T. L. STURTEVANT.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED JUNE 16, 1917.

1,278,784.

Patented Sept. 10, 1918.

2 SHEETS—SHEET 1.

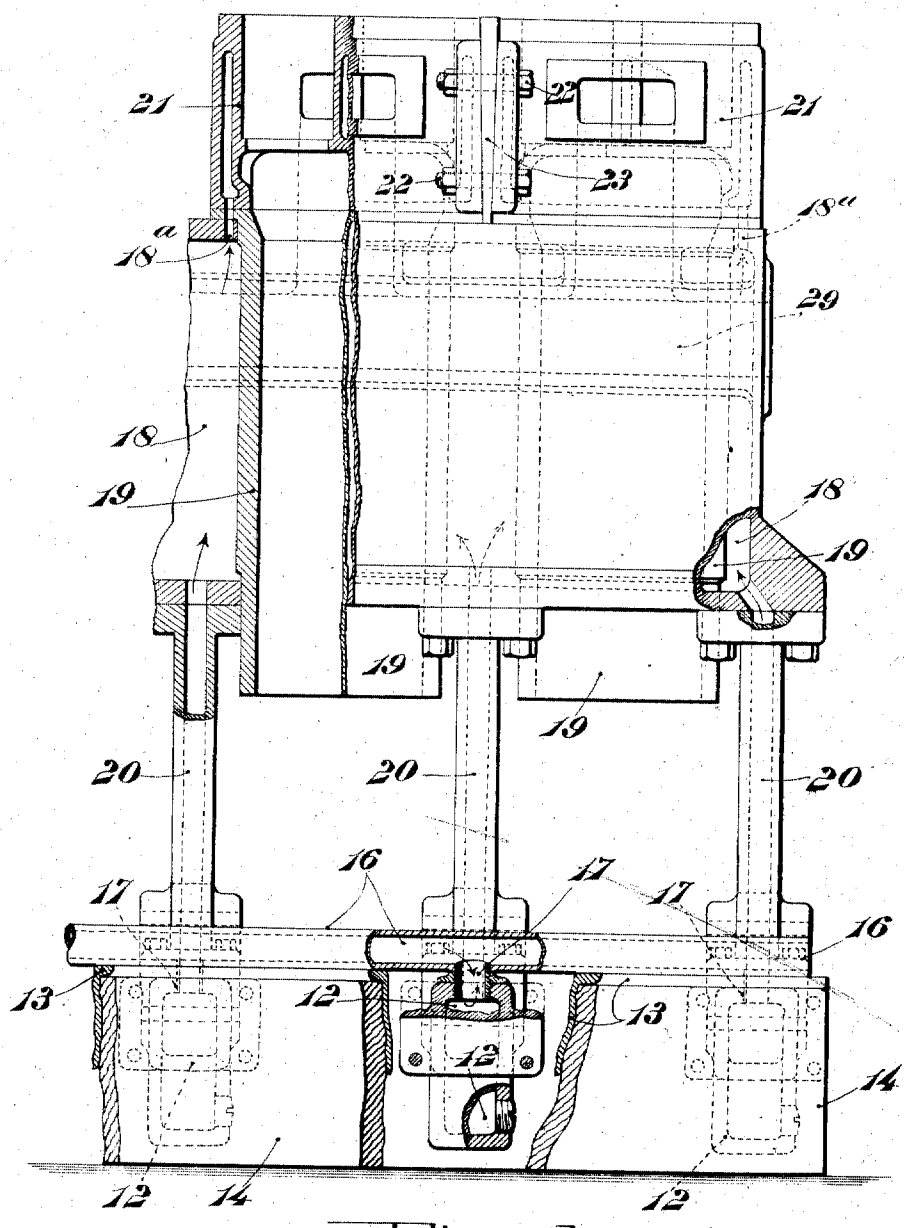


Fig. 1.

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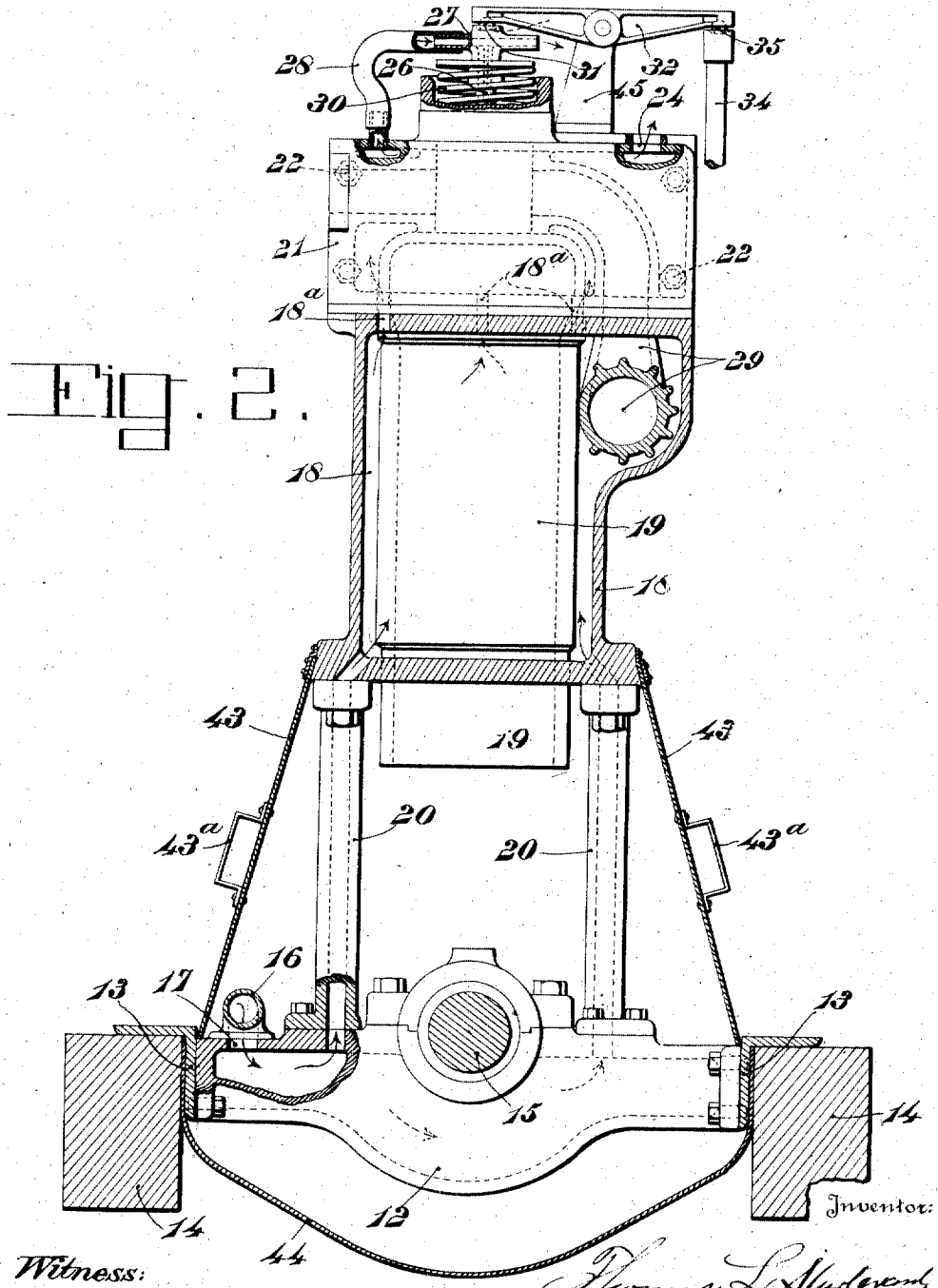
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

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INTERNAL-COMBUSTION ENGINE.

1,278,784. Specification of Letters Patent. Patented Sept. 10, 1918.

Application filed June 16, 1917. Serial No. 175,195.

To all whom it may concern:

Be it known that I, THOMAS L. STURTEVANT, a citizen of the United States, residing at Quincy, in the county of Norfolk and State of Massachusetts, have invented or discovered certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to that class of internal combustion engines more especially adapted for use as marine engines, and consists of certain Improvements in the inventions covered by the Sturtevant U. S. Patents Nos. 1,164,675, and 1,185,951.

In the present improved engine the crank shaft is carried by hollow cross beams each of which has closed ends. Through these hollow beams the water is circulated to keep the bearings cooled, and from these beams the water is forced upward through hollow standards or posts to a water box affording a water jacket for the engine cylinders. From the water box the upward flow of the water is continued through the water jackets of the cylinder heads, from whence it is discharged at or near the top of the engine. Water is also preferably circulated from the cylinder heads through the valve stems and valves as in the construction shown by the Sturtevant Patents Nos. 1,185,951 and 1,186,860.

In the accompanying drawings Figure 1 is a partial sectional elevation of an engine embodying the present invention, and Fig. 2 is a vertical section of the same on the line 2—2, Fig. 1.

Referring to the drawings, 12 denotes hollow cross beams which are bolted to longitudinal angle bars 13 by which they are connected together, said angle bars being secured in any suitable manner to the boat timbers or wooden beams 14. The beams 14 afford bearings for the crank shaft 15 and which bearings are kept properly cooled by water forced by a suitable pump through a supply pipe or manifold 16 which communicates, as through ports 17, with the chambers of the beams 12. The supply pipe or manifold 16 will, in practice, preferably be provided with a regulating or "subtraction" valve, as in the engine of the Sturtevant Patent, No. 1,185,951.

The chambers of the hollow cross beams 12 communicate with a water box 18, affording a water jacket for the engine cylinders 19, through hollow standards or posts 20, two of which will preferably be provided for each hollow cross beam 12, so that the water supplied to the said hollow cross beams will be forced upward through the said hollow standards 20 to the said water box 18. These hollow standards or posts support said water box on said hollow cross beams and are removably bolted both to said box and beams, so that the parts may be conveniently assembled or taken apart. While two hollow standards or posts 20 are preferably provided for each hollow cross beam 12, to afford plenty of water-circulating capacity, a single hollow post or standard for each beam 12 may be used, if desired, the other standard or post between each beam 12 and the water box being solid.

The chamber of the water box 18 communicates with the chambers of the jacketed cylinder heads 21, bolted or otherwise rigidly secured to the water box 18 in the usual manner, through suitable water passages 18ª, as in the construction shown in the Sturtevant Patents Nos. 1,164,675 and 1,185,951, hereinbefore referred to. The jacketed cylinder heads 21 are not only rigidly attached to the top of the water box 18 but are also detachably connected together by bolts 22 passing through the adjacent walls of the cylinder heads and also preferably through wedge plates or tapered liners 23 interposed between the cylinder heads. This construction affords what is practically a massive composite beam surmounting the water box and adding greatly to the stiffness and rigidity thereof, thus affording the necessary strength and stiffness notwithstanding the hollow construction of the engine frame parts.

The cooling water circulated through the engine will preferably be discharged from the jacketed cylinder heads at or near the tops thereof, as through discharge openings 24. The valves and the valve rods or stems 26 are preferably formed hollow, as in the constructions shown in U. S. Patent No. 1,186,860, so that the cooling water will be circulated through the same, said valve rods being provided at their tops with hollow heads 27 communicating by means of flexible pipes 28 with the chambers of the water-jacketed cylinder heads 21. Thus a continuous circulation of water introduced near the

base of the engine will be forced upward through the several hollow engine frame parts and be discharged at or near the top of the engine. The exhaust pipe 29 is preferably located within the chamber of the water box 18, as in the construction shown in the Sturtevant Patents Nos. 1,164,675 and 1,185,951, so that it may be kept properly cooled. In the present instance, however, the said exhaust pipe is corrugated or provided with longitudinal ribs to augment the cooling effect of the water.

The lower part of the engine is properly housed by removable side-plates 43, provided with handles 43ª, and a crank-casing 44 at the bottom of the engine.

To avoid side strain on the hollow valve rods or valve stems 26, and thereby lessen cramping and friction on said valve rods or stems as the valves are forced downward against the stress of their closing springs 30 to open the valves, balls 31, loosely resting and slightly rolling in flat-bottomed cupped seats formed in the tops of the valve rods, are interposed between the rockers 32 and said valve rods or stems. The rockers 32 are preferably operated from lifting rods 34 through the medium of balls 35 interposed between the upper ends of the said lifting rods 34 and the outer ends of the rockers 32, said balls 35 also preferably resting loosely in flat-bottomed cupped seats in the upper ends of said lifting rods 34. The rockers 32 are mounted on standards or brackets 45 on the cylinder heads 21.

From the foregoing it will be understood that the present invention provides a water-cooled engine through the hollow frame parts of which the cooling water is streamed from the base of the engine to near its top, so that the cold water is introduced at the parts of the engine requiring most cooling, or, in other words, to the parts which are most liable to be damaged by heat. Also the hollow-frame engine is properly stiffened by the massive composite beam at its top afforded by the rigid connection of the cylinder heads together and with the water-box to which said heads, and also the engine cylinders, are rigidly attached. Also the construction of the engine is such that the parts thereof may be conveniently assembled or taken down. Also, in this improved construction the whole thrust of the pistons on the cranks is taken by the composite box and beam combination of strength and rigidity.

The invention is not to be understood as being limited to all of the details herein shown, as such details may be varied widely, within the province of mechanical skill, without departing from the scope thereof.

Having thus described my invention I claim and desire to secure by Letters Patent:

1. In a multiple-cylinder internal combustion engine, the combination with hollow cross beams affording bearings for the engine crank shaft, of means for rigidly securing said cross beams together, a water box, engine cylinders mounted in said water box, removably mounted hollow posts or standards supporting said water box on said hollow cross beams, the chambers of the latter communicating with the chamber of said water box through said hollow posts or standards, and means for supplying water under pressure to said hollow cross beams.

2. In a multiple-cylinder internal combustion engine, the combination with hollow cross beams affording bearings for the engine crank shaft, of means for rigidly securing said cross beams together, a water box, engine cylinders mounted in said water box, removably mounted hollow posts or standards supporting said water box on said hollow cross beams, the chambers of the latter communicating with the chamber of said water box through said hollow posts or standards, means for supplying water under pressure to said hollow cross beams, and jacketed cylinder heads mounted on and rigidly attached to said water box and rigidly connected together so as to afford a massive stiffening beam at the upper part of the engine.

3. In a multiple cylinder internal combustion engine, the combination with hollow frame parts, including a water box through which water may be circulated, of a plurality of cylinder heads rigidly attached to said water box and rigidly but removably attached together, so as to afford a massive stiffening beam at the upper part of the engine.

4. In a multiple-cylinder internal combustion engine, the combination with hollow frame parts, including a water box through which water may be circulated, of a plurality of cylinder heads rigidly attached to said water box and rigidly but removably attached together, so as to afford a massive stiffening beam at the upper part of the engine, and wedge-shaped plates interposed between said cylinder heads.

In testimony whereof I affix my signature.

THOMAS LEGGETT STURTEVANT.