Dec. 11, 1934. L. G. MANESS ET AL 1,983,862

SOIL WARMING DEVICE AND METHOD OF MANUFACTURING SAME

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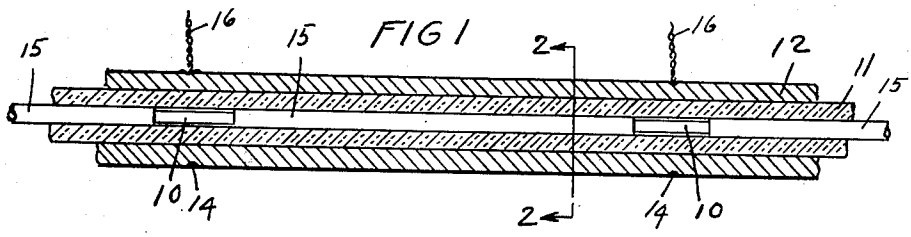


FIG 1

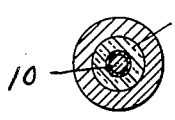


FIG 2

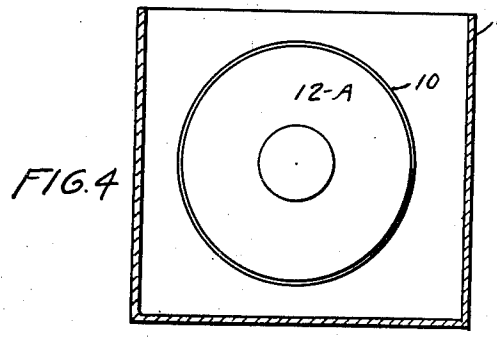


FIG 4

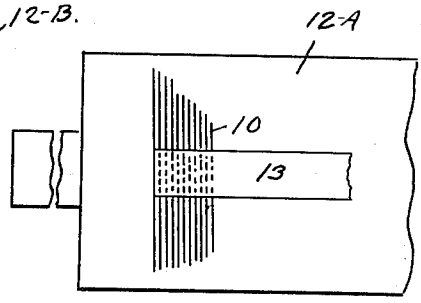


FIG 3

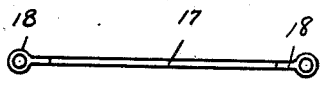


FIG 5

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SOIL WARMING DEVICE AND METHOD OF MANUFACTURING SAME

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3 Claims. (Cl. 219—19)

This invention relates generally to devices for converting electrical energy into heat, and particularly to a soil warming device and a method of manufacturing same.

Before entering into an explanation of this invention, it will be understood that the advantages of warming the soil for the purpose of increasing the rapidity of the growth of plant life are rapidly becoming known. It is also well known that the feasibility of the system is largely dependent upon the amount of power consumed and the rate paid therefor.

The main object of this invention is therefore to provide a form of soil warming element which will be economical in its use of power and also exceedingly simple and inexpensive to manufacture.

The second object is to so construct the warming element that it will actually expedite the process of planting, and also that the plants may be accurately placed with relation to the warming element in order to provide the maximum amount of warming action for the given consumption of power.

The third object is to form a heating element in which only portions of the element are heated while other portions are relatively cool.

These, and other objects, will become more apparent from the specification following as illustrated in the accompanying drawing, in which:

Fig. 1 is a longitudinal section through a portion of the soil warming element.

Fig. 2 is a transverse section taken along the line 2—2 in Fig. 1.

Fig. 3 is a side elevation of the apparatus used for forming the warming element.

Fig. 4 is a sectional view through the plating tank showing the arbor.

Fig. 5 is a view of a heating element whose ends are plated.

Similar numbers of reference refer to similar parts throughout the several views.

Referring in detail to the drawing, there is shown a continuous resistance element 10 which is surrounded by the usual insulating material 11 which, in turn, is covered by a yieldable waterproof sheath 12, preferably lead or copper.

Our device differs from those now in use in that the resistance element 10 does not have uniform resistance to the flow of current along the length thereof, but is alternately a good and poor conductor of electrical energy. Naturally those portions of the element which offer the most resistance to the flow of current will give off the most heat; therefore the resistor will not emit heat at a uniform rate along its length, but only at spaced intervals which correspond with the spacing of the plant hills in a row.

Although this result may be attained in different manners, such as by rolling the resistance element into unequal cross sections along its length or by building up the nominal diameter of a wire, for example, by crimping a clip around same or welding additional conductor metal along those portions of the wire not intended to give off heat. We prefer, however, to employ a special process which is substantially as follows:

Assuming that a warm spot is desired at each three foot interval to correspond with three foot plant spacings, it is only necessary to wind the bare wire 10 on an arbor 12A whose circumference is three feet. A line 13 of paint or other material which will prevent the deposition of metals thereon is now formed along the wound wire (as shown in Fig. 3) and the exposed portion of the wire covered with a plating or coating of metal applied by any of the well known processes.

In this instance we have illustrated a plating tank 12B. Copper is a very desirable metal, due to the fact that it is an excellent conductor and adheres readily to the ferrous metal of the wire 10. Also, in view of the fact that only a relatively low degree of heat is developed, there will be practically no deterioration in the plating or any other portions of the warming element.

It can be seen from the foregoing that by plating a low resistance coating around alternate sections of the resistance wire, these sections are kept at a lower temperature than are the intervening sections, and that by so doing heat is not wastefully dissipated along the plant row between its hills. In actual practice, where a three foot spacing is employed with a six inch warm spot, between one-fourth and one-sixth as much current will be required as would be if the entire wire were heated. Moreover, the thin coating of plating required to sufficiently reduce the resistance of the wire 10 is not sufficient to noticeably affect the flexibility thereof.

In order to facilitate the placing of the plants with relation to the warm spots, it is found desirable to either employ a marking cable which is placed on top of the ground directly above the warming wire 10, the cable being provided with marks spaced to conform with the warm spots, or to roll circumferential grooves 14 in

the lead sheath 12 between the plated sections 15, which plated portions are of course the cold spots. A flexible marker 16 of treated twine or other material is secured within each of the grooves 14.

While we have referred to this process mainly for the purpose of reducing the heat losses between the hills of a plant row, it will be understood that it is equally applicable to the treatment of terminal ends of numerous types of electrical conductors, providing thereby a better connection due to the reduction in corrosion and the maintenance of a lower temperature than is otherwise possible.

In Fig. 5 is illustrated a resistance element 17, the conductivity of whose ends 18 is increased by plating same, for the same reason as given for the making of the first described device, namely to prevent a rise in temperature at those points of the resistor where it is not needed, as in the soil warmer or where it is detrimental to the element itself (as shown in Fig. 5).

It is a well known fact that in all types of heating elements the trouble normally occurs at the points of connection, due to the fact that the usual ferrous heating elements are subject to corrosion causing an arcing to take place and the development of more heat at the connections than actually exists between the ends of the resistor.

It can, therefore, be seen that our invention has a wide field of usefulness, and it is not our intention to be limited to either of the precise forms shown herein, but intend to cover all such forms and modifications thereof as fall fairly within the appended claims.

We claim:

1. A method of forming soil warming elements consisting of progressively winding a resistance wire on an arbor having a predetermined circumference, then coating a section of each coil along the length of the arbor for the purpose of preventing the metal thereof from uniting with other metals, and then depositing a metallic coating of low electrical resistance upon the uncoated portions of the wire on said arbor.

2. A soil warming element including an elongated heating element composed of a resistance wire having alternate sections thereof plated with a metal having less electrical resistance than does the metal in the resistance wire, an electrical insulation surrounding said wire, and a moisture excluding shield surrounding said insulation, said element providing a source of warm spots along its length at fixed distances from each other for the purpose of heating only those portions of a plant row occupied by plants.

3. An article of manufacture consisting of lead sheath resistance wire having a series of elongated sections thereof plated with metal having a higher co-efficient of electrical conductivity than does the metal in said resistance wire, and shorter intermediate sections of unplated wire constituting the warming portions of the element, the distances between the warming spots equaling the distances between the plant centers in a row under which said element is placed.

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