METHOD OF TREATING SPRINGS

Paul Otto Friedrich Vorwerk, Volkingen-on-the-
Saar, Germany, assignor to Corporation of
Edelstahlwerk Boehling Aktiengesellschaft,
Volkingen-on-the-Saar, Germany

No Drawing. Application October 19, 1928, Serial
No. 1,497,927, and in Germany October 19, 1929

5 Claims. (Cl. 148—12)

It is generally known that the number of
oscillations up to fatigue or fracture of springs,
perticularly 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 etch-
ing or sand blasting such crevices can be flat-
tened out whereby the fatigue and fracture of
the springs is delayed and the life is thus some-
what 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
compacting surfaces 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
affected subsequent to structural or micro-struc-
tural improvement (for example by heat or
mechanical treatment) of the surface of the springs as the
improvement process itself modifies the tex-
ture of the surface layer which modificat
also causes an increase in the number of osci-
lations. Consequently it is further obvious that
when a sand blast is used no sand of a sharp
edge and coarse granulled nature is used since
this would give rise to small indentations hav-
ing the adverse effect hereinbefore men-
tioned.

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 600—
000 vibrations and in a case of structural im-
provement and subsequent blasting 300,000 vi-
bations; also in the case of other springs an in-
crease 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 smooth-
ing is to be seen in that for the latter a treat-
ment 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 70
sand blasting or steel particle blasting can be
used for carrying out the invention; also if de-
sired, an etching process could be used in con-
junction with the new process.

The invention is particularly suitable for the 75
load carrying springs of power vehicles.

What I claim is:

1. A method of increasing the resistance of
springs against fatigue which comprises comp-
pacting 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 blas-
ting 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 in-
creasing the strength and for other purposes,
particularly for equalizing the surfaces, and
blasting with sand and etching after the rolling
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 sub-
ected to bendings of substantial magnitude
which comprises eliminating minute surface im-
perfections and thereafter subjecting the sur-
face 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.

PAUL OTTO FRIEDRICH VORWERK.