Sept. 2, 1958 J. D. ARMSTRONG 2,849,859

MOTOR MANIFOLD EXHAUST

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Fig. 1

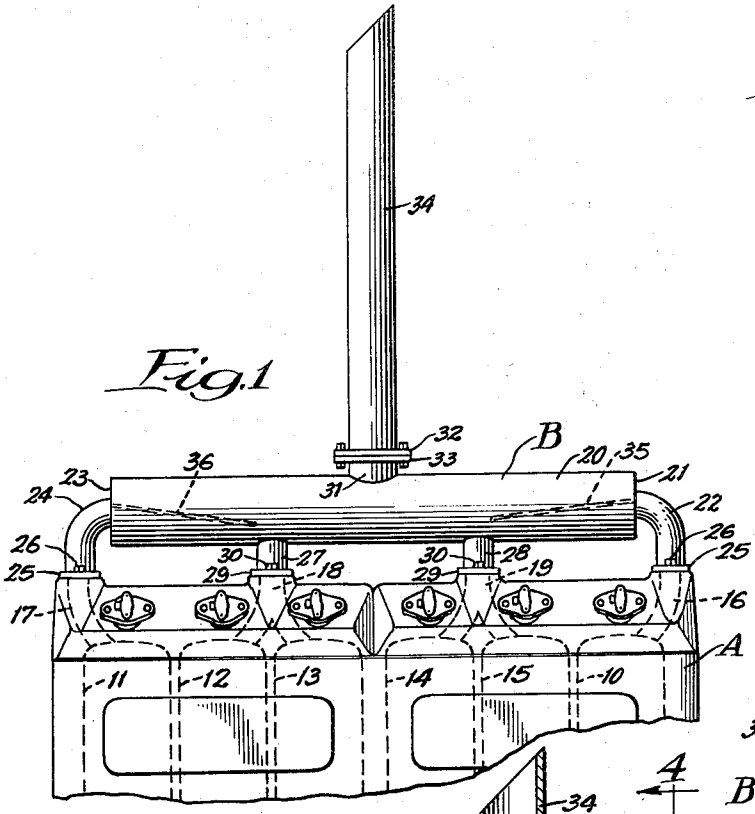


Fig. 4

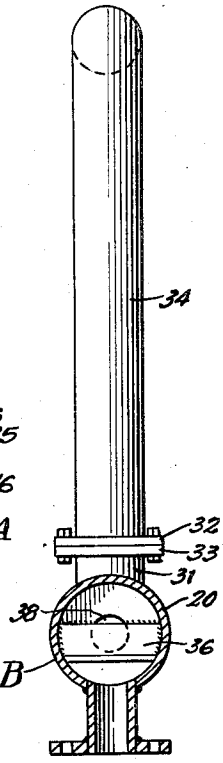


Fig. 2

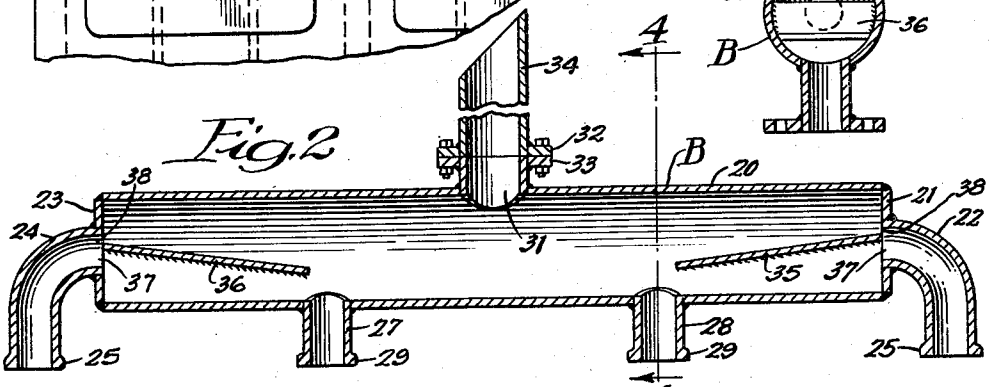
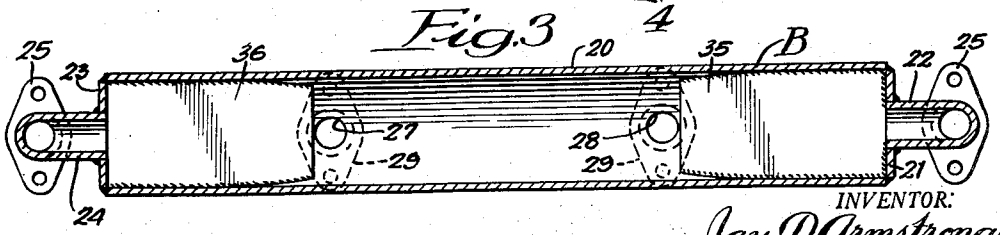


Fig. 3



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MOTOR MANIFOLD EXHAUST

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4 Claims. (Cl. 60—32)

This invention relates to a motor manifold exhaust, and more particularly to a motor manifold exhaust system wherein exhaust gases from certain of the cylinders are utilized for preventing back pressure or creating partial vacuum at the exhaust ports of other cylinders to lower the temperature and remove rapidly the gases of said cylinders.

In motors having a plurality of cylinders arranged in a line, and particularly in diesel engines, there has long been a problem with the breaking of the cylinder head block near the intermediate cylinders by reason of excessive temperatures maintained over substantial periods of time. The outermost or end cylinders are not subject to such difficulties because these have sufficient air cooling and orifice size to prevent the maintenance of excessive temperatures. The problem has existed with respect to the intermediate or interior cylinders where the excessive temperatures build up. If the gases from the end cylinders could be in some way utilized for bringing about a cooling of the inner cylinders while at the same time preventing back pressures in any of the cylinders, a solution to the long-existing problem may be found.

An object of the present invention is to provide a system or structure by which gases from the end cylinders are injected through end areas of a manifold to direct the flow or movement of the gases so that no back pressure is created on the intermediate cylinders while at the same time lowering the temperature of the exhaust ports for the intermediate cylinders by creating a Venturi or area of reduced pressure about the intermediate exhaust ports. Another object is to provide an exhaust manifold into the ends of which are directed gases from the end cylinders while utilizing such gases to create an area of reduced pressure about the exhaust ports of intermediate cylinders to reduce the temperature of such intermediate areas. A still further object is to provide in such a manifold structure, a deflector baffle which splits the stream or flow of gases from an end cylinder so as to release the gases rapidly from the manifold while creating an area of reduced pressure about the exhaust ports of intermediate cylinders. A still further object is to provide a system wherein the rapidly-flowing gases from end cylinders are utilized by directing them over the exhaust ports of intermediate cylinders, creating a partial vacuum therein, the gas streams from the end cylinders being introduced at such times that they do not collide with each other but are effective in pulling gases from the intermediate cylinders and rapidly exhausting them through a central discharge riser or pipe. Other specific objects and advantages will appear as the specification proceeds.

The invention is shown, in an illustrative embodiment, by the accompanying drawing, in which

Figure 1 is a broken side view in elevation of a diesel motor or engine equipped with a manifold structure embodying my invention; Fig. 2, an enlarged broken vertical sectional view of the manifold and exhaust apparatus; Fig. 3, a horizontal sectional view of the structure

shown in Fig. 2; and Fig. 4, a vertical sectional view, the section being taken as indicated at line 4—4 of Fig. 2.

In the illustration given, A designates a motor block, and B designates a manifold exhaust structure employed therewith.

The motor block A is that of a diesel motor having therein end cylinders **10** and **11** and intermediate cylinders **12**, **13**, **14** and **15**. The cylinder **10** is provided with an exhaust port **16**, and the end cylinder **11** is provided with an exhaust port **17**. The cylinders **12** and **13** are provided with a common exhaust port **18**, and cylinders **14** and **15** are provided with a common exhaust port **19**. Since the diesel motor structure is of well-known construction, it is believed unnecessary herein to describe the structure in any detail, it being sufficient to indicate that there are end ports leading from the end cylinders and intermediate exhaust ports leading from the intermediate cylinders.

The exhaust manifold B which embodies my invention comprises an elongated manifold cylinder **20**, having an end-plate **21** apertured to receive a conduit **22** which communicates with the exhaust port **16** of end cylinder **10**. The opposite end of the cylinder is provided with an end-plate **23** apertured to receive a conduit **24** communicating with the exhaust port **17** of the opposite end cylinder **11**. It will be understood that such plate and conduit connections may be formed by welding or by any other suitable means, the lower end of the conduits **22** and **24** being preferably provided with bolt plates **25** which are secured by bolts **26** to the cylinder head block.

The cylinder **20** is provided on its lower side with conduits **27** and **28** which communicate with the exhaust ports **18** and **19** leading from the intermediate cylinders, these conduits also being provided with flanges or plates **29** secured by bolts **30** to the cylinder block A.

Leading from the central portion of the manifold B is an exhaust pipe **31** which is preferably secured by the bolted flange members **32** and **33** to a riser or exhaust pipe **34**.

Within the manifold B and at the ends thereof, I provide baffles **35** and **36** which are preferably secured within the cylinders by welding the edges thereof to the side walls of the cylinder **20**. The deflector baffles **35** and **36** are so supported as to split the incoming stream or flow of gases from each end cylinder, directing a greater portion of the gases downwardly and over the ends of the intermediate exhaust ports, while at the same time directing a portion of the gases forwardly over the top surface of each baffle. The baffle thus provides at each end a portion **37** through which gases are directed downwardly below the inclined baffle, and a port **38** by which gases are directed inwardly and over the baffles. I find that the splitting of the incoming stream or flow is important and highly desirable in facilitating the rapid exhaust of the gases through the center outlet pipe **31**.

Operation

In the operation of the structure or system, the discharge of the hot gases from the end cylinders **10** and **11** is so regulated that the end streams which are directed toward the center of the cylinder B do not collide, but work in unison to pull the streams of gases from the intermediate ports outwardly. The downwardly-turned stream below each baffle **35** and **36** is effective in producing a Venturi effect over the exhaust ports **28** and **27**, with the result that no back pressure is created and the temperature of the intermediate cylinder block is kept cool so that the life of the cylinder head block is greatly prolonged. By the injecting of the hot gases through the end areas, I direct the flow or movement of the hot gas so that no back pressure is created upon the intermediate

cylinders as well as upon the end cylinders. This result is achieved by directing the flow of the end cylinder gases over the internal exhaust ports to create a partial vacuum at the end of the baffles 35 and 36. A Venturi effect is produced by the downwardly-inclined baffles 35 and 36 so as to draw or pull gases from the intermediate exhaust ports and direct them out of the central exhaust pipe.

The splitting of the gas stream from the end ports is important in the quick removal of the air streams. It may be that the upper stream passing through port 38 is effective in preventing eddying about the upper portion of the baffle end, or it may be that this gas stream is effective in producing a channel for the ready outflow of the gases sweeping over ports 27 and 28. Whatever be the reason, it is found that this structure gives substantially improved performance and is highly effective in preventing eddying or turbulence, and it brings about a smooth, rapid outflow of gases from the central portion of the manifold B. With the exhaust manifold shown, it is found that the exhaust gases from the end cylinders can be utilized without injury or causing back pressure upon the end cylinders, and such gases, through the Venturi action produced, are effective in preventing excessive temperatures in the intermediate cylinders by reason of the rapid removal of the exhaust gases therefrom and by the prevention of back pressure on such inner cylinders.

While the invention is particularly useful in connection with diesel motors and engines, it will be understood that the invention is applicable to other motors and other uses, and it is also obvious that the manifold exhaust structure may be varied in construction for the purpose of utilizing the system or principle herein disclosed.

While, in the foregoing specification, I have set forth a specific structure in considerable detail for the purpose of illustrating an embodiment of the invention, it will be understood that such details of structure or operation may be varied widely by those skilled in the art without departing from the spirit of my invention.

I claim:

1. In an exhaust manifold system for a motor having end and intermediate cylinders and exhaust ports leading therefrom, a manifold provided on one side with an exhaust outlet and at its ends with inlets communicating with the exhaust ports of said end cylinders and at a side opposite said exhaust outlet with ports communicating with said intermediate cylinders, and a baffle in each end of the manifold dividing the inlet stream of gas and extending from the end inlet toward said exhaust outlet and in a direction toward an intermediate port for directing one stream of gas from the end inlet over said intermediate port and another stream directly to said exhaust outlet, said baffles being spaced apart to provide an open area in the central portion of the manifold communicating with said exhaust outlet.

2. In combination with a diesel motor having end cylinders and intermediate cylinders and exhaust conduits communicating therewith, an elongated manifold cylinder having an exhaust outlet and having its ends provided with inlets communicating with conduits from said end cylinders, said manifold having intermediate ports communicating with the conduits from said intermediate cylinders, and deflector baffles within said manifold cylinder including at least one baffle at each end extending across the inlet to divide the inlet stream of gas and extending between a portion of the end inlet and the exhaust outlet of the manifold, each baffle extending in a direction toward but spaced from an intermediate port whereby one stream of gas from each inlet is directed over an intermediate port and another stream is directed to said outlet, said baffles terminating adjacent said intermediate ports and providing between them an open area communicating directly with said exhaust outlet.

3. In combination with a motor having end and intermediate cylinders and exhaust conduits leading therefrom, an elongated manifold supported over said motor and having end inlets communicating with the conduits from said end cylinders and having intermediate ports communicating with conduits from said intermediate cylinders, said manifold having said last mentioned ports in one side portion thereof and having an exhaust outlet in the opposite side portion thereof, whereby said intermediate ports and said exhaust outlet are in open communication with each other, and baffles extending across the end portions of said manifold and in general alignment with said end inlets for dividing incoming gases into two streams, and directing one stream over the said ports leading from said intermediate cylinders and the other stream directly to said exhaust outlet.

4. The structure of claim 3, in which said baffles are inclined in a direction generally toward said intermediate ports but terminating short thereof.

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