Making the Farm House Comfortable in Winter

There are several different styles of house-heating plants on the market, the cheapness and convenience of which make it unnecessary for farm houses to be without a heating system which means comfort for the household

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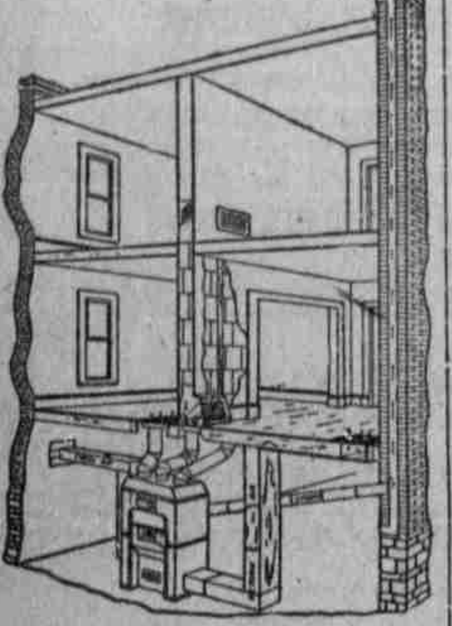
YEARS of progress have developed at least six styles of house-heating installations, aside from the old-fashioned first method, the fireplace, where from 80 to 90 per cent of the heat generated went up the chimney—where your shins roasted while your back froze.

Real progress was made when the grate fire was moved to the center of the room and incased in thin cast iron or sheet iron, giving us the stove, and increasing the radiating surface 200 per cent. At the same time the size of the flue was reduced 75 per cent, and the large loss of heat characteristic of the open-grate fire was eliminated.

Another step was made when the stove was moved to the cellar, and a jacket placed around it which opened through the floor to the room above.

With the neck of this jacket divided into two or more parts a hot-air fur-



Hot-Air Furnace.

nace is produced which will heat two or more rooms, one for each pipe.

Later improvements gave us the hot-water and steam systems; and these now find some competition in the vapor system.

A combination of hot air with either hot water, steam or vapor, known as a combination system, is now often used.

The outside of a stove becomes hot from the fire within which heats the air in contact with it. This air in turn becomes lighter, rises, and is replaced by cold air from below and at the sides. This displacement of warm air by cold air continues, and produces currents. The room can be made comfortable with a stove when it is not too cold outside. If very cold outside, say ten degrees below, the current of air will become so cold while passing down the cold walls that the stove cannot heat the room comfortably.

A sheet iron jacket, with neither top nor bottom, set up from the floor, will increase the rapidity of air circulation, since only the air within the jacket is heated. This air gets hotter and rises faster, thus making a more rapid circulation and a more effective heat.

A Furnace.

A stove with a jacket, placed in the cellar, becomes a furnace. A brick wall may be substituted for the steel jacket. A return flue through the floor some distance from the furnace, makes the system complete. Such a scheme is used for many churches, schools and assembly rooms, where the basement can be used as a furnace room.

When this furnace is set a little lower in the ground and the neck divided, into several small pipes, it may be used to heat several rooms. Heat is conducted to the second-floor rooms by rectangular pipes set in the walls between the studs. Over each opening in the floor or walls is a register of perforated cast iron.

In each pipe leading from a furnace is a damper, so that any pipe may be closed at will. There is a return air duct, to be used when the weather is too cold to allow the heated and used air to pass out of the house. The rooms are full of air at all times, and more air cannot be forced into them by the small pressure exerted by the warm air in the pipes below. In order to get this warm air into the rooms a way must be provided for the cold air to get out. This is done by means of a return air duct, which may open into a chimney and allow the air to pass out; or under the furnace and permit the air to be reheated and returned to the room. When this is done the fresh-air duct may be closed or partly closed.

The burning of the air in order to get heat sufficient to warm the rooms, limits the usefulness of this style of heating to small houses, and generally to one floor. To be successful, the furnace must be large and the pipes from 50 to 100 per cent larger than are ordinarily used.

All pipes, in cellar and in walls, should be covered with asbestos paper to protect the pipes and to save heat. A damper in every pipe and also in the smoke flue will aid materially in controlling and distributing heat. Chimney flues should be 10 by 10 inches or larger.

Hot Water.

A hot-water system is only a slight elaboration of the principle. Enlarge the base to inclose the fire, and reduce the size of the tube or pipe between the fire and the rooms to be heated, and make that part of the circuit in the rooms large, to give enough radiating surface. The main body, cast in sections for convenience in handling, is often made quite irregular, in order to expose more surface to the fire. Water is conducted through a large pipe, from which smaller pipes connect with one end of the radiator in each room. The other end of the radiator is connected to a large return pipe, which enters the heater at the grate level. This allows for a more rapid circulation than if a single pipe were used for each radiator.

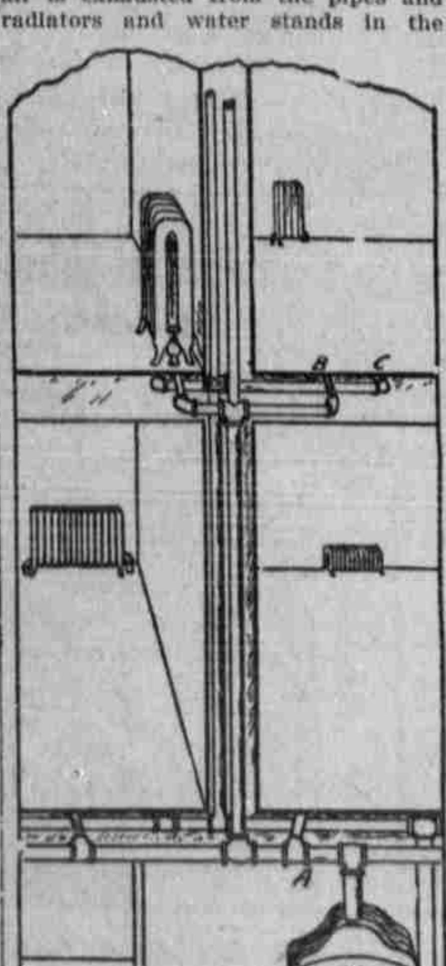
Allowance must be made for the expansion of the water. This is done by placing an open tank in the attic, or in a second-floor room above the top of the highest radiator, and connecting with the system at some convenient point. The system may be filled through this tank if there is no pressure system at hand.

This is called the open-tank hot-water system. If the tank were capped tight, and little or no water reached the tank, there would be a quantity of air confined which would be compressed, because the water in the heater, pipes and radiators expands when heated. This is the closed tank or semisteam system. The advantage is a higher temperature of the water before the boiling point is reached. The higher temperature will allow of smaller pipes and smaller radiators, and the practice is to install a smaller heater also. The cost of installation will consequently be less.

Objections to this system are: The need of safety devices, which may fail, and harder firing, which requires more fuel.

Vapor or Vacuum System.

The vapor or vacuum system is a comparatively recent development. It is the opposite in principle of the closed-tank hot-water system as the air is exhausted from the pipes and radiators and water stands in the



Connections of a Hot-Water Furnace With Pipes and Radiators.

heater only, as in a steam system. The exhaustion of the air makes it possible to produce steam at a temperature as low as 125 degrees Fahrenheit, which means that a small fire will produce results in a few minutes, because there are only a few gallons of water in the heater. It is virtually a steam system, and requires protective devices as carefully adjusted and attended as a steam system. Furthermore, leaks in the system will destroy the vacuum and it will become a steam system pure and simple.

Choosing Fuel.

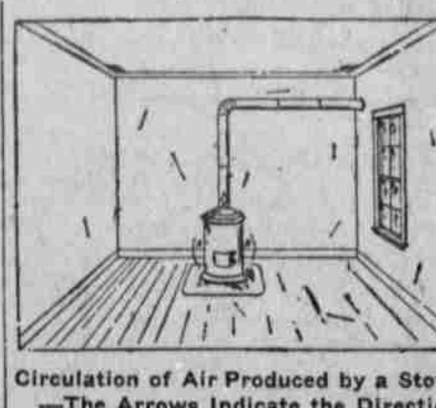
For hard coal a deep firebox gives best results. Hard coal burns slowly and requires less air than soft coal or wood, and the deep fire serves as a check on the air. Soft coal and wood burn best in a thin layer over a larger surface, and of course will require more frequent firing. All-round steam and hot-water boilers are made for hard coal. A sectional boiler may be lengthened by adding sections and the size of the firebox be thereby increased.

In round hot-water boilers, two styles are offered; one with a flat-top firebox, and one with water arms. The one with the flat top is much more easily cleaned than the one having water arms, and the heating coil is much more easily installed. The latter style is intended to give more heating surface in the firebox, but this feature is more than offset by the advantages mentioned.

In placing any of these heaters the clean-out doors should not be backed up against a chimney or partition.

Radiators.

The radiators are of cast or sheet iron, made up in sections, which may be placed together to give the required amount of radiating surface. The standard size is 38 inches high, three-column, and contains 5 square feet of radiation per section. A four-column 38-inch radiator contains 8 square feet of radiating surface. They sell for 18 to 20 cents a square foot. Each radiator has a valve at one end to cut off the water. In this valve is a pinhole, through which circulation will continue and thus prevent freezing when the radiation is cut off. At the top of each radiator, at one end, is an air valve, which must be opened



Circulation of Air Produced by a Stove—The Arrows Indicate the Direction of the Air Currents.

while filling the system, in order to let the air out, else the water cannot get in. When water flows from the valve it may be closed. This valve should be opened from time to time after filling the system, to let out air that has separated from the water and gathered in the top of the radiator. The small chamber of air will very effectively check the circulation through the radiator and it will not heat.

Cost.

The cost of a hot-water system for a six-room house will be about $275 or $300. It will cost about two-thirds more than hot air, but hot-air outfits last only from 7 to 9 years, with yearly repairs, while the hot-water system will last from three to six times as long, with no expense or upkeep.

The cost of a hot-water system will be about $85 or $90 for radiators, $130 for the heater, and about $65 for installation. Any farmer who is at all handy as a mechanic can do the work, leaving $210 for the plant, compared with $175 for hot air.

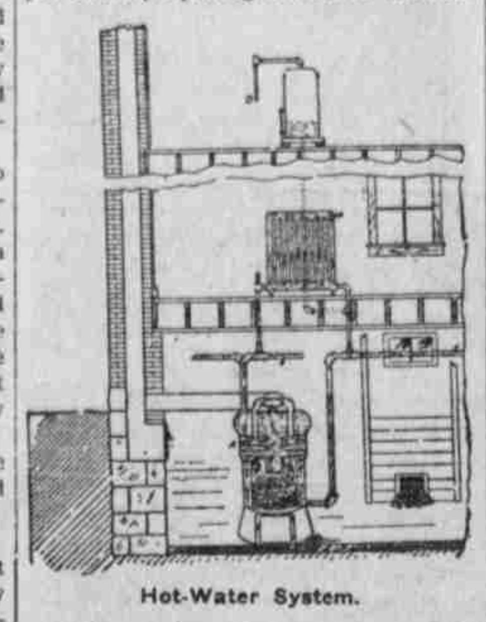
A hot-air system may give reasonably satisfactory results in small buildings, but for large houses and under most conditions either steam or hot water is unhesitatingly recommended. The higher cost is more than offset, in a few years, by a saving of fuel and better results.

Nothing has been said about steam systems. Little need be said. They are like water systems in makeup, except that the expansion tank is closed. There is no water in the radiators, only in the heater. There is no circulation until the water in the boiler is boiling, and there is pressure in the pipes and radiators. This pressure, while not intended to be heavy, may become so if not watched carefully. This is impossible in the average home. In the mill, factory, or large flat building, there is reason for keeping a man on duty constantly, but not so in the home.

By the process of elimination, it can safely be claimed that steam is not safe, and hot air is not satisfactory to any degree; while hot water, not perfect because it costs too much, is the best system of the three for heating a home.

Combination System.

A combination system—a combination of hot water and hot air—is the ideal system. However, instead of using a standard hot-air furnace, with a coil in the firebox for heating the water (similar to that used in a kitchen range), it is much better to place a large radiator or a coil of common pipe in a box in the cellar, which is open to the room above and to the outside air. This system may be installed at an additional cost of $25, and provides a fresh-air supply at all times. It is claimed, and with much reason, that ventilation is not necessary in the average house; that the air in the rooms is changed often enough to meet all requirements, except when an unusual number of people are present. It is true that, with an average winter wind blowing at ten miles per hour, the air in the rooms will change about every half hour. This is certainly all that is required for the average family. This rate of change can be increased 50 per cent by opening a door to the sec-



Hot-Water System.

ond floor. In order to operate this ventilation scheme in mild or still weather, it will be found necessary to have a return air duct. A fireplace is an ideal foul-air escape.

Such an escape will add from $12 to $20 to the cost of a chimney, for it must have an independent flue.

Three flash-light pictures were taken in adjoining rooms, one 12 by 12 feet and the other 12 by 23 feet. The rooms were almost filled with smoke. The outside temperature was a little below zero, so a door could not be left open very long. Six pounds of newspapers were burned in the fireplace to create a draft. In half an hour the smoke was cleared from the rooms, and one door had been open for about five minutes. There was no perceptible change in temperature.

Fireplace.

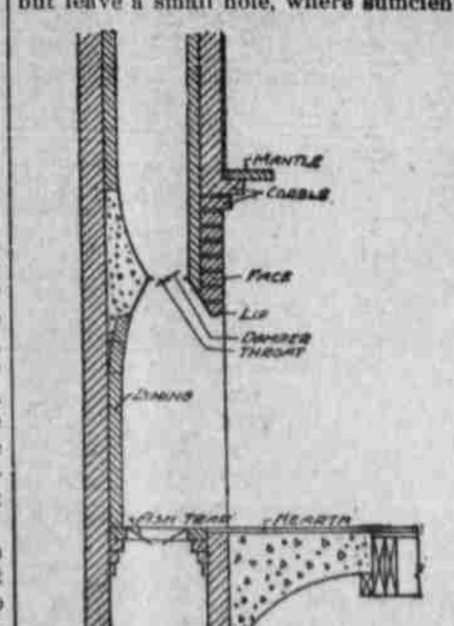
In a section where wood is plentiful, the comfort and satisfaction of an open fire should not be overlooked. In early spring and late fall a few sticks of wood on a grate fire will afford more cheer than double the amount in a heater.

If provided for at the time of building the expense need not exceed $60. This will provide facing, mantle, hearth, damper and ash traps, together with the added flue in the chimney. The flue should be large. A flue 8 by 8 inches is usually too small. A fireplace should be at least 36 inches wide, 28 inches high, and 16 inches deep, or as near these dimensions as the commercial facing and lining materials will make. Colored brick with a rough face, make a most satisfactory facing, and may be placed at the time the chimney is built. The lining should, of course, be of fire-brick. A hearth is easily built, using a smooth hard brick or tile.

The essentials of a satisfactory fireplace are: (1) a large flue; (2) a smooth throat set well to the front; (3) a thin lip. A smoking fireplace can usually be remedied by adding a thin lip-member.

Firing.

Economical stoking is an art. Hard coal is popular because the average person does not care to fire every half hour. However, a little admixture of brains with the coal will pay, even with hard coal. In general, add as small an amount of coal as possible at each firing, and fire often. Do not entirely cover the bed of live coals, but leave a small hole, where sufficient



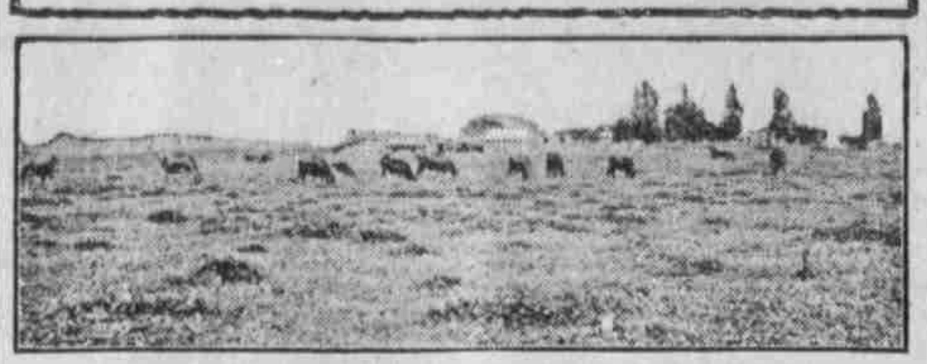
The Essentials of a Fireplace.

heat can get through to fire the gases as they distill off from the new coal, otherwise they are lost up the chimney. These gases burn clear and hot, and form a large part of the coal.

Keep the grates clean and clear of clinkers. Use a slice-bar, and prevent a tendency to cake at the bottom of the fire.

Three instances of firing came to notice recently, in houses or nearly the same size. The cost in one case was $47; in another, $36; and in the third, $16. All the houses were warm and comfortable at all times. In one the coal was fired, in the other two it was dumped in.

LIVE STOCK ON RECLAMATION PROJECTS



IRRIGATED PASTURE ON BOISE RECLAMATION PASTURE.

(Prepared by the United States Department of Agriculture.)

It is becoming generally understood that live stock industries must be established on northern reclamation projects if the best agricultural development on these areas is to be brought about. In such development, it is recognized, irrigated pastures must play an important part. One of the chief advantages of the summer pasturing of live stock on irrigation projects is that during that period labor is especially scarce and costly on the reclaimed areas. The proper management of irrigated pastures is outlined in a circular recently issued by the bureau of plant industry of the United States department of agriculture.

The information in the circular is based on experiments conducted during several years by federal and state agencies at the Huntley (Mont.), Scottsbluff (Neb.), and Belle Fourche (S. D.) field stations, and at the Gooding (Idaho) experiment station, by the University of Idaho; and on observations made during the past four years on 11 northern reclamation projects.

There is reason to believe that, while the carrying capacity and methods followed vary on different farms under observation, with good management an acre of pasture will support two cows or their equivalent in other live stock from four to six months each year, depending on the location of the project. It also appears that under favorable local conditions and proper care, the stock-carrying capacity of these pastures could be increased somewhat from year to year.

Profitable Pastures.

Farmers in the Salt Lake valley of Utah have found that irrigated pastures are profitable on land which is valued at $200 an acre. A dairy farmer in the Snake River valley of Idaho reports that his irrigated pasture carries three cows per acre.

The value of such pasturage can be stated in terms of hay replacement. Two cows will consume approximately a ton of alfalfa hay each month. If this hay is valued at $5 a ton, the hay-replacement value of an acre of irrigated pasture will be $5 a month. The length of the pasture season varies from four to six months, depending on the climatic conditions on the different projects. Hence the hay-replacement value of an acre of good pasture can be estimated at from $20 to $30 a year. These hay-replacement values would, of course, be greater when the price of hay exceeded $5 a ton. In connection with this, it is important to consider the fact that the use of pastures requires much less labor than the feeding of hay, and that good pasture is at least equal to, if not better than, hay as feed for cows. Such returns as these fully justify the use of some of the best land on the farm for irrigated pasture.

Not all farmers who have tried irrigated pastures have obtained satisfactory results, but in most cases the failures have been due to causes which might have been prevented. One common error is the belief that the pasture should occupy that part of the farm which does not produce satisfactory yields of farm crops. Many have attempted to produce pasture on shallow soil or land that is rocky and unsuited for pasturage. Careless preparation of soil and poor seed are also common causes of failure. Low carrying capacity frequently is due to the fact that only grasses are used, whereas it is desirable to include one or two clovers. Overstocking, particularly during the first year, grazing when the soil is too wet, and inadequate or improper irrigation are other explanations of lack of success.

Preparing Seedbed.

The circular devotes considerable attention to selection of locations for pastures, preparation of the land, the importance of using fertile and productive soil, making provision for proper irrigation and proper preparation of seedbed. Under the subject of the seedbed, the author writes:

"The seedbed should be carefully prepared and made firm and smooth, so that a satisfactory stand can be secured. It is ordinarily better to provide plenty of moisture in the soil before seeding time than to seed in a dry soil and irrigate immediately afterwards. This is true particularly of heavy soil, on which a tough crust is likely to form after irrigation and interfere with the emergence of the young plants. On light soils, however, where the upper three or four inches dries out very rapidly, it frequently is necessary to seed in dry soil and to irrigate immediately after seeding. In such instances the use of the corrugation method of irrigation during the first year is particularly desirable, and the land should be prepared accordingly."

Pasture Crop Varieties.

Regarding pasture crops the publication says:

"There are in use in irrigated pastures a variety of crops in almost innumerable combinations. In the great majority of cases, however, the best results are secured with a mixture of one or more grasses and at least one variety of clover. Sweet clover alone is used to some extent on a number of projects, but no information has been secured which appears to warrant any general recommendation of this crop in preference to mixed grasses for irrigated pastures. Some cases of sweet-clover bloat have been reported, and it has not been possible to secure any reliable data showing that sweet clover has a high carrying capacity. The use of alfalfa as a pasture crop for cattle or sheep cannot be recommended for the northern projects, because alfalfa so frequently causes loss from bloat. On one of the projects, 55 per cent of the cattle lost during the year 1915 are known to have died from alfalfa bloat. Losses sustained by farmers and in the experiments of the office of western irrigation agriculture of the bureau of plant industry indicate that it is not safe to use even a small quantity of alfalfa seed in pasture mixture. From the information at present available there seems to be no doubt that it is advisable to confine the selection of pasture crops to the grasses and clovers.

"There is little uniformity at present as to the kinds of grasses and clovers used. Some pastures contain only a single grass and no clover, while others have as many as seven or eight grasses and two or three clovers. The use of a single grass or several grasses without clover is considered inadvisable, largely because of low carrying capacity. The use of several grasses which have different habits of growth and different temperature requirements assures more nearly continuous growth throughout the season. For example, some grasses will grow better during cool weather or in times of water shortage than other grasses which, on the other hand, may make rapid growth when the temperature is high or when water is abundant.

"The two clovers most commonly used with the grasses are white and alsike, sometimes one and sometimes both being used. Difficulty occasionally results from clover bloat where the clover has been seeded too heavily or where the conditions are especially favorable to its growth, as they are on some of the projects. Where the pasture crops include several grasses and where not to exceed two pounds per acre of either clover seed is used, the danger of bloat is not likely to be serious. In the selection of corps for irrigated pastures, provision should always be made for variety and high carrying capacity and this necessitates the use of at least one clover and preferably more than one grass."

The bulletin then devotes several pages to pasture mixtures for various soils, method of seeding, irrigation, and management.

DAIRY BULL'S VALUE SHOWN BY OFFSPRING

Farmers Are Advised Not to Sell Sire Until His Daughters Have Been Tested.

C. C. Hayden of the Ohio experiment station is authority for a statement that the dairy bull may be worth more than $3,000 in one year to a dairy herd. He shows that in the station herd one bull produced daughters averaging 153 pounds more butterfat than their dams. If ten daughters produced milk for six years, the total production of this sire would be worth $2,750 more than that of a bull that produced no increase, if butterfat is worth 30 cents a pound.

Since the value of the bull can be determined only by the milk and butter yields of his daughters, farmers are advised not to sell the dairy sire until his daughters have been tested. Buyers should not discriminate against an old bull if he has some high producing daughters, for his value cannot be determined until he is at least four years old.

HOGGING OFF CORN QUITE ECONOMICAL

Purdue Bulletin Outlines Advantages of This Method—Rapid Gains Are Made.

"The opinion that hogging off corn is a wasteful and shiftless practice has been more or less common among good farmers. Feeding tests conducted under average conditions, however, prove quite the opposite. Rapid and economical gains are made by the hogs and satisfactory cash returns received for the corn crop consumed," is stated in extension bulletin No. 48, "Hogging Off Corn," a most interesting and valuable publication issued by the agricultural extension department of Purdue university.