

Robotic Rock Picker Coming To Market

A Washington company named TerraClear uses a drone to make field maps of pick-worthy rocks and calculates the best route for removing them using their own patented rock picker. What's more, they hope to have a robotic rock picker ready for market soon.

TerraClear is one of 10 companies competing for the \$50,000 Farm Bureau Ag Innovation Challenge this year.

TerraClear is the brainchild of software and farmland investment fund entrepreneur Brent Frei. The fourth generation Idaho farmer picked plenty of rocks as a youth. If he has his way, that chore may be history. Rock identification, mapping and picking is already being offered as a service in Idaho and eastern Washington.

"The next step is to sell pickers directly to farmers and custom operators," says Thompson. "Soon after will be the automation of that tool, what we call AutoPick, where an operator just needs to drive the tractor or skid steer and the implement sees and picks the rocks. Longer term, we will put the tool on an autonomous platform to remove the operator entirely."

The rock picker was developed in-house

and requires at least a 60-hp. skid steer. The universal skid steer mounting plate has quick connections for electric power, hydraulic supply and sensors.

The operator controls the picker via the auxiliary function switches on the skid steer joysticks and connects to these inputs via the typical 14-pin auxiliary electrical connector available on newer skid steers.

The picker uses dual rubber tracks on an articulating arm to grab rocks. The twin tracks work like jaws to open around rocks of 6 to 24-in. size. At the same time, sufficient pressure is maintained to hold them in place as the tracks counter rotate to spit them back and into the grated bucket, sifting out dirt and smaller rocks as it goes.

The arm alone requires 18-gpm peak flow at 3000 psi if all functions are operated simultaneously. It is capable of picking 300 to 400 rocks/hr., depending on the rock density in the field.

Basic components are off-the-shelf tracks adapted from off-road vehicle applications and hydraulic valves, sensors and controllers from heavy construction and agricultural equipment. Cameras and onboard processing



Robotic rock picker uses a drone to make field maps of pick-worthy rocks in your field. A loader-mounted picker, equipped with twin rubber tracks on an articulating arm, sees and picks the rocks and spits them back into bucket.

systems, which will be necessary for AutoPick, are used in autonomous cars under development.

The Rock Picker component will be available to farmers and service providers this year. The attachment will be priced at \$25,000 with discounts for initial rollout. Upgrades

with AutoPick and other refinements will be available as they are introduced.

Contact: FARM SHOW Followup, TerraClear Inc., 1709 139th Place NE, Bellevue, Wash. 98005 or 1101 Hill St., Grangeville, Idaho 83530 (info@terraclear.com; www.terraclear.com).



Alternate Heating offers several top-loading furnace models that burn anthracite coal with no smoke (left). Hoover wood burning furnace uses a gasification system that burns clean.

Top-Loading Wood Furnaces

Elvin Hoover of Hoover Pump Works says his Conestoga Champion Furnaces have no smoke, no smell, and don't soot up. The gasification system has a heat exchanger and boiler.

"We are the only manufacturers of our size that use an oxygen sensor," Hoover says. With it the gas from the wood and oxygen are the same high temperature to get the right mix for a nearly perfect burn, no matter what kind of wood is used for fuel.

The burn is so complete that the smoke cools to 300 degrees and doesn't soot up the stack.

The top-loading hopper is handy for businesses such as woodworking shops that can dump in loads of all sizes of scrap wood. Hoover and his business partner offer the furnace in three sizes. The smallest puts out 600,000 btu's and sells for \$19,000. Larger heaters that are ideal for manufacturing shops and greenhouses put out 1.2 million and 2.5 million btu's. The largest heater weighs 18,000 lbs. and sells for \$53,000. Hoover has shipped them on drop-deck lowboy trailers to other states and Canada.

Contact: FARM SHOW Followup, Hoover Pump Works, 222 Conestoga Creek Rd., Ephrata, Penn. 17522 (ph 717 733-0630; Norm.welding@gmail.com).

Alternate Heating Systems offers several models of coal burning furnaces.

"Anthracite coal burns clean naturally so it doesn't need to gasify to burn clean. It's much cleaner than wood," says Jeff Gingerich, owner of Alternate Heating. The shiny, hard coal burns with no smoke and the boiler only needs to be cleaned annually.

It is designed and built well enough that he offers a lifetime warranty on the parts that move coal in and ash out.

For convenience, he offers two top-loading hopper models. When filled they last up to 30 days. The S130 holds nearly a ton of coal, heats 3,500 sq. ft., and costs \$10,500. The S260 holds 1.75 tons of coal, heats 6,000 sq. ft. and costs \$13,500. Both have large ash receptacles to hold the ash left after burning a hopper of coal, and only need to be emptied monthly.

Customers appreciate the once-a-month schedule and cost savings. Gingerich keeps a stockpile of coal for customers to purchase from him for \$230/ton (btu's equal to 300 gal. of propane). Large loads delivered cost \$185/ton.

Contact: FARM SHOW Followup, Alternate Heating, 2393 Little Egypt Rd., Harrisonville, Penn. 17228 (ph 717 987-0099; www.alternateheatingsystems.com; sales@woodgun.com).



Wood stove heats an overhead water tank that serves as a heat exchanger. Hot water is then pumped through Pex tubing installed in shop's floor.

Home-Built Wood Stove Heats Shop Floor Cheap

Gary Gradek wanted to keep his shop warm without spending a lot of money, so he built a wood stove and mounted a water tank above it to serve as a heat exchanger. It circulates hot water through Pex tubing installed in the shop's floor.

He installed rows of 1/2-in. dia. Pex tubing in the concrete floor of the 1,200 sq. ft. shop as it was being built. The tubing runs 3/4 the length of the building, which has big storage racks at one end. The tank can be filled by a garden hose that hooks up to a valve mounted on the shop wall. An electric pump circulates water from the tank through insulated, 3/4-in. galvanized steel pipe that extends over a walk-through door and down to a series of valves that control 2 different zones.

"It works great and was relatively inexpensive to build, with the total cost less than \$1,000. I used about 1,000 ft. of Pex tubing," says Gradek. "I load wood into the stove a couple of times each day. It increases the shop's floor temperature by about 22 degrees, from 55 to 77 degrees.

"The shop floor is divided into 2 zones. One zone covers an area where I stand and weld, and the tubing is on 6-in. centers. We park vehicles over the other zone, and because less heat is required the tubing is on 18-in. centers."

He used a pair of 24-in. dia., 1/4-in. thick steel pipes to build both the stove and tank. The stove mounts on 3 legs made from 3-in. dia. tubing, and has a door at one end and vents at both ends. A spring-loaded damper controls the temperature inside the stove. Heat and smoke rise through a 6-in. dia. stainless steel pipe welded on between the stove and tank.

To build the tank, Gradek welded steel plates inside both ends of the tank to create water reservoirs. Eight 1 1/4-in. dia. steel tubes run in a loop inside the length of the tank and through the reservoirs to heat the water.

"I installed a pressure relief valve off a water heater to keep the tank from exploding if it gets too hot," says Gradek.

He paid \$200 for the end caps in the water tank and \$125 for an electric pump. The valves cost \$15 apiece.

As an added touch, Gradek welded a horizontal steel plate onto one side of the stove to keep a coffee pot and cup warm. "I plan to add another shelf to dry my boots," he notes.

Contact: FARM SHOW Followup, Gary Gradek, 497 Kennwood Dr., Ukiah, Calif. 95482 (ph 707 695-6040; gary.gradek@ejgallo.com).