

## Gas-Fired Big Boiler Modified For Wood

Tom Harmon wanted an outside wood furnace to heat his house and provide hot water. Already equipped with a closed loop geothermal heat pump that used well water, Harmon felt a commercial wood furnace would be too expensive to justify. When he got his hands on an old 350-gal. conventional boiler, he figured he was halfway home.

"I cut off both ends, took out all the tubes and inserted an 80-gal. air compressor tank for a fire box," says Harmon.

He cut one end off the tank/firebox and ran four 3-in. diameter steel tubes (thin wall sprinkler pipe) through the other end to serve as exhaust outlets. At the front, the firebox mounts to a steel plate with a matching hole. The plate closes off the front of the boiler. Legs left on the rear end of the tank support it inside the boiler.

Once the firebox was installed, a steel plate with holes for the exhaust tubes was mounted at the rear of the boiler. Harmon then boxed in the tubes' ends to make an exhaust chamber. The chamber included a clean out door for ashes at the bottom and a short chimney flue at the top.

"I used 8-in., double-wall, galvanized flue pipe, but it didn't last and will be replaced with stainless," says Harmon. "I built a front door for the boiler and firebox out of 3-in.

channel iron covered in 1/4-in. steel. The inside of the door is filled with commercial grade boiler insulation."

The insulation is held in place with chain link fence welded to the back of the door. When the door was filled with insulation and closed, the insulation formed a tight seal with the door.

"It is always cool to the touch," says Harmon.

Strips of 2-in. insulation were double layered to the outside of the boiler, glued in place with high temperature silicone and banded with steel strap. Cracks were filled with spray foam insulation.

The front of the stove extends down 8 in. and out 7 in. from the face of the firebox. Harmon wanted to catch any "spill-outs" when the door is opened. This became especially important once he enclosed the furnace/boiler in an 8 by 11-ft. shed, made from a shipping crate from an MRI machine delivered to a nearby hospital.

"The crate had 6-in. I-beams underneath with 1-in. plywood sidewalls," says Harmon. "All I had to do was build stud side walls, reattach the plywood and build a roof."

A hot water coil mounted at the rear of the firebox, runs to a water heater in the house. When the boiler is operating, the coil pro-

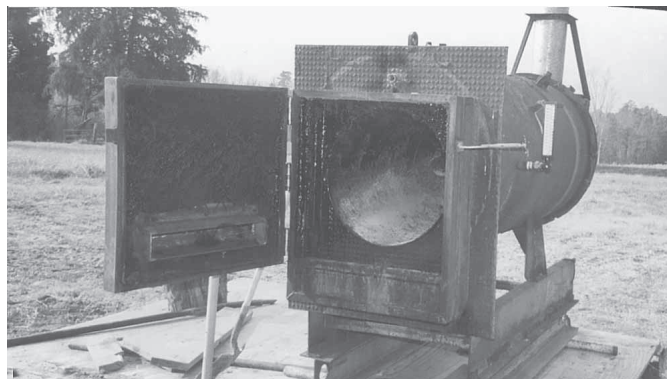


Photo shows boiler before shed was built and insulation was added around tank.

vides hot water on demand. If the boiler should cool down, the water heater, which is set low, maintains backup warm water.

A circulating in-line pump moves the boiler water through a loop of 3/4-in. feed and return lines to a coil in the existing ductwork in the house. The lines are insulated and sleeved in 50 ft. of irrigation pipe.

The temperature in the boiler is controlled by a dry-well aquastat that opens the draft door as needed. It is powered by a 110-volt vent motor.

"Water only circulates in the house when the heat pump calls for it," explains Harmon. "We have two thermostats, one that overrides

everything that takes care of heat in the house. A second one kicks in the geothermal heat pump when the temperature falls in the boiler."

In the winter the thermostats are set at 160 and 180°. In the summer, they are lowered 20°, still sufficient for hot water.

"The total cost, including the new Mig welder I bought for the project, was less than \$2,000," says Harmon. "The firebox works great. Green pine will burn as clean as anything."

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## "No Smoke" Grain Burner

Morten Jensen and Teresa Walker of Harvest Heat Inc. at Redvers, Sask., are firm believers in burning small grains or wood pellets because they're cost efficient and easy to handle.

They sell the HS Tarm Multi Heat Boilers from Denmark, which are said to deliver up to 91% efficiency, and can run for days on a single load of fuel in the hopper. On top of that, they burn much cleaner than other wood stoves, according to Walker.

The Tarm Multi Heat Boiler has two distinct burning chambers so it can burn up the combustible gases created by the burning fuel. "The boiler burns so clean and hot that no visible smoke comes out the chimney. Tests have shown that the boilers can burn with less smoke output than the equivalent of one cigarette," says Teresa.

The heat chamber is lined with a ceramic arch which, when combined with precise carburetion, superheats the solid fuel to a gasification state. This allows a hotter burn than other types of furnaces and turns the grain into a white ash, which requires minimal maintenance. This eliminates the need for total shut down cleaning.

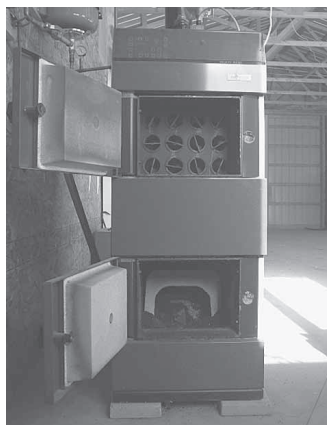
"A combustion draft fan blows the released gases through the live embers, and into the superheated ceramic tunnel, where secondary air is injected to complete the burning process," she explains.

The system is available in three different sizes - 51,200 btu/hour, 85,300 btu/hour, or 146,700 btu/hour. For larger applications, two or more units can be linked together.

Walker says that any grain can be burned, but wheat or rye at 15% moisture or less are most efficient.

The boiler is easily operated with a multi-functional digital control on the front panel. It allows you to regulate the flow of fuel and air, and also provides individual temperature readings of the water supply and return, and smoke. The unit has variable heat output from 30 to 100 percent, and an automatic shut-off to prevent hopper burn back. No water storage tank is required, and automatic hopper refilling is available.

The combustion chamber is constructed



HS Tarm Multi Heat Boiler is said to burn at 91 percent efficiency, and can run for days on a single load of fuel.

from acid-proof stainless steel and the boiler interior has 1/4-in. water-cooled steel plates. A gear motor turns the worm conveyor/auger to feed fuel into the combustion chamber at the proper rate.

The unit has two heavily insulated doors, which can be mounted on either side for easier access. Heat exchange tubes, which feature turbulators (or retarders) for maximum heat exchange efficiency, are located behind the upper door.

The boiler can be installed with either closed or open expansion. With closed expansion, a separate hot water tank can be connected prior to the shunt valve. With correct adjustment, it's possible to heat domestic hot water outside the regular heating season.

The unit is delivered completely assembled, and prices range from 7,600 to \$10,200 (Can.), depending on the model.

Contact: FARM SHOW Followup, Harvest Heat Inc., P. O. Box 44, Redvers, Sask., Canada S0C 2H0 (ph 306 646 2070; harvestheat@sasktel.net; www.harvestheat.ca).

## Simple Device Keeps Receiver Hitch From Rattling

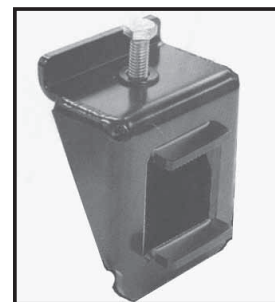
No one likes to hear the sound of a rattling hitch as you head down the road. Here's a simple fix for the problem.

The Quiet Hitch is an anti-rattle ring that slips over the end of the receiver hitch. Tightening down a bolt pulls up the slip-in drawbar, removing any free play.

Works on most hitch receivers.

Sells for \$24.95. Sold only through dealers.

Contact: FARM SHOW Followup, Roadmaster, Inc., 5602 N.E. Skyport Way, Portland, Oregon 97218 (ph 800 669-9690; info@roadmasterinc.com; www.roadmasterinc.com).



Anti-rattle ring slips over end of receiver hitch. Tightening down bolt on top pulls up the slip-in drawbar, removing any free play.

## Orange Water Gets Cows To Drink More

A dairy researcher at the University of Guelph, Ontario, has found a number of ways to get cows to drink more water.

Vern Osborne says it makes sense that water intake is important, when you consider that milk is 87 per cent water, and a cow's own body makeup is between 50 and 80 percent water. More water equals more milk.

One discovery Osborne made is that cows drink 12 percent more when the water is at or near their own body temperature.

He has also found that by adding orange flavoring to their water, test cows would drink more, but this may be only because it was a novelty to them. The study is ongoing as he continues to test a variety of flavorings.

"When we added glucose to the water, it significantly reduced rumen ammonia and blood urea, improving digestive functions."

Other studies are looking at water supplementation of glycerol and soybean oil for transition dairy cows. Glycerol is a

byproduct of biodiesel made from soybeans.

Jim Linn, a dairy nutritionist at the University of Minnesota is also doing water quality studies on how the mineral content in water interacts with the minerals in forage and purchased feeds.

"Most people discount the minerals in water, but you can get fairly high mineral intake. It could result in a ration that's not balanced," Osborne points out.

It's important to test water quality twice yearly, because mineral levels can change. When iron is present, it may prevent the cows from properly absorbing other nutrients. High iron levels may also reduce immune function or cause mastitis and oxidative stress.

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