(No Model.)

F. M. BROWN.

HORIZONTAL MARINE ENGINE.

No. 423,120. Patented Mar. 11, 1890.

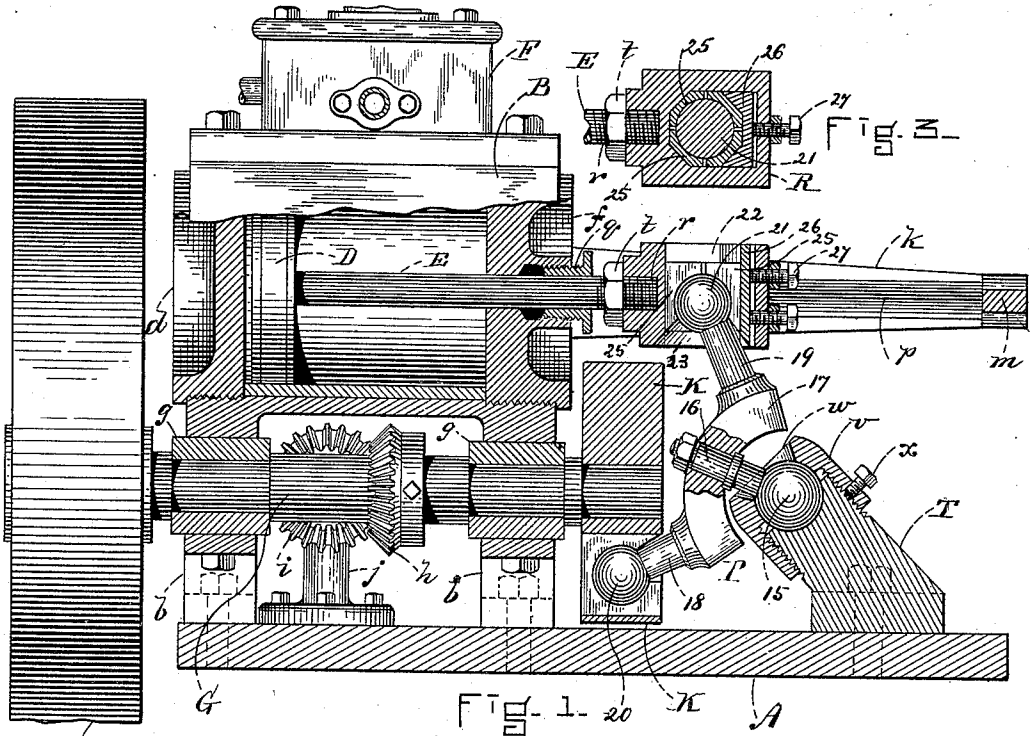


FIG. 1.

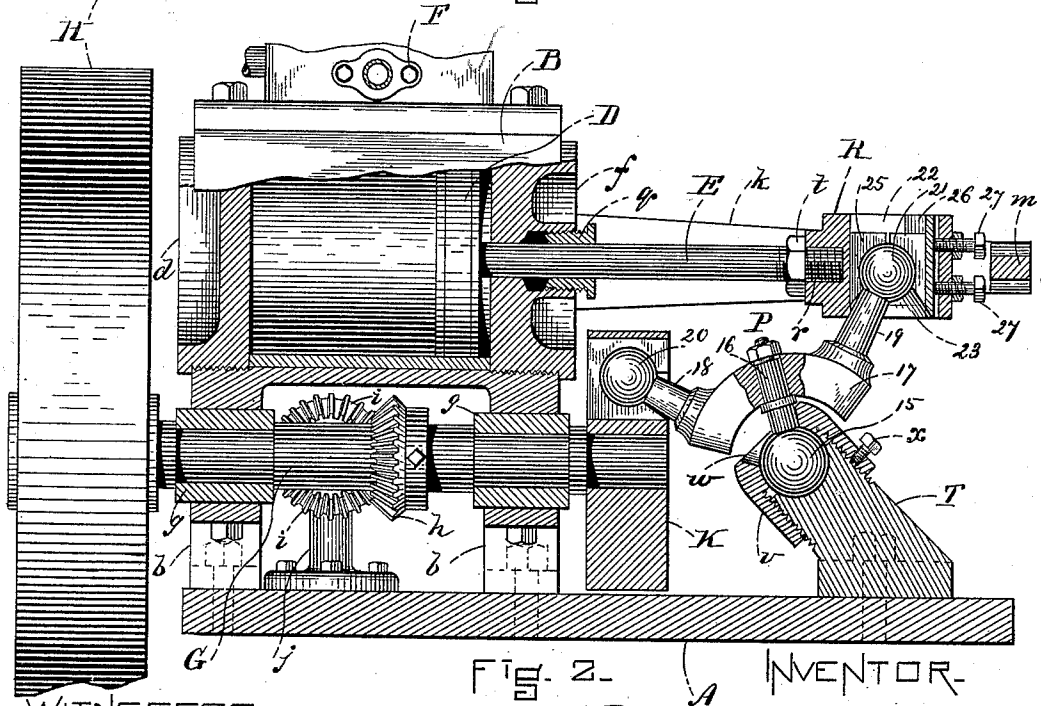


FIG. 2.

WITNESSES.

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HORIZONTAL MARINE ENGINE.

SPECIFICATION forming part of Letters Patent No. 423,120, dated March 11, 1890.

Application filed September 18, 1889. Serial No. 324,286. (No model.)

To all whom it may concern:

Be it known that I, FREDRIC M. BROWN, of Warren, in the county of Bristol, State of Rhode Island, have invented a certain new and useful Improvement in Horizontal Marine Engines, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figures 1 and 2 are sectional elevations of my improved engine, and Fig. 3 a horizontal section of the cross-head.

Like letters and figures of reference indicate corresponding parts in the different figures of the drawings.

My invention relates especially to steam-engines which are particularly adapted for marine purposes and in which the piston moves horizontally; and it consists in certain novel features, as hereinafter fully set forth and claimed, the object being to produce a simpler, cheaper, and more effective device of this character than is now in ordinary use.

The nature and operation of the improvement will be readily understood by all conversant with such matters from the following explanation.

In the drawings, A represents the bed-plate; B, the cylinder; D, the piston; E, the piston-rod; F, the steam-chest, and G the driving-shaft.

The cylinder B is proportionately shorter and of greater diameter than is usual in engines of this class, and is supported on a frame or standards *b*, bolted to the bed A. The heads *d f* of the cylinder are screw-threaded and the cylinder ends threaded in like manner to receive the said heads.

The steam-chest F is disposed on top of the cylinder B and is provided with ordinary steam-valves in the usual manner, the construction and operation of which it is not deemed necessary to illustrate or describe.

The driving-shaft G is journaled horizontally in bearings *g* in the standards *b*, directly below the cylinder B, said shaft bearing a large pulley H at its outer end and a solid wheel K at its inner end. A beveled gear *h* is secured to the shaft G and meshes with a corresponding gear *i* on a shaft supported in a standard *j*, secured to the bed A, said gears actuating a crank connected with the valve-gear. Two parallel arms *k* project horizontally from the cylinder, one at each side of the head *f*. Said arms are connected at their outer ends by a cross-piece *m*, and are provided on the inner faces with longitudinal guideways *p*. The flanges *p* form a track upon which a cross-head R slides.

The piston-rod E is secured by one end to the piston D and slides horizontally through suitable packing *q* in the head *f*. The outer end of the rod is screw-threaded at *r*, and the cross-head R is turned onto said threaded portion. A check-nut *t* prevents the rod from rotating in said head.

An inclined standard T is bolted to the bed A opposite the wheel K. The top of the standard is screw-threaded and a threaded cap *v* is turned thereon, said cap having a circular mouth *w*, the walls of which converge inwardly. A set-screw *x* prevents said cap from rotating on the standard. The cap *v* forms with said standard a socket, in which a ball 15 works, said ball having an arm 16, projecting through the mouth *w*. A curved or segmental bar 17 is secured centrally to the outer end of the arm 16. Two radially-arranged arms 18 and 19 project, respectively, from each end of the bar 17, and are provided at their outer ends with balls 20 and 21. The ball 20 works in a socket formed in the solid wheel K. The ball 21 works in a socket formed in the cross-head R, said socket being constructed as follows: The cross-head is chambered vertically at 22, the lower ends of the walls of said chamber diverging outwardly at 23. The ball 21, projecting into said chamber, is inclosed by a series of plates 25, the outer faces of which form an octagon when viewed in cross-section, as shown in Fig. 3, and their inner faces concaved to conform to the shape of said ball. A take-up plate 26 engages the plates 25 on the side adjacent to the outer end of the cross-head, said plate being held in position by set-screws 27. Steam being admitted to the cylinder in the ordinary manner, the cross-head being driven outward from the position shown in Fig. 1, causes the balls

15, 20, and 21 to rotate in their sockets, the wheel K being thereby turned a semi-revolution, and the parts assuming the position shown in Fig. 2. On the return-stroke of the piston the revolution of the wheel K is completed. The connected balls 15, 20, and 21 form a crank mechanism P, whereby the horizontal reciprocating movement of the piston-rod is converted directly into a rotary movement of the shaft G.

By increasing the length of the piston-rod and diameter of the wheel K it will readily be seen that a long crank-stroke on the shaft G may be attained with the use of a much shorter cylinder than in ordinary engines of this class.

All connecting-points of the crank mechanism being ball-and-socket joints very little resistance is offered and the "center" is passed far more readily in the stroke than is usual.

It is well known that in marine engines of the ordinary construction a constant lateral jar or vibration is imparted to the hull of the vessel, which rapidly weakens it. In my improvement the vibration is longitudinal or parallel with the keel, thus in a great measure obviating this objection.

I do not confine myself to using the solid wheel K on the shaft G, as a cross-head or counterbalance crank-arm may be employed and effect the same result.

Having thus explained my invention, what I claim is—

The combination of a steam-cylinder provided with horizontal arms projecting from one end thereof and having guideways, a driving-shaft disposed parallel with said cylinder adjacent thereto, a piston-rod provided with a piston at its inner end within said cylinder, a cross-head sliding on said guideways and connected to the outer end of said piston-rod, said cross-head having a ball-socket, a wheel on one end of said driving-shaft provided with a ball-socket, an inclined standard provided with a screw-threaded concaved top and with a cap having a circular mouth, said cap and top forming a ball-socket, and a three-arm clamp-lever, the arms of which are provided with balls at their outer ends which rest in the ball-sockets of the standard, cross-head, and wheel, substantially as described.

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Witnesses:
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