(No Model.)

2 Sheets—Sheet 1.

E. SPAULDING.

DIES FOR SHAPING AND SETTING PLATES FOR ELLIPTIC SPRINGS.

No. 266,653. Patented Oct. 31, 1882.

Fig. 1.

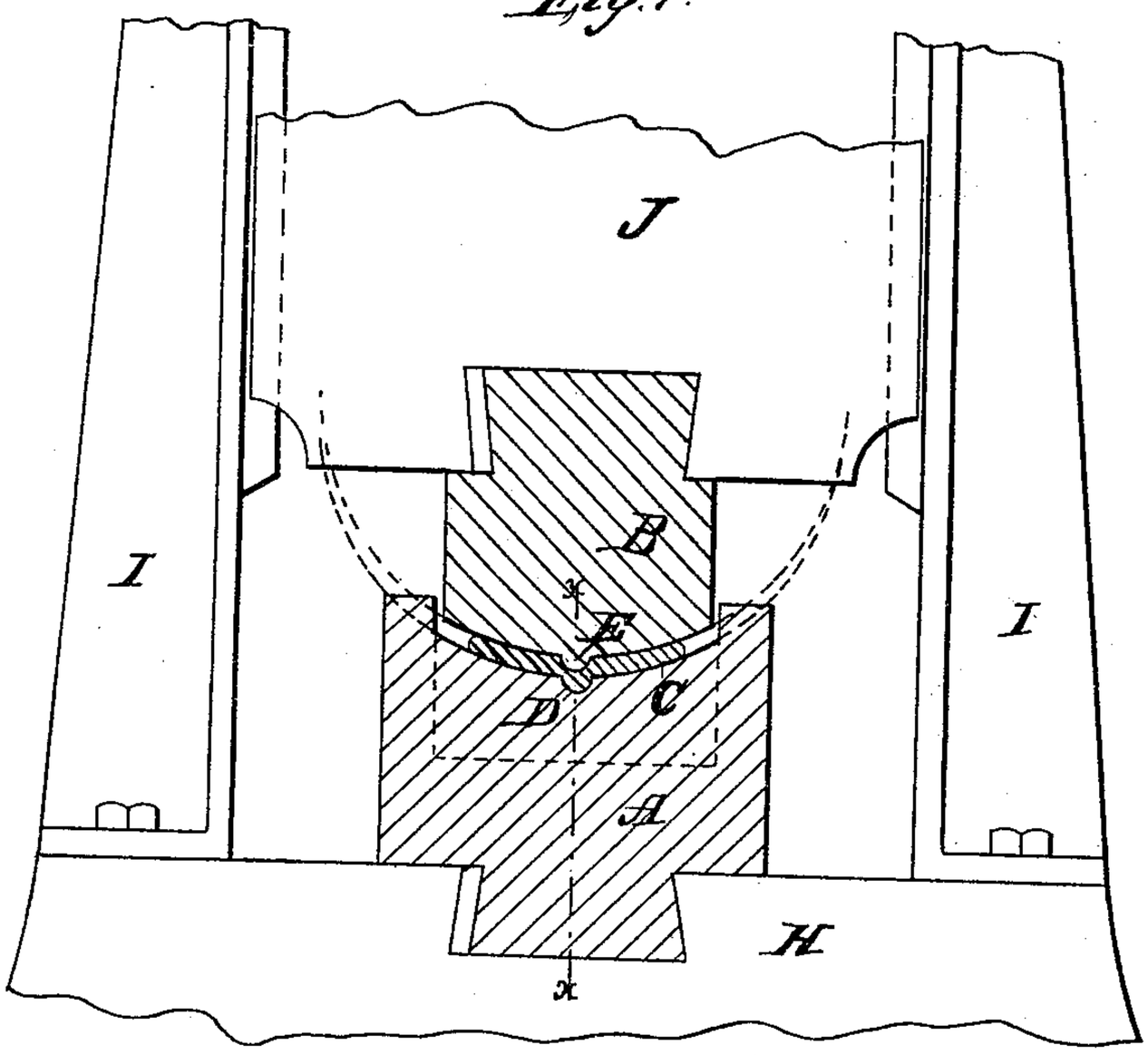
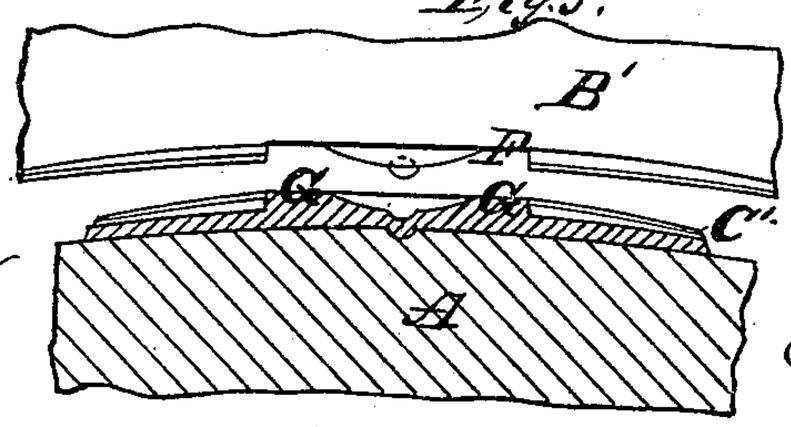


Fig. 2.

Fig. 3.



Witnesses:
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(No Model.)

2 Sheets—Sheet 2.

E. SPAULDING.

DIES FOR SHAPING AND SETTING PLATES FOR ELLIPTIC SPRINGS.

No. 266,653. Patented Oct. 31, 1882.

Fig. 4

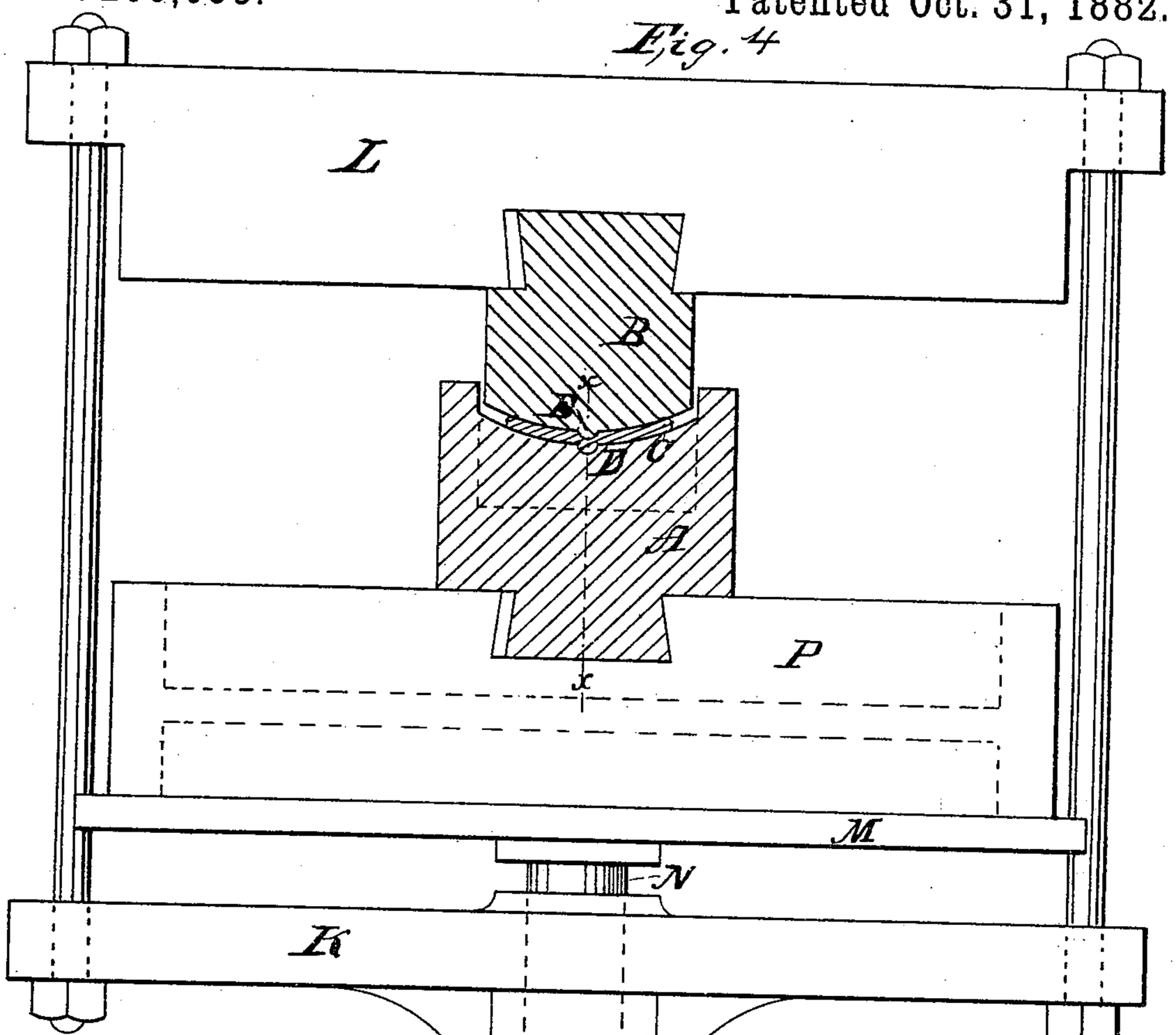
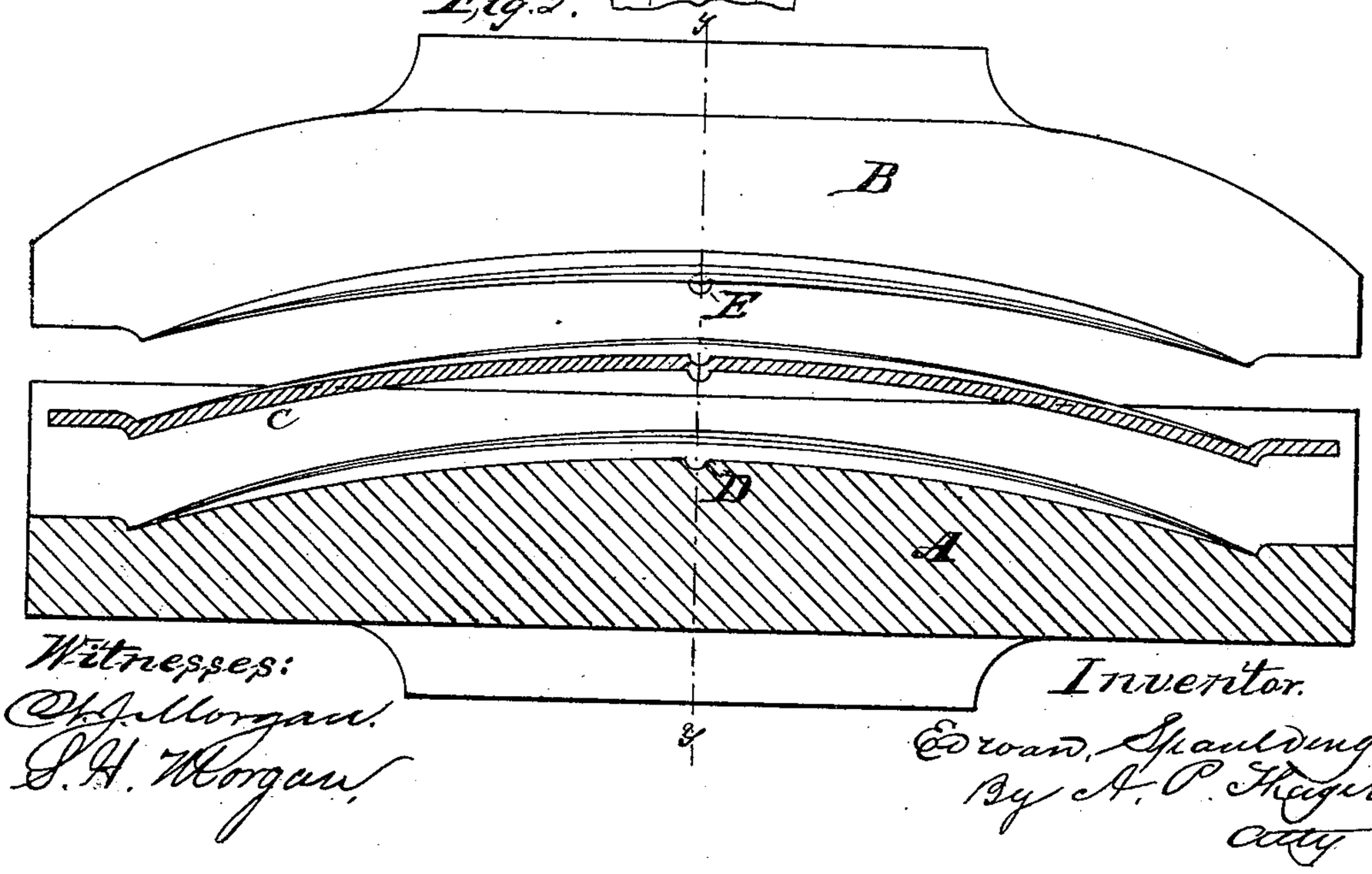


Fig. 5.



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UNITED STATES PATENT OFFICE.

EDWARD SPAULDING, OF BROOKLYN, NEW YORK.

DIES FOR SHAPING AND SETTING PLATES FOR ELLIPTIC SPRINGS.

SPECIFICATION forming part of Letters Patent No. 266,653, dated October 31, 1882.

Application filed February 18, 1882. (No model.)

To all whom it may concern:

Be it known that I, EDWARD SPAULDING, of Brooklyn, Kings county, New York, have invented a new and useful Improvement in Dies for Shaping and Setting Plates for Elliptic Springs, of which the following is a specification.

The invention consists of dies for the shaping and setting of the leaves or plates for elliptic springs that are constructed in concavo-convex form in cross-section, the convex side being inside of the longitudinal curve of the spring, the concave side being upon the outer side of said curve, and the edges of the plates being made thinner than the middle web to enable the several plates of a spring to bear uniformly upon each other from side to side, and also to arrange the metal in the best manner for the service—that is to say, to give the greatest thickness to the middle web, which, by reason of the above-described arrangement of the concavo-convex plates, bears the tension of the load, and the lesser portion of the edges, which sustain compression only.

Figure 1 in the accompanying drawings is a transverse section of the said improved dies, arranged in a drop-press for the first operation of shaping the plates. Fig. 2 is a side elevation of the male die and longitudinal section of the female die, with a plate for the long leaf of a spring in position preparatory to shaping it. Fig. 3 is a similar view of Fig. 2, showing a modified form of the male die for making a flat portion of the top plate where the band applies, with a section of a short or top plate thereon, as when shaped by the dies. Fig. 4 is a transverse section of the dies and a leaf or plate, and a side elevation of a press in which said dies are used for setting the plates after being shaped and hardened. Fig. 5 is a side elevation of the male die and longitudinal section of the female die and the long leaf or plate of a spring.

A represents the bed or female die, and B the male die, which, for the first operation of shaping the plates or leaves C of the spring, are arranged in a drop-press, Fig. 1, by preference, and for subsequently setting the plates are arranged in a hydraulic press, Fig. 3; but although these forms of presses are the best for the respective purposes, I do not limit myself to them, as steam and trip hammers may be used for the first operation, and screw and other presses for the second.

The contrivances that distinguish these dies from all others used in the shaping and setting of plates for springs are as follows: First, the longitudinally-convex die A, for the longitudinally-concave side of the plates, is concave in transverse section for making that side of the plate convex transversely; second, the longitudinally-concave die for the longitudinally-convex side of the plate is convex transversely for making that side of the plate concave transversely; third, the transverse concavity of die A and the transverse convexity of die B are constructed upon one and the same radius, (see Fig. 1,) the object of which is to make the transverse curvatures of the plates alike on both sides, so that the several plates or leaves composing the springs shall bear alike upon each other from side to side; and, fourth, the die A, which makes the transverse convex form of the plate, has a recess or socket, D, in the center, and the die B, which makes the transverse concave form, has a corresponding projection, E, by which the sockets and studs for centering and keeping the plates in position on each other are formed at the same time that the plates are shaped; and it is to be noted that by these arrangements the studs are made to project from the side of the plates that is transversely convex, and the recesses are formed in the transversely-concave side of the plates, which is less weakening to the plates than the reverse would be, because the convex protrusion of the stud and the concavity of the socket are in near uniformity with the shapes of the respective sides, thereby preserving the strength of the metal, whereas they would be in such angular inconformity as to weaken it if on the other sides.

The die A is employed for all the plates or leaves of different lengths, and die B for all except the top plate, C′, for which a die, B′, is used, having the recess F for making the flat top G of said top plate to fill the band employed to bind all the leaves of a spring together. The plates, being cut in the required lengths, are first heated and then placed between the dies, as shown at C, Fig. 2, and then shaped by the fall of the upper die, B, one blow

being generally sufficient. They are then, while still hot, quickly removed and plunged into a bath of oil to harden by cooling. By this operation they are made very hard, and they often warp, bend, or spring, and so change their shape as to require to be reshaped for permanently setting them in conformity with the shape of the dies, so that the several plates of a spring will nest together without grinding or otherwise fitting; but in the first place the temper has to be drawn and reduced by heat to the requisite condition for springs, which I propose to do in the usual way, by reheating them, or any approved way, after which, and while yet hot, I reshape and permanently set them in the original shape by again placing them between the same dies, which are now removed from the drop-press and placed in the hydraulic press, Fig. 4, in order to subject the plates to great and continuous swaging-pressure instead of a striking blow, the pressure being sufficient to shift or change the metal and to continue and hold it under pressure until the heat is reduced to that of the dies, or thereabout, so that the plates will be thereby permanently set in the required uniform shape.

In the drop-press, Fig. 1, H represents the bed, I the frame and guide-standard, and J the hammer. In the hydraulic press, Fig. 4, K represents the bed-plate, L the head-block, M the follower, N the piston, O the cylinder, and P a base-plate, temporarily attached to the follower, for holding the die A. These presses may vary at will or according to circumstances.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A pair of dies having the longitudinal convex and concave shapes for longitudinally curving or shaping the plates or leaves of elliptic springs, and also having transverse convex and concave faces for simultaneously producing said longitudinal curves, and also the transverse concavo-convex shape, substantially as described.

2. A pair of dies having the longitudinal convex and concave shapes for longitudinally curving or shaping the plates or leaves of elliptic springs, also the transverse convex and concave shapes for transversely curving the plates, the arrangement being such that they produce the transverse concavity in the longitudinally-convex side and the transverse convexity in the longitudinal concave side of the plates, substantially as described.

3. A pair of dies having the longitudinal convex and concave shapes for longitudinally shaping and curving the plates or leaves of elliptic springs, also the transverse convex and concave shapes for transversely curving said plates, the transverse curvatures of both the dies being formed on one and the same radius for making the plates thicker in the middle and diminishing in thickness therefrom to the edges, substantially as described.

4. The method of reshaping and setting the hardened leaves or plates of elliptic springs, consisting of subjecting them, after being heated for drawing the temper and while hot, to squeezing or swaging pressure in the dies employed for previously shaping them, the said pressure being continued till the heat is reduced to the normal temperature, or thereabout, substantially as described.

5. A pair of dies constructed with longitudinal and transverse curves for shaping the leaves of elliptic springs, as described, and also provided with the socket or recess D and stud E for simultaneously shaping said leaves or plates and also forming the studs and indentations, substantially as described.

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Witnesses:
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