Feb. 25, 1941. W. R. CHESLEY 2,233,000

METHOD FOR PUNCHING SHEET METAL BLANKS FOR SPRING CASINGS

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Fig. 1.

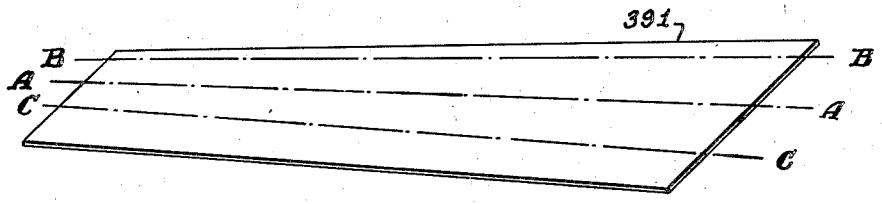


Fig. 2.

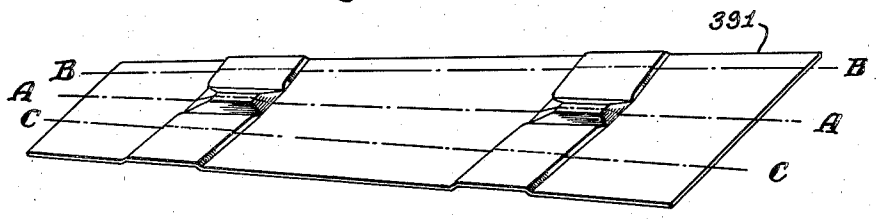


Fig. 3.

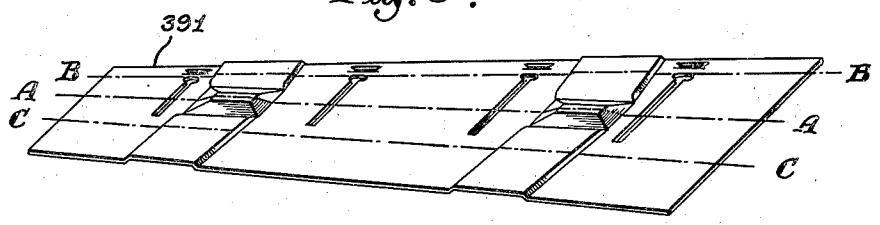


Fig. 4.

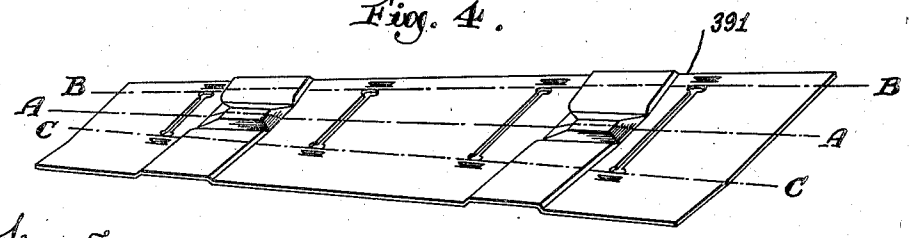
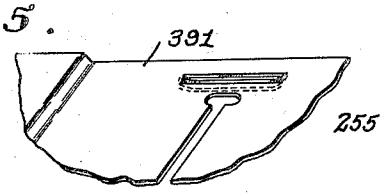


Fig. 5.



Inventor
Walter R. Chesley
by C. Yardley Chittick
Attorney

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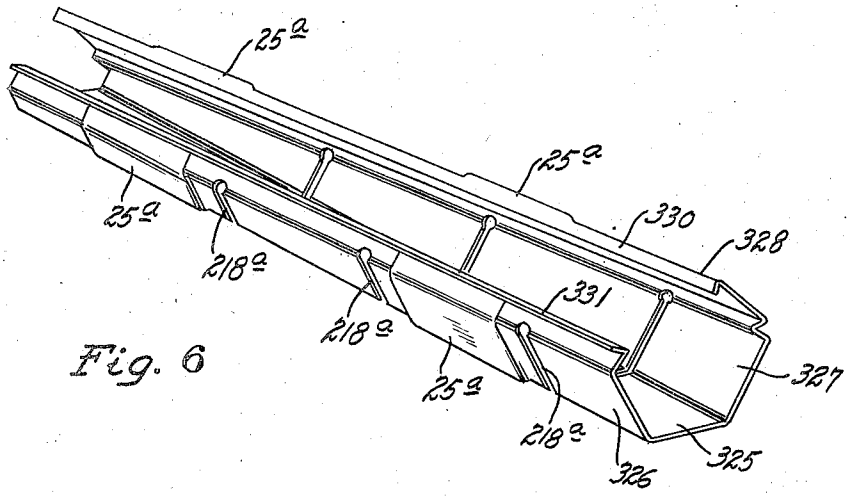


Fig. 6

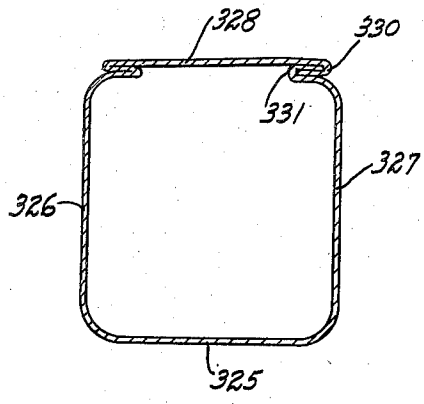


Fig. 7

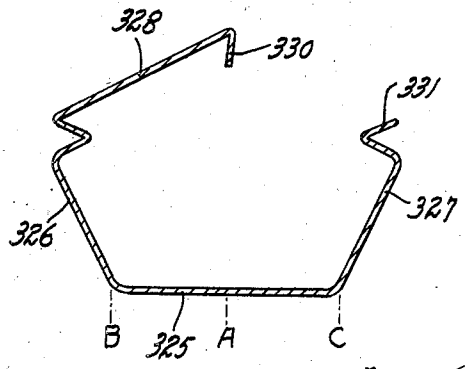


Fig. 8

Inventor
WALTER R. CHESLEY.

By

Attorneys

Patented Feb. 25, 1941 2,233,000

UNITED STATES PATENT OFFICE

2,233,000

METHOD FOR PUNCHING SHEET METAL BLANKS FOR SPRING CASINGS

Walter R. Chesley, Somerville, Mass., assignor, by mesne assignments, to Reconstruction Finance Corporation, Detroit, Mich., a corporation of the United States

Application June 12, 1936, Serial No. 84,886

2 Claims. (Cl. 164—125)

This invention is concerned with a method for punching sheet metal. It is more particularly concerned with punching individual blanks of metal in a series of operations so that the resulting article may be subsequently formed to make articulated metal covers adapted for use on leaf springs such as used on automotive vehicles.

One object of my invention is to provide a suitable method or series of steps whereby a blank suitable for formation into a spring cover may be produced.

Still another object of my invention is to provide a method of punching capable of producing spaced I-shaped slots of varying length disposed within chosen lines of reference.

Other objects and purposes of my invention will become more apparent as the description of the machine and method progresses.

In the drawings:

Fig. 1 shows in perspective the blank of sheet metal prior to the embossing and punching operations;

Fig. 2 shows in perspective the blank after the embossing operation has been performed;

Fig. 3 shows in perspective the embossed blank after the first punching operation has been performed and the adjacent strap has been formed;

Fig. 4 shows in perspective the blank after the second punching operation, and the second strap has been formed;

Fig. 5 is a detail of the punched-out portion and the depressed strap sheared at its sides but not at the ends.

Fig. 6 is a perspective view of one form of spring casing which may be made from the blank shown in Figures 1 to 5 inclusive;

Fig. 7 is a cross section through the completed spring casing after it has been closed; and

Fig. 8 is a similar cross section before the spring casing has been closed.

In the manufacture of spring covers for leaf springs having spring clips it is necessary to emboss the blank that there may be room for the spring clip within the cover. In order that the cover may flex with the movement of the spring it is further necessary that the cover, if made of a single sheet of material, be severed about three sides of the spring to form a plurality of relatively short sections so that movement between the sections of the cover may take place as the spring bends. Thus, in the typical case, the blank must be embossed at one or more places and must have one or more transverse slots punched therethrough. The embossing and punching is preferably done when the blank is flat.

By the method of my invention it is now possible to punch a series of I-shaped transverse slots in a suitable blank by performing a series of operations which result in an article adapted to be formed into a finished articulated cover.

The metal blank shown in Fig. 1, on which my method is performed, is fed by the operator into any suitable machine, which may be of the type disclosed in my copending divisional application Serial No. 332,311, filed April 29, 1940. The first operation which the machine performs is that of embossing certain transverse portions **25***a* of the blank to produce the formation shown in Fig. 2 to provide clearance for clips (not shown) which band together the leaves of elliptical motor vehicle springs. To accomplish this result my embossing dies are mounted between the bed and the sliding head of the machine.

Passing now from the embossing dies the method preferably utilizes two sets or groups of T-shaped punches and cooperating dies to produce oppositely-directed T-shaped slots the shanks of which overlap one another. The first set of punches results in the formation of the blank as in Fig. 3. In this punching operation only a part **217***a* of each of a plurality of transverse slots **218***a* are made and one strap **291***a* at the end of each slot is formed. In the final punching operation the transverse slots **218***a* are completed and the second straps **220***a* are formed at the other ends of the slots, resulting in the blank shown in Fig. 3.

Each pair of dies in the present instance possesses T-shaped narrow slots which, in cooperation with T-shaped upper punches (Figure 3), will produce a single T-shaped slot **217***a* in the blank **391**. The slot in the first die is enlarged at one end, while the slot in the second die of the pair is enlarged at the other end, the result being that the finished slot **218***a* in the blank **391**, after the two punching operations, is I-shaped and has the enlarged portions at the ends of the slot as shown in Fig. 4.

Adjacent the enlarged end of each of the slotters is a small die extending transversely thereof and adapted in cooperation with a punch to produce the straps **219***a*, **220***a* which are preferably short slightly depressed portions as shown in Fig. 5, the said straps being connected at its ends with the blank, but severed therefrom along the sides. Thus in the finished blank, there is a strap at each end of each slot. These straps

219a, 220a are for the purpose of holding a narrow band of metal (not shown) in position over each slot, which bands close the slotted openings 218a. The slotted openings 218a are provided so that an elongated casing, Fig. 6, formed out of one of the prepared blanks will have longitudinal flexing movement.

The spring casing that will be subsequently formed from the blank which my method produces (Figures 6 to 8) will comprises a channel-shaped section 325, 326, 327 adapted to extend around three sides of the spring and a cover section 328 that is connected with the channel-shaped section either as an integral part or a separate piece to close the fourth side. The channel-shaped section is symmetrical since the spring it covers is symmetrical. Thus when the channel-shaped section is unfolded, it will be symmetrical with respect to a central line of reference.

Thus in Fig. 1 the central line of reference A—A is the line which designates the longitudinal centre of the channel-shaped portion that encloses three sides of the spring. The lines B—B and C—C are the lines designating the terminal edge of the casing and these lines are, of course, symmetrical with respect to the centre line A—A. The portions of the blank beyond B—B and C—C extend on the fourth side of the spring.

To make the channel-shaped section flexible it is essential that the transverse slots 218a extend between lines B—B and C—C, and the angle that the slots, as well as the embossed portions, make with the line B—B should preferably be the same as the angle they make with the line C—C. This result is readily accomplished in the setting of the various dies, punches and stops.

In actual practice the blank from which the spring casing is made is symmetrical and trapezoidal in shape but the method is adapted to punch slots properly disposed in an unsymmetrical blank if required. This is accomplished by properly locating the several dies, punches and stops that engage the blank.

Referring to Fig. 2 the embossing die and blank must be positioned with relation to each other so that the embossed sections will be adjacent the spring clips when the cover is applied to a spring.

By reference to the spring to be covered, the distance from the end of the cover to the first embossed section and to the second embossed section may be determined. An end stop is then positioned at a suitable distance from the first embossing die and the second embossing die is shifted laterally by means of the adjustments until it is the proper distance from the first die. The centre line of the dies must coincide with the central line of reference A—A of the blank. To accomplish this, lateral stops are adjusted until the blank, when positioned thereagainst and also against the end stop, has its centre line A—A coinciding with the centre line of the dies.

After the embossing operation has taken place the blank is moved so that it may advance to the first punching stage.

Because of adjustments, the several dies can be set so that a line through their ends may form any desired angularity with their centre line. Thus, if the blank is positioned so that it may be operated on by punches in the first stage and thereafter this blank is transferred to the second punching stage and set in a position parallel and longitudinally alined with its position in the first punching stage, then it follows that the resulting continuous slots will be such that lines drawn through their ends, as B—B and C—C of Fig. 4, will be symmetrical with respect to the centre line A—A.

In setting the punches to make any particular casing the angularity of lines B—B and C—C is determined by reference to the spring to be covered. This angle is divided in half and the dies are then set so that the angle between their center line and a line through the ends of the dies is equal to one-half the angle between B—B and C—C. By this adjustment, the angle between lines through the ends of the dies will be equal to the angle between lines B—B and C—C.

After the punching operation at the first stage, the blank is held in position by stops. These stops are set so that the blank at the second punching stage will be parallel to and longitudinally alined with its position in the first stage, so that the dies of the second stage will be alined with and partially overlap the slots 217a formed at the first stage. The length of the final slot is determined by the position of the stops which, however, will always be adjusted to keep the blank at the second stage parallel to the first. Thus it is clear that by the simple expedient of setting the angularity of the dies properly, the dies will automatically be positioned correctly to produce finished slots in which the lines B—B and C—C drawn through the ends will be symmetrical with respect to the centre line A—A, which is at right angles to the slots.

In Figs. 6, 7 and 8 there is shown a spring cover formed of one of the prepared blanks shown in Fig. 4, but it should be understood that the present invention relates to the preparing of the blank and is not to be limited by the form, shape and details of an article formed of the blank. The present spring casing includes a bottom wall 325, upstanding side walls 326 and 327 and a top wall 328 which is integral with the side wall 326. In Fig. 8, are the numerals A, B and C corresponding with like numerals on the views of Figs. 1 to 4 inclusive. As previously mentioned the blanks are bent along the lines designated B and C providing the bottom roll 325 and the side walls 326 and 327. The top wall 328 is bent inwardly from the side wall 326 and along its edge is provided with a flange 330 cooperable with a similar flange 331 of the side wall 327 to lock the top wall and the side wall 327 together after the casing has been positioned around a spring to be covered. In the present instance, the cover 328 is so formed and bent at its juncture with the casing side wall 326 that the cover may be pressed down to secure it tightly to the casing side walls as shown in Fig. 7.

In the operation of the method, the operator places a blank of the type shown in Fig. 1 on top of the lower half of the embossing dies and against their stops. The upper half of the embossing dies is moved into engagement with the lower half to create the formation shown in Fig. 2. The blank is then freed from the embossing stops whereupon it descends by gravity to the first punching position being stopped thereat by the first punching stops.

Thereafter the blank is punched at the first punching stage with the T-shaped transverse slots 217a, with the heads thereof lying substantially along one of the lines of reference B—B. The machine is then operated to enable the blank to slide downwardly to the second punching position where it is held by the second punching stops.

It should be pointed out that in the operation of the punches at the second punching stage the second stage punches punch a second set of spaced T-shaped transverse slots with the heads thereof lying substantially along the second line of reference C—C and with the shanks alignigly intersecting the shanks of the first set of slots. In this manner the blank is formed with a plurality of spaced transverse I-shaped slots extending between said lines of reference B—B and C—C. If the blank is tapered, these reference lines B—B and C—C converge, and then the slots successively decrease in length from one end of the blank to the other end thereof.

While the above disclosure illustrates a preferred form of my invention, I wish it to be distinctly understood, however, that I intend my invention not to be limited thereby, but only by the appended claims.

I claim:

1. In the method of making a blank suitable for forming into a slotted flexible spring casing shaped for enclosing at least three sides of a spring, selecting on said blank two lines of reference spaced inwardly of the proposed locations of the side edges of the blank, punching a set of spaced T-shaped transverse slots in said blank with the heads of said T-shaped slots lying substantially along one of said lines of reference and with the shanks of said slots extending transversely from said first line of reference to a point part way between said lines, and thereafter punching a second set of spaced T-shaped transverse slots with the heads thereof lying substantially along the second line of reference and with the shanks alignigly intersecting the shanks of the first set of slots whereby to form a plurality of spaced transverse I-shaped slots extending between said lines of reference.

2. In the method of making a blank suitable for forming into a slotted flexible spring casing shaped for enclosing at least three sides of a spring, selecting on said blank two converging lines of reference spaced inwardly of the proposed locations of the side edges of the blank, punching a set of spaced T-shaped transverse slots in said blank with the heads of said T-shaped slots lying substantially along one of said lines of reference and with the shanks of said slots extending transversely from said first line of reference to a point part way between said lines, and thereafter punching a second set of spaced T-shaped transverse slots with the heads thereof lying substantially along the second line of reference and with the shanks alignigly intersecting and overlapping the shanks of the first set of slots whereby to form a plurality of spaced transverse I-shaped slots extending between said converging lines of reference and successively decreasing in length from one end of the blank to the other end thereof.

WALTER R. CHESLEY.