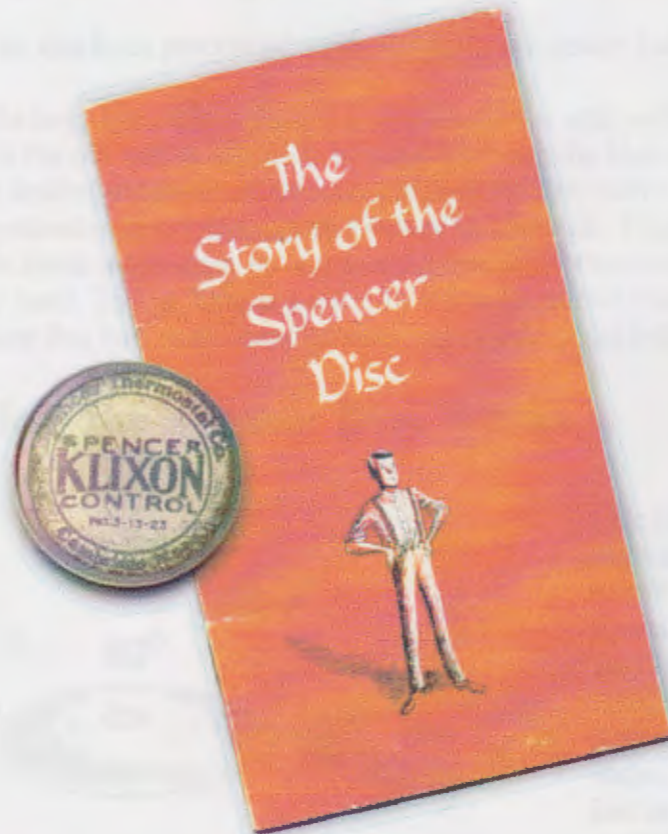


These are excerpts from a pamphlet that was used to introduce an invention by John Alby "Al" Spencer, Brother of Percy Spencer. It was published around 1955.

Al invented this at his home, while working at AMRAD - American Research and Development Corporation. AMRAD was assembled with funds from J.P. Morgan. A number of the principals at AMRAD left to form Spencer Thermostat Co. Having heard of Spencer Thermostat, Mr. Morgan sent an investigator who reported back that AMRAD "had lost a bright young man who had made an important invention". Mr. Morgan withdrew his support, effectively killing AMRAD.

Thanks to Otto J. Scott's book - *The Creative Ordeal - The Story of Raytheon* for filling in the details.

Rod Spencer



THE SPENCER DISC is a unique thermal element.

It is different from all other thermal elements in that it is inherently snap-acting.

It has been used for over thirty years in KLIXON Thermostats, which are manufactured by Spencer Thermostat Division of Metals & Controls Corporation, located in Attleboro, Massachusetts.

To date millions of KLIXON Thermostats have been manufactured and successfully used in all manner of temperature control applications.

Inevitably, people everywhere ask, "What is the Spencer Disc? How was it invented? How is it used?"

The disc is one that my Grandfather (Percy) used to carry around and demonstrate at the slightest provocation. It was among the first manufactured in Cambridge at Spencer Thermostat Co. - an important part of the prehistory of Raytheon.

Gramps used to heat this up by rubbing it on his pant leg, place it on a table, and "click" it would jump into the air.

It is the purpose of this booklet to provide the answers to these questions.

This is a typically American success story that begins with a door in a furnace and an alert boy.

The story opens many years ago in a clothespin mill in northern Maine. The boy was fifteen. His job was a tough one - fireman for a wood-burning steam boiler that powered the machinery.

Clothespin machinery requires a lot of steady power and because the boiler was fired with waste chips and wood shavings from the manufacturing operations, the young fellow had to move fast to maintain a sufficient head of steam pressure in the boiler.

One day he began to puzzle over something he had noticed. Why was it, he wondered, that when the fire was well up, the round clean-out door in the top of the boiler would belly out with a loud report?

Why was it when he added more fuel and the fire cooled down temporarily, the door would snap back into its original shape?

He got an idea. He realized that the boiler was practically telling him when it needed more fuel. When the door bulged out, it meant that the last charge of fuel was burning well and the fire was hot. That was when he could put on more shavings and chips without smothering the fire. After that, the boy didn't have to run back and forth looking into the fire box to see if more fuel was needed. Instead, he waited until the door signaled. When it popped out, he knew the furnace was ready for another charge.

Yes, this keen perception made the boy's job easier, but it had a much more far-reaching effect than that.

The boy, John Alby Spencer, remembered the snap-acting clean-out door of the boiler long after he had left the old mill in Maine. It inspired him with the idea of making a disc which could be calibrated to snap at desired temperature settings. He realized that such a thermal element would have tremendous application possibilities in all kinds of thermostats. Finally, after 18 years of research and experiment in his home work shop, he acquired a piece of thermostatic bimetal and made the first Spencer Disc out of it by hand. Today, discs are made by the millions and every one is a direct descendant of the old furnace door that had made John Spencer's job easier years before.

How the Spencer Disc Works



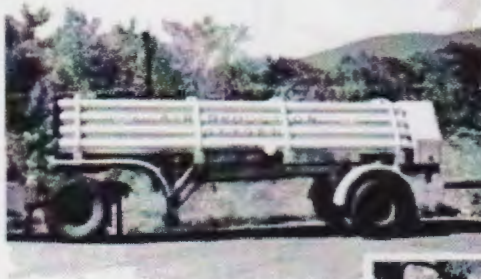
Like the common bimetallic strip type of thermal element, the Spencer Disc is made of two different metals bonded together permanently. When such material is heated, the metal on one side expands more than the metal on the other, and this tends to bend the material. Unlike a thermal element made from strip, however, the Spencer Disc is round and is dished into a concave shape. It resists being bent into the opposite direction, just as the curved bottom of an oil can resists being pushed in. As the disc gets hotter, one side expands more than the other, but the disc cannot bend slowly like a strip because it is arched.

Suddenly, the forces which have built up in the high expansion side overpower the structural resistance of the arch, and the whole disc snaps. When it is allowed to cool, it snaps right back into its original position by the reverse process. These changes of shape take place in approximately 16/100,000 of a second, and both can be preset with lasting temperature calibrations.

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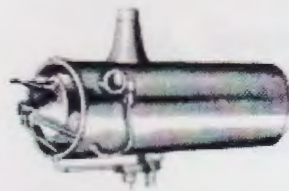
Illustrated below are a number of products in which KLIXON Thermo-Snap Controls are used.

**Klixon Circuit Breakers
are used in all types
of Aircraft . . .**



**. . . Commercial
and Private
Vehicles . . .**

**. . . and
Military Vehicles.**





Thanks...
[Gramps](#) for the vision, and Al for the message - Rod.

[Related story - See the story of Percy Spencer, Al's brother, and his "Itch To Know"](#)



This page last updated on August 29, 1998