

DEVICE FOR PROPAGATING
BEAN-SPROUT OR OTHER PLANTS

The present invention relates to a device for propagating sprouting beans such as green beans and soya beans, etc. In order to germinate and grow bean sprouts successfully, we take the advantage of the growing strength of the beans during their growing stage to effect automatic watering wherein the necessary moisture is controlled for such a specific purpose.

Since the germination and sprouting process of a bean does not take place on a straight line of the growth curve, but rather it grows slowly in the initial stage then grows and spreads rapidly at the final stage. Moreover, it can not survive long submerged in water or it will rot and smell. A sufficient amount of water should therefore be supplied constantly during the short time when it needs moisture so badly, until it reaches full maturity. So far the previous conventional technique for bean-sprouting mainly relies on manual watering day and night. However to accomplish bean sprouting one or half a days work is required to finish and this is particularly hard work.

It is an object of the present invention to overcome the disadvantages of manual watering and provide a new and workable technique for automatic watering in bean sprouting. It is desirable that the structure of the machine be simple and the cost thereof reasonable.

It is also an object of the invention to provide a device which is suitable for family use or large scale production.

The prime feature of the device is that it requires no outside power or energy to make bean sprouting automatic.

In its broadest aspect the invention comprises a device for propagating plants comprising a water reservoir in liquid communication with a seed and/or plant container, and an irrigation control member displaceable in the container by the growth of the seed and/or plants so as to cause or permit water to flow from said reservoir to the container.

According to the invention there is provided a device for propagating bean-sprouts comprising a water reservoir in liquid-communication with a seed and/or plant container and an irrigation control member within the plant container displaceable by the growth of the seed and/or plants; said reservoir having outlet means co-operable with said control member such that with progressive growth, the effective level of the operable part of the outlet means in the reservoir may lower the level of water in the reservoir means in regulated manner in dependence of the rate of growth of the plants.

In a preferred embodiment the device comprises a water tank as reservoir, a central pipe extending through the bottom of the tank and thereby communicating with the plant and/or seed container, and having a plurality of holes in the walls communicating with the tank, a movable supporting plate in the container acting as irrigation control member, a shaft secured to the supporting plate and extending to the central pipe. The plurality of holes are aligned in the central pipe and can be adjusted to accommodate differences in temperature, humidity and other elements, free from any fixed arrangement. In operation, the plurality of holes are closed by resilient stoppers. The stoppers are circular in section with a slightly slanting face, i.e. are of rounded conical

shape. It is easy for the part of the shaft projecting into said tube when moving with the movable supporting plate along the axes of the shaft, to tap off or dislodge the small stoppers out of the holes. By this action, water in the water tank will accordingly flow into the central pipe. Water sprinkles through tiny holes on the supporting plate over the growing bean-sprouts while the excess water will drain out through an outlet in the bottom of the bean sprouting tank. Thus, as the bean-sprouts grow continually, they push the supporting plate further to carry the stopper dislodging part of the shaft for tapping off or dislodging another small stopper. Through this continued process, the bean-sprouts receive regular supplies of water, until they reach full maturity.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is an exploded perspective view of a propagating device according to the invention illustrating the steps of assembly or dismantling;

Fig. 2 is a section through level outlet means showing the correspondance between the outer tube and a displaceable control shaft;

Fig. 3 is an enlarged fragmentary detail of the tube and shaft in vertical section;

Fig. 4 is a vertical sectional view illustrating the device in the assembled condition;

Fig. 5 is a view similar to Fig. 4 but showing a certain stage in the sprouting of beans therein;

Fig. 6 is an elevation partly in section of an alternative embodiment of the invention;

Fig. 7 is an enlarged fragmentary detail in section of the outer tube and displaceable control shaft of the device; and

5 Fig. 8 is a schematic sectional illustration of the embodiment of Fig. 6.

The propagation device illustrated in Figs. 1 to 5 comprises a water container in the form of a tank 1 having a central draining tube 2 of triangular section and provided with a plurality of aligned drain holes 21 differently disposed on each face. A two part operating shaft 3 extends from apertured supporting plate 4 which is upwardly displaceable by the action of bean seeds 7 sprouting so as to displace stoppers 22 from apertures in tube 2 and effect desired watering. Base plate or disc 5 is located in bean container or tank 6 and supports the bean-sprouts 7 and is apertured to permit water to drain away via drain pipe 61.

15 The device will now be described in greater detail. The holes 21 are orderly aligned on each of the three faces of the tube 2 and offset longitudinally with respect to adjacent rows with the spacing between the apertures, any one face increasing downwardly so that the overall density of apertures in the tube 2 increases upwardly and so that the stoppers 22 in the upper regions of tube 2 may be displaced first by specially disposed projections 32 on shaft 3 to achieve desired watering of the bean-sprouts for the whole of the growing period.

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In this respect growth is slower in initial stages and faster in the final stage of growing. The device requires suitable flow control to meet the difference in elements, temperature and humidity which are vital factors for the growing of bean-sprouts.

Apertures or holes 21 may be blocked by small stoppers 22 which have curved or circular portions secured in the tube 2. As shown in Fig. 3, a circular projecting surface with slight slanting projection 32, upon movement of the shaft bar 3 toward the direction as shown by the arrow, causes the stopper 22 to be pushed out of the hole 21 under the action of the projection 32 on the shaft bar 3. The disposition of the stopper displacing projections 32 of the shaft 3 is matched with the arrangement of the holes 21 in the tube 2 in order to tap off the stoppers 22 orderly and timely. Thus, water in tank 1 flows into the tube 2 thence through the gap between the tube 2 and the shaft 3 and passes by the supporting plate 4 and finally sprinkles over the beans and bean-sprouts.

In order to minimize the size of components for packaging, the shaft 3 is divided into two sections which may be connected together by using joggling machine when needed. The length of each section is identical to that of the tube 2. The upper section is retained against angular displacement by means of three projecting ribs which extend into guide grooves in the tube 2 so that the shaft is guided so as to be displaceable parallel to bore of the tube. The sectional drawing of Fig. 2 illustrates the shape and relationship of the components. Since the tube 2

and the shaft 3 are not firmly interconnected, the shaft 3 is slidable along its axis and the tube 2. In the position of the shaft 3 extended from the base tank 1, a plug 33 portion is inserted in the center hole 41 of the supporting plate 4. When
5 the supporting disc is pushed upwards by the growing strength of beans, the shaft bar 3 is caused to move concurrently in the tube 2.

The many tiny holes 42 on the movable supporting disc 4 serve to help water flow from the holes 21 and through the bean-
10 sprouts located between supporting disc 4 and the bottom plate 5. After sufficient water has been supplied, excess water will be drained out through drain pipe 61 at the base of the bean-sprout tank 6 after flowing through the tiny holes 51 on the bottom plate 5. The arrangement is intended to prevent
15 beans and bean-sprouts from becoming rotten and of unpleasant smell as a result of such being soaked in water too long.

Fig. 4 is a sectionalised elevational view of the assembled device of Fig. 1. A tubular part 23 extends from the base of the tube 2 through a center hole 11 in the bottom 4
20 of the water tank 1 and is fastened in the center hole 11. The beans 7 such as green-beans and soy-beans, etc. are put in the bean sprouting tank 6 located between the supporting plate 4 and the bottom plate 5. When beans are growing, they push the movable supporting plate upwards as indicated by the arrows,
25 by the action of their growing strength originating within.

Thus, the supporting plate 4 which carries the shaft lifts it and makes it move in the tube 2 along the axis of the shaft and thus causes it to tap off or displace the small stoppers from in the holes 21 in desired order from the top and let water from the water tank 1 flow through the tube 2. fig. 5 is a sectional view of the bean-sprouting at certain developed stage, the displaced stoppers 22 being indicated on the bottom of tank 1.

Fig. 6 is a sectional elevation illustrating an alternative embodiment of the invention, wherein a reversed operation is effected. The water tank 1, movable supporting plate 4 and bean sprouting tank 6 are the same as shown in Fig. 1. The bean sprouting tank 6 with a drain pipe 61 at its base and a hooking device 81 over the top connecting with a retaining elastic band 8. As shown in Fig. 8, the other end of the band is connected with the periphery of the supporting plate 4 so that the whole supporting plate is secured, resiliently supported in the bean sprouting tank 6.

The tube 2 is of circular cross section and is punched with a plurality of orderly aligned apertures or holes. As described previously, the interval between the neighboring holes are lined-up as smaller in upper part and larger in lower part. The holes 21 are temporarily closed with small resilient stoppers 22. A plate-like surface 32 on the top of the tubular shaft 31 extends laterally and has a lower slanting edge circular in section. The water tank 1 on top of the bean-sprouts is too heavy to move when the bean-sprouts on the supporting plate 4 are growing, and consequently the growing

action causes the bands to stretch downwardly and the shaft 3 is moved correspondingly since it is plugged into the center hole of the supporting plate 4. The shaft 3 is caused to move axially in the tube 2 and taps off or displaces the small stoppers 22 from the holes 21 step by step as the beans sprout.

The arrangement enables water in the water tank to flow under control into the tube and sprinkle over the bean-sprouts in the growing process, while excess water therefrom flows through the holes in the supporting plate and drains out from the drain pipe.

As indicated, in Fig. 8 which is an enlarged schematic sectional view of a portion of the device of Fig. 6, the plate 4 takes the place of the movable supporting plate of the previous embodiment in order to make the loading of the beans more convenient.

With this invention, the length of time may be adjusted automatically to meet the changes of elements, temperature and humidity. As the seeds germinate faster in high temperature, the shaft 3 moves faster to shorten the watering time accordingly. However, during the low temperature season, the watering time will be lengthened. Thus, the movement of the shaft for dislodging the small stoppers will be slower at such time and thus saves unnecessary waste.

It will be appreciated that the disposition of the projections on the shaft, which with the supporting plate

form irrigation control means and the disposition of the apertures in the central tube of the outer reservoir which forms the adjustable level outlet means enables the required regulation of water flow from the reservoir, the small stoppers
5 being dislodged from the top of the shaft downwardly as the growth progresses.

Various modifications and changes may be made without departing from the scope of the invention claimed.



CLAIMS

1. A device for propagating bean-sprouts comprising a water reservoir in liquid-communication with a seed and/or plant container and an irrigation control member within the plant container displaceable by the growth of the seed and/or plants; said reservoir having outlet means co-operable with said control member such that with progressive growth, the effective level of the operable part of the outlet means in the reservoir may lower the level of water in the reservoir means in regulated manner in dependence of the rate of growth of the plants.
2. A device as claimed in claim 1 in which the reservoir comprises a water tank, in which the reduceable level outlet means comprises an upwardly extending tube located in said tank with a plurality of drain holes in said tube extending from the top to the bottom along the length of the tube, and in which the irrigation control member is a movable plate displaceable by the growth of the plants and having a shaft carried by the movable plate and extending to said tube and having a plurality of projections extending therefrom and adapted to displace temporary closure means located in the holes in said tube to permit water to flow therethrough with the disposition of said projections along the length of the shaft and the disposition of the drain holes being such that the temporary closure means therefor will be displaced sequentially from the uppermost drain hole downwardly.



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3. A device as claimed in claim 2, in which the temporary closure members for the drain aperture comprise small elastic resilient stoppers having a circular cross-section and being tapered so as to provide a slightly slanting surface so that similarly slanting projections on the shaft co-operate to dislodge the temporary closure members.
4. A device as claimed in any of claims 1 to 3, in which a drain outlet is provided at the base of the plant container.
5. A device as claimed in any of claims 1 to 4 in which the plants are supported by a perforated plate.
6. A device as claimed in any of claims 1 to 5, in which the tube in the reservoir is triangular in cross-section and each face has a plurality of aligned holes with the interval between holes and the upper region of the tube being greater than in the lower region of the tube.
7. A device as claimed in claim 6, in which the displaceable shaft has a plurality of alignment ribs co-operable with corresponding longitudinally extending guide grooves in the tube to ensure aligned displacement of the shaft.
8. A device as claimed in any of the claims 1 to 6, in which the tube is circular in cross-section and the top of the displaceable shaft has an enlargement adapted to displace temporary closure members from apertures in the tube upon downward displacement of said member, in which the lower end of the shaft carries a supporting plate for the plants and/or seeds locatable thereabove, and in which resilient means support said plate in a normally upward position although permit displacement downwardly with growth of said plants.

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9. A device for propagating plants substantially as herein described with reference to and as illustrated in Figs. 1 to 5 and Figs. 6 to 8 of the accompanying drawings.

10. A device for propagating plants comprising a water reservoir in liquid communication with a seed and/or plant container, and an irrigation control member displaceable in the container by the growth of the seed and/or plants so as to cause or permit water to flow from said reservoir to the container.
