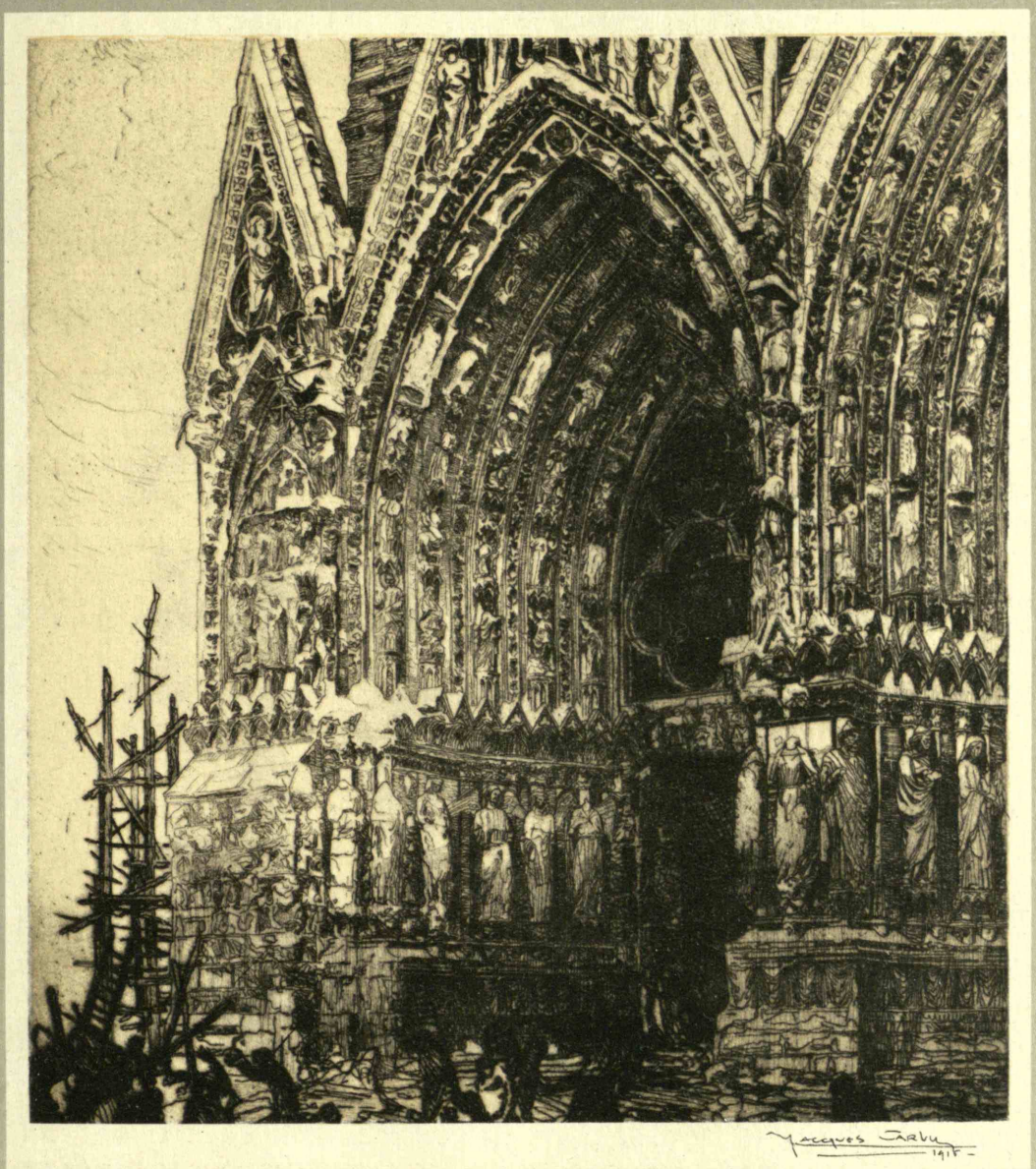
THE·TECHNOLOGY REVIEW



RELATING·TO·THE·MASSACHUSETTS INSTITUTE OF TECHNOLOGY

MARCH • • • 1929

With their mosques, bazaars, turbanned horsemen, snake charmers and dervishes, the cities of Morocco are veritable glimpses of the Orient

RAYMOND-WHITCOMB

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Sailing April 8, on the S. S. "Carinthia"

¶ It will go to *Casablanca,* the gateway to Morocco (with side trips to *Salé* and to *Rabat,* the city of the sultan). It is the first cruise to visit romantic, walled *Carcassonne.* It will go to such out-of-the-way places as the *Balearic Islands, Malta, Corfu* and *Dalmatia*—and to *Spain, Algiers* and *Tunis, Sicily, Naples* and the *Riviera.* It is planned for either a complete Spring holiday or a voyage to Europe with extensive Mediterranean sight-seeing en route.

Rates, $725 and upward

North Cape Cruise

¶ With a 9-day side trip to Leningrad and Moscow. The complete northern cruise with visits to *Iceland, Norway, Sweden,* and *Denmark, Finland* and *Esthonia.* Sailing on June 26 on the S. S. "Carinthia." Rates, $800 and upward.

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¶ On the S. S. "Columbus"—the largest, most luxurious and fastest liner ever to sail around the world. A comprehensive World Cruise in three and one-half months—half a month or more shorter in the time spent at sea than any other cruise round the world. Sailing January 21, 1930.

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Resident Tech Men!

Most SHELTON *guests reside at the hotel the year 'round. An attractive monthly rate makes living here most reasonable.* NO LEASES *are required.*

Tech visitors to New York are especially welcome

—the management of The SHELTON *does not hesitate to say to you that it considers your patronage particularly desirable.*

And we believe you'll like *The* SHELTON

IT is not the usual type of hotel you find in New York. *It is different.* Not just another "room and bath" hotel. Instead it is more like a huge club home for men and women, with all the luxuries and characteristics of a private club.

Naturally it provides every service and convenience of any first class metropolitan hotel—but in addition the guest at *The* SHELTON is privileged to enjoy many other things, so that his visit will be pleasanter.

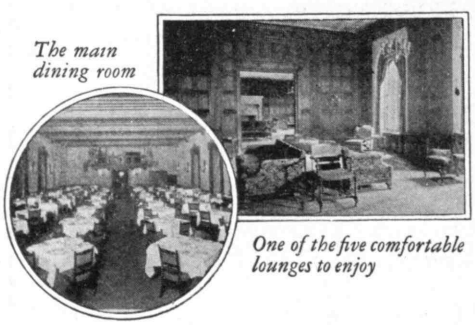
A large and crystal clear swimming pool—a fully equipped gymnasium — the roof garden and Solarium—squash courts —beautifully furnished lounges —game rooms for recreation— reading room and well stocked library—billiards—bowling, etc., etc.

We will be glad to have you and your family as guests any time you are in New York. We are sure if you visit *The* SHELTON once you will want to come again—doubly sure because yours is the kind of patronage we have and we want in the hotel and we do everything we can to make your stay enjoyable.

Ready for a dip in the pool

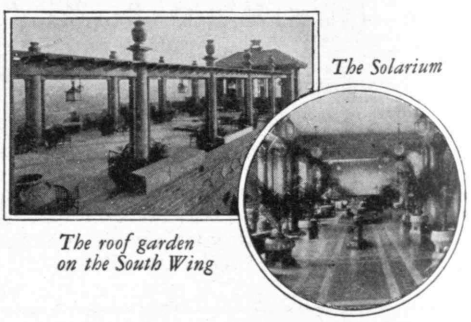
No charge for the pool
The swimming pool may be enjoyed by guests of the hotel —without charge.

The main dining room



One of the five comfortable lounges to enjoy

The Solarium



The roof garden on the South Wing

The SHELTON
49th and Lexington
NEW YORK

THE TABULAR VIEW

GORDON B. WILKES, '11, has been an Associate Professor of Industrial Physics at the Institute since 1924. After he was graduated from Technology in 1911 he became an Assistant in Heat Measurements, and his present position is the outcome of seventeen years of work in the Department of Physics. This year he was appointed by the Society of Arts to give one of the Popular Science Lectures. He chose for his subject "Artificial Cold and Its Applications," and his lecture with its demonstrations aroused so much interest that The Review Editors importuned him to rearrange it as an article. ¶PAUL H. WILSON, the author of the article on calendar simplification, has been for twenty years with the Graton and Knight Company in Worcester, Mass. He now holds the positions of Clerk of its Corporation and Secretary of its Board of Directors, as well as that of instructor in cost accounting at Northeastern College of Worcester. The use of the International Fixed Calendar with its arrangement of thirteen equal months in the firm of the Graton and Knight Company for the past eleven years has brought Mr. Wilson to a firm belief in its advantages from a business point of view. ¶HARRY W. TYLER, '84, has been a member of the Department of Mathematics since his graduation in 1884 and its Head since 1901. As President of the Faculty Club it is the delight of all members to hear his humorous and felicitous impromptu introductions and addresses. This year, as Secretary of the American Association of University Professors, he has leave of absence for the second term to establish a headquarters for the Association in Washington.

NORBERT WIENER, Assistant Professor of Mathematics at Technology since 1924, was a very young man when he won his three degrees. Tufts gave him an A.B. in 1909, when he was fourteen years old, and Harvard gave him an A.M. in 1912 and a Ph.D. in 1913. Now that the real name of the writer, S. S. Van Dine, has been revealed as Willard Huntington Wright, all suspicion has been removed from Professor Wiener, although at one time it looked to a great many people as if he might be the author of the famous murder stories that have, by their erudition and brilliancy, thrown violently out of joint the noses of contemporary mystery-story writers. ¶The name of JACQUES CARLU is well known to Technology men since his coming to Rogers Building as Professor of Architectural Design in the Department of Architecture. Exhibitions held of his work have contained no finer example than the etching on the cover for this month of the entrance porch of Reims Cathedral. The Editors are indebted to William Emerson, Head of the Department of Architecture for the loan of this etching.

JAMES PHINNEY MUNROE, '82, who died February 2, was the Editor of The Review during the years 1900–1908. To be sure this post was not the only, or even

(*Concluded on page 262*)

THE TABULAR VIEW

(Continued from page 261)

the most important, activity of his fruitful career of which Dr. Tyler writes on page 271. Yet to The Review the years during which he guided its destinies were all important for they were the formative years of its adolescence. And it was under him that The Review's position in the Institute's life became assured. Nor did his interest cease when he relinquished the active burden to ISAAC W. LITCHFIELD, '85, twenty years ago for, until his final illness, he continued to be a most valued contributor, one who would accept an irksome assignment as a duty and derive pleasure from delivering finished copy on the exact date he promised it, disregarding both personal inconvenience and the multitude of other demands upon his time.

Truly, as he wrote in The Review's 25th Anniversary Number in January, 1924, The Review during the eight years of his editorship was "flesh of my flesh." With ARTHUR D. LITTLE, '85, C. FRANK ALLEN, '72, and WALTER B. SNOW, '82, he had brought the magazine into being and although two Editors, ARTHUR T. HOPKINS, '97, and WALTER HUMPHREYS, '97, preceded him, but five numbers had been issued when he took the helm. As he put it:

"I adopted the waif at the age of one, when it was moribund with financial starvation, and with little experience and less leisure, agreed to provide for it a home in my business office. This was on the dubious supposition that translation from the academic groves of Newbury Street to the harsh atmosphere of trade might keep the poor thing alive. In the very first number of that second volume, the editorial page — which, as the English say, 'was me' — entered an alibi by protesting that 'no child is interesting till it is three years old,' believing, of course, that the anaemic orphan would be off my hands ere then. MARK TWAIN (or was it BRET HARTE?) defined a mining camp gentleman as one who 'never shook his mother.' Perhaps it was a kindred hyper-delicacy that postponed my shaking The Review till it was nearly ten years old."

Despite the tribulations he referred to his task by concluding: "It (the Institute) has been a vast cooperative activity such as the educational world but seldom sees. Yet upon certain compelling forces it is possible to place a distinguishing finger; and even one so closely involved as the Third Editor is justified in declaring that among those truly creative forces has stood high The Technology Review. . . ."

Be that as it many, Munroe was, to the present Editors, an ideal and an inspiration. For it was Munroe who imbued The Review with a vital spirit. After all, any magazine like The Review — at least any successful one — is a living thing; it is not mere ink on paper, bound and mailed periodically to be absorbed by its subscribers because it may do them good like a breakfast food or a patent medicine.

Those at present responsible for The Review mourn the passing of a great editor.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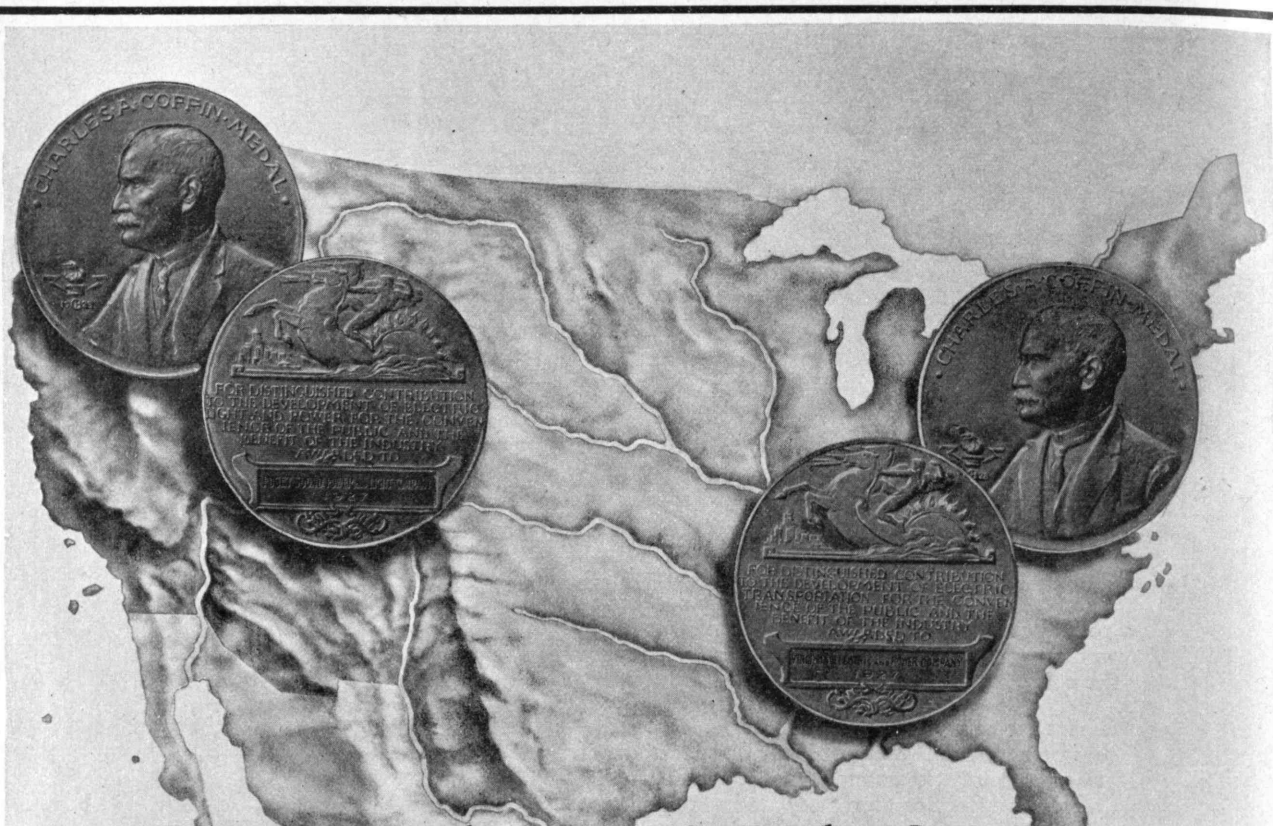

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The TECHNOLOGY REVIEW

VOLUME 31 · MARCH, 1929 · NUMBER 5

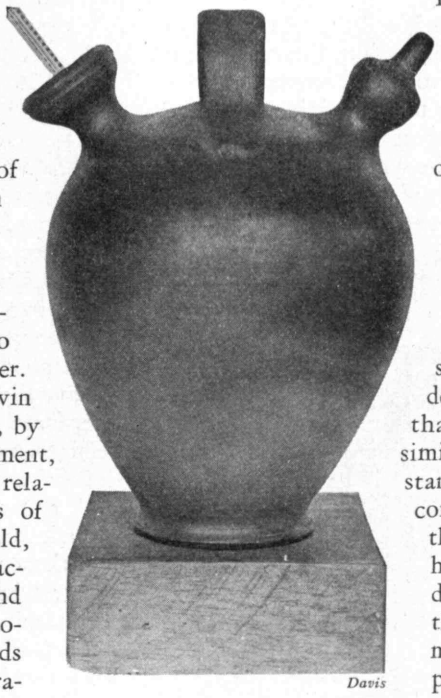
ARTIFICIAL COLD

Some modern cooling methods and their applications

BY GORDON B. WILKES '11

THE appearance of refrigerating machinery for domestic use has created among laymen an abiding interest in the mechanical methods of artificial cooling. Domestic refrigeration of one kind or another is here to stay and it is probable that an extensive development of cooling and ventilating machinery for the home is just around the corner. Already many of our theatres and public halls have installed devices for cooling the air during the warm months, and only a short time ago a combined heating and air cooling unit was advertised for private residences. If the temperature of our living quarters drops eight or ten degrees to around 60° F., we feel uncomfortable and start the heating system; but if a warm day arrives in summer with a temperature twenty or thirty degrees above 70° F., we are uncomfortable because we have had no easy means of cooling the air. I can see no reason why, during the next few years, it will not become a rather common practice in the more expensive homes to have some means of cooling the air in summer as well as a means of heating it to a comfortable temperature during winter.

Some fifty-odd years ago, Lord Kelvin (Sir William Thomson) demonstrated, by means of a simple lecture-table experiment, that the sensation of cold was a purely relative matter. He placed three basins of water on the table: one hot, one ice cold, and the third at room temperature. Placing his right hand in the hot water and his left in the cold water for a few moments, he quickly transferred both hands to the basin with water at room temperature. In attempting to describe the sensation he was forced to conclude that either his left hand or his right hand was deceiving him, for the water felt cold to his right and warm to his left hand. Since, therefore, the sensation of cold is largely a relative matter, we shall assume for our purposes that cold signifies any temperature below 70° F., ordinary room temperature. Let us also agree to understand that all of the temperatures referred to are in degrees on the Fahrenheit scale, the one we use for most work outside the laboratory.



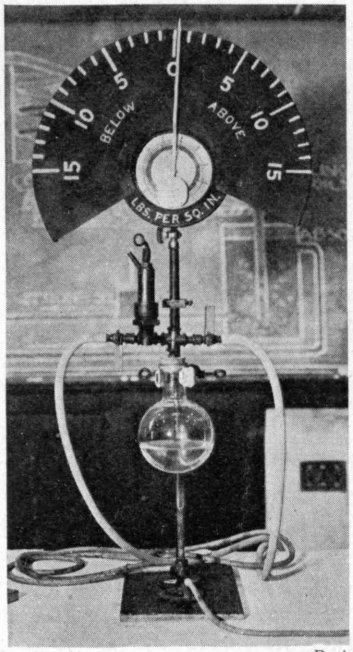
Davis

A PRIMITIVE WATER COOLER. FOR CENTURIES PEOPLES IN HOT, DRY CLIMATES USED POROUS EARTHENWARE JUGS FOR COOLING WATER. THIS ONE WAS MADE IN SPAIN

Primitive man found that an over supply of meat from a successful hunt could be preserved for a longer period of time if he kept it in an underground cavern, a well, or in the water from a spring or other relatively cool place. In a temperate climate like that in New England, the temperature of the air may vary as much as forty degrees in a day and as much as 100 degrees throughout the year. The daily variation affects underground temperatures only to a slight extent at a depth of two or three feet, while the annual variation is lost at a depth of twenty-five to fifty feet. There the temperature remains practically constant throughout the year and usually approximates the average yearly temperature of the surface. For this reason, water from deep wells usually has a temperature that is the same throughout the year; similarly, spring water is at almost constant temperature because this water comes from a considerable depth below the ground surface. Any one who has had the opportunity to visit caves in different seasons, nearly always finds them warm in winter and cool in summer. This and the common method of placing water pipes a few feet underground to prevent freezing in cold weather, illustrate the fact that the variation in air temperature soon disappears at a sufficient depth underground.

Nearly every one is familiar with the use of ice and salt to produce temperatures low enough to freeze ice cream. If ice and salt are mixed in proper proportions, it is not difficult to produce a temperature of zero degrees Fahrenheit, and by using calcium chloride in place of salt, considerably lower temperatures may be attained. There are many other substances that may be used with ice to produce temperatures below the freezing point of water, such as ammonium nitrate, alcohol, hydrochloric acid, and so on. The use of nitre (potassium nitrate) with snow or ice has long been known. As early as 1550 it is said the Roman nobles cooled their wines by snow and nitre.

In temperate climates, ice has for many years been used to produce low temperatures. Its melting point is 32° F. which represents the lowest temperature that one can expect to reach with the use of ice alone, but the ordinary domestic ice box is more frequently in the neighborhood of 50° F. as a recent survey of a large number of refrigerators determined. Despite the enormous sales of electrical and gas-heated refrigerators in recent years, ice will continue to be used, probably in somewhat lesser quantities, for many years to come, because of the low cost and the lack of many minor troubles that are bound to arise from any mechanical unit.



Davis

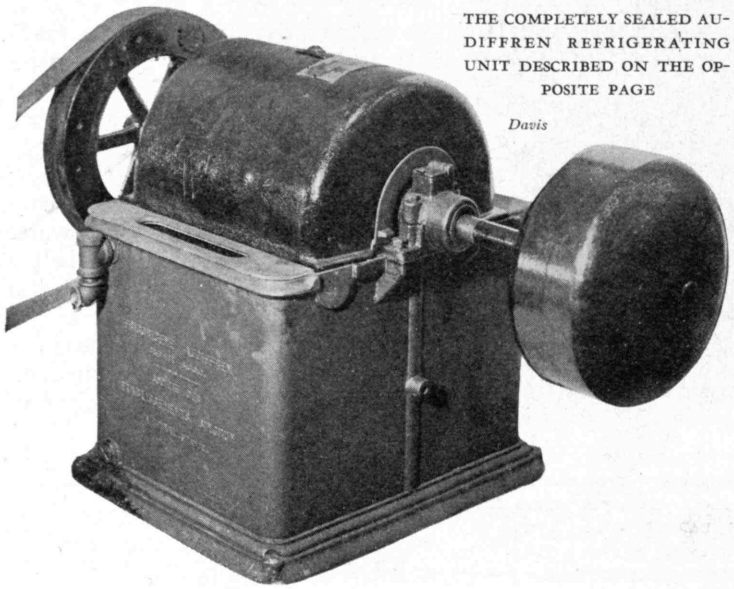
LECTURE-TABLE APPARATUS FOR SHOWING THE EFFECT OF PRESSURE ON THE BOILING POINT OF WATER

THE cooling effect of evaporation has been utilized for centuries by the peoples living in hot, dry climates who store their drinking water in porous earthenware jars. Moisture oozes through the walls to the outside of the vessel where it evaporates, the effect of which is sufficient to lower the temperature of the water from ten to twenty degrees below that of the surrounding air. This simple primitive expedient, strangely enough, contains the germ of the principle upon which are based all of the mechanical refrigeration systems now in domestic use. The principle is this: that evaporation — or what is the same thing, the transition from the liquid to the vapor state — requires a large amount of heat energy, which must be supplied by the liquid itself or the immediate surroundings. If one is boiling water, most of the heat energy comes from the heated air around the vessel and the air is thereby cooled. If water is evaporating from the surface of an earthenware water jar, the heat comes from the vessel and the surrounding air, both of which are cooled in the process.

One must also recognize the fact that the temperature at which a liquid boils (its "boiling point") depends upon the pressure. With the atmospheric pressure as it is at sea level, water boils at approximately 212° F., but if the pressure be increased twenty times, the boiling point is increased to about 417° F. If the pressure be sufficiently lowered, one can make water boil at room temperature or even at 32°, the ordinary freezing point.

This we can readily demonstrate on the lecture table by repeating what is known as Leslie's Experiment. If we place some water at room temperature in a thermos bottle and reduce the pressure until the water boils, heat will be drawn from the remaining water (since little can come from the surroundings) and it will become cooler. Then if we continue to reduce the pressure in order to keep the water boiling, it will soon reach a temperature of 32° F. and some of the water will be converted into ice, inasmuch as water does not normally exist in the liquid state at a temperature below 32° F.

The boiling points of all other liquids vary with the pressure and consequently all that has been said in regard to water applies equally well to ammonia, sulphur dioxide, carbon dioxide, and so on; only, of course, the temperature-pressure conditions may be very different from those of water. This principle of cooling by evaporation or boiling of various liquids is, as I have already mentioned, the foundation upon which nearly all of our refrigerating machines are constructed.



THE COMPLETELY SEALED AUDIFFREN REFRIGERATING UNIT DESCRIBED ON THE OPPOSITE PAGE

Davis

Refrigerating units for home use are, in general, of two different types: those using a small electrically driven pump, the compression type; and those using heat generated by a gas or kerosene oil burner, the absorption type. The operating principle of each is simple, the former particularly so. A suitable liquid (called the refrigerant) such as ammonia, sulphur dioxide, carbon dioxide, methyl chloride, or ethyl chloride, is placed in the cooling coil inside the refrigerator cabinet, where it is made to "boil" by having the pressure upon it reduced with the motor-driven pump. This pump receives the vapor from