A sprinkler system for a building includes an internal combustion engine which operates a water pump. The water pump in turn forces water through pipes to sprinkler heads. The engine is at least in part controlled by a throttle control mechanism which includes a spring biased piston which is moved in response to the output pressure of the pump. This prevents the pump from exceeding the rated capacity of the system components.
PUMP PRESSURE LIMITING ENGINE SPEED CONTROL

BACKGROUND

[0001] Building sprinkler systems are designed to provide water to extinguish fires during emergency situations. Typically a pump is used to provide the necessary water pressure. These pumps can be powered by internal combustion engines.

[0002] The sprinkler systems themselves are designed to operate within a defined flow rate and pressure. The pumps must be able to generate the defined flow rate. For a given pump, the pressure is dependent on flow rate. At a fixed speed, as the flow rate decreases, the pressure tends to increase. Further as flow rates decrease, the load on the engine decreases and the rpm increases thereby further increasing pressure produced by the pump (this is referred to as the engine droop). The net effect is to increase the pressure which a sprinkler system must be able to handle. This basically means stronger more expensive sprinkler system components including water pipes, fittings and sprinklers. Sprinklers are rated for specific operating pressures. This establishes the limits of the system pressures. Some types of sprinkler are further limited to smaller more specific pressure ranges further limiting system pressure ranges. The pressure of the water at the pump suction (called suction pressure) often has a wide range between its high and low resulting in equally wide contribution to pump output pressure variances.

SUMMARY OF THE INVENTION

[0003] The present invention is premised on the realization that the need for higher pressure rated sprinkler systems can be avoided by utilizing an engine throttle control which is responsive to the output pressure of a pump. As the pump pressure increases above a defined pressure, a control mechanism is utilized to pull back the throttle reducing engine rpm and in turn maintaining a constant pressure.

[0004] Preferably the control mechanism is a piston which is attached to the throttle and forced in a direction that pulls the throttle back when water pressure is increased. Preferably the piston is spring biased so that when the pressure decreases, the throttle will return to its normal setting to operate the pump within design parameters. Knowing the pressure at the rated flow of the pump allows one to adjust the control mechanism to maintain this pressure even at low flow rates thereby eliminating the need for the more expensive plumbing created by undesirable pressure.

[0005] The objects and advantages of the present invention will be further appreciated in light of the following detailed description and drawings.

BRIEF DESCRIPTION OF DRAWINGS

[0006] FIG. 1 is a perspective view of the present invention.

[0007] FIG. 2 is a cross-sectional view of the throttle control of the present invention.

[0008] FIG. 3 is a cross-sectional view of the throttle control shown in a different position according to the present invention.

DETAILED DESCRIPTION

[0009] As shown in FIG. 1, sprinkler system 12 includes a pump 14 which directs water from an inlet pipe 18 and through outlet pipe 16 to sprinkler heads (not shown). The pump 14 is in turn operated by an internal combustion engine 22 as shown in FIG. 1, preferably a diesel engine. Engine 22 drives the shaft 24 which in turn operates the pump 14.

[0010] The rpm of engine 22 and thereby the shaft 24 is controlled by a throttle 26. This is operatively connected to a control mechanism 28 which is mounted on the engine 22 by bracket 32.

[0011] As shown more particularly in FIGS. 2 and 3, the control mechanism 28 includes a piston 34 which extends through a block 36. Rearwardly of block 36 is a cylindrical casing 38 which screws onto block 36. Opposite block 36 is a cap 42 which screws onto the cylindrical casing 38 holding it in position. Between the cap 42 and the piston 34 is a spring 44 which engages a rear end 46 of piston 34.

[0012] Piston 34 includes a shaft 48 having a threaded end 52. The opposite end of piston 34 terminates with a stop member 56 which in turn is larger than the piston 34.

[0013] The piston 34 rides in block 36 which includes an enlarged axial first cylindrical chamber 58 and a smaller aligned second cylindrical chamber 62. First and second O-rings 64 and 66 are seated axially in chambers 58 and 62 respectively. Piston 34 is located in the first cylindrical chamber 58 and a seal is formed between piston 34 and the wall of chamber 58 by o-ring 64. The shaft 48 of piston 34 extends through the smaller second chamber 62 and again forms a seal with o-ring 66. The stop member 56 of piston 34 is larger than the large axial chamber 58 and acts as a stop limiting the movement of piston 34 relative to block 36.

[0014] Block 36 further includes first and second threaded transverse openings, 68 and 72 respectively which lead to chamber 58. The first threaded opening 68 is sealed by a bleed valve 74. The second threaded opening 72 is connected to tube 76 which extends to pipe 16 which is downstream of pump 14. Tube 76 further includes a strainer 78.

[0015] The threaded end 52 of piston 34 attaches via turnbuckle 82 to throttle control linkage 84 which in turn is attached to the throttle 26.

[0016] In operation when the engine 22 is activated, it will cause pump 14 to rotate increasing the water pressure in pipe 16. Tubing 76 and chamber 58 of block 36. The water pressure (when it reaches a defined level) within block 36 will force the piston 34 to move in the direction of arrow 88 pulling the throttle back decreasing the rpm’s for the engine and the output pressure from the pump. When the pressure is reduced below a defined pressure, the spring 44 will force the piston 34 back toward its starting position as shown in FIG. 2. The stop member 56 will engage a rear end of block 36 preventing further movement. When stop member 56 engages block 36, the throttle 26 is positioned for the engine to provide its rated power to drive pump 14.

[0017] The present invention includes two mechanisms to adjust the operation of the control unit 28. Between cap 42 and spring 44 are one or more metal disks or shims 92 which will increase the pressure applied by the spring against the
piston 34. By calculating the effect of a shim, one can determine the number of shims needed to achieve the necessary operating pressures. Alternatively, a bolt 94 could be threaded through cap 42 to adjust the pressure on spring 44 as best shown in FIG. 3. Further, turnbuckle 82 can adjust the position of throttle linkage 84 relative to shaft 52. This will permit on site adjustment which may be necessary for engine 22 power output to be trimmed to match pump 14 power demand.

[0018] The present invention provides an uncomplicated mechanism which accounts for increases in the pump pressure caused by changing flow rates, increases in pressure caused by engine droop as well as suction pressure. The simple pressure activated device of the present invention can be used to compensate for all of these automatically. The system itself does not require multiple adjustments for these three separate factors. This reduces the maximum pressure for a sprinkler system without limiting designed flow rate. Thus by utilizing the present invention, one can dramatically reduce the cost of a sprinkler system.

This has been a description of the present invention and the preferred mode of practicing the invention, however, the invention itself should only be defined by the appended claims wherein we claim:

1. A building sprinkler system having a pump said pump activated by an internal combustion engine;
   said engine having a throttle;
   said throttle attached to a control said control responsive to the output pressure of said pump and adapted to reduce engine speed at a pre-determined pressure.

2. The building sprinkler system claimed in claim 1 wherein said control has a piston said piston is linked to said throttle wherein said piston moves in response to said output pressure.

3. The sprinkler system claimed in claim 2 wherein said piston is spring biased.

4. The sprinkler system claimed in claim 3 wherein said piston rides in a cylinder having an end wall; and
   a spring located between said end wall and said piston urging said piston away from said end wall.

5. The sprinkler system claimed in claim 4 wherein said cylinder includes an end cap and wherein further comprising at least one shim between said cap and said spring.

6. The sprinkler system claimed in claim 2 wherein said piston includes a first cylindrical portion which rides in a cylindrical chamber wherein water from said pump is directed to said chamber and being effective to move said piston at said predetermined pressure.

7. The sprinkler system claim in claim 6 wherein said piston has a stop member wider than said cylindrical chamber.

8. A sprinkler system having a series of components said components having a rated pressure capacity;
   a pump connected to an internal combustion engine and having pressure capability which when combined with a system suction pressure exceeds said rated pressure of said components;
   throttle control responsive to water pressure from said pump adapted to prevent said water pressure from said pump from exceeding the rated pressure of said components.

9. The sprinkler system claimed in claim 5 wherein said piston further rides in a cylindrical chamber having an end portion wherein said piston extends beyond said end portion and has a stop member having diameter greater than the diameter of said cylindrical chamber.

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