April 19, 1955 E. B. ALLEN 2,706,606

VIBRATION ISOLATOR

Filed April 14, 1951

Fig. 1.

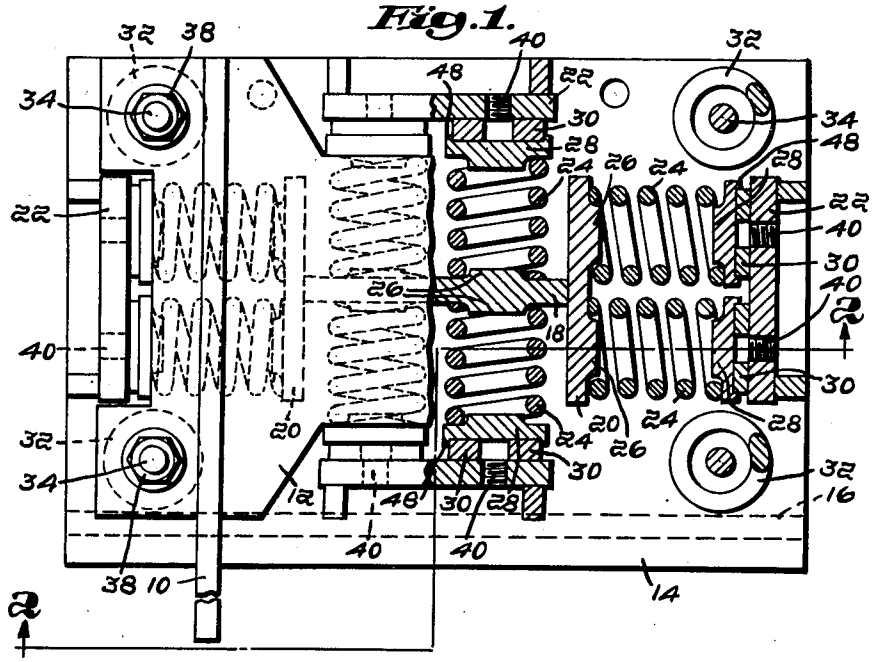


Fig. 2.

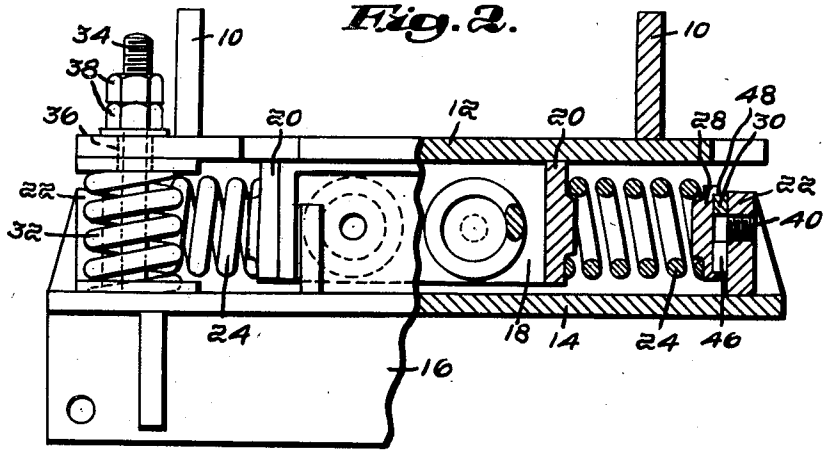


Fig. 3.

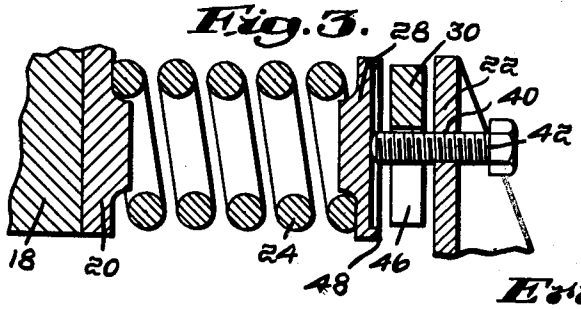
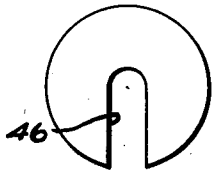


Fig. 4.



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VIBRATION ISOLATOR

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1 Claim. (Cl. 248—20)

This invention relates to a device for supporting a load from a substructure which will be effective in resisting transmission of vibrations to the substructure. Examples of its application in use are the support of individual machines from a foundation or, as described in an article by Francis J. Crandell in the periodical "Textile Industries," issue of March 1951, for the support from the walls of a building of a floor on which a number of machines are mounted.

The objects of the invention are to provide a simple and compact construction which may be embodied in a structure of suitable dimensions and inherent resistance suitable for the load which is to be carried, as determined in accordance with engineering principles and which will efficiently neutralize vibrations set up by the load, whatever their direction.

My invention will be well understood by reference to the following description of the illustrative embodiment thereof as shown by way of example in the accompanying drawings wherein:

Fig. 1 is a plan view of the supporting device as such partly broken away;

Fig. 2 is a longitudinal section through Fig. 1;

Fig. 3 is a partial vertical section illustrating the mounting and tensioning of a spring; and

Fig. 4 is a plan of a spacing washer.

I shall refer to the isolator in the singular and to the load supported thereby. It will be understood that several devices as herein illustrated may be used cooperatively to support a load.

The illustrative embodiment of my invention shown in the drawings embodies an upper plate **12** to which the load, that is the part subject to vibration, is secured, as for example by means of the two parallel projecting flanges **10**, and a lower plate **14** which is mounted on the substructure. The flange **16** herein shown is an example of a securing device for such lower plate. The upper plate is supported from the lower plate by resilient devices which resist movement of the former relative to the latter in all directions (other than the vertically upward direction wherein gravity does the work) that is to say downwardly and in four directions, two relatively perpendicular to the other two, which it might be convenient to think of as north, south, east and west, if it is understood that no actual orientation of the device with those compass points is thereby implied. Such a resilient support will of course function against forces which may be considered as having components in the several directions mentioned.

This resilient supporting mechanism will now be more particularly described. The upper plate **12** has a depending projection in the general form of a capital letter I embodying a stem **18** and crossbars **20**. The lower plate **14** has along its sides four upstanding projections **22** in the nature of ribs, those at the top and bottom, viewing Fig. 1, paralleling the stem **18** of the I and those at the sides, viewing that figure, paralleling the crossbars. The projections **22** overlap vertically the projections **18** and **20** their apposed faces providing abutments for spring units which resist relative horizontal movement of the two plates. These spring units herein each comprise two heavy helical springs **24**, the inner ends of which herein are shown as encircling and supported by bosses **26** on the depending elements **18** and **20**, while their outer ends are carried by seat members **28** which are adjustably supported, as by means of spacing washers **30**, from the upstanding projections **22** of the lower plate **14**, the springs thus being interposed between and suspended by the two plates.

It will be noted that the upper and lower spring units **24**, viewing Fig. 2, which bear on the stem **18** of the I-shaped projection, extend between and are partly accommodated in the space between the pair of spring units at the right and left in that figure. One dimension of the

unit is thus relatively short and convenient for positioning transversely to a wall.

The four spring units are organized as a centric group and define spaces between successive pairs adjacent the corners of the plate which receive vertical supporting springs **32**. The size and the tension of the springs are suitably designed in view of the loads to which they are to be subjected in use in a given case.

To permit accurate prestressing of the vertical springs vertical jackscrews **34** may project up from the lower plate, conveniently passing through the centers of the springs **32** and through a clearance opening **36** in the upper plate. Nuts **38** may be applied to these screws to press the upper plate down toward the lower plate, imposing a desired load on the springs equivalent to the gravity load of the structure or machine to be supported. The prestressed spring unit being secured to the substructure, the machine or the like is secured in position after which the nuts may be backed off, and if desired, discarded. It will be noted that the jackscrews are all arranged outwardly of the flanges **10** which in the construction shown represent the means for securing the machine or the like to the top plate. The machine may thus be positioned and secured without interfering with the screws and the nuts are accessible thereafter.

To provide for prestressing the horizontal springs and to facilitate installation, the projections **22** may be provided with tapped openings **40** axially aligned with the several springs in this instance to receive suitable jackscrews **42**, as illustrated in Fig. 3. These screws may bear on the seat members **28** and when the screws are set up the members **28** will be moved toward the left in Fig. 3 compressing the springs. When adjusted the spacing washer **30** of selected thickness, suitable for the occasion and having a radial slot **46** (see Fig. 4) to permit it to be dropped laterally over the jackscrew is inserted between the seat **28** and the abutment surface **22**. In Fig. 3 the washer is shown as it would appear while being inserted in its desired position. Herein the seat member **28** has a flange **48** which embraces the washer and holds it in position. After the spring has been stressed to the desired degree an extra turn or two of the screw **42** will permit the washer to be dropped into position and when these turns are backed off the flange will encircle the washer and hold it in position.

I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive, as is in fact clear in several matters from the description itself. Reference is to be had to the appended claim to indicate those principles of the invention exemplified by the particular embodiment described and which I desire to secure by Letters Patent.

I claim:

An isolator for supporting a load from a sub-structure and for resisting transmission of vibration to the substructure comprising upper and lower opposed plates for underriding the load and for resting on the substructure respectively, a projection from one plate defining a general I-shape, projections at four sides of the other plate paralleling the ends and the web of the I respectively, vertical springs in the spaces between the latter projections supporting the upper plate from the lower, and horizontal springs interposed between and terminally supported from the apposed faces of the projections and providing a yielding resistance to movement of the upper plate relative to the lower in each of four horizontal directions, two relatively perpendicular to the other two.

References Cited in the file of this patent

UNITED STATES PATENTS

804,884	Rutan	Nov. 21, 1905
1,377,556	Bridgman	May 10, 1921
1,766,597	Bushnell	June 24, 1930
1,845,551	Mitzl	Feb. 16, 1932
2,281,955	Rosenzweig	May 5, 1942
2,365,842	Rosenzweig	Dec. 26, 1944

FOREIGN PATENTS

501,130	Great Britain	Feb. 13, 1939