

Sept. 30, 1941.

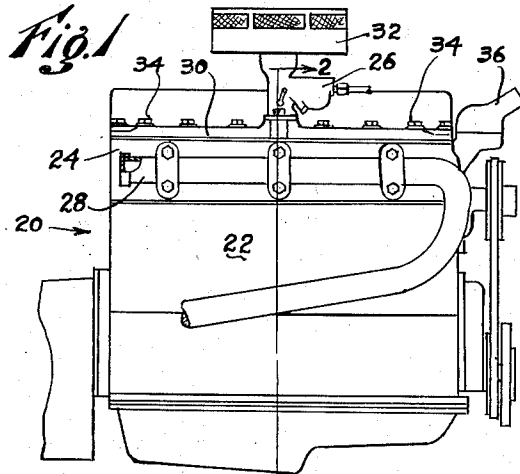
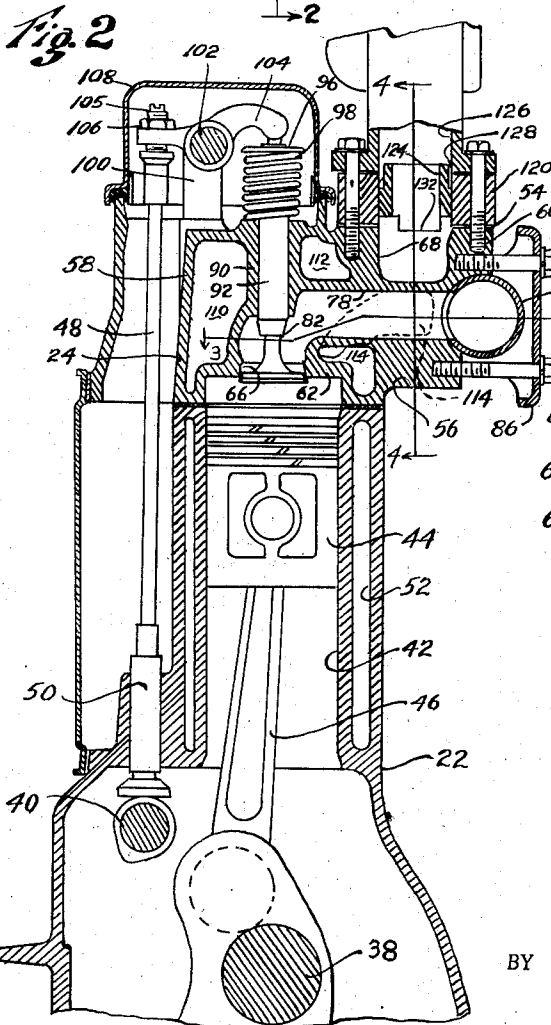
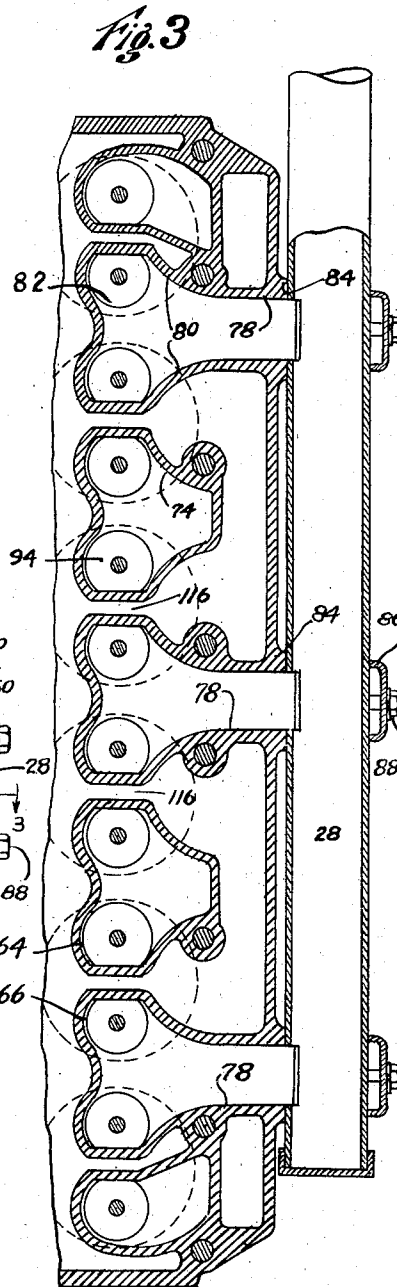
N. E. WAHLBERG

2,257,631

INTERNAL COMBUSTION ENGINE

Filed Nov. 13, 1939

2 Sheets-Sheet 1



INVENTOR.
NILS ERIK WAHLBERG
BY *Carl J. Barber*
ATTORNEY.

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2 Sheets-Sheet 2

Fig. 4

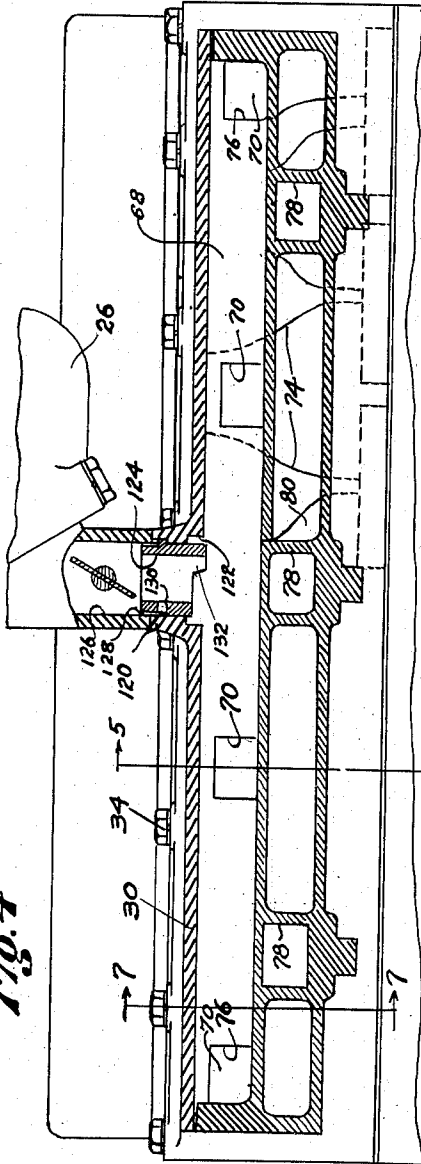


Fig. 6

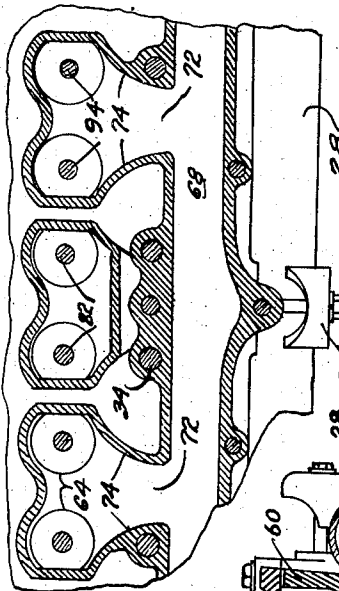


Fig. 5

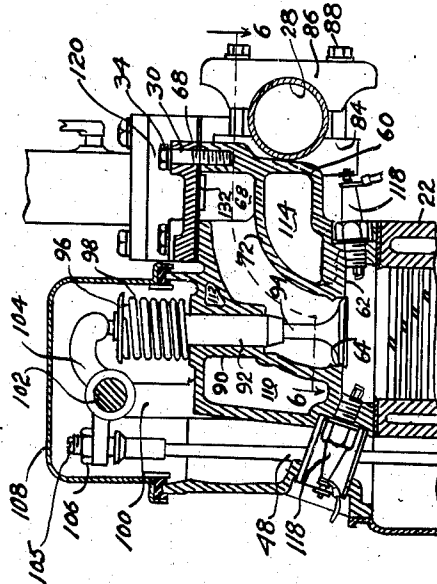
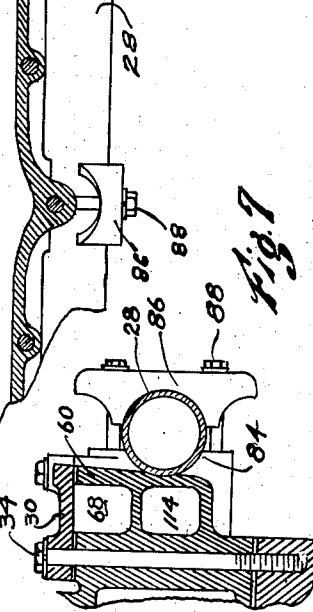


Fig. 7



INVENTOR.
NILS ERIK WAHLBERG
BY *Carl J. Barber*
ATTORNEY.

UNITED STATES PATENT OFFICE

2,257,631

INTERNAL COMBUSTION ENGINE

Nils Erik Wahlberg, Kenosha, Wis., assignor to
Nash-Kelvinator Corporation, Kenosha, Wis.,
a corporation of Maryland

Application November 13, 1939, Serial No. 304,029

9 Claims. (Cl. 123—52)

My invention relates to internal combustion engines and has particular reference to a novel design of cylinder head casting.

It is an object of this invention to provide a cylinder head casting in which the intake manifold is cast integrally with the cylinder head.

It is another object of this invention to provide a cylinder head casting which will permit the use of an exhaust manifold of simple symmetrical shape.

It is another object of this invention to provide a cylinder head casting which when assembled into an engine will require fewer and simpler parts.

It is an object of this invention to provide a cylinder head casting having novel and efficient cooling water ducts.

It is another object of this invention to provide a cylinder head casting embodying a novel and efficient intake manifold within the casting.

It is another object of this invention to reduce the cost of motor production by reducing the number of parts to be assembled and by reducing the amount of machining required on these parts.

Other objects and advantages of the invention will be apparent upon a consideration of the following specification and the attached drawings of which there are two sheets and in which Figure 1 represents a side elevation of an internal combustion engine embodying my invention;

Figure 2 represents a section taken along the line 2—2 of Figure 1;

Figure 3 represents a section taken along the broken line 3—3 of Figure 2 and looking in the direction of the arrows;

Figure 4 represents a section taken along the line 4—4 of Figure 2 and looking in the direction of the arrows;

Figure 5 represents a section taken along the line 5—5 of Figure 4 and looking in the direction of the arrows;

Figure 6 represents a section taken along the line 6—6 of Figure 5 and looking in the direction of the arrows; and,

Figure 7 represents a section taken along the line 7—7 of Figure 4 and looking in the direction of the arrows.

In Figure 1 there is illustrated generally a motor 20 having a cylinder block 22, cylinder head 24, carburetor 26 and exhaust manifold 28. The carburetor 26 is mounted on an intake manifold cover plate 30 and supports an air filter 32 for cleaning the air taken into the engine.

The manifold cover plate 30 is held to the head casting 24 by means of bolts 34. The head casting 24 is provided with a cooling water connection 36 which is adapted to be connected to a radiator (not shown).

Shown more specifically in Figure 2 the cylinder block 22 houses the usual crank shaft 38 and cam shaft 40 and is provided with the cylinders 42 within which the pistons 44 operate for driving the crank shaft through the connecting rods 46. The cam shaft 40, driven from the crank shaft 38, operates to actuate the valve lifter rods 48 which are journaled in a portion of the cylinder block at 50. It will be noted that the cylinders 42 have the usual water jackets 52 for cooling purposes.

The cylinder head casting 24 is generally rectangular in cross section having a top wall 54, a bottom wall 56, a left side wall 58 and the right side wall 60. The bottom wall 56 is recessed as at 62 to form a combustion chamber over each cylinder, and each of these recessed walls 62 defines an intake port 64 and an exhaust port 66.

The top wall 60 of the head casting is recessed to form the intake manifold 68 along the top of the casting. This manifold 68 is a straight passage along the top of the casting and is generally rectangular in cross section. Opening from the inside wall of the manifold 68 are four intake ducts 70 (see Figure 4) from which the intake tubes 72 (see Figure 5) curve downwardly to the intake ports 64. It will be noted that each of the two center intake tubes 72 diverge as shown at 74 (see Figure 3) as they approach the bottom of the head casting so as to enclose two intake ports of adjacent cylinders. It will be noted that the top of the head casting overhangs the right side of the cylinder block. This overhang gives ample room for the intake manifold without interfering with the valves. It also insures plenty of space for cooling water to circulate.

The intake ports of the end cylinders are served by single tubes similar to the interior tubes 72 and are fed from the manifold through the end ducts 76. Located between the intake tubes 72 are the exhaust tubes 78 which curve sharply to the side (as shown in Figure 2) and pass underneath the intake manifold 68 and open into the exhaust manifold 28. It will be noted that each exhaust tube 78 diverges as at 80 (see Figure 3) to enclose two exhaust valves 82 of adjacent cylinders. The side of the head casting is built up around the end of the exhaust ducts to form the bosses 84 which are braced to receive the tubular exhaust pipe 28. The pipe

28 is held in place by means of clamps 86 and bolts 88.

Cast integrally with the top wall 54 and the intake and exhaust tubes are the bosses 90 within which are press fitted the valve guides 92. It is to be understood that there is a boss and valve guide provided for each intake and exhaust port. The valves 94 are journaled in the valve guides 92 and are carried through the top wall of the head casting where they are provided with the spring retainer 96. The retainer 96 forms one abutment for the valve springs 98 which rest at their other end against the top of the head casting. The springs function in the normal manner to retain the valves in closed position.

Formed along the top of the head casting are the brackets 100 which support the rocker arm shaft 102. The rocker arms 104 are journaled on the shaft 102 and have one end for operating the valves 94 and another end arranged to be actuated by the valve lift rods 48. An adjusting screw 105 and lock nut 106 may be provided to adjust the spacing between the valve lift rod and the rocker arm. The rocker arms and valve springs may be enclosed by the pressed metal cover 108. It is to be noted that the hollow construction of the head casting, as is described above, forms a water passage 110 along the left side of the casting and a passage 112 along the right hand side of the casting and over the intake and exhaust ducts. This passage 112 is diminished where each intake tube leaves the side of the intake manifold, but increases in cross section between the intake tubes and over the exhaust tubes. Underneath the intake and exhaust tubes there is a water passage 114 which is small in cross section under each exhaust tube but increases under each of the intake tubes. All of these passages 110, 112, 114 are interconnected between each of the cylinders as indicated at 116 in Figure 3, thus assuring complete circulation of cooling fluid over all of the surfaces within the head casting.

As illustrated in Figure 5 each of the side walls of the head casting is drilled and tapped to receive the spark plugs 118. These spark plugs extend into the combustion chamber space of the head and are cooled by the lower portions of the passages 110 and 114.

The intake manifold 68 is closed by the cover plate 30 held in place by means of the bolts 34. The center of the plate 30 is provided with a thickened portion 120 to which is attached the carburetor 26. It will be noted that the lower surface of the thickened portion 120 is recessed longitudinally of the manifold as shown at 122. Within this recessed portion 122 is positioned the distributing cuff 124 which functions to give an even distribution of the fuel mixture to all cylinders. The cuff 124 is generally cylindrical and of smaller diameter than the carburetor tube 126. This leaves the annular space 128 around the cuff which is connected with the interior of the cuff by the hole 130. The lower end of the cuff is provided with a baffle 132 which depends from the forward half of the cuff and extends slightly into the manifold below the plane of the cover plate. I have found that since the engine is often placed in an automobile in a tilted position, heavier particles of gasoline tend to collect toward the low side of the manifold with a consequent starving of the cylinders on the high side. This is particularly true when the car is on a hill and when the throttle is suddenly opened reducing the suction

in the manifold. With the distributing cuff just described, the carburetor port is slightly constricted, thus speeding up the flow of air. The baffle on the front of the cuff further restricts the passage to the front or high cylinders causing an increased velocity in that direction. The increased velocity of the air causes much more of the heavy gas particles to be picked up and fed to the forward cylinders. The hole 130 drains any liquid gasoline that may collect around the cuff into the manifold.

While I have described my invention in some detail, I intend this description to be an example only and reserve the rights to such changes in structure and design as are covered by the following claims.

I claim:

1. In an internal combustion engine of the valve in head type, a head casting having valve mechanism carried thereby, the top wall of said casting defining a straight intake manifold longitudinally of said casting, intake tubes opening from the side of said manifold and curving downwardly to said valve mechanism, a plate defining a carburetor port covering said manifold, and a down draft carburetor supported by said plate and adapted to discharge into said manifold.

2. In a valve in head engine, a head casting having valve mechanism therein, said head overhanging the rest of said engine along one side thereof, an intake manifold formed in the overhanging portion of said casting, intake tubes opening into said manifold and curving down to said valves, and means for circulating a cooling fluid through said casting around said intake tubes, valve mechanism and said intake manifold.

3. In an engine of the valve in head type, a cylinder block, a head casting cooperative with said cylinder block to form combustion chambers, said casting being hollow and overhanging one side of said cylinder block, valve mechanism in said casting, spark plugs extending through the walls of said casting to said combustion chambers, one wall of said casting defining a straight intake manifold of rectangular cross section in the overhanging portion of said casting, intake tubes opening into the side of said intake manifold and curving downwardly to said valve mechanism, exhaust tubes between said intake tubes and curving out to the side of said casting below said intake manifold, means for circulating cooling fluid around said valve mechanism, intake tubes, exhaust tubes and intake manifold and a down draft carburetor carried on said casting and arranged to discharge downwardly against the bottom of said intake manifold.

4. In an engine of the valve in head type, a cylinder block, a head casting cooperative with said cylinder block to form combustion chambers, said casting being hollow and overhanging one side of said cylinder block, valve mechanism in said casting, spark plugs extending through the walls of said casting to said combustion chambers, the top wall of said casting defining a straight intake manifold of rectangular cross section in the overhanging portion of said casting, intake tubes opening into the side of said intake manifold and curving downwardly to said valve mechanism, exhaust tubes between said intake ducts and curving out to the side of said casting below said intake manifold, means for circulating cooling fluid around said valve mechanism, intake tubes, exhaust tubes and intake manifold and a down draft carburetor carried on said

casting and arranged to discharge downwardly against the bottom of said intake manifold.

5. A cylinder head having intake and exhaust ports in its surface, two intake ports being adjacent and two exhaust ports being adjacent, a tube curving to each pair of intake ports from above, a channel for supplying said tubes, a cover for said channel, said cover forming a support for fuel supplying means, tubes passing from each pair of exhaust ports under said channel to the side of said block, and means for passing a cooling fluid through said block and around said tubes.

6. A cylinder head casting for an internal combustion engine defining an open intake manifold longitudinal of the casting and along one edge thereof, intake tubes opening downwardly from said intake manifold and diverging toward the center of said casting, two intake ports at the bottom of each of said tubes, a series of exhaust tubes between said intake tubes and opening horizontally below said intake manifold, two exhaust ports in each of said exhaust tubes, water circulating space around all of said tubes, and a plate for covering said intake manifold, said plate having a port for the introduction of air and fuel into said manifold.

7. A cylinder head casting for an internal combustion engine defining a generally hollow rectangular block through which water is adapted to circulate, intake and exhaust ports in one wall of said casting, a single intake manifold, intake tubes leading from said manifold to said intake ports, exhaust tubes leading from said exhaust ports to openings in one side of said casting, each of said intake and exhaust tubes and said intake manifold being substantially surrounded by water and bosses forming valve guides also surrounded by water.

8. In a cylinder head casting, an intake manifold cast in said head in a straight line along the top thereof, a cover plate for said manifold having a port in the center thereof, and a single carburetor adapted to be supported on said plate and discharge down through said port.

9. In a cylinder head casting, a straight line manifold cast along the top of said head casting, and a plate for closing said manifold, said plate having a single port in the center thereof for admitting fuel to said manifold.

NILS ERIK WAHLBERG.