July 30, 1940. R. S. TROTT 2,209,862

ENGINE MOUNTING

Filed Oct. 5, 1934 2 Sheets-Sheet 1

Fig. 1.

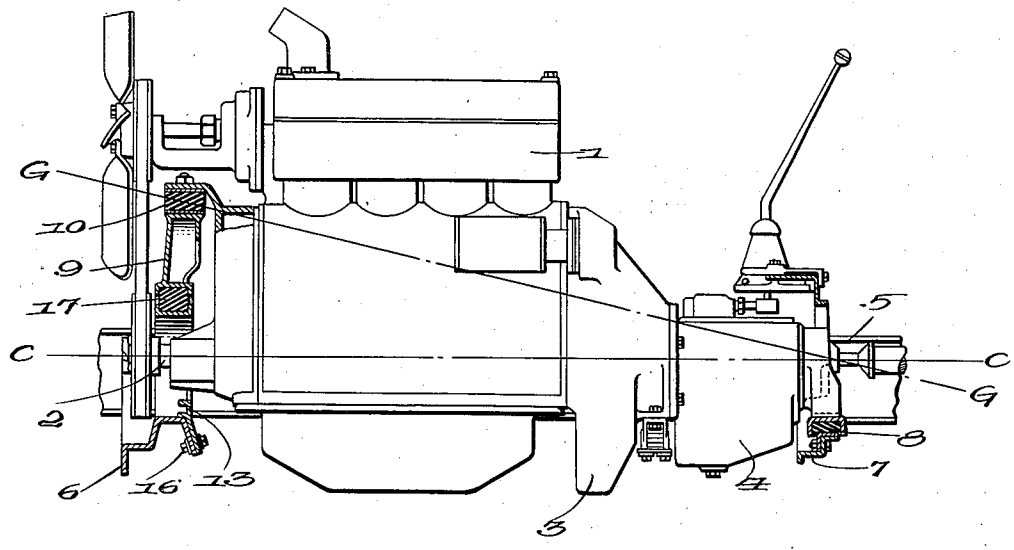


Fig. 3.

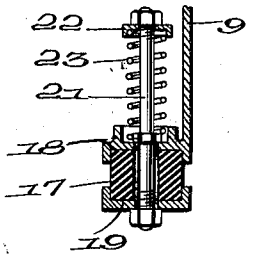
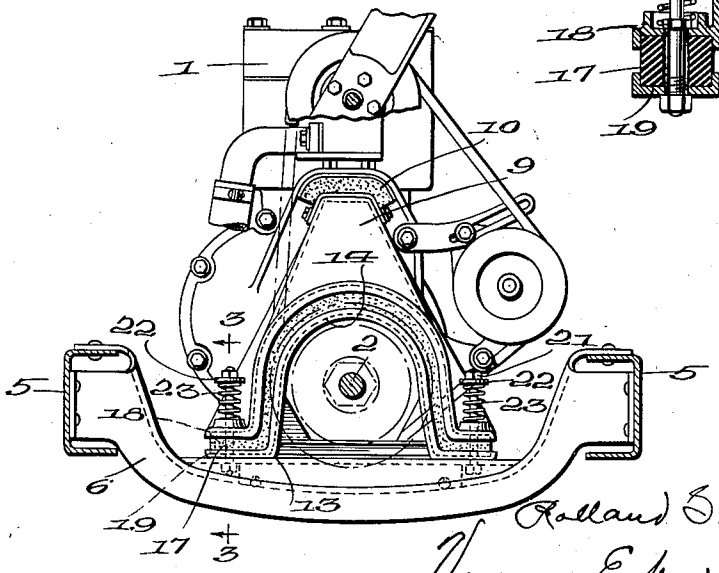


Fig. 2.



Inventor

Rolland S. Trott

By Vernon E. Hodges

Attorney

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Fig. 4.

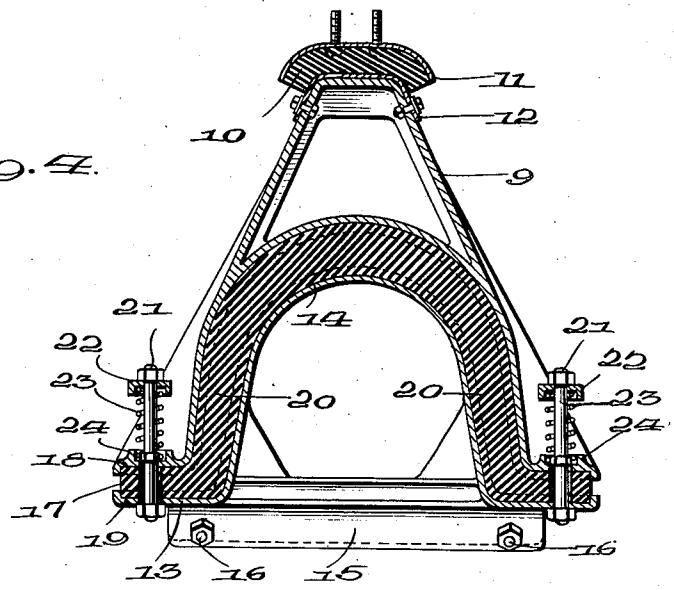


Fig. 5.

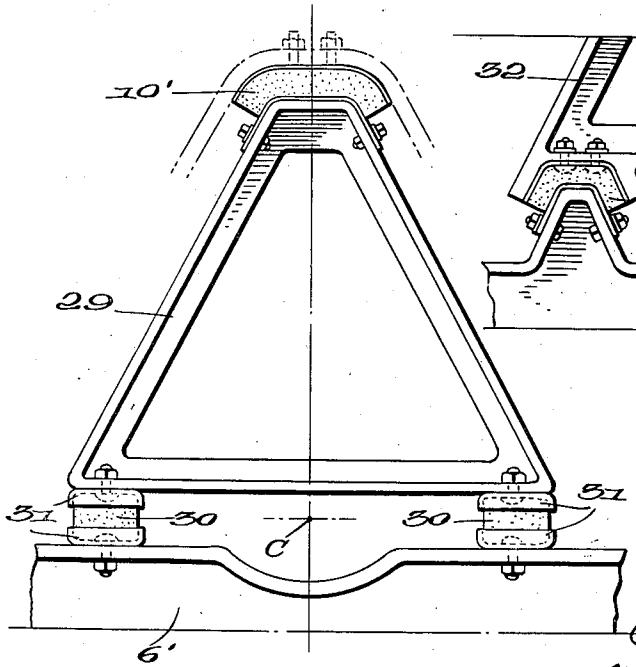
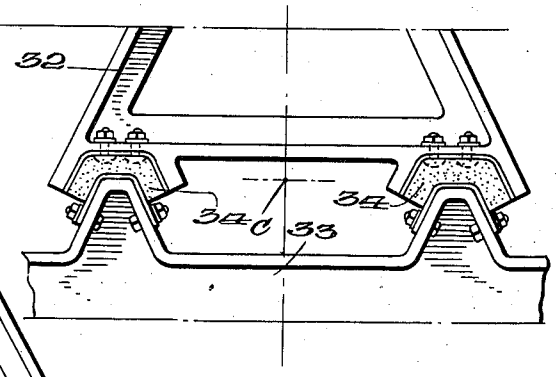


Fig. 6.



Inventor

Rolland S. Trott

By Vernon E. Hodges

his Attorney

Patented July 30, 1940 2,209,862

UNITED STATES PATENT OFFICE

2,209,862

ENGINE MOUNTING

Rolland S. Trott, Denver, Colo.

Application October 5, 1934, Serial No. 747,104

12 Claims. (Cl. 248—7)

This invention relates to improvements in engine mountings, particularly for an internal combustion engine unit of a motor vehicle.

An object of the invention is to improve the mounting of such an engine unit while permitting oscillation thereof about a longitudinal axis as a result of the forces incident to the operation thereof.

Another object of the invention is to provide an improved floating member or pedestal to mount an end portion of the engine unit which will permit oscillation of the engine unit about an axis which extends longitudinally of the engine unit approximately through the center of gravity thereof, and which intersects the crank-shaft axis adjacent the rear mounting, and also about an axis of oscillation which extends approximately coincident with the axis of the crank-shaft or adjacent the crank-shaft, in order to take into consideration the forces due to torque and due to weight or mass.

In carrying out these objects, I provide a mounting comprising a pedestal or bracket which has an end portion of the engine unit mounted thereon substantially pivotally, as by means of a strip or block of non-metallic resilient material such as rubber, and this pedestal is mounted on a strip or block or blocks of non-metallic resilient material, such as rubber, which will permit bodily movement of the pedestal relative to the frame or vehicle.

Another feature of my improved mounting is the use of a strip of non-metallic resilient material for supporting an end portion of the engine unit, which strip has flat horizontal end portions, and the strip resists transverse movement of the supported portion of the engine unit solely by the resiliency of the non-metallic resilient material itself. This strip of non-metallic resilient material preferably includes flat horizontal end portions with an arcuate portion intermediate said end portions, and which assists in supporting the weight of the engine unit and in opposing lateral movement of the engine unit.

In carrying out my invention in accordance with the foregoing objects, I have illustrated in the accompanying drawings a preferred embodiment of my invention, together with modifications thereof, in which:

Fig. 1 is a side elevation of an engine unit showing the mountings thereof in section;

Fig. 2 is a front elevation of the engine unit mounted in the frame, the latter being in section;

Fig. 3 is a detail vertical sectional view through a portion of the front mounting approximately on the line 3—3 of Fig. 2, but with parts of the frame omitted;

Fig. 4 is a transverse vertical sectional view through the front mounting detached;

Fig. 5 is front elevation of a modified form of front mounting which may be used; and

Fig. 6 is a similar view showing a further modification in the front mounting.

My invention is shown in conjunction with a multiple cylinder internal combustion engine 1 having the cylinders arranged vertically in line longitudinally of the vehicle, and the engine unit has the usual crankshaft 2 extending longitudinally thereof. A combined flywheel and clutch housing is designated 3, to the rear end of which is rigidly attached the transmission casing 4, all of these parts being permanently connected together and forming a complete engine unit.

The engine unit is mounted in a motor vehicle chassis frame which includes side channel-members 5 between which extend transverse front and rear frame members 6 and 7 respectively. These transverse frame members 6 and 7 are rigidly attached to the side frame members 5, and together these constitute a major portion of the motor vehicle chassis frame.

The rear portion of the engine unit is mounted on the transverse member 7 by means of an arcuate block of non-metallic resilient material 8, such as rubber, the center of which arc is approximately coincident with the crankshaft axis. Although the rear mounting 8 is arcuate, any other proper substantially pivotal mounting construction may be used so long as it tends to maintain the location of the axis of oscillation approximately coincident with the crankshaft axis at the rear.

As shown in Figs. 1 to 4, the front end portion of the engine unit is mounted on a front pedestal 9 by means of a block or strip of non-metallic resilient material, such as soft rubber, 10, which block or strip of material 10 may be of the usual construction for supporting the front end portion of the engine unit on the pedestal 9, and ordinarily this block or strip 10 is permanently secured as by vulcanization, or in any other suitable manner, to metal brackets 11 and 12 which are attached respectively to the engine unit and to the pedestal 9.

The pedestal 9 is mounted on the cross-member 6 of the frame by means of a pillow bracket 13 which has an upwardly curved middle portion 14, and which pillow bracket is seated directly on the transverse frame member 6 and is provided with a downturned flange 15 bolted or otherwise

secured as at 16 to the transverse frame member 6. The supporting portion of the bracket 13 may be made integral with the frame member 6, if desired, instead of using the additional member 13.

The lower portion of the pedestal 9 is made approximately complementary to the pillow-bracket 13, and between the pillow-bracket 13 and the pedestal 9 is a block or strip of non-metallic resilient material 17, such as soft rubber, which extends approximately throughout the transverse extent of the opposing surfaces of the pillow-bracket and pedestal in the preferred embodiment of this invention, which is illustrated in Figs. 1 to 4 of the drawings.

The block or strip 17 is seated in depressions 18 and 19, respectively, in the pedestal 9 and pillow-bracket 13, which depressions serve to hold the block or strip 17 in place and against transverse movement of the pedestal relative to the pillow-bracket except as permitted by the flow of the material, and which transverse movement is resisted solely by the rubber. The upright portions of the block or strip 17, which upright portions are designated 20 in Fig. 4, also assist in resisting transverse movement of the pedestal 9 and the engine unit supported thereon.

Bolts 21 extend loosely through the side flanges of the pedestal 9 and pillow-bracket 13 and through portions of the block or strip 17 therebetween, but with sufficient clearance around the bolts 21 so that the bolts do not interfere with movement of the pedestal relative to the pillow-bracket and do not tend to prevent transverse movement of the pedestal relative to its support, such transverse movement being opposed solely by the resiliency of the rubber of the block or strip 17.

Each of the bolts 21 carries a cap-washer 22 against which a spring 23 bears, the opposite end of which spring is seated in a cup 24 formed in the upper end of the base flange of the pedestal 9, so that the spring 23 bears against the base flange of the pedestal tending to prevent displacement thereof or substantial upward swinging motion of the pedestal, relative to the pillow-bracket 13.

The mounting of the engine unit on the mounting members 8 and 10 permits oscillation of the engine unit about an axis designated G—G in Fig. 1, which extends approximately through the center of gravity or weight of the engine unit, and which axis of oscillation takes into consideration principally the weight or mass of the engine unit. The arcuate portion of the strip or block 17 of the front mounting has its center approximately at the crank-shaft axis of the engine unit and thereby locates a secondary axis of oscillation designated C—C in Fig. 1, which extends approximately coincident with the crank-shaft axes, although this front mounting may be varied to locate the axis C—C slightly spaced above the crank-shaft axis if such location should be found desirable and preferable for some types of engine units.

Due to the resiliency and substantial thickness of the mounting members 10 and 17 at the front of the engine unit, a certain amount of vertical movement of the engine unit will be permitted about a point approximately at the intersection of the axes C—C and G—G at the rear of the engine unit. This mounting of the engine unit permits restrained freedom of movement in any direction approximately in an orbit, which freedom of movement is in addition to, or combined with, the oscillatory movements of the engine unit referred to above, the kind of movement varying from time to time under different speeds and different operating conditions. In other words, the engine unit may have force cushioning oscillation combined with resiliently opposed transverse cushioning movements with respect to the axis 6—6, and also may have both the oscillation and the transverse movements about the axis C—C, or it may have these movements about either axis alone or both axes at the same time, depending on the forces present at any one time and the force cushioning movements required by the engine unit.

During oscillation of the engine unit about the axis C—C, the pedestal 9 will tend to rock or float on the rubber member 17, but the transverse motion of the engine unit will be opposed by said rubber member. In the form shown in Figs. 1 to 4, the weight of the engine unit at the front is carried not only by the arcuate portion of the engine portion but also by the horizontal end portions which serve to carry some of the weight.

Instead of the block or strip 17, any other construction suitable for the purpose may be used, so long as it provides for substantially pivotal movement and combines this with resiliently opposed transverse movement in any direction but having the improved features of this invention.

In the modification shown in Fig. 5, a pedestal 29 of triangular shape supports the front end portion of the engine unit on the usual rubber mounting 10' and the pedestal is mounted on the transverse frame member 6' by means of rubber mounting blocks 30 which are housed within cups 31 secured respectively to the pedestal 29 and the frame member 6'.

In the further modification shown in Fig. 6, the pedestal 32 is mounted on a cross frame member 33 by means of rubber mountings 34, each of which is similar to the mounting 10 and has a block or strip of rubber or similar non-metallic material vulcanized between metal plates which are attached respectively to the pedestal 32 and the cross frame member 33.

The forms of the invention shown in Figs. 5 and 6 will locate the pivot point C midway between them only when the two horizontally separated rubber mountings 30, or 34, move the same amount at the same time and in opposite directions, but these forms tend to make the pedestal slightly more stable than Fig. 4 while still providing for considerable cushioning movement. This movement, when combined with the movement about the axis 6—6, will help to overcome the lack of perfection when the two separated lower mountings do not locate the pivot point midway between them.

The modified forms shown in Figs. 5 and 6 may be used, if desired, for some operating conditions, and will have the same general effects produced by the form shown in Figs. 1 to 4, although the latter may be preferable because it affords a better mounting for the pedestal 9 and locates the lower pivot point more certainly.

I claim:

1. A mounting for an end portion of an engine unit comprising a pedestal, and means for supporting said pedestal including non-metallic resilient material having an intermediate arcuate portion terminating in approximately horizontal end portions supporting the pedestal.

2. The combination with a frame, and an internal combustion engine unit, of means for

mounting said engine unit on the frame and providing for oscillation of the engine unit about a longitudinal axis in response to the impulses incident to the operation thereof, said mounting means including a pedestal having a non-metallic resilient support for an end portion of the engine unit, and non-metallic resilient means having supporting engagement with vertically and horizontally spaced portions of the pedestal.

3. The combination with a frame, and an internal combustion engine unit, of means for mounting said engine unit on the frame for oscillation about a longitudinal axis in response to the impulses incident to the operation thereof, said mounting means including spaced approximately horizontal portions of non-metallic resilient material having an approximately arcuate portion of said material therebetween located approximately in a vertical longitudinal plane in which said longitudinal axis extends and supporting a portion of the engine unit.

4. The combination with a frame, and an internal combustion engine unit, of means for mounting said engine unit on the frame for oscillation about a longitudinal axis in response to the impulses incident to the operation thereof, said mounting means including a strip of non-metallic resilient material having an arcuate portion terminating in approximately horizontal portions at the ends of said arcuate portion located approximately in a vertical longitudinal plane in which said longitudinal axis extends and supporting a portion of the engine unit.

5. The combination with a frame, and an internal combustion engine unit, of means for mounting said engine unit on the frame for oscillation about a longitudinal axis in response to the impulses incident to the operation thereof, said mounting means including a strip of non-metallic resilient material supporting at least a portion of the weight of the engine unit and having flat horizontal end portions and resisting transverse movement of said portion of the engine unit solely by the material intermediate the extreme ends of the strip.

6. A mounting for an internal combustion engine unit including a frame structure, and means on said frame structure for oscillatively supporting said engine unit including a mounting member interposed between said frame structure and one portion of said unit comprising a substantially rigid intermediate part, an upper yieldable non-metallic element connecting said intermediate part and engine unit and adapted to accommodate oscillatory movement of the latter and a lower non-metallic yieldable element interposed between and fixed to said intermediate part and frame structure respectively, said lower resilient element having upwardly extending portions adjacent respectively opposite side portions of said intermediate part for yieldably holding the latter and the corresponding portion of said engine unit against lateral movement.

7. A mounting for an internal combustion engine unit including a frame structure, and means on said frame structure for oscillatively supporting said engine unit including a mounting member interposed between said frame structure and one portion of said unit comprising a substantially rigid pedestal, an upper yieldable non-metallic element connecting said pedestal and engine unit and adapted to accommodate oscillatory movement of the latter and lower non-metallic yieldable means interposed between said pedestal and frame structure respectively, said lower resilient means having portions extending upwardly beyond the base of said pedestal for yieldably holding the latter and the corresponding portion of said engine unit against lateral movement.

8. A mounting for an internal combustion engine unit including a frame structure, and means on said frame structure for oscillatively supporting said engine unit including a mounting member interposed between said frame structure and one portion of said unit comprising a substantially rigid pedestal, an upper yieldable non-metallic element connecting said pedestal and engine unit and adapted to accommodate oscillatory movement of the latter, and lower non-metallic yieldable means interposed between said pedestal and frame structure respectively, said lower resilient means having horizontal portions and other portions extending upwardly beside portions of the pedestal base for yieldably holding the latter and the corresponding portion of said engine unit against lateral movement.

9. In a motor vehicle having a frame structure, the combination with an engine unit, of means mounting said engine unit in the vehicle for oscillatory movement relative to the frame structure, said mounting means comprising a mounting member interposed between said frame structure and a portion of said unit including a substantially rigid pedestal, an upper yieldable non-metallic element connecting said pedestal and engine unit and adapted to accommodate but resiliently resist oscillatory movement of the latter, and thereby tend to move the pedestal base horizontally and lower non-metallic yieldable means interposed between said pedestal and frame structure respectively, said lower resilient means having horizontal portions and other portions positioned with respect to the pedestal to resiliently resist said horizontal movement of the base of the pedestal.

10. The combination of a frame structure, an engine unit, a pedestal interposed between the frame structure and engine, yieldable means between the frame and the pedestal having both horizontal and downwardly extending portions substantially filling a space between corresponding portions of the frame and pedestal.

11. In an engine mounting, the combination of a frame, an engine unit, a pedestal interposed between the frame and engine unit, providing a support for the latter, resilient non-metallic means interposed between the pedestal and frame, and a second resilient means between the engine unit and the pedestal, the central portion of said first means extending substantially horizontally and having the ends at an angle to said central portion, said resilient means substantially filling the space between corresponding portions of the frame and pedestal for cushioning the engine unit at two points in series.

12. The combination of a frame, an engine unit, means for mounting said engine unit on the frame for oscillation about a longitudinal axis in response to the impulses incident to the operation of the engine, said mounting means including a pedestal, resilient means interposed between and secured to the pedestal and frame, said frame and pedestal at least partially enclosing the resilient means and affording lateral support therefor, and thereby absorbing vertical and transverse vibrations of the engine unit.

ROLLAND S. TROTT.