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DESIGN AND FABRICATION OF FOOD CONTAINER WARM BY USING EXHAUST GAS

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Abstract- As we know that the food delivery is a major field now and needs to have improvement for maintaining proper quality of food as the present servicing system comprises an insulated box our project focus is on this area to enhance the existing system A system comprises a combination of heat exchanger utilizes the waste heat of said automobile exhaust and transfer it to said delivery box for maintaining the quality of food by maintaining the temperature. Said system has been integrated with sensors, filter inlet outlet manifold for manual cleaning of the soot as well as flow control valves for improving the efficiency of the system. Based on this realization, we are aiming to make the device that maintain temperature and quality of food by reducing dimension and cost to existing system. This food delivery system can capable to fulfill requirement of quality and temperature in long distance. This new mechanism will indirectly boost any economy that depends on food delivery. It reduces the risk of rejection of food and increase the relation of customers and restaurants (pizza outlets, e-commerce food business). So our main object is to develop such type of device which delivers best quality of food to the customers and improving the existing system.

Keywords -

I INTRODUCTION

Low temperature fluid which is used in heat exchanger process goes to the coil type heat exchanger which is mounted on exhaust pipe of engine and takes the heat from the exhaust as in, then it goes to the second heat exchanger which is mounted on fins of the engine and absorbs the heat from the fins making it as twin cooled engine. Now we have high temperature fluid which we will use to maintain the temperature of delivery box. This high temperature fluid goes to delivery box where it gives heat to food and maintain the temperature of food. This process is repeat again and again. For the selection of the fluid we use the various data's suggested in TABLE and as helium is having highest heat caring capacity along with this it's inert nature diminishes the adverse effect in the case of leakage. Due to said reason we choose the heat caring fluid as helium. Even due to usage of gas there is no need of using separate pump which is another benefit of choosing the helium. For getting more heat content we use flow control valves which is utilized to make the contact for said time as much as we need to increase the heat gain.

The higher the utilization of natural resources due to increase in population and technology development leads to the depletion fuel resources. Increasing fuel cost and reducing petroleum supplies are forces to utilize the energy fully from the fuel. In energy conservation, use of IC engine is of special important, because the machineries use around 60% of petroleum derived fuels in worldwide. The major difficulty to overcome the development of internal combustion engine is the reduction of emission (such as CO2, CO, N2O and particulate matter); it is achieved by increasing the engine efficiency and the partial recovery of waste energy from the exhaust gases. The recovery of waste energy or waste heat recovery is heat, which is produced in a process by way of fuel combustion (or) chemical reaction and then dumped into the environment even through it could still be reused for some useful and financial resolution. In water cooled engine, the one third of the energy is wasted in engine cooling system and the one third of the energy is wasted in exhaust gases. For such cases, vapor compression air conditioning system is used for cooling the cabin and in goods carrying. Internal combustion engine efficiency can be increased by attaching absorption refrigeration system.

In recent year, the online food delivery items like Pizza, Burger etc. has been increasing rapidly. But to deliver the ordered food item requires time of about 20-25 minutes. Meanwhile the food items get cooled and lose its taste. So either customer needs to heat it or to eat as it is. To avoid this loss of food quality, some arrangement should be made which will solve this problem. If the delivered food is warm then customer gets more satisfaction and this will attract more customers to order online food which will ultimately increases the business.

Keeping this need in mind a device which will solve this problem is to be made. We have two main options either make more effective insulated box which will restrict the heat transfer or some device which will maintain the temperature of that box at desired temperature. Now the aim is to design an arrangement which will keep the temperature of box to required value. All the available boxes are only acts as an insulation box. There no as such device which will maintain the temperature of food item till the time of delivery. With two-wheeler, we are available with considerably large amount of exhaust gas heat which anyways gets waste. We can utilize this heat from Exhaust Gas to keep food delivery items warm. So the exhaust gas should be circulated around the box and thus temperature can be maintained.

1. To make an arrangement which will keep ordered food warm till it reaches the customer
2. Now the aim is to design an arrangement which will keep the temperature of box to required value. All the available boxes are only acts as an insulation box. There no as such device which will maintain the temperature of food item till the time of delivery.
3. With two-wheeler, we are available with considerably large amount of exhaust gas heat which anyways gets waste. We can utilize this heat from Exhaust Gas to keep food delivery items warm. So the exhaust gas should
4. Be circulated around the box and thus temperature can be maintained.

1.1 PROBLEM STATEMENT

Online food business is increasing day by day. There are many problems regarding food delivery like bad quality, poor packing, different taste, timing, etc. When delivering perishable goods like meals it's very important for every business to make sure it reaches their foodies fresh, hot (or chilled) and exactly the way they want it to taste. But as we know that maintain temperature and quality of food in food delivery is the major problem. In a recent time, existing box as a insulating box is used, They are failed to maintain temperature in a long distance. Quality of food is also affected in a long distance. Nowadays there are many methods available for deliver heated food but some are ineffective, some are complex and costly. There is need for the improvement in present methods of food delivery. These conventional methods are failed to maintain temperature and quality of food for a period of time.

1.2 OBJECTIVES

The main objectives of the project are as follows:
• To make arrangement within compact box volume only, so that it shouldn't disturb the vehicle structure.
• To make use of available exhaust gas heat from delivery vehicle.
• To build an economical system so that it should be convenient to implement.
• To increase the efficacy of food delivery box with the help of filter

1.3 SCOPE

The project touches the practical problem faced by the online food delivery system. The main focus is to make use of exhaust gas heat of delivery vehicle to keep the food item warm in such a way that it shouldn't add much cost to the system. The system should be maintenance free and should be easy to use. The setup fabricated in this project can be used as basic type of design for further development of food delivery system.

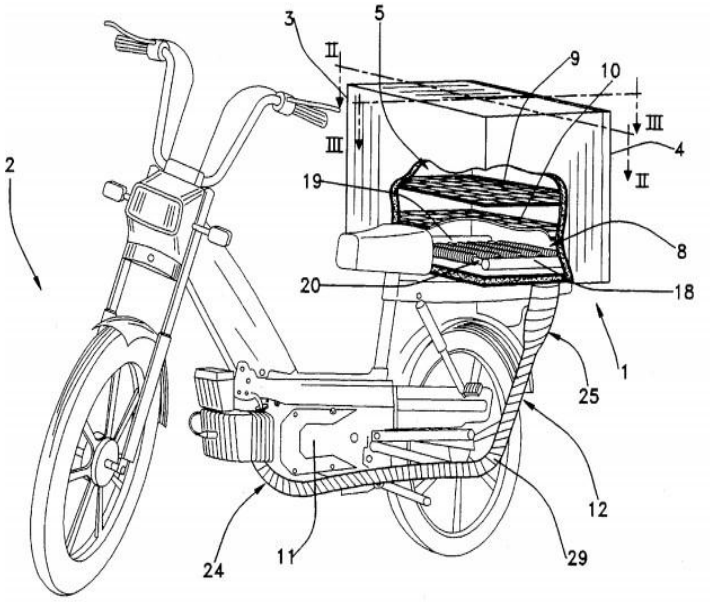
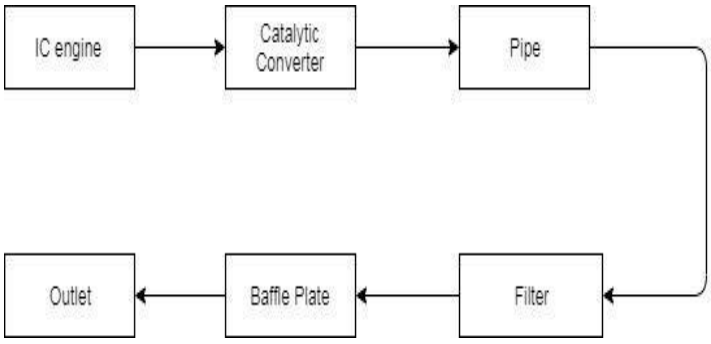


Figure 1 Food-Warming Arrangement for a Food-Delivering Motor Vehicle

II SETUP DESCRIPTION

In this set up connecting pipe is connected to the silencer of the bike through which exhaust gas will come out some part of the exhaust gas is diverted toward the delivery box through the connecting pipe then this gas is left at the lower part of the delivery box and this heat of exhaust gas will be used up to keep the product warm with the help of the metal sheet (copper sheet) because of the high thermal conductivity.



III SYSTEM COMPONENTS

3.1.1Delivery Box

Delivery box material is taken as FRP (Fiber Reinforced plastic) . The reason behind selecting FRP is as follows:
1. Fibers can be oriented to reinforce against specific stresses, increasing the durability and safety.

2. Good resistance to corrosion.
3. It can be easily mold into any desired shape.
4. Manufacturing cost is low and easily available in market.
5. High weight to strength ratio.
6. Good heat resistance.

3.1.2 Copper Plate

For transferring heat from bottom chamber to food chamber some conducting medium is required. Also copper has high thermal conductivity so copper is selected as heat transfer medium. Moreover copper has least effect of corrosion due to exhaust gas.

Copper has following advantages:

- Copper has high thermal conductivity
- Copper has least effect of corrosion due to exhaust gas
- Copper sheet can be easily cut and fabricated as per requirement

IV CONCLUSION

There are lots of problems in delivery of food because of several reasons, many designs are developed to improve the delivery of food but all of them are not able to solve all the problems which faced in delivery of food. Depending upon the necessity the suitable mechanism needs to be selected. As mentioned above the system serves to in numerous people with novel system of heating of food.

It gives not only the quality but also the enjoyment so overall we can deduce that our system works for a good cause. We also admit it that there can be more integration to our suggested system.

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