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RESILIENT BIAS FOR THE END THRUSTS OF A ROTATABLE SHAFT

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Fig. 1.

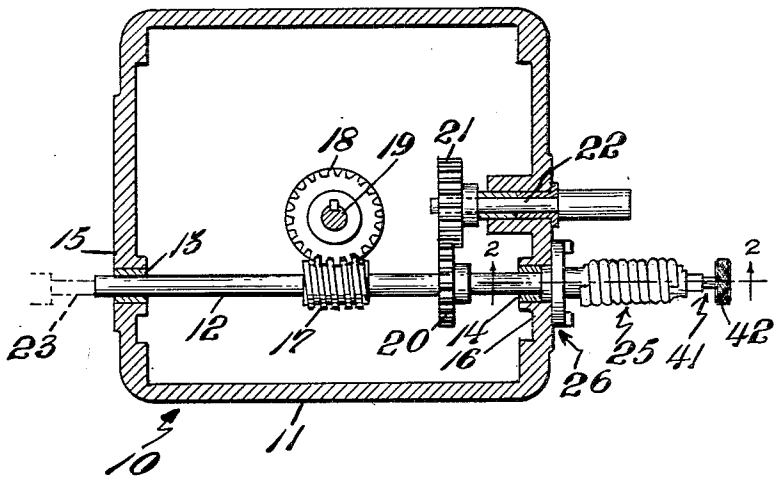
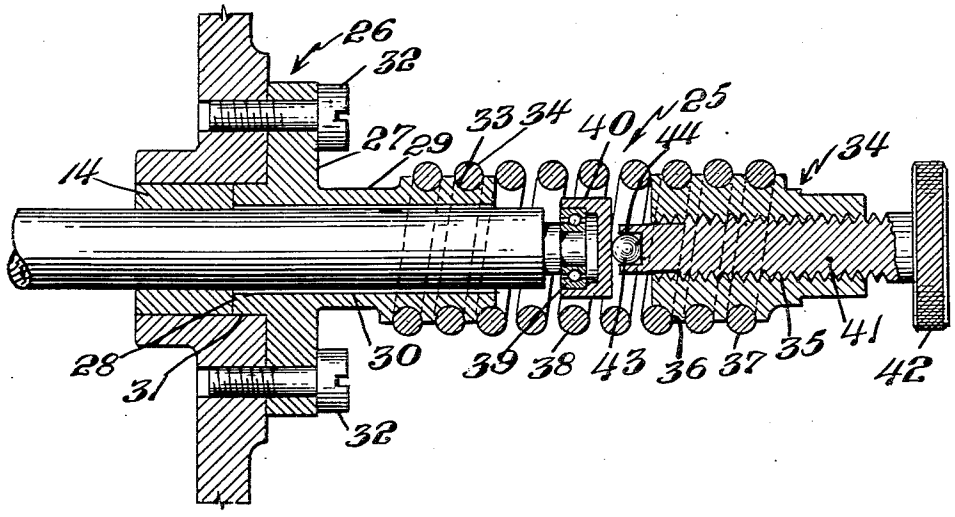


Fig. 2.



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RESILIENT BIAS FOR THE END THRUSTS OF A ROTATABLE SHAFT

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5 Claims. (Cl. 308—233)

This invention relates to improvements in a plastometer, particularly the plastometer disclosed in Patent No. 2,037,529 issued April 14, 1936, to Melvin Mooney.

In the above identified apparatus, the resistance to a shearing deformation of a specimen is measured by means of an end thrust developed in a shaft which is resiliently biased or loaded to oppose such thrust developed in said shaft. The resilient bias is provided by means of a U spring, one arm of which is held stationary and the other arm thereof extends to engage against the end of said shaft.

An object of the invention is to provide for applying an adjustable resilient bias on the said shaft in which the opposing force of the bias will be in a linear direction axially of said shaft.

Another object is to employ a coiled spring for applying the resilient bias on the shaft and arrange for varying the effective length of said spring.

Another object is to provide a coiled compression spring for applying the spring bias in which the spring will be supported in a cantilever fashion to extend beyond the shaft.

A more specific object is to provide a coil compression spring for applying a bias in which the spring will be readily assembled to its supporting structure without the use of fastening members.

With these and other objects in view, the invention consists of certain novel features of construction as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawing:

Figure 1 is a sectional view of a fragmental portion of a plastometer embodying my invention;

Figure 2 is a sectional view taken substantially along line 2—2 of Figure 1 on an enlarged scale.

Referring to the drawing, 10 designates generally a fragmentary portion of an apparatus of the type shown in the patent above referred to and to which reference is made for a more complete showing and description. The apparatus has a base 11 and a generally horizontally extending shaft 12 which is journalled for rotation and for axial movement in bearings 13 and 14 which are supported in the side walls 15 and 16 of the base 11. A gear worm 17 is fixed to the shaft 12 to rotate therewith and extend into engagement with a worm gear 18 mounted on a vertical shaft 19. A gear 20 is fixed to the shaft 12 and engages a wider face gear 21 mounted on the drive shaft 22 which is rotated from a power source (not shown). Thus, the rotation of shaft 22 will be transmitted through the said gear train to rotate the vertical shaft 19.

A rotor (not shown) having a roughened surface is attached to the vertical shaft 19 to be rotated thereby and engages a specimen to apply a rotary shearing action thereon. The resistance in the specimens to such shearing action will be transmitted to the shaft 12 and develop an endwise thrust in said shaft in a direction towards the bearing 14 of the shaft 12. The axial displacement of the shaft 12 against a known or predetermined resilient bias on the shaft may be measured as by means of an indicator,

the pointer arm 23 of which is positioned against the opposite end of the said shaft to follow such displacement in the shaft.

In accordance with the present invention, the said resilient bias is applied by means of a coil compression spring 25 which encircles the shaft and is supported by a bracket 26 in cantilever fashion from the side wall 16. The bracket 26 has an annular flange 27 provided with a locating hub 28 on one side thereof and a hub 29 on the other side. A bore 30 extends through the hubs and is made slightly greater in diameter than the shaft 12. The hub 28 is received in the opening 31 in which the bearing 14 is positioned, and the flange 27 extends into engagement with the said wall 16 and is secured in place by screw fasteners 32. The hub 29 is provided with a spiral groove 33 on its outer side in which is threadedly received the inner coils 34 of the spring 25. A nut or the like element 34 is provided with a threaded central bore 35 and has a spiral groove 36 on the outer side in which is threadedly received the outer end coils 37 of the said spring 25. Thus, each end of the spring may be adjustably positioned on the bracket 26 and nut 34 so as to predetermine the number of coils 38 which may be positioned between the said bracket and nut and be free to expand or contract as the condition may require.

The shaft 12 extends through and beyond the bore 30 and carries a ball bearing 39, the outer race of which is enclosed by a cup housing 40. An adjustable screw 41 having a knurled head 42 at one end and a cup recess 43 at the other end is threadedly received in the bore 35 and projects therefrom into engagement with the housing 40, a single ball bearing 44 being received in said recess 43 to bear against the end of the shaft 12. Thus, the free coils 38 may be adjusted to provide a predetermined resilient bias on the said shaft 12.

It may now be apparent that I have disclosed a spring bias for resiliently opposing an endwise thrust in a shaft and in which the spring may be easily attached to its support without the use of fastening members other than its own coils and a helical groove in the supporting bracket and in which the opposing force of the bias will be in a linear direction axially of the said shaft.

I claim:

1. A bias for applying a resilient opposing force against an endwise thrust in a rotatable shaft comprising a bracket, a shaft journaled in said bracket for rotational and axial movement, a coil compression spring surrounding said shaft and secured at one end portion only to said bracket and extending therefrom to beyond said shaft, said spring at the free end portion thereof carrying a screw adjustable on said free end portion and extending to bear against the adjacent end of the shaft to adjust the tension of the said spring.

2. A bias as set forth in claim 1 wherein a ball bearing is carried on the end of the shaft and said screw bears against said bearing.

3. A bias as set forth in claim 1 wherein a ball bearing is carried on the end of the shaft and said screw carries a ball engaging against said ball bearing.

4. A bias as set forth in claim 1 wherein said bracket has a hub surrounding said shaft and is provided with a spiral groove in which the end coils of said spring frictionally engage.

5. A bias as set forth in claim 1 wherein said spring at the free end portion has a nut adjustably threaded thereon and said screw threadedly extends through said nut.

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