

## Welcome

Places that need a bike trailer the most, often have the least capacity to build or buy them.

Carry Freedom developed the Bamboo trailer to allow anyone the ability to build a strong adaptable trailer from anything.

These plans allow a builder to make a trailer from most materials, with pinned joints, and no bending or welding. Whether you make it from titanium or bamboo, this is a stiff light trailer. It can be varied in width length and strength, and made to fold.

We are developing this project as a non profit venture. These free plans are funded by profits from our western trailer sales.

Any help in developing funding and circulating this project is welcome.

## Document Notes

This is a work in progress, so appologies for all mistakes and omisions. The ultimate aim is to have a document that can be followed and understood by most people irrespective of language culture or literacy. This of course will take a lot of time feedback and help.

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## Innovative design

The trailer's innovative for 4 reasons.

- 1) The plans are free to distribute.
- 2) Its simple. The trailer can be made with very simple tools and skills.
- 3) Its flexible. The trailers length width strength and materials can be varied..
- 4) Its strong. The trailer strength to weight ratio is near perfect.

## These Instructions

These instructions main aim is to provide, basic layout and sequences. It does not cover the detail of how to do things as techniques will vary depending on the tools you have to hand and the materials you are using.



## **The Bamboo Trailer**

This trailer is special because no tubes need bent or welded, and all joints may be simply pinned or lashed. At one extreme this trailer can be made out of eight pieces of green wood or bamboo lashed together, at the other titanium and Kevlar pinned together. Either way you can have a very respectable stiff light trailer. Variations in width length and strength are easy; it will take any load you have. Hitch it behind a donkey if you lack a bike, or make it fold/collapse if you lack space.

## **Construction**

You'll need eight lengths of material capable of withstanding bending and compression, tubing or angle iron are ideal. You also need eight "spokes" that are good at taking tension. These could be wire, chain, or steel strip. The exoticists amongst could use Kevlar. Two bike wheels and a hitch will also be useful.

Seven tubes are pinned or bound together where they cross to create the basic frame shape that looks like a 6. This structure can distort like a parallelogram, or warp like a sheet of paper.

## **The Clever Bit**

With the addition of the eight spokes and the last tube this floppy structure transforms into a stiff light structure reminiscent of a square bicycle wheel.

Imagine the square load area as the rim of a wheel, with 8 spokes connecting from its corners to a central hub. Trueing these controls how square and flat the trailer frame is. The arrangement can be dished to make it flatter on the load side than the underside. Four spokes stops the structure from parallelograming while the addition of another four and the hub stops the frame warping. The

top set of spokes could be replaced by a flat load bed.

## **The difficult bits**

The wheels are supported from each side by brackets attached to the four frame tubes running front to back. These brackets should be attached so they have flat plates facing parallel to each other with slots cut in for the axle stubs. Each wheel is supported by a vertical slot and a horizontal slot allowing the ability to adjust the wheels so they both are pointing in the same direction and not touching the frame. Attach these plates securely or else you will have no end of problems.

This trailer hitches to the bike at the bikes left hand rear axle stub. This is the most efficient, and the strongest place to hitch a trailer. (See our Trailer science pdf for an explanation).

## **The Purpose?**

If anyone can build a trailer out of practically anything with hardly any tools that can do anything, then a whole new world opens up. The places where bikes are most essential are the very places with the least capacity to fabricate them. This trailer allows what bikes there are to do a more useful job; from acting as ambulances to carrying food to market. Furthermore the building of these trailers provides local jobs, and helps invigorate the local economy. Carry Freedom will be distributing plans for it through charities such as World Bicycle Relief.

## **The Potential**

For the foolhardy the central tube can be extended to create a mast for a land sail, and there are plenty of options left for the more practical amongst us.

## **Solid Load Bed**

The most obvious step to making the trailer useful is to replace the top four spokes with a flat load bed. Onto this most things can either be lashed or bolted. It is worth reading our Y-Frame instructions to see how our box QR works as this can be copied for use on the Bamboo trailer.

## **Fabric load bed**

The spokes can support a simple load bed made from fabric, or rope could be woven between the spokes to create a load bed. The load bed is best supported by the lower spokes. If it is being woven between the spokes a single cord should be woven in a spiral to form the warp, then four separate triangular panels can be woven with the weft running from the load bed edge to centre.

## **Cut Down Barrel**

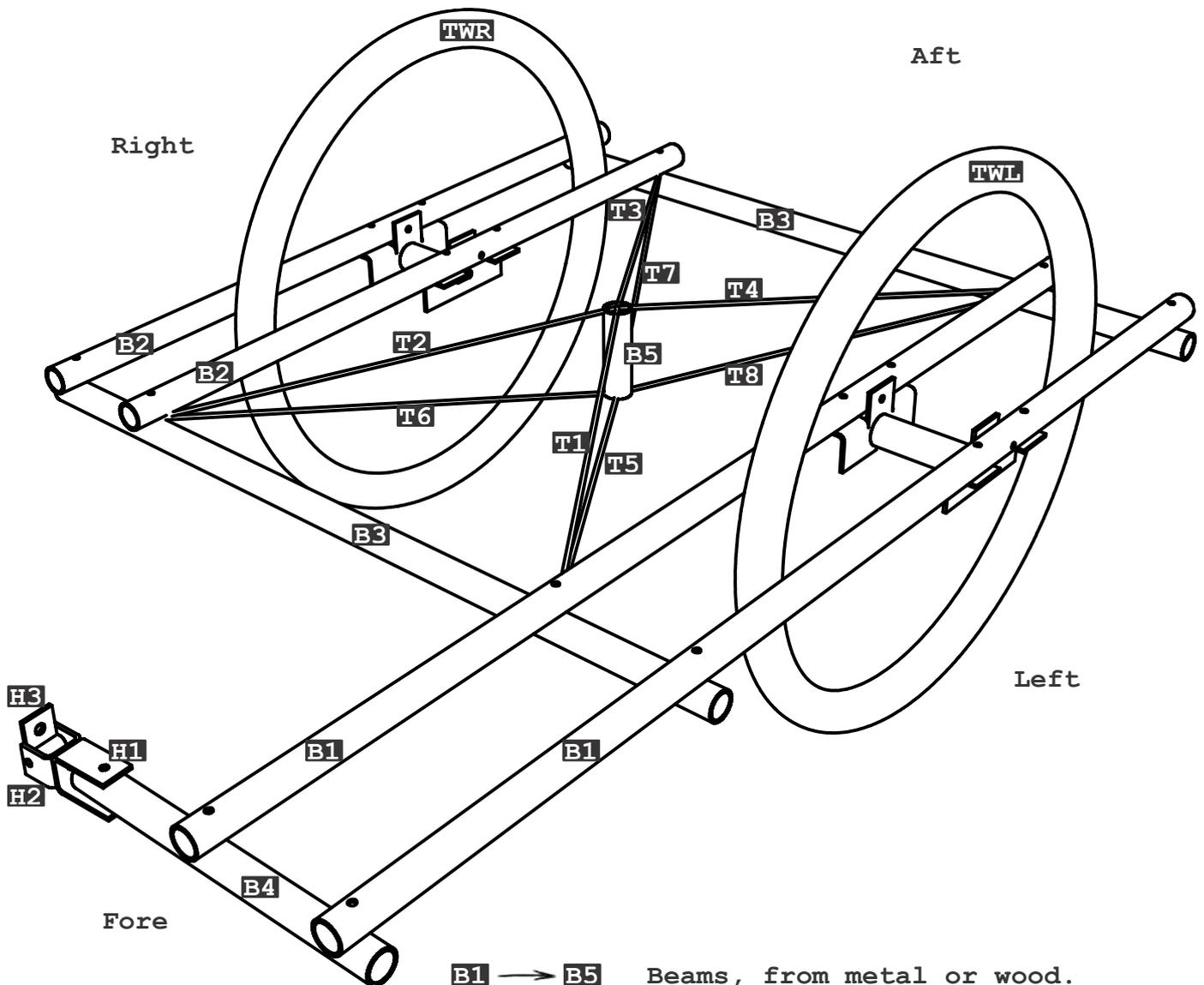
Remove the brace wires from the centre and fill the void with an old barrel, cutting some form of access hatch into it.

## **Lifting Handles**

The frame beam over hangs can be extended to create lift handles. At the simple level this provides a useful grips to lift the trailer over obstacles on washed out roads. There is no reason not to extend the inside right wheel pole and shortening the outside left pole to create two long poles running forward. These are ideal for hitching to an animal thus turning the trailer into a cart.

## **Four Wheeler**

A second trailer can be hitched onto the back of your first trailer, to create a four wheel trailer. This is probably best done by extending the left inside wheel beam forwards and hitching this to the rear of the front trailers inside wheel beam.

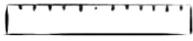


- B1** → **B5** Beams, from metal or wood.
- T1** → **T8** Spokes from wire chain or rope.
- H1** → **H3** Hitch Brackets from sheet metal.
- TWR** & **TWL** Trailer wheels, from old bike.
- WB1** & **WB2** Wheel Brackets, from sheet metal.

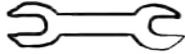
**NB.** You will also need materials for making a load bed, and to join all the parts together.



## Tools



Measure,  
M1, M2, M3, ...



Bolt,  
B1, B2, B3, ...



Cut,  
C1, C2, C3, ...



Paint/Mark,  
P1, P2, P3, ...



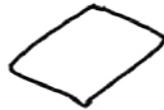
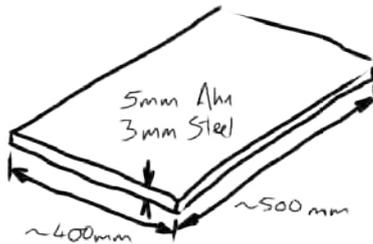
Drill,  
D1, D2, D3, ...

## Events

- Action/Measure
- Detail
- ↔ Zoom
- ✓ Good
- ✗ Bad
- ! Caution
- B1** Object
- ⇒ Proceed

### Sheet

**H1** → **H3**  
**WB1** & **WB2**



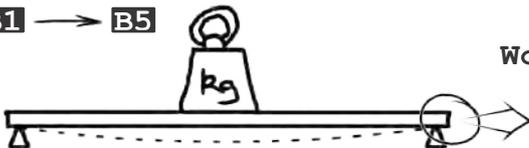
### Ties

**T1** → **T8**

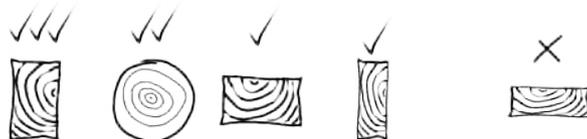


### Beams

**B1** → **B5**



Wood



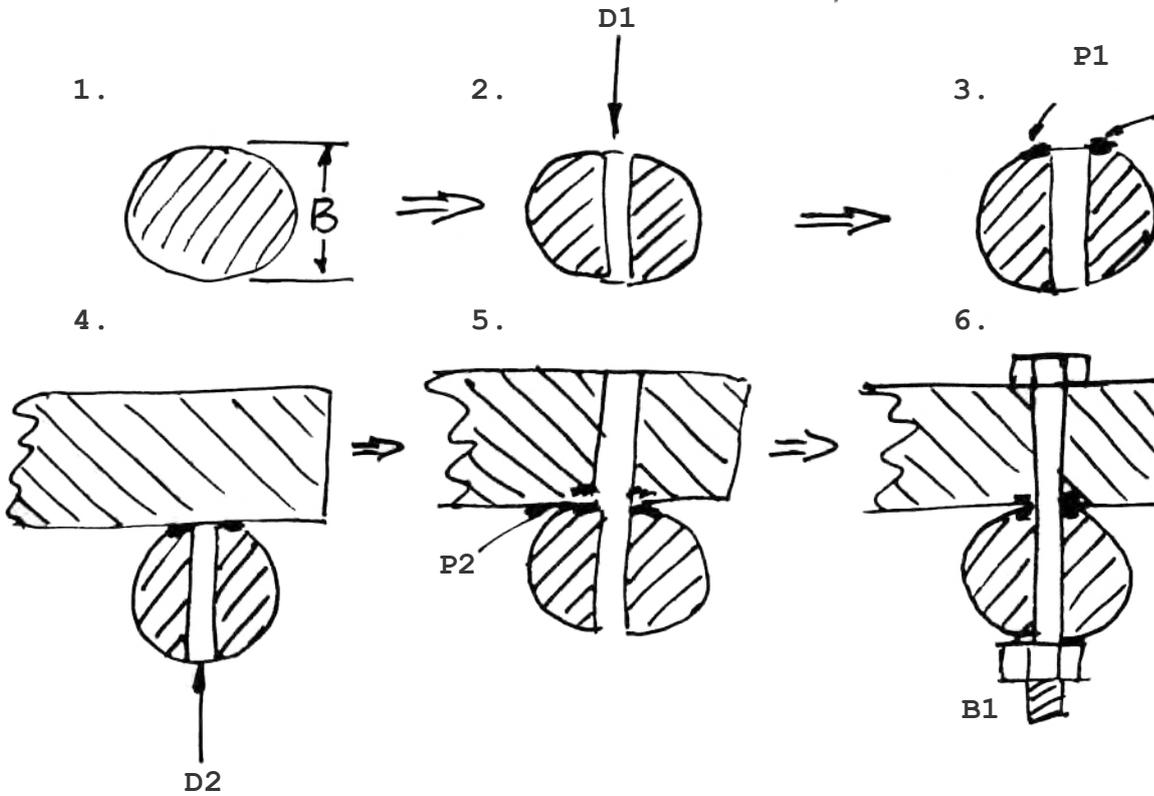
Metal



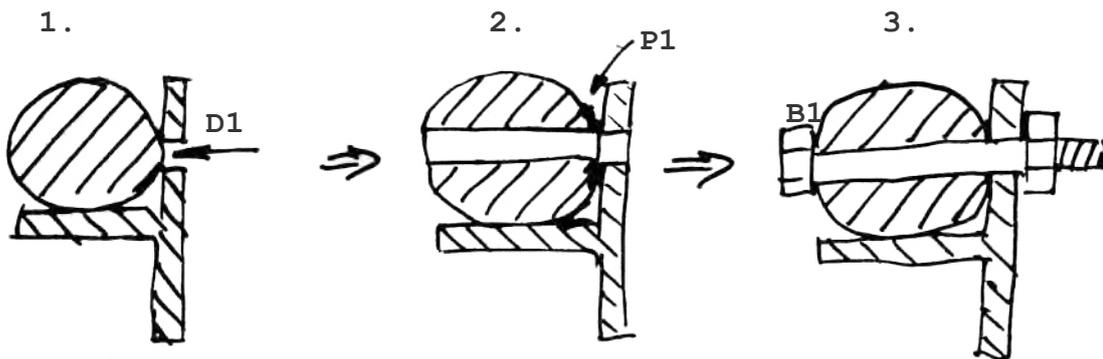
B



## Beam to Beam



## Beam to Plate

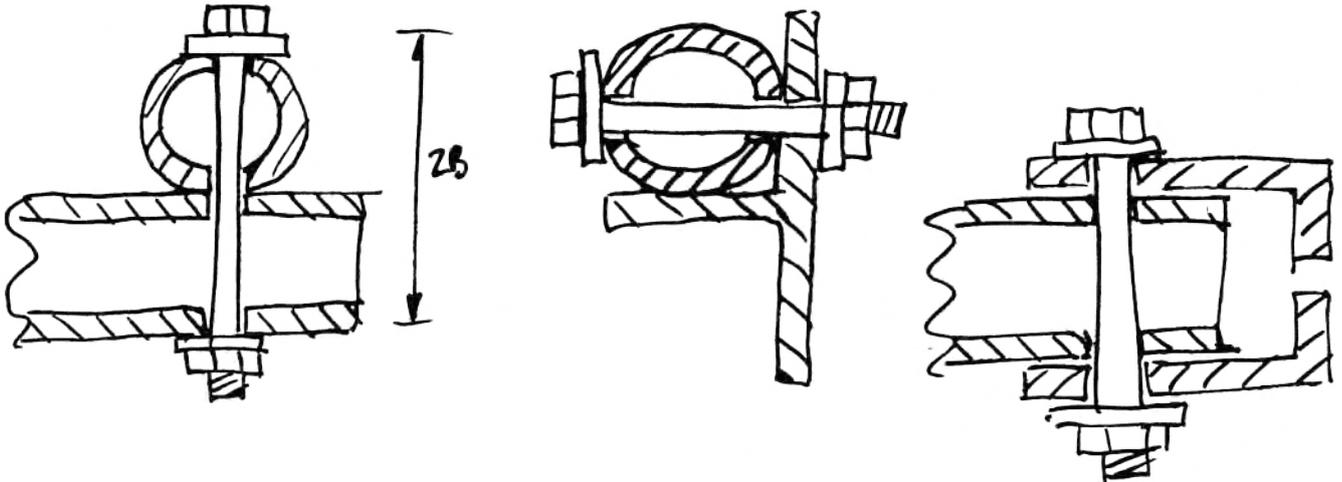


**NB.** Always mark the entry side of any hole, with paint or a marker. This will be more accurately positioned than the exit hole. When joining two beams the entry holes should be touching.

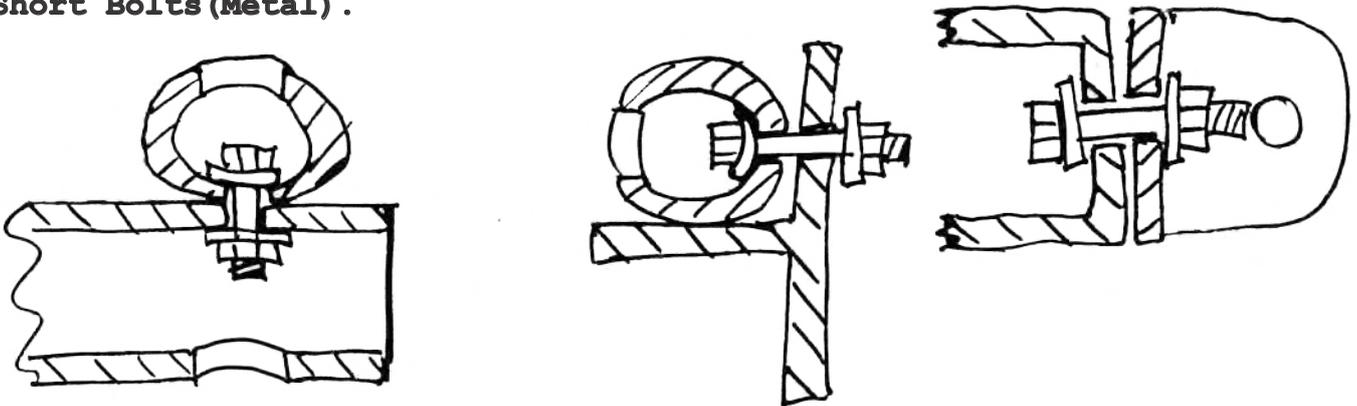
# Bolting Options



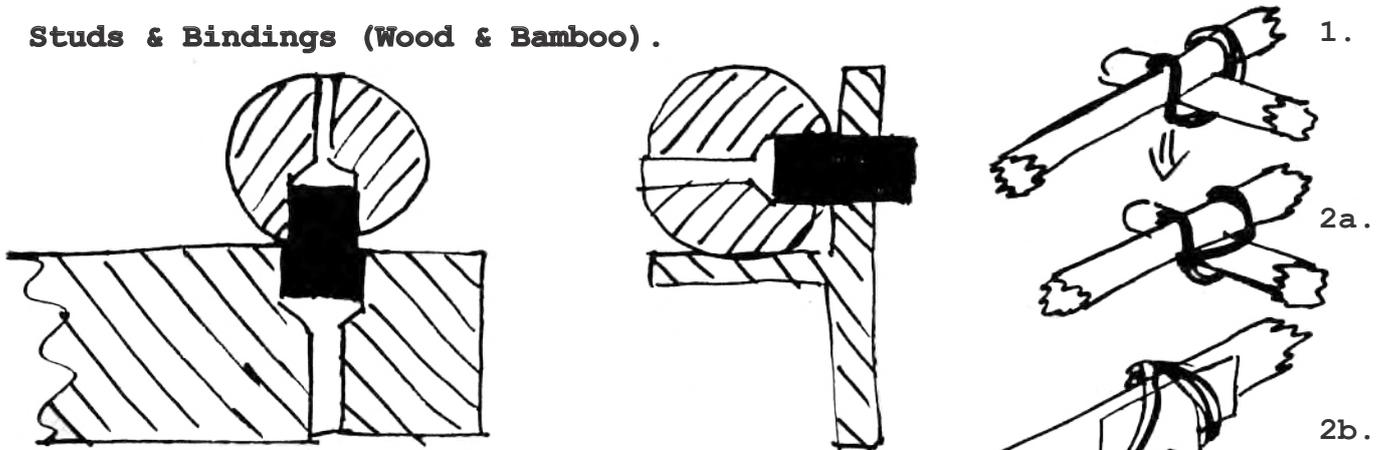
## Long Bolts (All) .



## Short Bolts (Metal) .



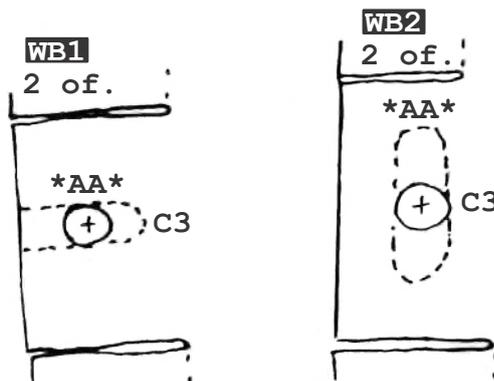
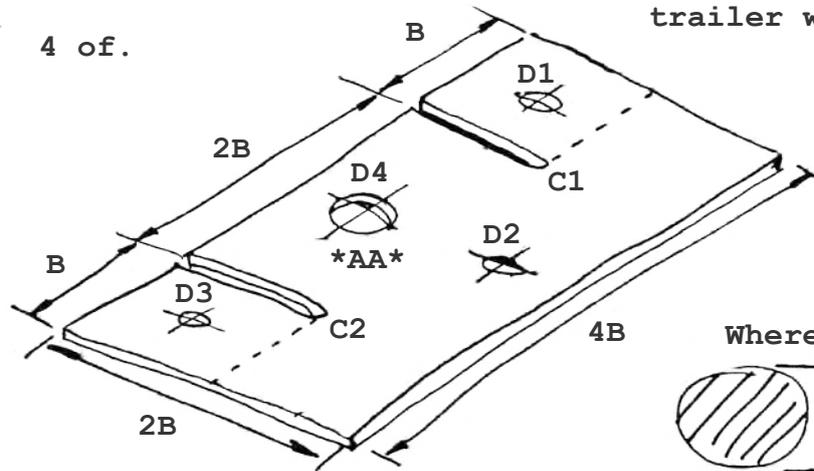
## Studs & Bindings (Wood & Bamboo) .



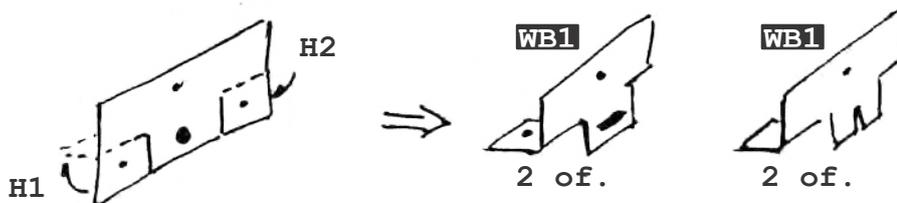
The stud locates the two beams, while the binding prevents them separating. Alternatively the two beams can be notched rather than pegged with a stud.



**NB.** D4 should be the same diameter as the trailer wheels axle.

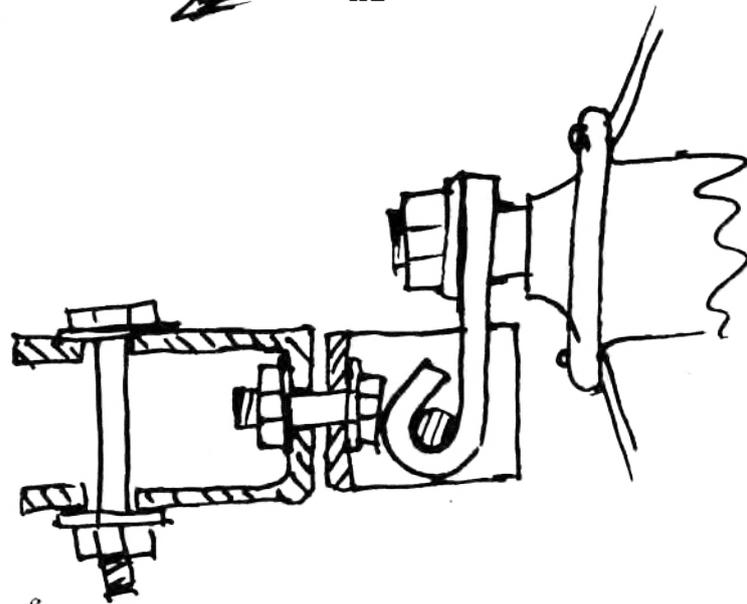
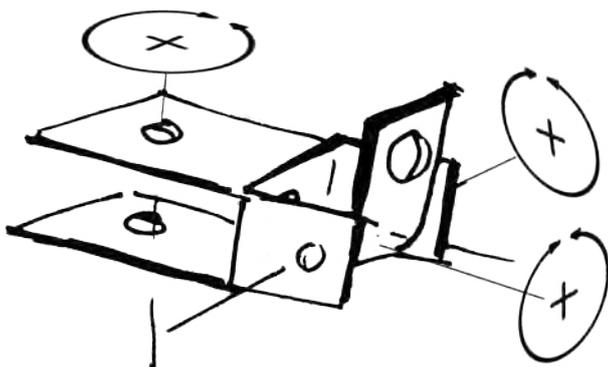
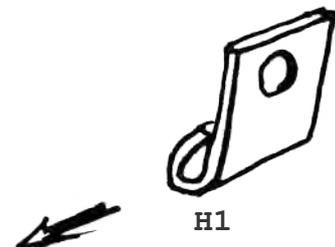
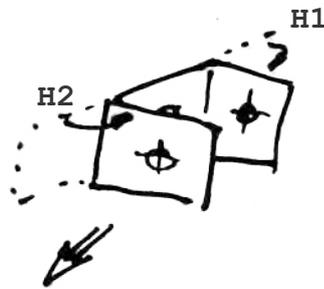
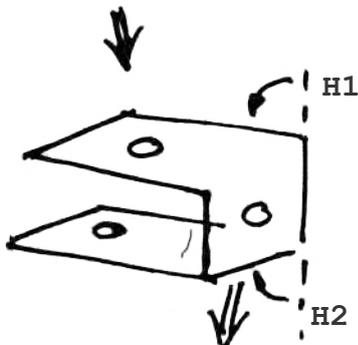
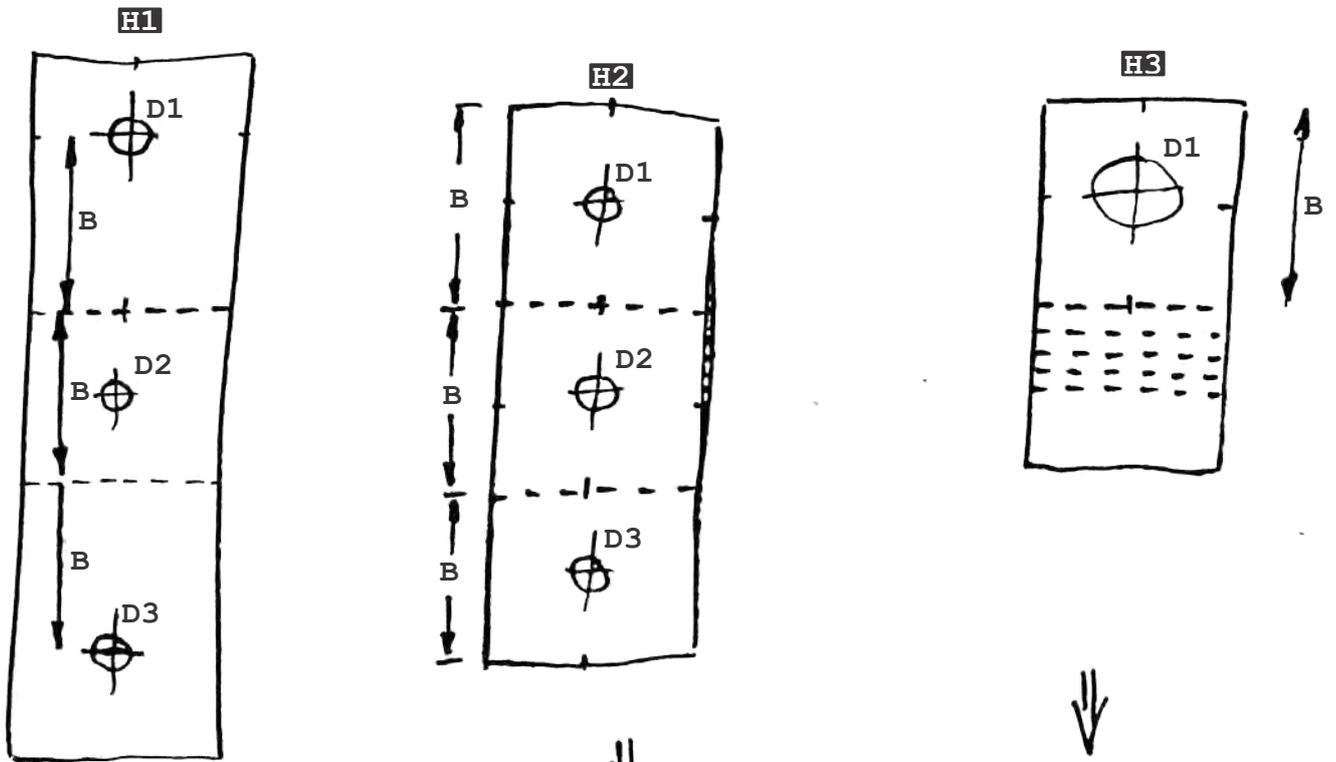


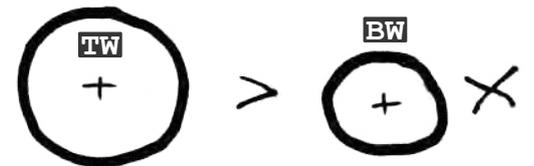
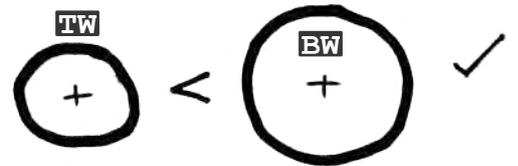
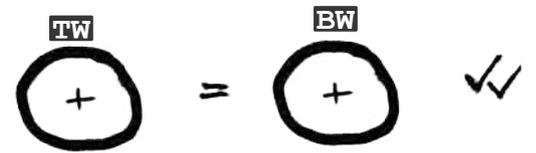
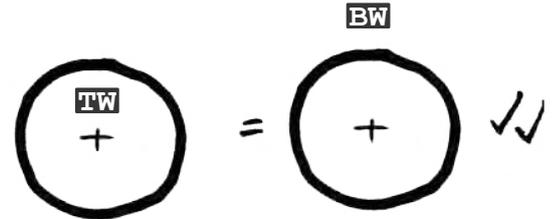
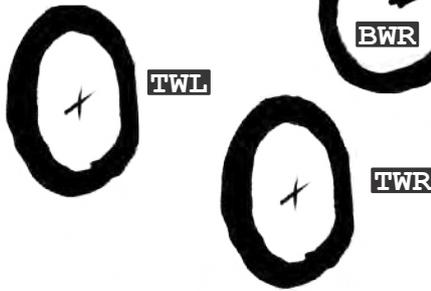
**NB.** Most sheet dimensions are measured relative to the depth of the main frames beams.



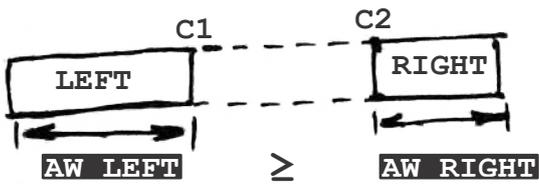
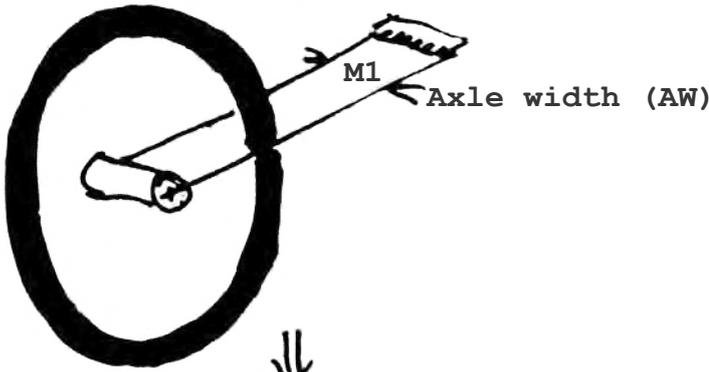
**NB.** You need two types of wheel bracket. One with a Vertical axle slot, the other with a horizontal axle slot. Each wheel is fixed with one bracket of each type.

In combination the horizontal and vertical axle slots allow the wheels to be adjusted so they are parallel to each other. This means the frame alignment only ever needs to be approximate.

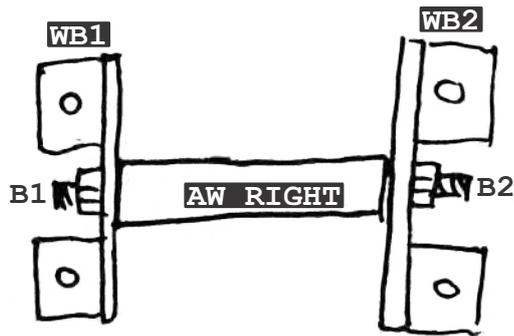
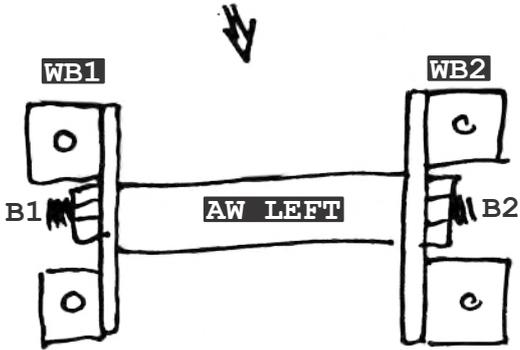




TWR & TWL



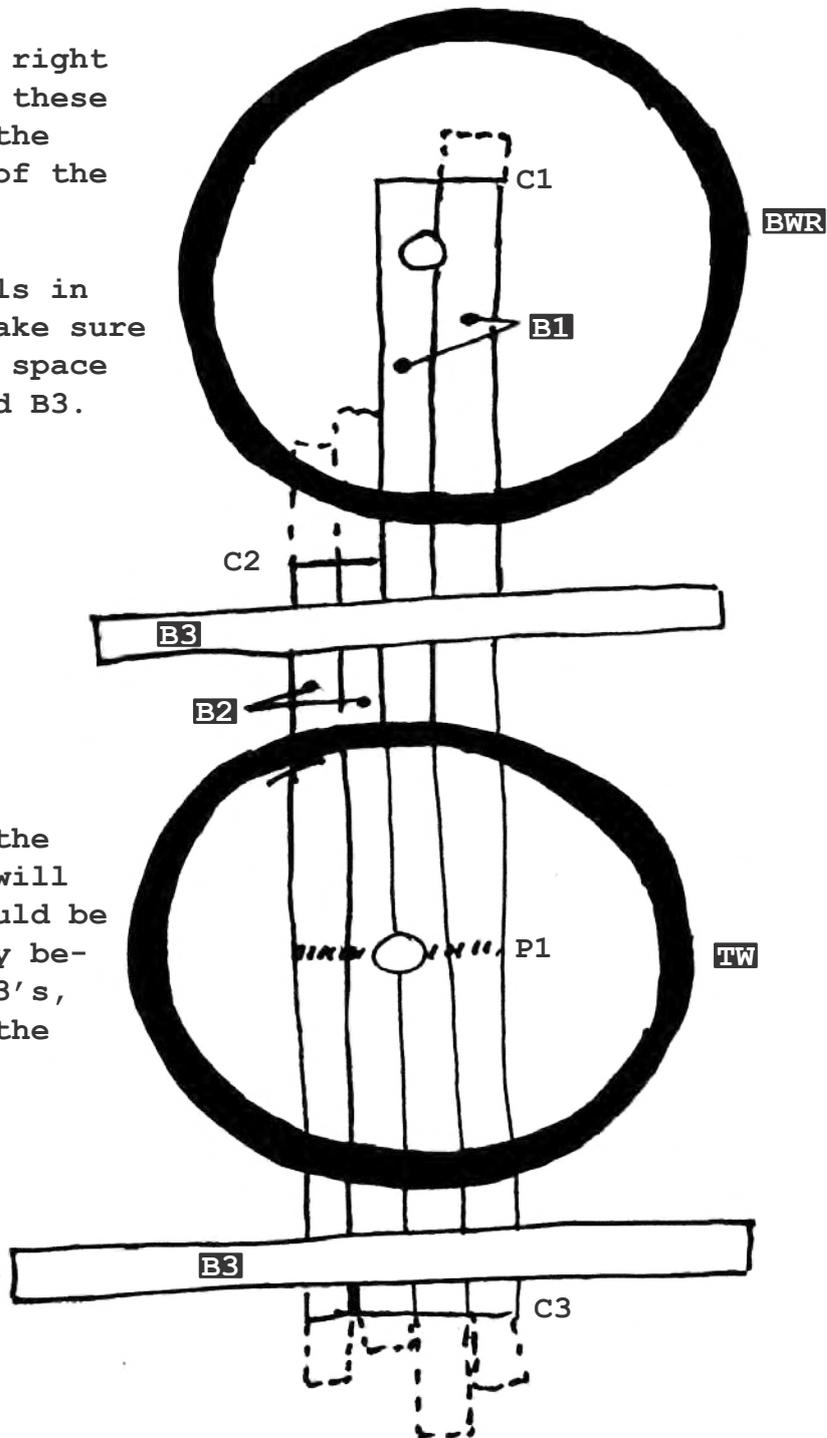
Where AW left is greater than or equal to AW Right.



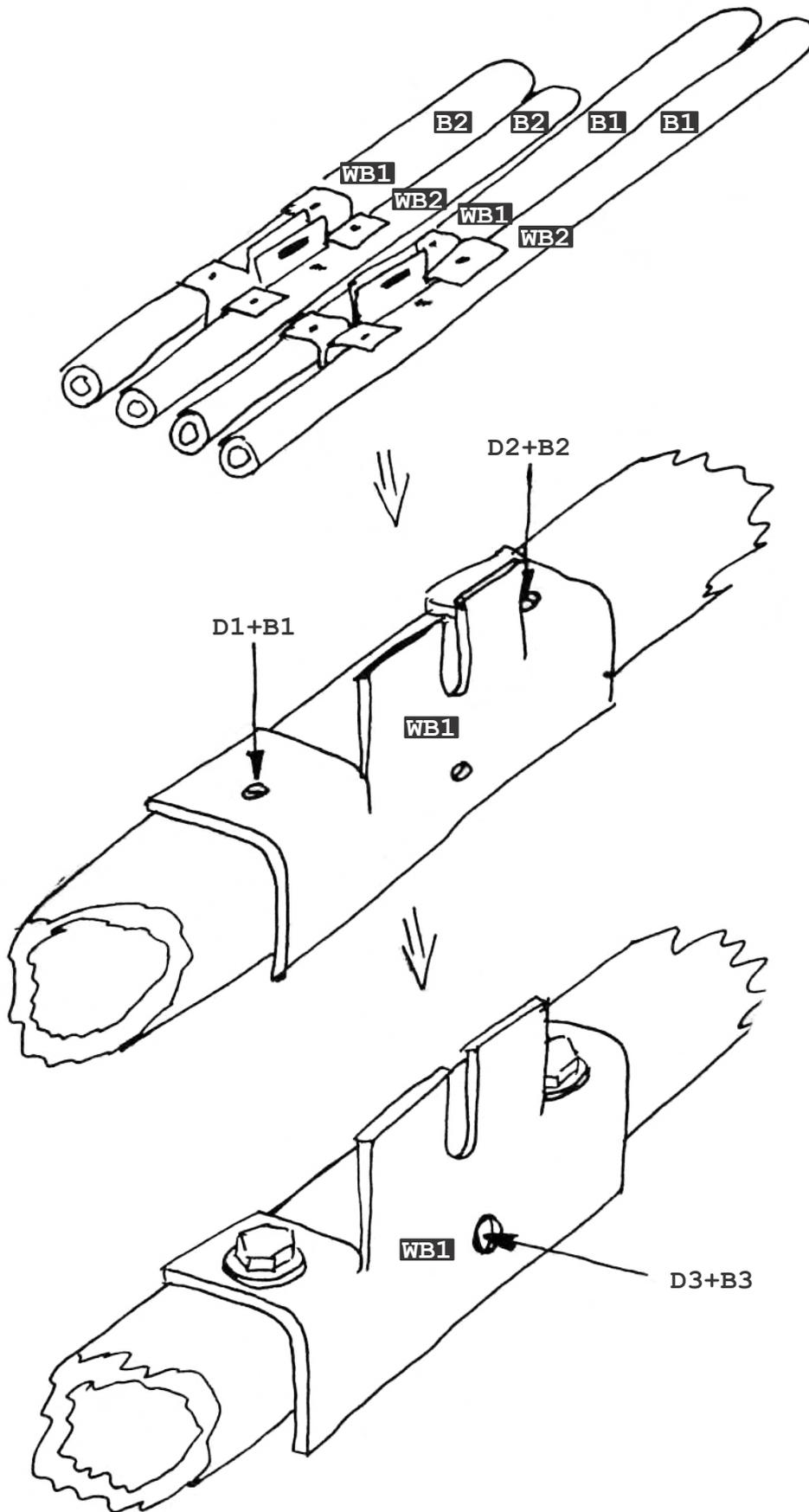
1) Lay the fore/aft (B1 & B2) beams on a flat surface.

2) Lay the left right beams (B3) over these where you want the front and back of the load bed to be.

3) Lay the wheels in position, and make sure there is enough space between them and B3.



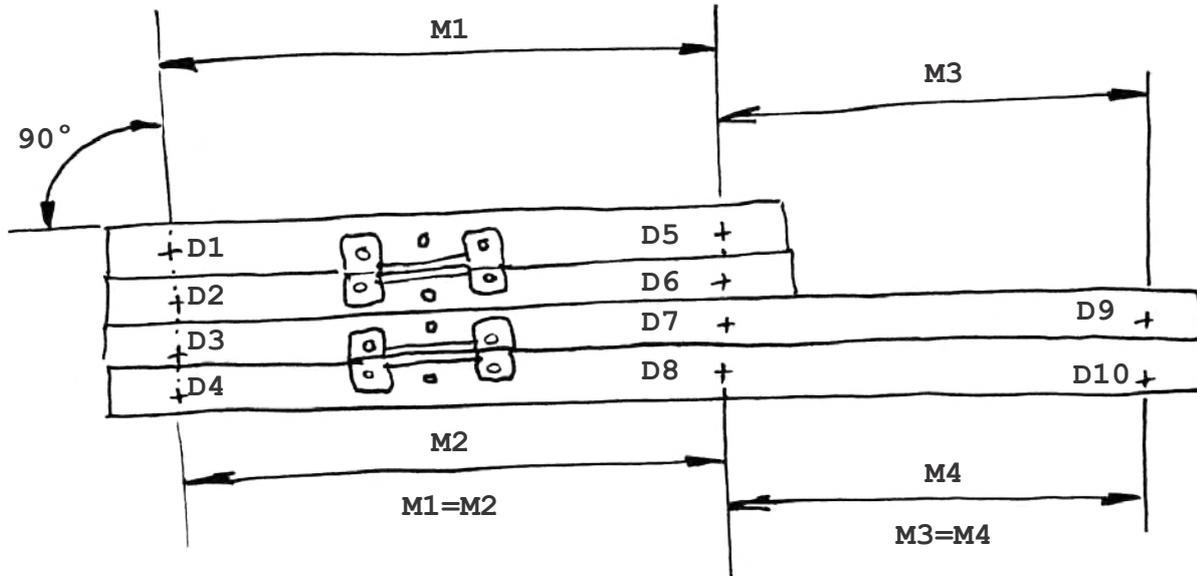
P1 marks where the wheel brackets will be fixed. It should be roughly half way between the two B3's, or slightly to the rear of this position.



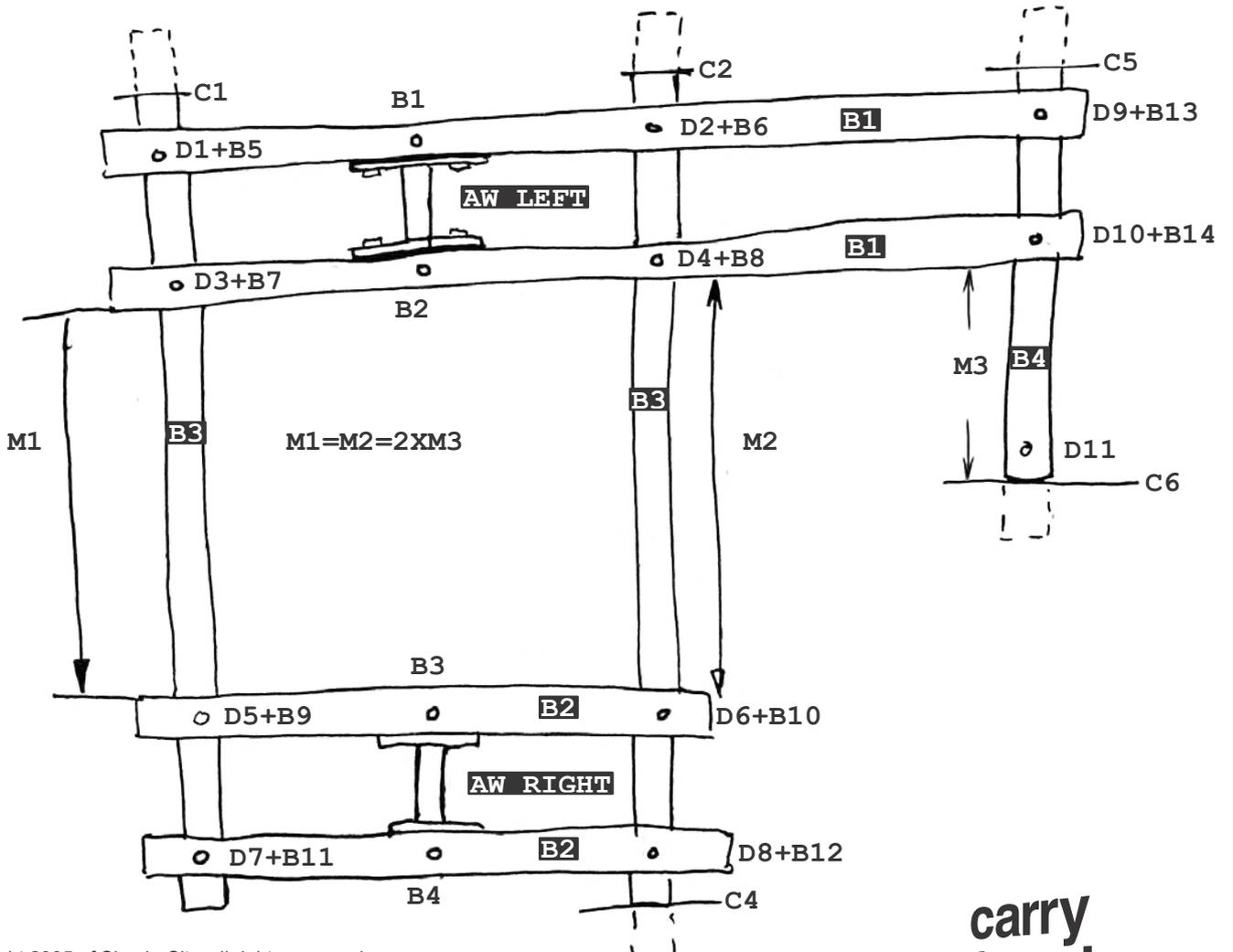
# Frame arrangement

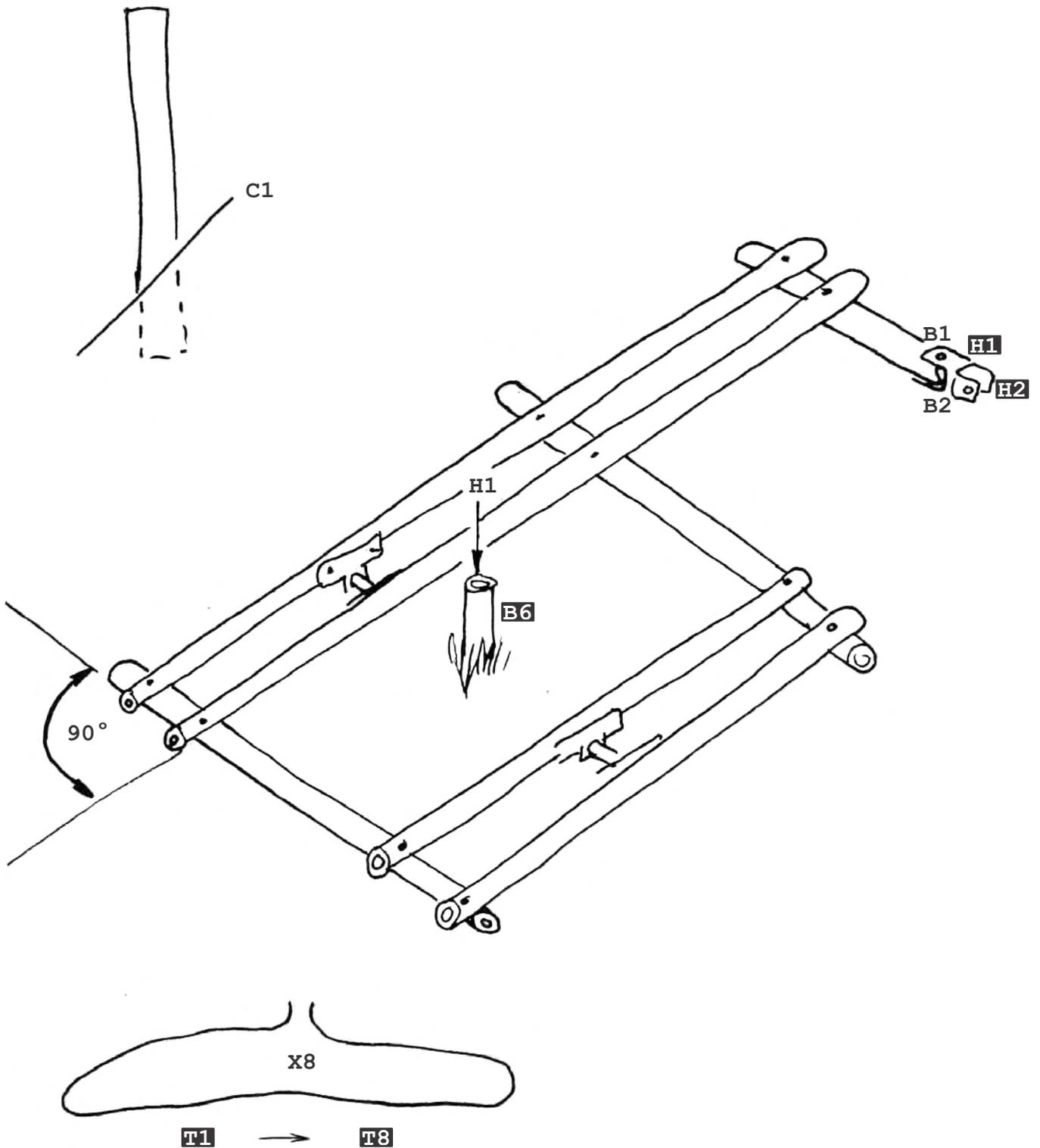


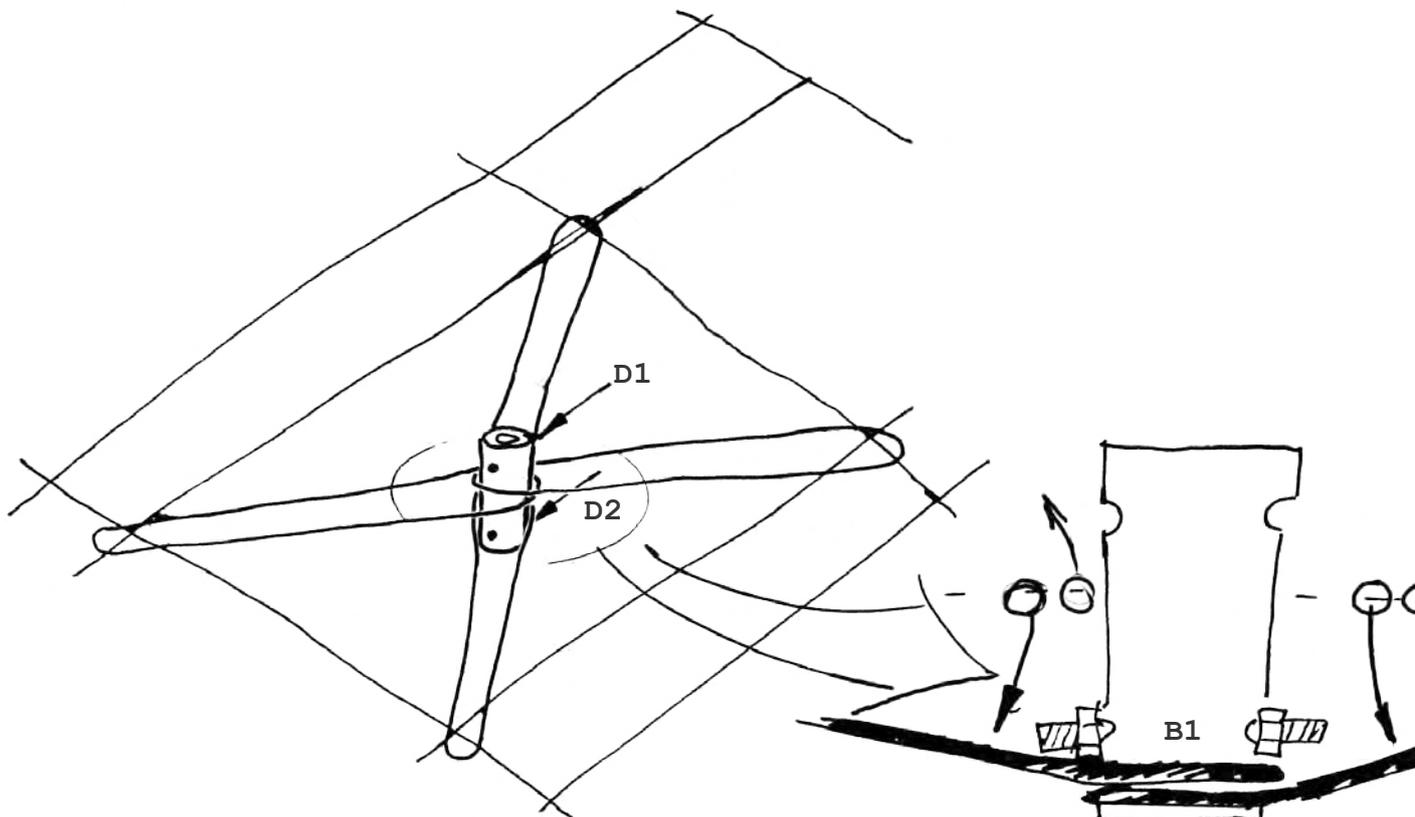
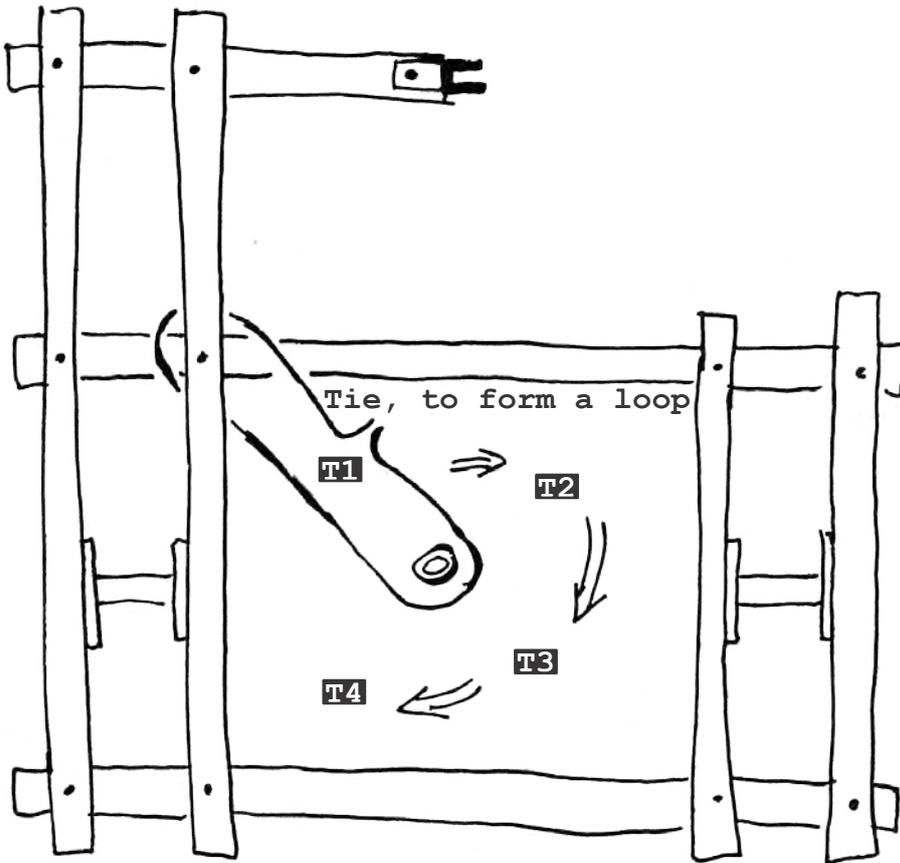
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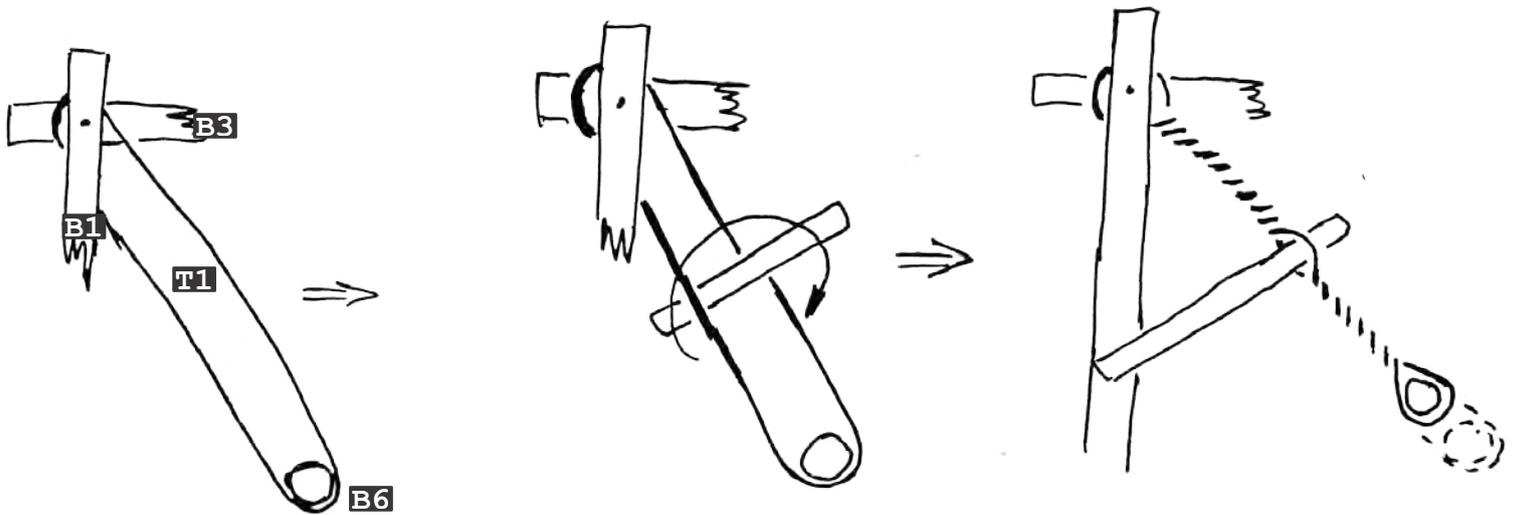


Place B3 & B4 on ground,  
and B1 & B2 on top of them.  
Bolt the Axle spacers in  
place (B1-B4) first.



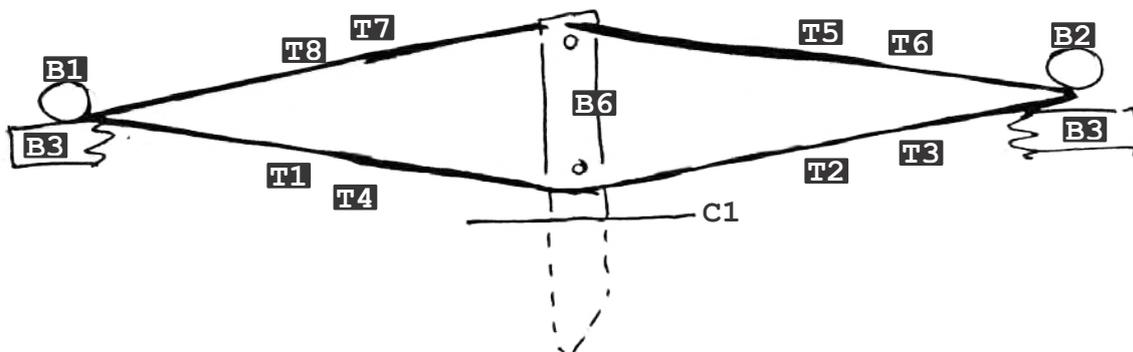


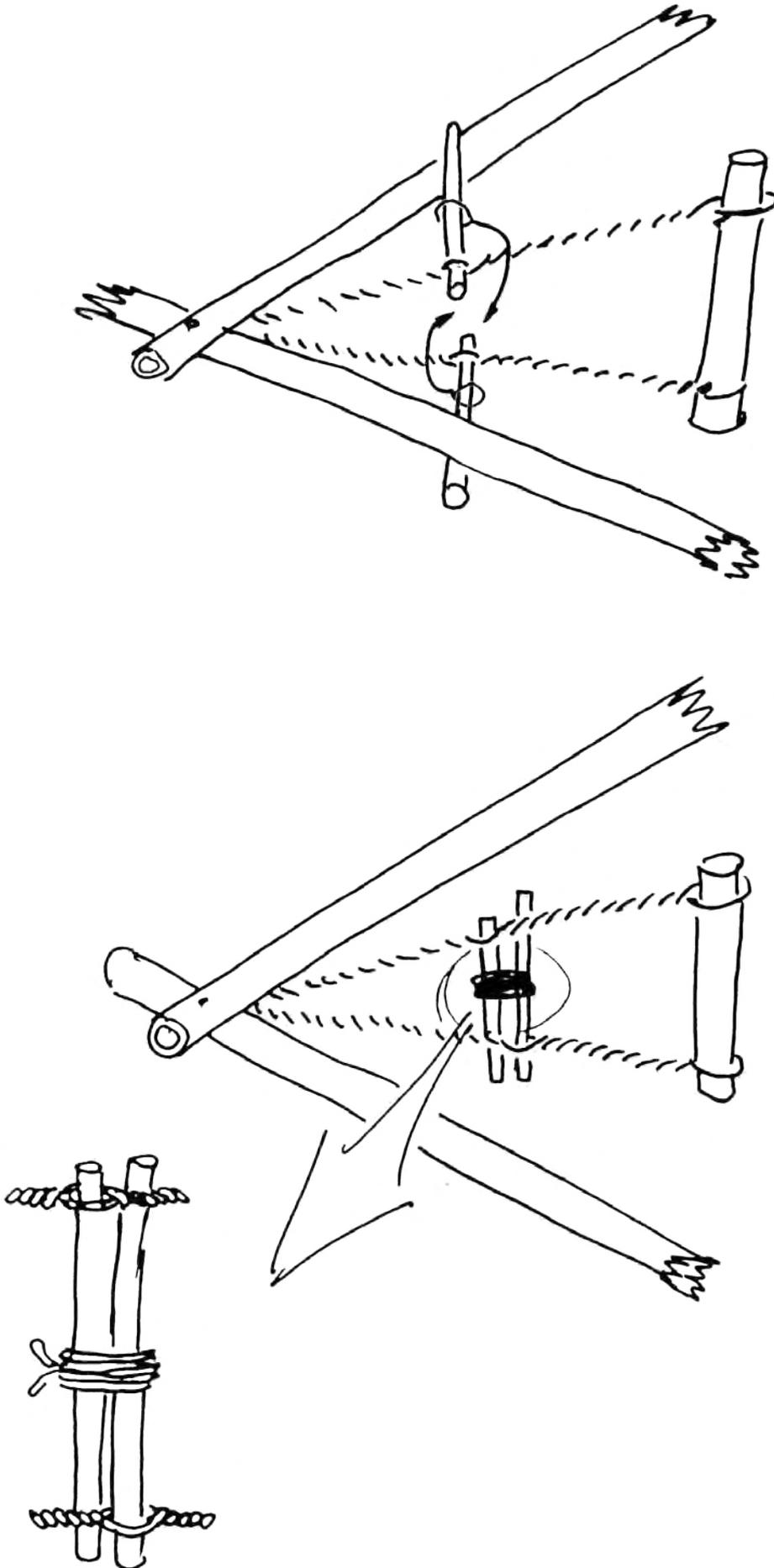


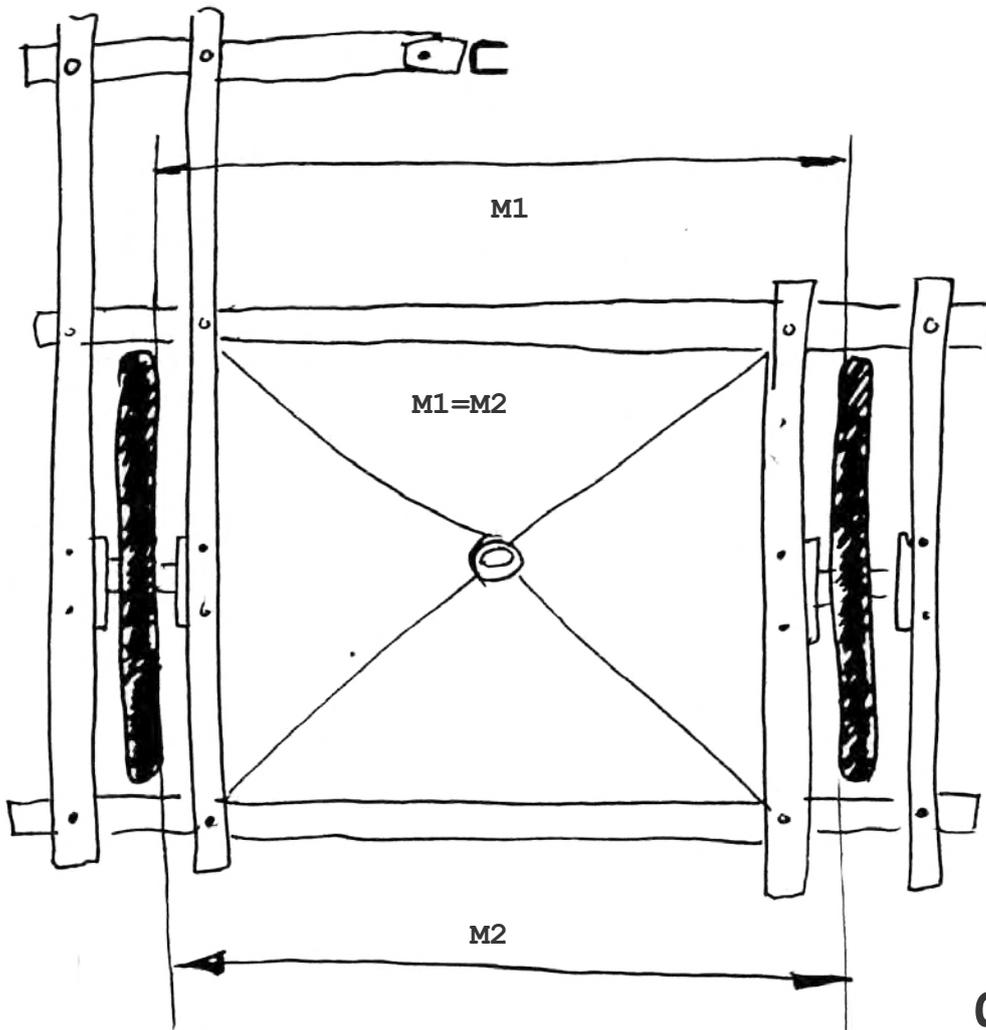
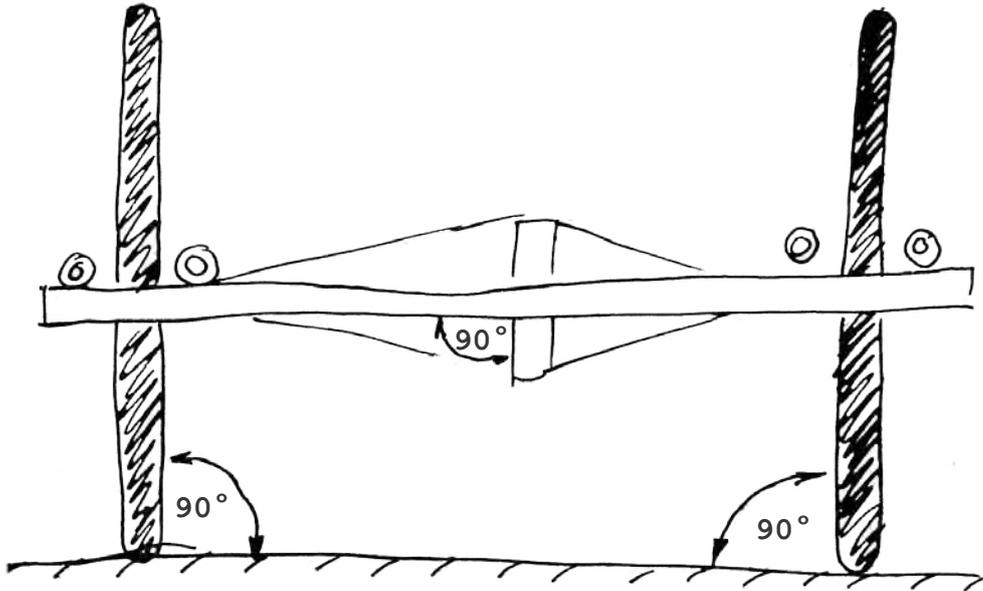


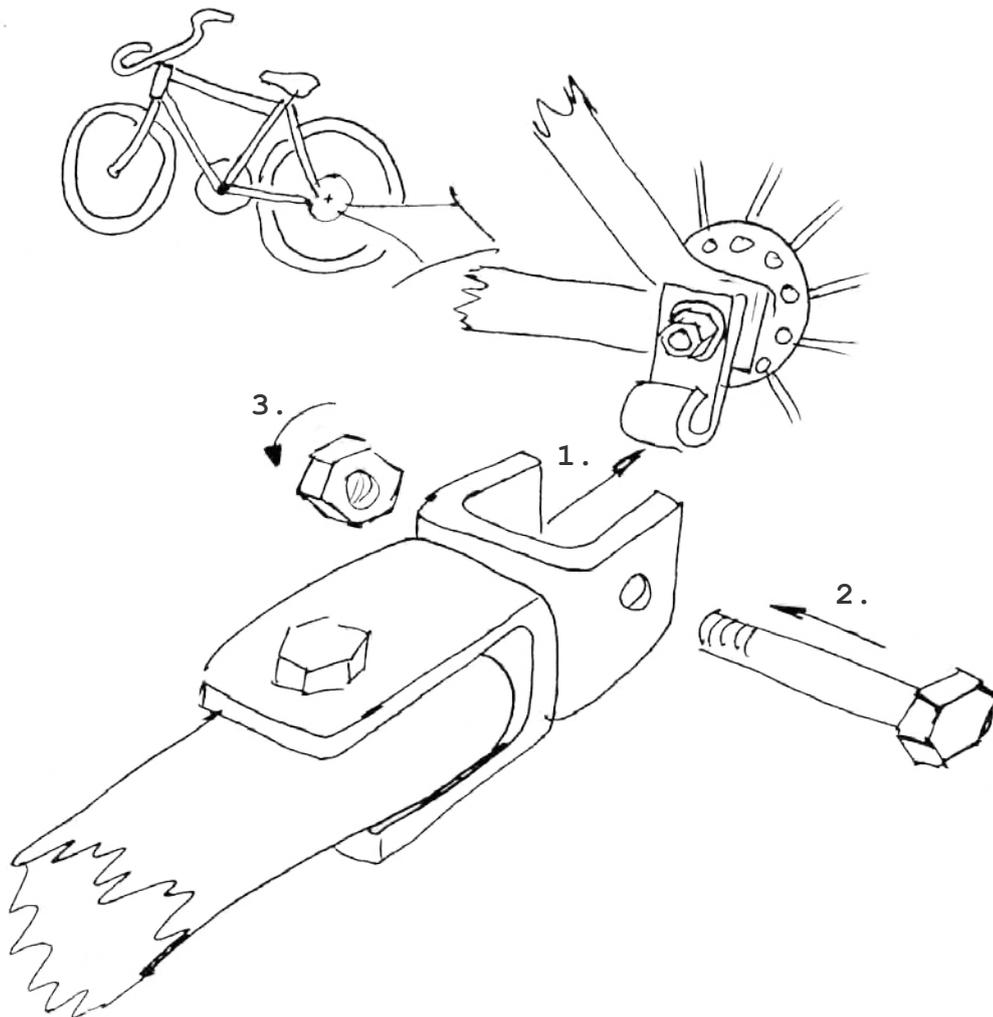
Repeat step for T3 T2 T4 *in this order*.  
Tighten the ties until they are all tight, the load bed is square, and B6 is in the load bed center.

Repeat all steps for T1-> T4 on T5->T6,  
but pull T5->T8 up rather than down.











THE END

A handwritten signature in black ink, followed by the year "2005." written below it.