Patented Feb. 20, 1934 1,947,927

UNITED STATES PATENT OFFICE

1,947,927

METHOD OF TREATING SPRINGS

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No Drawing. Application October 10, 1930, Serial No. 487,920, and in Germany October 16, 1929

5 Claims. (Cl. 148—12)

It is generally known that the number of oscillations up to fatigue or fracture of springs, particularly leaf springs, is related with the properties of the surface of the springs. It is also known that small scores in the surface of springs such as occur due to rolled-in scales or grooves and small crevices of other types, give rise to points of incipient premature fatigue or fracture. It is further known that by etching or sand blasting such crevices can be flattened out whereby the fatigue and fracture of the springs is delayed and the life is thus somewhat extended.

The invention resides in the utilization of the knowledge that by increasing the tensile strength of a very thin superficial layer of springs, the number of oscillations up to fatigue can be increased by 600–1000% and that for this purpose a compacting suffices by impacts which are so small that they can be effected by a sand blast. Obviously this optimum effect only occurs when other causes of fatigue such as crevices are either absent from the start or have been overcome by a separate process.

For this reason the compacting preferably is effected subsequent to structural or micro-structural improvement (for example by heat or mechanical treatment) of the springs as the said improvement process itself modifies the texture of the surface layer which modification also causes an increase in the number of oscillations. Consequently it is further obvious that when a sand blast is used no sand of a sharp edge and coarse granuled nature is used since this would give rise to small indentations having the adverse effect hereinbefore mentioned.

That it is purely a matter of the effect of impacts is shown by the fact that the blasting can be carried out also with rounded steel particles of 1–2 mm. diameter and that these also are operative through a thin layer of scales. The relationship of the effect with respect to the usual sand blasting and etching is shown by the following example.

The leaves of a spring in the case of sand blasting and subsequent structural improvement resisted 50,000 vibrations, in the case of structural improvement and subsequent etching 60,000 vibrations and in a case of structural improvement and subsequent blasting 300,000 vibrations; also in the case of other springs an increase in the number of vibrations from 100,000 to 1,000,000 has been observed.

In many cases treatment in the sand blast for about 5 minutes is sufficient. The optimum time of treatment in individual cases can be readily determined for different types of spring and different materials by a few experiments.

A superficial difference with respect to the ordinary blasting with sand blasting for smoothing is to be seen in that for the latter a treatment of 5 seconds is adequate whereas for a good consolidation effect using the ordinary blasts and with the most usual types of spring the time of 20 seconds has been the minimum. The time depends naturally also upon the energy of the blast so that by improvements in this direction it may be shortened.

From the foregoing it follows that other modes of procedure which have the same effect as the sand blasting or steel particle blasting can be used for carrying out the invention; also if desired, an etching process could be used in conjunction with the new process.

The invention is particularly suitable for the load carrying springs of power vehicles.

What I claim is:

1. A method of increasing the resistance of springs against fatigue which comprises compacting the surface layers of said spring by blasting the surface with hard small bodies, said small bodies being free from sharp edges and points.

2. A method of increasing the resistance of springs against fatigue which comprises blasting the surface of said springs with fine hard particles without materially affecting the outer surface of the springs.

3. Method of treating flat oscillatory springs for such uses in which fracture could occur through fatigue as a result of the type and rate of oscillation and which are subjected to the usual treatments of hot-rolled springs for increasing the strength and for other purposes, particularly for equalizing the surfaces, and blasting with sand and etching after the rolling, consisting in that the resistance to fatigue is obtained by compacting a thin surface stratum by the impacting of a large number of small hard bodies.

4. The method of treating flat springs to be subjected to bendings of substantial magnitude to increase the resistance against fatigue which comprises impacting the surface of a spring by small smooth bodies by projecting the bodies against said surface with a momentum sufficient to compact the metal at the impacted surface.

5. The method of increasing the resistance against fatigue of flat metal springs to be subjected to bendings of substantial magnitude which comprises eliminating minute surface imperfections and thereafter subjecting the surface to repeated small impacts of insufficient force to permanently deform the surface to a substantial extent but sufficient to compact the surface layers of metal.

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