

Self-lighting orchard heated system showing a 1,000-foot line of pots opening mechanically and lighted automatically.

## The Smudge Pot and Its Work

A New Invention to Prevent the Destruction of Fruit by Frost

By Frances Lynne

**T**HE result of many experiments to save fruit trees from frost is the orchard heater or smudge pot of to-day—a simple invention based on scientific, practical principles.

There are any number of different types of heaters—some one has said as many as one hundred. Any fuel may be used, the heater or smudge pot being designed for the special kind of fuel employed. Coal and oil have been the fuels most extensively used, and from the testimony of hundreds of fruit growers in all parts of the country it would seem that oil is held in greater favor because it is more practical and can be handled with much less trouble and labor and with much less expenditure of time.

The secret of success in smudging lies in not waiting too long before starting the fires. Everything should be in readiness for prompt action. The torches for starting the fires should be close at hand and properly prepared. The smudge pots or heaters are placed in the orchard as soon as the buds begin to swell, so as to be in readiness for the first signs of a fall in temperature.

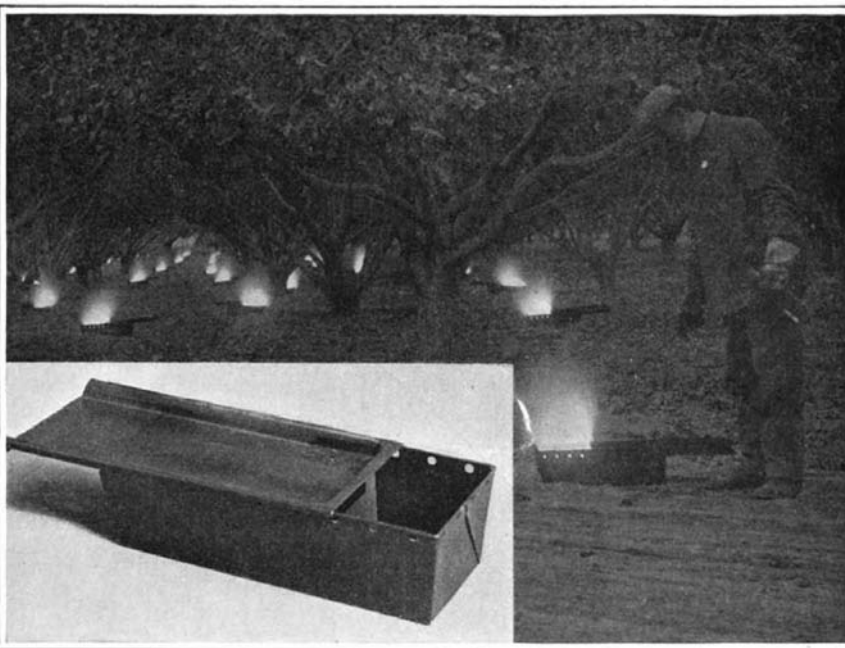
Every orchardist has his own tested thermometers, one for about every five acres, hung on a tree; but he also keeps in close touch with the United States Weather Bureau. When the thermometer shows signs of falling, warning is sent from the Bureau to the fruit growers far and wide. At the first sound of alarm, the men are up and doing.

During the smudging time, which often extends over a period of from ten to thirty hours, one man is generally selected as foreman to oversee a certain amount of land, direct the several men under him and keep close watch on the thermometers, heaters, etc. When the signal to light up is given each helper takes a lighted torch and a can of gasoline and begins to draw the covers. As the cover is drawn a certain amount of gasoline is thrown over the surface of the oil, the lighted torch is then passed over the heater and the fuel takes fire at once. Immediately a dense cloud of smoke arises and covers the region to be protected. This prevents heat radiation from the earth's surface and safeguards the buds of the fruit trees from the rays of the sun.

A new self-lighting orchard heating system has been invented which promises to minimize the work incident to the smudging season and prove of inestimable value to the fruit growers. This device may be attached to the various kinds of heaters in such a way that it lights the pots instantaneously with mechanical appliances, thus doing away with the task of lighting each heater separately. So rapidly



Refilling oil heaters from a tank on wheels by means of a hose.



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The oil heater in operation in Grand Junction, Colo. The oblong type of reservoir orchard heater is used.



A Colorado orchard which will be saved from frost if necessary by oil heaters. The insert shows the round type of oil heater.

THE SMUDGE POT AND ITS WORK

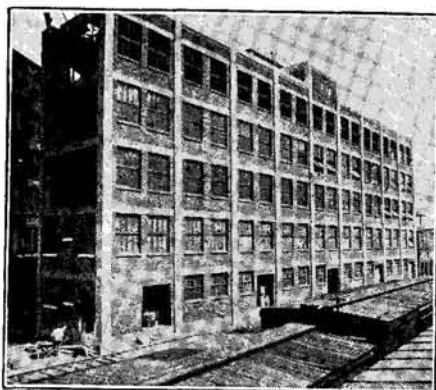
are the heaters ignited that a vast amount of oil is saved, as it is not necessary with this new invention to light up until the thermometer indicates that frost is in the vicinity.

By means of the self-lighting equipment a line of a quarter of a mile of smudge pots can be lighted instantaneously. It may be attached to any style of smudge pot now on the market, the overhead system being used to operate the round style of pot and the ground system for the oblong heater. The illustration shows the system equipped on the round and oblong types of pots. The system, when operated with the round pot, consists of two overhead wires running down through a row of trees from a post, with reel and lever attached, to the end of the orchard. The overhead wire, which is erected about seven feet from the ground, may be conveniently run through the limbs of the trees or between rows as desired. From the overhead line a wire extends to each pot lid, which connects with a chemical cartridge placed on a holder attached to each pot. This wire is made in two lengths, a long and a short, the object of this being that when the lever is turned once around every other pot is mechanically opened and the self-lighting chemical cartridges are brought into position and lighted instantaneously without any further operation. When the cartridge is opened, blazing gasoline flows therefrom onto the crude oil. Upon a second turn of the lever the intermediate pots are opened and lighted. The system is designed upon this construction for the reason that when a minimum amount of heat is required the number of smudge pots in operation is only every other one throughout the orchard. If the temperature requires additional heat it is immediately obtainable simply by an additional turn of the lever, and the full number of pots are put into instantaneous operation. The rapidity of the work and the economy of oil is self-apparent with this method of operation, for it is entirely unnecessary to light up an hour ahead of frost.

In equipping an entire orchard with the self-lighting orchard heater system the levers are placed in a centrally located row so that when smudging time comes, all that is necessary is to throw the series of levers and the whole orchard, within a few minutes' time, is ablaze with smudge pots to meet any needs of temperature. The chemical cartridges are renewed at the time the pots are refilled and the entire smudging apparatus is then all ready to overcome the next frost.

The self-lighting system when adapted

(Concluded on page 140.)



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## The Rural Motor Vehicle

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Regarding as a constant the time consumed between the dairy and the point of delivery, the variant became the load to be carried. This, however, was merely a matter of horse-power of engine and size of body. The interesting point that has been worked out is the construction of the body. On each side of a center aisle are tiers of compartments. The top few inches under the roof are packed with ice. Syphon cooling is maintained as on the transcontinental railway fruit expresses. By the use of the motor vehicle in this method all the advantages of shipping by milk train are had and the advantages are secured of direct delivery to the distributors.

Unfortunately there are no accurate figures showing the comparative costs of operating vehicles within the capacity ranges of one-half to one and one-half tons, as between the horse and the gasoline vehicles. This particularly applies to such as are used for farm work. The main appeal is the saving of time, for time, or rather the moment of delivery, frequently spells a difference in profits secured. In fact it may be well questioned whether or not exact figures can ever be arrived at for farming comparisons.

Setting aside the tractor gang plows of the northwest wheat fields, tilling of the soil by motor has reached only small proportions and these mostly in England. Occasional instances have been published where the automobile has been rigged up to saw wood and other similar jobs about the farm, but those have always come from personal initiative. As these instances widen it is not too much to expect, at least in prophetic spirit, that tilling usages will come, but from the initiative of personal ownership rather than from concerted effort on the part of the manufacturers, the varying conditions presenting a not attractive field to well-regulated factory practice.

The elimination of the horse on the farm in hauling, if not in tilling, will increase the effective acreage for man's food products by just so much as it cuts down the acreage needed for raising feed for the horse. This added productiveness on any farm must count in favor of the automobile in comparing its cost with that of horse maintenance.

With the constantly increasing co-operative marketing of farm products, there comes into play the large truck. Here the problem measurably approaches the haulage conditions of large business houses in the cities, the one difference being that in its connection with large farming operations the truck would probably not be in use for so many total days in the year. Unlike the case with the smaller truck, there are to be had many lists of figures showing the costs of hauling, as applied to the large trucks with a capacity of three tons and over. The quality of these lists vary from general statements to careful analysis where every item is given, based generally on experience, covering gasoline; oil; grease and waste; wages; storage; depreciation, varying from 15 per cent to 20 per cent; interest; taxes; insurance of all classes; periodic inspection; overhaul and current repairs, and tires based on a flat renewal of one set per year, or on a continuous mileage guarantee. Taken as a total the sum of these items for each year about equals the first cost of the truck where it is in use for a full day on all working days of the year. It is therefore obvious that the cost per day is nearly fixed and the cost per ton for hauling must vary with the load weight per trip.

In large farm work there would be a considerable difference from the above total, because, as with all farm machinery, there would be considerable periods of rest. This would mean that the only fixed figures would be those applying to interest, insurance and taxes. All the other items would change, some in direct proportion to the time used and others would depend on the locality for

their ratio of change. On the whole, the motor truck, of any size, on the farm will soon come to be recognized in the same light as is now all farm tool machinery. Its first cost and the immediate costs of operation will be minor factors in face of the volume, combined with dispatch, of the services rendered while in operation.

## The Smudge Pot and Its Work

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to the oblong type of pot is in principle essentially the same, a slight difference being made in the arrangements of the connecting wires. The heaters are placed in the orchard at required distances and from a lever extend two parallel wires attached to the lid of each heater, and so on from heater to heater to the last tree in the row. A self-lighting cartridge is placed upon a holder attached to the end of each heater and also connected with the lid of the heater by means of a hook. The reel at the end of every row of heaters is constructed with a gage which regulates the size of the opening of the heaters. By turning the lever to the first point the lids of the heaters are opened a distance of three inches and simultaneously with this operation all of the heaters are lighted, thus giving a minimum amount of heat on the entire line. If the temperature is to be raised the lever is turned to the next point and all of the lids of the heaters are opened two inches wider. If this opening is not sufficient, another movement of the lever throws all of the heaters wide open and the maximum amount of heat is obtained.

The self-lighting system on this type of heater is also arranged with mechanical means of closing the lids on each row by a single operation should the temperature have been raised and a lesser degree of heat be required. This arrangement is designed to give to the operator perfect control over every line of heaters in opening, closing, lighting and extinguishing by mechanical devices, thus doing away with manual labor as well as effecting a large saving in oil. Thus, by the convenience which this self-lighting system affords one man can operate a large acreage of orchard heaters.

The self-lighting cartridge which is the medium of igniting the pots is of simple construction. It is made of treated paper and consists of self-lighting chemical agents placed in a tube within the container. The space surrounding the tube is filled with gasoline, and a sealed cap covers the container. The operation of the cartridge is accomplished simply by breaking the cover seal, which is done automatically as the lid of the heater is thrown open by the lever. The chemicals burst forth with a large flame, and simultaneously the blazing gasoline in the cartridge flows out upon the crude oil in the heater and in turn ignites it. The cartridge never fails to light. The cartridge is made of treated weather-proof paper, to reduce the cost of manufacture. When one cartridge is used it may be readily removed and another attached.

Last year nearly \$3,000,000 dollars were at the mercy of frost in Colorado alone. The residents of Grand Valley meant business, held a mass meeting at which over 900 business men and orchardists participated. The latter told of the efficacy of smudging and the success with which they had met in the use of orchard heaters. A square block of the city of Grand Junction was covered with smudge pots of different varieties and designs, and numerous demonstrations were given.

A \$3,000,000 fruit crop is not to be sneered at. So the railroads, oil and fuel companies promised co-operation, while the trades and labor assembly also lent assistance.

## The Model Boat "Froude"

(Concluded from page 136.)

steamers there is only one place—that planned for it by the builder. The construction does not permit of its being moved. Prof. Peabody accordingly had trial runs made with the propeller placed



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