

Backwoods Methods of Producing Methane Fuel

BY REV. DR. J. D. HOOKER

While all that we've been using bottled gas for has been the kitchen stove that my wife purchased new only a few years ago, we've been watching the price of BPG deliveries keep right on spiraling upwards ever since. In just a little over two years, these costs have more than tripled. Originally we were spending only about \$150 a year on gas to operate the stove, but now we're finding that the cost for the same quantity of fuel is now approaching \$500. I doubt if our situation is all that unusual. From what I've been hearing, similar drastic price increases have become standard all over.

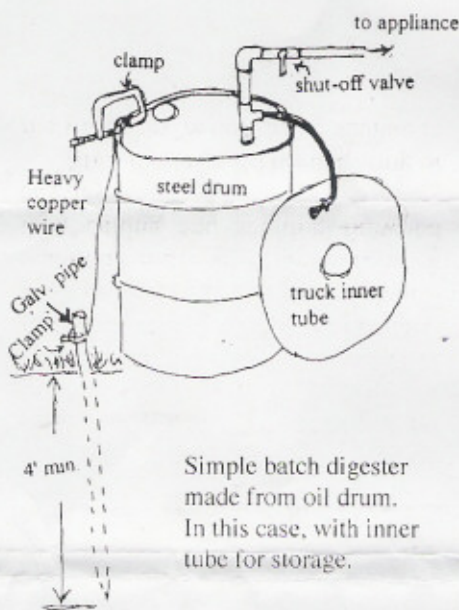
Honestly, though we do live very comfortably, it's been a very long time since I've brought in anything approaching a large income. So that extra \$350 or so a year is pretty hard to come by. So, I've been looking for a less expensive alternative for a while now. Even though we heat our home with wood, my wife has refused to return to using a wood fueled cook stove, which, at least during the hot summer months, does make very good sense.

At the same time, we've grown to really value our independence. So, coming up with some means of producing a reliable fuel supply from something that we could produce or collect ourselves, seemed like the best possible solution. But, it took me a while to come up with an idea that would work effectively. Alcohol seemed to offer a reasonable enough option at first, but finding an affordable range that could use this fuel didn't turn out to be a reasonable task. Nor did producing sufficient quantities of home produced alcohol without

getting all snagged up in governmental red tape and regulations.

One thing though that we've always managed to produce copiously around here is manure. With all of our wolves, dogs, goats, hogs, poultry, and burros, manure is one byproduct that we find constantly in plentiful supply. At the same time, I've long realized that in addition to its tremendous fertilizer value, manure has plenty of BTUs capable of being utilized in some fashion.

In fact, I'd fooled around just a



little with the idea of using dried manure as a heating fuel some years back. But, in addition to the unpleasantness that you'd normally associate with such an idea, I found that collecting, drying, and storing so much animal dung ended up being more work than cutting and splitting firewood anyway.

Still, for years I'd been hearing of the ways they're now using manure in

the Far East, especially in China and India, to produce a propane substitute. Whether you'd opt to call the resulting fuel "swamp gas", "Bio-gas", or simply methane, doesn't really matter. What did matter to us is that these Far Eastern rural folks have been reliably producing plentiful supplies of such fuel on small, large, and even massive scales, for decades, with the simplest possible techniques and equipment.

The principle behind such gas production is remarkably simple. Working inside any sort of closed container, naturally occurring anaerobic bacteria go to work on organic substances, breaking them down into digested sludge (a rich, compost sort of fertilizer) and flammable methane gas.

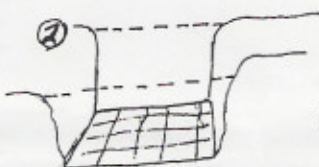
Before even considering attempting anything of this nature on a large scale, we decided to give methane production a "trial run," in a scaled down fashion.

First we fooled around considerably, to arrive at the best mixture of manure, bedding, water, and shredded plant residues. We then decided to use a 55-gallon drum as a sealed "digester," and an old 16" truck inner-tube for storage. Once the bacteria started producing gas (usually after about a week long wait), the resulting methane could be used to either fuel the stove for slightly over half an hour each day, or run a trio of propane lanterns continuously, with each batch of "slurry" producing a usable quantity of methane gas for a period lasting about three weeks.

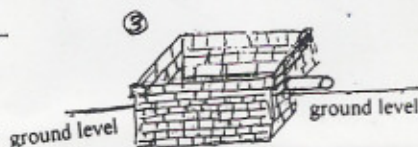
The slurry mixtures that we found to give the best results when producing methane gas in 55-gallon barrels are as follows: 1. Dump in 10 gallons



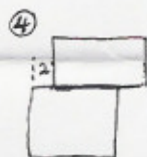
1 Dig pit in ground
64" wide, 128" long
and 26" deep



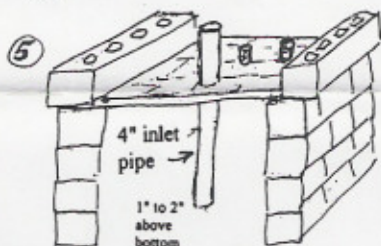
2 Use reinforcing wire
or old metal fence and
pour 3" thick concrete
floor



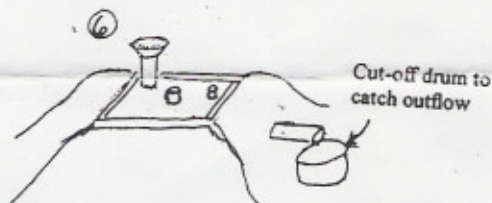
3 Build block walls,
8 blocks high, inside
of pit, installing 4"
plastic discharge pipe
18" above ground level.



4 When laying up block
wall, offset top row of
blocks 2"-towards out-
side

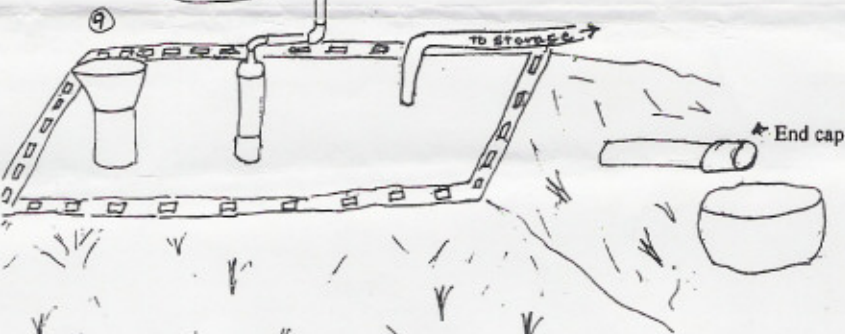
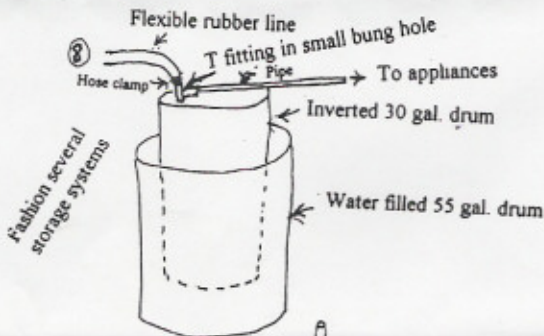
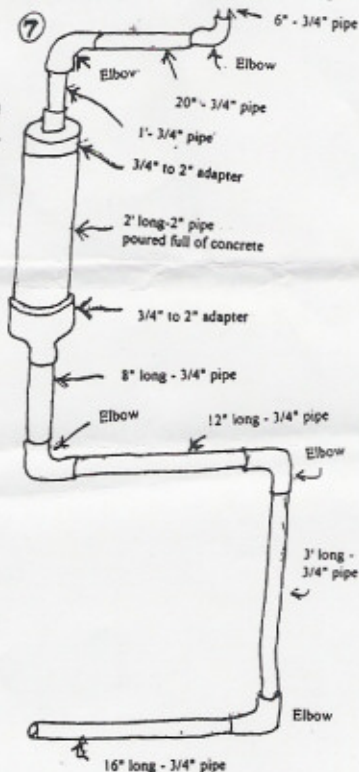


5 Lay 2" x lumber in place
place on offsets, setting
plastic 4" inlet pipe, 2"
outlet pipe, 82" center
pipe in place. Pour 2"
thick concrete roof,
using wire reinforcing.



6 Mound soil around sides
of block work and add
large funnel to top of 4"
inlet pipe.

7 Make stirrer from
galv. pipe and install
at center 2" pipe.
(Weight will seal off
leakage)



9 Add equal quantities of water, manure, plant residue, until slurry first starts to flow from discharge pipe. Screw end cap onto end of discharge pipe. Twice weekly remove end cap; add 5 gals. each of manure, plant residue and water. Catch overflow and add to compost pile, then recap. Stir daily.

of water, add two five-gallon buckets full of wet manure, then add enough dry, shredded plant residue (dead leaves or cornstalks, dried grass clippings, vines, sawdust, etc.) to fill the drum about 2/3s full OR. 2. Again dump in 10 gallons of water, then simply fill the barrel 2/3s of the way with the manure and damp bedding removed from cleaning out your animal stalls, poultry coop, or whatever.

Removing the large bung on top of the drum, and using a large funnel along with a "tamping stick", facilitates loading up the drum. Remember to replace this bung once the barrel has been filled. Mounting a T-fitting, lines, and a shut-off valve in place of the smaller bung, as shown, allows the fuel to be used or stored, as needed.

Seeing for ourselves how well this very simple methane producing system worked, we still never got involved in trying any larger scale production methods. Instead we simply started using seven such simple drum and innertube systems together. Over the summer months, this set-up has reliably produced sufficient methane gas not only to supply all of our cooking needs, but most of our lighting as well.

Though the "Coleman" brand propane lanterns we use seem to operate in a completely normal fashion, we did find that the orifices on the stove needed to be switched from those used for LPG gas to the larger ones usually used with natural gas. Apparently, at least in our case, the methane produced by this method is more in the BTU range of natural gas than propane. I'm not certain, but I suspect that each individual brand of gas appliance might vary a little from most others. I'd recommend seeing just how any such methane you might produce worked on your own appliances before changing anything of this nature.

We also found that by simply

staggering the original dates of filling each drum by one week intervals, we never experienced even the slightest interruption in our methane supply, as each separate drum would stop producing and require refilling individually from all the others. As an additional benefit, adding the spent sludge slurry directly to our garden seemed to boost our yields quite considerably.

I have observed just a couple of extra precautions in our methane production methods that seem worth mentioning. First, as we do have frequent visitors, I posted "No Smoking" signs, conspicuously, near the drums. Also, I realize that the steel drums I elected to use will eventually rust through and need replacement. The reason I chose them over plastic, was that each set-up could be individually grounded, as shown, for safety's sake. Though wooden barrels might possibly prove even better, I think it might be best to steer clear of plastic, as there might exist a possibility for an explosion caused by static electricity involved when using such ungroundable containers.

Though our own needs here are pretty basic, methane is also very well suited to a wide variety of additional uses, aside from simple lighting and cooking tasks. During the second World War, vast numbers of automotive engines were adapted to run on methane, and it's still entirely possible and practical to fuel tractors, vehicles, generators, and other engines in this manner. Home heating, powering gas fueled refrigerators, coolers, and freezers, and many other appliances, are also possibilities that you might wish to look into.

This drum and innertube set-up that we've decided on using, is what's known as a "batch digester system," which simply means that the drums must be refilled and emptied on a regular basis, for the system to work. For production capable of meeting much

larger energy needs, a "continuous digester system", in which organic material mixed with water, is simply added regularly, would probably offer a better and easier to operate alternative.

If you think you might want to consider producing your own methane fuel on a much larger scale, you'll find illustrations covering what several Baptist missionaries have assured me is among the most commonly utilized methane digester systems in southeastern Asia: Although I haven't actually tried this on my own, it would work on exactly the same principals as our small scale setup does. While this sort of system would appear somewhat easier to use than ours is, it would also produce much larger quantities of usable sludge type fertilizer as well, all of which would seem to make such a set-up ideal for larger scale operations, such as farms, ranches, dairy systems, and similar operations of medium to very large sizes.

Again, even though I haven't attempted such larger scale methane production methods myself, I understand that aside from building up incredibly fertile soil, such a masonry digester readily provides for all of the energy for the average farming family in the areas where its use is common.

Whether your own energy needs are pretty minimal, like ours, or considerably larger, possibly closer to the larger family farming operations more common in India, or even more like the huge farm conglomerate system of America, putting the simple, natural, and hard working anaerobic bacteria that produce clean burning methane fuel to work might provide you with all of the energy that your situation requires. For our family's purposes, it's turned out to be almost like sitting on our own small natural gas well! So, methane production might prove to be a mighty valuable energy source for you.