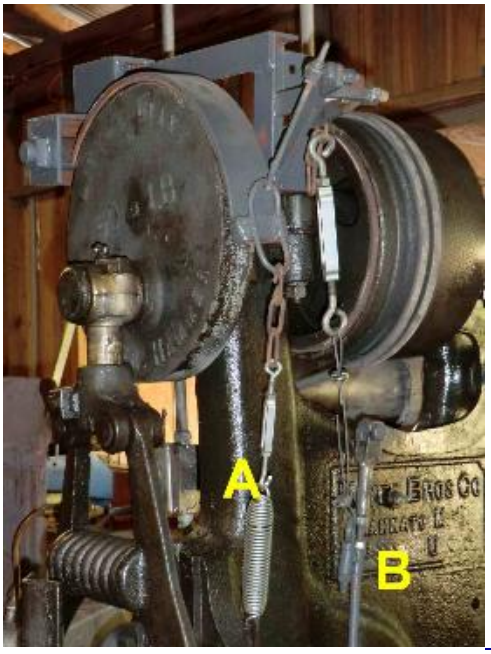
Power Hammer Brake - MK 3



(click image for a hi-res version)

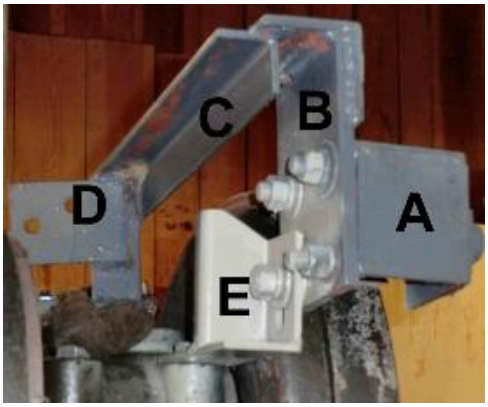
Hammer is seen from front right (operator orientation). The brake shoe is lined with leather, arches over the flywheel and pivots at the left. The shoe has a pair of loops welded to the right side. The brake frame is bolted to the frame on the front pair of bolts of the front bearing housing and has an arm running behind the flywheel and connecting the pivot box to the arm frame. There are three control linkages:

(A) is a combination of extension spring, turn buckle, chain link and hook. It runs between the lower loop on the brake shoe and the upper bolt of the ram guide. This linkage pulls the brake shoe down onto the flywheel.

(B) is a combination of a turn buckle and a section of wire rope. It runs between the tread linkage rod and the rear control arm of the brake (details to be shown below). When the foot tread is depressed, this linkage pulls down the rear control arm and lifts the shoe off the flywheel.

(C) [note not labeled in the image] is a section of 1/4x20 all-thread. The lower end is bent into a hook and is hooked in the upper loop of the shoe. The upper end inserts through a pivoting arm. The effective length is controlled by two nuts and washers that trap the front control arm.

The spring in (A) needs only be strong enough to stop the flywheel. By adjusting the turn buckles and the length of (C), the hammer can start as soon as the foot moves the tread and stops when the tread returns to the full up position.

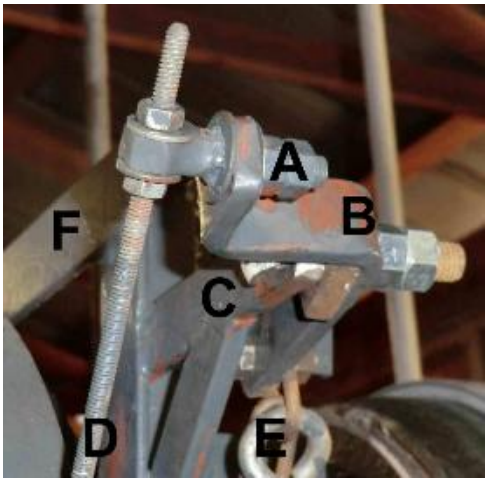


This image is from the rear and left. (A) is the pivot box - the shoe was fabricated from a leaf spring so that the hinge pin was approximately 1" in diameter. The box was fabricated from 1/4" plate to securely hold the pin and was provided with 4 1/2x13 bolts on the rear surface to allow for some adjustment when connected to (B) the vertical left upper support. (C) is a stiffening arm welded between (B) and (D) the vertical right support. (D) is 'L' shaped such that there is a flange at it's lower end shaped and drilled to allow the right front bearing bolt to secure it to the hammer. (E) is the left connector whose lower end is the mirror image of lower end of (D). Note that E is composed of a flat section which runs from the bolt on the hammer to a section of angle iron. A slot is cut into that section of angle through which the lower inner bolt of the pivot box can be secured. This allows adjusting the clearance of the shoe to the flywheel at the pivot point.

This images shows the brake assembly from the front left. You can see the pivot pin, the brake shoe and the left vertical support. There is NO need to copy all the geometry shown - remember that this particular unit was frankensteined from an earlier design and I used whatever was laying around as material. The unit simply requires a flange that allows the left front bolt on the front bearing housing to hold it to the hammer. That flange needs to be connected to a rigid box (the angle iron) with a slot facing forward. The pivot box need only hold the pivot pin securely and have a bolt to the rear to run through the slot. If you are confident that you will never need to remove the shoe from the pivot box, you can just weld the box and pin around the shoe.

The pivot box need to connect to an upper stiffening arm (angle iron again) that runs either behind or over the flywheel, That arm need to connect to the right vertical support which, in turn, has a flange that allow it to be bolted to the right front bolt of the front bearing housing. All that is left to is the control structures.

This image shows the control arms. (C) is a rigid support welded to the right vertical support. It is composed of a horizontal arm (1" x 1/2" x ~ 6") with a 1/2" hole on its free end and has a knee brace (Ok, I tend to overbuild!). (F) is the upper stiffening structure (angle iron) = C in the 2nd image.



(B) is a squared 'Z' arm with a short (front) and a long limb (rear). The short limb has a 3/8" hole in its end through which a pivot assembly (=A) is inserted. The length of the 'Z' connecting the two limbs has to be long enough to position the pivot assembly in line with the shoe and to allow the rear arm to clear (C) (about 4"). A 1/2" hole is drilled in the rear arm sufficiently far from the bend to allow the arm to rotate around a bolt running from the hole in the support arm to the hole is the rear arm. In the image, you can see a fat washer (just below the letter 'B') and a pair of hex nuts on that bolt. You want the arm to be able to move but not to have much play. (E) is the point at which the 'B' arm in the first image connects.

The most complex part is (A). It is a 3/8" bolt with a small pipe section welded to be bolt head (imagine a magnifying glass with the bolt as the handle and the pipe as the ring of metal holding the glass). The pipe just need to have a 1/4" or more bore. The bolt runs through the hole in the front arm of the 'Z' and is secured with a nylock nut or a pair of nuts. Like the 1/2" bolt, it just has to be loose enough to rotate . The all-thread mentioned above (D) runs through the pipe section. Given the sequence : nut, washer, pipe, washer, nut on the all-thread (as shown), you can adjust the distance between the shoe and (A). Since the shoe has to contact the flywheel, what you are really doing is adjusting the angle of the rear arm of the 'Z' to the base of the hammer. The optimal arrangement is to have the arm parallel to the floor (as shown). When the rear arm is pulled down by rear control linkage, (A) moves counter-clockwise and up. The all-thread is pulled up and (A) meanwhile rotates in place. The result is the shoe lifting off the flywheel.