

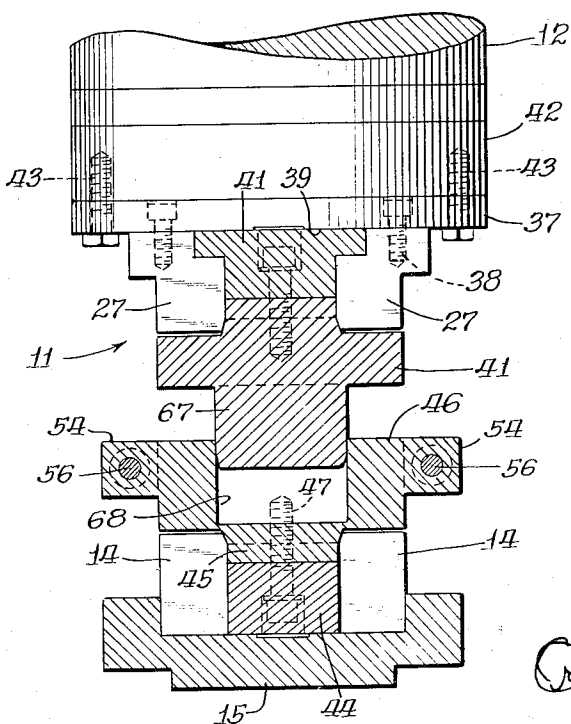
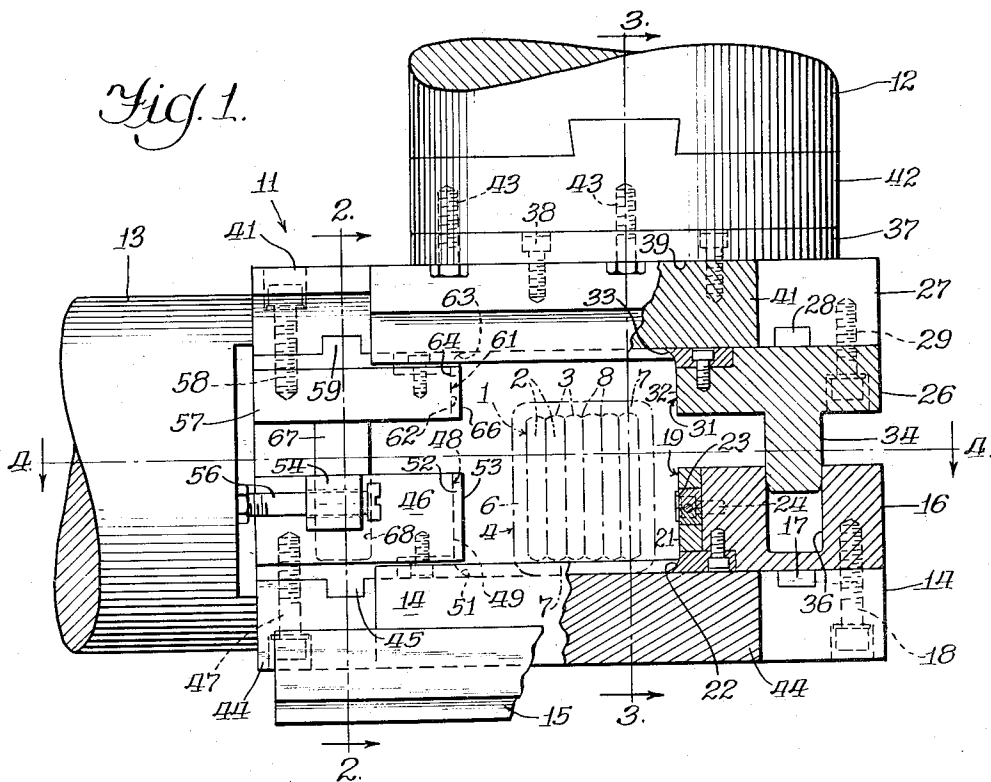
June 5, 1956

R. DE GROOT ET AL  
DIE FOR COMPRESSING A METAL BAND  
ABOUT A GROUP OF LEAF SPRINGS

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Filed May 9, 1951

2 Sheets-Sheet 1



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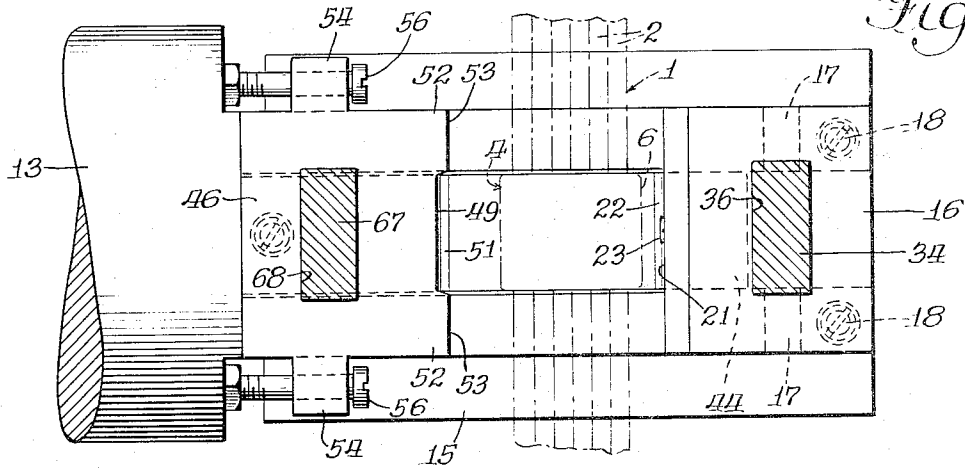


Fig. 4.

Fig. 3.

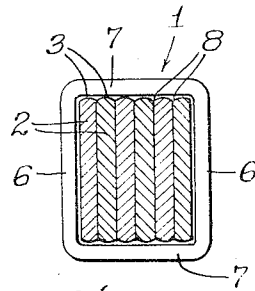
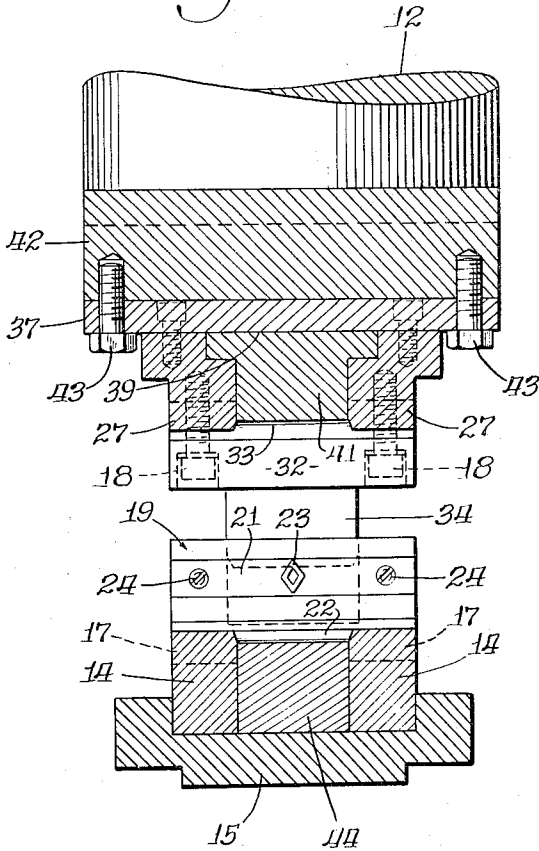


Fig. 5.

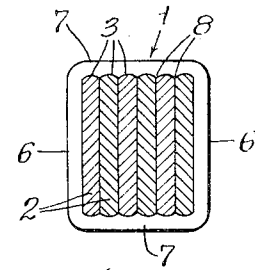


Fig. 6.

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## DIE FOR COMPRESSING A METAL BAND ABOUT A GROUP OF LEAF SPRINGS

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5 Claims. (Cl. 78-78)

This invention relates to a spring group comprising a plurality of leaf springs secured in face to face abutting relation by means of a metal band.

The present invention contemplates the provision of an improved die construction adapted to compress a metal band into tight engagement around a spring group to cause the metal in the band to conform to the contour of the spring group.

This invention further contemplates the provision of an improved method for compressing a metal band around a spring group to more securely engage the several leaf springs in tight face to face abutting relation.

Preferably, the present invention contemplates the provision of a die embodying a plurality of formers arranged to enclose and compress the four sides of a metal band to cause the excess metal in the band to be forced into recesses defined by the rounded side edges of adjacent leaf springs. In the use of the type of dies heretofore employed in applying metal bands to spring groups, the excess metal in the band was forced into the four corners of the band and thus produced laps of metal in the corners.

This invention embodies other novel features, details of construction and arrangements of parts which are hereinafter set forth in the specification and claims and illustrated in the accompanying drawings, wherein:

Figure 1 is a side elevational view, partly in section, illustrating a die embodying features of the present invention, the forming members being disposed in their open position;

Figure 2 is a transverse sectional view taken along the line 2-2 of Figure 1;

Figure 3 is a transverse sectional view taken along the line 3-3 of Figure 1;

Figure 4 is a longitudinal sectional view taken along the line 4-4 of Figure 1;

Figure 5 is a detail transverse sectional view illustrating a metal band as positioned on a spring group prior to being compressed between the forming members of the die to secure the several leaf springs in face to face abutting engagement;

Figure 6 is a detail transverse sectional view illustrating a metal band as compressed by the die to secure the several leaf springs together.

Referring now to the drawings for a better understanding of the present invention, the spring group 1 is shown as comprising a plurality of leaf springs 2 formed with rounded side edges 3 and disposed in face to face abutting relation to slidably receive a metal band 4, as illustrated in Figure 3. The metal band is formed with side walls 6-6 and end walls 7-7 substantially conforming to the contour of the spring group. If desired, the leaf springs 2 and side walls 6 may be formed with interlocking protuberances and recesses (not shown). By means of the method and apparatus hereinafter described, the four walls of the metal band are so engaged and compressed as to cause the excess metal in the band to be forced into the recesses 8 defined by the rounded side

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edges 3 of adjacent leaf springs 2, as illustrated in Figure 1.

The die 11 for compressing the metal band 4 around the spring group 1 is adapted to be positioned within the die opening of a hydraulic press of the type embodying a vertical ram 12 and a horizontal ram 13, each ram being movable toward and away from the die opening. The die is shown as comprising a pair of spaced base members 14-14 secured in spaced parallel relation upon a holder 15 by means of cap screws (not shown), the holder being positioned and secured within the die opening of the press by any suitable means. A fixed lower former 16 is secured to the upper surfaces of the base members 14-14 by means of keys 17 and cap screws 18, and is formed with a band engaging face 19 which extends downwardly at 21 and then curves outwardly at 22 adjacent the upper surfaces of the base members. A stamp 23 is secured by cap screws 24 to the lower former 16 and has its outer face in alignment with and forming part of the band engaging face 19 to form impressions defining numerals, letters, etc. on the side wall 6 of the metal band 4.

A fixed upper former 26 is secured to a pair of gibs 27-27 by means of keys 28 and cap screws 29 and is provided with a band engaging face 31 extending upwardly at 32 and thence outwardly at 33 adjacent the lower faces of the gibs. The upper former 26 is provided with a guide post 34 projecting downwardly into a guide recess 36 formed in the lower former 16 to maintain the band engaging faces 19 and 31 in vertical alignment. The gibs 27-27 are secured in spaced parallel relation to the underside of a wear plate 37 by cap screws 38 and are formed to define with the wear plate a dovetail slot 39 to slidably receive an upper carriage 41. The wear plate 37 is secured to the lower face of an adapter 42 by means of cap screws 43, and the adapter is in turn secured to the end of the vertical ram 12 by any suitable means (not shown).

A lower carriage 44 is mounted for reciprocative movement upon the holder 15 and between the spaced base members 14-14 to support a reciprocable lower former 46, the former being secured to the carriage by means of cap screws 47 and a tongue and groove joint 45. The lower former 46 is formed with a band engaging face 48 which extends downwardly at 49 and curves outwardly at 51 adjacent the upper surfaces of base members 14-14. A pair of flange portions 52-52 are formed at opposite sides of the lower former 46 to provide abutment shoulders 53-53 diverging outwardly from opposite sides of the face 48. A pair of apertured lugs 54-54 project from opposite sides of the lower former 46 to receive the shanks of cap screws 56-56 having their ends threaded into the horizontal ram 14. As illustrated in Figures 1 and 4 in the drawings, the cap screws 56-56 are slidably engaged within the apertures formed in the lugs 54-54 and are of sufficient length to permit a limited amount of relative movement between the ram 13 and the lower former 46.

A reciprocative upper former 57 is secured to the lower face of the upper carriage 41 by means of cap screws 58 and a tongue and groove joint 59, and is formed with a band engaging face 61 which extends upwardly at 62 and then curves outwardly at 63 adjacent the lower face of the carriage. Flanges 64-64 are formed on the upper former 57 to provide abutment shoulders 66-66 which diverge outwardly at opposite sides of the face 61, in the manner shown and described in connection with the abutment shoulders 53-53 formed on the flanges 52-52 of the lower former 46. The abutment shoulders 53-53 are arranged in vertical alignment with their respective shoulders 66-66 and coact therewith in engaging the adjacent side walls 6 of a metal band 4 as the latter is

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being compressed into engagement around a group of leaf springs 1. The guide post 67 is provided on the upper reciprocable former 57 for sliding reciprocative movement within a recess 68 formed in the lower former 46 to maintain the band engaging faces 48 and 61 in vertical alignment during vertical reciprocative movement of the ram 12 or horizontal reciprocative movement of the ram 13.

In the operation of the die thus shown and described in applying a metal band 4 around a group of leaf springs 1, a rectangular band of metal is first slidably positioned around the spring group. The spring group and its associated band is then positioned upon the lower carriage 44 with the band disposed between the base members 14—14. The vertical ram 12 is then actuated to move the upper carriage 41 into engagement with the adjacent portion of the band. The end walls 7—7 are thus engaged under relative light pressure between the carriages 41 and 44.

The horizontal ram 13 is then actuated to move the reciprocable formers 46 and 57 toward the formers 16 and 26. During inward movement of the reciprocable formers 46 and 57 sufficient pressure is exerted against the side walls 6—6 of the metal ring 4 to cause the excess metal therein to flow into the end walls 7—7 of the ring. While the metal ring is thus being compressed between the reciprocable formers 46—57 and fixed formers 16—26, the ram 12 is actuated to apply an additional compressive force to the metal band 4 to force the metal along the inner surfaces of the end walls 7—7 into the alternate ridges and grooves defined by the side edges of the leaf springs 2. As the formers are actuated to tightly compress the metal band 4 around the group of leaf springs, the stamp 23 acts to form impressions defining numerals, letters, etc. in the adjacent side walls 6 of the band.

While this invention has been shown in a preferred embodiment it is obvious to those skilled in this art that it is not so limited but is susceptible of various changes and modifications without departing from the spirit and scope of the claimed invention.

We claim:

1. In a die for compressing a solid rectangular metal band around a group of leaf springs, means including a pair of carriages to engage and apply compressive forces against the end walls of the band, and a plurality of formers to engage and apply compressive forces against the side walls of the band, said formers being arranged in pairs, one pair of formers being mounted for relative reciprocative movement, and the other pair of formers being mounted for relative reciprocative movement in one plane and common reciprocative movement in another plane.

2. In a die for compressing a solid rectangular metal band around a group of leaf springs, means including a pair of carriages mounted for relative movement in one plane and common movement in another plane, a pair of formers secured on said carriages to engage one side wall

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and adjacent corners of the metal band, and another pair of formers to engage the opposite side wall and adjacent corners of the metal band.

3. In a die for compressing a solid rectangular metal band around a group of leaf springs, means including a pair of carriages mounted for relative movement in one plane and common movement in another plane, a pair of formers secured on said carriages to engage one side wall and adjacent corners of the metal band, and another pair of formers to engage the opposite side wall and adjacent corners of the metal band, said carriages being disposed to engage the end walls of the band.

4. In a die for compressing a solid rectangular metal band around a group of leaf springs, means including a pair of carriages mounted for relative movement in one plane and common movement in another plane, a pair of formers secured on said carriages to engage one side wall and adjacent corners of the metal band, and another pair of formers to engage the opposite side wall and adjacent corners of the metal band, said carriages being disposed to engage the end walls of the band, means to move said carriages toward and away from each other, and means to reciprocate said carriages in parallel planes.

5. In a die arrangement for compressively causing a solid rectangular metal band to tightly bind a group of leaf springs, a pair of formers, one fixed and one movable, a guide post on one former received by an aperture in the other former operative to maintain alignment therebetween, a guidably movable lower carriage, a guidably movable upper carriage, formers mounted on said carriages, a post mounted on one of said carriage mounted formers received by an aperture on the other of said carriage mounted formers whereby said carriage mounted formers are kept in operative alignment, means to move all of said carriages and said formers except said fixed former whereby said formers and said carriages are urged to pressure engage said band, and arcuate guide means on said formers to engage the corners of said rectangular band and to arcuately guide the flow of metal in said band during pressured engagement of the band by the formers and carriages.

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