CHAPTER X

Air Valves

Doubtless no portion of a heating apparatus has received more attention or has been more experimented with and improved than has the air valve. The free circulation through a heating system is conditional upon the removal of the air as it accumulates in the apparatus. The circulation of steam, vapor or water through an air-bound pipe or radiator is as completely blocked as though shut off with a valve.

The first air valve used was a small pet-cock. As late as 1842, the period when Nason and Walworth first began the busi-

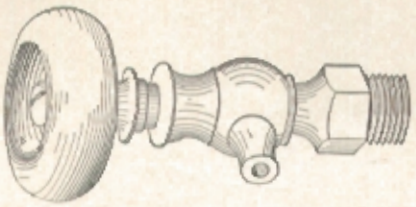

Fig. 100.—Wood wheel compression air valve.

ness of warming buildings with steam, the common form of pet-cock or compression air valve was used for venting. Fig. 100 illustrates a common wood wheel compression air valve; a little more refined in appearance than the original type but exactly the same in method of operation.

For use on hot-water systems a compression-air valve operated with a key is used. A wood wheel valve would answer the same purpose except that the wheel might be tampered with or the valve might be carelessly opened allowing the water to leak out of the system. Fig. 101 shows the type of key operated compression air valve in common use.

Air valves are of two general kinds; *positive* and *automatic*. The positive type is of the compression variety as already illus-

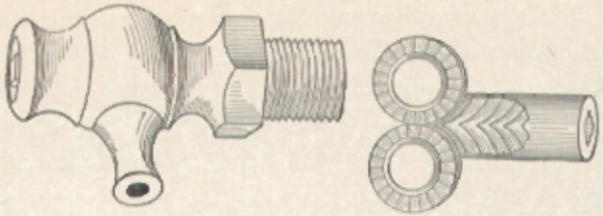

FIG. 101.—Lock and shield compression air valve.

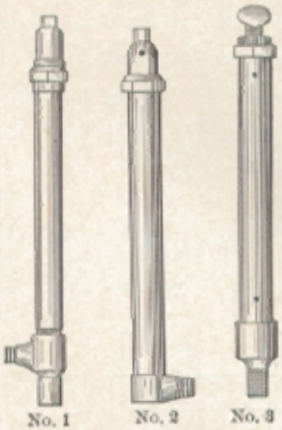

FIG. 102.—Baker automatic air valve.

FIG. 103.—Interior of Baker automatic air valve.

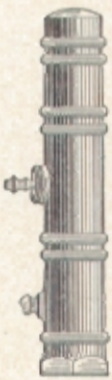

FIG. 104.—Breckenridge automatic air valve.

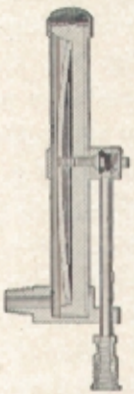

FIG. 105.—Breckenridge automatic air valve with drip.

trated. The use of valves of this character was continued until about the period of our Civil War. At this time the first of the automatic valves was invented. The early type of automatic air valves were quite effective when new, however, they easily became clogged with water or the expansion member of the valve would stick fast.

Two of the earliest types of automatic air valves were the Baker and Breckenridge. The Baker valve was made in three styles as illustrated by Fig. 102. No. 1 valve was provided with a coupling at the bottom for attaching a drip pipe connection. No. 2 valve had no drip and No. 3 had a straight shank for screwing into the top of a fitting or radiator tapping. The expansion member of this valve consisted of a short piece of thin brass tub-

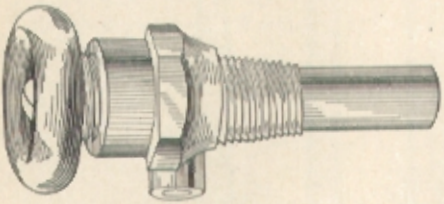

Fig. 106.—Victor automatic air valve with wood wheel.

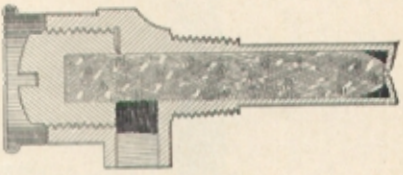

Fig. 107.—Interior of Victor automatic air valve.

ing which, when expanded, seated and closed the valve port. The interior construction is shown by Fig. 103.

The Breckenridge automatic air valve is still used to some extent. Fig. 104 shows the appearance of the valve and Fig. 105 the same valve provided with a drip connection. This illustration also shows the construction of the valve. The expansion member consists of a curved strip of brass which, when expanded, pulls a small conical disc against a seat and closes the valve.

The early types of automatic air valves would not close against water. This was a common fault of all of the valves in use until a very recent date. The later of these types were constructed in one of two forms. The "expansion post" type and the "expansion chamber" type. Fig. 106 shows the exterior appearance of the Victor automatic air valve, a small valve of the expansion post type. Fig. 107 shows its construction. The expansion member is a round carbon post, in diameter about that

of an ordinary lead pencil. The stick of carbon is attached to the head cap of the valve which is adjusted by screwing down the cap so that the carbon rests against or is held in position very near to the exhaust port of the valve.

The Jenkins automatic air valve was similarly constructed except that the carbon post was short and of greater diameter.

With the purpose of preventing the leakage of water through the valve several types of automatic expansion post air valves were devised in which a hollow float operated in conjunction with

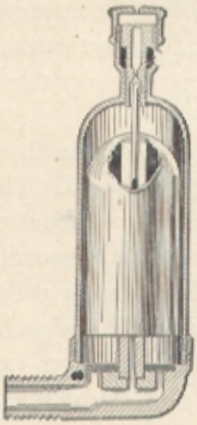

FIG. 108.—Automatic air valve with expansion post and float.

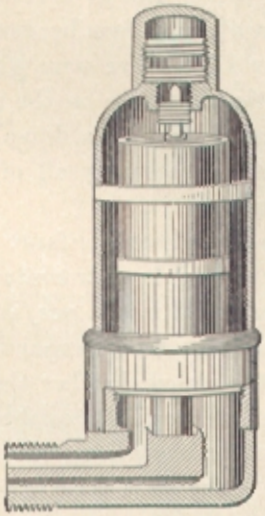

FIG. 109.—Russell automatic air valve.

the expansion post. In some of these valves the float was composed of a thin metal shell open at the bottom as illustrated by Fig. 108. In some valves the expansion post was replaced by a sealed float which contained a small amount of volatile liquid extremely sensitive to heat, which, vaporizing at a low temperature, formed a gas which by pressure expanded the ends of the float. This operation closed the valve by raising the valve stem, attached to the top of the float or expansion member, so that it was pushed against the seat of the valve port. The Russell automatic air valve (old style) shown by Fig. 109 is illustrative of air valves of this type.

Later types of valves were provided with vacuum attachments, which, working in conjunction with the float or expansion post, allowed the air to escape under pressure of the steam and closed as soon as the air was expelled. When the steam pressure was removed and the heating system cooled, the vacuum attachment prevented the return of the air through the valve and the condensing steam placed the system under a partial vacuum.

Air valves of the character described were subject to two serious faults. Most of them were adjustable by hand or by using a screw driver and as a result, due to too frequent or improper adjustment, they soon became inoperative and useless. As late as the year 1900 there were probably not more than half a dozen automatic air valves on the market. During the succeeding ten-year period possibly a dozen automatic valves were designed and patented. Practically all of these valves were capable of hand adjustment.

The second serious fault was the collapse of the thermostatic member or the chamber containing the volatile liquid. This liquid, when expanded into a gas, is increased in volume about seventeen hundred times and in expanding exerted such a tremendous force within the sealed chamber that it would fracture or collapse.

Most of the faults of the air valves of early design have been corrected or overcome and many good venting valves are now to be had. The past ten-year period has seen the development of the automatic air valve brought to a state bordering on perfection. All of the better valves are non-adjustable and of all-metal construction.

Automatic air valves of the expansion and float type have a tendency to become water-logged or to spurt water into the valve when there is a sudden rush of steam. To prevent this water from escaping through the exhaust port of the valve floats are used in the body of it and the water is drained back into the radiator by a syphon or drain tube. The expansion medium in many of these valves is a quantity of volatile liquid sealed within the float or expansion chamber. This liquid vaporizes, at a very low temperature, into a gas which expands the member and closes the valve.

Automatic air valves are now so numerous in variety that it

is necessary to illustrate but few of them to show the various types available. Fig. 110 illustrates the No. 1 Hoffman valve with syphon.

The Hoffman No. 2 air valve is similar in external appearance to the No. 1 but has a vacuum feature. It allows the air to

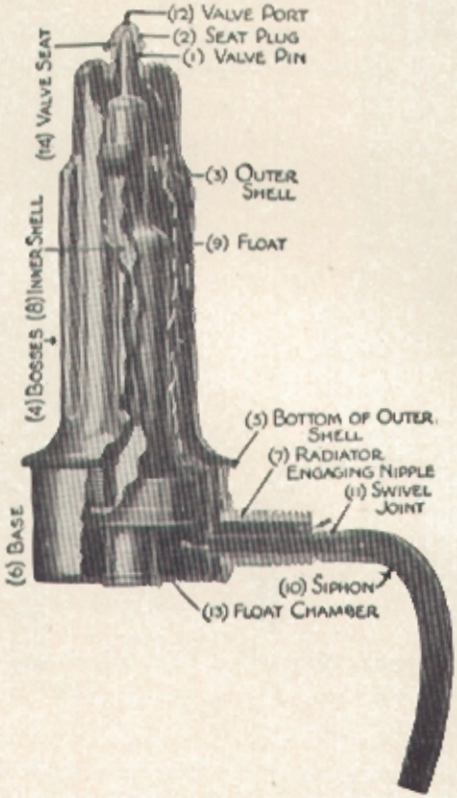

Fig. 110.—No. 1 Hoffman syphon air valve.

escape from the system and prevents it from returning when the steam pressure is removed. Fig. 111 illustrates the Dole automatic air valve, one of the later varieties or newer addition to the line of venting valves. The Russell Company, makers of air valves for many years, have several new types of air valves, one of which is illustrated by Fig. 112. This valve is called the

Russell Non-adjustable Syphon Valve; it has a quantity of volatile liquid sealed within the float and represents the latest construction of this type of valve.

In late years it is generally recognized that the steam main should be quickly freed of air in order that it will fill with steam and act as a reservoir to supply the various radiators connected to it. By this provision all radiators will then receive their supply of steam at practically the same time. For this purpose large "free venting" air valves are employed. These valves have extra

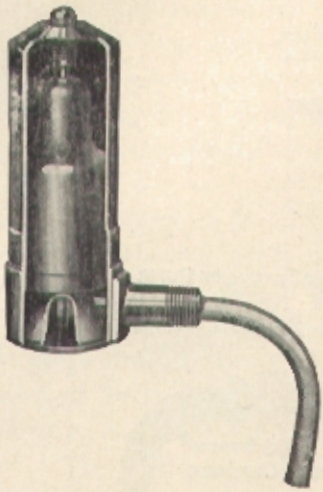

FIG. 111.—Dole syphon automatic air valve.

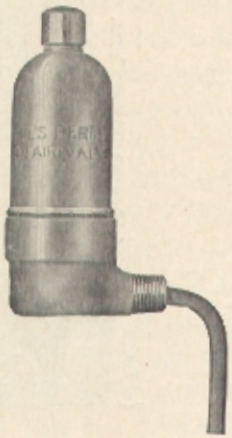

FIG. 112.—Russell non-adjustable syphon air valve.

large inlet and exhaust ports. They are made in a variety of styles and sizes. Some types close against steam and air but will not close against water and therefore should not be employed in places where a slight leakage of water is objectionable. Other types close against steam, air and water and will not allow steam to blow through them. Fig. 113 illustrates the Hoffman No. 5 quick venting valve and Fig. 114 a similar type of valve which possess vacuum features for use on vacuum installations. This is called the Hoffman No. 6 valve.

Automatic air valves are continually being improved. As

the manufacturers discover objectionable features, these are corrected, or, as new requirements are ascertained, the manufacturers

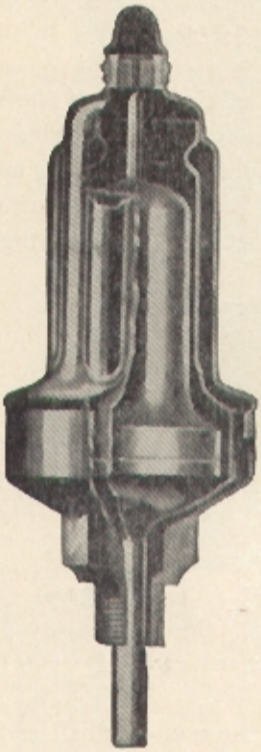

FIG. 113.—No. 5 Hoffman air valve.

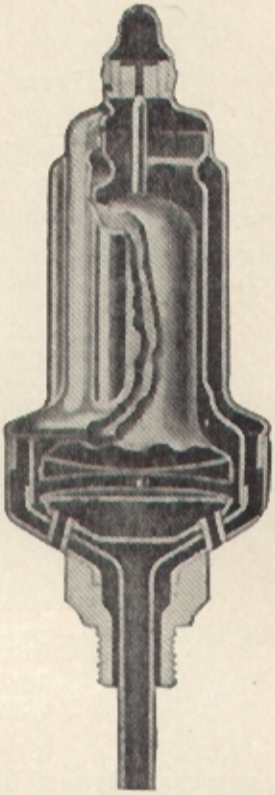

FIG. 114.—Hoffman No. 6 vacuum air valve.

hasten to meet them. There is no question but what this is one of the most important details of the heating business.