



A 4 by 8-ft. solar panel sets outside tank, with a small pump circulating antifreeze from panel to a copper heating coil inside pvc drinking tube.



Animals drink from the open tube, which always stays open. The tube is open at the bottom of tank so fresh water is drawn up from below.

Clever Design Keeps Frozen Stock Tanks Open

"It lets my cattle enjoy a nice, warm drink of water even on the coldest days," says Roger Brown, Walker, Kan., about the solar-powered system he uses to heat his 400-gal.

stock tank. It has a unique control heating tube that stays open all winter.

"The key to this system is that I'm only heating 10 to 15 gal. of water at a time," says Brown, noting that the system costs just pennies a day to operate.

The system is "powered" by a 4 by 8-ft. solar panel that sets just outside the tank. A small pump circulates antifreeze from the solar panel to the tank.

A length of 12-in. dia. pvc pipe with a copper heating coil inside it runs from the surface of the water, down to within a couple inches of the bottom of the tank. A pair of hoses run from the heating coil to the solar panel. As the animals drink, water is drawn into the pipe from the rest of the tank.

"In cold weather, the water inside the pvc pipe is generally 20 to 40 degrees warmer than the water in the rest of the tank," says Brown. "On a cold morning when there's ice on the rest of the tank, the heating element will keep the water inside the pvc pipe from freezing. If it's very cold, a little ice might



Heat gun shows that water temperature inside pvc drinking tube is at 50 degrees while the rest of the tank is covered with ice.

form inside the pipe. But if the sun is shining, by 9 a.m. the ice will have already melted inside the pipe. Then as the day gets warmer, the ice on the rest of the tank will melt. If it's a cloudy day I just turn a valve to shut the water off.

"The 110-volt pump draws only 1/2 amp. It moves a very small amount of water but that's just enough to keep hot water pushing through the coil and back to the solar panel."

Brown says the system didn't cost much

to put together. "I paid \$125 for the pump. I already had the heating element coil and the pvc pipe, and I got the solar panel free from someone who had been using it on his house but no longer needed it. My only other cost was for copper fittings, hoses and antifreeze," he notes.

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Wagon Collector Pulls 102 Wagons In Parade

When Dwain Schultz, 78, fixed the red wagon he played with as a child, he had no idea that it would lead to rows and rows of red wagons.

"My dad bought it used, so it's at least 80 years old," Schultz says of his Radio Flyer wagon. When he showed it to his Clarks, Neb., friends and neighbors they started bringing him wagons rescued from junk piles and pastures.

"It kind of mushroomed from there," Schultz says. "I have 160 wagons now and 30 yet to redo."

He tears each of them completely apart, sands and repaints them. He replaces old rusty bolts with new ones and buys sheet metal from a local manufacturing company to weld new bottoms in wagons that have rusted through. He buys used wheels at auctions and flea markets. One of his best deals was 21 wagons and four pallets of wheels for \$30. For tires, Schultz wraps black plastic water hose around the wheel rim and secures it by twisting wire inside the hose.

Schultz's collection includes Radio Flyers, Greyhound, Arrow, Mercury, John Deere and other model wagons. Schultz paints or adds decals when he knows the wagon model. Many names deteriorated a long time ago, and he has no idea what they were. While most are red there are also yellow and wooden models.

Schultz doesn't know how old his wagons are, but Antonia Pasin first built coaster wagons in Chicago in 1917, after he came to the U.S. from Venice when he was 16. He called his first wooden box wagons Liberty Coaster after the Statue of Liberty. Later he



Dwain Schultz can pull five rows of toy wagons - 102 in all - with his 4-wheeler. The colorful wagon trains are a big hit at parades.

made them out of steel and changed the name to Radio Flyer in appreciation of the newly invented radio, by a fellow Italian.

Radio Flyer and other companies still make coaster wagons, and Schultz notes they seem to be popular when he takes them to parades.

"I can pull five rows with 102 wagons with a four-wheeler," he says. "I connect the tongue to the back axle of the wagon in front of it and they stay in place, even when I turn a corner."

He says he doesn't have any real advice for people interested in collecting. They just need patience, and perhaps a penchant for lost causes.

"Sometimes you shake your head and wonder if it's worth it," Schultz says with a smile.

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Schultz's wagon collection includes Radio Flyers, Greyhound, Arrow, Mercury, Deere and other models.