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METHOD OF SHOT-BLASTING COIL SPRINGS

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7 Claims. (Cl. 29—90)

This invention relates to the shot-blasting of coil springs for increasing their useful life and aims to provide a novel method by which the shot-blasting treatment can be carried out more effectively than heretofore by moving the springs substantially in the direction of their longitudinal axes and along a relatively inclined path during their passage through the shot stream.

Another object of my invention is to provide a novel method for shot-blasting coil springs in which the springs are moved substantially in the direction of their longitudinal axes and along a relatively inclined path during a first passage through the shot stream and are then reversed end-for-end and passed through the shot stream a second time.

As a further object my invention aims to provide a novel method for shot-blasting coil springs made from wire or stock of rectangular cross-section in which such springs are passed through the shot stream in a manner to cause corresponding faces on one side of the spring convolutions to receive effective shot-blast treatment and then reversing the springs end-for-end and passing them through the shot stream a second time so that the other side faces of the convolutions will be effectively treated.

Other objects and advantages of the invention will be apparent from the following description and accompanying drawing, in which:

Fig. 1 is a side elevation of a helical coil spring to be shot-blasted;

Fig. 2 is a similar view showing a helical coil spring made from wire or stock of substantially rectangular cross-section.

Fig. 3 is an end view thereof;

Fig. 4 is a side view, somewhat diagrammatic, illustrating the shot-blasting of coil springs by my method;

Fig. 5 is a sectional view taken as indicated by line 5—5 of Fig. 4 and further illustrating the shot-blasting operation; and

Fig. 6 is another diagrammatic view similar to that of Fig. 4 but showing a modified arrangement for carrying out my shot-blasting method.

In Figs. 1 and 2 I show coil springs 10 and 11 to which my novel shot-blasting method may be applied. The spring 10 is a conventional helical coil spring made from round wire or stock and having a plurality of convolutions 12. The spring 11 is similar to the spring 10 but has been made from wire or stock of substantially rectangular cross-section.

I have observed that when coil springs are shot-blasted, as, for example, by the shot-blasting operations disclosed in my Patent No. 2,249,677, granted July 15, 1941, certain portions of the spring surfaces may be only partially presented to the shot stream and may not receive adequate treatment. In the case of the spring 11, I find that this is true of one or both of the side faces 13 and 14 of the convolutions. By my novel method, hereinafter described in detail, this deficiency is overcome and all portions of the spring surfaces receive adequate treatment including the side faces 13 and 14 of springs made from stock of substantially rectangular cross-section.

In Figs. 3 and 4 I have illustrated one manner in which my novel method of shot-blasting the coil springs 10 may be carried out. As here shown, the springs 10 are passed through a shot stream 15 by endwise or axial movement and are simultaneously rotated about their axes, but instead of moving the springs substantially horizontally through the shot stream, that is to say, in a direction substantially normal to the general direction of the shot stream, I cause the springs to be moved along an inclined support so that the direction or path of axial travel of the springs is inclined to the general direction of the shot stream. By moving the springs 10 through the shot stream in such a relatively inclined condition, it will be observed that the sides 16 of the convolutions will be elevated relative to the sides 17 and will be more directly presented to the shot stream while the springs travel therethrough. It will be seen also that the movement of the springs through the shot stream in this relatively inclined condition will not prevent the shot from entering the spaces between adjacent convolutions and effectively reaching all portions of the inner surfaces of the convolutions. The circumferential outer surfaces of the convolutions are, of course, exposed directly to the shot stream.

After the coil springs 10 have passed through the shot stream and all of its surfaces have been shot-blasted as above explained, with the exception that the sides 17 of the convolutions have received a relatively smaller amount of treatment, I reverse the springs end-for-end and again pass them through the shot stream in the relatively inclined condition. During this second passage through the shot stream, the sides 17 of the convolutions will be relatively elevated and more directly presented to the shot stream and will now receive effective treatment. At the completion of the second passage through the shot stream, all portions of the springs will have been effectively treated by the shot stream.

In passing the springs 10 through the shot

stream 15, the springs may be advanced by a belt or conveyor 18, as shown in Figs. 4 and 5, having spaced fingers 19 which engage and propel the springs. The belt 18 may extend around pulleys 20 and 21, one of which may be suitably driven. The belt may travel between a pair of substantially parallel rollers 22 and 23 on which the springs rest during their passage through the shot stream. One or both of the rollers is rotatably driven so as to impart continuous rotation to the springs while they are passing through the shot stream. The shot stream 15 may be obtained from a suitably driven shot-throwing wheel 24 located above the belt and which may have its axis extend transversely to the direction of spring travel.

In Fig. 6 I show another arrangement for carrying out my method but in which the rollers 25 and 26 are inclined to the horizontal at a relatively steeper angle than the rollers of Fig. 4 and the axis of the shot-throwing wheel 27 extends in the same general direction as the rollers 25 and 26. In other respects the apparatus of Fig. 6 and its manner of use are similar to what has been described above in connection with Figs. 4 and 5.

It is important to note that the support for the springs as formed by the rollers 22 and 23 in Fig. 4 and the rollers 25 and 26 in Fig. 6 extends in inclined relation to the horizontal. In other words, the springs are moved along the support preferably in a downhill direction, although they could be made to travel in an uphill direction, and at a suitable inclination to the horizontal which causes the relatively elevated sides of the convolutions to be presented more directly to the shot stream, as explained above. It will be understood, of course, that the angle of inclination of the path of travel of the springs may be varied considerably depending upon the pitch of the springs, the cross-sectional shape of the wire or stock, and various other factors or characteristics. Although Figs. 4 and 6 show my method being carried out with springs 10 made from round wire or stock, the same operations are applicable to springs made from stock of other cross-sectional shapes such as the spring 11 which is made from wire of rectangular cross-section.

From the foregoing description and the accompanying drawing, it will now be readily understood that I have provided a novel method for shot-blasting coil springs so that all portions of the springs, including both side faces of the convolutions, will receive effective treatment by the shot-blasting stream.

While I have illustrated and described my shot-blasting method in more or less detail, it will be understood, of course, that I intend my invention to cover all modifications coming within the scope of the appended claims.

Having thus described my invention, I claim:

1. The method of shot-blasting coil springs which comprises passing the springs through a shot stream by moving them endwise along a path which is inclined relative to the general direction of movement of the shot stream and simultaneously rotating the springs.

2. The method of shot-blasting coil springs which comprises passing the springs through a shot stream while the springs are being rotated, and then reversing the springs end-for-end and passing them through the shot stream a second time.

3. The method of shot-blasting coil springs which comprises passing the springs through a shot stream by moving them in the direction of their axes along a path which is inclined relative to the general direction of movement of the shot stream and simultaneously rotating the springs about their axes, and then reversing the springs end-for-end and passing them through the shot stream a second time.

4. The method of shot-blasting coil springs which comprises passing the springs through a shot stream by moving them in the direction of their axes along a downwardly extending support which is inclined relative to the general direction of movement of the shot stream and simultaneously rotating the springs about their axes, and then reversing the springs end-for-end and passing them in the same manner through the shot stream a second time.

5. The method of shot-blasting coil springs which comprises passing the springs through a shot stream by moving them in the direction of their axes along a path which is inclined relative to the direction of the shot stream such that one side face of each convolution will be presented to the shot stream and simultaneously rotating the springs about their axes, and then reversing the springs end-for-end and moving them along said relatively inclined path and through the shot stream a second time such that the opposite side face of each convolution will be presented to the shot stream.

6. The method of shot-blasting coil springs made of wire of rectangular cross-section which comprises passing the springs through a shot stream by moving them endwise along a path which is inclined to the direction of the shot stream such that corresponding side faces of the spring convolutions will be relatively elevated and presented to the shot stream and simultaneously rotating the springs about their axes, and then reversing the springs end-for-end and moving them endwise along said inclined path and through the shot stream a second time such that the other side faces of the convolutions will be relatively elevated and presented to the shot stream.

7. The method of shot-blasting coil springs which comprises passing the springs through a shot stream by endwise movement of the springs while they are being rotated about their axes, and then reversing the springs end-for-end and similarly passing them through the shot stream a second time.

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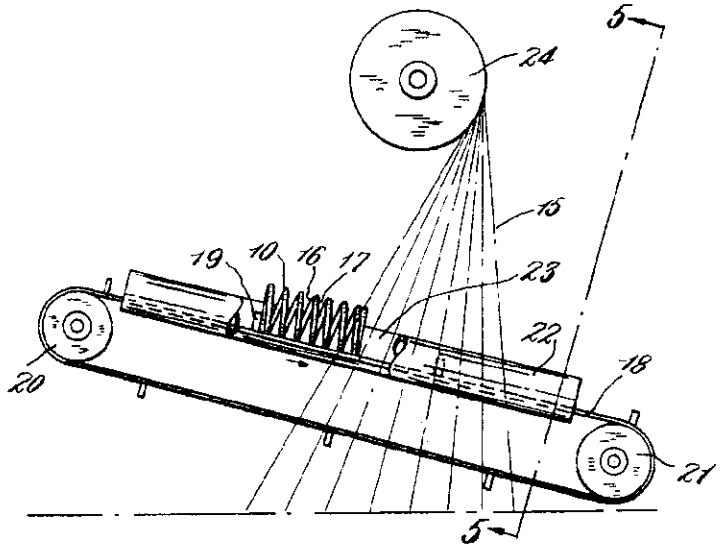

FIG. 4

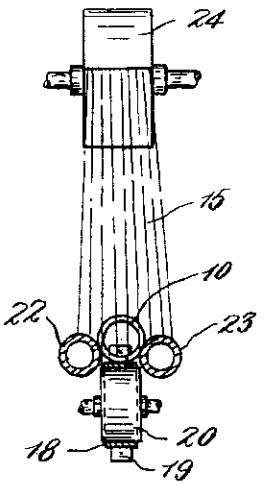

FIG. 5

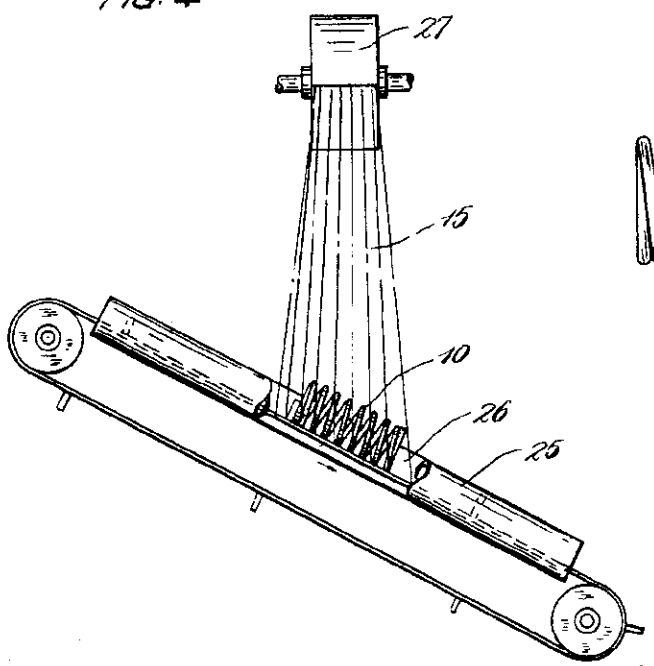

FIG. 6

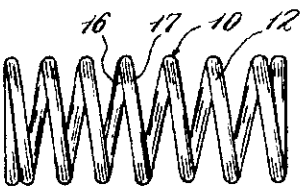

FIG. 1

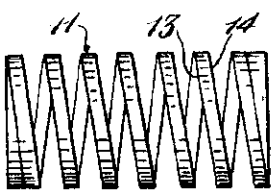

FIG. 2

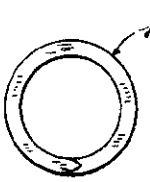

FIG. 3

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