Dec. 17, 1929. G. J. LUGT 1,739,644

DOUBLE ACTING MOTOR

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FIG. 1.

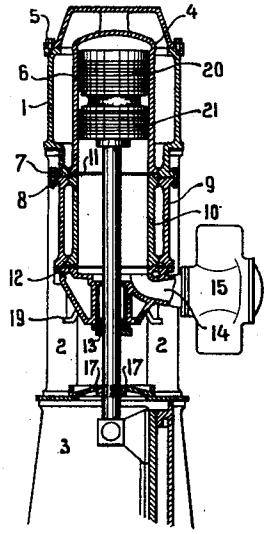


FIG.2.

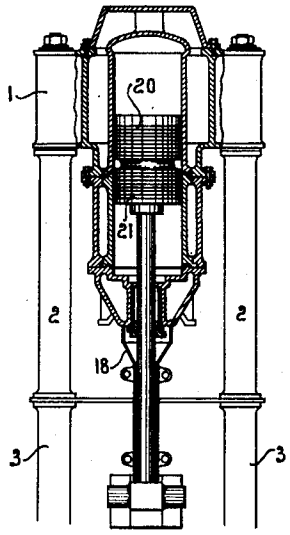


FIG.3.

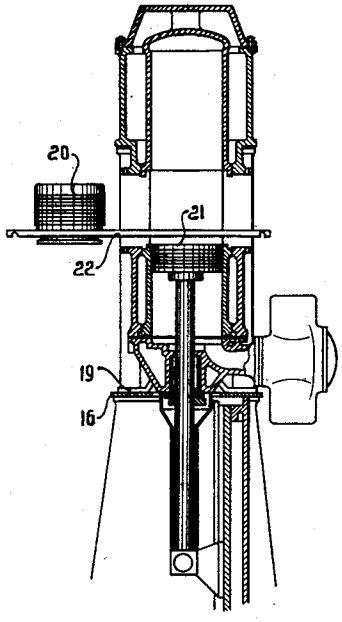
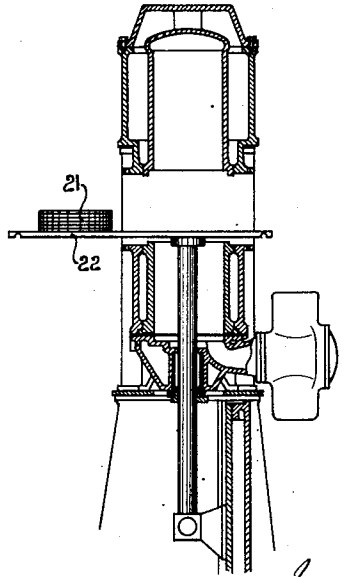


FIG.4.



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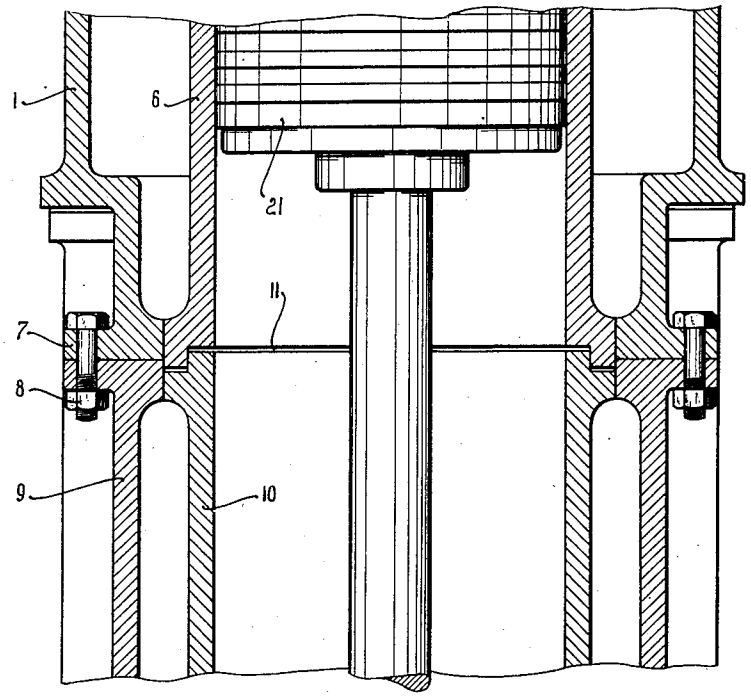


FIG. 5.

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UNITED STATES PATENT OFFICE

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DOUBLE-ACTING MOTOR

Application filed January 20, 1925, Serial No. 3,544, and in the Netherlands March 6, 1924.

My invention relates to double acting internal combustion engines, and an object of my present invention is an arrangement or construction whereby access to the piston of such an engine may be had without any need for troublesome dismantling, another object being an arrangement which allows of easy inspection of the interior of the cylinder sections.

The underlying principle of the invention will be set forth and certain modifications will be described hereinafter in conjunction with the annexed more or less diagrammatic drawing, which illustrates one embodiment of the invention, and in which

Fig. 1 shows in elevation partly in vertical section a motor embodying my invention, while

Fig. 2 is a similar view as Fig. 1 at right angles thereto showing the piston in another position;

Figs. 3 and 4 illustrate the motor in similar views as Fig. 1, with the piston occupying different positions.

Fig. 5 is a fragment of Fig. 1 drawn to a larger scale to better show the expansion joint.

The top 4 of the upper cylinder section 6 is secured by bolts 5 to the beam 1, which latter is supported by means of columns 2 on the crank case columns 3. The beam 1 also serves as a water jacket for the said cylinder section.

The lower end of the upper cylinder section 6 slidably fits within beam 1 so as to be capable of axial expansion therein. The lower part 9 of the cylinder jacket, which encloses the lower cylinder section 10, is secured by bolts 8 to a flange 7 on beam 1. The lower cylinder section can expand in upward direction because of the small clearance 11 (Fig. 1) provided between it and the upper cylinder section 6. Secured to the lower cylinder jacket 9 is the bottom cylinder cover 12, which is provided with the stuffing box 13 for the piston rod and with a passage 14 terminating in a combustion chamber 15. The upper cylinder section 6 does not have a separate combustion chamber, said cylinder section being constructed to operate on the well known Diesel principle. The crank case is closed at the top by a horizontal plate 16 (Fig. 3) and by a cover 17 (Fig. 1) composed of two halves.

When it is desired to inspect or remove the piston the engine is turned until the piston rod is in the position shown in Fig. 2. Thereupon a sleeve 18, composed of two halves (one half being shown in Fig. 2) is placed around the projecting piston rod so as to rest with its bottom edge upon the crosshead, its upper edge serving to support the bottom cover 12, after the bolts 8 have been removed. A further turning of the engine causes the piston and the lower cylinder section 10 to descend together until the latter rests with its feet 19 on the top cover plate 16 of the crank case, see Fig. 3, after first the cover 17 has been removed. The piston is now in its lower dead center position and its upper portion 20 has completely moved out of the upper cylinder section 6. If necessary the upper piston portion 20, which is secured to the lower portion 21 and provided near its bottom with a circumferential groove, can now be moved laterally out of the cylinder on suitable rails 22, and the interior of the upper cylinder section can be inspected. The free space left between the top of the piston and the bottom edge of the cylinder section 6 in the position of the parts shown in Fig. 3, allows of fitting new piston rings without moving the piston sideways out of the cylinder.

If the sleeve 18 is now removed, the lower piston portion 21 can be moved upward relative to the lower cylinder section until it projects from the said cylinder section in position to be fitted with new rings; if desired, the said portion 21 can be entirely disconnected from the piston rod and can also be moved sideways out of the cylinder (Fig. 4). Further upward movement of the piston renders the interior of the lower cylinder section accessible.

Stripped of unessential details the invention consists broadly in a construction in which the engine cylinder is provided in its central portion with a circumferential joint which when opened permits the lower cylinder section provided with the cylinder cover

and stuffing box to be displaced axially towards the crosshead, the said joint being so disposed that after such displacement the piston or a portion of the piston can be removed through the opening between the two portions of the cylinder.

The means shown in the drawing for transmitting the axial stresses, viz, the connection of the one cylinder section to the stationary frame and the free projection of the other cylinder section (nearer the crosshead) from the frame is not strictly necessary for obtaining access to the piston.

Another important feature of the invention is that the lower cylinder section transmits the axial stresses exclusively through its jacket and that it does not transmit any strain. The cylinder section is free to expand axially in a direction away from the crosshead. The circular joint is located at a place where the gas pressures are always comparatively low and the joints between the jacket and the cylinder sections of the cylinder may be easily kept tight. Moreover, the thinness of the cylinder sections permits of efficient cooling.

The simple manner in which the cylinder can be opened permits of constructing the piston so that it can be taken out for inspection and repair without it being necessary to retract it axially from the cylinder together with the piston rod. The freedom of motion of the piston during the turning of the engine also allows of the piston being inspected and of its rings, being renewed without the piston being disconnected.

The simplicity of the work involved in opening the cylinder and removing the piston is of special value for marine engines. The distributing and reversing mechanism at the top or at the side of the cylinder need not even be touched, and only a few parts need be disconnected in order that the cylinder may be opened.

What I claim is:—

1. In a double action internal combustion engine, the combination with the frame, of a cylinder comprising two superposed sections, the upper section being secured to said frame, detachable means for securing the lower section to said upper section, said lower section being axially displaceable relative to said upper section to thereby give access to the piston and the interiors of said sections, and means for maintaining said lower section while being displaced in alinement with said upper section.

2. In a double acting internal combustion engine, the combination with the frame, of a cylinder comprising two superposed sections, a piston in said cylinder, the upper section being secured to said frame, detachable means for securing the lower section to said upper section, a bottom cover for said lower section, said lower section being axially displaceable relative to said upper section to thereby give access to said piston and the interiors of said cylinder sections, and a piston rod having a cross-head adapted to maintain said lower section while being displaced in alinement with said upper section by means of an intermediate member temporarily placed between said cross-head and said bottom cover.

3. The combination as specified in claim 1, in which said cylinder sections have an expansion joint therebetween.

4. The combination as specified in claim 1, including a jacket surrounding said lower cylinder section and detachable from said frame, a cylinder head secured to said jacket, and a stuffing box in said cylinder head.

In testimony whereof I affix my signature.

GERARD JOHAN LUGT.