- Patent For Sale by Inventor: Neil B Kaplan 2025-02-07
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- US Patent **12,078,362**
- Issued 2024-09-03
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Safe Domestic Hot Water (DHW) System and Method That Saves Water and Energy.

This is my seventh US Patent: the five earlier patents relate to automotive security, mechanic & electronic, starting with 4,107,543 in 1978 (invented because my carefully restored 1966 Corvette was stolen!). That first patent held up 100% to a multi-million-dollar lawsuit in the early 1990's. The sixth patent is a swimming pool DE powder filter titled: Self-Regenerating Pressurized Filtering System for Liquids US 5,389,243 Issued 1/10/1995.

Most of my prior patents have been used in my businesses (2-million-dollar automotive security manufacturer of Z-LOK, hood lock with engine disable) or were sold to companies like: CODE-ALARM, Inc., TSI Security Acquisition Corp, Audiovox Corp, Sensormatic, Titan Security Systems, etc.

ABSTRACT (patent verbatim)

A hot water system, such as a Domestic Hot Water (DHW) system, combines the best characteristics of a tankless heater and a hot water storage tank to provide superior energy and water savings and safety. The storage tank does not need an internal heat source. Tank hot water may be recovered through the tankless heater. A first control (A) activates hot water recirculation from the storage tank to safely heat pipes to supply, for example, a sink, with no wasted water. The tankless heater supplies a greater demand, such as for a shower or tub. A second control (B) activates a cold-water diverter to the supply from the storage tank to the tankless heater. A water flow sensor keeps the tankless heater as the hot water source until the water flow stops. The so-called cold-water-sandwich is eliminated, and waste of water or heat is reduced.

BRIEF SUMMARY OF PREFERRED EMBODIMENTS (patent verbatim)

In an aspect disclosed herein, a system and method for safe and efficient delivery of hot water by preheating hot water pipes in a particular way is disclosed.

More particularly, a user control input (A) may start a preheating pump that sends hot water from a hot water storage tank through a closed piping loop, which returns room temperature water that may exist in the pipes.

A branch piping circuit may allow for at least one input and at least two outlets for apportionment of room temperature return water. A tempering valve having a cold-input and a hot-input may be used to temper safe hot water. A valve may control what portion of return water is drawn directly into its cold-input from the branch piping circuit outlet. The tempering valve controls what portion of hot water is drawn into the valve hot-input from a storage tank hot-output, forcing the storage tank to draw that same water volume into its cold-input from room temperature return water through the branch piping circuit outlet. The tempering valve may now output safe hot water.

An electronic control circuit may turn the preheating pump off when a preset temperature has been reached. In addition, or alternatively, an electronic circuit may turn the preheating pump off when a preset time limit has been reached.

An electric valve in the return water pipe may open when the preheating pump is on and may close when preheating pump is off. This electric valve may prevent a potential thermosiphon from occurring in the closed piping loop.

A hot water storage tank may supply hot water for low and medium hot water demand, such as at a bathroom sink. A tankless heater may supply hot water to satisfy higher hot water demand like at a shower or for a tub fill.

A user control (B) may activate the tankless heater by controlling a cold-water diverter that may redirect cold water to enter the tankless heater cold input instead of the storage tank cold input, thus enabling the tankless heater to be the supplier of hot water.

A cold-water diverter may be kept in position by a timer and a water flow sensor. When the water flow sensor indicates that water use has ended or the preset time limit has been reached, the cold-water diverter may revert the cold-water supply to the storage tank cold-water input and no longer to tankless heater, which may then enable the storage tank to be the supplier of hot water.

User control (B) may also activate a pump to send the initial cold-water output from the tankless heater into the hot water tank to assure that cold water never enters the hot water pipes. A water flow sensor may stop the tankless pump operation when use of water is detected or when a preset time limit has been reached.

A tank thermostat and tankless pump may also recover the hot water storage tank temperature by cycling hot water stored tank water through the tankless heater.

As a result, the system and method provide water at a precise, controllable temperature, to at a faucet as rapidly as possible, and with minimal water wasted.

(End Brief Summary)

Background of the invention: My wife and I bought an old house in 2012, situated in Hull, MA, built in 1930. Hull MA is a peninsula 7 miles long, pointed toward Boston Harbor. Hull was first settled in 1622. From Hull, we can see planes landing at Boston's Logan Airport. Commuter boats run to Boston and Logan Airport in 18-25 minutes. Hull has 3.5 miles of beautiful sandy beaches and a very long history. For info, hulllifesavingmuseum.org. Read about Captain Joshua James, a father of the US Coast Guard.

The house, built in 1930, was originally heated by oil. The oil burner ran 24/7. Its only purpose during summer was to recover the 40-gallon storage tank. A circulator pump and heating oil burner recovered the tank hot water. In 2017, we upgraded our fuel to natural gas and installed a combi-boiler to do both forced hot water heat, and tankless hot water. When the normal limits and faults of a tankless heater appeared, I re-connected the above circulator to recover hot water in the 40-gallon tank.

Showers still began to cool down in a short 15 minutes. Recovery is very slow, even with the 132,000 BTU/hour tankless heater. It was easy to verify that the dip tube was still in place and positioned all the way to the bottom of the tank. I believe that high velocity flow disrupts the stratified layers and allows cold water to push up higher in the tank, closer to the hot water outlet.

I worked for at least a year, trying to overcome both excessive layer mixing and slow speed recovery. I studied the history of hot water tanks (again), back to early 1900's. I tried placing the recovery hot water into different tank side ports and tried a few other changes. I even thought of a way to build a tank that would isolate temperature layers physically, but decided that was a little nuts.

I tried using the tankless heater directly, but we found it very unsatisfactory for many of the common reasons that everybody knows. Slow to arrive hot, the cold-water sandwich, temperature fluctuations when using on and off at a kitchen sink. Varying temperature even with an anti-scald valve. Missing all the good things that regular hot water tanks do offer. Hot water recirculation is not simple to add.

Solution: since tankless heaters and hot water tanks each have some wonderful features, I created a system where the best features of each system is carefully combined to make a wonderful hot water experience for all types of use. The best aspects of each system can work in concert with one another.

The Fix* for tankless heaters**; ***use the tank to add recirculation, provide 6 second hot water, bury the cold-water sandwich, provide quick, smooth use at close and remote sinks like people are used to.

The Fix for storage tank; ***make the tank small to enable quick recovery*** by the tankless. The system has been tested down to a 3-gallon tank with no adverse effects (three adults in house). Keep in mind that if the small tank runs down to its set low hysteresis temperature, the tank thermostat will turn recovery on. The tankless will quickly and smoothly become the provider of hot water.

A 5-gallon tank can recover 8°F (134°F to 142°F) in 6 minutes using the tankless heater. The tank can handle recirculation and *point of use* hot water easily.

When a user signals that they want hot water at a sink or bidet, they can just press a button and it's there in 30 seconds with no water down the drain. Hot water arrives at the faucet 6 seconds after it's turned on. When a user signals that they want a shower, the tankless heater becomes the source of hot water, the cold-water sandwich is buried in the hot water tank by tankless pump 146. Safe hot water is also recirculated in just 30 seconds. Tankless is ready in one-minute. It's a good time to get ready for the shower, there is no wasted water down the drain while waiting a minute for a shower.

This invention does not use crossover valves; as they are illegal in MA. They send non-potable, hot water, into the cold side, that *was* potable water. Crossover valves violate MA 10.14 of 248 CMR.

Legionnaires disease is caused by Legionella bacteria. Crossover valves send recirculation hot water to 'crossover valves' under sinks. The idea is that cool water is allowed to pass through the valve to the cold-water line headed for the hot water tank cold input. When the valve detects that hot water has arrived, it blocks the pump water flow (the pump still spins dead-head, wasting electricity). That cold

water return pipe is neither hot nor cold, it's great for promoting growth of Legionella bacteria, which grows in 77°F to 113°F water. Dead legs in the return piping are a common area for bacteria growth.

Crossover valves fail all the time, see the purchases on Amazon. In fact, read the 1-star reviews of such circulators. These systems also do not allow the anti-scald valve to work. In a pressurized closed loop, cold water cannot enter the anti-scald valve because the water loop is closed. It's like a water bottle, if it's full, more water cannot be squeezed in! Many of these systems are made so the pump is installed directly on the hot water tank output pipe. That exasperates the situation. This patent allows for apportionment of return water during recirculation so the tempering valve can work properly.

Regarding this patent and the handling of potential Legionella bacteria. The hot water tank is kept between 136°F and 142°F (adjustable). That's considered a good temperature range to keep the bacteria from forming or living. When the tank is recovered, the tankless heater runs all the tank water through the tankless heater at temperatures between 151°F and 165°F. Excellent system to be sure that any Legionella bacteria is eradicated and isn't allowed to form in the tank or piping.

I created all the patent drawings (figures) for this invention, the US Patent office accepted them all without changes. I also engineered the circuit, the electronic schematic and circuit board layout with tracks, pads, and holes (pictures attached). The circuit board and system have been working flawlessly in my own home for two years. I'm sure a fully digital circuit board with an advanced feature set could be created by your company, or outsourced. Controls (A) & (B) could be push button, voice, or any method desired.

Attachments & Resources: To send info about this to your company colleagues in another state, they can visit the patent website: **12078362.com**

Some of my work in graphics…

I created a substantial graphics business in FL (1990 ~ 2001). The processes, canvas coatings and pigmented ink coatings were kept as trade secrets without patents. My company printed large format photos on real canvas (64" wide printers using 8 primary colors). I developed high end, scientific color control process (helped by using Gretag-McBeth Cie Lab color ICC profiling). My company won customers like Carnival Cruise Lines, Princess Cruise Lines, Royal Caribbean Cruises Ltd, David's Bridal, Ducks Unlimited, Wackenhut in Palm Beach Gardens. Monthly custom posters for eight IBM Southeast Credit Unions in GA and FL, custom color work for Flagler Museum, the former Kennedy Estate on Palm Beach, just to name a few. I was also one of the pioneers of digital photo restoration in the early 1990's. I used the very first version of Photoshop. Printed with dye sublimation, then inkjet printers.

My father graduated Rhode Island School of Design after WWII. He taught me about color and graphics. To this day, I find very few people understand color in its additive mode: red, green, and blue primary colors (like a video screen) and subtractive color mode of cyan, magenta, yellow and black (like color on a painting, print or object). After we returned to MA from FL, I worked as the graphic designer and production manager for Fast Signs in Hanover MA for 3 years.

Thank You,
Neil B Kaplan