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Lever Arm Briquette Press

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briquettes Source: Keith Flanagan

INTRODUCTION

Briquettes made from materials that cost little or no money to obtain, such as old newspaper or unutilized plant waste, can be a cost-effective alternate fuel to charcoal or firewood. This could alleviate the harsh pressures put on many forests for providing enough fuel energy to meet people's needs. At the same time, it could prevent the wastage of materials that still have value, so they will not be 'thrown away', discarded as litter, or left to rot. Many different methods and technologies exist for pressing briquettes, each with its own unique advantages and disadvantages. This document describes the process of making briquettes and two designs for briquette presses.

THE BRIQUETTE PROCESS

Gather and Soak Materials

One of the most commonly used materials is shredded newspaper. Small woodchips, sawdust, and fine charcoal remnants also work well. Plant waste, such as leaves, chopped stalks or grasses, hulls, and chaff can make good briquettes, but it is best to compost the plant waste for a two or three weeks so that it will stick together when it is pressed. Adding a small amount of wood ash to the mix makes briquettes harder and makes them burn longer. The addition of manure can achieve the same effect

To prepare materials for pressing, soak them in water. Depending on the material, you may need to soak in water for as little as an hour, or up to 3 days. The easiest way to test if a material will make a good briquette is to soak it in water, grab a handful of the material and press it into a ball in your hands. If the material forms into a ball that retains its shape and doesn't fall apart, it will most likely press into a good solid briquette. Some people choose to use a binding agent in their recipe in order to increase the binding capacity of their materials. Some good binders include: fish waste, molasses, wood ash, manure, corn starch or wheat starch. Most materials will not need a binding agent if you build a press that is able to exert a sufficient amount of pressure. Experiment with materials that are locally available in order to come up with a good briquette recipe, and also experiment with the proportions of the recipe to find a good, long-burning briquette. For example, 100% shredded newspaper will work for making briquettes, but they burn better if some small woodchips or a small amount of crushed charcoal is added.



Figure 1: Dry materials gathered for making briquettes, old paper and wood shavings (top of photo). Materials after shredding and soaking (bottom of photo).
Source: Keith Flanagan

Pressing the Materials into Briquettes

Place the soaked materials into a hollow mold which will withstand the force of the press, allow the excess water to escape, and allow the briquette to release after pressing. Large diameter PVC pipe with holes drilled in the side works very well for this. Be sure to put a base under the mold, so the soaked material does not fall out the bottom. A center rod placed inside the cylinder will make donut-shaped briquettes, which allows them to dry faster. To press more than one briquette at once, fill the mold partially full of material, place a thin plastic disk in the mold to keep the two briquettes separate (repeat if more than two are desired), and then fill the mold the rest of the way. Insert a wooden piston and compress by hand, squeezing out some of the water. Place the mold and piston into the press, and use the mechanical advantage of the press to compress the material inside the mold.

Note: If using a center rod, the piston and divider disks must have holes to accommodate.



Figure 2: (Left to right) Wooden piston, center rod, plastic divider disk, wooden base, PVC cylinder.
Source: Keith Flanagan

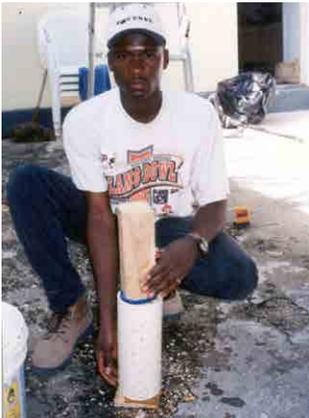


Figure 3: Inserting the wooden piston
Source: Keith Flanagan



Figure 4: Initial pressing, by hand
Source: Keith Flanagan



Figure 5: Using a press to compress briquettes
Source: Keith Flanagan

Removing the Briquettes from the Press

The briquettes are now tightly compacted inside the mold. It can be quite difficult to remove them without damage. The simplest way is to use leverage to gently push them out of the mold. In order to do this, remove the base plate so the briquettes can exit the bottom of the mold, and support just the edges of the mold to resist the force of the lever.



Figure 6: Placing mold into extractor, note the PVC square which supports the edge of the mold. Source: Keith Flanagan

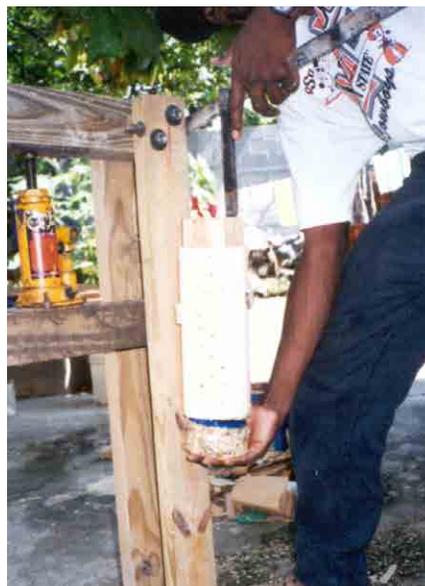


Figure 7: Using lever to extract briquettes.
Source: Keith Flanagan

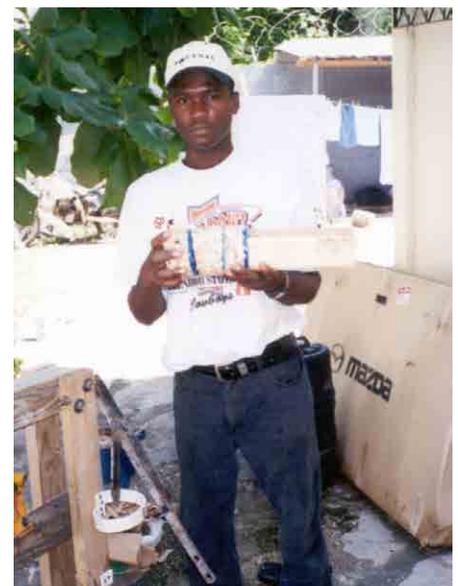


Figure 8: Briquettes successfully removed. Source: Keith Flanagan

Drying the Briquettes

After the briquettes are pressed they will be moist. It is important to fully dry them before using for fuel. Not only so they will burn well, but also because they are fragile when moist, but become much more rigid when dry. A few days in the hot sun with good airflow should provide sufficient drying. Cover with clear plastic if rain is possible.



Figure 9: Briquettes drying under clear plastic
Source: Keith Flanagan

Using the Briquettes

Burn briquettes in stoves typically fueled by wood or charcoal. You can break them apart rather than burning them whole, to create more surface area, causing them to burn hotter and cleaner.



Figure 10: Briquettes in a charcoal stove.
Source: Keith Flanagan



Figure 11: Burning briquettes to heat water for a dry cleaning business.
Source: Keith Flanagan



Figure 12: Briquettes used as fuel for cooking
Source: Keith Flanagan

BOTTLE JACK BRIQUETTE PRESS

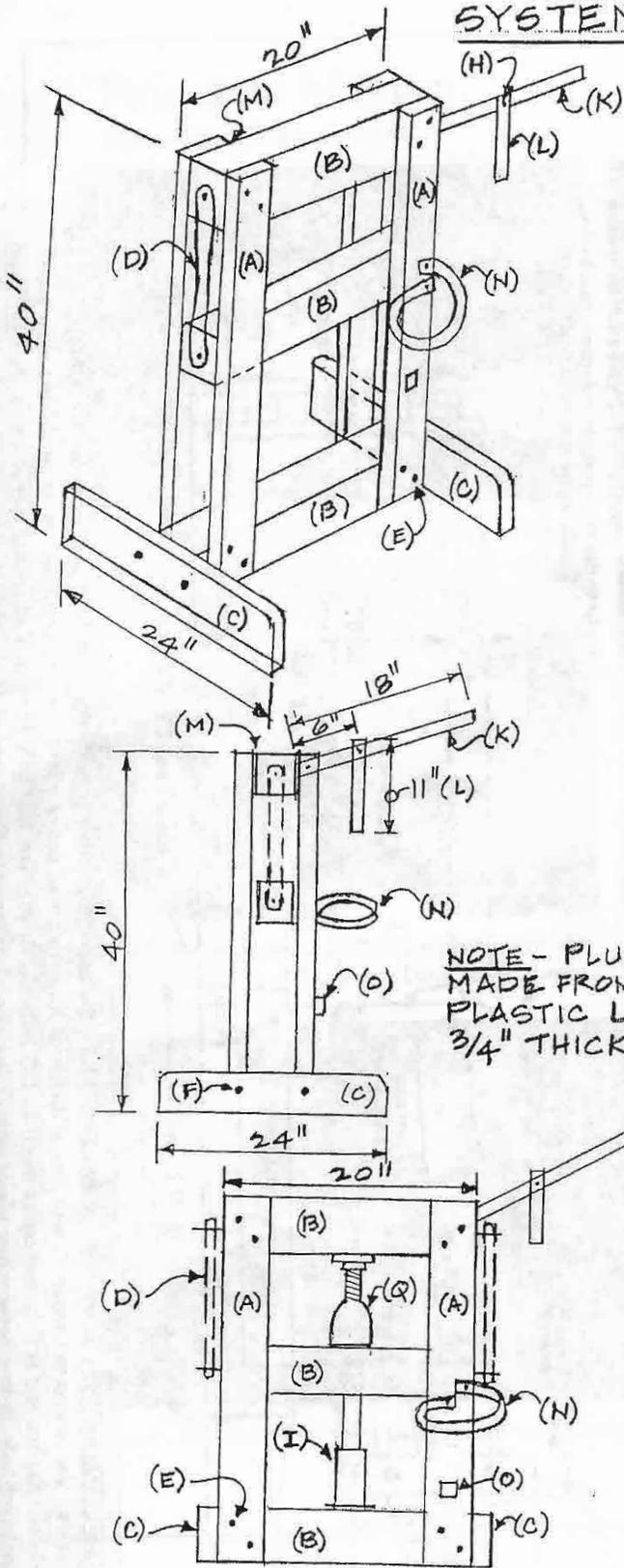


Figure 13: Bottle jack briquette press
Source: Keith Flanagan

The Bottle Jack Press uses a hydraulic bottle jack to exert pressure. The jack is placed within a wooden frame, along with the filled briquette mold. The center of the wooden frame has a wooden block supported by rubber inner tube strips. This block supports and guides the bottle jack as it is compressing the briquettes, and the rubber strips act as a spring to help return the jack to a closed position after pressing. The press is also outfitted with an extractor to remove the briquettes from the mold after pressing. The extractor consists of a small ledge for the edge of the mold to set on, a loop to hold the mold upright, and a steel lever to push the briquettes out. The extractor elements are located on the front right corner of the wooden frame.

Created by Keith Flanagan

SYSTEM HYDRAULIC BRICKET



- A 4 - 2" X 4" X 40"
- B 3 - 4" X 4" X 20"
- C 2 - 2" X 4" X 24"
- D CART TIRE TUBE - 1" WIDE STRIP
- E 8 - BOLTS 8" X 1/2"
- F 4 - BOLTS 6" X 1/2"
- G 1 - BOLT 5" X 3/8"
- H 1 - BOLT 1 1/2" X 3/8"
- I 1 - MOLD PVC SCH 40 - 11" X 4"
- J 1 - WOODEN PISTON 3" X 3" X 9"
- K 1 - STEEL BAR 18" X 1" X 1"
- L 1 - STEEL BAR 11" X 1" X 1"
- M 8 - PLYWOOD SHIMS 4" X 4" X 1/4"
- N PVC MOLD HOLDER 6" DIA.
- O PVC MOLD SUPPORT 2" SQ.
- P PVC BRICKET SEPARATORS 3 1/2" DIA.
- Q HYDRAULIC JACK

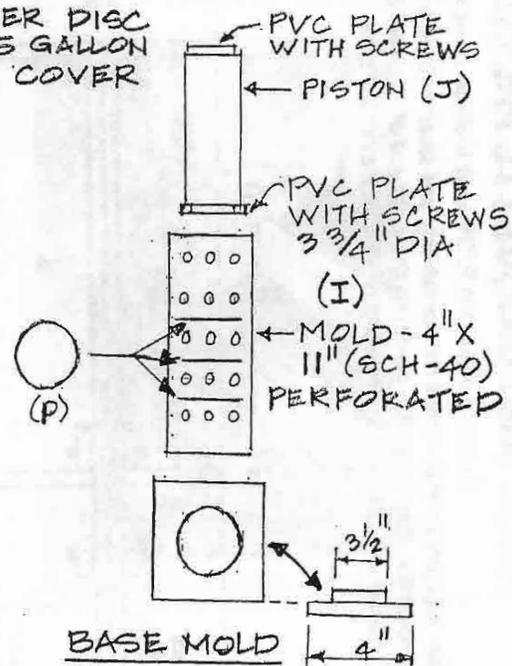


Diagram 1: Bottle jack briquette press; including wooden frame, extractor, and mold components.
Source: Keith Flanagan

LEVER ARM BRIQUETTE PRESS

The Lever Arm Briquette Press is built almost entirely out of lumber. The pressing is achieved through a simple lever mechanism. It is easy to understand and does not require special parts (as opposed to screw presses and hydraulic jack presses). However, the press is quite large and heavy so it is hard to transport and requires two people to run it efficiently. Also, this design only allows for pressing briquettes while some other designs can also be used as oil presses.

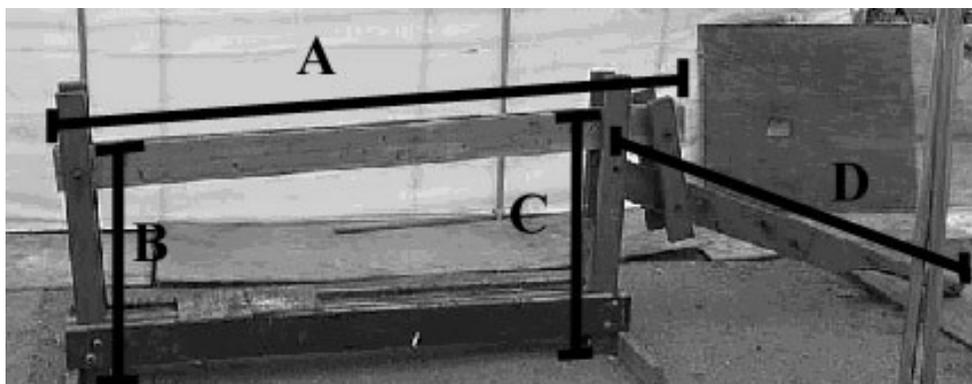


Figure 14: Lever Arm Briquette Press Measurements:
 A- 215 cm (86 inches)
 B- 80 cm (32 inches)
 C- 85 cm (34 inches)
 D- 180 cm (72 inches)

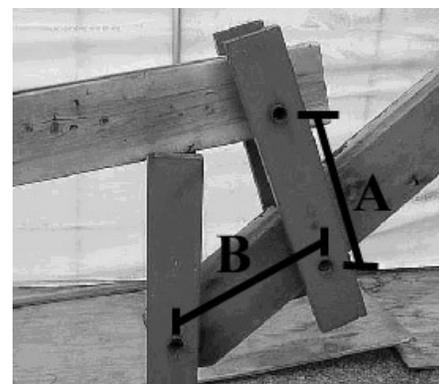


Figure 15: Close-up of the hinge mechanism that generates the pressure.
 A- 30 cm (12 inches)
 B- 30 cm (12 inches)

This briquette mold is made from a piece of PVC pipe 40 cm (16 in) long with a 7.5 cm (3 in) diameter. Drill holes all around the pipe so that water can escape when the briquette is pressed. Use a sturdy piece of flat wood as a base on which to press your briquettes. We have found that it is best to cut a wooden disk about 3 cm in height with a diameter slightly smaller than the diameter of the PVC pipe. Screw it down onto the flat wooden base. The pipe will then fit directly over the wooden disk and will not slide when pressure is applied from the press.

A piece of PVC pipe with a smaller diameter can be used to form a hole in the center of the briquette. If the center pipe is to be used, partially bore a hole into the base board the same size diameter as the small pipe so that it can be inserted into the hole. This will help keep it in the middle of the mold when you fill it with your briquette material.

Lift the handle of the press and place the full mold under the compaction arm of the press. Lower the handle and press the piston down into the briquette mold. Water will flow out the holes as you press the slurry.

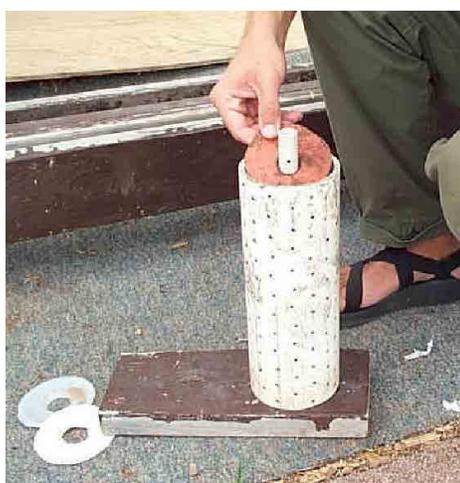


Figure 16: Briquette mold, wooden base, and center pipe



Figure 17: Lever arm pushed down to compress briquettes inside mold

To extract the pressed briquettes from the mold on this press, the wooden base board is removed and replaced by a wooden frame which supports the edges of the mold and allows the briquettes to be pushed out the bottom. Using the press in the same way as before will now push the briquettes out of the mold.



Figure 18: Using the press to remove the briquettes from the mold



Figure 19: Briquette that has been pressed and removed from the mold (center of photo)
Note the wooden frame used for extraction (left of photo)