A NOVEL
HEATING
INSTALLATION

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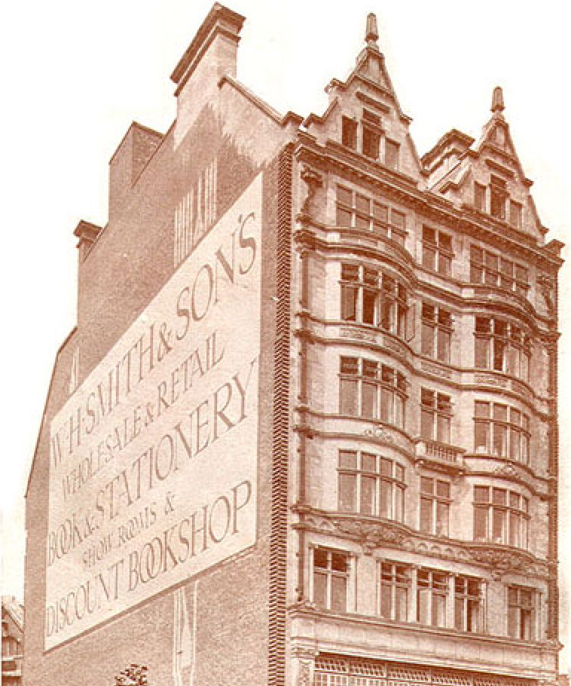
The
PULSIAL SYSTEM

as Installed at The New Premises of

W. H. SMITH & SON, KINGSWAY
LONDON

by

WERNER PFLEIDERER & PERKINS LTD.
(A.M. PERKINS & SON LTD.)
LONDON



CLAIMS

We claim that by adopting the Apparatus described in this pamphlet, the following advantages are secured :

1. Smaller circulating mains than are possible with any other apparatus.

2. Radiators or coils can be placed as desired, and the circulating main can be run at will — dips, loops, branches and levels being matters of complete indifference.

3. Forced circulation at any desired rate without pumps, lubricated parts, emission of exhaust, or loss of water or steam.

4. Heating centre (boiler) can be placed in any position above, below, or on same level as apparatus.

5. Head of water can be arranged to suit any conditions, so that pressure in any part of the installation can be kept within any specified limit.

6. Length of circulation only limited by its usefulness—*i.e.*, best proportions to suit any given case.

7. Perfect regulation of temperature of circulating water (from cold to 200°) apart from regulation by stop valves on radiators, etc.

8. No skilled attendance, and no renewals other than occur in any Low Pressure hot water system.

9. Utmost economy of fuel.

10. Low first cost owing to small mains and simple heat generating and circulating centre.

11. The use of hot water, which is the ideal heat-conveying medium, under any conditions however impossible to all hitherto known systems.

WERNER, PFLEIDERER & PERKINS, LTD.

A NOVEL HEATING INSTALLATION

THE following short description of the heating installation recently completed at Messrs. W. H. Smith & Son's new premises, Kingsway, London, W.C., will be found of special interest, as the system adopted presents great advantages for the heating of extensive and especially of lofty buildings.

The Architects, Messrs. D. Cubitt Nichols, Sons & Chuter, decided upon hot water as the most perfect medium for distributing heat throughout the building, and insisted on the following conditions as absolutely necessary.

1. That, in order to eliminate as far as possible any danger of leaks, the

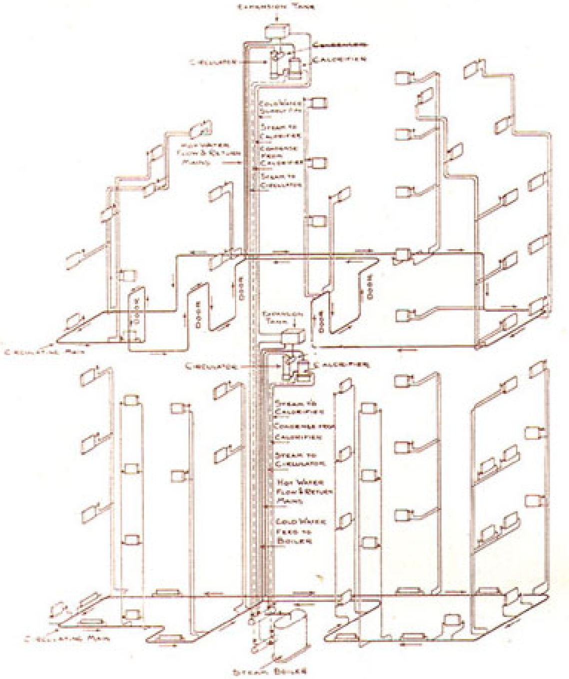
pressure of water on any part of the apparatus installed must not exceed that due to a head of water equal to one half the total height of the building, which is 109 feet above basement floor.

2. That there must be ample means provided for controlling and regulating the temperature in every portion of the building.

3. That no skilled attention must be required.

4. That no pumps or apparatus for circulating the water were permissible which should require lubrication or which would constantly or at intervals emit vapour or exhaust steam under normal working conditions.

The system ultimately decided upon was that introduced by ourselves and



Height from Circulating Main to Water Line in Expansion Tank in Bottom Apparatus = 48 Feet
do do do do Top do = 46 Feet
Total Height of Building = 109 Feet, from Basement Floor.

known as the "Pulsial." In this system steam at low pressure serves the double purpose of heating the water, by means of which the building is heated, and of circulating this water through the various portions of the apparatus employed.

The following is a brief description of the apparatus which meets the requirements laid down.

The diagram on the opposite page clearly shows the arrangement of the two apparatus installed and operated from one boiler.

The boiler, specially designed for this work, is of wrought iron throughout, and occupies a remarkably small floor space in relation to the total surface of the heating apparatus.

Its steam pressure is absolutely limited

to that due to a head of water 30 ft. high, created in an open relief pipe, and so arranged that the pressure due to this head of water is always exactly equivalent to that in the boiler.

Each of the two separate heating apparatus is equipped with a calorifier placed on the third and eighth floors respectively and supplied with steam by separate mains from the boiler.

The condensation water from the calorifiers is taken back to the boiler by separate return mains provided for the purpose.

Both calorifiers are placed as high above the boiler as possible, to enable an absolute regulation of the temperature of the water to be circulated around the building.

It is of course evident that the temperature of the water in the calorifiers

depends upon the amount of steam admitted to the calorifiers and therefore upon the extent to which the valves controlling the supply of steam to the calorifiers are open. With the calorifier steam valves only slightly open there would at times be no steam pressure in the condensed main, where water would collect until its weight became sufficient to overcome the boiler pressure, which is normally 5-8 lbs. and cannot exceed 10 lbs. to the square inch. Ample head is provided for returning the calorifier condensation water to the boiler by gravity, whether the calorifier steam valves are only "cracked off their seats" or fully open.

The motive force for circulating the heated water is provided by the "Pulsial" circulator fixed in conjunction with each calorifier.

The "Pulsial" circulator is of very simple construction and only possesses three valves, one suction, and one delivery valve, of the ordinary swinging check valve type, and one automatic valve to shut off the steam when the circulator has finished its "stroke." Each circulator is provided with a condenser for liquefying the steam from the circulator after every "stroke" by means of the "return" water which has lost some of its heat after having been passed round the building.

The steam is admitted to the condenser by syphon pipes, *no valve whatever being used for this purpose.* These syphon pipes are so arranged that no steam can enter the condenser until the end of the stroke has been completed, nor can the condenser be shut off from the circulator until the amount of water

drawn into the circulator equals that previously ejected.

The valve controlling the supply of steam to the circulator is of such construction that it automatically shuts off the admission of steam when it is about to enter the condenser. The motion of this valve is obtained from the "making" and "breaking" of a column of water which actuates a diaphragm to which the valve is connected.

The only moving parts of the whole installation are therefore found in the "Pulsial" circulator, and consist of three valves of very simple construction. There are no pistons, plungers, glands, stuffing boxes or wearing parts whatever, and no lubrication of any kind is required in the whole installation,

nor is there any emission of exhaust steam or vapour.

None of the valves controlling the admission of steam to these circulators are of the nature of float or ball valves, neither do they depend upon any vacuum that may be produced in the condenser, which vacuum must necessarily vary and become unreliable, as the water in the condenser gradually becomes hot.

Each circulator at Kingsway is supplied with a separate steam pipe from the boiler, so that each can be worked independently of the other, and separately controlled from the boiler house.

After steam has been generated in the boiler the circulators are set to work and circulate the water through the calorifiers wherein it is heated to any

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Each circulator at Kingsway is supplied with a separate steam pipe from the boiler, so that each can be worked independently of the other, and separately controlled from the boiler house.

After steam has been generated in the boiler the circulators are set to work and circulate the water through the calorifiers wherein it is heated to any

temperature from cold to the maximum obtainable (about 200° Fahr.) through the whole circuit of mains and radiators up into the expansion tank, whence it returns to the circulator.

The maximum speed of the circulator is about two strokes per minute, giving to the water a velocity of approximately 150 feet per minute through the circulating mains.

Each radiator is fitted with a valve for controlling the amount of heat given off, but it is important to remember that apart from this usual means of regulation, the temperature of the whole of the circulating water can be accurately controlled to suit weather conditions by regulating the amount of steam admitted to the calorifiers. The circulators will circulate whether the water in the heat-

ing mains and radiators be cold or at the maximum temperature obtainable.

As already pointed out the steam used for heating the circulating water in the calorifiers is condensed and returned direct to the boiler by gravity. The steam used in the circulators, however, and dealt with in the condensers, finds its way into the circulating mains. A feed pipe is therefore taken from the expansion tanks to the boiler, water being fed into the boiler as required to make up for the steam condensed in the circulators.

Each expansion tank is fitted with a ball valve as in any ordinary hot water apparatus, and no heat is wasted, as *all* steam generated is utilised in heating the water by which the building is warmed.

From the above description it will be seen that the requirements of the Architect were fully met :—

1. By the erection of two separate apparatus heated from one boiler.

2. By the fact that water at any temperature from cold up to 200° Fahr. can be circulated through the apparatus, and by the controlling valves on the radiators.

3. By the whole of the working of the apparatus being effected from the boiler house.

4. By the patented features of the "Pulsial" circulator.

Needless to say, the requirements of the London Building Acts and Fire Insurance Companies, with regard to heating apparatus, are fully complied with.

We believe that the "Pulsial" system removes the last objections to a full realization of these advantages, and offers at the same time the best and least expensive method of obtaining entirely satisfactory installations on a large scale as well as smaller ones at a moderate cost.

We shall be very pleased to furnish any further information as well as plans and estimates with a view to substantiating our claims.

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