July 2, 1968 W. E. SCHMIDT 3,390,709

RESILIENT MOUNTING

Filed Nov. 29, 1965

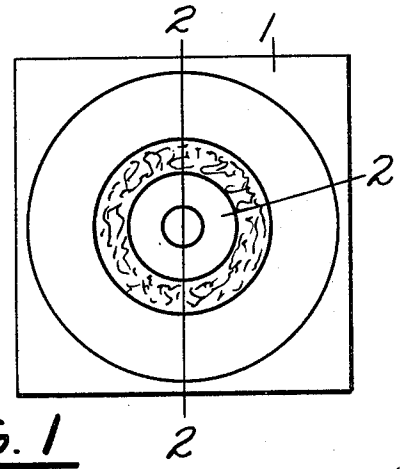
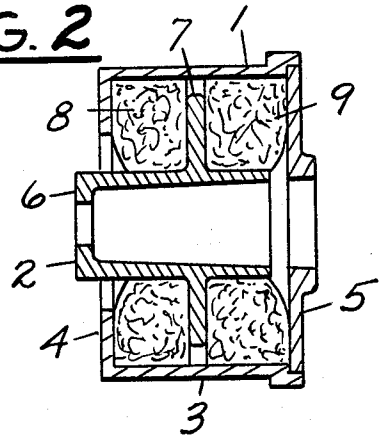


FIG. 1

FIG. 2



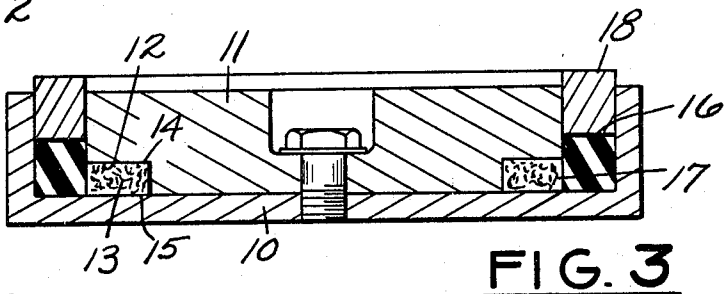


FIG. 3

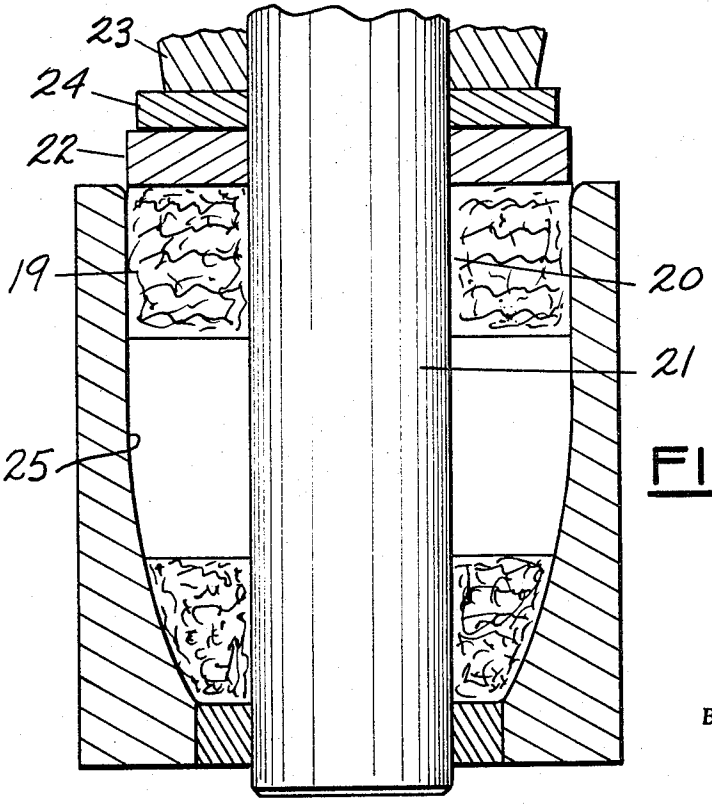


FIG. 4

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United States Patent Office 3,390,709 Patented July 2, 1968

3,390,709

RESILIENT MOUNTING

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Filed Nov. 29, 1965, Ser. No. 510,208
12 Claims. (Cl. 140—89)

ABSTRACT OF THE DISCLOSURE

Metal mesh wire mountings initially compressed axially to a density in the range of 7–45% and having little load carrying ability in radial directions are further compressed radially to a density in the range of 10–80% thereby increasing the load carrying ability in radial directions without substantially affecting the characteristics in the axial direction.

This invention is intended to improve the characteristics of metal mesh type mountings. Such mountings have heretofore been made of knitted metal wire in an annular or cylindrical shape which is shaped by axial compression in a die stressing the wires beyond their yield point to develop a stable spring rate along the axis of compression. Such mesh has good characteristics, i.e. a stable spring rate and good load carrying ability in the axial direction but has little load carrying ability in radial directions. By subjecting the formed mesh to radial compression stressing the wires beyond their yield point, its characteristics, i.e. a stable spring rate and good load carrying ability in the radial direction are improved without significantly changing the characteristics in the axial direction.

In the drawing, FIG. 1 is an end elevation of a mounting using metal mesh as a spring element; FIG. 2 is a section on line 2—2 of FIG. 1; FIG. 3 is a section through a swaging die for radially compressing a metal mesh element and FIG. 4 is a section through another form of swaging die for radially compressing a metal mesh element.

In the drawing, **1** and **2** indicate a supporting and supported members. Member **1** comprises a cup shaped housing **3** with an integral inwardly extending flange **4** at one end and with a cover **5** closing the opposite end. Member **2** comprises a hollow cylinder **6** with a radially projecting flange **7** at its center. Between the flanges **4** and **7** is an annulus **8** of metal mesh. Between the flange **7** and the cover **5** is another annulus **9** also of metal mesh.

Metal mesh is a common form of resilient element. In one mode of manufacture, wire is knitted in circular "stockings" which are cut in specified lengths and loaded into a die having an inside diameter corresponding closely to the outside diameter of the finished element. The metal mesh is compressed axially to a block of the desired size, stressing the wires beyond their yield point to develop a stable spring rate along the axis of compression. The mesh is specified by its density which ranges from a low of substantially 7% to a high of substantially 45%. The density is the percentage of the envelope occupied by the wire. Most commonly, the density is in the range of 15% to 25%. The lower densities are used for light mountings while the higher densities are used for heavy duty mountings.

The finished mounting exhibits little tendency to flow at right angles to the direction in which it was compressed for forming. The spring rate is a maximum in the direction of the forming pressure and is much less in all directions at right angles to the forming pressure. This is a characteristic of metal mesh mountings heretofore available regardless of the density. Because of this limitation,

in mounting systems involving heavy radial loads, it has heretofore been necessary to arrange several mountings with their individual axes extending radially so that each mounting would itself be stressed axially by the radial load.

This limitation is overcome by subjecting the formed metal mesh mounting to further radial compression or a compression at right angles to that used to form the mounting. By so doing, the load capacity of the mounting in the radial direction is materially increased without affecting its load capacity in the axial direction. This makes possible the use of a single mounting for carrying radial loads.

FIG. 3 shows one construction for radially compressing the metal mesh element. The die comprises a stationary member **10** to which is bolted a member **11** having at its periphery an annular recess **12** for receiving an annulus **13** of metal mesh. The metal mesh element **13** has previously been formed by axial compression between its faces **14** and **15**. The size of the element **13** is substantially that of the annular recess **12**. In order to effect radial compression, a ring **16** of elastomer is arranged around the peripheral edge **17** of the metal mesh element and is compressed axially by an annular piston **18**. Under the axial compression, the elastomeric ring **16** has a hydraulic action, transferring a uniform hydraulic pressure to the outer surface **17** of the metal mesh element and compressing it radially inward. The compression will ordinarily substantially double the density of the metal mesh element. That is, if the metal mesh element after forming by axial compression has a density of 15%, the radial compression will increase the density to about 30%. These figures are by way of example and not by limitation. The spring rate in the axial direction will be essentially unchanged by the radial compression but the radial compression will bring the radial spring rate up to substantial equality with the axial spring rate. The element after radial compression will have good load carrying ability in the radial direction.

FIG. 4 shows another die for radially swaging an annulus **19** of metal mesh material which has been previously formed by axial compression. As thus formed, the inside diameter **20** has a sliding fit on center member **21** of the die. To effect the radial compression, a ring **22** of elastomer is placed on the upper end of the metal mesh element **19** and is forced axially by plunger **23** and split washer **24** through a tapered section **25** which progressively reduces the outside diameter without changing the inside diameter. In the final stage, the metal mesh element has been subjected to some axial compression but its primary change is due to the radial compression. The density has been substantially doubled and the metal mesh element now has substantially the same load carrying ability in radial and axial directions.

By way of example, one of the annular metal mesh elements such as shown in FIGS. 1 and 2 was tested first as received from the manufacturer and again after being subjected to radial compression. As received, the element, which had been subjected only to axial compression, was capable of carrying an axial load of 18,000 pounds with less than 5% permanent set. This same element when loaded radially took a 10% permanent set with a radial load of only 600 pounds and a 40% permanent set with a radial load of 1,000 pounds. This is typical of all of the metal mesh elements heretofore available. After being subjected to radial swaging as disclosed in this application, the element carried a radial load of over 10,000 pounds without exceeding 10% permanent set. The radial swaging converted the element from a mounting for use primarily in one direction to a mounting capable of carrying loads in all directions.

What is claimed as new is:

1. A resilient mounting having a load carrying element comprising a mesh of metal wires having a stable spring rate along one axis developed by being initially compressed into a block by pressure applied along said one axis of the block stressing the wires beyond their yield point, and having a stable spring rate transverse to paid axis developed by said block being further compressed transverse to said axis stressing the wires beyond their yield point without substantially affecting the spring rate along said axis.

2. The mounting of claim 1 in which the further compression of the block is radially to said axis.

3. The mounting of claim 2 in which the block is annular and the further compression of the block is inward from the periphery without substantially changing the diameter of the center hole.

4. The mounting of claim 1 in which the further compression substantially doubles the density of the element.

5. The mounting of claim 1 in which the density after initial compression is in the range of 7–45% and the density after the further compression is in the range of 10–80%.

6. The mounting of claim 1 in which the density after initial compression is in the range of 15–25% and the density after the further compression is in the range of 25–50%.

7. The method of improving the load carrying characteristics of a resilient element comprising a mesh of metal wires initially compressed into a block by pressure applied along one axis of the block stressing the

wires beyond their yield point to develop a stable spring rate along said axis which comprises further compressing the block transverse to said axis stressing the wires beyond their yield point to develop a stable spring rate transverse to said axis without substantially affecting the spring rate along said axis.

8. The method of claim 7 in which the further compression of the block is radially to said axis.

9. The method of claim 8 in which the block is annular and the further compression of the block is inward from the periphery without substantially changing the diameter of the center hole.

10. The method of claim 7 in which the further compression substantially doubles the density of the element.

11. The method of claim 7 in which the density after initial compression is in the range of 7–45% and the density after the further compression is in the range of 10–80%.

12. The method of claim 7 in which the density after initial compression is in the range of 15–25% and the density after the further compression is in the range of 25–50%.

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