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H. G. FREEMAN
FIRE FIGHTING TURRET

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Filed Dec. 1, 1951

3 Sheets-Sheet 1

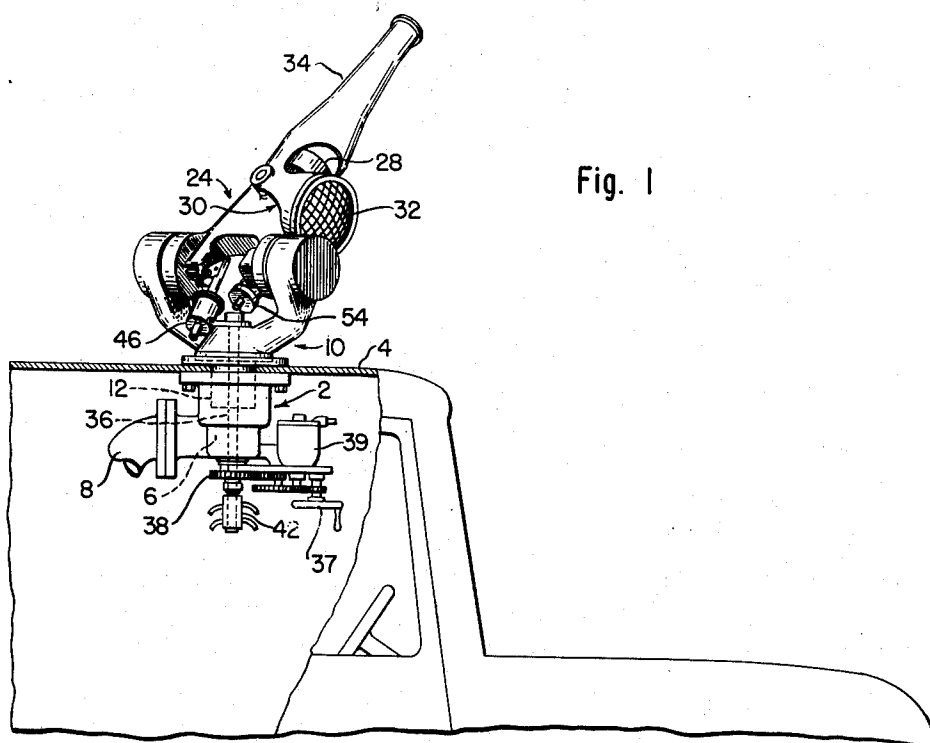


Fig. 1

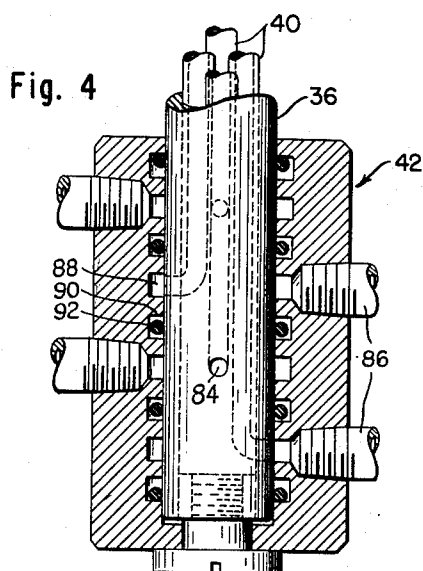


Fig. 4

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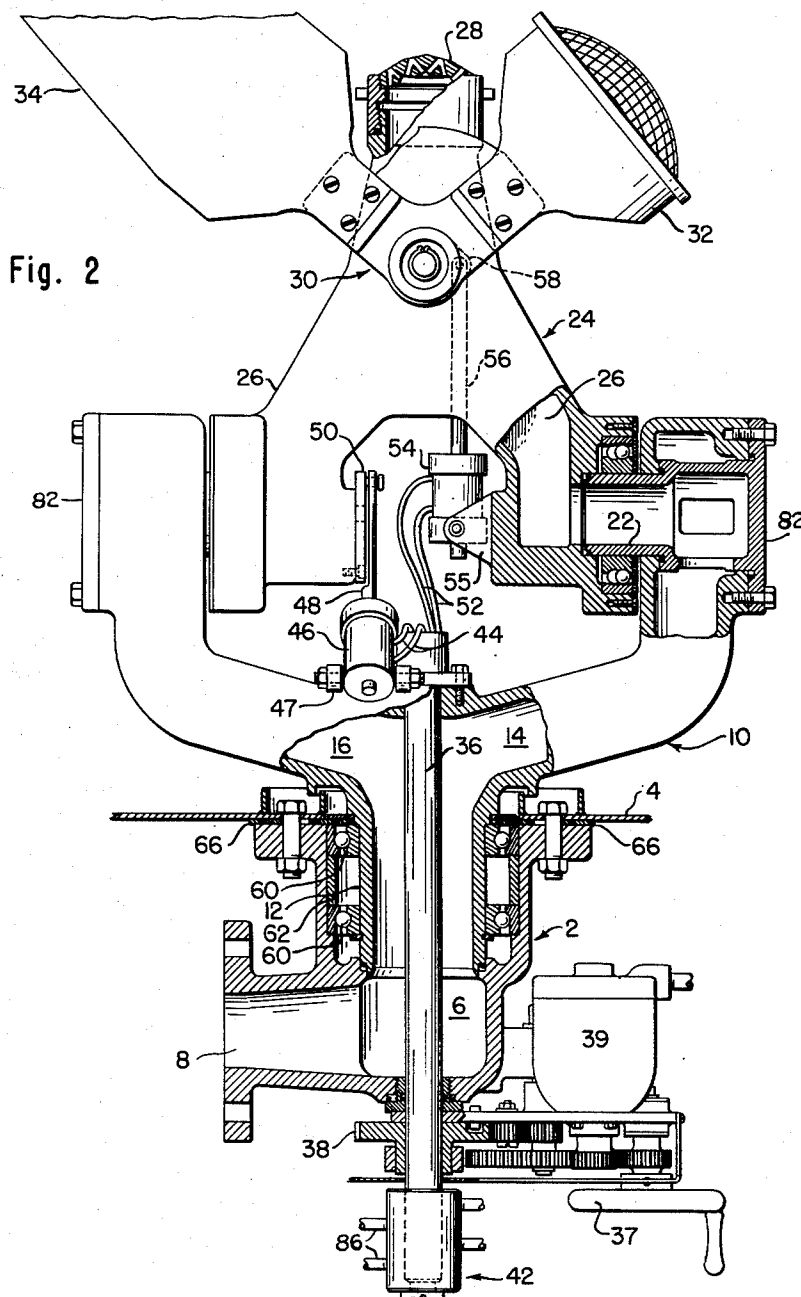
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3 Sheets-Sheet 2



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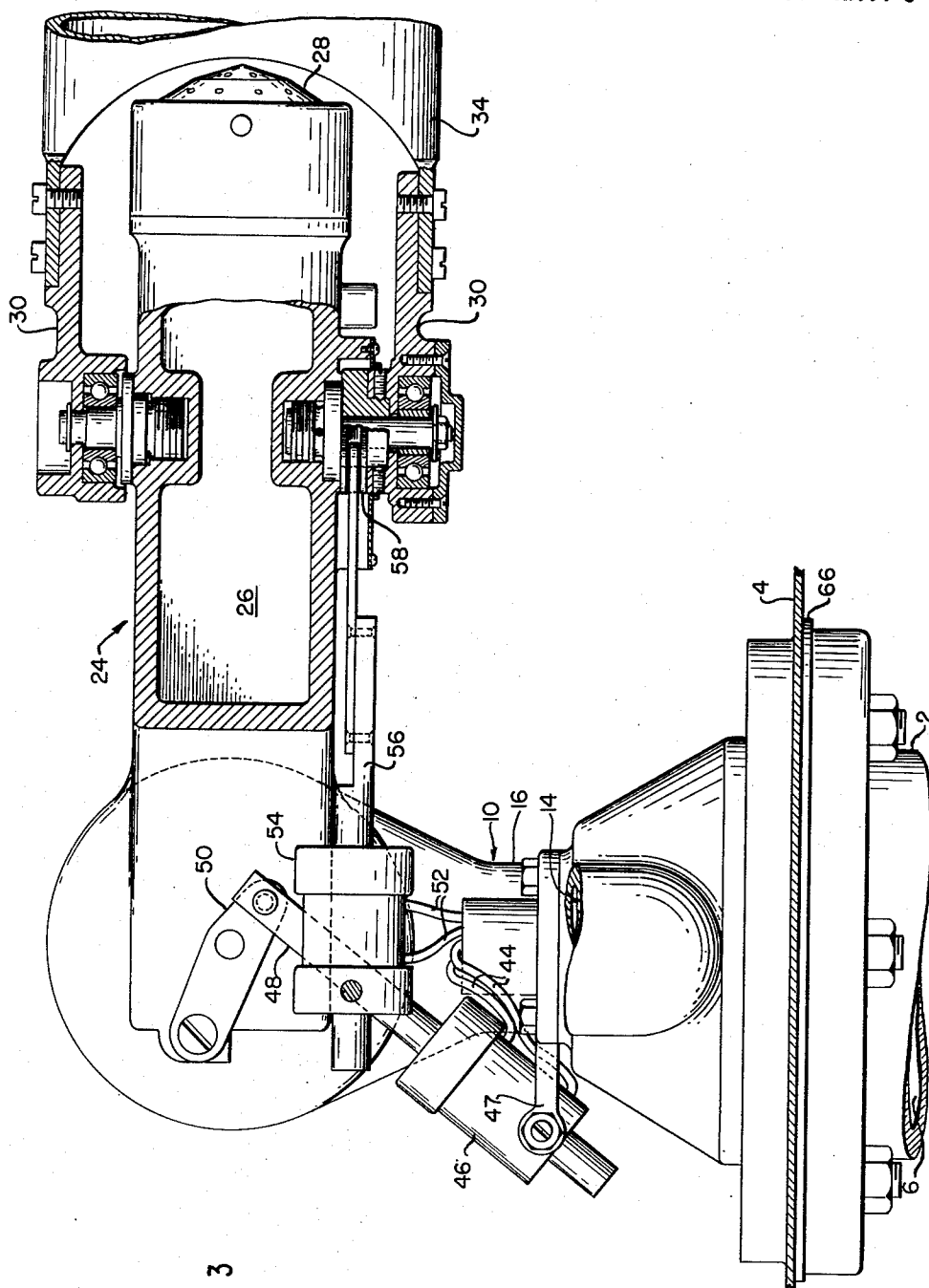


Fig. 3

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FIRE-FIGHTING TURRET

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Application December 1, 1951, Serial No. 259,378

7 Claims. (Cl. 169—25)

This invention relates to turrets and more particularly to fire fighting turrets capable of being hydraulically driven from a remote position.

This invention is described herein as being embodied in a fire-fighting turret but is not thus limited. In the construction of fire-fighting turrets in the past, the turret has been usually mounted on a vehicle such as on the roof of a crash truck, on a fire truck, or on a fire boat. This fire-fighting turret has been of the usual turret construction with the base fixed to a platform, the turret device rotatably mounted in azimuth within the base and capable of being elevated. The turret device has been operated entirely by hand and therefore at least one man has been required at the turret mount to manipulate it. The disadvantage of this is that the heat of the fire prevents the turret operator from approaching too close to the fire, and in northern climates the severe weather hinders the operator in manipulating the turret. In the present invention, these disadvantages are eliminated by providing a turret construction which has a shaft containing hydraulic lines to permit training and elevating the turret hydraulically from a remote position.

It is also desirable to provide means whereby the character of the stream may be varied, and it is one of the principal objects of the invention to provide remote control means for that purpose.

In the usual fire-fighting turret there is a single discharge nozzle through which a stream of water is emitted. In the present invention we provide a turret with a plurality of shaper devices, each of which can be rotated from a remote position into alignment with the discharge nozzle to vary the character of the discharge stream. This is particularly useful in fighting fires of highly inflammable fluids as will be explained herein.

With the above and other objects in view, other features of the invention comprise the control apparatus hereinafter described and claimed.

In the accompanying drawings, Fig. 1 is a pictorial view of the turret mounted on the roof of a crash truck; Fig. 2 is a front view of the turret with various parts shown in section with the turret nozzle at 90° elevation; Fig. 3 is a side view of the turret head shown partly in section looking from the right side of Fig. 2, with the turret nozzle at 0° elevation and the stream shaper tube in operating position; Fig. 4 is a front view of the hydraulic coupling and its connections shown in section.

Referring now to Figs. 1 and 2 the present invention is shown as embodied in a fire-fighting turret mounted on the roof of a crash truck. A turret base 2 is bolted to the inside roof of the crash truck 4. The base 2 has an L-shaped hollow passageway 6 to which a water inlet 8 is connected. A yoke-shaped structure 10, hereinafter called the turret body, has a hollow neck 12 which fits rotatably within passageway 6 of base 2. Passageway 6 connects with passageways 14 and 16 leading to passageways 26 of the turret head 24, which is rotatably mounted on the hollow shafts 22 of the yoke-shaped structure 10. The parts thus far described are in general similar to a conventional turret system in which a discharge nozzle is attached to the head 24, and which can be trained and elevated by hand. The turret is rotatable in azimuth about the axis of passage 6 and in elevation about the axis of the hollow shaft 22.

In the present invention the discharge nozzle preferably comprises a discharge tip 28 of the internal impingement type shown in the Freeman Patent No. 2,302,021. Appa-

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ratus suitable for generating foam in the manner disclosed in U. S. Patent No. 2,492,037 of December 20, 1949 granted to Freeman and Hencinski is also provided. The use of foam is very effective in fighting fires of highly inflammable fluids such as gasoline fires which result from airplane crashes. To this end, a cradle 30 is rotatably mounted on the turret head 24. Mounted on one end of the cradle is a screen shaper 32 which when aligned with the discharge nozzle 28 provides a wide-angle dispersion of foam. When a concentrated stream of foam is desired, a shaper tube 34 may be aligned with the nozzle, and to this end the tube 34 is also mounted on the cradle. As described in the copending application of John L. Wiik, Serial No. 259,421 filed December 1, 1951, the cradle can be rotated to align either shaper nozzle with the discharge nozzle to vary the character of the discharge stream depending on the magnitude and concentration of the fire. Although a different discharge nozzle may be provided to be used with other fire extinguishing materials, the liquid referred to in the following description will be foam liquid.

Integral with the body 10 and extending through the passageways of the body and turret base 2 is a hollow turret body shaft 36. Below the turret base, a gear 38 is mounted on shaft 36. As the gear 38 is driven, the shaft 36 rotates therewith, carrying the turret body and training the turret. Thus to train the turret from a remote position the gear 38 is driven through a gearing mechanism, which is itself driven from a remote position either manually by a handwheel 37 or hydraulically through a hydraulic motor 39, as is disclosed in the copending application of Freeman Serial No. 255,217 filed November 7, 1951.

Located within the hollow turret body shaft 36 are four hydraulic lines 40 (Fig. 4) through which the turret is remotely elevated and the cradle is remotely rotated. At the lower end of the shaft these hydraulic lines are connected to hydraulic lines which lead from a remotely controlled source of power, by means of an hydraulic coupling 42, the construction of which will later be described in detail. At the upper end of the shaft two of the hydraulic lines 40 are connected by hydraulic lines 44 to an hydraulic elevation cylinder 46. The cylinder is rotatably mounted on a bracket 47 which is bolted to turret body 10 (Fig. 3) pinned to the elevation arm 50, the movement of which elevates the turret. The other two hydraulic lines 40 are similarly connected by flexible hydraulic lines 52 to a hydraulic shaper cylinder 54 pivotally mounted on a bracket 55 which is bolted to the turret head 24. The cylinder 54 also contains a piston and piston rod 56 which is connected to an arm 58, the latter arm being fixed to the cradle 30.

To elevate the turret and to rotate the cradle hydraulically, hydraulic power is selectively transmitted from the remote control source to two hydraulic lines 40, the other two lines being used as return lines. The hydraulic power is then transmitted from lines 40 through one line 44 to elevation cylinder 46 actuating the piston rod 48 which elevates the turret through elevation arm 50. To rotate the cradle 30, the hydraulic power is led from lines 40 through one line 52 to the shaper cylinder 54, actuating the piston and piston rod 56. The movement of the piston rod 56 drives the shaper arm 58 which rotates the cradle 30. To obtain the proper elevation and shaper nozzle alignment, hydraulic power is transmitted selectively to the hydraulic lines 40 as is fully described in the copending application of Freeman, Serial No. 255,217 filed November 7, 1951.

Referring more particularly to Figs. 2 and 3, the turret base 2 which is a hollow L-shaped metal structure is bolted to the inside roof of the crash truck 4. An opening 8 in one side of the base to which a water supply line is connected, cooperates with the passage 6 through which the water flows towards the discharge nozzle. The turret body 10 is yoke-shaped and is rotatably mounted within the turret base, its neck 12 fitting within the passage 6. Mounted on the periphery of the neck 12 are two main bearings 60 separated by a spacer 62, the turret body rotating in azimuth on its bearings within the base. Retainer plates 66 inserted above the bearings

and fitting around the periphery of neck 12, prevent the turret body from moving longitudinally out of the turret base. The plates 66 and the bearing arrangement are so fixed as to withstand the great forces exerted by the liquid on the turret body, and yet provide for easy disassembly of the turret from the base.

As previously mentioned, the hollow shaft 36 extends through the turret body 10 and the turret base 2. At the upper end of the shaft the lines 40 connect with the lines 44 and 52. The shaft 36 extends through the base and is suitably sealed against leakage. Below the turret base 2, the turret body shaft gear 38 is mounted on the shaft 36.

The passageway 12 of the turret body 10 separates into two branches 14 and 16. Mounted in the end of each branch and cooperating with the passageways are short hollow shafts 22. The turret head 24 is mounted on the shafts 22 and is rotatable in elevation about the axis of said shafts. The branches 14 and 16 are sealed to prevent leakage, as by the turret head caps 82 bolted to the arms. The water, whether or not mixed with foam liquid passes through passageways 6 and 12, flows through the two branches 14 and 16 and the hollow shafts 22, and through the turret head 24 to the discharge nozzle 28.

In the construction of the cradle and the foam shaper devices mounted thereon, it is to be noted that the sides of each foam device are cut away to permit their rotation over the discharge nozzle, and also to aspirate air for foam formation. Either foam device may be aligned with the discharge nozzle, or as shown in Fig. 2, when neither device is in alignment, the fire extinguishing material is projected directly through the discharge nozzle.

The operation of the turret described up to this point has included hydraulic turret elevation and shaper nozzle rotation independent of the training of the turret. If the hydraulic lines from the outside source were directly connected to the hydraulic lines within shaft 36, these lines would be twisted as the turret was trained. To avoid this the invention provides for coupling the outside stationary hydraulic lines to the rotating elevation and shaper hydraulic lines through the connections 49.

Referring to Figs. 2 and 4, as mentioned previously the turret shaft 36 extends through the turret body and is provided with the four hydraulic lines 40. Two of these lines lead to the elevation cylinder while the other two lead to the shaper cylinder. When the shaft rotates these lines rotate with it. The lower end of the shaft is surrounded by a stationary hydraulic coupling member 42 which provides the means for supplying the oil to the oil lines 40. The member 42 has four inlet holes 84 to which are connected the oil lines 86 from an outside source. The internal surface of the coupling has a series of annular grooves 88. The number of grooves and their spacing is so arranged that an oil groove 88 cooperates with each of the four tubes 40, and there is a sealing groove 90 on either side of each oil groove. The sealing grooves 90 are supplied with seals 92 to prevent the leakage of oil from the grooves 88 along shaft 36 as the latter rotates. Although the shaft 36 rotates as the turret turns, the coupling 42 remains stationary.

Although the turret embodying this invention has been described as a fire fighting turret having a single discharge nozzle with shaper nozzles rotatable about the tip, it is not to be so limited. This invention can apply to any turret which is to be hydraulically operated from a remote position. The number of hydraulic lines running within the turret body shaft may be as numerous as the desired operations may require.

Having thus described my invention, I claim:

1. A remotely controlled fire-fighting turret having a turret base, a turret body capable of being trained in azimuth on said base, a turret head carried by the body, means forming passageways to convey liquid through the body to the head, elevation control means for the turret head, pattern control means carried by the turret head for controlling the pattern of liquid discharge from the head, a hollow shaft, means for rotating the body about the axis of the hollow shaft, operating means extending through the hollow shaft for operating the elevation control means and additional operating means extending through the hollow shaft for operating the pattern control means, both of said operating means being independent of the position of the turret body in azimuth.

2. A remotely controlled fire-fighting turret having a turret base, a turret body capable of being trained in

azimuth on said base, a turret head carried by the body, means forming passageways to convey liquid through the body to the head, elevation control means carried by the body and connected with the head to control the elevation of the head, pattern control means carried by the head for controlling the pattern of liquid discharged from the head, a hollow shaft, means for rotating the body about the axis of the hollow shaft, operating means extending through the hollow shaft and connected with the elevation control means, additional operating means extending through the hollow shaft, and flexible connections between said additional operating means and the pattern control means, both of said operating means being independent of the position of the turret body in azimuth.

3. A remotely controlled fire-fighting turret having a turret base, a turret body capable of being trained in azimuth on said base, a turret head carried by the body, means forming passageways to convey liquid through the body to the head, hydraulic elevation control means on the turret body to control the elevation of the turret head, hydraulically-operated pattern control means on the turret head for controlling the pattern of liquid discharged from the head, a hollow shaft, means for rotating the body about the axis of the shaft, hydraulic supply lines passing through the shaft to the body, connections from one supply line to the elevation control means, and flexible connection from another supply line to the pattern control means, said supply lines being effective to supply hydraulic pressure to the elevation control means independent of the position of the turret body in azimuth.

4. A remotely controlled fire-fighting turret having a turret base, a turret body having a hollow shaft rigidly secured thereto and means for training the body in azimuth on said base about the axis of the shaft, a turret head carried by the body, pattern control means for controlling the pattern of liquid discharged from the head, elevation control means for the turret head, means forming passageways to convey liquid through the body to the head, operating means extending through the hollow shaft for operating the elevation control means independently of the position of the turret body in azimuth, and additional operating means for the pattern control means.

5. A remotely controlled fire-fighting turret having a turret base, a turret body having a hollow shaft rigidly secured thereto and means for training the body in azimuth on said base about the axis of the shaft, hydraulic supply means rigidly secured to and extending through the shaft, a turret head carried by the body, pattern control means for controlling the pattern of liquid discharged from the head, hydraulic elevation control means on the turret body and flexibly connected to said supply means, to control the elevation of the turret head independently of the position of the turret body in azimuth, additional operating means for the pattern control means, and means forming passageways to convey liquid through the body to the head.

6. A remotely controlled fire-fighting turret having a turret base, a turret body having a hollow shaft rigidly secured thereto and means for training the body in azimuth on said base about the axis of the shaft, hydraulic supply means rigidly secured to and extending through the shaft, a turret head carried by the body, pattern control means for controlling the pattern of liquid discharged from the head, hydraulic elevation control means on the turret body and flexibly connected to said supply means, remotely-controlled valve means flexibly connected to said supply means to control the elevation of the turret head independently of the position of the turret body in azimuth, additional operating means for the pattern control means, and means forming passageways to convey liquid through the body to the head.

7. A remotely controlled fire-fighting turret having a turret base, a turret body having a hollow shaft rigidly secured thereto and means for training the body in azimuth on said base about the axis of the shaft, hydraulic supply means rigidly secured to and extending through the shaft, a turret head carried by the body, hydraulic elevation control means on the turret body to control the elevation of the turret head, hydraulically-operated pattern control means on the turret head for controlling the pattern of liquid discharged from the head, said elevation and pattern control means being flexibly connected

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to said supply means, remotely-controlled valve means flexibly connected to said supply means to control the elevation of the turret head and said pattern control means independently of the position of the turret body in azimuth, and means forming passageways to convey liquid through the body to the head.

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