April 12, 1932. A. M. NIVEN 1,853,922

INTERNAL COMBUSTION ENGINE

Filed Dec. 19, 1927

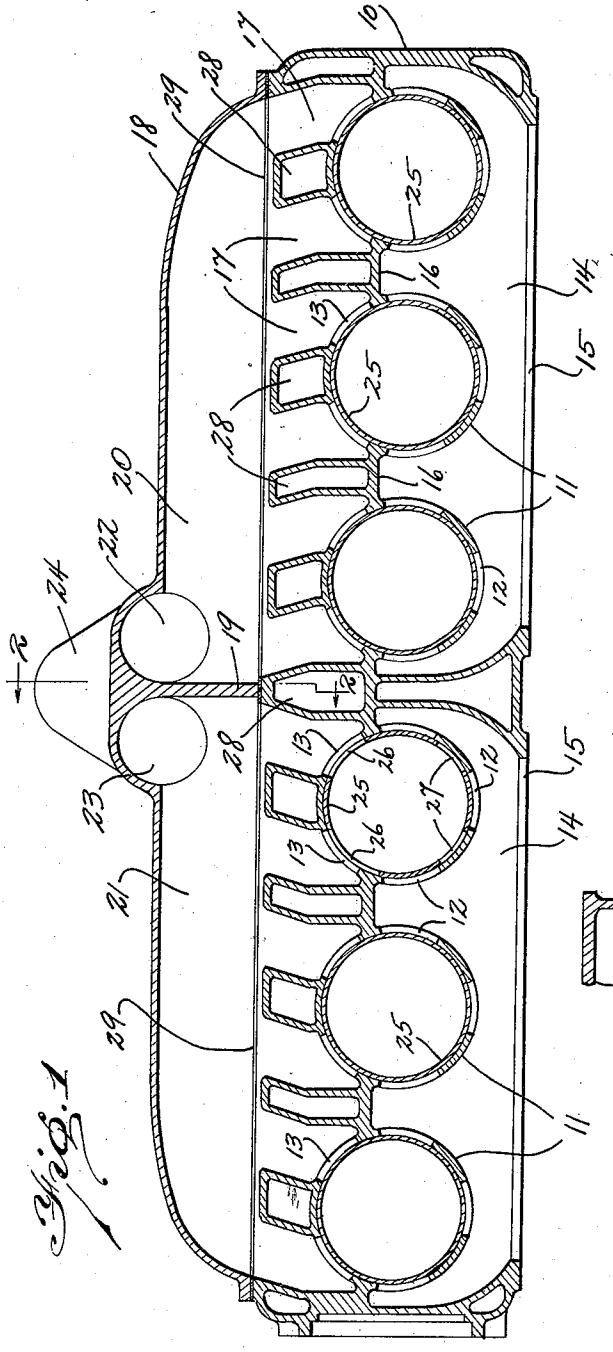

Fig. 1

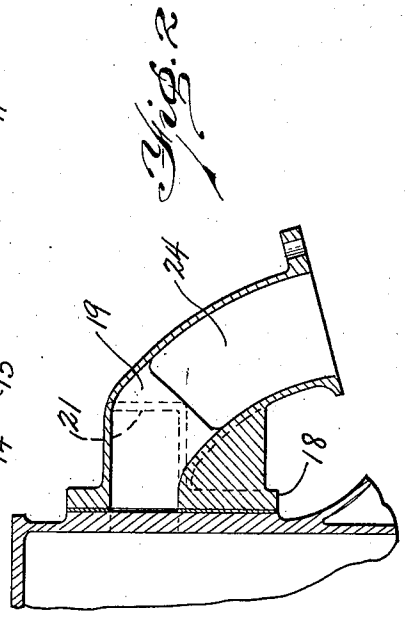

Fig. 2

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INTERNAL COMBUSTION ENGINE

Application filed December 19, 1927. Serial No. 240,962.

This invention relates to internal combustion engines and refers more particularly to the sleeve valve type of engine.

One object of my invention resides in providing an engine construction which will exhaust the gases from the engine cylinders in an improved manner, reducing the back pressure effective on the engine. A further object resides in an engine construction which will impart a directional effect on the exhaust gases before passage of the gases to the exhaust manifold. Such a construction in addition to reducing the engine back pressure permits the use of an exhaust manifold of simplified construction as hereinafter described.

Referring to the accompanying drawings illustrating one embodiment of my invention,

Fig. 1 is a plan sectional view of the engine illustrating my invention, and

Fig. 2 is a detail section through 2—2 of Fig. 1.

Referring to the drawings reference character 10 illustrates the cylinder block or main engine body casting formed with cylinders 11 having intake and exhaust ports 12 and 13 respectively. Cylinder block intake chambers 14 communicate with the ports 12 to supply the cylinders 10 with the combustible mixture through openings 15 from the usual intake manifold (not shown). The longitudinally extending walls 16 connect adjacent cylinders and separate the intake chambers 14 from the cylinder block exhaust chambers 17. The chambers 17 are open to an exhaust manifold 18 preferably divided centrally by a wall 19 so as to form separate branches 20, 21 which may have the centrally located outlets 22, 23 respectively. The outlets 22, 23 are merged or combined in a common outlet 24 beyond the wall 19 as best shown in Fig. 2.

Cooperating with the cylinder ports 12 and 13 are one or more sleeve valves 25 having intake and exhaust ports 26, 27 respectively, such sleeve valves being of any preferred type and movement. The particular number and arrangement of the sleeve or sleeves forms no part of this invention apart from the provision of some type of sleeve valve or like means serving to control the cylinder ports 12 and 13.

The cylinder block exhaust chambers 17 are bounded at their sides by substantially transverse walls 28 formed hollow for circulation of a cooling medium. These transverse walls 28 in addition to extending generally transversely of the engine also extend, toward their outer ends, slightly longitudinally of the engine in the direction of the exhaust manifold outlets 22 and 23. Thus where the outlets 22, 23 are centrally located with respect to the cylinder block, the chambers 17 extend from the cylinder ports 13 generally transversely of the cylinder block toward the exhaust manifold outlets at the center of the block, the chambers for the cylinders to one side of the wall 19 or engine block center being directed generally toward those to the other side. Such an arrangement imparts to the exhaust gases a directional effect assisting the gases in exhausting with a minimum of friction and back pressure. I prefer, in order to realize the fullest benefits of my invention, to provide each of the ports 13 of each cylinder with an independent or separate chamber 17 as illustrated. Through the use of the branches 20, 21 there is no overlapping of exhaust periods in the exhaust manifold with a firing order of the cylinders such as 1—5—3—6—2—4. Furthermore, the exhaust manifold branches may be provided with relatively large openings 29 each opening to half the cylinders, and being free from obstructions such as division walls or separate conduits for each cylinder as now customary.

What I claim as my invention is:

1. In an internal combustion engine of the sleeve valve type the combination of a cylinder block having a plurality of engine cylinders ported for intake and exhaust, sleeve valve means within the cylinders, cylinder block intake means communicating with the cylinder intake ports, cylinder block exhaust chambers communicating directly with the cylinder exhaust ports, said sleeve valve means controlling said cylinder intake and exhaust ports, an exhaust manifold device communicating with the exhaust chambers

and having a discharge outlet, the said chambers extending from the cylinder exhaust ports substantially in the plane containing the exhaust ports and generally transversely of and within the cylinder block toward the side thereof and in the direction of the manifold outlet.

2. In an internal combustion engine of the sleeve valve type the combination of a cylinder block having a plurality of engine cylinders ported for intake and exhaust, cylinder block intake means communicating with the cylinder intake ports, cylinder block exhaust chambers communicating with the cylinder exhaust ports, sleeve valve means within the cylinders controlling said cylinder intake and exhaust ports, an exhaust manifold device communicating directly with the exhaust chambers and having a discharge outlet, the said chambers extending from the cylinder exhaust ports generally transversely of and within the cylinder block toward the side thereof and in the direction of the manifold outlet, the exhaust chambers of a portion of the cylinders extending generally toward the exhaust chambers of other cylinders.

3. In an internal combustion engine of the sleeve valve type the combination of a cylinder block having a plurality of engine cylinders ported for intake and exhaust, cylinder block intake means communicating with the cylinder intake ports, cylinder block exhaust chambers communicating directly with the cylinder exhaust ports, sleeve valve means within the cylinders controlling said cylinder intake and exhaust ports, an exhaust manifold device communicating with the exhaust chamber and having a discharge outlet substantially centrally of the cylinder block, the said exhaust chambers extending generally transversely of and within the cylinder block toward the said discharge outlet.

4. In an internal combustion engine of the sleeve valve type the combination of a cylinder block having a plurality of engine cylinders ported for intake and exhaust, cylinder block intake means communicating with the cylinder intake ports, cylinder block exhaust chambers communicating directly with the cylinder exhaust ports, sleeve valve means within the cylinders controlling said cylinder intake and exhaust ports, an exhaust manifold device communicating with the exhaust chambers and having a discharge outlet, longitudinally extending cylinder block walls dividing the cylinder block intake means and the cylinder block exhaust chambers, second walls bounding said exhaust chambers extending generally transversely of the first walls but deviating therefrom in the direction of the manifold discharge outlet sufficiently to impart to the exhaust gases a directional movement toward said outlet before entering the exhaust manifold.

5. In an internal combustion engine of the sleeve valve type the combination of a cylinder block having a plurality of engine cylinders ported for intake and exhaust, cylinder block intake means communicating with the cylinder intake ports, cylinder block exhaust chambers communicating with the cylinder exhaust ports, sleeve valve means within the cylinders controlling said cylinder intake and exhaust ports, an exhaust manifold device communicating directly with the exhaust chambers and having a discharge outlet, said manifold being branched from said outlet to provide a pair of independent longitudinally and oppositely extending portions respectively communicating with the groups of engine cylinders lying to each side of the longitudinal engine center, the said chambers of each group of cylinders extending from the associated cylinder exhaust ports generally transversely of and within the cylinder block toward the side thereof and in the direction of the manifold outlet.

6. In an internal combustion engine of the sleeve valve type the combination of a cylinder block having a plurality of engine cylinders ported for intake and exhaust, cylinder block intake means communicating with the cylinder intake ports, cylinder block exhaust chambers communicating with the cylinder exhaust ports, sleeve valve means within the cylinders controlling said cylinder intake and exhaust ports, an exhaust manifold device communicating directly with the exhaust chambers and having a discharge outlet, said manifold being branched from said outlet to provide a pair of independent longitudinally and oppositely extending portions respectively communicating with the groups of engine cylinders lying to each side of the longitudinal engine center, the said chambers of each group of cylinders extending from the associated cylinder exhaust ports generally transversely of and within the cylinder block toward the side thereof and in the direction of the manifold outlet, the manifold branched portions each having a longitudinal opening extending at least the length of the exhaust chambers communicating therewith.

7. In an internal combustion engine of the sleeve valve type the combination of a cylinder block having a plurality of engine cylinders ported for intake and exhaust, cylinder block intake means communicating with the cylinder intake ports, cylinder block exhaust chambers communicating with the cylinder exhaust ports, sleeve valve means within the cylinders controlling said cylinder intake and exhaust ports, an exhaust manifold device communicating directly with the exhaust chambers and having a discharge outlet, said manifold being branched from said outlet to provide a pair of independent longitudinally and oppositely extending portions respectively communicating with the groups of engine cylinders lying to each side

of the longitudinal engine center, the said chambers of each group of cylinders extending from the associated cylinder exhaust ports generally transversely of and within the cylinder block, said chambers provided with a bend and the outer portion thereof extended in the direction of the manifold outlet.

In witness whereof, I hereunto subscribe my name this 14th day of December, A. D. 1927.

ARCHIE MACPHAIL NIVEN.