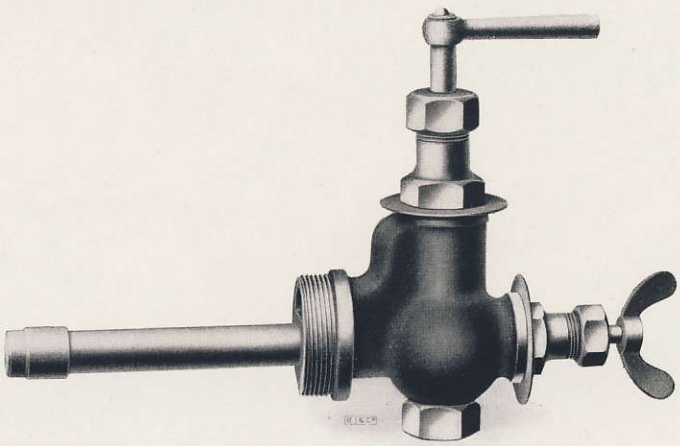
The Latest Method of Heating.

Entered at Stationers' Hall.

Price 1/6.



"NUVACUUMETTE" VAPOUR VALVE.

The Latest Method of Heating.

NO branch of engineering has made more rapid improvements than that devoted to the warming of buildings.

Hot Water. IN this country a popular means of conducting warmth has been the use of hot water pipes, and, later, of radiators. In old-fashioned institutions, even at the present day, cast iron socket and spigot pipes of large diameter, jointed with spun yarn, &c., may still be seen doing this duty, though often defectively and at great cost. As applied, however, to small buildings, with modern improvements, hot water is still an efficient warming agent, but subject to considerable risks from freezing, from mechanical defects, and from other possibilities of flooding, as, for instance, from an overflow of the expansion tank consequent upon over heating. A great objection to hot water arises, however, when it is applied to large buildings, owing to the pressure created by the height at which the cistern,

or tank, feeding the apparatus is necessarily placed. Thus, in the case of a building 100 feet high, the pressure on the boiler due to the head of water would be 43·35 lbs., at which pressure the water can be heated to 290° Fah. before steam is generated. Taking into consideration also the large and unsightly sizes of the pipes required for such a building, with the high temperature to which the heating surface must be brought, it will be readily conceded that the objections to heating by hot water, when applied on a large scale, are demonstrated beyond question.

Live Steam. BOTH in this country and in America live steam has been, and is now used very largely for heating buildings; yet where the pressure exceeds 3 to 5 lbs. the high temperature of the pipes, &c., causes considerable discomfort; added to which is occasionally the alarming noise known as "water hammer," resulting from faulty alignment of the piping. It is also to be noticed in this connection that the expedient of discharging the water of condensation by means of steam traps is not only harmful to the drains into which it is directed, but it represents a considerable loss to the establishment by the waste of much valuable heat.

Low Pressure Steam. THE substitution of low pressure steam gravity systems has proved in experience to be of greater advantage; but the defect known as "air binding," when large volumes of air remain in the radiators, has to be carefully guarded against, or the radiators will be robbed of much of their efficiency. Other difficulties are apt to arise when valves have to be manipulated, difficulties which are not always overcome by automatic valves that may sometimes be of defective pattern and prove uncertain in their action.

Latent Heat of Steam. WHILE efforts were being made in various directions to subdue live steam to the purpose in hand, it was singular that little attention was paid to the enormous waste of heat units permitted wherever steam power was used for driving. Until a few years ago 70% at least of the heat passing through engine throttles was thrown away. It is now realized, however, or should be, by every up-to-date steam-using concern, that all the latent heat of steam formerly turned into the atmosphere or otherwise wasted can be passed along an apparatus suitably devised for warming the building, while the heat retained in the water of condensation

and vapours can be returned to the boiler almost at boiling point, without back pressure on the piston, and with no expense to the establishment in the process.

Hot Vapour. THE greatly enlarged requirements of modern Architecture have made it necessary to perfect methods by which the temperature of halls and apartments can be maintained evenly under variable conditions, and controlled with ease and certainty; but until within the last few years, when hot vapour was for the first time made governable, it could not have been asserted that all serious difficulties had been overcome. When, however, the thoughts of engineers were directed to the utilization of the hitherto wasted bye-products of steam, in association with the problems of warming buildings, attention was concentrated on the possibilities of steam at very low pressures. It was then that progress became rapid in the solution of many difficulties, and the belief was entertained, since justified by practical results, that hot vapour, placed under easily manageable conditions, was likely to become the most important warming agent of the future. Seeing that the lower the pressure obtainable the greater is the advantage from expansion,

steam, or, more correctly speaking, vapour was adopted as the heating medium at a pressure not greater, but sometimes less than that of the atmosphere. It may be added in fairness that though American systems led the way by utilizing low pressure steam in this direction the success attained fell short of that which has since attended its practical application by English engineering.

Control of the Vapour. AT this point it may be useful to explain that when steam is heated above 212° Fah. within an enclosed space, its expansion is about five times as great as that of air under similar conditions ; thus air is a much denser and heavier gas than steam. When, therefore, pipes and radiators are full of cold air before the admission of the warming agent, it is obvious that the comparative density must be much greater still. Accordingly, the air must be got rid of by establishing a partial vacuum before the low pressure vapour can be admitted to the heating surfaces. When that has been done an easy and highly important means of circulation has been arrived at; one that has, moreover, the additional advantage of making the internal surfaces of the pipes and radiators direct conveyors of heat—the economy

attending thereupon being apparent to everyone. Yet, having reached this point, means were lacking of exerting entire command over the new warming agent. It was still necessary to regulate the volume of incoming vapour in due relation to the rate of condensation, and to obtain full control of the variable temperatures within the pipes and radiators. It is here that the method known under the style of "The Nuvacuumette System" supersedes all others, and meets the foregoing requirements in all respects. It also ensures definiteness of result, and is the first, and, so far, the only system rendering it possible to circulate vapour at a temperature of 180° Fah., and even less. Until these essentials were realized, the results achieved by individual installations, however good those installations may have been, and by whatever system obtained, must have been more or less empirical.

The Nuvacuumette system affords control automatically for the first time over the supply of hot vapour to the radiator, or heating coil, in direct proportion to the rate of condensation proceeding within the coil. This power of regulation can be exerted by the new system with entire accuracy, so that the temperature of any room, hall, or apartment in which it is employed can be maintained at will, and over or under heating can

be guarded against effectively. The apparatus required is not complicated, delicate, or difficult to manipulate. A vacuum pump placed at the end of the system is necessary for large installations only, driven by whatever power is available, but in the case of a small apparatus a vacuum pump need not be used.

Success of the "Nuvacuumette" System.

THIS system has been installed during the past few years at various large buildings and institutions, such as Town Halls, Infirmaries, Workhouses and Schools, a list of which will be found on pages 24 and 25. Entirely efficient means of controlling the warming agent are afforded by the system, together with greater economy in the working, by reason of the readiness with which the inflow of heat can be moderated, as already explained, to suit varying conditions of the external atmosphere and the needs of separate apartments. A good example of the system in operation may be seen at the Council Schools, Harrison Road, Leicester, opened July 18th, 1904. Here the heating medium is steam with a minimum pressure of not more than 2 lbs. per square inch, and reduced in the apparatus to a minimum of 10 inches of

HARRISON ROAD COUNCIL SCHOOLS, LEICESTER.

Heated on Patent
"Nuvacuumette" Vapour System
by Ashwell & Nesbit, Ltd.

Architect:
E. Burgess, Esq.

vacuum, representing a temperature of about 190° Fah. Every apartment can be warmed separately if necessary, and every radiator can be so regulated as to impart the particular degree of warmth that may be desired.

The Nuvacuumette System circulates vapour at a low temperature (from 180° to 200° Fah.) noiselessly, with no risk from frost; it gives out an agreeable warmth without over-heating, and practically embodies the best points of a first-class hot water heating apparatus, but avoiding its attendant disadvantages and dangers; while from the point of view of economy it may be justly claimed to be without equal.

We respectfully offer the foregoing facts and considerations to all members of the architectural and engineering professions, and to all to whom an efficient method of warming under conditions of entire control is a subject of practical importance.

All appliances relating to the Nuvacuumette System are protected under letters patent by

The Atmospheric Steam Heating Company, Ltd.,
52 Gray's Inn Road, LONDON, W.C.

All particulars can be obtained of

ASHWELL & NESBIT, Ltd.,
LONDON, LEICESTER and MANCHESTER.

Properties of Saturated Steam.

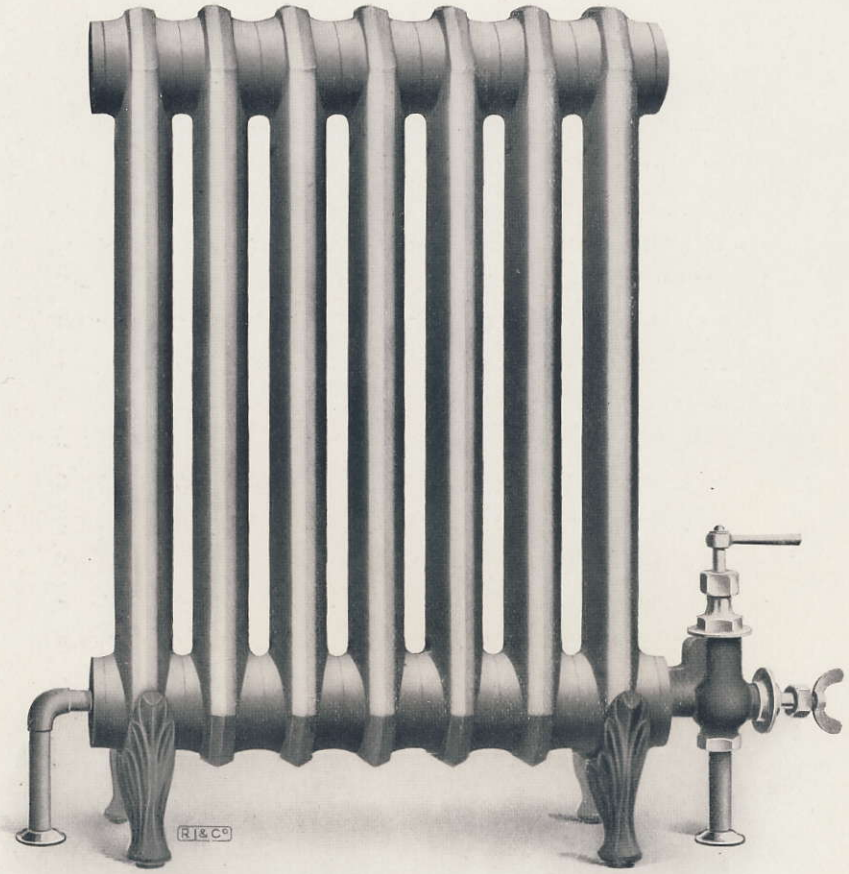
	1.	2.	3	4.	5.	6.	7.	8.
	Vacuum Gauge inches of mercury.	Total or absolute pressure.	Equivalent head of water in feet.	Temperature in degrees Fahrenheit.	Total heat in 1lb. of steam raised from water at 32° Fah. B.T.U.	Weight of 1 cubic foot of steam in lbs.	Volume of 1 lb. weight of steam in cubic feet.	Specific volume or cubic feet of steam from one cubic foot of water.
Below Atmospheric Pressure.	29	0·5	1·15	80	1105	·0013	726·60	45307
	28	1	2·31	102	1113·5	·0030	330·36	20600
	26	2	4·62	126	1119·7	·0058	172·08	10730
	24	3	6·93	141	1124·6	·0085	117·52	7327
	22	4	9·24	153	1128·1	·0112	89·62	5589
	20	5	11·50	162	1130·9	·0138	72·66	4530
	18	6	13·86	170	1133·3	·0163	61·21	3816
	16	7	16·17	176	1135·3	·0189	52·94	3301
	14	8	18·48	182	1137·2	·0214	46·69	2911
	11 29/30	9	20·79	188	1138·8	·0239	41·79	2606
	10	10	23·10	193	1140·3	·0264	37·84	2360
	7 1/2	11	25·41	197	1141·7	·0289	34·62	2157
	5	12	27·22	202	1143·0	·0314	31·88	1988
	3 1/2	13	30·03	205	1144·2	·0338	29·27	1844
	1 1/2	14	32·44	209	1145	·0362	27·61	1721
Atmospheric Pressure	0 Gauge pressure	14·7	34·00	212	1146·1	·0380	26·36	1644
Above Atmospheric Pressure.	0	14·7	34·00	212	1146·1	·0380	26·36	1644
	0·3	15	34·60	213	1146·4	·0387	25·85	1611
	1·3	16	35·03	216	1147·4	·0411	24·32	1514
	2·3	17	35·46	219	1148·3	·0435	22·96	1432
	3·3	18	35·89	222	1149·2	·0459	21·78	1350
	4·3	19	36·32	225	1150·1	·0483	20·70	1285
	5·3	20	36·75	228	1150·9	·0507	19·72	1220
	6·3	21	37·18	230	1151·7	·0531	18·84	1167
	7·3	22	37·61	233	1152·5	·0555	18·03	1113
	8·3	23	38·04	235	1153·2	·0580	17·26	1069
	9·3	24	38·47	238	1153·9	·0601	16·64	1024
	10·3	25	38·90	240	1154·6	·0625	15·99	925
	15·3	30	41·05	250	1157·8	·0743	13·46	826
	20·3	35	43·20	259	1160·5	·0858	11·65	694
	25·3	40	45·35	267	1162·9	·0974	10·27	628
	30·3	45	47·50	274	1165·1	·1089	9·18	560
	40·3	55	51·83	287	1169·0	·1314	7·61	455
	50·3	65	56·16	299	1172·3	·1538	6·49	391
	60·3	75	60·49	307	1175·2	·1759	5·68	353
	70·3	85	64·82	316	1177·9	·1980	5·05	306

Advantages of the "Nuvacuumette" Vapour System.

ON the preceding page will be found a table giving the temperatures and other properties of saturated steam, or vapour, at various pressures. The upper half of the table deals with the vapour at and below atmospheric pressure. The Nuvacuumette System is worked at from 10 to 18 inches vacuum gauge, and by reference to columns 1 and 4 in the table it will be observed that at 10 inches vacuum gauge the temperature of the vapour is 193° Fah., while at 18 inches vacuum gauge it is 170° Fah. only. This explains the fact often commented upon by users of the Nuvacuumette System that the rooms warmed by it do not become stuffy, the heat given off being mild and pleasant.

Experience proves also that a great economy is effected in fuel and attention by circulating vapour at these low temperatures, as for instance, at a building in the Midlands where £600 was saved in fuel in one year, due to the introduction of the Nuvacuumette System.

The simplicity of the system is another marked characteristic. On pages 18 and 19 are depicted in diagram form an apparatus on the Nuvacuumette System, and an apparatus on a different system often employed in steam heating. The latter (page 19) shows the numerous steam traps required under former conditions. These are always a source of annoyance. The hot well or receiving tank for the water discharged from these traps is also shown, and the pump to deliver this water into the boiler. The hot well is a common and well known source of extravagance. The reader can readily contrast this with the apparatus depicted on page 18, and note the simplicity of the arrangements. The steam traps or hot wells are not required by the new system, but all the condensed water is discharged by the vacuum pump to a receiver from which it gravitates at a high temperature into the Boiler, without the possibility of any loss of heat.



RADIATOR WITH "NUVACUUMETTE" VAPOUR VALVE.

ST. ANDREW'S HOSPITAL, NORTHAMPTON.

Heated on Patent
"Nuvacuumette" Vapour System
by Ashwell & Nesbit, Ltd.

Architects for Alterations and Extensions:
Messrs. Chas. Dorman & Son.

Extract from the 60th Report of the Commissioners in Lunacy for 1906. (No. 224.)

Page 60. NORTHAMPTON ST. ANDREW'S HOSPITAL.

"A new system of heating and hot water supply by means "of waste steam at low pressure from the electric lighting "plant was found to be very effective and economical."

Page 428. Appendix E. IMPROVEMENTS.

"Since our visit to this Hospital in June last, further progress "has been made with the additions to the female side, which "will, however, require about two years more for their "completion. For the last twelve months the new warming "apparatus has been in operation, which utilizes the exhaust "steam from the electric lighting engine. The steam is "drawn through the house by vacuum pumps, and the con-"densed water returned is used to feed the boilers. The "hot water supply is also in constant circulation to the taps, "rendering it unnecessary to draw off a quantity of cold "water before the hot is reached. Besides the economy thus "effected in water and fuel, which we are informed is "considerable, there are the incidental advantages that the "steam in the coils being at a low pressure is of a moderate "temperature (180°) and does not overheat the atmosphere, "that the coils do not require the protection of guards, which "serve as receptacles of rubbish, and that a leak in a valve "causes no escape of steam, but merely an inflow of air."

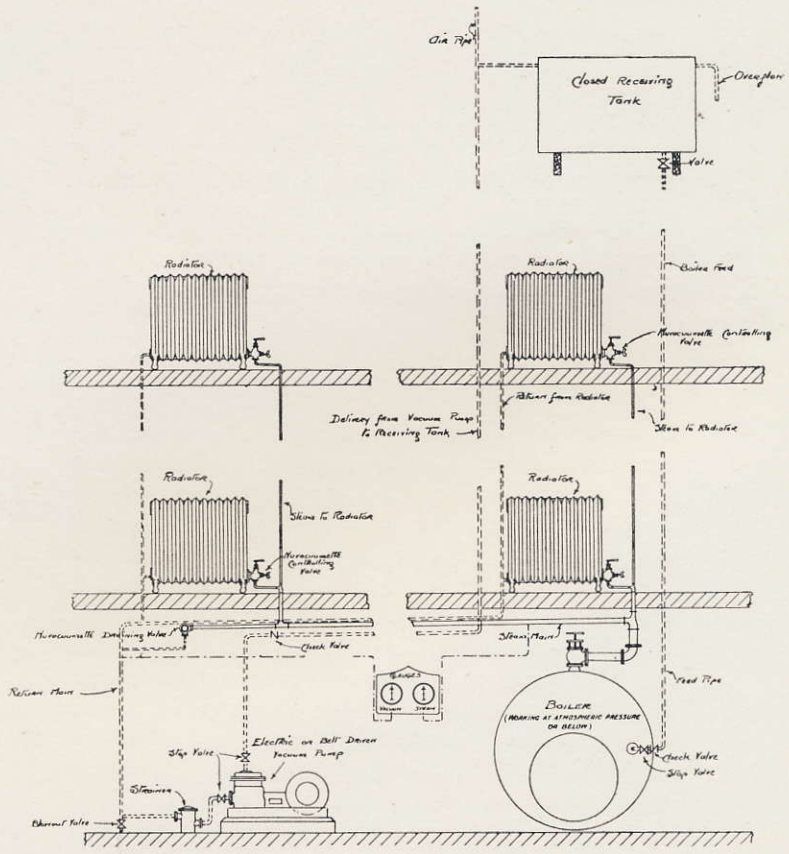
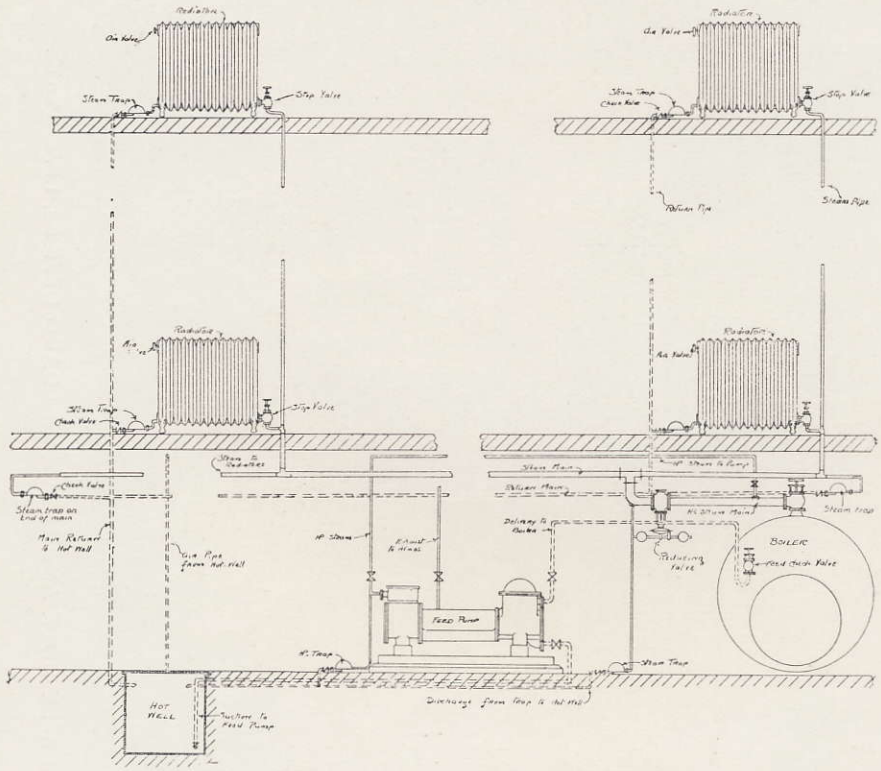


DIAGRAM SHOWING ARRANGEMENT OF WARMING APPARATUS ON THE "NUVACUUMETTE" SYSTEM.
(Patented.)



ARRANGEMENT OF WARMING APPARATUS ON THE L.P. STEAM TRAP SYSTEM.

THE MERSEY DOCK AND HARBOUR BOARD OFFICES, LIVERPOOL.

Heated on Patent
"Nuvacuumette" Vapour System
by Ashwell & Nesbit, Ltd.

Joint Architects: Messrs. Briggs & Wolstenholme.
F. B. Hobbs, Esq.
Arnold Thornely, Esq.

NEW COTTON EXCHANGE, LIVERPOOL.

Heated on Patent
"Nuvacuumette" Vapour System
by Ashwell & Nesbit, Ltd.

Architects:
Messrs. Matear & Simon.

ARBURY HALL, WARWICKSHIRE.

Heated on Patent
"Nuvacuumette" Vapour System
by Ashwell & Nesbit, Ltd.

Architects for Alterations:
Messrs. F. S. Brereton & Sons.

HOTEL MÊTROPOLE, BRIGHTON.

Heated on Patent
"Nuvacuumette" Vapour System
by Ashwell & Nesbit, Ltd.

Architect:
Alfred Waterhouse, Esq., R.A.

List of Installations.

The Nuvacuumette System has been installed at the following important places by Messrs. Ashwell & Nesbit, Ltd.

LONDON:
- Empire Theatre.
- Deptford Town Hall.
- Grosvenor Hotel.
- St. Mary le Bow Church.
- Kennington Road Public Baths.

BIRMINGHAM:
- Rotton Park Schools.
- Waverley Road Schools.

BRADFORD:
- Messrs. G. Richardson & Co.'s Premises.

BRIGHTON:
- Hotel Metropole.

HANLEY:
- Messrs. Harrison & Sons' Premises.

JACKFIELD (Salop):
- Messrs. Maw & Co.'s Works.

LEICESTER:
- Harrison Road Council Schools.
- Leicester and Rutland Counties Asylum (Narborough).

LIVERPOOL:
- New Dock and Harbour Board Offices.
- New Cotton Exchange.

MANCHESTER:
Union Workhouse, Chorlton.

NORTHAMPTON:
St. Andrew's Hospital.

NORTHALLERTON:
County Hall.

NUNEATON:
Workhouse Infirmary.
Arbury Hall.

SUTTON COLDFIELD:
Town Hall.

STORTHES HALL (Yorks):
West Riding Asylum (Contract No. 3).

SHEFFIELD:
Messrs. Vickers, Sons & Maxim, Ltd., Offices.

SCOTLAND.

AYRSHIRE:
Turnberry Hotel (also repeat order).

EDINBURGH:
Broughton Higher Grade Schools.
Albion Road Schools.

GLASGOW:
Central Station Hotel.
University Extension Buildings.
Union Street Buildings.

PEEBLES:
The Hydro.

London and Leicester.
1906.


De Montfort Press
Leicester