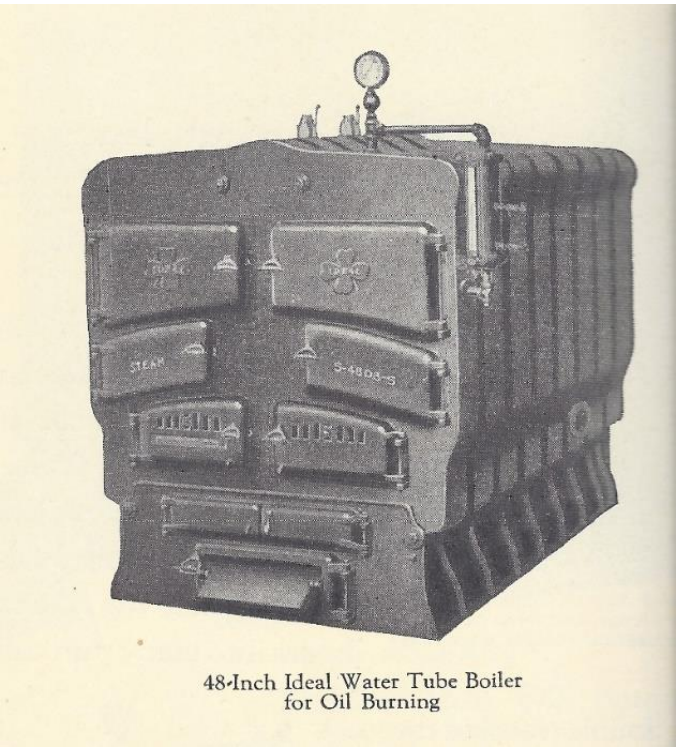
Heating and Hot Water in the Ca' d'Zan

Steam Supply

Because of its size, the Ca' d'Zan mansion had a heating plant befitting a small apartment building. Two large 48-inch oil-burning Ideal Water Tube Boilers from the American Radiator Company were installed "in battery." Together they could provide enough steam to heat 25,000 square feet of occupied space. Although the mansion has a total of 36,000 square feet of living space, only 23,000 square feet was heated (now that same area is under air conditioning).

Each boiler was 12 feet long, 5 foot 9 inches wide, and 6 feet 10 inches tall.



48-Inch Ideal Water Tube Boiler
for Oil Burning

The boilers were fed from two large oil tanks buried under the driveway on the east side of the house. These tanks were removed around 2008 to prevent them collapsing unexpectantly.

Radiators

The boilers fed steam to radiators located throughout the house. Some of these have been removed (for instance, in the valet's pantry), but many are still in their original locations (for instance, in the kitchen).

Radiator in the Kitchen of Ca' d'Zan

Each radiator had a valve to regulate the incoming steam, and a "trap" to let the condensed water return to the boiler while maintaining steam pressure.

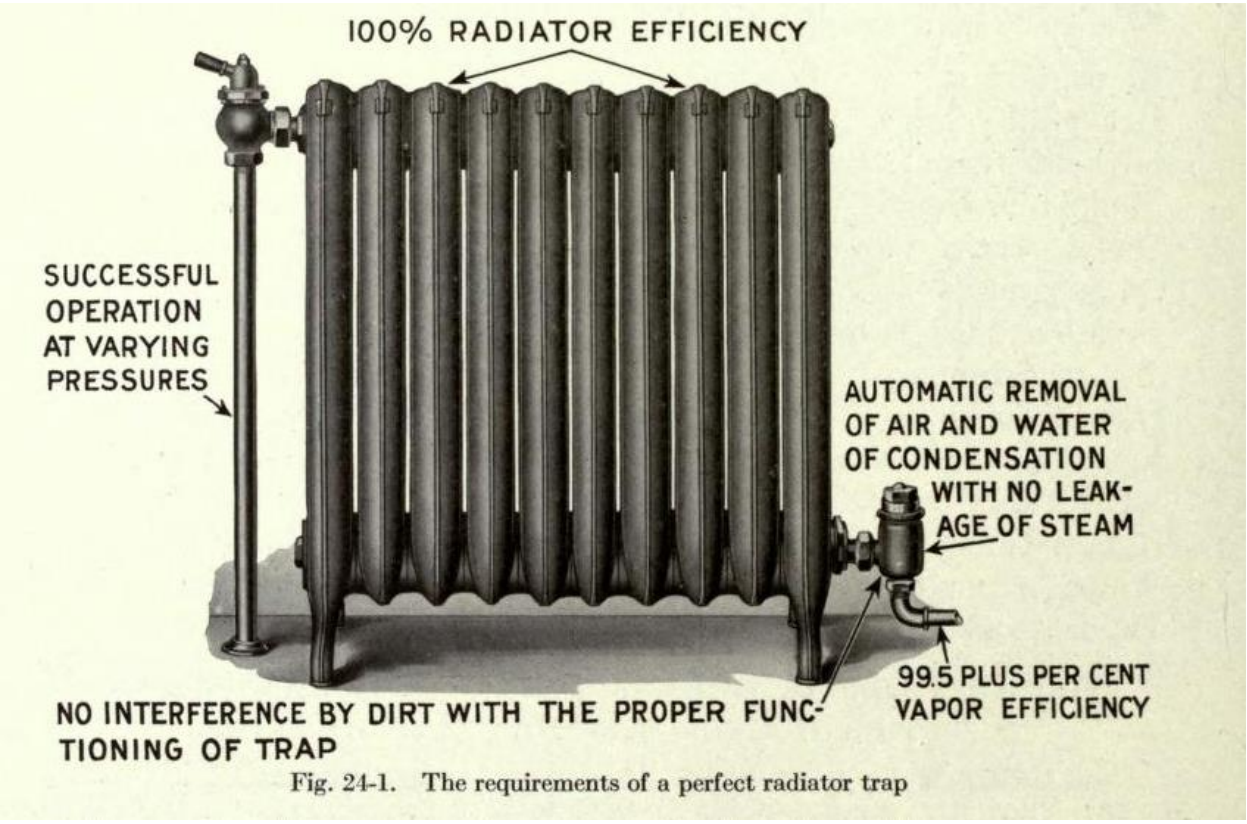
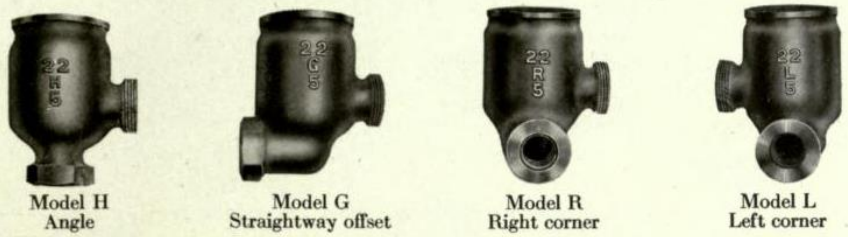


Fig. 24-1. The requirements of a perfect radiator trap

All the radiators were fitted with a Webster 5-series Sylphon trap.

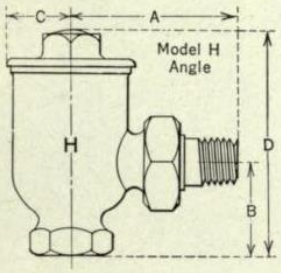
Table 24-1. Models and Dimensions of No. 5 Sylphon Traps for Working Pressure Up to 10 Lb. per Sq. In.

For convenience in making pipe connections, Webster Series 5 Sylphon Traps of the smaller sizes are made with four types of bodies as shown. Model H or angle is the one most used



Model H Angle | Model G Straightway offset | Model R Right corner | Model L Left corner

Fig. 24-5. Bodies of Webster Series 5 Sylphon Traps



Size	Trap no. & model	A	B	C	D
½″	512H	3″	1⅝″	1⅛″	4⅛″
½″	522H	3⅜″	1⅞″	1 3/16″	5¼″
¾″	523H	3⅜″	2″	1 3/16″	5¼″
¾″	533H	4 1/16″	2⅜″	1¾″	5⅜″
1″	534H	4⅛″	2⅝″	1¾″	5 13/16″
1″	544H	4 5/16″	2 9/16″	2″	6 13/16″
1¼″	545H	4½″	2 9/16″	2″	6 13/16″

In the kitchen and pantry, the input valves were Webster Type W Modulation Valves. These were operated manually and required access to the radiator.

The Webster Type W Modulation Valve

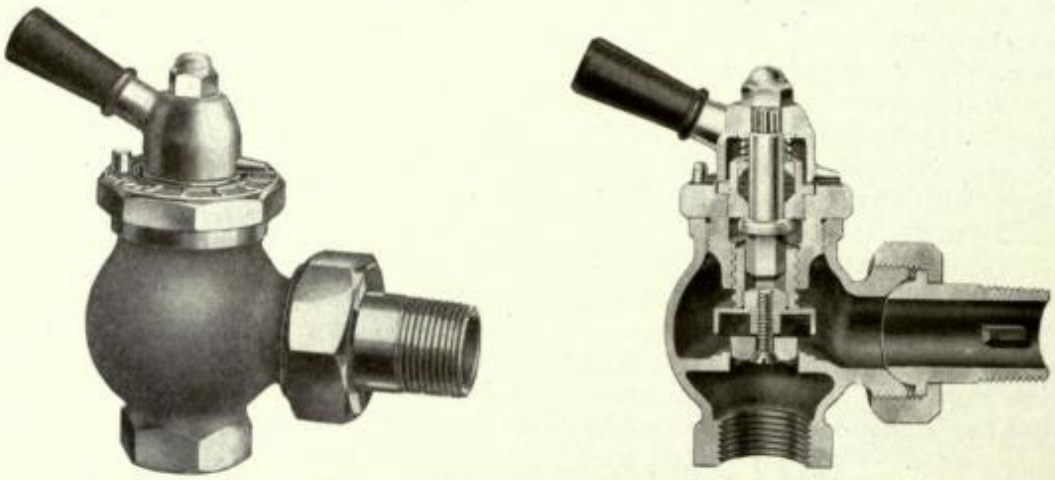


Fig. 24-17. The Webster Type W Modulation Valve—shown in partly open position

Close up of the radiator in the Kitchen of Ca' d'Zan

Radiators

In much of the rest of the house, the input valves were controlled by a thermostat. This was part of a complex system from the Johnson Service Company.

JOHNSON SYSTEM

TEMPERATURE JSC REGULATION

Over thirty years ago Prof. Warren S. Johnson invented the first successful thermostat. Since that time the effort toward improvement has never stopped. The Johnson Company **has always led** in new equipment—**we have never been imitators or followers.** We now offer two big improvements in heat regulation—and the only two advances which have been made in recent years. They are: **The Johnson Model Thermostat,** the smallest and most perfect thermostat ever produced; and **The Johnson Sylphon Valve,** an all metal valve which will not deteriorate.

The Johnson Model Thermostat is only 2 inches wide and less than 5 inches long. It can be easily concealed in one's hand. It operates on one-half degree variation in temperature—thus is **doubly sensitive.** Patented improvements are the **"open" and "closed" heat indicator, positive heat shut off, temperature locking device, patented adjusting dial,** and **self adjusting regulator.**

It is **THE LAST WORD IN THERMOSTATS**

The Johnson Sylphon Valve has a seamless Sylphon Metal Diaphragm or Bellows, instead of the ordinary rubber diaphragm. These metal diaphragms will not vulcanize, crack or leak and hence are a big improvement over the old rubber diaphragm valve, which was subject to all these faults. These valve diaphragms are patented and we have the exclusive right to use them.

Send for Booklet

Johnson Service Company

MILWAUKEE, WIS.

Notice: Infringers and unlicensed users of our patent 924,235, relating to automatic control of humidity will be prosecuted.

The thermostat in the Great Court of Ca' d'Zan

Unlike a modern thermostat that sends an electric signal when the temperature reaches a set point, the thermostats in the Ca' d'Zan used a complex pneumatic system of air pipes and Johnson Sylphon heat control valves. An air tank in the basement was pressurized by a small electric motor. Supply air lines ran from the tank to each of the thermostats throughout the house, and then from each thermostat to the radiator. The thermostats would modulate the air pressure based on the room temperature, which would then operate the Sylphon valve and regulate the flow of steam.

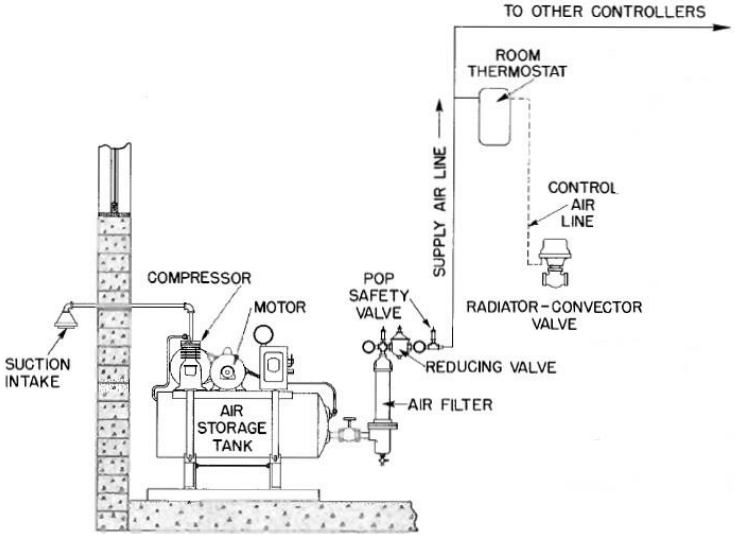


FIG. 1: TYPICAL PNEUMATIC CONTROL SYSTEM SHOWING THE VARIOUS COMPONENTS

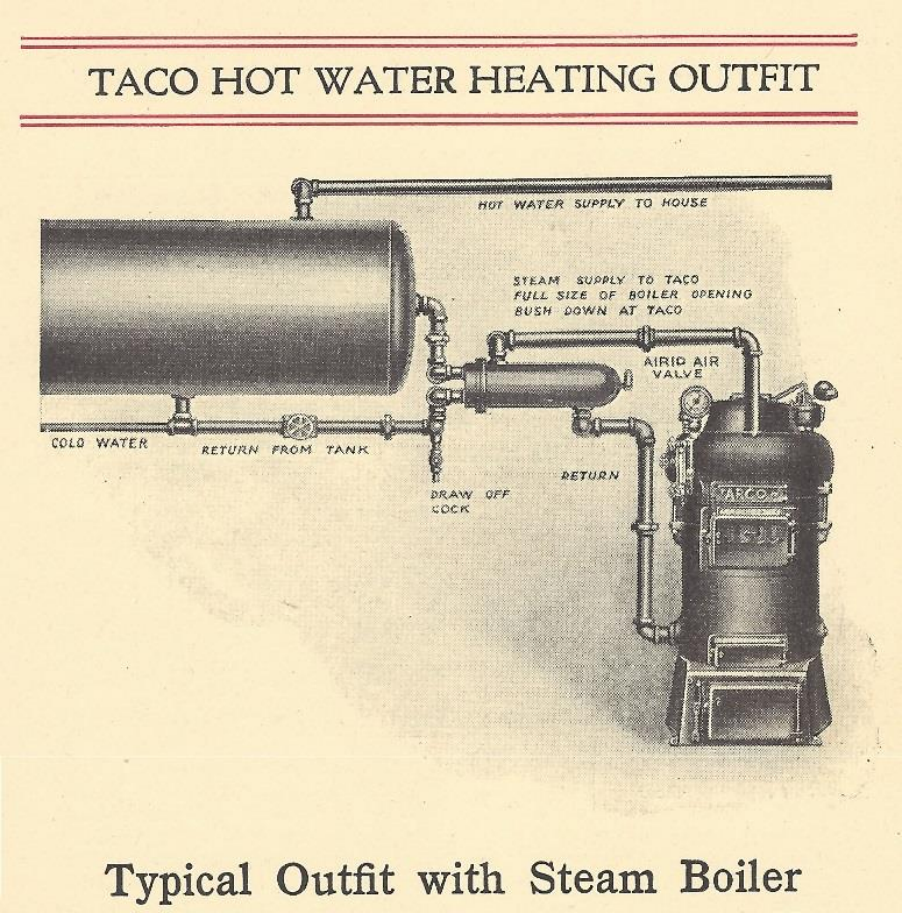
Photo credit: HeatingHelp.com

Most of the pneumatically controlled valves are behind radiator covers in the Ca' d'Zan, but you can see an entire assembly in the bathroom of the fourth-floor tower bedroom. There you can see the incoming steam pipe with the Johnson Sylphon valve on top, and the ¼ inch copper air line running to the valve:

Radiator in the Fourth Floor Bathroom
Photo credit: Kristy Cambron on YouTube

Hot Water

With fifteen bathrooms, a laundry room, and sinks in the kitchen, pantry, and tap room, there was a very large demand for hot water in the Ca' d'Zan. This was complicated by needing to supply heated *saltwater* to the bathrooms in both John's and Mable's suite. It is likely, but unconfirmed, that there were four or more hot water heaters serving different zones in the house. All would have been oil-fired and located in the basement of the house.



In a typical arrangement from 1925, steam from an American Radiator Company (ARCO) boiler fed a heat exchanger from the Thermal Appliance Company (T.A.CO.), which continuously warmed water that was stored in a separate tank. The "Ideal Fitter" manual says that:

> *"The Steam Taco Domestic Hot Water Heating Outfit, being very simple and compact, including Taco Heater and storage tank in connection with an Ideal steam heating boiler, offers several decided advantages.*
>
> *"It relieves the boiler of any possible excessive water pressure by transferring it to the Taco Heater. It keeps the boiler clean by precipitating in the Taco, lime or other foreign matter; and the Taco is accessible for easy cleaning or replacement. It insures a supply of hot water free of discoloration, because the interior of the Taco consists of copper and bronze. Also, the automatic regulation on the boiler maintains fuel economy and prevents overheating of water."*

Sources

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