Brass and Copper

in your home

RADIANT HEATING

PLUMBING · ROOFING · SCREENING

CHASE

Chase Copper Tube for Radiant Heating can be installed in the ceiling in the standard thickness of plaster. Generally ceiling coils give off a larger percentage of radiant heat than either wall or floor installations. There are no radiators or grilles in a radiant heated room to interfere with the arrangement of furniture, nor circulating air currents to deposit dust on walls or draperies

CHASE

introduction

How to be Comfortable without Feeling Warm . . .

RADIANT HEATING. What is it?

THE WORDS "Radiant Heating" probably will not be new to you. You have seen this combination somewhere before. Nearly everyone interested in better living has heard of Radiant Heat. But what is it?

Quite simply, it is *warming* by means of radiant heat rays which pass through space (air) without having any effect upon temperature. An open fireplace, for example, radiates heat. You can be comfortable before an open fire even though the temperature of the surrounding air may be very low.

Interception of radiant heat rays by any solid object (a kettle, a table top, or a human being) at once results in the warming of that object's exposed surface. "It was hot enough to fry an egg in the street," the saying goes. The sun radiates heat. In this instance, the pavement is the intercepting object or exposed surface.

When a *person* becomes the "intercepting surface" of radiating heat rays, which tend to offset the body's natural heat loss, he feels the sensation of warmth.

In a room heated by the conventional system, the body is immersed in the heating medium, since it is the *air* that is being warmed. *Radiant Heating* directly warms the occupants of a room, with less change in air temperature. Thus, you feel comfortable in a room in which the temperature would, by ordinary standards, be considered too low for comfort.

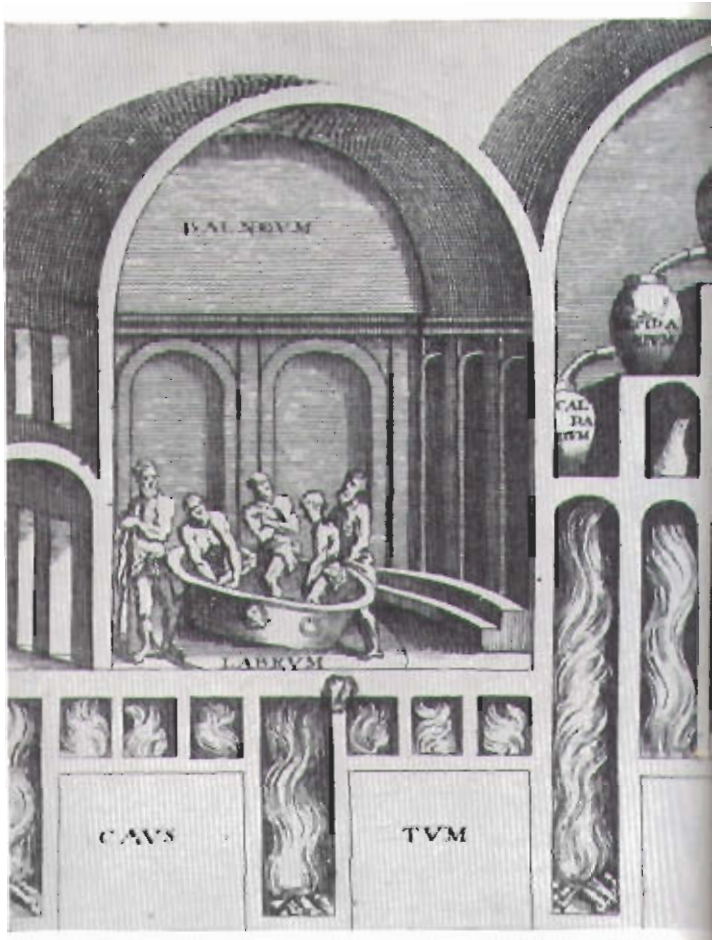
Actually, the Radiant Heating system is not something strange and formidable, but merely our old friend, the circulating-hot-water system, with the single difference that embedded pipe coils replace the usual radiators or convectors.

In presenting this booklet, Chase Brass & Copper Co. hopes to remove some of the mystery that has long surrounded Radiant Heating, so that its principle may be readily understood.

history OF RADIANT HEATING

RADIANT HEATING B.C.

RADIANT HEATING is older than history. Recent discoveries prove that the ancient Koreans used this principle in heating their dwellings indirectly from cooking-oven fires. Excavations at Rome and Pompeii show that the Romans were familiar with its use by means of masonry ducts beneath floors and within walls. Roman ruins uncovered in England by the ravages of World War II prove that they used metal piping, much as is done in modern work. The reconstruction of Williamsburg, Virginia, brought out evidence that the early Colonial builders made use of radiant heat from fireplace flues in the brick walls.



Early Roman application of Radiant Heating. Fires in masonry ducts warm the floor and walls, heat the room.

THE FIRST OF THE MODERN ENGINEERED INSTALLATIONS

In the latter part of the 19th century, an awakened interest in Radiant Heating took place on the Continent, and in the Scandinavian countries, followed shortly by a similar experience in England. The first of the modern engineered installations in England appears to have been made about 1907.

Since then, Radiant Heating has been extensively adopted by the English for dwellings, industrial plants, stores, restaurants, office buildings, schools, hospitals and churches. Best known church is the famous Liverpool Cathedral which employs warm air circulated below the masonry floors as the heating medium.

ONE OF THE EARLIEST INSTALLATIONS IN THIS COUNTRY

The early success of Radiant Heating on the continent and in England so aroused the interest of engineers in the United States that Mr. Theodore Crane, Supt. of Construction, (now professor of Architectural Engineering at the Yale School of Fine Arts) was requested to lay out a radiant heating system for the Cornell Cosmopolitan Club, Ithaca, N. Y., in 1910.

Drawing on the limited amount of material published on English practice, Mr. Crane had a test conducted in one room, the results of which were encouraging enough to warrant its adoption for the entire building. One inch ferrous pipe was laid in channels in the concrete floor and covered with quarry tile. Steam and hot water was circulated through the coils. These proved adequate for all the rooms except the corners, where radiators were added later to supplement the experimental coils. In the years since these crude beginnings, hundreds of scientifically designed radiant heating systems have been installed throughout this country.

In 1910 the Cornell Cosmopolitan Club was one of the first Radiant Heating installations in this country.

explanation of RADIANT HEATING

THE FIREPLACE (Radiant Heating Principle)

THE principle of Radiant Heating exists in such commonplace things as an open fireplace, outdoor camp fire, or the familiar electric spot-heater. In all of these, it should be noted, no attempt is made to heat the *air* or room surfaces surrounding a person.

Indeed, the conventional thermometer might indicate a temperature near freezing, yet the Radiant Heat from a fireplace will produce a sensation of comfort (or even of *discomfort* from too much heat) to persons within range, even if a window is opened on a still, cold day. Its main drawback is that it does not distribute the radiant heat evenly to a person, but tends to concentrate high temperatures on one side of the body, while the other side remains relatively cool.

The secret of the success of embedded pipe coils is that they distribute relatively low temperature radiant heat rays over large areas, causing heat to reach all sides of the human body in nearly equal intensity.

The camp fire and fireplace are early forms of radiant heat.

HUMAN BEINGS AND THE COMFORT BALANCE

People are energy-producing machines. Food is the fuel they burn and, like any fuel, it generates heat. A normally active human generates heat at a rate of approximately 500 heat units per hour.

But only about 100 of these units are required for normal requirements of the body. This leaves 400 to be dissipated in form of heat in order to maintain what is known as a "comfort balance."

THE HEATING SYSTEM ... *Nature's Helper*

Under ordinary conditions, Nature takes care of our "comfort balance." However, when summer heat or winter cold tips this balance, the mechanical cooling or heating system is put into use as Nature's helper.

There are four ways in which your body can lose heat. But the two principal ones are by *convection* to the surrounding air, and by *radiation* to any near-by surface (such as a ceiling, floor or window-pane).

SINGLE BASIC REQUIREMENT FOR A HEATING SYSTEM

What this amounts to is simply this—that the single basic job of any heating system is to permit persons within reach to lose body heat at a uniform hourly rate. The conventional radiator and warm air heating systems take care of this by keeping room air warm. This kind of heating system pays little attention to the temperature of floors, ceilings or walls.

TO UNDERSTAND RADIANT HEATING—*Forget AIR Temperature*

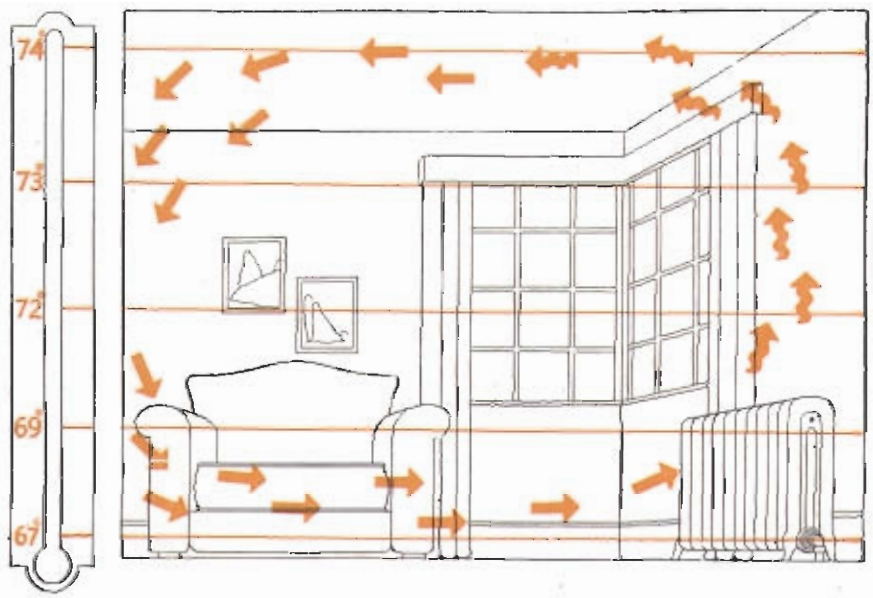
The primary function of the *Radiant Heating* system is to keep people comfortably warm by heating the ceiling, floor or walls of the room, and checking the body heat loss by radiation. Thus, in a radiant heated room, you will have no use for the ordinary thermometer since the chances are you will be entirely comfortable, at temperatures less than 70°F.

COMPARISON OF CONVENTIONAL and *RADIANT HEATING*

Use of the ceiling area as a radiating panel has the advantage of giving more heat into the room, and a greater percentage of radiant heat than any other location. Another advantage of this location is that plumbing fixtures, kitchen cabinets, and various types of built-in equipment may make it difficult to install adequate floor coils, while an unobstructed ceiling may be covered with buried tube if necessary.

Where desired, the ceiling system may be augmented by floor or wall coils located at strategic points which act as additional heating sources.

In the average two story house, the first floor ceiling is a good place to have the radiating panel. The heat flow downward provides for the first story, while the heat "loss" flowing upward makes a "radiating panel" of the second floor capable of supplying about 25% of the second story's heat requirements. In this case the first floor ceiling should not be insulated, but the second floor ceiling which provides the other 75% of the heat should be fully insulated. Many people find the heat from the first floor ceiling is sufficient for second floor bedrooms, which are usually kept cooler.



CONVENTIONAL HEATING

The radiator (or warm air register) heats the air above it. This heated air rises and is replaced by new cold air that causes air currents to move throughout the room. These air currents often create drafts, spread dust, and cause hot air to collect at the ceiling and cool air near the floor.

Notice the temperature levels in the illustration at left and compare them with the Radiant Heating drawing below.

RADIANT HEATING

Healthier and more economical to operate, Radiant Heating warms the interior surfaces (ceiling, floor or walls) of a room, rather than the air.

When this happens, as shown by the thermometer opposite, the cold layer at floor level is eliminated. Moreover, since a person is comfortable at a lower temperature in a radiant-heated room than in a room heated in the conventional way, it should result in a saving in annual fuel costs.

Notice in the illustrations that by eliminating the radiator there is more usable floor and wall space for arranging furniture, and hanging full-length window curtains.

COPPER

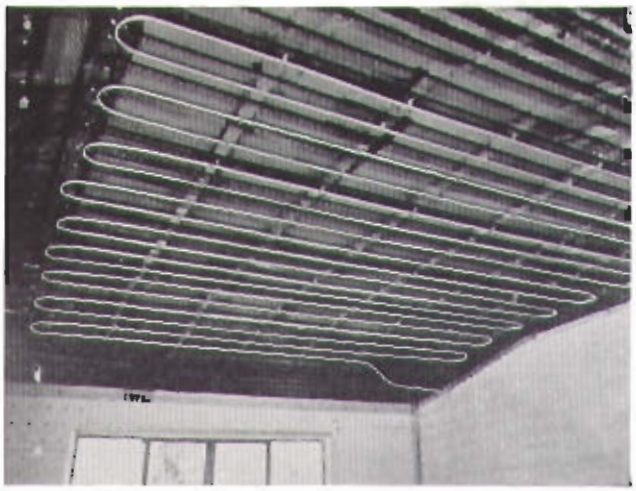
Radiant heating

IN A NEW HOME

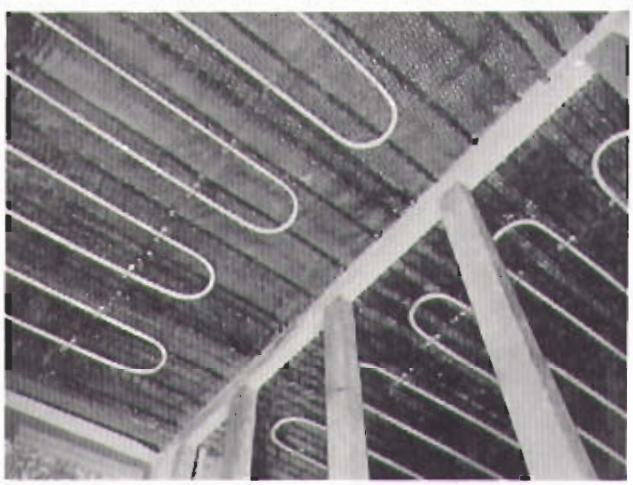
THIS house is located in New England where the winters can be severely cold, and the weather is noted for its sudden changes in temperature, a good test for the efficiency of any heating system. Houses with large glass areas are usually difficult to heat by conventional methods, but this house was comfortably heated with Radiant Heat.

This Radiant Heating installation of Chase copper tube was installed in 1941. With the co-operation of the owner, individual panel controls, thermocouples, etc., were placed in the system, permitting our engineers to obtain first-hand information about the performance of Radiant Heating, both during the construction of the house, and during occupancy. It served as an actual laboratory, and all data pertaining to the operation of the Radiant Heating system, and air temperatures at varying room levels were carefully recorded during the extreme conditions prevailing in the winter of 1942-43.

The owners of this home report that they have had to do no redecorating whatever since the house was completed five years ago, and that their bills for cleaning draperies have been substantially reduced.



Copper tube can be installed in ceiling in long continuous lengths and covered with the normal depth of plaster.



This close-up of the ceiling panel shows how copper tube is held to the joists or furring strips with copper straps.

This is the finished appearance of the living room. Notice the high ceiling, large window glass areas, and that there are no standing radiators to interfere with the arrangement of furniture.

The master bedroom floor is comfortably tempered from the ceiling panel in the first story room directly below and with supplementary warmth, as required, provided by the ceiling panel in the bedroom.

COPPER radiant heating

In an Architect's Home

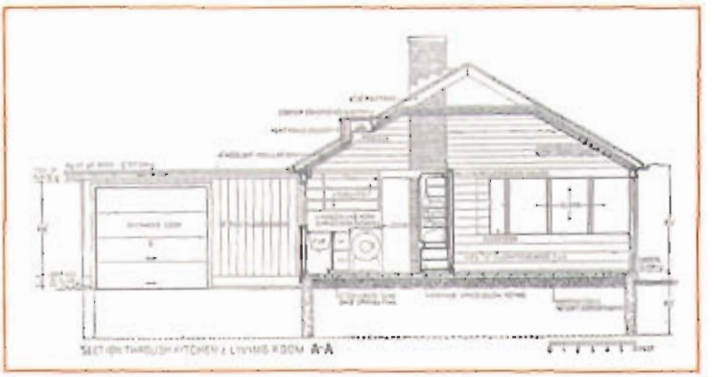
This house was designed and built by an Architect for his own use, and in writing for the January 1944 issue of the Architectural Forum magazine, he said:

"This house was built with no thought of pleasing anyone but the Architect's family. It was planned for informal living and easy housekeeping, and to take advantage of the extensive views offered by the 1½ acre site. Most important, it was designed to meet the real needs of a fairly typical family, with few concessions to conservatism and every effort made to incorporate recent technological advances.

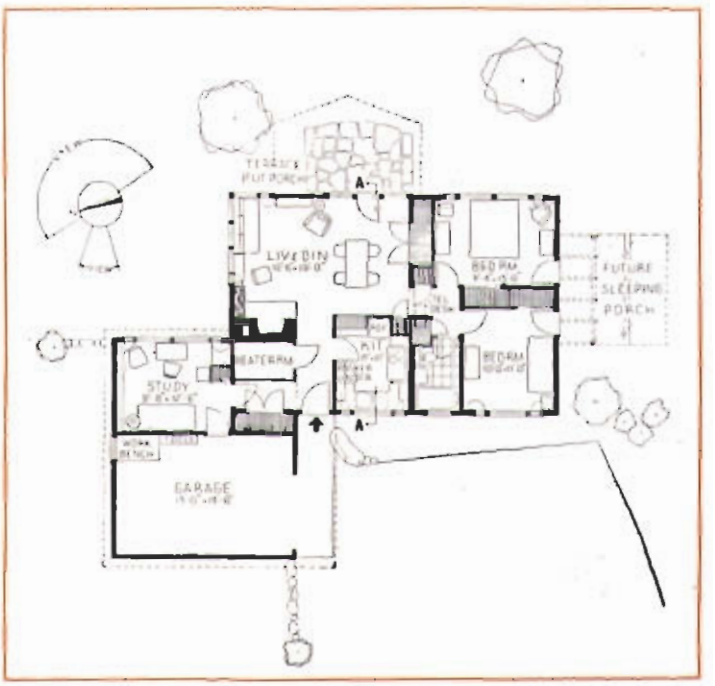
"Probably for this reason the design offers an excellent prototype for the postwar house for sale which must, above all, put aside preconceived ideas in favor of a fresh evaluation of what people really need and how best to supply it. It is a practical house with many attractive sales features . . . including floor heating which made possible an unusually economical foundation and floor construction.

"Despite the generous windows, the average combined cost of both domestic hot water and radiant floor heating (supplemented by ceiling panels in the living room and bathroom) has been (automatic oil-fired) $8.50 a month over a two year period."

The Architect selected copper tube for Radiant Heating his home built in 1941. Despite the full exposure and large glass areas, it was heated at a very low cost.



The radiant heating coils in the basement floor and living room ceiling are ⅜ inch Chase Copper Tube.



Notice that the greatest glass areas are toward the most severe weather exposures. In spite of this, the children played on the living room floors in perfect comfort.

Approximately 1,200 ft. of ⅜" Type L Copper Tube was built into panel coils for this house.

NEW ADDITION *equipped with* RADIANT HEATING

IN this house, already equipped with a steam heating system, the owner wished to enjoy the comforts of Radiant Heating in the addition of a new bathroom and dressing room, without going to the extra expense of converting the whole heating system to circulating hot water.

By the simple procedure of installing a by-pass at the domestic hot water connection of the steam boiler, the heating contractor ran a separately controlled miniature hot water system to the floor coil in the bathroom and the wall coil in the dressing room.

It was obviously a more costly installation than it would have been to alter and extend the existing steam system to heat the new rooms, but it did give Radiant Heat to the owner who was well pleased with it.

Had the original heating system been a circulating hot water system, the cost of changing to Radiant Heat for the new rooms would have been nominal.

Forced hot water Radiant Heating was installed in the new addition to this house as an extension to the conventional steam heating system in use.

Radiant Heating copper pipes were installed in the dressing-room wall.

OLD HOUSE REMODELED *with* RADIANT HEATING

This is a fine old colonial home, sturdily built, attractive, and in excellent condition on the outside, but the interior was old and in need of a complete job of modernization.

The hot air heating system was inadequate and worn out. Since a completely new heating system was required, any type could have been installed, but Radiant Heating was chosen.

The old ceilings were used as the base for new ceilings, and the Radiant Heating copper pipes installed between the old and new ceilings. Furring was nailed to the old ceilings; the copper tube was fastened to sheets of Gypsum board and erected as three large prefabricated ceiling coils.

The joints between the large sheets were taped and the whole ceiling area painted in the usual way.

Circulating hot water Radiant Heating is ideally suited for installation in old houses where space is limited. It will compete in price with any 2-pipe system, but its cost will not be as low as gravity warm air or any 1-pipe system.

Radiant Heating replaced hot air heating in this house.

Note the absence of radiators in radiantly heated rooms.

advantages *OF RADIANT HEATING*

1. More floor space. Radiant Heating eliminates unsightly radiators and grilles, as well as the need for window recesses to accommodate radiators. This has the effect not only of making a room *look* larger, but actually of increasing the amount of usable floor space.

2. More attractive interior decoration. With Radiant Heating there are no restrictions on the furniture arrangement or wall decorations in a room. The interior decorator has full freedom so that each room may be furnished to best advantage.

3. Plants and flowers need sun. They can be placed in front of window with radiant heating. They cannot with usual radiators which are generally placed under windows, and heat wilts flowers.

4. Less streaking and dust on walls and ceiling. In the Radiant Heating system there are lower velocities of air currents, and a notable absence of high temperature concentration, which normally causes streaking and dust deposits on walls and ceilings.

5. Fewer fire hazards. The simplified structural design that Radiant Heating permits, eliminating radiator recesses, duct spaces, etc., reduces fire hazards in the commercial building and overcomes many troublesome architectural and engineering design problems wherever the Radiant Heating system is adopted.

6. Re-arrangement of partitions. With ceilings or floors as the source of heat, interior partitions may be changed about at will, giving a house an entirely new appearance, without altering the performance or plan of the heating system.

7. Heat during construction. Since Radiant Heating panels are built into ceilings, floors and walls, the complete heating system is progressively constructed as the building goes up. This avoids any need for "temporary settings," and makes heat available during construction.

8. Warm floors in basementless homes. Radiant Heating is the only system that does away with cold floors where there is no basement. One reason for this is the thermal resistance of the earth; the temperature loss downward from a floor panel is negligible.

9. Lower operating costs. A well designed Radiant Heating system should result in the lowest over-all operating and general maintenance expense for the heating plant. This is because radiant panels permit relatively low temperatures in the heating medium, avoiding the necessity for maintaining at higher temperatures the conventional radiator which is normally placed against the coldest (wall and glass) exposure. To Radiant Heating's fuel economy can be added appreciable savings in expenditures for repainting interior surfaces and cleaning furnishings.

TABLE OF COMPARATIVE EQUIPMENT

Type of Equipment	Conventional Heating	Radiant Heating
Furnace		
Oil Burner	same	same
Gas Burner	same	same
Boiler	same	same
Stoker	same	same
Hand Fired	same	same
Domestic Hot Water System	same	same
Circulating Pump	same	same
Controls	same	same
Distribution & Return Main	same	same
Branches	same	same
Control Valves	same	same
Radiators (open or concealed)		Not Used
Imbedded Pipe Coils	Not Used	

WHY copper tube IS BEST FOR *RADIANT HEATING*

We come now to the selection of a material for tube coils—the "arteries" of a Radiant Heating system. This is probably the most important consideration of all in a Radiant Heating installation since, as we have seen, Radiant heat is very much like the conventional system save for the fact that pipe coils are used instead of radiators.

Further, it should be remembered that these tube coils, unlike radiators, are imbedded in ceilings, walls or floors. They become permanent installations . . . a functional part of the construction, in other words, and so the material for them should be selected with an eye to durability.

Copper, engineers and architects are generally agreed, is the ideal material for tube coils. It is unusually durable, and its ability to conduct and transmit heat is, of course, widely known. But in addition, copper possesses a number of other characteristics vitally important to the efficient installation and operation of a modern Radiant Heating system.

Copper comes in small sizes and long lengths which, together with lightness in weight make it easy to bend by hand to meet design and construction problems. This represents a sizable saving, since it eliminates numerous joints in the coil formation (Copper is joined to fittings by conventional soldering operations familiar to all pipe fitters.)

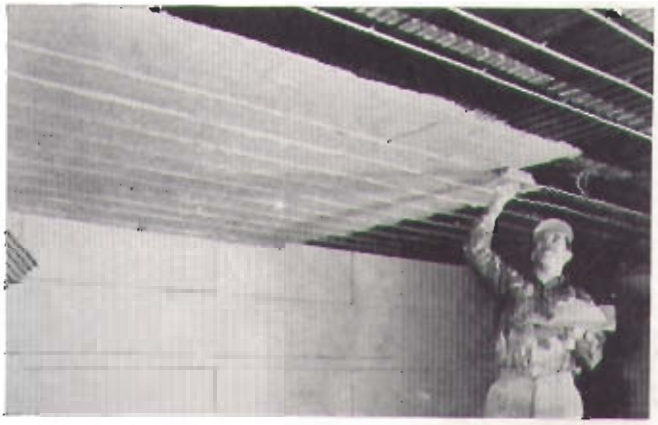
Tube coils for Radiant Heating, it is well to note, should have as nearly as possible the same coefficient of expansion as the surrounding material (usually plaster) in order to prevent ceilings, floors and walls from developing unsightly cracks. Copper's coefficient of expansion is practically identical with that of plaster.

Finally, copper is resistant to corrosion. In most parts of the country, copper tube can be used with safety, and when installed with soldered joints, its freedom from scale and the building up of rust deposits on the interior, make it ideal for the circulation of water through pumps and small-diameter piping. Where well water is to be used, or where doubt exists as to water, the owner should send a sealed sample to our laboratory for analysis.

From whatever angle you approach the question of tube selection—ease of installation, heat conductivity, or durability in service—the advantages of copper are outstanding. Leading architects and engineers have been quick to recognize this unique fitness of copper for Radiant Heating systems, for in report after report of installations throughout the country, the plans specify copper for the all-important tube coils.

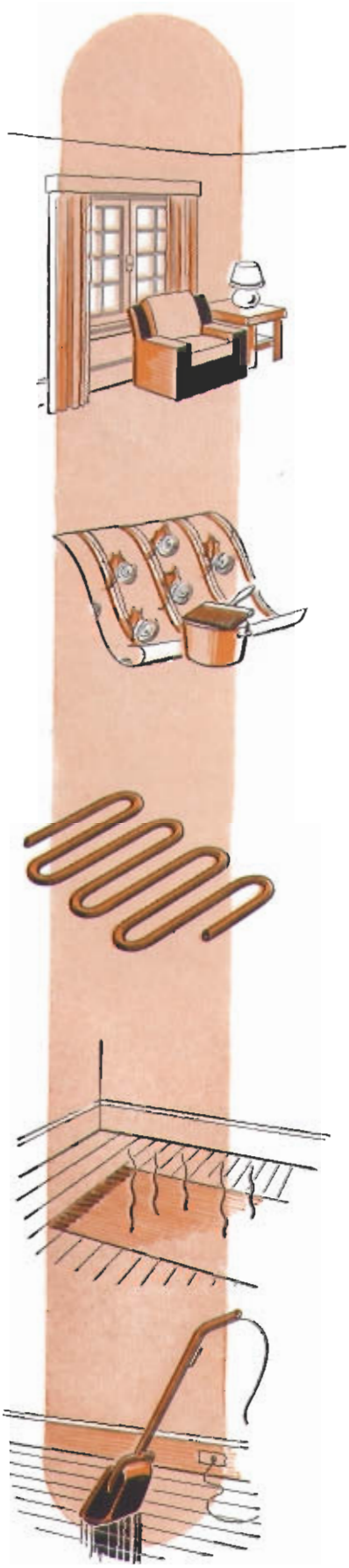
Locating the position of the first tube in the ceiling panel coil. Notice the coil of copper tube temporarily hung from the mesh with a U-hook while the measurement is being taken.

Making uniform bends by hand, to the required center-to-center distance of tubes, using a helical spring to bend the tube.



Applying the first or scratch coat of Gypsum plaster to ceiling. Other coats will follow to give final cover of ¼" over copper tube.

QUESTIONS *and* ANSWERS



Q. Will Radiant Heating dry out furniture or harm fabrics more so than conventional heating systems?

A. No, the opposite is true. Radiant Heating affects furniture or draperies less than conventional types of heating.

Q. Will Radiant Heating coils installed in walls affect wall paint or paper?

A. No.

Q. Do walls feel hot to the touch?

A. No, pleasantly warm.

Q. Do Radiant Heating coils, when properly installed, have any tendency to crack the plaster in ceilings or walls?

A. No. Home-owners are familiar of course with the fact that "hairline cracks" will often appear even in a well-built house. However, the properly installed Radiant Heating system will not cause plaster to crack.

Q. What happens if water lies in panel coils? Radiators can be drained . . . how do you draw off the water from pipes installed in a floor or ceiling?

A. Ceiling and floor pipes can easily be drained by conventional methods. No trouble need be expected from the Radiant Heating system.

Q. If a radiant panel is in the floor, will rugs or carpet interfere with heat radiation? Will the rug be damaged?

A. No. Radiation will be slower until the room warms up; after that, no difference. No "drying" of rugs can be expected with surface temperatures less than 85° F.

Q. When Radiant Heat coils are set in a floor, does this affect floor varnish or wax polish . . . are the coils liable to cause buckling of floor boards or damage linoleum?

A. No. If floor temperatures are kept below 85° F. the heat from floor coils will not exceed that of summer sunlight falling on the surface of the floor.

QUESTIONS *and* ANSWERS

Q. Where is the best place to install pipe coils for Radiant Heating—in a floor, wall or ceiling?

A. Consult your architect or heating contractor. Generally speaking ceiling installations are most favorable, floors next, with walls the least desirable.

Q. Why is Radiant Heating recommended for ceiling installation more often than in floors which would seem to be the logical place?

A. Ceiling installation provides a greater percentage* of Radiant Heat than either floor or walls. (Conventional steam and hot water systems provide a certain amount of radiant heat—about 20% from a radiator, but a *Radiant Heating system*—installed in the ceiling—offers the greatest amount.)

*Comparison of Radiant Heating Efficiency

Type of Panel	*Amount of heat given off to the room*
Ceiling	65% Radiant Heat
Wall	52% " "
Floor	48% " "

Q. Does heat from heated walls warp woodwork, dry out paint, injure pictures, etc.?

A. No. However, walls are very seldom used for radiant heating.

Q. Is there a tendency towards dry air in a Radiant Heated room? If so, how is this overcome?

A. There is no more tendency than in any other system and it can be overcome by using a humidifier, the same as with conventional heating systems.

Q. Can you use Radiant Heating in remodeling an existing house?

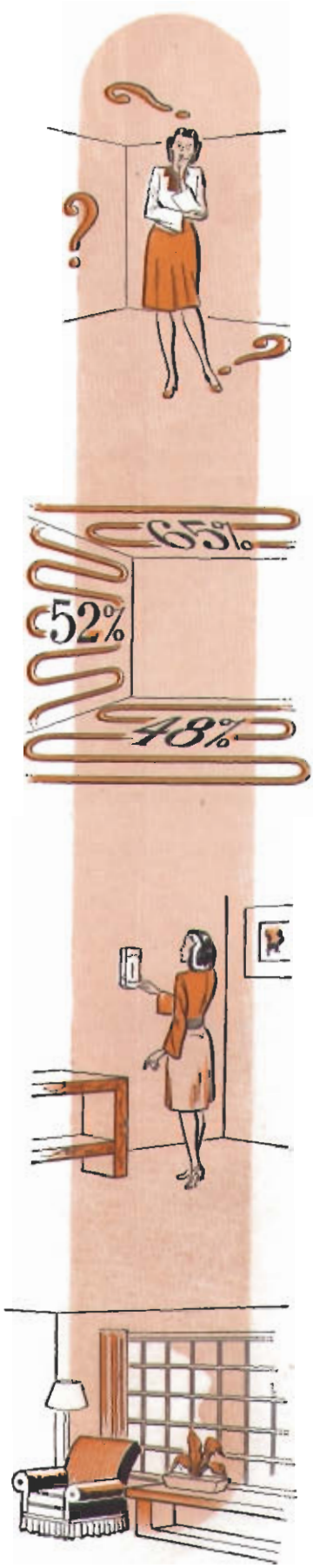
A. Yes.

Q. What kind of controls are required?

A. Same as any good conventional circulating hot water system.

Q. Can you use Radiant Heating for the new type houses with extra large windows?

A. Yes.



THE radiant heating INSTALLATION

How to go about it

FOR YOUR PRESENT HOUSE

You needn't wait until that "someday" when you're *going to build* to install a Radiant Heating system. It can be installed in your present house, or as a remodeling job, as in the renovated house shown on page 9.

For Radiant Heating makes use of conventional heating equipment, except that copper tube coils are substituted for radiators. Your heating contractor is qualified to handle a Radiant Heating installation for you. Consult him.

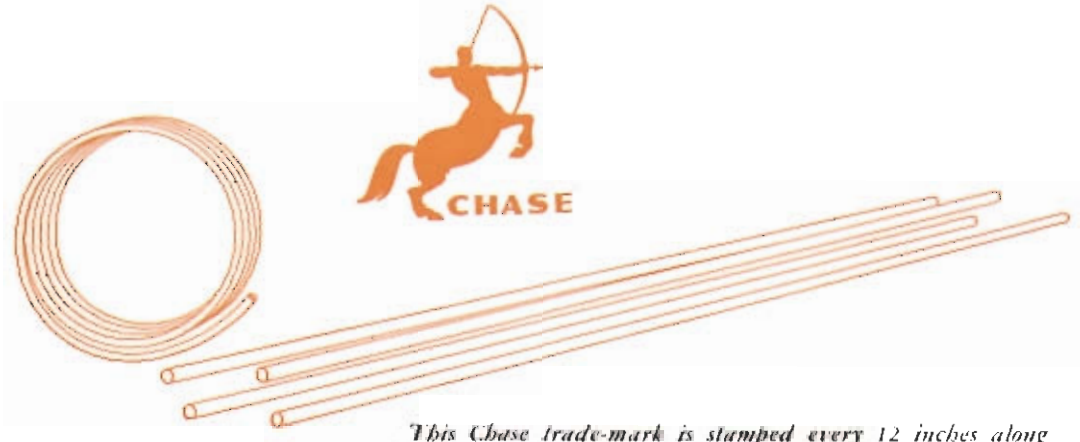
FOR THAT NEW HOUSE

If, of course, you plan to *build*, and you are interested in a Radiant Heating system then you will want to discuss the installation of it with your architect. He can advise you concerning the procedure necessary to follow in designing a Radiant Heating system to meet any given set of conditions applying to your building or its location.

INSIST ON CHASE COPPER TUBE

Remember that a Radiant Heating installation is a *permanent* part of the construction of a building in which it is installed. Therefore, as much care should be taken in selecting tube coils to be embedded in floor and ceiling panels, as in choosing pipe for concealed water lines.

For this all-important assignment, copper is the ideal material (see page 11), and there is no finer copper than the product of Chase Brass & Copper Co. Specify Chase Copper Tube coils when you install a Radiant Heating system . . . to enjoy Radiant Heat at its best.



This Chase trade-mark is stamped every 12 inches along the length of all Chase Copper Tube for Radiant Heating and plumbing lines. If it isn't there, it isn't Chase!

CHASE COPPER WATER TUBE BRINGS A FULL CLEAR FLOW OF WATER *from every faucet*

WHEN you take into consideration all the factors that enter into a plumbing system, the original cost of the plumbing installation, the cost of upkeep and repairs, the cost of the water you use, the cost of heating water, the need for a full flow of clean water—you will find that the most economical system is an installation of copper water tube and solder-joint fittings.

Chase Copper Water Tube will always give you plenty of water unless, of course, the city water pressure is inadequate. Downstairs, upstairs, and all over the house there can always be a full flow of water for everyone at the same time. For copper, you see, is resistant to corrosion and does not choke up with rust to cut down the water flow at faucets.

Doing dishes can be a quicker, easier job when there is no waiting for a puny flow of water to fill the dishpan. And with plenty of clean hot water to wash the clothes in, you get snowy-white fabrics from your washing machine or laundry tubs.

Your bath too will be more enjoyable because you won't have to wait for what seems like hours to fill the tub. And your shower will have that refreshing zip that is always lacking with rusty, clogged-up water lines.

INEXPENSIVE

Chase copper tube and solder-joint fittings are not expensive. The first cost is only slightly more than an installation of ordinary pipe. In many cases it is possible to cut down the cost even more by using a smaller size tube, than rustable pipe, because no allowance need be made for rust.

SAVES WATER

Chase copper tube actually saves water. Less water is drawn before the water runs hot at the faucet because copper tube does not absorb as much of the heat from the water as rusted pipes do.

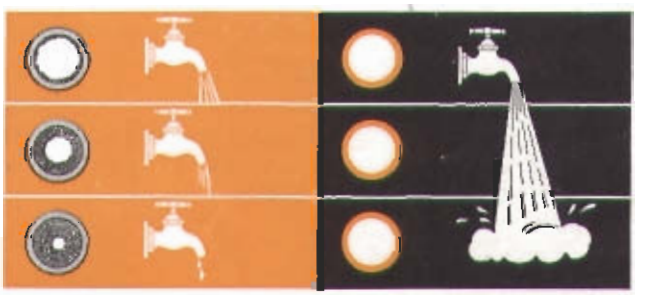
SAVES HEAT

Chase copper tube and solder-joint fittings will save in the cost of heating water. This is because copper absorbs and radiates (loses) less heat than ferrous pipe. If you place your hand near ferrous pipe in which hot water is being conducted, you will feel the heat loss. Therefore, hot water in copper tube does not cool off as quickly.

Full water pressure through copper tube that does not choke-up with rust helps make sudsy water.

REPAIRS

For repairing and replacing rust-clogged or rust-eaten pipes, Chase flexible copper tube is ideal, and offers the owner of an existing home a chance to modernize his plumbing system at minimum expense. See next page for more complete information.



PIPES THAT RUST
When rustable pipe clogs up with rust, it leaves a smaller and smaller hole. Eventually expensive replacement must be made.

COPPER WATER TUBE
Chase copper water tube after many years of service still gives a full flow of water. The inside is still smooth and clean.

In the old days, walls and floors had to be torn open, but now with Chase flexible copper tube the plumber can make it down through a small opening in the wall.

CHASE FLEXIBLE COPPER WATER TUBE *FOR EASIER REPLACEMENTS*

IF you have a building with rust-clogged water pipes, here is a way to replace them inexpensively with Chase copper water tube.

Ordinarily, replacements with straight lengths of rigid pipe require wholesale destruction of walls and floors, with repair bills not only from the plumber, but also from the plasterer, the carpenter and the painter as well.

Chase flexible copper water tube, however, has eliminated most of these charges. It has made replacements not only easier to do but less expensive to have done. Many times the removal of a baseboard or a single floor board is all that is necessary to make the replacement.

HOW IT WORKS

Instead of tearing gaping holes in walls expensive to replace, the plumber takes a coil of Chase flexible copper water tube and works it down through the space between the walls and snakes it under the flooring. This tube is strong enough to be pushed between the walls, yet flexible enough to be bent around any obstructions.

Chase flexible copper water tube can be worked from floor to floor in one continuous length, for it comes in coils of 40, 60 and 100 feet.

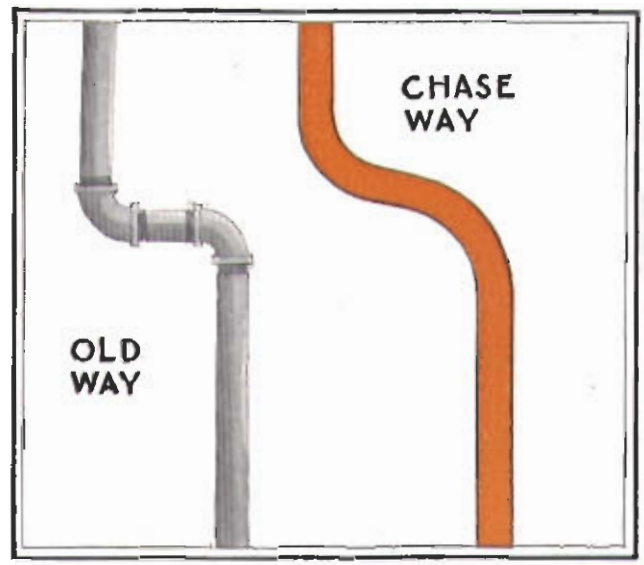
OLD PIPES CAN REMAIN

It is not always necessary to remove the old pipes in order to install copper water tube. Having proved a costly expense in the first place, they are not worth the added cost of removal. If there is room, leave them there. They are occupying unusable space anyway.

Chase flexible copper water tube can be installed alongside the old worn-out pipes. Often a replacement can be made without discontinuing the water service except for a short interruption to make the final connection to the outlets.

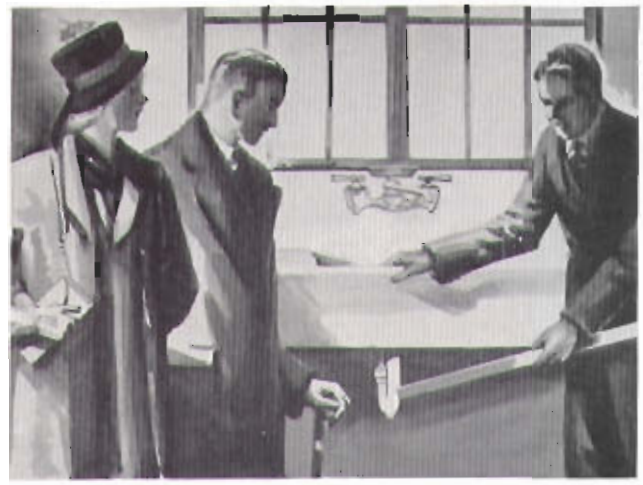
REDUCES COST OF MODERNIZING

Using copper tube in long 40, 60 and 100 foot lengths eliminates many fittings, and fewer fittings mean less cost. Chase flared fittings require no threading. They are assembled over copper tube, then flared—in the same way as fittings are used on locomotives, and on the gas and oil lines of your automobile. The reduced demolition to the walls and floors in installing Chase flexible copper water tube, the elimination of many fittings, and the quicker flanging operation makes the cost for modernizing plumbing a moderate expense.



How Chase flexible copper water tube is bent around obstructions to eliminate pipe fittings and their extra cost.

CHASE COPPER TUBE *and* SOLDER-JOINT FITTINGS *FOR DRAINAGE LINES*



There is no roughness to the inside of Chase copper tube drainage lines to retard the flow or for grease to pile up against.

CHASE copper water tube and solder-joint drainage fittings are recommended for all waste and vent piping systems. They have the following outstanding advantages for waste lines:

1. The interior of Chase copper water tube is as smooth as a gun barrel.
2. There is no roughness to which foreign matter can cling, gradually accumulate and clog the drain pipes.
3. There are no threaded pipe ends to retard the swift flow of disposed water and for grease to pile up at the threads.

Chase drainage fittings are made with long sweep ells that offer no resistance to fast quiet draining. The inside diameter of the fitting is the same as the copper tube and the outside is hardly larger. Chase solder-joint drainage fittings are a good deal less bulky than threaded fittings, and because of their reduced bulk it is unnecessary to cut away such large sections of strengthening supports when concealing drain pipes between studs and joists.

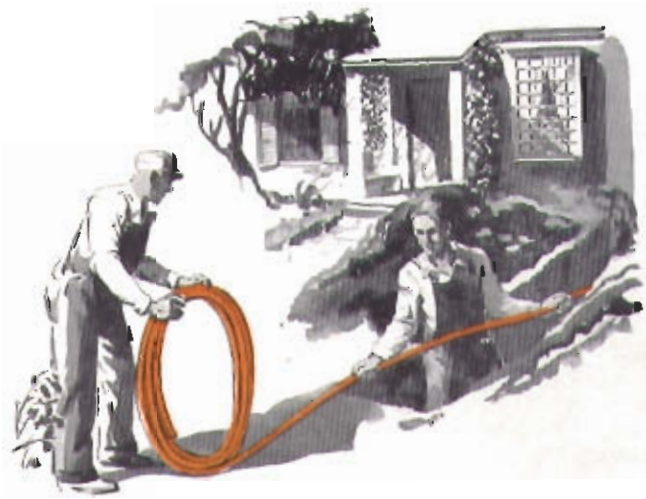
CHASE FLEXIBLE COPPER WATER TUBE *FROM STREET MAIN TO HOUSE*

The main service line running from the water main in the street to your house carries every drop of water you use. The condition of this pipe affects the water that passes through it. If it is choked with rust there will never be more than a slow, irritating flow of water from the faucets. If it freezes and breaks, your water is cut off, and to make repairs you must tear up expensive sidewalks, beautiful grass lawns and shrubbery.

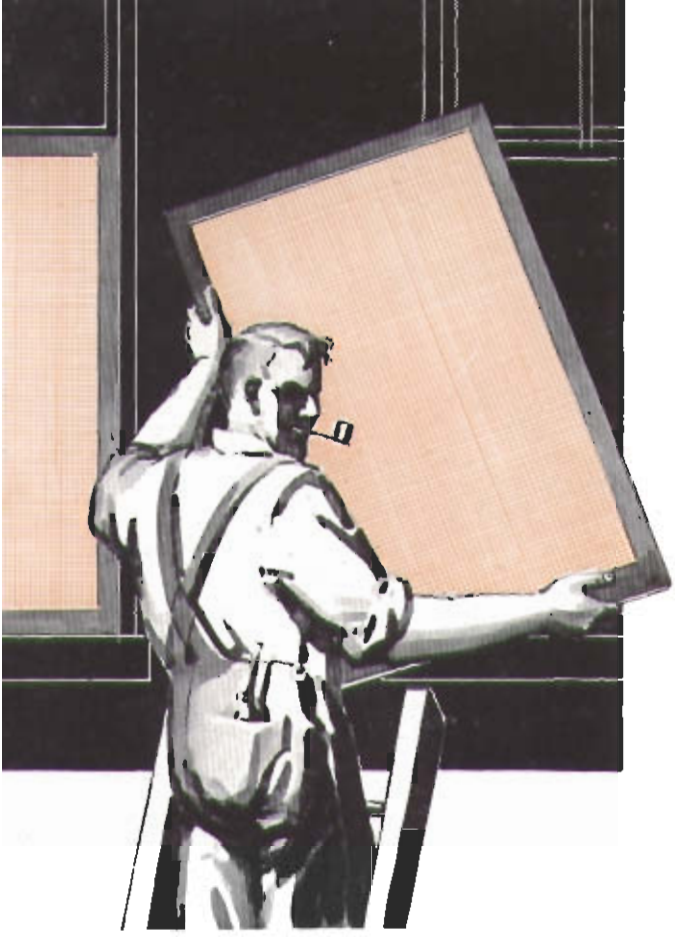
For this all important line, Chase flexible copper water tube is the best to use. It is so well adapted for underground use that city water-works engineers and private companies all over the country are using it.

Chase copper tube underground lines will give excellent service in waters of practically all types, and because copper expands and contracts with heat and cold, it has been frozen again and again without bursting, a feature unique to flexible copper water tube.

There is no need to dig wide ditches, blast rocks, or remove tree roots to install Chase copper water tube. This flexible tube is bent around obstructions, saving fittings, and usually installed in one piece from the curb stop to the house, from 60 ft. coils.



For the main water service line, Chase flexible copper water tube is the best pipe to use.



Make sure that your Chase bronze insect wire screening is fastened to the screen frames with Chase copper tacks and pins.

chase BRONZE SCREENS FOR LONG LIFE AND BEAUTY FOR YOUR HOME

ONE of the many decisions you must make in the completion of your home is the selection of screens for the windows. When your home is brand new, the saving of a few cents per screen for rustable metal may seem a logical saving to make. But rustable metal, even when it is painted and painted again, keeps right on rusting until it breaks down completely.

A strand of wire will be eaten away here and there in spite of your constant attention. And the worst part of it is that a screen with a hole big enough to let in one insect is as good as no screen at all. You must either patch it—which is unsightly—or replace it—which is costly.

It is logical and economical, therefore, to install screens for your windows, doors, and porches of Chase bronze insect wire screening right in the beginning. This strong cloth is made from .011" diameter wire as approved by the Bureau of Standards. It has been found strong enough to withstand the abuse that screens receive.

Solid BRASS AND BRONZE BUILDING HARDWARE *is the sign of a well planned home.*

When you build, the use of solid brass and bronze builders hardware is one of the best investments you can make in your home for appearance and permanence. Less durable metals often are more expensive, for replacement costs run high.

Door locks, handles, knockers and hinges of brass or bronze are corrosion-resistant and do not rust. A door that's hung from a brass hinge swings easily and quietly. No rust will interfere with its easy operation. Brass locks work smoothly in all climatic conditions.

Your friends get their first impression of your house from the appearance of your front door. The golden mellowness of a brass door knocker, knob, and brass or copper exterior lantern lend charm to your door and reflect good taste and pride in your home.

Chase does not make building hardware. Chase does, however, supply brass and bronze to many manufacturers of building hardware.

chase

COPPER ROOFING PRODUCTS

protect the outside of your home

RAIN causes serious damage both outside and inside the building. A succession of storms hitting a roof will rot away rustable flashings, causing roof failure and leaks which will allow water to enter the building, stain the walls, and weaken the ceilings.

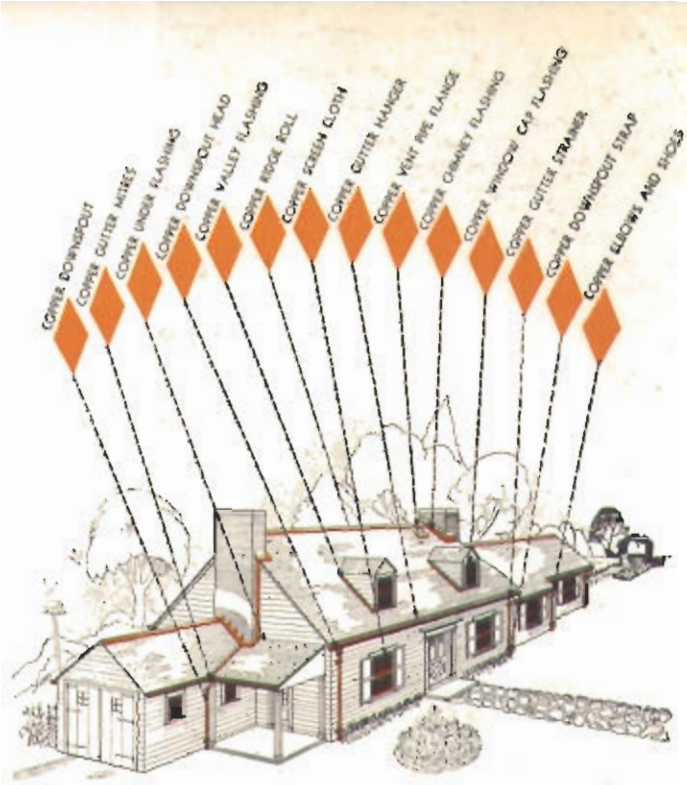
To help prevent this, use full weight 16 oz. Chase copper roofing products. It takes copper of this strength to withstand the strain imposed by snow and ice.

CHASE COPPER GUTTERS

These are the metal troughs that collect water as it comes off the roof and carry it to the downspouts where it can be disposed safely. Uncontrolled water, running off the roof, will spoil foliage, shrubs and flower beds near the house.

CHASE COPPER DOWNSPOUTS AND HEADS

Water in the gutter is carried to the downspout head and through the downspout to a point where it will drain away harmlessly.



The outside of every house should have copper at these vulnerable spots on the roof where every joint is a potential leak if not properly flashed.

CHASE COPPER FLASHING

A "flashing" is simply a flat piece of copper which is used to keep water from leaking into your house at the places where the roof joins the chimney, or at the side of a dormer window, or where two sections of roof meet at different angles.

CHASE COPPER RIDGE ROLL

The ridge roll is a protecting cap that fits over the apex of gable roofs or dormer windows.

The joint formed where two flat surfaces meet is one of the most vulnerable spots in roof construction.

CHASE COPPER FITTINGS AND ACCESSORIES

It is most important that all fittings and accessories, such as elbows, end caps, straps, strainers and nails be made of enduring copper.

CHASE COPPER ROOFS

There is probably no roofing material which has a longer life than copper. Copper roofs have weathered the storms of more than 100 years, without even the protection of paint.

CHASE

Look for the Chase trade-mark on Chase copper roofing products, made of full-weight, 16 ounce copper, an extra thickness to withstand the attacks of snow, ice, and high winds.

Chase

BRASS & COPPER CO.
Waterbury 91, Conn.

Where to Buy

If you retain an architect, he is probably already well familiar with Chase brass and copper building products. Architects have been specifying Chase for many years for all types and sizes of buildings.

Your plumbing and heating contractor, building contractor, roofer, and screen manufacturer can obtain Chase brass pipe, copper water tube, copper roofing products, and bronze wire screening through his regular channels of distribution.

If there is any difficulty in locating a distributor of Chase building products in your locality, please ask your contractor to communicate with our nearest warehouse or sales office listed below.

WAREHOUSES

BALTIMORE 30, MD.
1315 Key Highway

BOSTON 4, MASS.
411 "D" St.

CHICAGO 7, ILL.
1300 W. Harrison St.

CINCINNATI 2, OHIO
222 Post Square

CLEVELAND 1, OHIO
5005 Superior Ave.

DETROIT 3, MICH.
14480 Woodrow Wilson Ave.

INDIANAPOLIS 4, IND.
520 So. New Jersey St.

KANSAS CITY 8, MO.
316 W. 16th St.

LOS ANGELES 12, CALIF.
210 S. Central Ave.

MILWAUKEE 3, WIS.
1741 West St. Paul Ave.

MINNEAPOLIS 3, MINN.
145 N. Tenth St.

NEWARK 8, N. J.
188 Badger Ave.

NEW ORLEANS 2, LA.
751 Baronne St.

NEW YORK 13, N. Y.
80 Lafayette St.

PHILADELPHIA 6, PENN.
46 N. Sixth St.

PITTSBURGH 12, PENN.
1001 Brighton Road

PROVIDENCE 4, R. I.
66 Branch Ave.

ST. LOUIS 10, MO.
3815 Market St.

SAN FRANCISCO 7, CAL.
680 Second St.

SEATTLE 4, WASH.
1957 First Ave., S.

WATERBURY 91, CONN.
246 Grand St.

SALES OFFICES

ALBANY 7, N. Y.
91 State St.

ATLANTA 3, GA.
Bona Allen Bldg.

HOUSTON 2, TEXAS
1 Main St.

JACKSONVILLE 1, FLA.
409 W. Adams St.

ROCHESTER 4, N. Y.
45 Exchange St.

WASHINGTON 1, D. C.
420 N. Capitol St.

CHASE