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VIBRATION QUENCHING MOUNT FOR INTERNAL COMBUSTION MOTORS.

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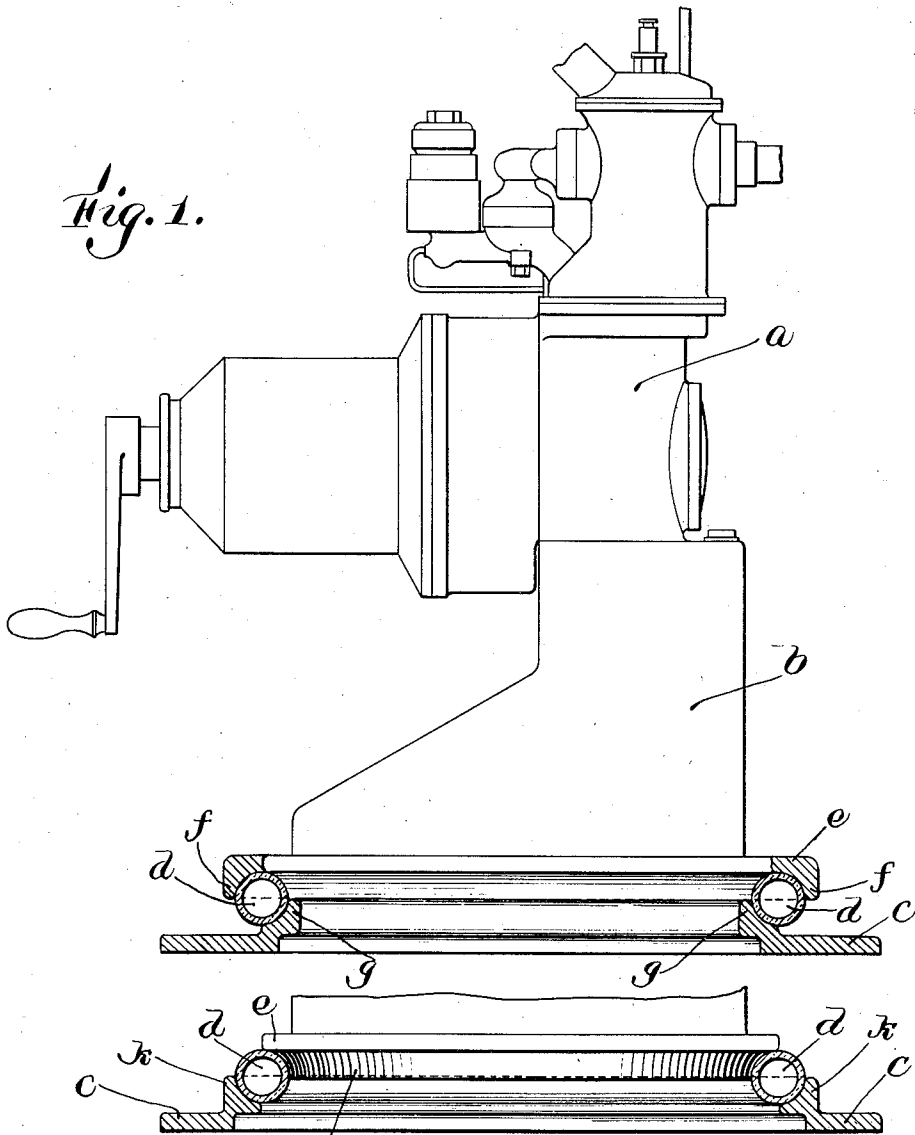


Fig. 2.

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VIBRATION-QUENCHING MOUNT FOR INTERNAL-COMBUSTION MOTORS.

1,388,967.

Specification of Letters Patent.

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Application filed June 3, 1919. Serial No. 301,528.

To all whom it may concern:

Be it known that I, WARREN NOBLE, a subject of the King of Great Britain, residing at Providence, in the county of Providence and State of Rhode Island, have invented new and useful Improvements in Vibration-Quenching Mounts for Internal-Combustion Motors, of which the following is a specification.

10 In the operation of stationary internal combustion motors various causes of objectionable noise exist. Some of the objectionable noises can be and are in practice eliminated by elimination of lost motion and balancing of rotating and reciprocating parts. 15 Other sources of noise reside in the fundamental and unavoidable lack of balance of a single cylinder motor and the vibrations caused by intermittent intake of air into the carbureter at a high frequency, and the striking or fluttering of the carbureter valves, such as that governing the auxiliary air, in the case of carbureters equipped with valves. I have devised remedies for largely 25 eliminating noises arising from the last named sources; the means or remedy for eliminating those noises due to air intake being disclosed and claimed in a companion application for patent, and that for overcoming the noise due to vibration of the motor being the subject of the present application.

Single cylinder internal combustion motors are used in large numbers for various 35 purposes in stationary work. Their inherent lack of balance creates noise by generating vibration which is communicated through the machine, which itself has a certain resonance, to the floor and walls of the 40 building containing the motor, which floor and walls generally have great resonance. As such motors serve a necessary use and can not economically be replaced by those of the types in which good balance is obtainable, it becomes important to provide 45 other means for preventing transmission of vibrations from the motor to the walls and floors of the building, and thus quenching the noise due to the resonance of the latter. 50 The accomplishment of this result is the object of the present invention, and I have accomplished it by providing a mounting or base for the motor consisting wholly or in part of an elastic body having substantially no mass; that is to say a body of air

under moderate pressure confined in a flexible elastic container and arranged to support the motor out of contact with the floor of the room or apartment in which the motor is installed.

In order most clearly to explain the principles of the invention and the manner in which I prefer that such principles should be put into practice, I have illustrated in the drawings furnished with this specification a form of pneumatic vibration quenching base support or mounting for a single cylinder motor; the motor shown in the illustration being one which I have designed as part of an electric lighting set. In the 70 drawings,

Figure 1 is a side elevation of the motor showing one form of the support or mounting in section. Fig. 2 is a sectional view of another form of mounting embodying the 75 same principles but specifically different in form.

While I have chosen to illustrate the present invention in connection with a lighting set consisting of a single cylinder motor 80 combined with an electric generator, I have made that choice because motors of that type are in wide use and are employed in homes where the vibration would be more objectionable perhaps than in factory buildings 85 in which vibration exists any way, but without any intent to indicate a limit in the use of the invention or in the scope of protection which I claim for it. With this explanation then it will be understood that the 90 motor represented by *a* typifies any internal combustion motor or other machine in the operation of which vibrations are unavoidably set up, and as to which it is desired to check or quench such vibrations. *b* is the 95 base of the motor, *c* a ring which is adapted to be secured upon a floor or other support, bed, or foundation, and *d* is the vibration quenching means which consists of a flexible casing containing a body of air under moderate pressure. The pressure is of course 100 enough to support the weight of the motor, but it need not be very great and will ordinarily be of an order of magnitude approximating one or two pounds per square inch. 105 The case may be of any material impervious to air, such as a rubber composition, or textile fabric or other fibrous tissue which is impregnated with rubber sufficiently to be impervious to air. The casing may also be 110

made either closed entirely or provided with a valve by which it may be inflated and any loss of air through leakage may be made up.

The engine base is formed with a flange *e* which in the preferred construction, that shown in Fig. 1, overlies the cushion and has a lip *f* partially surrounding the cushion, whereby to retain the motor thereon; the cushion itself being held against lateral displacement by being seated in a concavity in the ring *c*, which has a shoulder or rib *g* rising at the inner circumference of the cushion.

In the alternative construction shown in Fig. 1 the flange *e'* of the base has a rib *h* lying inside of the cushion, and the supporting ring *c'* has a rib *k* outside of the cushion, the ribs *h* and *k* performing in this arrangement the same functions as the ribs or lips *f* and *g* of the construction first described.

So far as the invention which I claim herein is concerned it is not important whether the cushion is supported upon a ring as here shown, or directly upon the floor or other foundation of the motor. It is practically necessary, however, that means be provided for preventing the motor from slipping off from the cushion, and for preventing the cushion from shifting on the floor or other foundation. Such means are typified in the lips *f* and *g* or *h* and *k*, but equivalent means may be otherwise constructed.

Ordinarily the cushion will be made as a continuous annulus, although not necessarily of circular outline; but I may without departure from the invention as claimed, provide a number of separate cushions supporting different parts of the motor. Thus for instance assuming that the motor base is rectangular in outline, I may provide four straight cushions each supporting one side of the base, and such cushions may be independent bags or tubes, or they may be connected together with internal communication from one to another, whereby to equalize automatically the pressure of the confined body of air. And it is also within my contemplation to make the cushion as a continuous bed underlying all or a considerable part of the motor base, or as two or more beds underlying different parts of the base.

The body of air thus confined in the jacket or casing as described is elastic but non-rigid and substantially without mass in comparison with materials having such density as the metal and wood (or concrete, etc.) employed in the structure of motors and buildings. This body, or cushion is substantially without resonance; that is, in comparison with the high-frequency vibrations generated by the motor, it has no vibration, or at most such a very slow rate of vibration as to be practically none at all. Thus

vibrations of the frequencies which cause resonance are absorbed in the cushion and are not transmitted, at least to any objectionable degree, to the floor and walls of the apartment in which the motor is installed. Horizontal as well as vertical vibrations are thus absorbed, due to the fact that the motor base is formed to deliver horizontal stresses into the cushion and that the latter, although held against displacement in the horizontal directions, is elastic and untrammelled in those directions. This feature is important, since in such a motor as has been herein described the horizontal vibrations and components of vibrations are large, and may even be greater than the vertical vibration and component.

It may be observed that the vibrations controlled by the means thus explained originate in the motor; that is, they are auto-generated by the machine which rests on the cushion. The invention may therefore be considered as consisting of the combination between a machine generating high-frequency vibrations compounded of a number of individual vibrations acting in different directions, and a non-vibrative absorptive cushion supporting such machine and arranged to take up and check the vibrations emitted in all directions.

What I claim and desire to secure by Letters Patent is:

1. The combination of an internal combustion motor having a base with an outstanding flange, and an annular cushion consisting of a jacket having a confined body of air underlying said flange, the flange having centering means engaging the cushion laterally and arranged to prevent relative lateral displacement of either with respect to the other.

2. A means for supporting an internal combustion motor and preventing transmission of vibrations therefrom, comprising the combination with the base of the motor, of a supporting ring and an annular tube containing a confined body of air resting upon said ring and on which said base rests.

3. A means for supporting an internal combustion motor and preventing transmission of vibrations therefrom, comprising the combination with the base of the motor, of a supporting ring and an annular tube containing a confined body of air resting upon said ring and on which said base rests, said ring and the base having complementary centering ribs one of which engages the outer side of the annular tube and the other the inner side or circumference thereof, whereby to prevent lateral displacement of the motor relatively to the ring.

In testimony whereof I have affixed my signature.

WARREN NOBLE,