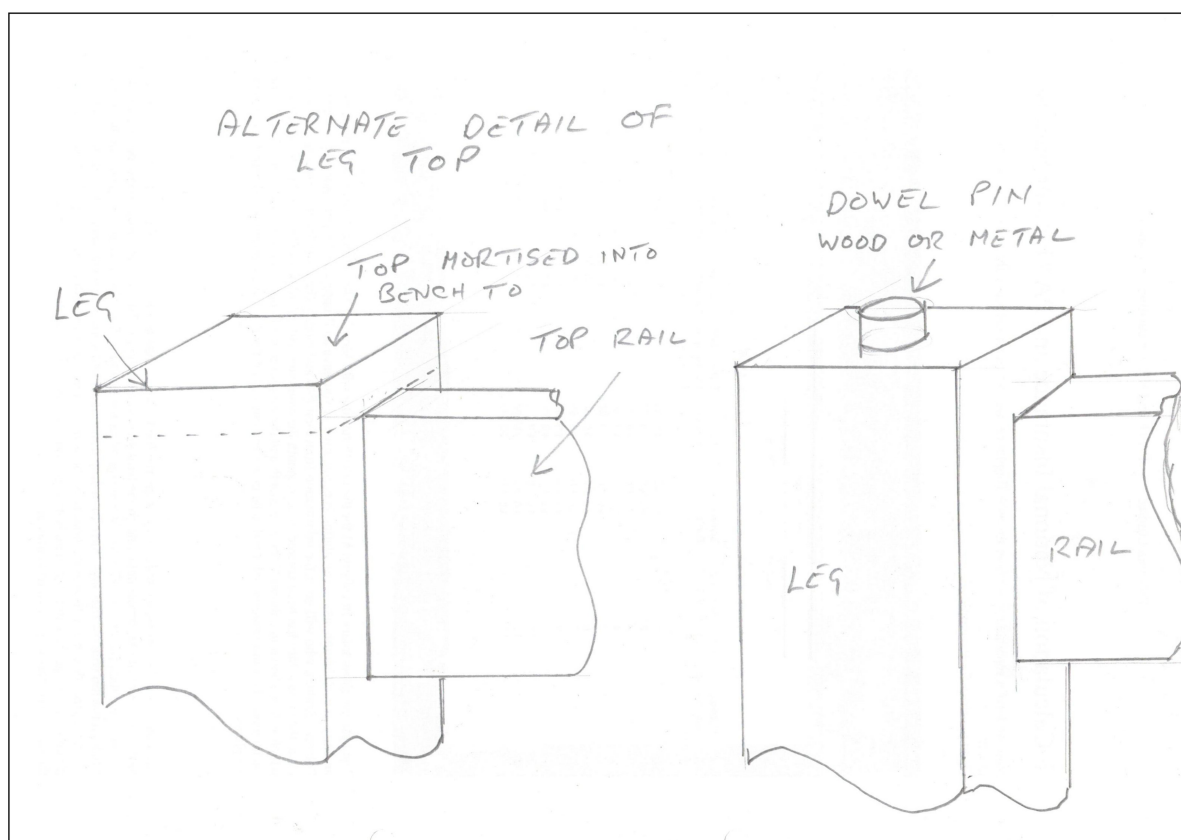
You need to glue these four parts together, to pull them together it is unlikely you will have sash cramps long enough, put a loop of rope from leg to leg and using the 'Spanish Windlass' principle apply pressure, make sure the structure is square, if you don't have a 'large square' you can resort to 'good old Pythagoras' 3 x 4 x 5 measurements. Once square, fix a temporary brace to hold the assembly square until the glue sets, try to lay it down on an even surface to avoid 'twisting' if you have a twist put blocks under the two low corners and weights over the two high corners to remove the twist until the glue sets. When set, you can cut the braces to fit and glue into position.

The primary design requires the legs and top rail to be morticed in the underside of the bench top, easily done with a router, however if you don't want to do this, set the top rail down 1/2" from the top of the leg, so now you have a protrusion on each leg so the mortice under the bench top only needs to accommodate these, so much easier but still safe. As an alternative, have the top rail and legs level, and fit a dowel in the top of the legs that will locate in a hole in the underside of the top.

The bench top can be fabricated from timber planks or be made from manufactured timber e.g. particle board, if you choose manufactured board be aware that fixings e.g. screws may not be as secure and you may need to use alternate fastening techniques i.e. bolt through the top or a timber nut.

To make the bench top from planks you can use 'biscuit' joints, dowels or tongue and groove for alignment. If you don't have a sash clamp you can glue the boards edge to edge one at a time using long decking bolts, drill and counterbore through the width so the fixing gets a good grip. You can also use a 'cleat' under the width of the bench top and screw into the underside of the bench top, just avoid where you intend to fix the hinge, you will need to stop it short of the back to allow it to clear the wall plate when it is in the stored position.

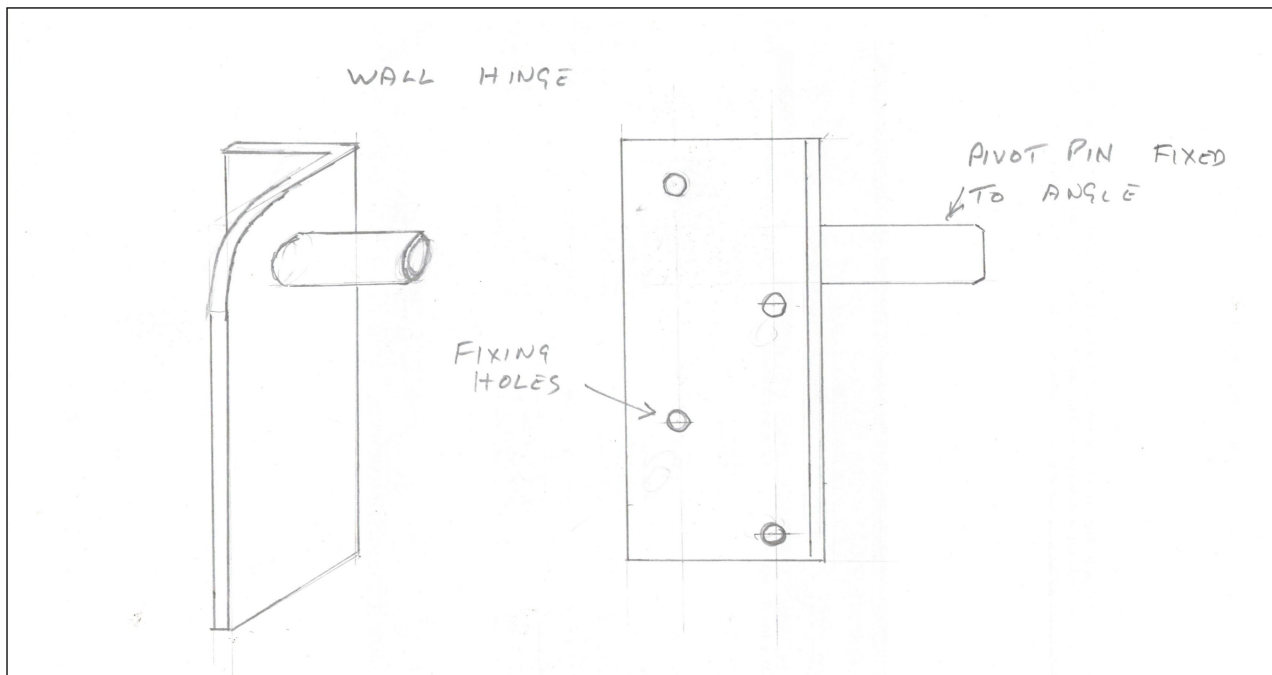
A simple clamp can be fabricated from fence post type stock, securely fix a stout block squarely on one end, fix a second block just clear of the timber you need to clamp then drive two wooden wedges in to apply pressure, once the glue has set move the second block to the other position to accommodate the increased width and repeat until all the boards have been fastened. Now is the time to make the hinges the wall hinge is a piece of angle, on one face we drill the holes for the fixings, on the other face is the hole for the pin.



We suggest you use three for rigidity, but two would suffice with a sturdy bench top, they are all the same hand or you will end up being unable to slide the top off the wall hinges, you need to radius the top edge to allow the top to fold down, this radius would be centred 1" down and 1" in from the top corner of the angle (based on 2" x 2" size), to ensure clearance, I would centre the drilled hole 7/8" down and 7/8" in from the side to give clearance on the movement. Again I would fix the pins to these, though it doesn't matter, what does matter is that all the pins MUST face the same direction.

The pins can be made from round rod welded into the angle, studding could be used, with a nut either side to fix, or a part threaded bolt with the head cut off and a nut either side to fix, a more engineered pin

could be a round rod of the required size with a $\frac{3}{4}$ " section reduced to the next tapping size smaller so it can be held with a nut pulling against the shoulder, or welded, or even riveted .



Whatever you use, they need a good lead-in chamfer, and adjust the lengths so they engage one at a time i.e. one protruding 2", one 1.5" and the last 1".

The length of the wall hinge is dictated by either the width of the wall plate or the wall structure if you are **fixing** direct to the wall.

The strap hinge is next, again angle is ideal for this strong and light. The length should permit it to be fastened to the fullest width of the bench top without fouling the top rail of the leg assembly. Take note of the 'Hand' the 'wall hinge' has the protruding side on the right hand side, while the strap hinge has the protruding side on the left. The end has to be radiused the same as the wall hinge likewise the hole is drilled at $\frac{7}{8}$ " from the end and edge to give clearance. The **fixing** screw holes are spaced to ensure they attach **efficiently** for the best security. If you have decided to **fix** the pins to the strap hinge the same advice applies re the length. If you have used planks for the top, ensure at least on **fixing** goes into each board to improve rigidity.

For safety, you can drill a hole in the longest pin in a position that is accessible when the top is folded down and **fit** a safety pin to stop the bench getting pulled off the hinges, if you have used studding for the pins just put a nut on.

The positioning of the strap hinge has to be measured accurately, **firstly** decide if the wall plate is under, level or above the bench top, then measure where the pivot point on the wall hinge is in relation to the wall/wall plate, then position the pivot point on the strap hinge in the same position. I would recommend doing a scale drawing to **confirm** the position planned actually works without fouling.

If the hinge is **fitted** too close to the end you will have a gap when the bench is raised, too far and the edge of the top will hit the wall before the top is fully raised and stop it fully raising, if forced you will lever the hinge off the wall

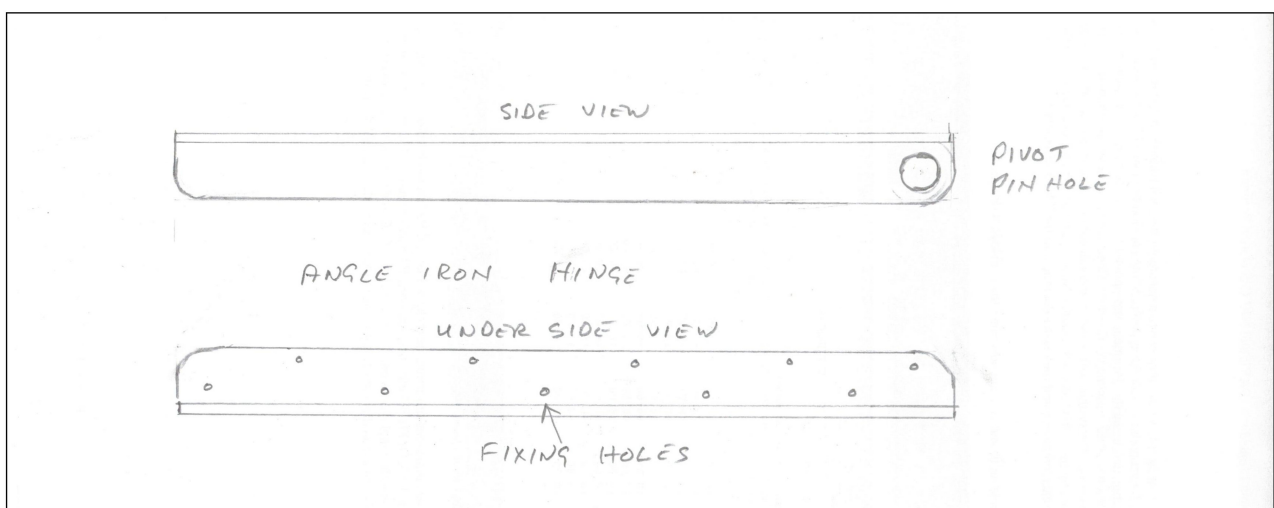
The wall plate is not essential, but recommended for accuracy and load dispersal. You can **fix** the wall hinge directly into the wall, but drilling into masonry can be problematic if you want accurately placed holes. Do not **fix** this until the legs and bench top have been assembled, to ensure it all works.

The wall plate can be **fixed** to **fit** under the top, **finish** level with the top or above, be aware of the need to fasten the hinge, the higher the plate, the less space is available to **fix** the hinge and some screws could end up below the wood! In this case consider **fitting** a second wall-plate under the **first** or a wider wall-plate in the **first** place

Fix the wood to the wall, then mark out the position of the hinges, you can remove the wall plate and screw or bolt the hinges more easily and accurately, then re **fix**.

You can hinge the leg assembly to the underside of the bench top, then the legs will fold under the top as the top is lowered, this negates the need to mortice the legs into the top, but will need the 'wall hinge' to be spaced off on blocks and the strap hinge re-positioned accordingly.

You can **fix** a block on the wall once the bench is assembled to stop it sliding off the hinges as an alternate to putting a safety pin in the hinge.



This is just a simple bench, it can be made smaller and lighter, depending on space and needs, this is just a suggestion that I use and works for me, is it strong? one of mine has a 24" x 24" cast surface plate on one end and a 4" heavy vice on the other.

Another thing to consider, you can move your bench to a second location, after **fitting** a second wall-plate in that new location, giving you the option to work in several locations