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FATIGUE TESTING MACHINE

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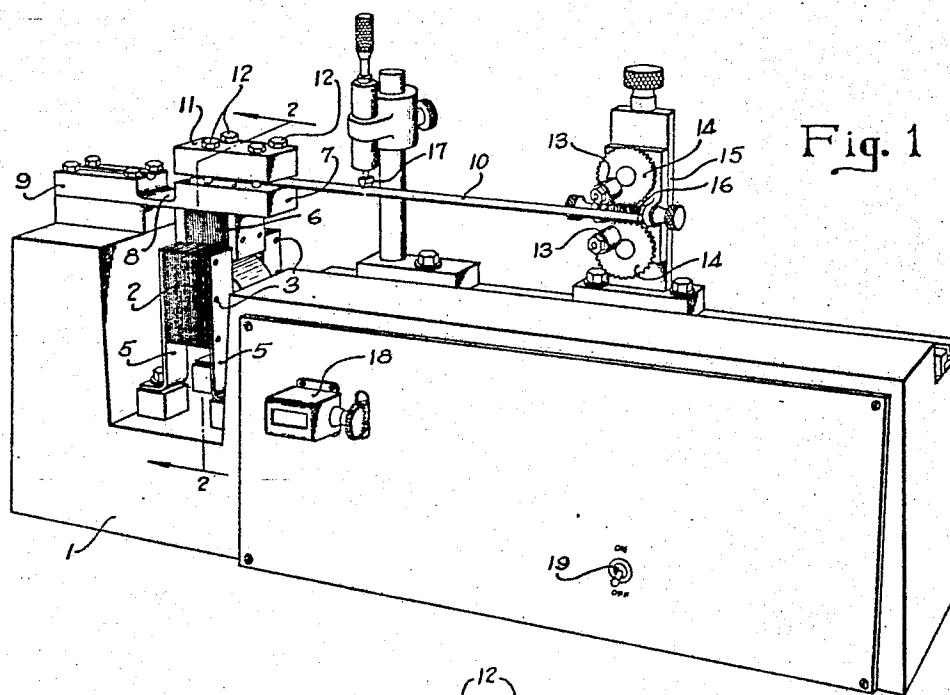


Fig. 1

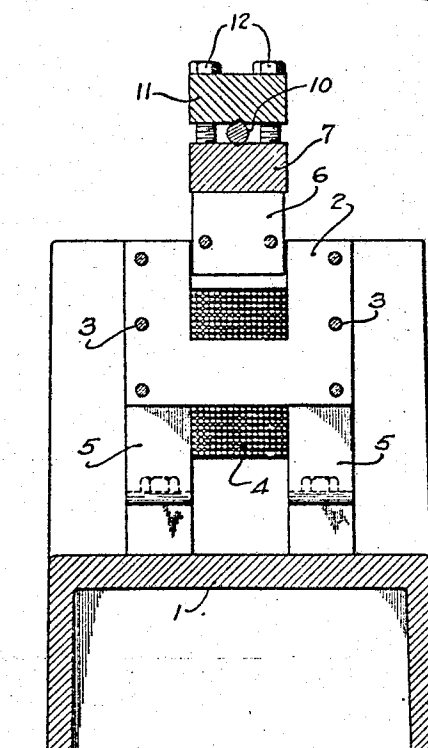


Fig. 2

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FATIGUE TESTING MACHINE

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4 Claims. (Cl. 73—51)

This invention relates generally to materials testing apparatus and more particularly to resonant vibration fatigue testers.

The present invention is an improvement on the resonant fatigue tester disclosed in de Forest Patent No. 2,171,303, the operation of which has certain limitations such as the inability to test non-magnetic materials. It is an object of my invention to provide an improved resonant fatigue tester that is adapted to test materials of all kinds and to do so with an arrangement that is simple and economical in construction, operation and maintenance. A further object is to provide an improved arrangement that has a high degree of ruggedness combined with adequate flexibility both in operation and in readily and conveniently holding specimens in position without requiring dismantling or other interference with the resonant producing elements.

Other objects and advantages will be more apparent to those skilled in the art from the following description of the accompanying drawing in which:

Fig. 1 is a perspective of my resonant fatigue tester; and

Fig. 2 is a vertical transverse section taken substantially on the line 2—2 of Fig. 1.

In the drawing a suitable base 1 carries a U-shaped magnet 2 formed preferably of laminations riveted together as at 3, while the winding 4 is energized from a suitable source of alternating current having any desired frequency. This magnet is supported upon the base 1 through legs 5.

An armature 6 formed preferably of laminated members is secured together and formed rigidly with the underside of a flexure plate 7 and as shown in Fig. 2 the armature extends downwardly within the U magnet. The flexure plate 7 consists of a reduced flexible portion 8 connecting two relatively heavy, rigid portions, the outer free one then constituting a lower vise jaw connected to the armature 6 and the inner one 9 being bolted to the base 1. A specimen 10 of any desired material is adapted to be removably clamped to the free end of flexure plate 7 as by an upper vise jaw 11 secured to the flexure member by bolts 12. When the field 2 is energized it causes the vise jaws to vibrate vertically and set up a certain resonant wave in specimen 10 which subjects the same to fatigue stresses. As is necessary in this type of fatigue tester two adjustable eccentric rubber rollers 13 are adapted to have slight engagement with the specimen. These rollers are mounted upon gear

wheels 14 which, in turn, are pivotally supported on a frame 15 while a small finger operated worm 16 is adapted to rotate the gears 14 and rubber pads 13 toward or away from the free end of specimen 10. The stress created in the specimen is determined by measuring the specimen deflection through a vertically adjustable V-shaped end of a micrometer screw 17 until it has slight contact with the specimen 10. A frequency counter 18 as well as an electric switch 19 for the current of coil 4 may be provided.

From the foregoing disclosure it is seen that I have provided an extremely simple and effective structure and mode of operation whereby non-magnetic material may be supported in the vise and subjected to a resonant fatigue force set up by a magnetic source of energy imposed on the armature and the vise connected thereto, this being done uniformly for all types of specimens while still retaining the magnetic characteristics of the source and without interfering in any way with the structural elements thereof.

It will of course be understood that various changes in details of construction and arrangement of parts may be made by those skilled in the art without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. A resonant vibration fatigue testing apparatus comprising, in combination, a resiliently mounted clamp for removably holding and supporting one end of a specimen while its other end is free, and magnetic means having a magnetically actuated element connected to said clamp to vibrate the clamp and establish a resonant vibration in the specimen clamped thereby.

2. A resonant vibration fatigue testing apparatus comprising, in combination, a resiliently mounted clamp for removably holding and supporting one end of a specimen while its other end is free, and magnetic means connected to said clamp to vibrate the clamp and establish a resonant vibration in the specimen clamped thereby, said magnetic means including a stationary electrical element for producing a vibrating magnetic field and a magnetic element adapted to be vibrated by said field, said vibrated element and clamp being connected together to constitute a unitary vibratory structure.

3. A resonant vibration fatigue tester comprising, in combination, a base, a flexure plate secured thereto and having a free end constituting an element of a specimen vise for removably clamping and supporting one end of a speci-

men while its other end is free, a magnet and armature one of which is supported on said base and the other of which forms a unitary structure with said flexure plate whereby the vise and specimen clamped thereby vibrate as a unit. 5

4. A resonant vibration fatigue tester comprising, in combination, a base, a flexure member having two relatively heavy inflexible portions connected by a relatively thin flexure portion, means for securing one of said heavy portions 10

to said base, a removable clamping element secured to the other heavy portion of said flexure member for supporting and securing one end of a specimen thereto while the other end of said specimen is free, and a magnet and armature one of which is connected to said base and the other of which forms a unitary part of said flexure member so as to vibrate in unison with the clamp and specimen.

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