March 1, 1932. M. W. McARDLE 1,847,406

SPRINKLER

Filed June 11, 1927 2 Sheets-Sheet 1

Fig. 1

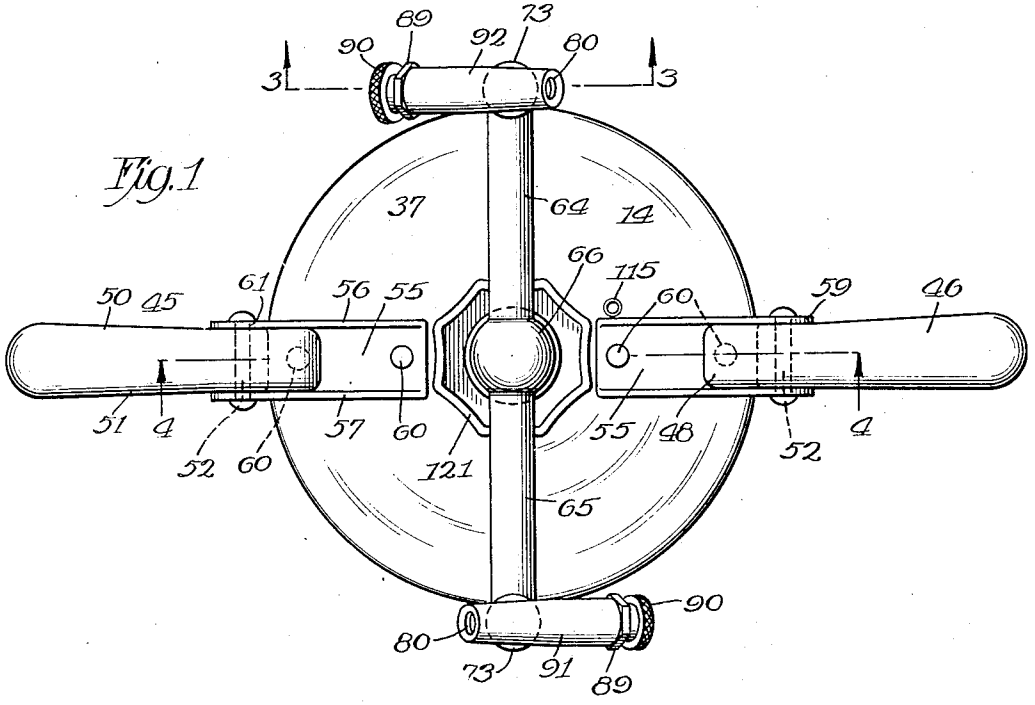


Fig. 2

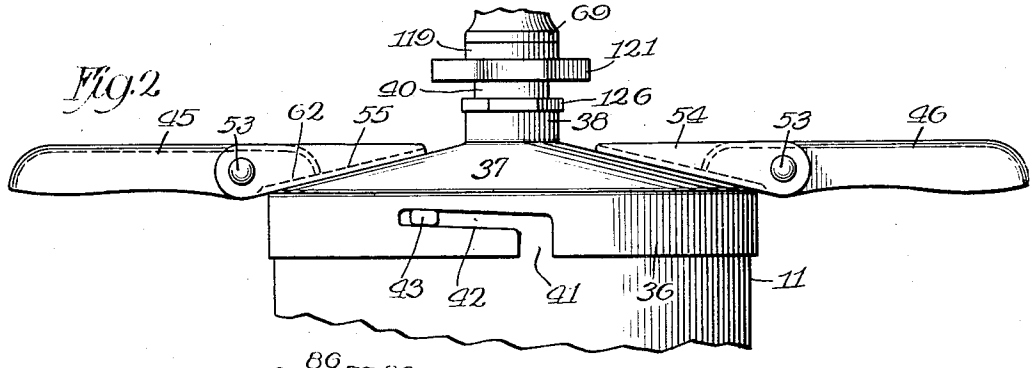
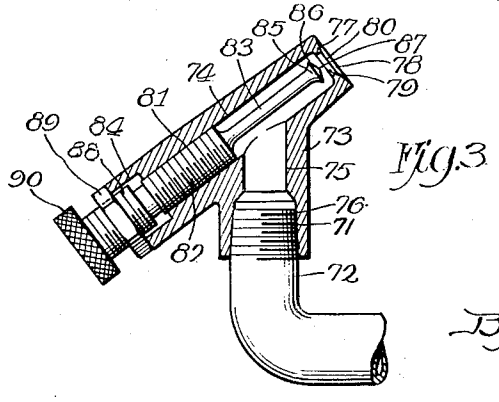


Fig. 3



Inventor:
Michael W. McArdle
By Williams, Bradbury,
McCaleb & Hinkle Attys.

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Fig. 4

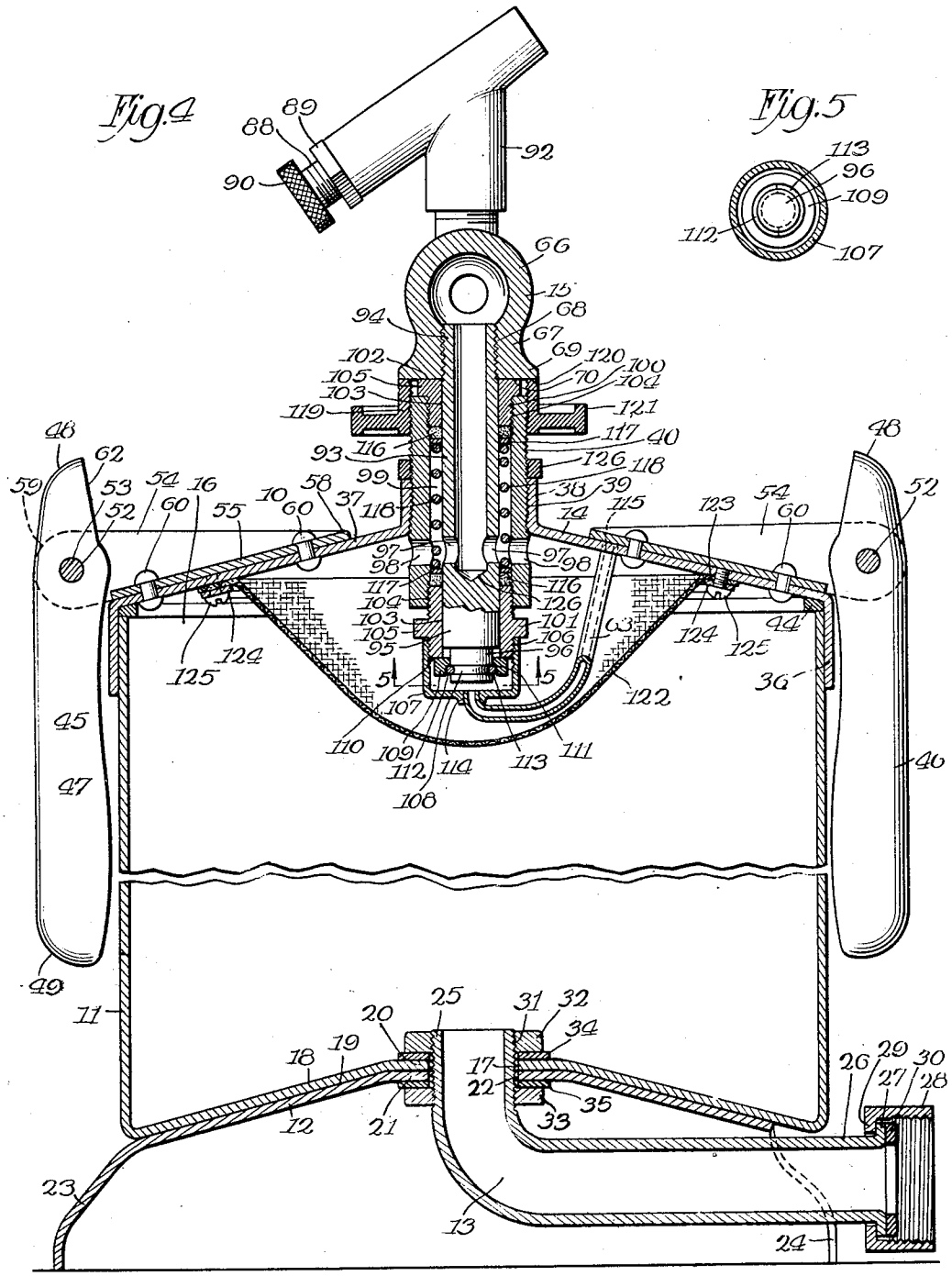


Fig. 5

Inventor:
Michael W. McArdle
By Williams, Bradbury, McCaleb & Hinkle
Attys.

Patented Mar. 1, 1932 1,847,406

UNITED STATES PATENT OFFICE

MICHAEL W. McARDLE, OF CHICAGO, ILLINOIS

SPRINKLER

Application filed June 11, 1927. Serial No. 198,023.

The present invention relates to sprinklers, being more particularly concerned with sprinklers adapted to be used for distributing fertilizer by using water as a vehicle for this purpose.

One of the objects of my invention is the provision of a sprinkler having a reservoir adapted to receive a solvent or semi-solid fertilizer, a sprinkler head in communication with said reservoir for the purpose of receiving and distributing the fertilizer carried by the water, and means interposed between said sprinkler head and reservoir to prevent access to the sprinkler head of solid particles of the fertilizer of such size as might clog the sprinkler head.

Another object of my invention is the provision of a sprinkler of the class described including a reservoir with a quick-detachable cover, means for substantially equalizing the axial pressure on such sprinkler head to reduce the friction of rotation, and means for locking the sprinkler head from rotation during the fertilizing action.

Another object of my invention is the provision of a novel and economical sprinkler assembly of the class described including a stamped metal base, a stamped metal container for fertilizer, a simple hose-connecting means for clamping the base and container together and quick-detachable stamped metal cover having a sprinkler head rotatably mounted therein.

Other objects and advantages of my invention will appear more fully from the following description and from the accompanying drawings which similar characters of reference indicate similar parts throughout the several views.

Fig. 1 is a plan view of my improved sprinkler.

Fig. 2 is a partial elevational view of the same, showing the quick-detachable cover.

Fig. 3 is a detailed cross-sectional view of one of the nozzles on the line 3—3 of Fig. 1.

Fig. 4 is an elevational cross-sectional view of my sprinkler on the line 4—4 of Fig. 1.

Fig. 5 is a detailed cross-sectional view on the line 5—5 of Fig 4 looking in the direction of the arrows.

Referring to Fig. 4, 10 indicates in its entirety my sprinkler, which comprises a reservoir or receptacle 11, a base 12, water supply conduit 13, a cover 14, and a rotatable sprinkler head 15.

The receptacle 11 may consist of a stamped sheet metal receptacle, preferably cylindrical in form, and having its upper end open as at 16 and its lower end formed with an aperture 17. The bottom 18 of the receptacle 11 may slope upward toward the aperture 17, being substantially conical in shape in order that material placed within the receptacle 11 will tend to fall away from the aperture 17 which is employed for connection to the water supply.

The base 12 may consist of a substantially cup-shaped stamped metal member having an upper surface 19 which is complementary to the conical exterior surface of the bottom 18 of the receptacle 11.

In order to provide a flat surface for the engagement of washers, the central portion 20 of the bottom 18 and the central portion 21 of the base 12 may be flattened adjacent the aperture 17. The base 12 is likewise provided with an aperture 22 adapted to register with the aperture 17 and with a downwardly extending flange 23 adapted to form a support for the sprinkler.

The flange 23 of the base 12 may be cut away as at 24 to form a substantially U-shaped aperture in the base for the purpose of receiving the water conduit 13. The conduit 13 may consist of a piece of metal tubing of sufficient length to extend from outside the aperture 24 to the middle of the base 12 where the conduit is bent up at substantially right angles, its end 25 extending through the apertures 17 and 22 of the base and receptacle. The opposite end 26 of the conduit 13 may be formed with an integral annular flange 27 adapted to retain an internally threaded bushing 28 having an inwardly extending flange 29.

The bushing 28 may be provided with a washer 30 resting against the flange 27 and adapted with the bushing 28 to form a watertight connection with a hose or other source of water supply. The inner end 25 of the

conduit 13 may be threaded as at 31 and provided with a pair of non-circular nuts 32 and 33 adapted to clamp the base 12 and bottom 18 between said nuts and a pair of washers 34 and 35 of leather, rubber, soft metal or other sealing material.

The method of assembly of the foregoing parts is as follows:

The coupler bushing 28 may be slid upon the conduit 13 until it reaches the flange 27; and the nut 33 and washer 35 may be threaded upon the end 25 of the conduit. The conduit 13 may then be located in aperture 24 of the base 12 with the end 25 passing through the aperture 22 and the receptacle 11 having been placed upon the base 12 with the aperture 17 over the end 25, the washer 34 may be placed on the end 25 and the nut 32 screwed into place clamping the bottom of the receptacle and the base 12 together between the nuts and washers.

The receptacle 11 may be provided with a stamped sheet metal cover 14 of substantially cup shape with depending annular flange 36 adapted to fit closely about the cylindrical top of the receptacle 11. The top 37 of the cover 14 is preferably slightly conical so as to be adapted to drain any water falling thereon or issuing from an equalizing conduit 63, further to be described, and the cover 14 is preferably provided with an upwardly projecting annular flange 38 surrounding a central aperture 39.

The central aperture 39 may be threaded to receive a supporting sleeve 40 and the flange 38 is adapted to provide an extended area for threaded engagement with said sleeve.

The depending annular flange 36 is provided with an upwardly extending slot 41 terminating in a laterally extending slot 42 which slopes slightly upward. The breadth of the slot 42 is slightly larger than the breadth of lug 43 supported upon the side of the container 11 in position to be received in said slot. The lug 43 may consists of a stamped projection upon the receptacle 11 or of a lug riveted to the receptacle 11. The lug 43 is preferably located in such manner that when the cover is placed upon the receptacle 11 and the upper edge of the receptacle engages a washer 44 in the cover the lug 43 is located at the beginning of slot 42 in the upper end of the slot 41.

The opposite side of the cover 14 (not shown) is provided with similar slots 41, 42, and the opposite side of the receptacle with a similar lug 43. Any number of lugs and slots may thus be provided, being so located that the lugs register simultaneously with their respective slots when the cover is put in place. As the slot 42 slopes slightly upward, when the cover 14 is rotated counter-clock-wise upon the receptacle in Fig. 2, the lower edge of the slot 42 will cam against the lug 43 drawing the cover tightly upon the receptacle 11 and forming a water-tight closure.

In order to carry the sprinkler 10 from place to place and to facilitate the removal of the quick-detachable cover 14, my sprinkler is preferably provided with a pair of handles 45 and 46. The handles 45 and 46 may consist of stamped metal members having a rounded exterior surface 47 at the middle and both ends 48 and 49.

The substantially parallel lateral flanges 50 and 51 may be provided with aligned apertures 52 adapted to receive a pin 53 for pivotally connecting the handles 45 and 46 to the brackets 54. The brackets 54 may comprise stamped sheet metal members having a flat web 55 and a pair of upwardly projecting flanges 56 and 57. The flanges 56 and 57 may be substantially triangular in shape, tapering from the upper edge 58 of the brackets to a width substantially equal to that of the flanges 50 and 51 at the rounded end 59.

The flanges 56 and 57 may extend beyond the web 55, the latter terminating at the edge of the cover 14 and web 55 may be secured to the cover by a plurality of rivets 60 or other convenient fastening means. The projecting ends of the flanges 56 and 57 may be provided with aligned apertures 61 adapted to register with the apertures 52 and the pin 53 may pass through the apertures 52 and 61 and be riveted at each end to permanently connect the handles 45 to the brackets 54.

The structure of the brackets and handles upon each side of the cover may be identical and the handles are preferably located at diametrically opposite points. The apertures 52 in the handles 45 and 46 are preferably located slightly below the upper ends 48 of the handles so that said ends project slightly above the brackets 54. It will thus be observed that when the handles 45 and 46 are pivoted outward on their brackets, the edges 62 of the flanges 50 and 51 at the upper end of the handles are adapted to come into contact with the web 55 of the bracket, limiting the upward movement of the handles 45 and 46. The handles 45 and 46 may thus be adapted to project outwardly at substantially right angles to the receptacle 11 in position to facilitate either the lifting and transportation of the receptacle or the use of said handles for rotating the cover 14 upon the receptacle to effect a water-tight closure.

The sprinkler head 15 comprises a cast metal member having a pair of tubular arms 64 and 65 projecting in opposite directions from the substantially spherical juncture 66. The juncture 66 of the arms is formed with a downwardly extending annular flange 67 having a threaded aperture 68 connecting with the arms 64 and 65. The flange 67 may be made thicker as at 69 being provided with

a flat lower surface 70 to provide a thrust bearing for the sprinkler head.

The sprinkler head 15 may of course be provided with any number of arms 64, 65, preferably located symmetrically about the juncture 66 and all communicating with the aperture 68. The outer ends 71 of the arms may be turned up at substantially right angles to the arms and threaded as at 72 to support nozzle 73. The nozzles 73 comprise cast metal members of substantially Y shape having a tubular conduit 74 connecting with a supporting conduit 75, preferably at an angle of substantially 45°. The supporting conduit 75 of the nozzles may be provided with a threaded counter-bore 76 adapted to receive the threaded end 72 of the sprinkler arms and the direction in which the nozzles point may be adjusted by rotating the nozzle point on its threaded end 76.

The tubular conduit 74 of the nozzle may be provided with an inwardly extending flange 77 having an outer surface 78 which is slightly conical and the flange 77 may also have a slightly conical edge 79 forming a relatively sharp nozzle aperture 80. The conduit 74 of the nozzle may be threaded below the supporting conduit 75 as at 81 to receive a threaded stem 82 of a nozzle valve 83 and the lower end of the conduit 74 may be counter-bored as at 84. The nozzle valve 83 may comprise an elongated member threaded to be received in the threaded portion 81 having a relatively narrow stem 83 extending from said threaded portion to valve 85. The valve 85 comprises a disc like enlargement of the stem 83 having a sharp outer edge 86 and an obtuse conical forward surface 87, the size of the disc being such that it will just pass the nozzle aperture 80.

The opposite end of the nozzle valve supports a threaded portion 88 provided with a locknut 89 and the valve terminates in a knurled head 90 adapted to be used in adjusting the nozzle valve. It will thus be obvious that the nozzle valve 85 may be adjusted to any desired position in the nozzle aperture 80 so that the nozzle is adapted to furnish a wide variety of types of streams varying from a full stream to a fine spray and the valve may be fixed in adjusted position by the locknut 89 engaging the end of the conduit 74.

The nozzles 91 and 92 may also be turned toward each other in substantial alignment with the arms 64 and 65 in such manner that the streams issuing therefrom meet at substantially right angles separating and diffusing each other to uniformly spray the fertilizer in all directions about the sprinkler. The sprinkler head 15 is supported upon a tubular shaft 93 having a threaded upper end 94 adapted to be received in the aperture 68, and having a lower end 95 which is closed and turned down as at 96. The tubular shaft 93 may be provided with a plurality of lateral ports 97 near its lower end and the bushing 40 may be provided with a plurality of ports 98 located substantially opposite the ports 97.

The size of the tubular shaft 98 is considerably less than the internal diameter of the sleeve 40 thereby providing an annular chamber 99 between these members and the sleeve 40 is threaded at each end to receive bearings 100 and 101 for the tubular shaft 93. The bearing 100 may comprise a bushing which has a flat upper surface 102, a cylindrical inner surface 103 and a threaded outer surface 104 adapted to be received in the internally threaded end of the bushing 40. The bearing 100 is preferably provided with an annular projecting flange 105 determining its final position when threaded in the bushing 40.

The bearing 101 may be of similar shape having an outer threaded surface 104, an inner cylindrical surface 103 and an outwardly projecting flange 105 but the bearing 101 is also provided with a downwardly projecting threaded end 106 adapted to support the cap 107. The reduced end 96 of the tubular shaft 93 is provided with an annular groove 108 of substantially semi-circular cross section and the reduced end 96 is adapted to receive a retaining ring 109 of sufficient size to bear against an end 110 of the bearing 101. The retaining ring 109 fits snugly upon the reduced end 96 and is provided with an inner annular groove 111 of substantially the cross section of a quarter of a circle.

It will thus be observed that the grooves 108 and 111 form a closed groove of substantially the cross section of approximately three-quarters of a circle in which a number of curved retaining pins 112 and 113 may be received. The retaining pins 112 and 113 are short lengths of wire of a size and shape adapted to fit within the groove 108 and 111, each extending one-half way about the reduced end 96.

The cap 107 comprises a substantially cup shaped member internally threaded at its upper end to be received upon the end 106 of the bearing 101. The cap 107 is provided with an aperture 114 in its bottom and extending from the aperture 114 to an aperture 115 in the cover is a conduit 63 in the form of a curved length of tubing. As the cap 107 and cover 14 are fixed relative to each other the tubing 63 may be soldered or riveted in place in the cap 107 and cover 14 when the sprinkler is finally assembled.

The tubular shaft 93 is provided within the chamber 99 with a gasket 116 at each end of said chamber the gasket being held in place by metal washers 117 and a helical compression spring 118 tensioned between said washers. The sleeve 40 also supports at its upper end an internally threaded collar 119 having an upper edge 120 adapted to be

forced into engagement with the sprinkler head 15 to fix said sprinkler head from rotation, and having an outer wheel 121 for convenient grasp in actuating said collar.

The cover 14 is also provided with a screen 122, preferably of non-corrodible metal, of substantially cup shape and adapted to enclose the lower end of the sprinkler head about the ports 98 and prevent the access of solid particles to the sprinkler head, of such size as might clog the nozzles. The screen 122 may be provided with an outwardly extending annular flange 123 adapted to fit against a lower surface of the cover 14 and secured in place by a metal ring 124 and a plurality of screws 125 passing through said ring and screen flange into the cover 14.

The assembly of the parts of the sprinkler head and cover is as follows:

The sleeve 40 may be threaded into the cover 14 from its lower side to the position shown in Figure 4 and secured in place by a locknut 126 after which the tubular shaft 93 may be firmly screwed into the aperture 68 of the sprinkler head. The upper bearing 100 may then be screwed into the sleeve 40 and the collar 119 threaded upon the upper end of the sleeve 40. The tubular shaft 93 of the sprinkler head may then be inserted in the bearing 100 and the gasket 116, washer 117, spring 118, washer 117 and gasket 116 placed upon the shaft 93 in the sleeve. The lower bearing 101 may then be screwed in place compressing the spring 118 which forces the gasket 116 into engagement with the bearings 100 and 101 forming a water tight closure about the shaft 93 at the upper and lower ends of the chamber 99.

The lower bearing 101 may be screwed in to a distance slightly greater than that shown in Figure 4 and the retaining ring 109 placed on the end of the reduced end 96. In this position the groove 111 of the retaining ring will be slightly above the groove 108 on the reduced end so that the curved retaining pins 112 and 113 may be inserted. If the retaining ring 109 is then slid downward into the position of Fig. 4 the retaining pins 112 and 113 will be held in place by the retaining ring 109. Conversely the curved pins 112 and 113 will resist the downward motion of the retaining ring 109 and the bearing 101 may be screwed out to the position of Figure 4 engaging the retaining ring. It will thus be observed that the grooves and retaining pins furnish a simple and conveniently assembled thrust bearing for the lower end of the tubular shaft 93. The cap 107 may then be threaded in place upon the lower end of the bearing 101 and the conduit 63 soldered or riveted in place.

The operation of my sprinkler is as follows:

The cover 14 may be easily and quickly removed by grasping the handles 45 and 46 and turning in a clockwise direction and a brick of soluble fertilizer may be placed in the receptacle 11. For this purpose I prefer to use a brick formed by compressing together a quantity of salts known as "Urea" and enclosed in a cover of waxed paper or tin foil which is perforated in order to provide limited access of the water to the salts and to delay the dissolution of the salts by the water.

The fertilizer will thus be slowly dissolved over a considerable period of time during which the sprinkler may operate to spread the fertilizer uniformly by means of the water over the surrounding area of ground. The slightly sloping bottom of the container insures the location of the fertilizer in the receptacle in such manner that it will not close the conduit 13.

After the cover 14 has been replaced and the water turned on, the receptacle 11 will be filled with water dissolving the fertilizer, passing through the screen 122 in at the ports 98 to the annular chamber 99, thence through the ports 97 to the tubular shaft 93 thence up said shaft into the sprinkler arms 64 and 65 out of the nozzles 91 and 92. The nozzles 91 and 92 may be adjusted as shown in Figure 1 so that the reaction of the water issuing from the nozzles will cause the sprinkler head to rotate throwing the water backward from the nozzles and outward due to centrifugal action, or the nozzles may be adjusted as previously described pointing toward each other, the streams striking each other and diffusing in all directions. The collar 119 provides a means for fixing the sprinkler head against rotation by simply turning the collar upward on its threads into engagement with the surface 120. The screen 122 prevents the access of undissolved fertilizer to the sprinkler head so that large particles of fertilizer cannot become clogged in the sprinkler head or nozzles.

When the reservoir 11 becomes filled with water under pressure, there will of course be water pressure upon all parts of the sprinkler head. For this purpose I prefer to provide lateral ports 97 and 98 so that the pressure of the water upon the tubular shaft 93 may be balanced axially; and the cap 107 is adapted to enclose the lower end of the shaft 93 protecting it from water pressure within the reservoir 11. While the water in the tubular shaft 93 exerts an upward pressure upon the sprinkler head this water likewise exerts a downward pressure upon the lower inner end 126 of the tubular shaft 93.

I find, however, that when such a sprinkler is employed for a long period of time that a certain amount of water will penetrate past the lower gasket 116 into the cap 107 and that when this occurs the water pressure will build up in the cap 107 to practically the same amount as the water pressure within the reservoir 11 and the friction of rotation upon the sprinkler head 15 may be greatly in-

creased thereby. I therefore provide the cap 107 with means for equalizing the pressure within the cap 107 with an air pressure outside the receptacle comprising the conduit 63 extending from the cap 107 to the exterior of the cover 14. The conduit 63 permits any water which leaks past into the cap 107 to escape to the outside of the receptacle thereby preventing the building up of pressure within the cap 107.

It will thus be observed that I have provided a sprinkler having a receptacle in which a fertilizer may be placed for dissolution and distribution by the sprinkler head carried by said receptacle and that my sprinkler head is provided with means for substantially equalizing the axial pressures of the water upon the same. My sprinkler is also provided with a quick detachable cover giving access to the receptacle for placing fertilizer therein, a screen for preventing fertilizer from clogging the sprinkler head and nozzles and my sprinkler comprises a simple and economical assembly of stamped metal units which may be cheaply manufactured and easily assembled.

While I have illustrated and described a specific embodiment of my invention many modifications may be made without departing from the spirit of the invention and I do not wish to be limited from the precise details of construction, but desire to avail myself of all changes within the scope of appended claims.

Having thus described my invention what I claim is new and desire to secure by Letters Patent of the United States is:

1. In a sprinkler, the combination of a receptacle for fluid under pressure with a sprinkler head rotatably mounted in said receptacle, said sprinkler head including a rotatable tubular member having a closed end and lateral ports communicating with said receptacle, fixed means for covering the closed inner end of said tubular member and means for preventing the building up of pressure between said tubular member and said covering means, resulting from the leakage of fluid by said tubular member.

2. In a sprinkler, the combination of a receptacle, with a sprinkler head rotatably mounted in said receptacle, a tubular member carried by said receptacle, bushings in either end of said tubular member, the inner ends of said bushings being spaced apart for journalling said sprinkler head, said tubular member having lateral ports in open communication with the interior of said receptacle and with the space between said bushings, said sprinkler head having a closed tube with lateral ports, in communication with said space between said bushings, said closed tube being rotatably mounted in said bushings and extending therethrough and a cap for closing the inner end of said tubular member.

3. In a sprinkler, the combination of a receptacle, with a sprinkler head rotatably mounted in said receptacle, a tubular member carried by said receptacle, bushings in either end of said tubular member, the inner ends of said bushings being spaced apart for journalling said sprinkler head, said tubular member having lateral ports in open communication with the interior of said receptacle and with the space between said bushings, said sprinkler head having a closed tube with lateral ports, in communication with said space between said bushings, said closed tube being rotatably mounted in said bushings and extending therethrough, a cap for closing the inner end of said tubular member and a conduit leading from said cap to the exterior of said cover.

4. In a sprinkler, the combination of a receptacle, with a sprinkler head rotatably mounted in said receptacle, a tubular member carried by said receptacle, bushings in either end of said tubular member, the inner ends of said bushings being spaced apart for journalling said sprinkler head, said tubular member having lateral ports in open communication with the interior of said receptacle and with the space between said bushings, said sprinkler head having a closed tube with lateral ports, in communication with said space between said bushings, said closed tube being rotatably mounted in said bushings and extending therethrough, packing about said closed tube adjacent each bushing, a spring tensioned between said packing, a cap for closing the inner end of said tubular member and a conduit leading from said cap to the exterior of said cover.

5. In a sprinkler, the combination of a receptacle, with a sprinkler head rotatably mounted in said receptacle, a tubular member carried by said receptacle, bushings in either end of said tubular member, the inner ends of said bushings being spaced apart for journalling said sprinkler head, said tubular member having lateral ports in open communication with the interior of said receptacle and with the space between said bushings, said sprinkler head having a closed tube with lateral ports, in communication with said space between said bushings, said closed tube being rotatably mounted in said bushings and extending therethrough, packing about said closed tube adjacent each bushing, a spring tensioned between said packing, a cap for closing the inner end of said tubular member, a conduit leading from said cap to the exterior of said cover and a screen carried by said cover below said sprinkler head.

6. In a sprinkler, the combination of a receptacle, with a sprinkler head adjustably mounted in a wall of said receptacle, comprising a tubular member detachably mount-

ed therein and extending therethrough, spaced bushings in the ends of said tubular member, a closed tube with lateral ports mounted in said tubular member and said bushings, ports in said tubular member within said receptacle and communicating with the ports in said closed tube, a juncture rotatably supported on one of said bushings, and forming a support for said closed tube, nozzle means mounted on said juncture, a cap on the other of said bushings for closing the inner end of said tubular member and enclosing the inner end of said closed tube, and a conduit leading from said cap to the exterior of said cover.

7. In a sprinkler, the combination of a receptable adapted to contain fluid under pressure, with a sprinkler head rotatably mounted in a wall of the receptacle, said head comprising a tubular shaft terminating in and communicating with said receptacle, a fixed sleeve surrounding said shaft, means on said sleeve covering the inner end of said tubular shaft.

8. In a sprinkler, the combination of a receptable adapted to contain fluid under pressure, with a sprinkler head rotatably mounted in a wall of the receptacle, said head comprising a tubular shaft terminating in and communicating with said receptacle, a fixed sleeve surrounding said shaft, means on said sleeve covering the inner end of said tubular shaft, and a vent leading from the space between said shaft and said covering means.

9. In a sprinkler, the combination of a receptacle adapted to contain fluid under pressure, with a sprinkler head rotatably mounted in and extending therefrom, said head comprising a tubular shaft having its inner end closed and provided with lateral ports communicating with said receptacle, the inner end of said shaft being completely surrounded by the fluid in said container, and means for preventing the action of fluid pressure on the lower end of said shaft.

10. In a sprinkler, the combination of a receptacle adapted to contain fluid under pressure, with a sprinkler head rotatably mounted in and extending therefrom, said head comprising a tubular shaft communicating with said receptacle, the inner end of which is completely surrounded by the fluid in said container, a cover preventing the action of fluid pressure on the lower end of said shaft, and means for substantially equalizing the axial pressure of fluid on said head.

11. In a sprinkler, the combination of a receptacle adapted to contain fluid under pressure, with a sprinkler head rotatably mounted in and extending therefrom, said head comprising a tubular shaft communicating with said receptacle, the inner end of which is completely surrounded by the fluid in said container, a cover preventing the action of fluid pressure on the lower end of said shaft, means for substantially equalizing the axial pressure of fluid on said head, and a vent leading from said cover to a point outside of said container.

12. In a sprinkler, the combination of a stamped metal base having a substantially frusto-conical downwardly and outwardly sloping upper portion and a centrally located bore with a sheet metal receptacle having a complementary base and a registering bore, a pipe coupling projecting laterally from said base and having an upwardly projecting threaded portion, and threaded members on said pipe for securing said base and receptacle together, forming a sprinkler reservoir having a downwardly sloping settling surface located about a central inlet opening.

In witness whereof, I hereunto subscribe my name this 8th day of June, 1927.

MICHAEL W. McARDLE.