Conversion procedure of a Traditional Fire Extinguisher to an Automatic Fire Retardant Discharge

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ABSTRACT

In recent years it has been seen that there has been exponential growth in Car fires, and there are not many ways to solve this problem. We are going to manufacture a mechanism that will solve this problem. We are planning to make a mechanism that will be using AFFF FOAM as fire retardants which would be stored in a tank made of aluminum alloy. The mechanism would consist of smoke, infrared, and thermal sensors which will help in detecting the fire near ENGINE. With this kind of mechanism in use, it will help in reducing casualties and the cost of repair of cars caused due to fires while riding the vehicle. There are 3 probable causes of fire. The fire can start when the fuel is being supplied from the fuel tank, as the fuel is coming in high pressure, pumped by the fuel pump to the engine, there are many chances that fuel gets leaked and that leads to fire.

The second cause can be electrical wiring. All the cars have a lot of electrical wiring spread all around the car, so it becomes difficult to reach out to every possible place at the time of the fire, and also the rate of these causes is also less.
Third can be from coolant failure. If cars are not serviced on time that leads to deterioration of coolant and which in turns leads to increase in temp of car engine while driving. May lead to fire when driving a car at high temperature.

INTRODUCTION

Most of us have heard that a car catches fire due to fuel leaks near the engine, short-circuiting, or coolant failure. When a car becomes old or is not maintained properly it can generate one of the 3 above-listed issues regarding the fire. We are planning to make a simple mechanism which will play the role of an Automatic Fire Extinguisher for engines of passenger vehicles. It will work mainly on different types of sensors, solenoid valves, hose pipes, manufacturing of fire extinguisher containers and usage of nozzle/sprinkler. The sensors will activate when the threshold temperature is attained or smoke is detected. It will be programmed in such a way that an electric signal would be given to the valve and lead to

discharge of fire retardants. Our main objective is to get an additional safety feature for passengers, which is not provided in the vehicle. And our other objective is that we are going to make a new mechanism for vehicles with cost-efficiency. It will reduce the cost of repairs in cars due to fire. It will help in preventing injuries/fatalities caused by fire.

REQUIREMENT OF A T-SHAPED EXTENSION:-

The requirement of a T-shaped extension was necessary because we had to also attach the old filling valve from the traditional fire extinguisher, as without it one cannot fill the AFFF foam with the required pressure. And for automation, we required a solenoid valve that will turn on and off the electrical impulse given by the sensors through the Arduino Uno board. So there we needed 2 openings for the traditional valve and another one for the solenoid valve and finally, in the third opening, we attached it with the mouth of the extinguisher.

FIGURE-1

The traditional valve used to fill a Fire extinguisher

By making this extension it was easier to connect all Mechanical parts of the Automatic Fire extinguisher and filling and releasing of the AFFF foam also got a little bit easier.

Converting traditional fire extinguisher into automatic fire extinguisher.

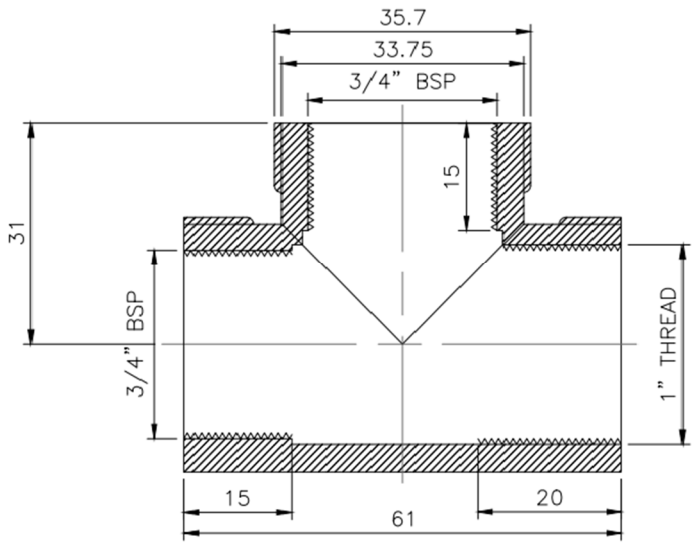
Here we took a traditional AFFF Foam fire extinguisher and did some suitable modifications on the top of the cylinder, to make it an automatic fire extinguisher. Components manufactured for conversion are T-SHAPE metal pipe was manufactured and extension of fire extinguishers mouth was done.

Doing this helped us to connect the manual valve at one end, the solenoid valve at another, and last was the extension was attached. Detailed plugging of this is mentioned in the figure below.

Using the above modifications we were able to fill the fire extinguisher with the help of a manual(traditional) valve and the plastic pipe was fixed in the extension which helped in using a manual valve for filling and a solenoid valve was used for extracting the fire.

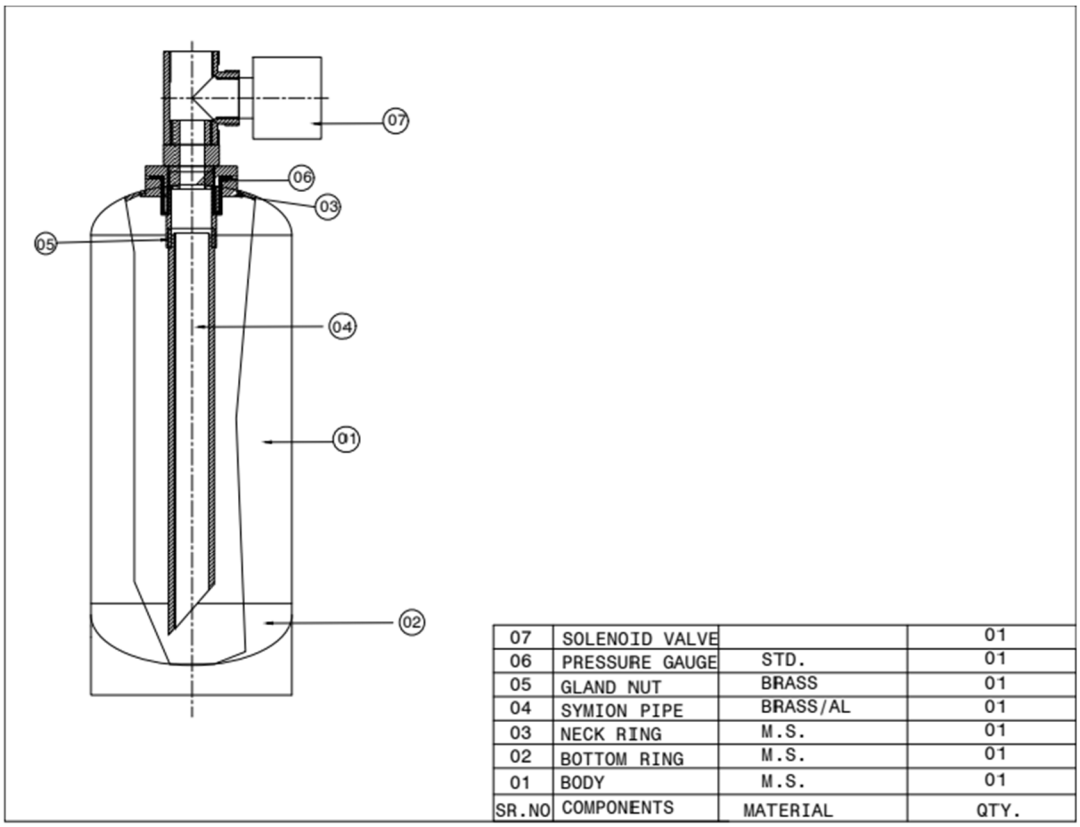
As both the components were made of iron it was able to withstand the pressure and didn't allow the gas to leak, which solved the main problem of leakage in the fire extinguisher.

So on getting an electrical signal from Arduino to the solenoid valve it use to open its valve and let the Foam come out of it which was used to extinguish the fire.



. FIGURE-2

T-SHAPE Extensions with dimensions.



SR.NO	COMPONENTS	MATERIAL	QTY.
07	SOLENOID VALVE		01
06	PRESSURE GAUGE	STD.	01
05	GLAND NUT	BRASS	01
04	SYMION PIPE	BRASS/AL	01
03	NECK RING	M.S.	01
02	BOTTOM RING	M.S.	01
01	BODY	M.S.	01

FIGURE-3

T and extension attached to traditional Fire Extinguisher.

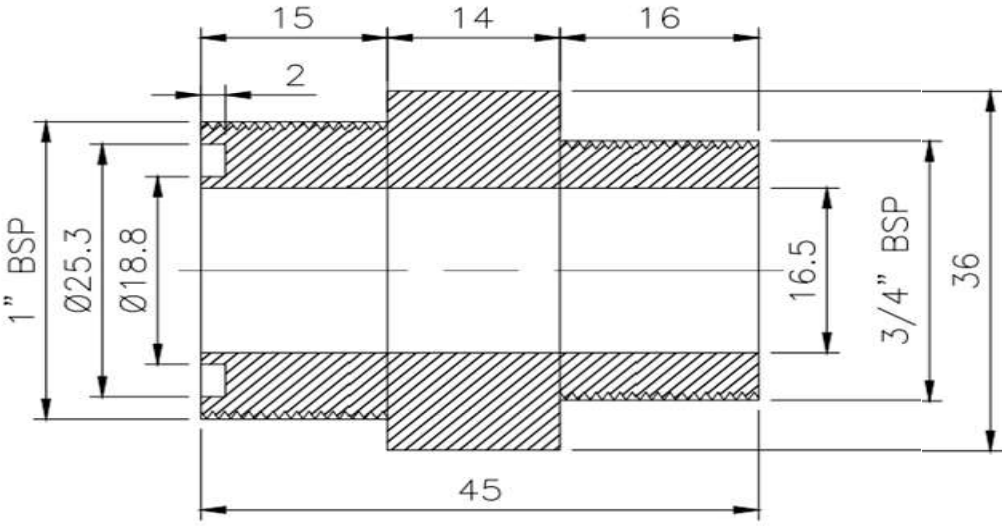


FIGURE-4

Extension used to attach T and Fire Extinguisher.

FIGURE-5

Pressure leakage test.

CONCLUSION

As per the figure-2,3,4 T-shaped extension were manufactured according to the dimensions mentioned in the diagram.
Using this iron-based t-shaped extension helped us in converting the fire extinguisher successfully, as there was no leakage of pressure, and successful discharge of AFFF foam was achieved.
As T-shaped extension are made of Iron, it was able to handle filling pressure of 150bar and the extension was able to catch plastic (PVC) pipe which helped proper inlet and outlet of pressure and foam discharge.

APPENDIX

FIGURE-1 The traditional valve used to fill a Fire extinguisher

FIGURE-2 T-SHAPE Extensions with dimensions.

FIGURE-3 T-shaped extension attached to traditional Fire Extinguisher

FIGURE-4 Extension used to attach T and Fire Extinguisher.

FIGURE-5 Pressure leakage test.

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