Liverpool Cathedral

A brochure of 1924 produced by G N Haden & Sons Ltd which provides details of their mechanical services installations

The Cathedral under construction in 1910

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Liverpool Cathedral
Heating and Ventilation

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Foreword

The Firm of G. N. HADEN AND SONS, LTD., was established in the year 1816, and during the last one hundred and eight years has been uninterruptedly at work carrying out Engineering Installations throughout Great Britain.

In the early history of the Firm they turned their attention to the problem of Heating, Ventilation, and Hot Water Supply, and during this long period have dealt with many thousands of buildings.

The Comfort of a congregation worshipping in Cathedrals, Churches, Chapels, and Mission Halls, has had their continual careful consideration, and from time to time they have evolved various systems, viz.: Warm Air, Combined Air and Water, the "Turbo" Accelerated System of Hot Water, and recently HADEN's Patent System of Floor Heating, as installed at this Cathedral.

In commemoration of this unique event in the Science of Heating, G. N. Haden and Sons, Ltd., have much pleasure in asking your acceptance of this illustrated brochure of the Installation carried out by them in England's latest Cathedral.

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Liverpool Cathedral
Heating and Ventilation

The following description is reprinted from the Official Hand Book of the Cathedral :—

The arrangements for Heating the Cathedral, being on an entirely new System, require special reference.

Very early in the history of the building of the Cathedral, before the principal foundations were laid, the question of Heating was carefully considered, so that preparation might be made as the work proceeded, and the subsequent cutting and disfigurement of the Structure avoided. It was then decided to adopt a Combined System of Warm Air and Hot Water with an Accelerated Circulation, similar to the Heating Systems in Westminster Abbey, St. Paul's Cathedral, and many other large Churches. With this System the heat lost through the windows, walls, etc., is made up from Hot Water Pipes and Radiators under the windows and any other places where heat is rapidly lost from the building.

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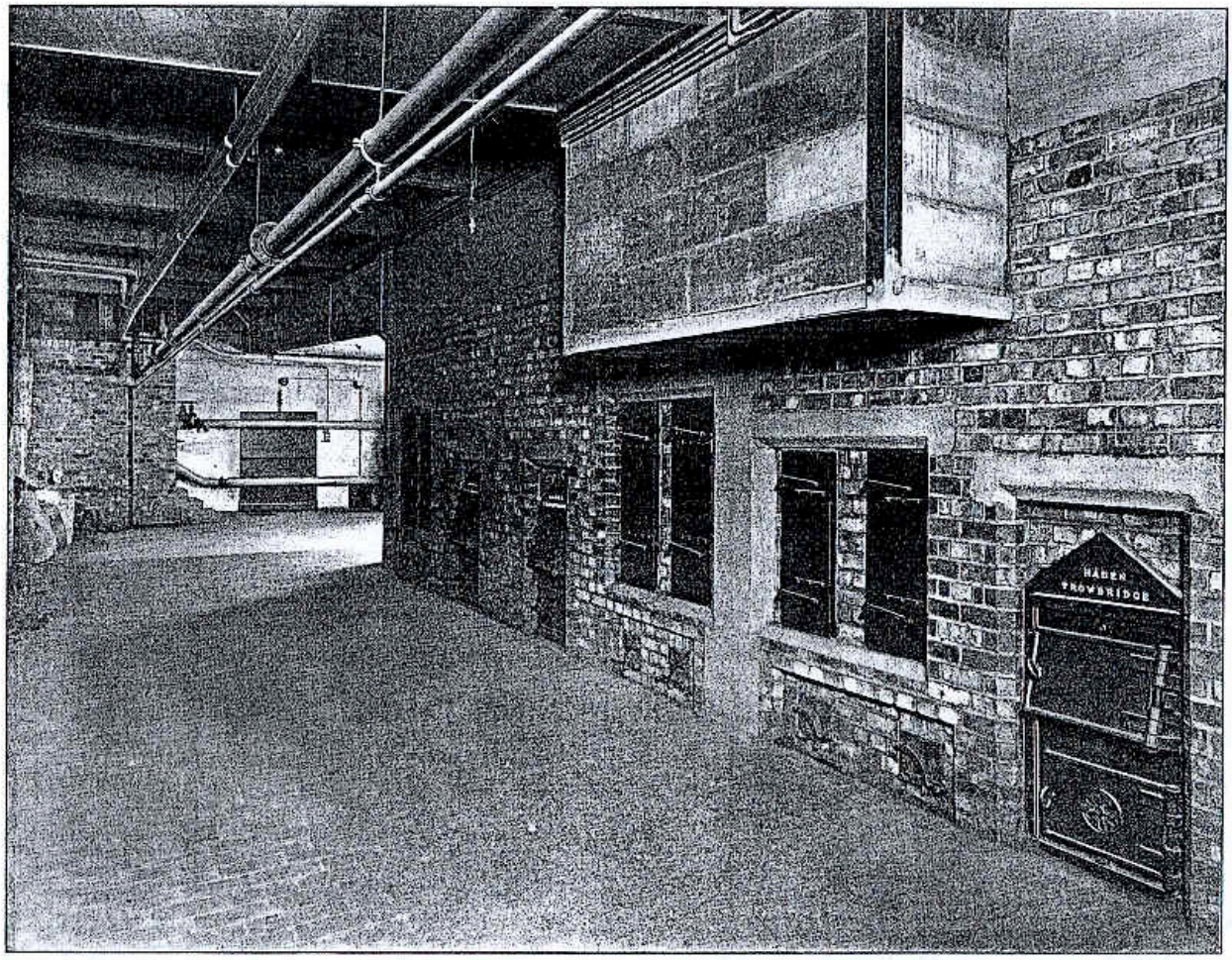
The balance of the heat required and the heating of the Air for Ventilation is provided by Warm Air Stoves. These Stoves consist essentially of a Wrought Iron Box enclosed in a brickwork box, with an annular air space between the two. The Wrought Iron Box encloses a Furnace and the air to be heated is drawn or blown through the annular space. It was arranged to heat the Lady Chapel, Vestries, Ambulatory, and Chapter House, by Hot Water only, the Radiators being specially designed by the Architect to harmonise with the building. That portion of the Apparatus in the Lady Chapel and adjoining Vestries has been in use since the opening of that part of the building.

In the year 1920, the Engineers, G. N. Haden and Sons, Ltd., having developed and patented a System of Heating by means of a Warm Floor, submitted an alternative scheme for the main building, which was adopted by the Committee after very careful consideration. The method of heating a building by warming the floor was used by the Romans as may be seen in the Baths at Bath, and in the Baths of Caracalla at Rome. Here the hot gases and products of combustion from a fire outside the room passed under the floor on their way to a chimney stack.



Warm Air Apparatus for Floor Heating.

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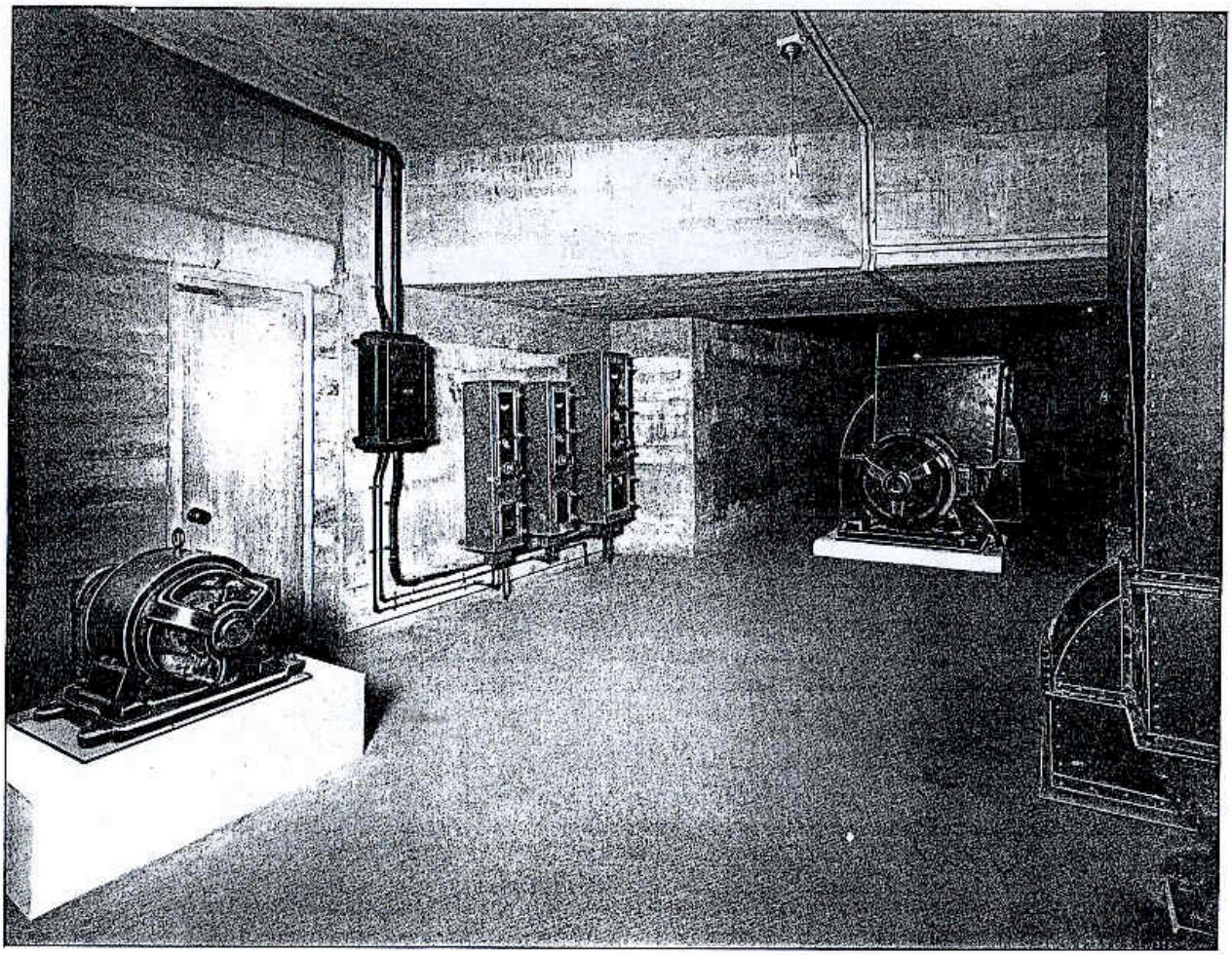
In the Cathedral almost the entire floor space consists of a double floor, enclosing a system of shallow ducts.

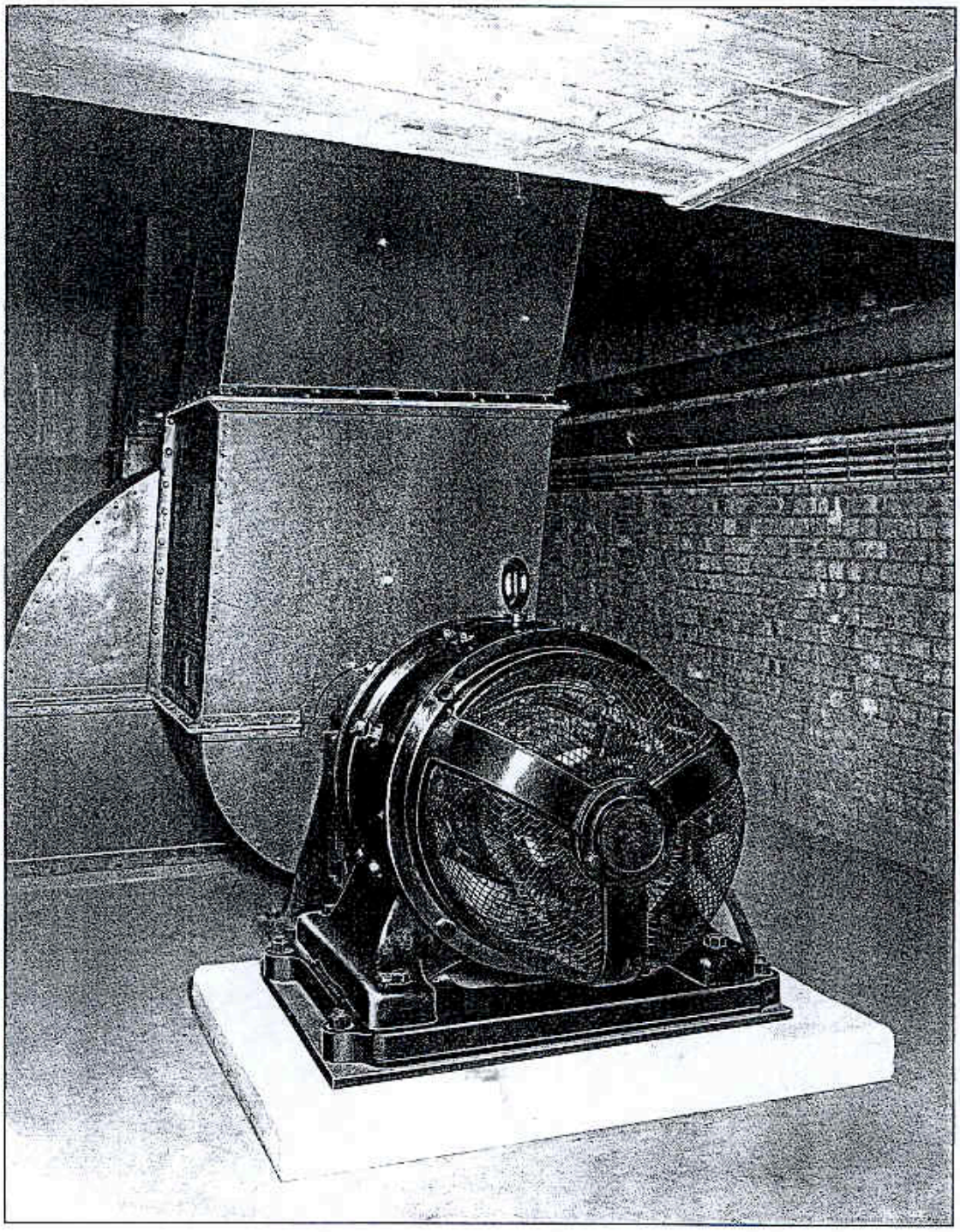
The warmed air from stoves, similar to those above mentioned, is circulated through these ducts by an electrically driven centrifugal fan. The system of ducts is a closed one and the same air is circulated continually through the system, so that there will be no accumulating deposit of dust to clean out. There are no steam or water pipes to require attention, nor is there any buried metal work to deteriorate in course of time.

Under this arrangement the floor of the Cathedral itself becomes an immense radiator, the surface of which is so large compared to that of hot water radiation that the temperature required at its surface is considerably below blood temperature, and for this reason the floor does not feel warm to the feet.

The tempering of the marble floor will, however, add to the comfort of the congregation, and the heating surface being at a very low temperature there will be no drying of the air.



Fan Chamber shewing Fan for circulating the Warm Air in Floor Heating System. Motor for driving Fresh Air Inlet Fan. Fan for Extract Ventilation.



Fan for Circulating Air in the Floor Heating System.

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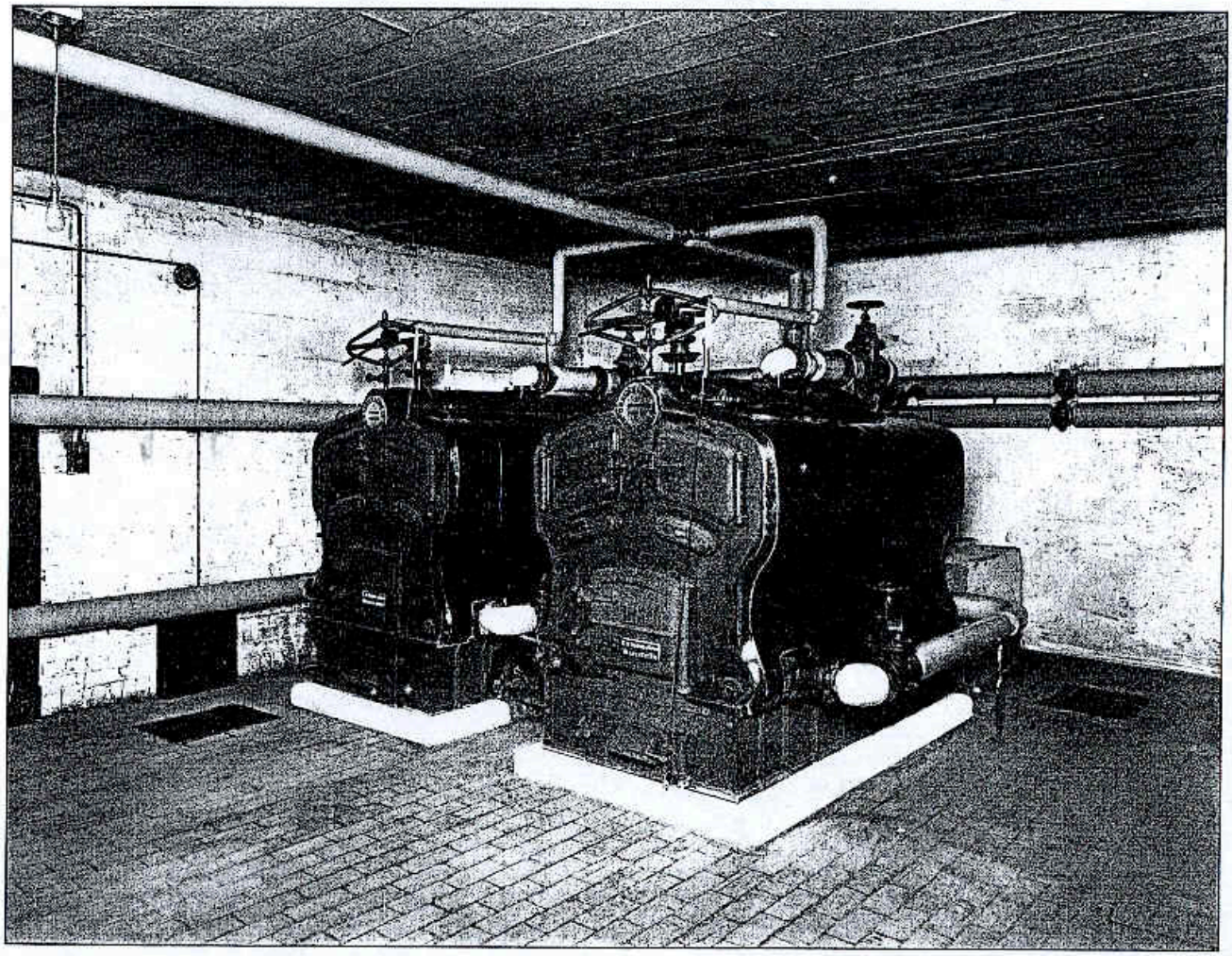
The heat is evenly distributed and down draughts are prevented because the heating surface is the whole floor area of the Choir, Aisles, and Transepts. A hot water radiator is provided at the sill of the large East Window behind the Reredos, and similar provision is made at the North Transept Window to counteract the great loss of heat through these large areas of glass. There are radiators also in the Triforium to counteract the loss of heat through the Clere Story Windows.

The Heating Chamber is situated under the centre of the Cathedral, with an approach from the roadway near the South Transept for fuel. The Floor Heating Apparatus, hot water boilers, air circulating and ventilating fans, are all arranged in the chamber, and provision is made for the apparatus that will be required for heating the Nave when that part of the Cathedral is built, the ducts being carried through the temporary wall ready for extension. The air which warms the floor has no access to the air in the building, special means are therefore provided for the admission of fresh air for ventilation. This air is warmed to the temperature of the inside of the



Hot Water Boilers for Heating the Lady Chapel, Chapter House and Vestries.

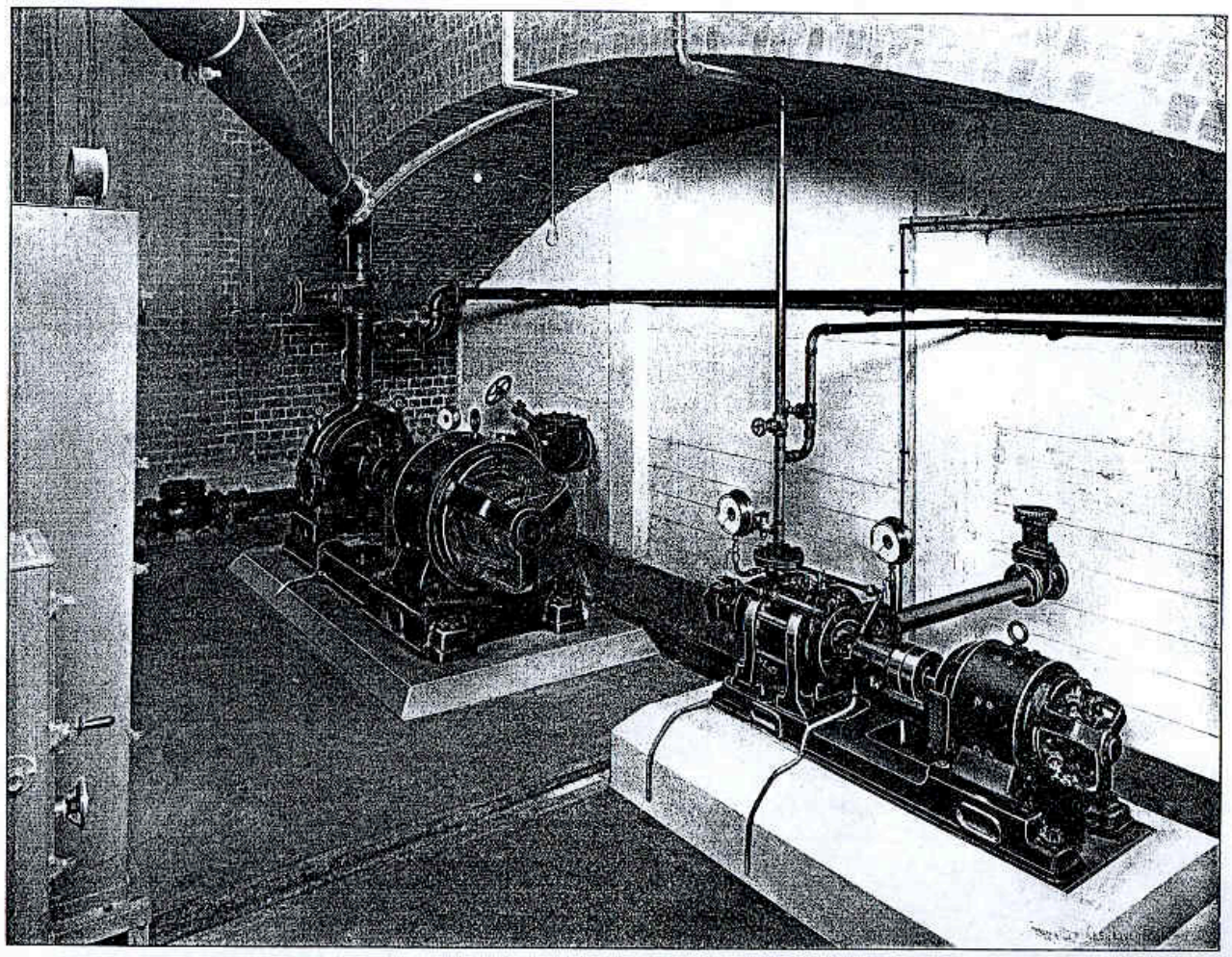
building by a warm air stove and delivered overhead by an electrically driven centrifugal fan.

Extraction of air from floor level is effected by a similar fan discharging into the churchyard.

This System could not have been installed without the cordial co-operation of the Architect, who has given the Engineers every assistance.

Hydrant Service

On account of the height of the Cathedral, and the elevation of the site, the pressure on the water mains is not sufficient for Hydrant Service. A powerful electrically driven pump has therefore been provided in the Basement, and there is a tank, of 20,000 gallons capacity, from which the pump takes its supply. This is sufficient to supply two hydrants for half-an-hour. Hydrants are fitted in suitable positions in the Cathedral and the pump can be started electrically from the hydrant boxes. The pump will be worked periodically to ensure that it is in good working order.



Pump Chamber, shewing Wall of Storage Tank, Fire Pump, Lifting Pump for supplying Expansion Tank.

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Special Features of the System

APPEARANCE.

The Heating is accomplished without interfering in the slightest degree with the furnish of the Building.

The whole floor surface becomes one large Radiator at a very low temperature, but no special Heating element is conspicuous in the Building.

HEATING EFFECT.

The Heating surface being so large in proportion to the size of building or room, its temperature is so low that it is not possible to detect by contact of the hand that it is heated at all, the temperature being considerably below blood temperature.

Equable Distribution of Heat

As the heating surface covers the whole area of the floor, the distribution of the radiant heat is as uniform as it is possible to obtain, and with the minimum amount of heating by convection currents of heated air.