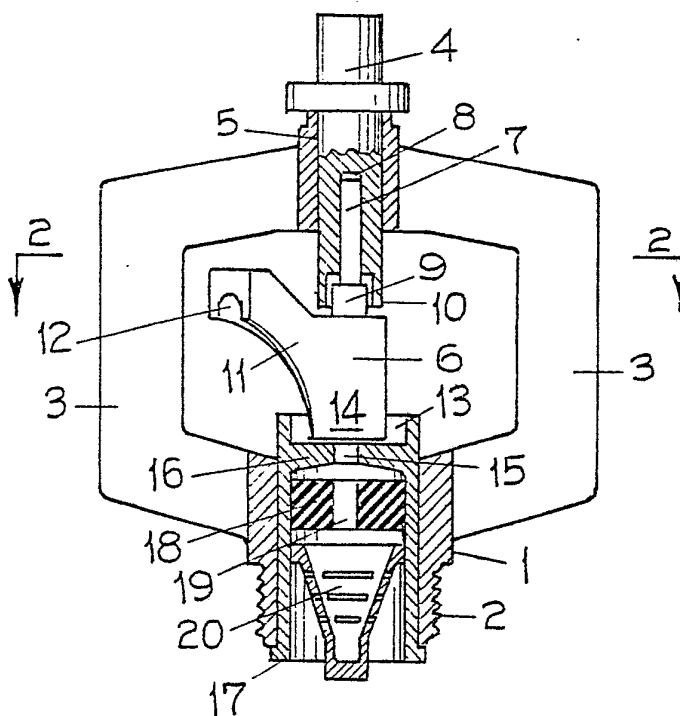


(51) International Patent Classification ³: B05B 3/06, 3/08	A1	(11) International Publication Number: WO 81/01528 (43) International Publication Date: 11 June 1981 (11.06.81)
(21) International Application Number: PCT/AU80/00101 (22) International Filing Date: 28 November 1980 (28.11.80) (31) Priority Application Number: PE 1532/79 (32) Priority Date: 29 November 1979 (29.11.79) (33) Priority Country: AU (71) Applicant (for all designated States except US): RIS IRRIGATION SYSTEMS PTY. LTD., [AU/AU]; Cnr Philip Highway and Hogarth Road, Elizabeth, S.A. 5112 (AU). (72) Inventor; and (75) Inventor/Applicant (for US only): TUCKER, Alfred, Denholm, [AU/AU]; Kersbrook Post Office, Kersbrook, S.A. 5231 (AU).	(74) Agent: COLLISON & CO., Savings Bank Building, 97 King William Street, Adelaide, S.A. 5000 (AU). (81) Designated States: AU, FR (European patent), GB (European patent), JP, US. Published <i>With international search report</i>	

(54) Title: BUTTERFLY SPRINKLER**(57) Abstract**

A butterfly sprinkler in which the rotating head (6) has an upwardly projecting shaft (7) to fit in a bearing (4) supported by arms (3). The shaft (7) is of stepped configuration with the bearing being of similar configuration to thus form a skirt (1) about the bearing. The nozzle (15) for the sprinkler is provided with a resilient flow regulator (18) arranged in such a way that as pressure of the water fed to the sprinkler increases the regulator is distorted to reduce the size of the orifice (19) to limit the amount of water flowing to a relatively uniform rate irrespective of changes of pressure.



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1.

BUTTERFLY SPRINKLER

This invention relates generally to sprinklers of the known type which have a rotating head so arranged that when water is projected axially to the head and is guided by a

5. curved channel to issue from the rotating head, the reaction causes the head to rotate.

In this type of sprinkler the rotating head has an upwardly projecting shaft which fits in a bearing supported by arms projecting upwards from a socket member by means of

10. which the device is connected to a water supply line, the head rotating within a space formed between the arms.

It is known that in butterfly sprinklers of this type certain problems can occur, one being caused through the bearing for the rotating head having grit introduced into

15. it with resultant wear and deteriorating rotation, and it is also known that the rotating head can be removed under some circumstances when not in operation by birds withdrawing the head from its bearing as the head when not raised is in a lowered position with its shaft partly withdrawn from the

20. bearing, the head being raised during operation by the force of the water directed against its underside as it flows along the curved channel of the head.

Various other disadvantages exist with sprinklers of this type and it is an object of the present invention to

25. provide certain improvements which will remove such disabilities.

It is an object of the invention to so arrange the sprinkler assembly that the shaft on which the rotating head operates will be protected against contamination by

30. dirt.

It is a further object of the invention to provide effective supporting means for the rotating head when not



2.

lifted by the flow of water to ensure that it cannot be readily removed from the frame in which it operates.

It is a still further object of the invention to give closer control of the rate of rotation of the head and also

5. to provide a flow regulator to ensure best operation in relation to pressures existing at the time.

- The objects of the invention are achieved by forming the sprinkler with a rotational head supported from a body having a least one upstanding arm supporting a bearing in
10. axial alignment with an orifice in a jet in the said body, characterised by a shaft upwardly projecting from the said head and arranged to engage in the bearing, the shaft having a larger diameter portion at the rotational head, the bearing having a depending skirt arranged to encircle the larger
15. diameter portion of the shaft to form a protective shroud against ingress of foreign matter to the bearing, further characterised in that the bearing is positionable to allow the rotating head to be positioned over the jet and then held confined with some axial movement between the bearing
20. and the body when the bearing is axially positioned.

- The invention also includes means to limit lateral displacement of the lower end of the rotating head to restrict damage to the head by birds or animals or removal of the head by birds which is common with butterfly
25. sprinklers known heretofore.

The assembly may also include pressure control means and a screen to remove solids from the water flowing through the sprinkler.

- In order however that the invention may be more fully
30. understood, an embodiment will now be described with reference to the accompanying drawings in which

FIG. 1 is a part sectional side elevation of a preferred form of the sprinkler,



3.

FIG. 2 is a sectional plan of same on line 2-2 of FIG. 1,
and

FIG. 3 is a side elevation of a modified form of the
invention.

5. The sprinkler illustrated in FIGS. 1 and 2 comprises a
body 1 having a screw thread 2 whereby it can be secured to
a stand pipe or the like, and has two arms 3-3 projecting
upwardly to a bearing 4 which is located in a bore 5 at the
junction of the arms, which arms 3-3 define a space in which
10. the rotating head operates.

- The rotating head 6 has an upwardly projecting shaft 7
which engages in the bearing 4, the shaft 7 and socket 8 of
the bearing 4 being dimensioned so that when water pressure
is exerted on the rotating head 6, the head is lifted into
15. an upper operating position with the end of the shaft 7
bearing against the inner end of the socket 8.

- The shaft 7 has a stepped configuration having a lower
part 9 of larger diameter fitting into a dust skirt 10
extending down from the bottom of the bearing so that, when
in its lowered position, the skirt 10 shrouds the larger
lower part 9 of the shaft 7 to prevent dust or grit getting
20. into the bearing itself which commences at the upper end of
the skirt 10.

- The rotating head 6 is generally similar to the heads
used heretofore in that it comprises a moulding with a
curved shaped director 11 in which is formed a channel 12
25. which terminates at the lower end to surround the axis of
the shaft 7 of the rotating head and curves upwardly and
outwardly to direct water laterally and is caused to rotate
by the reaction due to the curve of the channel. The
rotating head 6 extends downwardly sufficiently far to fit
30. into a recess 13 which is axially arranged with the shaft
7 of the rotating head 6 so that limited lateral displacement
only is possible of the lower part of the rotating head 6 to
ensure that the head 6 and shaft 7 cannot be damaged or



4.

removed.

The lower part 14 of the rotating head 6 which extends into the recess 13 terminates above a jet orifice 15 which is formed in a membrane 16 extending across an insert sleeve 17 which lines a hollow in the body 1. The insert sleeve 17 also holds a resilient regulator 18 which is arranged in such a way that as pressure of the water fed to the sprinkler increases, the flow regulator 18 is distorted to reduce the size of the orifice 19 and thus limit the amount of water flowing to a relatively uniform rate irrespective of changes of pressures. The sleeve can be an interference fit in the body to hold it in position, allowing it to be driven into a bore in the body. The recess freely accommodates that end of the head 6 remote from the bearing 4 to prevent significant lateral displacement of that end of the head.

The flow regulator 18 has beneath it a slitted member forming a screen 20, the screen 20 being held in the sleeve 17 by being an interference fit in the sleeve 17.

The rotating head 6, in the embodiment shown, has a projecting web 21 on the opposite side to that from which the director 11 projects, the purpose of the web 21 being to effect some amount of slowing down by increasing air resistance when the rotating head 6 is operating to thereby somewhat slow down the rotation of the rotating head, and also to at least partly balance the rotating head.

By means of the construction described the rotating head 6 is confined in an upward direction by the end of the shaft 7 of the head contacting the end 8 of the bore in the bearing 4, and at that stage the enlarged part 9 of the shaft 7 is disposed within the dust seal skirt 10 at the bottom of the bearing 4, but when supply of water is terminated the rotating head 6 drops but not sufficiently to bring the enlarged part of the shaft 7 out of the dust seal skirt 10. This ensures that the shaft 7 itself is



5.

protected against dirt, the downward movement being limited by the lower end of the rotating head 6 contacting the membrane 16 which extends across the sleeve 17.

The rotating head 6 thus has limited up and down movement, and it will be appreciated that firstly the head has the upwardly projecting shaft 7 protected against contamination because it is housed in the bearing 4 and is protected by the dust seal skirt 10 which accommodates the larger portion 9 at the lower end of the shaft 7, while the lower end of the rotating head 6 is located loosely in the recess 13 which is formed in the sleeve 17. This then ensures that the rotating head is protected against removal by birds or the like because, not only is it supported against sideways displacement by the shaft 7 engaging in the bearing 4, but by its lower end fitting into the recess 13, limits sideways movement when relatively heavy forces are applied which could otherwise distort the spindle 7 sufficiently to damage the rotating head. The arrangement is such that the lower end of the rotating head is a loose fit in the recess 13 so that it is not guided by the wall of the recess but the wall merely limits excessive displacement of the lower part of the rotating head which as said could cause damage to the spindle or removal of the head.

The sprinkler constructed as described has a very free action in that the rotating head is adequately supported by a shaft engaging in a bearing which is protected against the ingress of foreign matter while removal of the rotating head is equally guarded against because the sideways pull will simply bring the lower part of the rotating head against the wall of the bore previously described.

While two arms have been referred to in the preferred construction which extend from the socket portion of the frame to support the bearing for the shaft of the rotating head it will be realised that a single arm would suffice as



6.

- shown in FIG. 3, and it will also be realised that the bearing member needs to be removable, being an interference fit in the bore 5, so that the rotating head can be positioned to have the intake of the curved channel in the rotating head
5. co-axial with the jet in the flow regulator and co-axial also with the shaft and bearing which support the rotating head. An interference fit is defined as any arrangement which allows the bearing to be located axially in the bore and held in position against displacement when positioned.
10. In use the rotating head 6 is located to have its axis of rotation co-axial with the orifice of the jet 15 and the bearing 4 is then driven into the bore 5, a distance just sufficient to allow some axial movement of the rotating head 6 to ensure that when water issuing from the orifice of the
15. jet 15 lifts the rotating head, the thrust on the head is taken by the end of the spindle 7 against the end of the bore in the bearing 4, while the rotating head 6 has its lower part, which is located in the recess 13, lifted clear of the membrane 10 but loosely confined in the recess 13 so
20. that there is no friction at this point but constraint against significant displacement.



7.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A butterfly sprinkler having a rotational head and comprising a body having means to fix it to a support and having upstanding arm means thereon to support a bearing in axial alignment with an orifice in a jet in the said body
 5. and shaped to define a space to accommodate said head characterised by a shaft upwardly projecting from the said head arranged to engage in the said bearing, the said shaft having a larger diameter portion at the said rotational head, the said bearing having a depending skirt arranged to
 10. encircle the said larger diameter portion of the shaft to form a protective shroud against ingress of foreign matter to the said bearing, further characterised in that the said bearing is positionable on the said arm to allow the rotating head to be positioned over the said jet and then
 15. held confined with some axial movement between the said bearing and the said body when the said bearing is positioned.
-
2. A butterfly sprinkler according to claim 1 characterised by a recess in the said head adjacent the said jet and co-axial therewith to encircle but not touch the lower end of the said rotating head to prevent lateral
 5. displacement thereof.
-
3. A butterfly sprinkler according to claim 1 or 2 further characterised in that the said body is hollow, a cylindrical sleeve lining the said hollow arranged co-axially with the said bearing and having a membrane
 5. extending across it near one end with a jet orifice there-through co-axial with the said sleeve, said membrane with the said sleeve forming a recess in which that end of the said head remote from the said bearing is freely accommodated to prevent significant lateral displacement
 10. of that end of the said head.



8.

4. A butterfly sprinkler according to claim 3 further characterised by a regulator extending across the said sleeve formed of a resilient material and apertured to allow distortion of the regulator around the aperture and positioned to control water flow to the said jet orifice.

5. A butterfly sprinkler according to claim 3 or 4 characterised by an apertured screen across the said sleeve to remove solids from the water before flowing through the said jet orifice.

6. A butterfly sprinkler according to claim 3 characterised in that both the said bearings are interference fits into respectively the said arm means and the said body.

7. A butterfly sprinkler according to claim 1 characterised in that the said bearing is a drive fit into a bore in the junction of a pair of arms, said bore being co-axial with the orifice of the said jet.

8. A butterfly sprinkler according to claim 1 characterised in that the said bearing is a drive fit in a bore in one arm, the said bore being co-axial with the orifice of the said jet.

9. A butterfly sprinkler according to claim 1 further characterised by a web projecting from the said rotating head on the opposite side to the said curved director to form rotation retarding and balancing means.

10. A butterfly sprinkler constructed and operating substantially as described and illustrated.



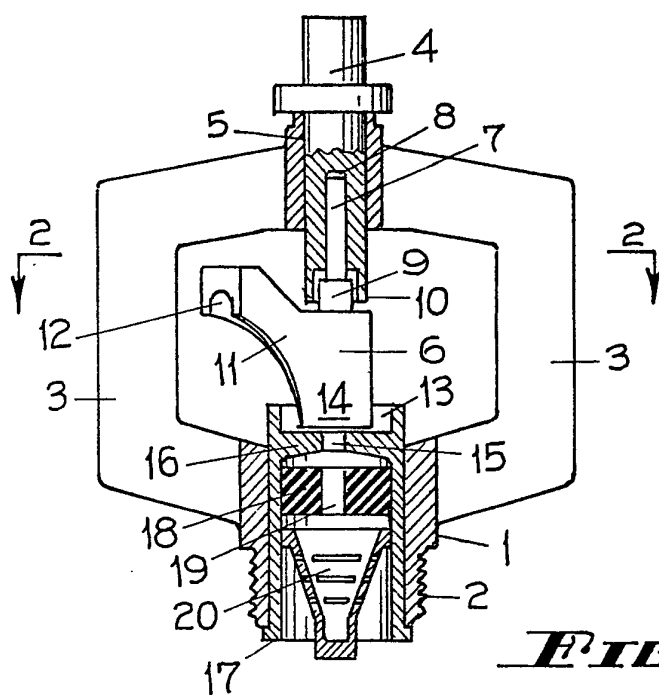


FIG. 1

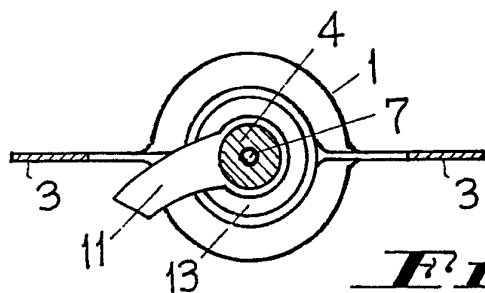


FIG. 2

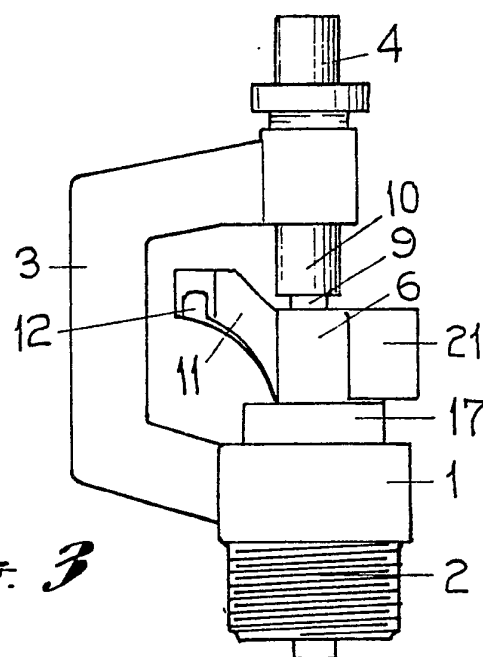


FIG. 3

INTERNATIONAL SEARCH REPORT

International Application No. **PCT/AU80/00101**

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ³ According to International Patent Classification (IPC) or to both National Classification and IPC <div style="text-align: center; font-size: 1.2em;">Int. Cl.³ B05B 3/06, 3/08</div>																										
II. FIELDS SEARCHED <div style="text-align: center; font-size: 0.8em;">Minimum Documentation Searched ⁴</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; padding: 5px;">Classification System</td> <td style="padding: 5px;">Classification Symbols</td> </tr> <tr> <td style="padding: 5px;">IPC</td> <td style="padding: 5px;">B05B 3/06, 3/08</td> </tr> </table> <div style="text-align: center; font-size: 0.8em; margin-top: 5px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁵</div> <div style="padding: 10px; margin-top: 10px;">AU: IPC as above</div>			Classification System	Classification Symbols	IPC	B05B 3/06, 3/08																				
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<div style="font-size: 0.8em;"> <p>• Special categories of cited documents: ¹⁵</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>"A" document defining the general state of the art</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document cited for special reason other than those referred to in the other categories</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> </div> <div style="width: 45%;"> <p>"P" document published prior to the international filing date but on or after the priority date claimed</p> <p>"T" later document published on or after the international filing date or priority date and not in conflict with the application, but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance</p> </div> </div> </div>																										
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