

March 9, 1926.

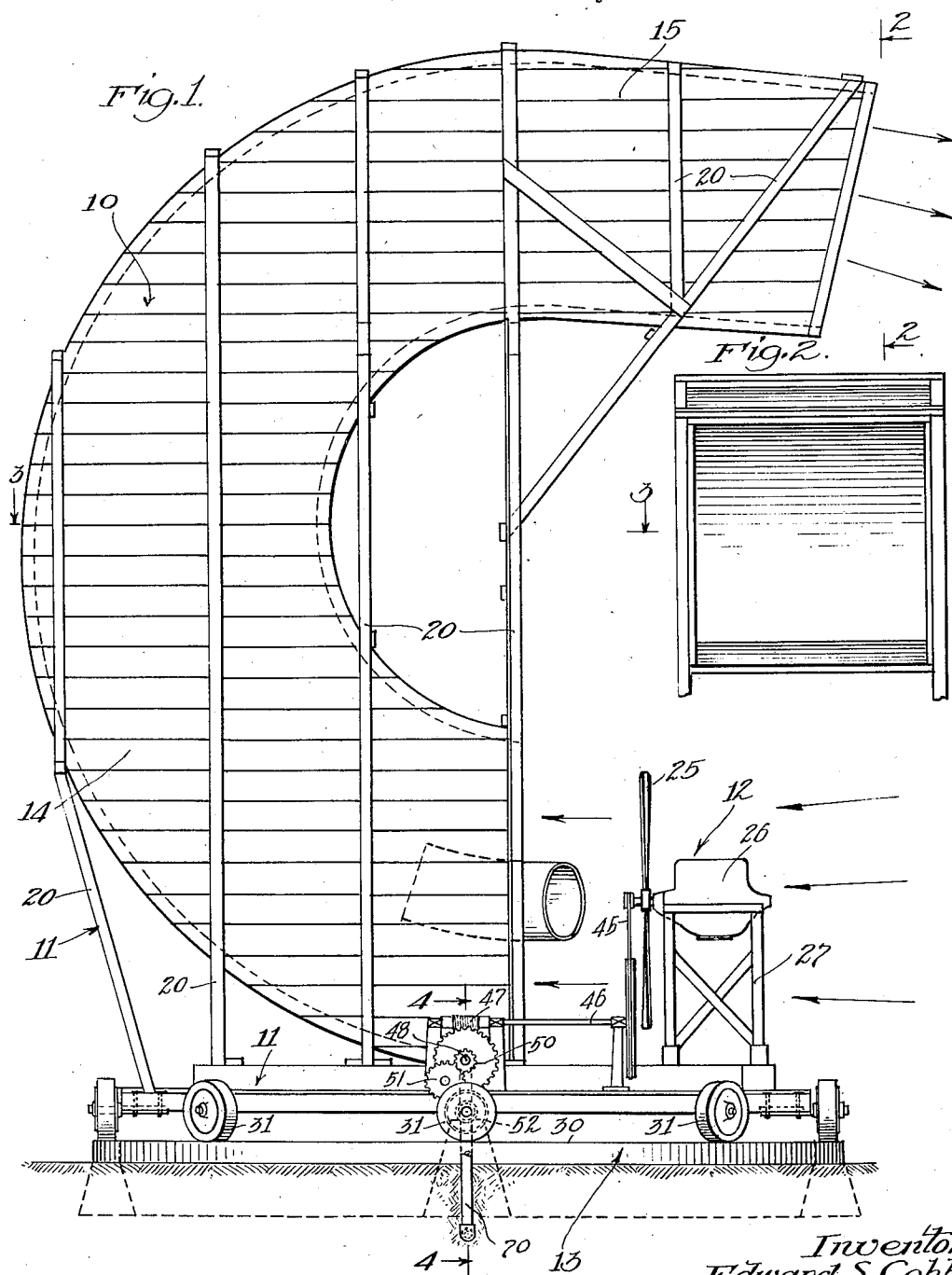
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E. S. COBB

FROST PREVENTER FOR ORCHARDS

Filed August 31, 1921

2 Sheets-Sheet 1



Inventor
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By *James T. Brinkley,*
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March 9, 1926.

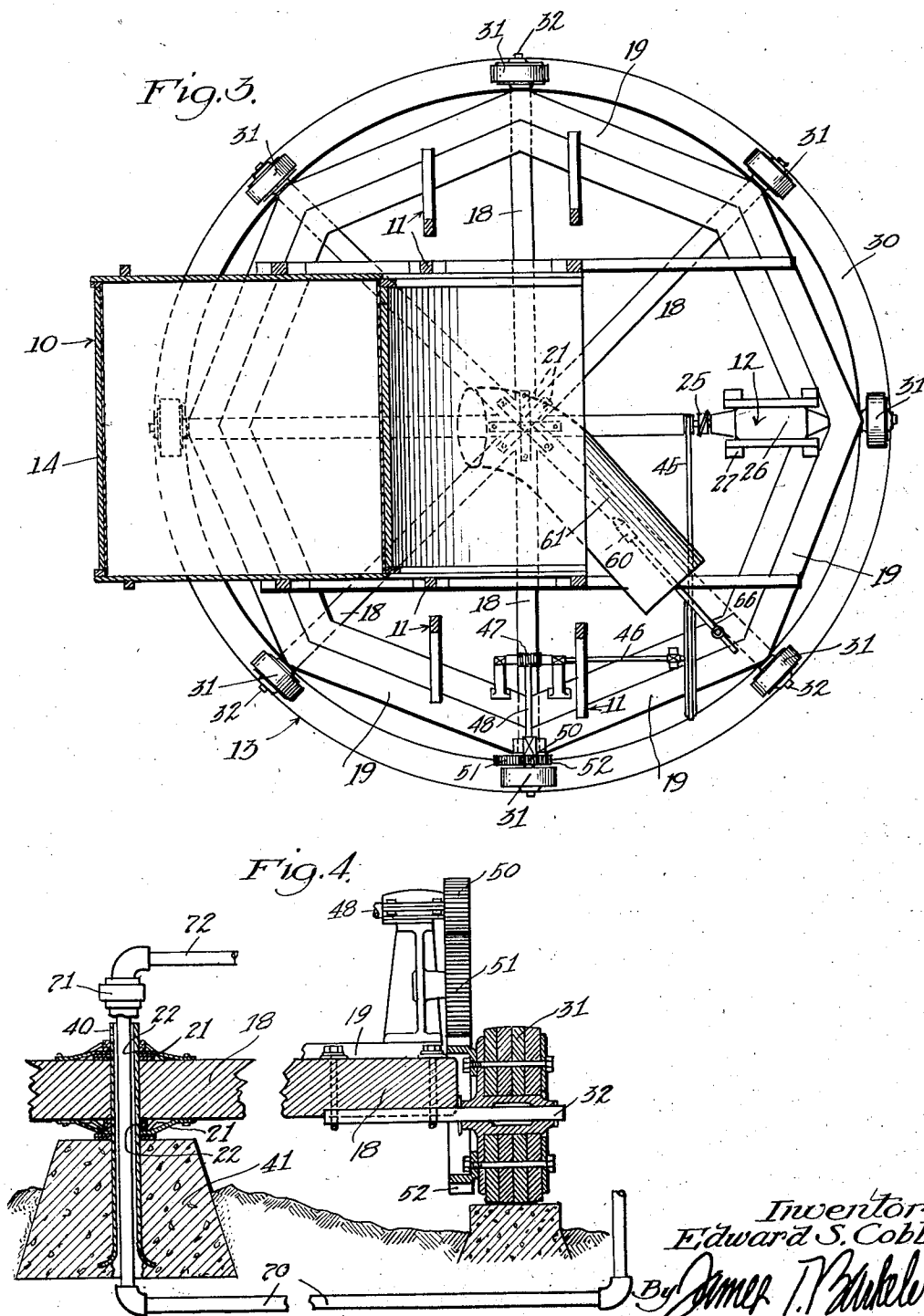
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE.

EDWARD S. COBB, OF WHITTIER, CALIFORNIA, ASSIGNOR TO COBB TEMPERATURE REGULATOR COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

FROST PREVENTER FOR ORCHARDS.

Application filed August 31, 1921. Serial No. 497,231.

To all whom it may concern:

Be it known that I, EDWARD S. COBB, a citizen of the United States, residing at Whittier, in the county of Los Angeles and State of California, have invented new and useful Improvements in Frost Preventers for Orchards, of which the following is a specification.

This invention has to do with apparatus for use in orchards, or other plantations, to prevent injury to vegetation therein in extremely hot or cold weather by causing circulation of air, and it is an object of the invention to provide an improved, simple, effective apparatus of this general character.

The apparatus provided by this invention is particularly adapted to carry out processes such as I set forth in Patent No. 1,357,314, entitled "Process of preventing frost or heat injury in orchards, etc." issued to me November 2nd, 1920.

A distinctive and noteworthy feature of the present invention is the provision of apparatus which will handle air, that is, receive, circulate, and direct air, so that the action of the apparatus is uniform at all times and equal in all directions. By providing an apparatus which operates uniformly and in a manner to have equal action in all directions I have overcome certain difficulties experienced with other apparatus of this general character and have provided an apparatus of particular practical commercial value.

Another feature of the invention is the provision of air circulating and direction apparatus in which the directing of the air is without appreciable loss of velocity and is the same at all times during operation. The fact that the apparatus directs the air without appreciable loss of velocity makes it particularly efficient and therefore desirable commercially. The present apparatus causes air passing through it to follow only one curvature or to be changed in direction only once, which curvature or change in direction is very gradual and therefore does not retard the flow of air to any appreciable extent.

The objects and features of the invention will be best and more fully understood from the following detailed description of a typi-

cal embodiment of the invention throughout which reference is had to the accompanying drawings, in which:

Fig. 1 is a side elevation of the apparatus; Fig. 2 is a face view or front elevation of the discharge end of the apparatus being a view taken as indicated by line 2—2 on Fig. 1; Fig. 3 is a plan sectional view of the apparatus being a view taken as indicated by line 3—3 on Fig. 1; and Fig. 4 is an enlarged detail sectional view of a portion of the apparatus being a view taken as indicated by line 4—4 on Fig. 1.

The apparatus provided by the present invention comprises, generally, a flue designated in the drawings by the numeral 10, a frame 11 which supports or in which is mounted the flue 10, air circulating means 12, and a base 13 which carries the frame 11. The flue 10 is a vertically disposed open ended member or structure having a curved part 14 and a straight part 15. The curved part 14 of the flue is preferably semi-circular in extent and has a comparatively large radius, as shown in the drawings. Air forced or introduced into the lower end of the curved part 14 of the flue 10 flows or is directed around and upwardly by the curved part 14, passes from the curved part 14 into the straight part 15, and finally so that it issues from the upper end of the curved part 14, discharges from the straight part at a point considerably above the point where it entered the flue and in a direction opposite to that in which it entered the flue. The flue extends to an elevation above the plantings to be protected so that it directs the air outwardly over and somewhat downwardly into the plantings. The curved part 14 having a large radius and being of even gradual curvature offers very little resistance to the flow of air through it and therefore does not appreciably decrease the velocity of air circulated through it. The straight part 15 of the flue 10 receives the air from the upper end of the curved part 14 and is sufficiently long and is so disposed as to direct the air outwardly and somewhat downwardly from the apparatus. Under certain conditions it may be found that the straight part 15 can be made very short, or in fact, can be entirely

dispensed with, by designing or continuing the curved part 14 so that it causes the proper directioning and distribution of the air. It is preferred, although not necessary, that the lower or intake part of the flue 10 be somewhat larger in cross sectional area than the upper or outlet portion thereof and that the flue vary substantially uniformly in cross sectional area between its two ends. By making the upper or outlet portion of the flue 10 somewhat smaller than the intake portion, air passing through it is increased somewhat in velocity thus making it possible to use an air circulating means 12 of comparatively great capacity, and not particularly high velocity and yet attain the necessary velocity at the discharge or outlet end of the flue 10. In the drawings I have shown the flue 10 to be substantially square in cross sectional configuration but do not thereby intend to limit my invention for it will be obvious that the flue might be advantageously constructed of cross sectional configurations other than that shown in the drawings and in fact that the flue might be constructed with one part of one cross-sectional configuration and another part or parts of another cross-sectional configuration. Further, in the drawings I have illustrated a design and form of construction particularly applicable to wooden construction because I have found that wooden construction is somewhat more economical than metal or other constructions such as could obviously be employed in carrying out the invention.

The frame 11, which I disclose in the drawings, is a wooden frame of a design particularly suited to accommodate the particular form of flue therein illustrated. The frame 11 comprises, generally, a plurality of horizontally disposed arms 18 which extend radially outwardly from a common center, spacing parts 19 which connect the outer portions of adjacent arms 18 to space and brace the arms, and a plurality of brace members 20 which extend upwardly from the structure formed by the arms and spacers to support or form a frame for the flue 10. The inner ends of the arms 18 are connected or tied together at top and bottom by metal straps 21 formed with openings 22 concentric with the center of the frame. The arms 18 are of uniform length and are sufficiently long to form a base structure which will support the flue 10 so that it cannot possibly fall over or be blown over by wind, etc.

The air circulating means 12 may comprise a propeller 25 arranged in front of the intake opening, or end, of the flue 10 and adapted to be operated by power means 26. The propeller 25 may be of the type used to propel aeroplanes, etc. and the power means may be an internal combustion engine or other power means capable of operating the

propeller at the necessary speed. In the drawings I illustrate a typical internal combustion engine mounted on a frame 27, extending upwardly from the structure formed by the arms 18 and spacers 19, so as to operate the propeller 25 directly. It will be understood, of course, that any suitable power means may be employed for operating the propeller and in fact that any suitable air circulating means may be employed in place of a propeller such as I herein specify.

The base 13 is a continuous annular structure, say of concrete, or the like, having a flat smooth top 30 adapted to carry wheels 31 by which the frame 11 is mounted on the base 13. The base 13 is preferably embedded in the ground so that it forms a solid support or track for the wheels 31. The wheels 31 are carried on spindles 32 which are secured to and extend from the outer ends of the arms 18. There is preferably a spindle 32 and therefore a wheel 31, at the outer end of each arm 18. The wheels 31 are, of course, all of equal size and are supported by the spindles so that they all operate on the base 13.

For the purpose of holding the frame 11 concentric with, or central relative to, the base 13 I provide a fixed pivot member 40 concentric with the base 13 and in position to extend through the openings 22 in the straps 21. The pivot member 40 is preferably carried by a foundation block 41, say of concrete, or the like, which is embedded in the ground. The pivot member in extending through the openings 22, which are concentric with each other and are at the center of the frame structure, holds the frame structure truly concentric with the base 13 so that it can be rotated without danger of its supporting wheels becoming displaced from the base 13.

In accordance with the invention I provide means for operating the frame 11, and therefore the flue 10, so that it rotates or turns on the base 13. In the particular form of the invention herein set forth I provide a driving connection between the power means 26, of the air circulating means, and one of the wheels 31 so that the power means when operating to circulate air will cause rotation of said wheel 31 to rotate the frame at the desired speed. The driving connection which I have shown comprises a belt drive 45 between the power means and a shaft 46, a worm drive mechanism 47 between the shaft 46 and a pinion shaft 48, and a spur gear drive between the pinion shaft 48 and the wheel 31. The last mentioned drive, that is, the spur gear drive between the shaft 48 and the wheels 31, comprises a pinion 50 mounted on the shaft 48, an idler gear 51 arranged to mesh with and be driven by the pinion 50, and a driven gear 52 mounted on one side of the wheel 31 concentrically with the axis

of the wheel to mesh with and be driven by the idler gear 51. The belt drive 45 between the power means and shaft 46 is such as to effect considerable speed reduction between the power means and the shaft 46 and the worm drive mechanism 47 between the shaft 46 and shaft 48 is such as to effect a considerable speed reduction between the shaft 46 and shaft 48. It will be obvious of course, how the driving connections hereinabove described permit of a great speed reduction between the power means 26 and wheel 31 and thus permit of the power means being of comparatively high speed without causing the frame, and therefore the flue 10, to operate or rotate at a high speed. It will be obvious, of course, that the particular driving connection just described, and, in fact, the means of driving the frame just described, are merely for the purpose of illustrating a manner in which the frame may be rotated in carrying out the invention.

In the drawings I show the apparatus equipped with a burner 60 which may be operated to heat the air circulated by the apparatus when such becomes necessary or desirable. The burner 60 is supplied with fuel by a pipe 66 and is arranged at the intake end of the flue 10 so that it will not interfere with the air circulating means and yet will cause effective heating of the air circulated through the flue 10. The burner 60 may be arranged a little to one side of the center of the intake of the flue 10 and may be housed by an open-ended pipe 61 which receives air from outside of the flue and discharges it within the flue. It is desirable to house or protect the burner 60 in some manner so that the air circulated by the circulating means 12 will not interfere with its operation and so that it will not ignite the flue 10 or any other parts of the apparatus in the event that the flue or some parts of the apparatus is constructed of wood or other combustible material.

Energy or material, say for instance liquid fuel or water, etc., may be supplied to the frame through a conduit 70 extending from a suitable point, say from a point outside of the base 13 to a point below the center of the base and frame, and then upwardly through or within the pivot member 40, the pivot member 40 of course being hollow or in the form of a tube when the construction being described is employed. The upper end of the conduit 70 projects beyond the pivot member 40 so that fluid or material can be conducted from the conduit 70 through a swivel joint 71 and a conduit 72, which are stationary relative to the frame 11.

In operation the present apparatus is located at the center of the area which is to be protected by it and when it is necessary to operate it the air circulating means 12 is put into operation. The propeller 25 in op-

erating draws air toward the apparatus from in front of the lower or intake end of the flue 10, and delivers it into the flue 10 at a comparatively high velocity. The propeller 25 in drawing air toward the apparatus in the manner indicated by the arrows in Figs. 1 and 3 causes circulation of air at or close to the ground in the immediate vicinity of the apparatus in front of the intake of the flue 10. The flue 10 upon receiving the air from the circulating means 12 conducts it upwardly and around and finally discharges it outwardly and somewhat downwardly at an elevation considerably above the elevation from which it was drawn and in a direction opposite to that in which it was drawn. The air thus directed outwardly and downwardly by the flue flows or circulates a considerable distance outward from the apparatus and thus causes circulation of air at points or areas opposite the outlet of the flue and outward of the points or areas where circulation is caused by the sucking action of the propeller 25. As a matter of fact, or in practice, there is no dividing line between the area at which the air is circulated by the sucking action of the propeller and the area at which the air is circulated by the flow of air from the discharge or upper end of the flue 10, but on the contrary there is a continuous agitation or circulation of air for a considerable distance outward from the apparatus outwardly of the intake and discharge of the flue 10. All the time that the power means is operating to cause the circulation of air just described the frame 11 and therefore the flue 10 is being turned through the mechanism hereinabove described. Ordinarily the power means 26 operates at a uniform speed and thereby causes the circulation of air to be uniform and the movement of the frame and flue to be uniform. As the frame and flue turn or revolve the direction from which the air is drawn and in which it is directed varies or changes so that upon each revolution of the frame and flue air is drawn from and directed in every direction from the apparatus. The action or effect of the apparatus is uniform in all directions because the relation between the direction from which the air is drawn and that in which it is directed is always the same, and the air is always changed in direction or conducted in exactly the same manner by the flue.

Having described only a preferred form of my invention I do not wish to limit myself to the particular details hereinabove set forth but wish to reserve to myself any changes and variations that may appear to those skilled in the art and that may fall within the scope of the following claims.

Having described a preferred form of my invention, I claim:

1. Apparatus for protecting orchards and

the like, comprising air circulating means movable to receive air from the atmosphere in different directions, and air delivery and directing means directing the outflowing air
5 into the atmosphere in the direction opposite to the direction of its inflow.

2. Apparatus for protecting orchards and the like, comprising air circulating means movable to receive air from the atmosphere
10 in different directions, and air delivery and directing means directing the outflowing air into the atmosphere in the direction opposite to the direction of its inflow, and at an elevation above the inflow.

15 3. Apparatus for protecting orchards and the like, comprising a semi-circular flue with its ends open to the atmosphere, supported with one end above the other and rotatable about a vertical axis, means to rotate the
20 flue, and means to blow air through the flue.

4. Apparatus for protecting orchards and the like, comprising a semi-circular flue with its ends open to the atmosphere, supported with one end above the other and rotatable about a vertical axis, means to rotate the
25 flue, and means to blow air through the flue in a direction from its lower to its upper end.

5. Apparatus for protecting orchards and the like, comprising a frame rotatable on a vertical axis, air circulating means and air
30 directing means both mounted on the frame and rotating therewith, the direction in which air is received by the circulating means being fixedly opposite to that in which the directing means discharges.
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In witness that I claim the foregoing I have hereunto subscribed my name this 20th day of August 1921.

EDWARD S. COBB.