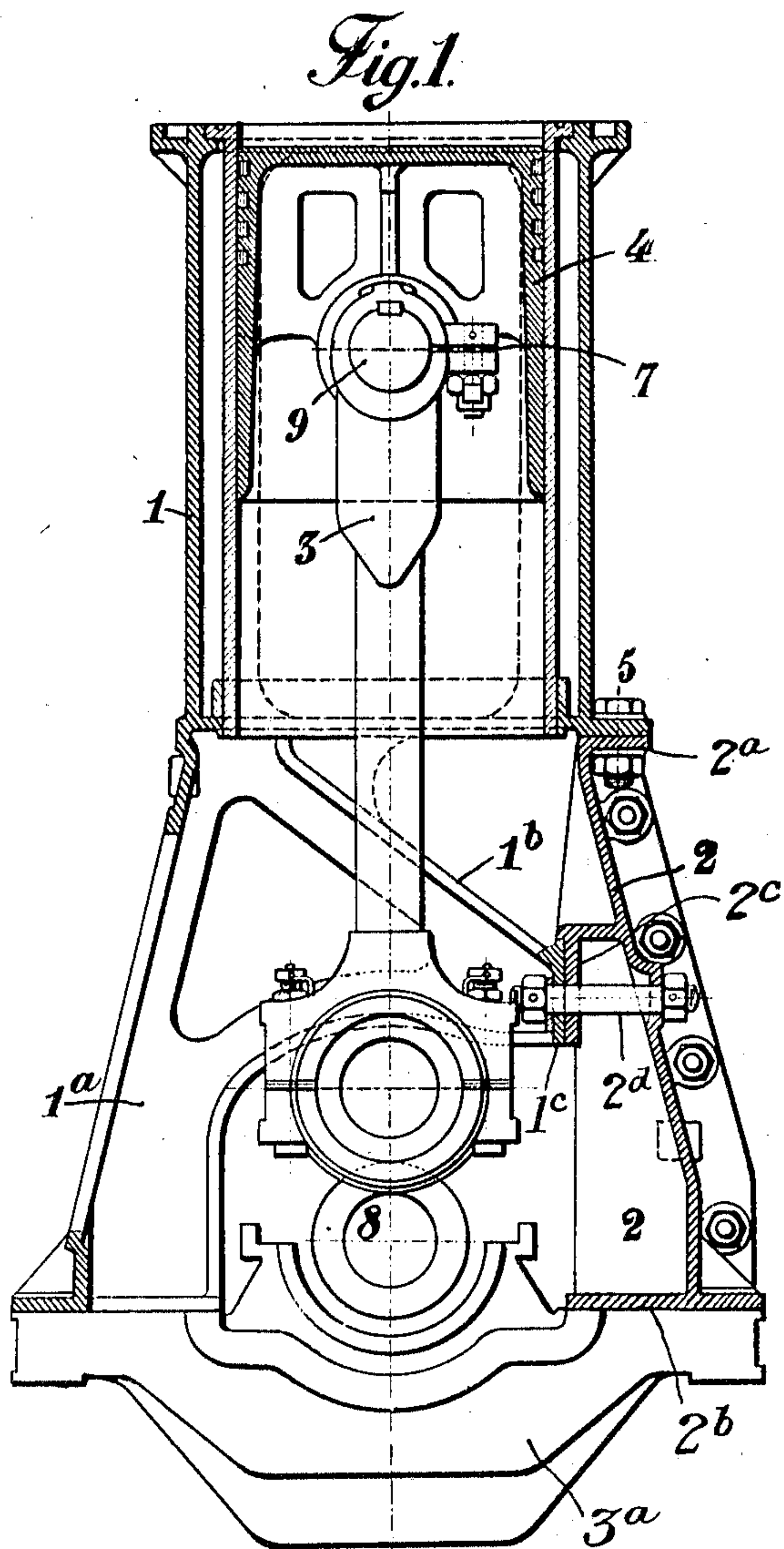


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 VERTICAL INTERNAL COMBUSTION ENGINE.
 APPLICATION FILED JUNE 10, 1908.

990,297.

Patented Apr. 25, 1911.

2 SHEETS—SHEET 1.



Witnesses:

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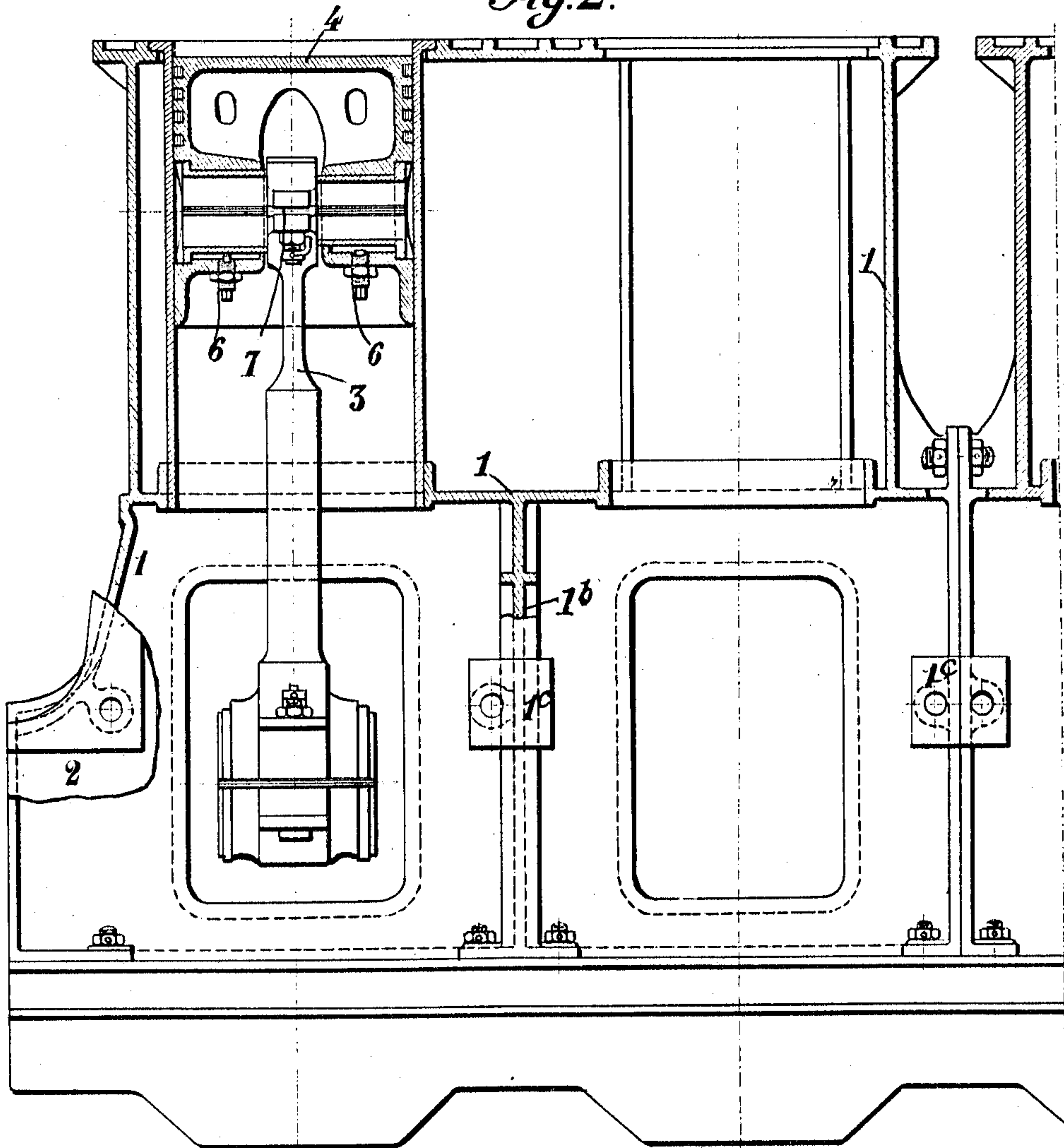
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Fig. 2.



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UNITED STATES PATENT OFFICE.

LOUIS GASTON SABATHÉ, OF PARIS, FRANCE, ASSIGNOR TO THE SOCIÉTÉ DES MOTEURS
SABATHÉ, OF ST. ETIENNE, LOIRE, FRANCE, A CORPORATION OF FRANCE.

VERTICAL INTERNAL-COMBUSTION ENGINE.

990,297

Specification of Letters Patent.

Patented Apr. 25, 1911.

Application filed June 10, 1908. Serial No. 437,650.

To all whom it may concern:

Be it known that I, LOUIS GASTON SABATHÉ, citizen of the French Republic, residing at Paris, Department of the Seine, in France, have invented certain new and useful Improvements in the Construction of Vertical Internal-Combustion Engines, of which the following is a specification.

In vertical internal combustion engines, the dismantling of the piston, connecting rod and crank shaft, is generally attended by considerable difficulty, and it is necessary that considerable space be available both above and at the ends of the engine. To effect a simple examination of the piston, the connecting rod, the head of the connecting rod or the cylinder, it is usually necessary to dismount the cylinder head and all of the valves and other distributing devices. The mere readjustment of a bearing of the crank shaft often requires the complete dismantling of the engine. The protracted and troublesome character of these operations is manifest.

The steam engine rarely requires to be dismantled and is therefore readily adapted to the vertical type, but the piston and cylinder of an internal combustion engine working, for example, with a poor quality of gas, have to be dismantled and cleaned with comparative frequency. The difficulty of obtaining access to these parts has hitherto been an obstacle in the employment of combustion or explosive engines of the vertical type where considerable power is required.

The object of the present invention is to obviate these disadvantages by constructing the engine in such a manner that the several parts may be readily dismantled and re-assembled.

In the accompanying drawings: Figure 1 is a vertical transverse section of an engine embodying my improvements, with certain parts omitted, and Fig. 2 is a vertical longitudinal section of the engine, also with parts omitted.

The frame of the engine comprises two separate parts 1 and 2, of which the part or section 1 carries the cylinder and the working portions of the engine while part 2 extends along one side of the engine and forms a door for the crank case. The door 2 is fixed to the main frame of the engine and to

the base plate in such a manner that it can be readily detached, but when in position it forms with the part 1 a structure which is absolutely rigid.

The door or section 2 is provided at the top and bottom edges with flanges 2^a, 2^b, respectively, which abut and are attached to the engine frame 1, and the base 3^a respectively, the connection being made by means of suitable nutted bolts 5, as shown. The door 2 may be divided transversely into a number of sections or panels, if desired, and in order to prevent the door from buckling the latter is strengthened in the direction of its vertical axis, by means of flanges such as shown in Fig. 1.

In order to strengthen the entire engine frame and firmly support the door or section 2, while still affording easy access to the crank shaft bearings, the part 1 is provided with internal cross pieces or webs 1^a which extend across the crank case in the manner shown. Each cross web 1^a rises from the base portion of the main frame, at a point alongside the crank shaft bearings, and it is curved over said bearings, as shown, in order to leave a free space above the latter, said cross pieces or webs being directed laterally at a distance above the tops of the bearings in order to overhang the latter with sufficient clearance and to present suitable supports adjacent the door 2 for the attachment and support of the latter. In the embodiment shown, the laterally projecting ends 1^b of the cross webs 1^a are provided with bearing plates or abutments 1^c against which abut corresponding brackets or plates 2^c carried by the door 2, as shown in Fig. 1. The brackets 2^c of the door are clamped against the brackets 1^c of the main engine frame by means of bolts 2^d, and the intermediate portion of the door, which abuts against the laterally directed cross piece of the main frame is therefore firmly but detachably supported. As the door 2 is attached to the main frame not only at the edges but also at the intermediate portion, a very rigid structure is obtained, and yet the door may be easily removed when required, simply by loosening the fastening bolts.

Owing to the cut-out or recessed portion of each cross piece 1^a, which creates a space between the bearings of the crank shaft 8

and the door supporting portion of the cross piece, the crank shaft may be readily dismounted in a direction parallel to that in which it normally lies, and the crank bearings are easily accessible for this purpose when the door 2 is removed. When the door is unbolted and removed in a lateral direction, the main frame 1 will alone bear the weight of the engine parts, and easy and complete access can be had to the interior of the engine for dismounting the pedestal cap pieces, the upper and lower ends of the connecting rods, and for the purpose of removing the connecting rods, pistons and crank shaft.

In order to facilitate the dismounting and remounting of the parts it is advisable to fix the pivot 9 to the connecting rod instead of forming it as a part of the piston. Thus it is possible to have a thinned connecting rod body 3 which will prevent the piston from canting in the cylinder. It is also advisable to provide piston 4 with bushes which may be arranged in such manner as to admit of adjustment by means of set screws 6 furnished with jamb nuts. The connecting rod is detachably fixed to the piston pin or pivot 9 by means of a clamp 7, and owing to the above described arrangements, the dismounting and remounting of the foot of the connecting rod may be effected without difficulty by loosening the clamp 7 and forcing the pivot 9 to the side.

It will therefore be seen that my invention provides a strong and rigid engine frame having one or more detachable casing sections which, when removed, permit easy access to the interior engine parts and the ready dismounting, adjustment and remounting of the latter. The removal of the cylinder head and all of the devices usually fixed on the upper part of vertical internal combustion engines (distributing devices, valves, pipes, regulating devices, accessories, etc.) is dispensed with. The space required above and at the ends of the engine is reduced to a minimum as a result of the complete access to the working parts which may be obtained through the longitudinal pas-

sage that extends throughout the length of the engine at one side thereof.

Without limiting myself to the precise construction shown, I claim:—

1. In a vertical internal combustion engine, the combination with a main frame having an opening extending along one side of the crank case, of a door for closing said opening, means to secure said door detachably to the main frame, and an interior cross piece secured to the main frame transversely within the crank case and supporting said door from within.

2. In a vertical internal combustion engine, a main frame having an opening extending along one side of the crank case, a door to close said opening, and a cross piece secured to the main frame and extending transversely within the crank case, said cross piece being detachably secured to the intermediate portion of the door.

3. In a vertical internal combustion engine, a main frame having an opening extending along one side of the crank case, a door for closing said opening detachably connected at its edges to the adjacent parts of the engine frame, an inwardly projecting bracket on the middle portion of the door, and means extending across the crank case and presenting a second bracket to which said first named bracket is detachably bolted.

4. In a vertical combustion engine, a main frame having an opening at one side of the crank case, a door to close said opening, a cross web secured to the main frame of the engine within the crank case, crank shaft bearings in the crank case which are overhung by said cross web at such a distance as to permit the removal of the crank shaft in a direction parallel to its normal position, and means for securing said door detachably to said cross web.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

LOUIS GASTON SABATHÉ.

Witnesses:

H. PITIENCIO,

T. BERNARD.