

[54] WATER SPRINKLER DEVICE

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[52] U.S. Cl. 239/230, 239/DIG. 1

[51] Int. Cl. B05b 3/08

[58] Field of Search 239/230, DIG. 1

[56] References Cited

UNITED STATES PATENTS

2,160,121	5/1939	Buckner.....	239/230
2,223,441	12/1940	Coles et al.....	239/230

2,256,737	9/1941	Englehart.....	239/230 T
3,033,469	5/1962	Green	239/230

Primary Examiner—Lloyd L. King

Assistant Examiner—Andres Kashnikow

[57] ABSTRACT

A water sprinkler device in which a spring-return impactor is driven by the water jet issuing from a rotary sprinkler head and executes oscillatory movement to apply impact forces to the sprinkler head which turn the sprinkler head changing the direction of the water jet. The intensity of the impact forces transmitted to the sprinkler head can be selectively varied for a given level of water jet impulse by operating an adjustment means provided on an impact receiving means.

2 Claims, 10 Drawing Figures

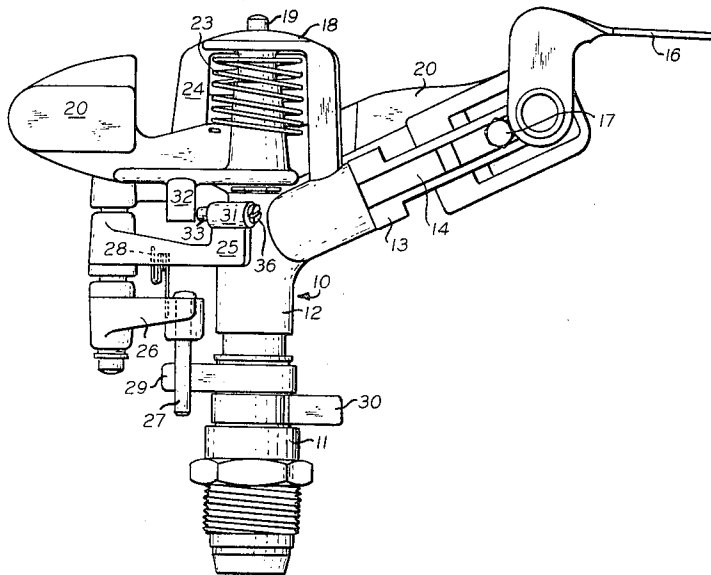


FIG. 1.

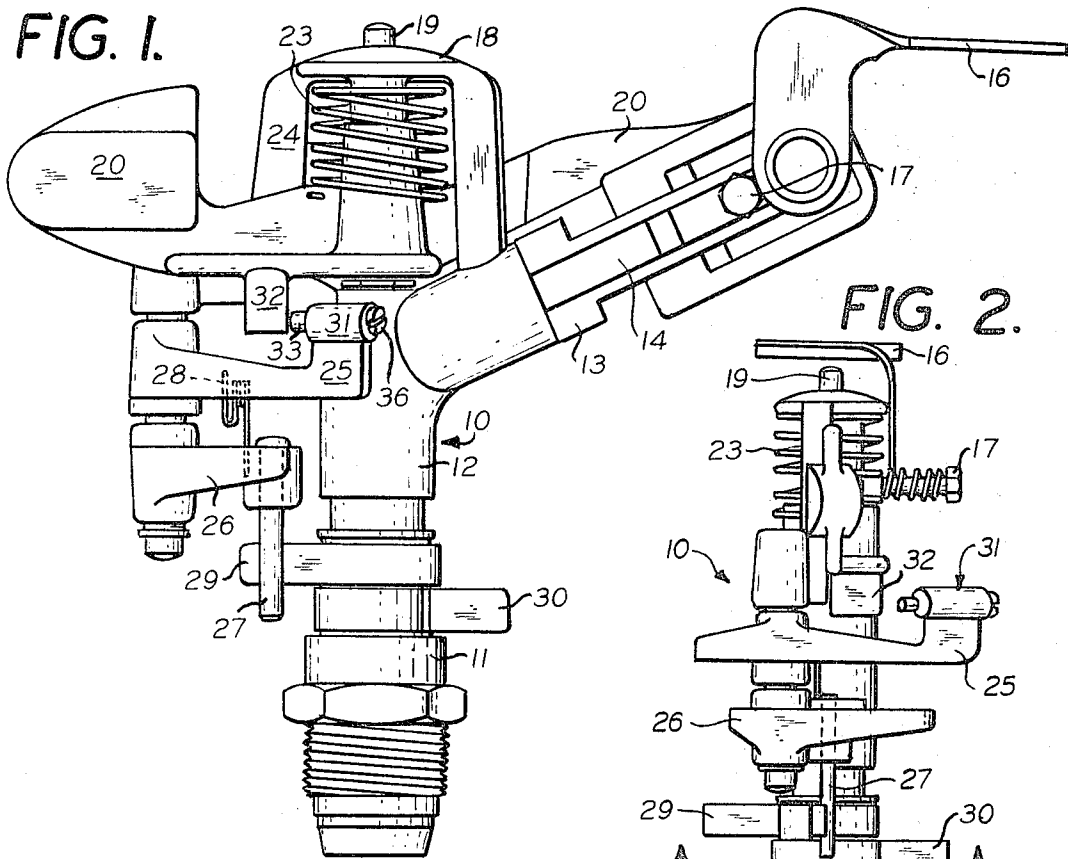


FIG. 2.

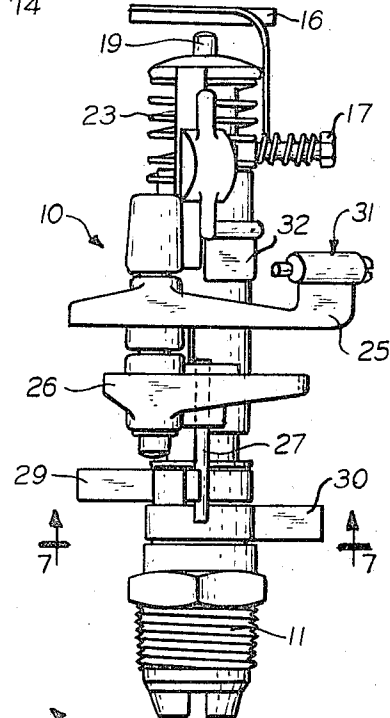


FIG. 3.

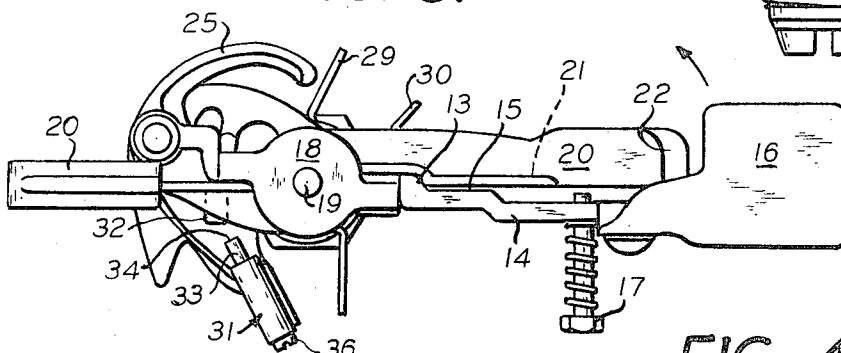


FIG. 4.

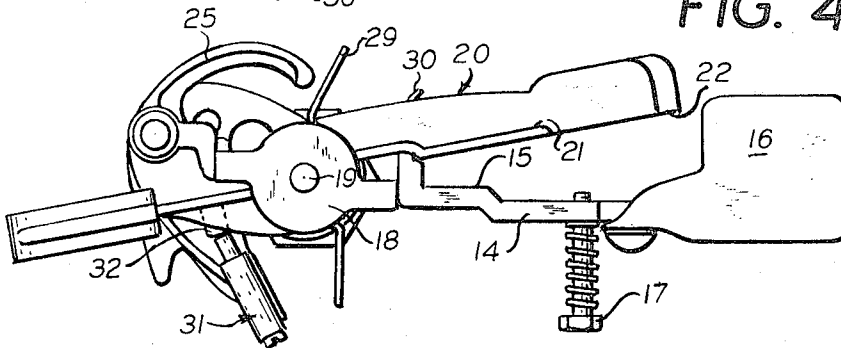


FIG. 5.

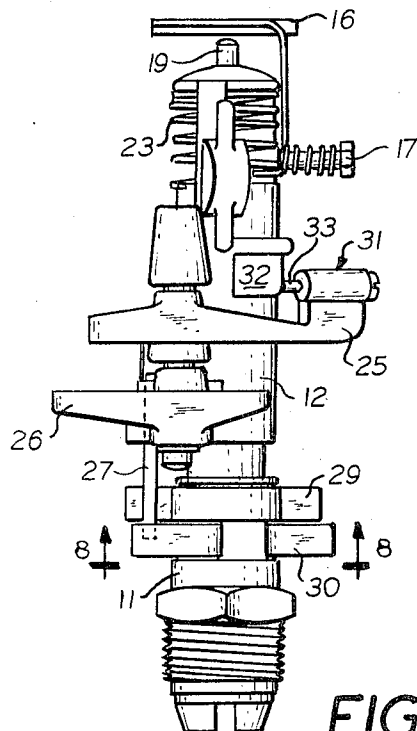


FIG. 6.

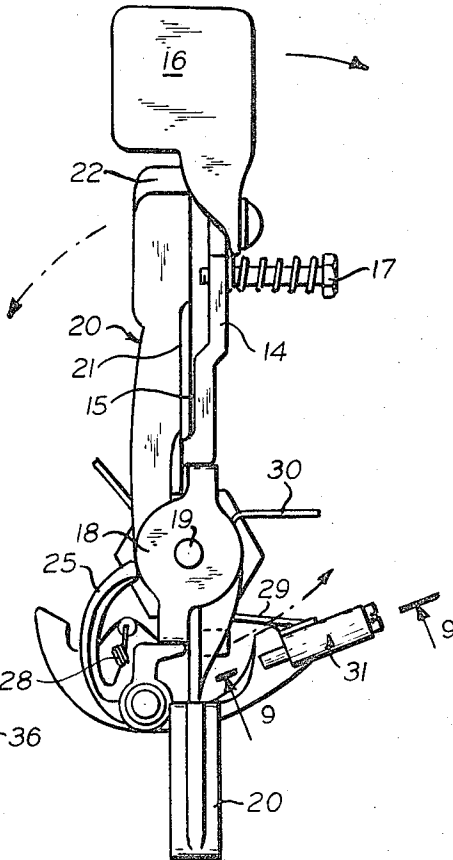


FIG. 9.

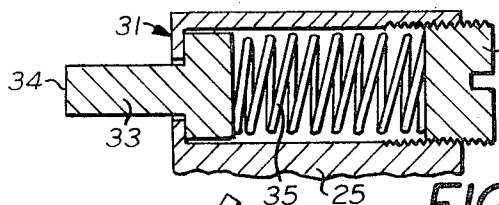


FIG. 10.

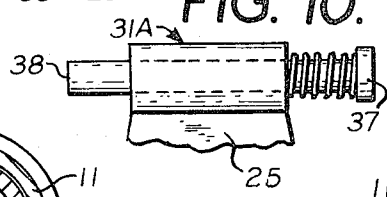


FIG. 7.

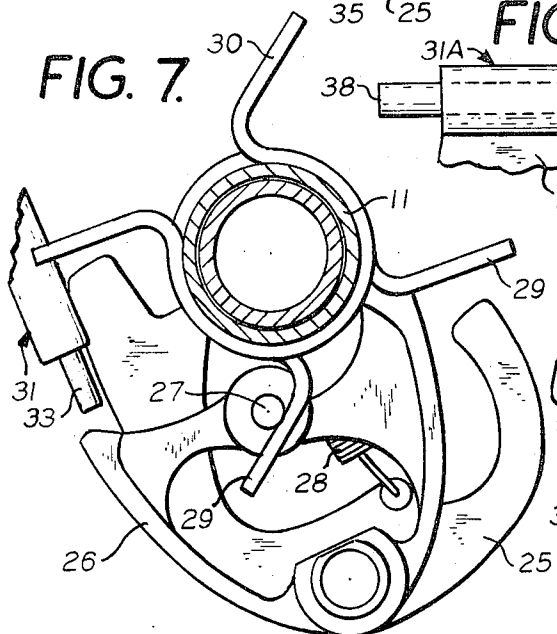
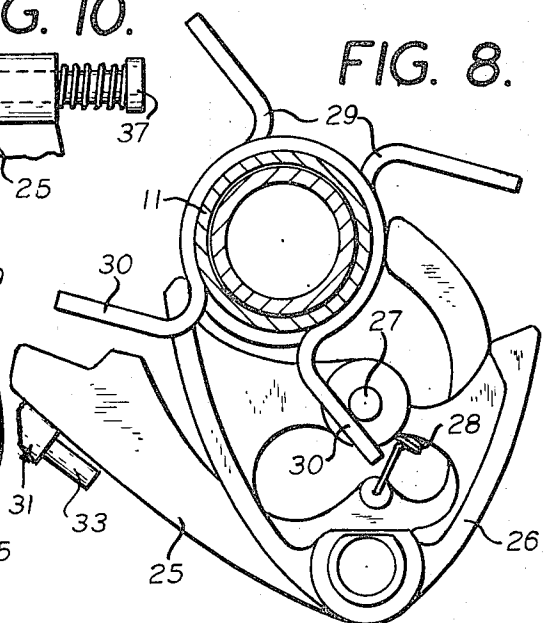


FIG. 8.



WATER SPRINKLER DEVICE

BACKGROUND AND SUMMARY OF THE INVENTION

This invention pertains in general to water sprinklers and more particularly to a rotary impact driven water sprinkler having means for adjusting the intensity of the impact forces applied to the sprinkler head.

The type of water sprinkler in which the invention provides an improvement might be classified more precisely as a reversing rotary sprinkler, such as is exemplified by U.S. Pat. No. 3,033,469 issued May 8, 1962 to A. J. Green, and U.S. Pat. No. 2,256,737 issued Sept. 23, 1941 to O. H. Englehart. While such sprinkler devices might operate satisfactorily when supplied with water at a predetermined pressure, certain problems arise when the water pressure drops below the design level, and the prior art does not provide any means on the sprinkler to compensate for changes in water supply pressure.

The invention provides means to compensate for changes in water supply pressure, in a water sprinkler device having an impactor supported for pivotal movement relative to a rotary sprinkler head and disposed for reaction with a water jet issuing from the sprinkler head. In such sprinkler, resilient means, such as a spring, biases the impactor to rotate in a direction opposite to the reaction torque of the water jet whereby the impactor oscillates relative to the sprinkler head and applies impact forces thereto which turn the sprinkler head and thereby change the direction of the water jet. Accordingly, the impactor, during each cycle of oscillation, will be first swung away from the water jet and then returned toward the water jet, the amount of displacement depending upon the water supply pressure, and the spring-return force. In the forward direction of sprinkler head rotation, the impactor return spring aids in the turning of sprinkler head, whereas in the opposite direction the spring opposes the turning of the sprinkler head by resisting the impact forces applied by the impactor.

While the prior art sprinkler devices have impact receiving means that can continue to function under reduced water pressure conditions, for the forward direction of sprinkler head rotation which is aided by the impactor return spring, some of the devices fail to operate in the reverse direction against the opposition of the spring.

To solve such low pressure failure problem, the invention provides an impact receiving means supported by the sprinkler head and disposed for striking engagement by the impactor to receive therefrom and transmit to the sprinkler head impact forces for turning the sprinkler head, which impact receiving means include adjustment means operable to selectively vary the intensity of the impact forces transmitted to the sprinkler head for a given level of reaction impulse applied to the impactor by the water jet.

For a better understanding of the invention, reference should be had to the following detailed description and accompanying drawings which together exemplify certain preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a right side elevation view of a water sprinkler device according to a preferred embodiment of the invention.

FIG. 2 is a rear elevation view of the water sprinkler device shown in FIG. 1, as seen set to rotate in a counterclockwise direction.

FIG. 3 is a top view of the water sprinkler device shown in FIG. 1 as seen set to rotate in a counterclockwise direction, and with the impactor spaced from the impact-receiving stop.

FIG. 4 is a top view of the water sprinkler device similar to FIG. 3, but showing how the impactor strikes the impact receiver.

FIG. 5 is a rear elevation view of the water sprinkler device of FIG. 1, as seen set to rotate in a clockwise direction.

FIG. 6 is a top view of the water sprinkler device as shown in FIG. 5.

FIG. 7 is a sectional view of the water sprinkler device shown in FIG. 1 as taken along line 7—7 therein to show how the reversing mechanism is set for counterclockwise rotation.

FIG. 8 is a sectional view similar to FIG. 7 but taken along line 8—8 of FIG. 5 to show how the reversing mechanism is set for clockwise rotation.

FIG. 9 is a sectional view of the water sprinkler device as taken along line 9—9 of FIG. 6 to show details of the impact receiver.

FIG. 10 is a detail view showing another type of impact receiver that can be used in the water sprinkler device of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

In FIGS. 1—6 there is shown an automatic reversing rotary water sprinkler 10 equipped with the impact adjustment feature of the invention.

Basically, sprinkler 10 has a threaded bushing 11 that is tightened into a similarly threaded water supply pipe fitting (not shown) which supplies water to sprinkler head 12. The sprinkler head 12 is rotatably received in bushing 11 so that the head 12 can freely turn relative to the supply pipe.

Within head 12 are passages (not shown) that lead to a nozzle 13 (see FIG. 1) from which a water jet issues. Extending from nozzle 13 is an arm 14 having a surface 15, and bearing an adjustably mounted deflector 16 and screw 17. The deflector 16 serves to control the elevation pattern of the spray delivered by sprinkler 10, and screw 17 serves to split and thereby disperse the jet.

On the upper portion of head 12, there is a bracket 18 that receives a pin 19 on which is supported an impactor 20. At the forward end of impactor 20 is an inclined surface 21 and a cupped surface 22 that are disposed for reaction with the water jet. A spring 23 biases impactor 20 toward a reference position, shown in FIG. 3, in which impactor 20 contacts the sprinkler head 12 at surface 15 and incidentally also at leg 24 of bracket 18.

The inclined and cupped surfaces 21 and 22 when struck by the water jet deflect the jet so as to apply to impactor 20 a force producing a torque directed counterclockwise about pivot pin 19 as seen looking downward in FIGS. 3 and 4. This torque is thus opposed to the torque exerted by spring 23 on impactor 20. Accordingly, the opposing water jet reaction force and

spring 23 force cause the impactor to oscillate about pin 19, the angular amplitude of such oscillation depending upon the pressure of the water supplied to the sprinkler head 12, and the location of such mechanical stops as are presented by impact receiving means employed to utilize impact forces resulting from the oscillation of impactor 20.

On sprinkler head 12 there is provided an automatic reversing mechanism including a pivotable arm 25 and an underlying switching arm 26 from which depends a pin 27. Arms 25 and 26 are interconnected by a spring 28 so that they have two stable positional states, one for clockwise or forward rotation of head 12, in which arms 25 and 26 are positioned as shown in FIGS. 5, 6 and 8, and the other for counterclockwise or reverse rotation of head 12, in which arms 25 and 26 are positioned as shown in FIGS. 1-4 and 7. Switching from one direction of sprinkler head 12 rotation to the opposite is effected when the pin 27 strikes against a corresponding adjustable clip 29, 30 frictionally supported on bushing 11. Clips 29 and 30 can be set at an angular relative displacement to establish corresponding angular limits upon the swing of sprinkler head 12.

On arm 25 there is provided an impact receiver 31 that is used exclusively to receive from impactor 20 impact forces for turning head 12 counterclockwise, and as can be seen from FIGS. 6 and 8, arm 25 is turned so as to position impact receiver 31 out of contact with impactor 20 when the device 10 is set for clockwise head 12 rotation.

In the device 10, it should be noted that the impactor 20 oscillation is not reversed to change direction of head 12 rotation, but rather such change in direction is effected through a change in how the impact forces produced by impactor 20 are applied to head 12.

For forward head 12 rotation, the surface 15 and/or leg 24 are repeatedly struck by impactor 20 and this turns head 12 clockwise. The invention is not directly concerned with the forward rotation mode of operation, since changes in water supply pressure are not too critical for reliable forward operation.

Impactor 20 is provided with a depending lug 32 which is positioned to strikingly engage impact receiver 31 when arm 25 is set for reverse head 12 rotation.

Impact receiver 31 thus sets an angular limit to the swing of impactor 20 and transmits to sprinkler head 12 impact forces for turning it in the reverse direction. The larger the angular swing executed by impactor 20 toward impact receiver 31, the greater will be the opposing force of spring 23. Consequently, if impact receiver 31 should be set too far from where lug 32 is when impactor 20 is at its reference position, the intensity of the strike impact delivered to receiver 31 will be diminished, and in an extreme case, such as when the water pressure is too low, the reaction impulse applied to impactor 20 by the water jet may not be enough for lug 32 to strike receiver 31 at all. This will cause failure of reverse operation.

To escape such failure, the invention provides an impact receiver 31 including adjustment means operable to selectively vary the intensity of the impact forces transmitted to sprinkler head 12 for a given level of reaction impulse applied to the impactor 20 by the water jet.

Details of a preferred adjustment means are shown in FIG. 9, wherein it can be noted that impact receiver 31 has a slidable member 33, the front 34 of which is dis-

posed for striking engagement by lug 32 of impactor 20. A spring 35 resiliently engages slidable member 33 and serves to transmit to sprinkler head 12 the impact force resulting from lug 32 striking slidable member 33.

The front 34 of slidable member 33 extends sufficiently far into the movement path of lug 32 so as to assure contact with lug 32 at the lowest water pressure that will suffice to operate the sprinkler device 10 in the forward direction. A screw 36 is provided for adjustably preloading spring 35 to vary the intensity of the impact forces applied to head 12. For a high water pressure, the preload on spring 35 can be light since the level of impulse applied to impactor 20 will be high. For a low water pressure the preload on spring 35 is increased so that a greater portion of the potentially available impactor 20 force will be applied to head 12. In an extreme case, with minimum operable water pressure, the preload can be increased until spring 35 is fully compressed, whereby the impactor 20 will continuously press lug 32 against member 33 rather than intermittently strike it.

The use of a preloaded spring 35 in combination with a slidable member 33 results in an impact receiver 31 that automatically compensated for changes (within limits) of water pressure so that when sprinkler head 12 is reversing, a fairly constant turning rate will be maintained.

FIG. 10 shows an alternate type of impact receiver 31A that can be substituted for impact receiver 31, at the sacrifice of automatic compensation for water pressure changes. Basically, the impact receiver 31A has a stop member in the form of a screw 37 extended through a threaded hole in arm 25. Screw 37 is adjustable in relation to the path of impactor lug 32 movement, and is turned to position the end 38 closer to the lug 32 reference position, to compensate for low water pressure, and is turned to back end 38 away therefrom to compensate for high water pressure. For any given level of water jet reaction impulse on impactor 20, screw 37 can be set to obtain variation of the impact forces transmitted to sprinkler head 12.

From the foregoing description of certain embodiments of the invention, the artisan will appreciate that the invention is capable of many obvious modifications and variations to suit the needs of a particular purpose.

What is claimed is:

1. In a water sprinkler device having an impactor supported for pivotal movement relative to a rotary sprinkler head and disposed for reaction with a water jet issuing from the sprinkler head, and resilient means biasing the impactor to rotate in a direction opposite to the reaction torque of the water jet whereby the impactor oscillates relative to the sprinkler head and applies impact forces thereto which turn the sprinkler head thereby change the direction of the water jet, the improvement which comprises in combination impact receiving means supported by the sprinkler head and disposed for striking engagement by said impactor to receive therefrom and transmit to the sprinkler head impact forces for turning the sprinkler head, said impact receiving means including adjustment means operable to selectively vary the intensity of the impact forces transmitted to the sprinkler head for a given level of reaction impulse applied to the impactor by the water jet, said sprinkler head having an arm and said adjustment

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means including a stop member supported by said arm and adjustable in relation to the path of impactor movement.

2. In a water sprinkler device having an impactor supported for pivotal movement relative to a rotary sprinkler head and disposed for reaction with a water jet issuing from the sprinkler head, and resilient means biasing the impactor to rotate in a direction opposite to the reaction torque of the water jet whereby the impactor oscillates relative to the sprinkler head and applies impact forces thereto which turn the sprinkler head and thereby change the direction of the water jet, the improvement which comprises in combination impact receiving means supported by the sprinkler head and dis-

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posed for striking engagement by said impactor to receive therefrom and transmit to the sprinkler head impact forces for turning the sprinkler head, said impact receiving means including adjustment means operable to selectively vary the intensity of the impact forces transmitted to the sprinkler head for a given level of reaction impulse applied to the impactor by the water jet, said impact receiving means being supported for movement relative to the sprinkler head from an operating position located in the path of impactor movement to a non-operating position clear of the path of impactor movement.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,837,576 Dated September 24, 1974

Inventor(s) Jules J. Rosenkranz

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet [73] "Lafayette Brass Manufacturing Co., Inc." should read -- Lafayette Brass Company Inc.

Signed and sealed this 24th day of December 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents