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C. E. SMITH.

MOTOR.

APPLICATION FILED JAN. 8, 1907.

FIG. 1.

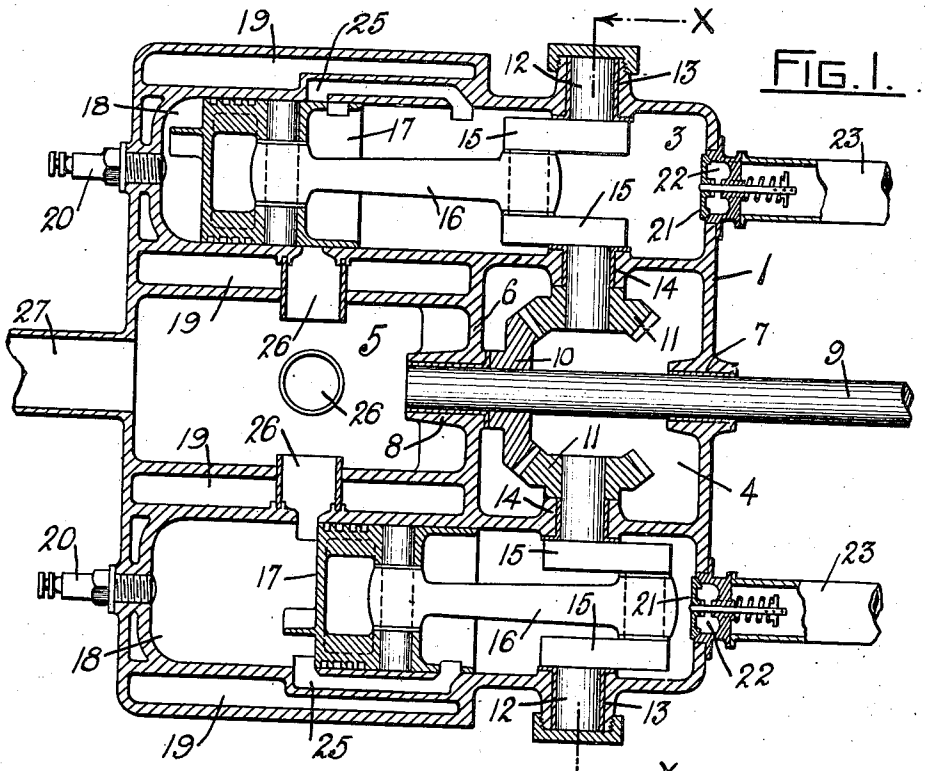
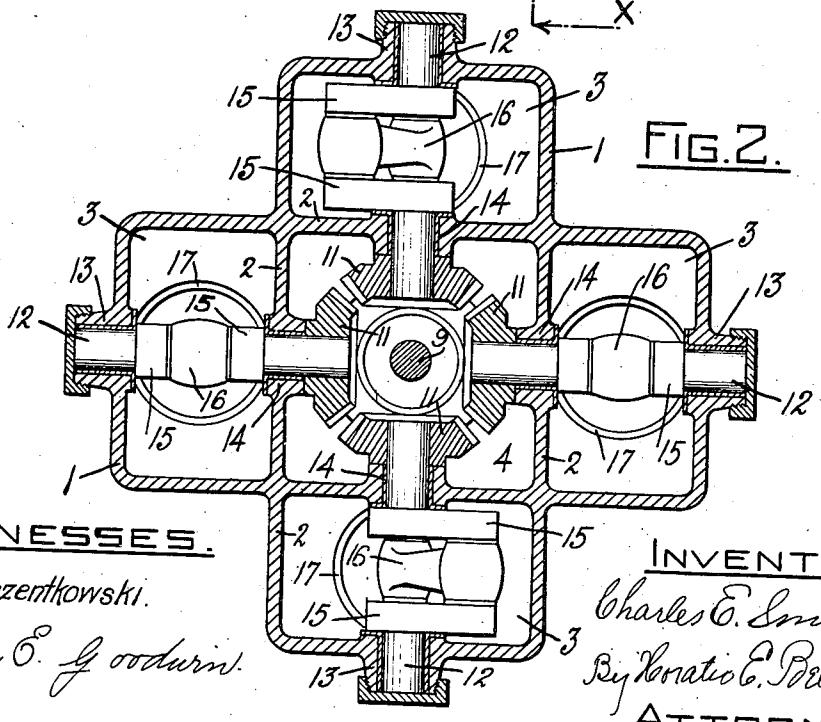


FIG. 2.



WITNESSES.

A. G. Pieczentkowski.

Walter E. Goodwin.

INVENTOR.

Charles E. Smith

By Horatio E. Bellows

ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES E. SMITH, OF PAWTUCKET, RHODE ISLAND.

MOTOR.

No. 868,497. Specification of Letters Patent. Patented Oct. 15, 1907.

Application filed January 8, 1907. Serial No. 351,330.

To all whom it may concern:

Be it known that I, CHARLES E. SMITH, a citizen of the United States, residing at Pawtucket, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Motors, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to motors adapted for use upon boats, automobiles and other vehicles, as well as in manufacturing plants, and has for its essential objects compactness, cheapness, simplicity and freedom from vibration and noise.

To the above ends my invention consists in a novel and convenient arrangement and construction of the casing, driving units, and connected parts.

In the accompanying drawings, Figure 1 is a longitudinal central section of my improved engine, and Fig. 2, a transverse section of the same on line *x x* of Fig. 1.

Like reference characters indicate like parts throughout the views.

The selected form of embodiment of my invention consists of a casing, 1, in the form of a Greek cross in cross section, divided by partitions, 2, into longitudinally disposed crank and combustion chambers, 3, within the group of which are two chambers, 4 and 5, with an intermediate partition, 6. Mounted in bearings, 7 and 8, in casing, 1 and partition 6, is the driven shaft, 9, to which is fixed the gear, 10, which meshes with four radially disposed bevel gears, 11, fixed to the inner ends of four crank shafts, 12, mounted in bearings, 13 and 14, in the casing, 1, and partitions, 2, respectively. The gears 10 and 11 are within the chamber, 4. The shafts, 12, provided with cranks, 15, are actuated through piston rods, 16, by pistons, 17, moving in the combustion chambers of the four cylinders, 18. Each cylinder is surrounded with the usual water jackets, 19, spark plug, 20, the spring closed supply valve, 21, for the inlet, 22, from the pipe, 23, the pass over port 25, and exhaust port, 26. The ports, 26, open into the intermediate or exhaust chamber, 5, whence passes the exhaust pipe, 27.

In the described mechanism the cranks are set at quarters so that when the stroke in one cylinder is completed the piston in the next adjacent cylinder or chamber is still performing its stroke. The impulse upon shaft, 9, from the cranks transmitted through gears, 11 and 10, are consecutive, constant and equidistant. For these reasons the usual jar of parts is avoided. It is not imperative that the number of cylinders and operating parts be limited to four, or that they be set at quarters, or that their arrangement be circular, or that the cylinders be "two-cycle" rather than "four-cycle," although the described arrangement is preferable.

All the combustion chambers exhaust into a common intermediate chamber, 5, which is distinct from, adjacent and in alinement with the chamber, 4, in which is housed the gearing. By this means compactness and strength is increased.

The connection of the exhaust ports 26 of the group of cylinders with a chamber 5 within the group, and the connection of the said chamber 5, in turn, with an exhaust pipe 27 extending from the end of the chamber, is advantageous because it obviates the necessity of employing considerable piping to carry off the products of combustion, and also because it renders it unnecessary to use pipes at the sides of the cylinders. In this connection it will be noticed that the fuel supply pipes 23 and the exhaust pipe 27 are arranged longitudinally within the transverse outline of the group of cylinders.

What I claim is,

1. A motor comprising a casing, an exhaust chamber arranged in the longitudinal center of the casing and having a discharge pipe, a longitudinal-central shaft journaled in and extending from the casing, a plurality of crank-chambers grouped about the shaft and having means for supplying fuel, a plurality of shafts journaled in the casing and grouped about the longitudinal-central shaft and having cranks disposed in the crank chambers, gearing intermediate said crank shafts and the longitudinal-central shaft for driving the latter by the former, piston cylinders arranged in the casing and grouped about the exhaust chamber and having inwardly extending exhaust ports leading to said chamber, pistons movable in said cylinders and connected with the crank-shafts, and ports for conducting fuel from the crank chambers to the chambers in the piston cylinders at the opposite sides of the pistons, with reference to the crank-chambers, and arranged to be overrun by the pistons.

2. A motor comprising a casing, an exhaust chamber arranged in the longitudinal center of the casing and having a discharge pipe extending from one end of the casing, a longitudinal shaft journaled in the casing and extending from the opposite end thereof, with reference to the exhaust pipe, a gear chamber arranged in front of the exhaust chamber and surrounding the shaft, a miter gear fixed on said shaft and disposed in the gear chamber, a plurality of crank-chambers grouped about the gear chamber, fuel supply pipes extending from the ends of the crank-chambers and having non-return valves, a plurality of shafts journaled in the casing and grouped about the longitudinal-central shaft and having cranks disposed in the crank chambers and miter gears disposed in the gear chamber and intermeshed with the miter gear on the longitudinal-central shaft, piston cylinders arranged in the casing and grouped about the exhaust chamber and having inwardly extending exhaust ports leading to said chamber, pistons movable in said cylinders and connected with the crank-shafts, and ports for conducting fuel from the crank chambers to the chambers in the piston cylinders at the opposite sides of the pistons, with reference to the crank chambers, and arranged to be overrun by the pistons.

In testimony whereof I have affixed my signature in presence of two witnesses.

CHARLES E. SMITH.

Witnesses:
HORATIO E. BELLOWS,
WALTER E. GOODWIN.