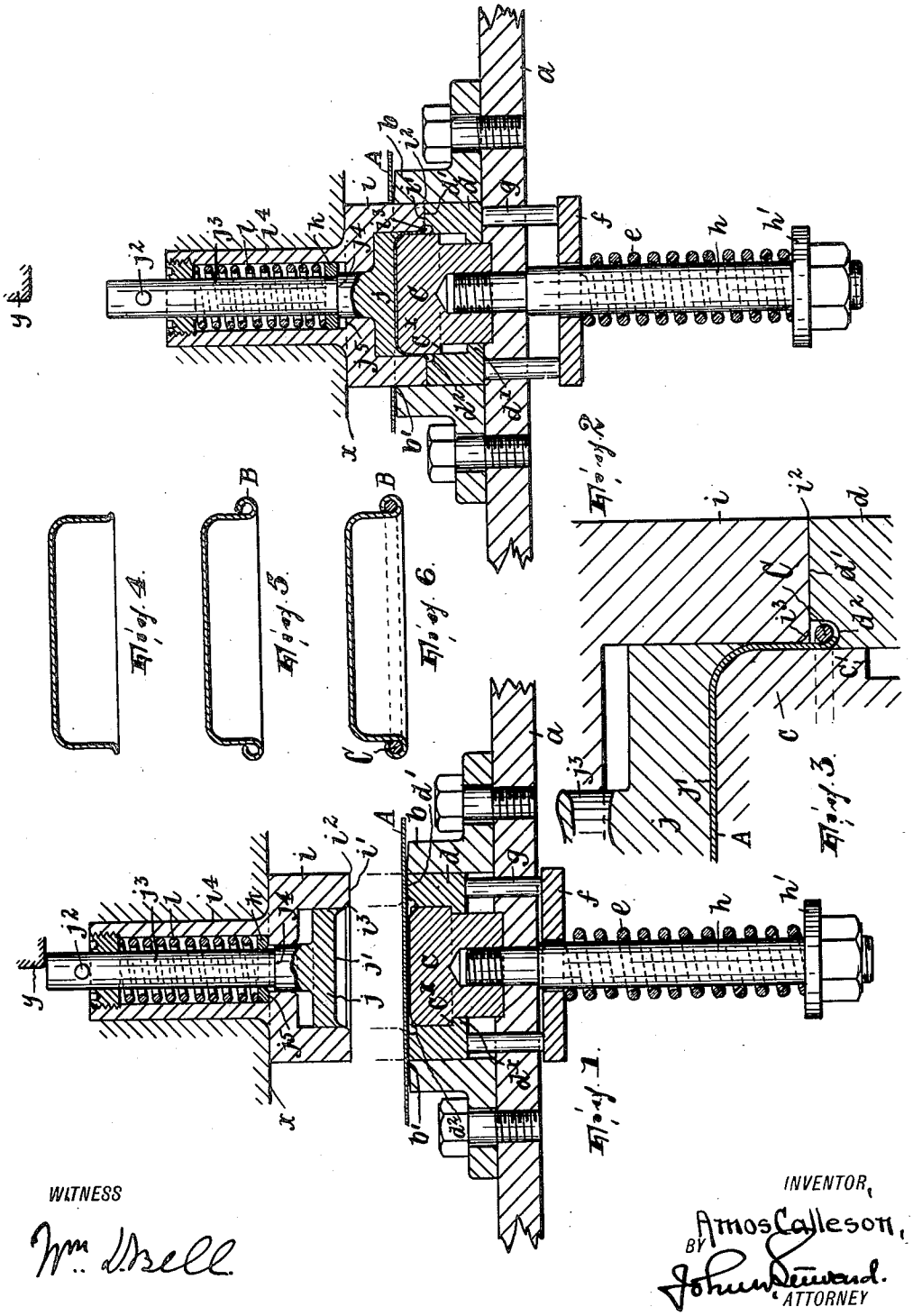
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APPARATUS FOR FORMING SHEET METAL CAPS

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WITNESS

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APPARATUS FOR FORMING SHEET-METAL CAPS.

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To all whom it may concern:

Be it known that I, AMOS CALLESON, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Apparatus for Forming Sheet-Metal Caps, of which the following is a specification.

This invention has for its object to form from a disk a cap with its edge deflected, as in an outward curl. By a "cap" I mean to define a body of sheet material having a depending wall, as a flange.

Usually the apparatus constituting the invention will first form the disk from a suitable piece of sheet material and then form the cap with its edge deflected; but it will be understood that the apparatus may be made to operate on already formed disks.

In the drawing,

Figs. 1 and 2 are vertical sectional views of the apparatus, Fig. 1 showing its parts ready to begin an operation and Fig. 2 showing them at that point in the operation where a cap-shaped body has been formed;

Fig. 3 is a detail view in vertical section illustrating how the edge of the cap is deflected, as in forming a curl;

Figs. 4 and 5 are vertical sectional views of the material operated upon at two stages in the forming of the product, Fig. 4 showing it as it appears in Fig. 2 and Fig. 5 showing it upon completion of the operation illustrated in Fig. 3; and

Fig. 6 shows a modified form of the product.

Let a represent the bed of a press. b is an annular cutting die secured thereon and having an annular cutting edge at b'. c is a circular anvil seated on the bed within and concentric with and spaced from the die b. d is an annular member which fits snugly between the die and anvil. It is normally pressed upwardly to the limit shown in Fig. 1 (where its flange d^x abuts the shoulder c^x on the anvil) by a spring e acting thereon through a disk f and pins g and seated, in a state of compression, on the head h' suitably provided at the lower end of a stud h depending from the bed and penetrating the spring. Said member includes an annular clamping instrumentality by virtue of an annular surface d' forming a clamping surface at the top of the member and extending from the outer perimeter inward short of its inner perimeter; said member also includes an annular die which in the present example is an annular groove d^2 round in cross section, and formed at the top of the member between and concentric with the surface d' and the inner perimeter of the member. The top of the anvil c, which is here shown flat and preferably has its margin rounded off, is flush with the cutting edge of the die b.

i is another annular member concentrically opposed to the member d. Said member includes an annular clamping instrumentality by virtue of an annular surface i', forming a clamping surface (coactive with surface d') at the bottom of the member. The outer and inner perimeters of the member i coincide with the corresponding perimeters of the member d. Its outer perimeter forms with the surface i, to wit, at i^2, an annular cutting edge coactive with the cutting edge b', but its inner perimeter preferably merges into the surface i' in a rounded edge i^3. The member i is adapted to be moved toward and from the bed of the press and for this purpose may have a stem i^4, by which to attach it to the means for effecting such movements thereof, as a plunger of the press, a fragment of which is indicated at x in Fig. 1. Member i contains an anvil j opposed by anvil c and formed with a concave surface j' to fit (approximately) the top surface of the latter; in its normal position (Fig. 1) the anvil j is held by gravity with a stop pin j^2 in its stem j^3 resting on the top of stem i^4, in which position its surface j is set back with reference to the clamping surface i' of member i, and said anvil is capable of free or lost upward motion, to wit, until the shoulder j^4 on its stem abuts a washer k which with a coiled spring l contained in stem i^4 constitutes means acting to depress anvil j when it rises above the point where shoulder j^4 abuts the washer, the latter being normally seated at j^5.

The operation is as follows: A sheet A (as sheet metal) being placed on the lower structure b—c—d the upper structure i—j is depressed. First edge i^2 coacts with edge b' to cut out a disk from the sheet, which remains clamped between the surface d' and i'. Member i forces member d downward, opposed by the resistance of spring h, and while the center part of the disk is held against descending by the anvil c the marginal part of the disk (which is held with

a slip-grip between d' and i') is carried downward, thus drawing the disk into the form of a cap (Fig. 2), the marginal part of the disk slipping from between the surfaces d' and i' until it finally clears them as shown in Fig. 2 (the product of this action being also shown in Fig. 4). In the latter part of the downward movement the anvil j becomes subject to the depressing force represented by the means k—l, which force of course remains active during the first part of the return or upward movement of member i. When therefore member i begins to return or rise with plunger x and member d follows, urged by spring h, the die d^2 impinges against the edge of the cap, while the latter is still held down by the anvil j, and this causes said edge to be deflected (in the present case outwardly), which deflection may be actually developed so far in practice as to produce the curl B shown in Fig. 5. After the deflecting operation is finished the washer k becomes seated at j^5 so that spring l exerts no further downward pressure on anvil j, and the cap being relieved of the pressure of the spring it rises with the member i and either falls therefrom as member i rises clear of member d or, if the cap sticks in member i, it may be ejected in some such way as by the impact of the stem of the anvil j with an abutment y.

It will be noted on reference to Fig. 3 that the deflecting of the cap edge is due to the die surface d^2 presenting in cross section obliquity to said edge, so that when the edge and said surface come together the former wipes over the latter and as an incident of the deflection is altered in diameter; the deflection will be developed into an actual curl, more or less as shown in Fig. 5, when the die surface is cross-sectionally concave. In Fig. 3 I have illustrated an annular wire, at C, lying in the groove in position to be embraced and housed in the curl when the same is formed, as shown in Fig. 6. This will leave the cap with a wired edge.

In the present instance the deflecting is outward; but my invention is not limited to its being outward.

It will be understood, moreover, that so long as the apparatus includes the essentials for forming from a disk a cap with its edge deflected which are hereinafter outlined in the claims it is not material that the drawing action should result from displacing the margin of the disk instead of its body or center part out of the original plane; or that the edge deflecting should result from moving a die as d^2 relatively toward the cap instead of moving the cap toward the die.

It will be understood that the form of the disk and completed cap need not necessarily be annular, as herein shown.

Having thus fully described my invention, what I claim is—

1. Apparatus for forming from a disk a cap with its edge deflected including a pair of opposed substantially concentric instrumentalities for clamping the disk with a slip-grip in a line substantially concentric with its edge, means coactive with said clamping instrumentalities while they are so clamping the disk to draw the latter into one of said instrumentalities into the form of a cap having its edge withdrawn from between them and left projecting at an angle to the plane originally occupied by the clamped disk, a die having its die surface inward of and extending along a line substantially concentric to the other instrumentality and in registry with the line assumed by said edge as thus left projecting and in cross-section presenting obliquity to said edge, and means after the cap is formed to effect movement as between it and the die one relatively to the other, whereby on acount of the obliquity of said die surface to said edge the latter will wipe over the same during such movement and be thereby altered in diameter.

2. Apparatus for forming from a disk a cap with its edge deflected including a pair of opposed substantially concentric instrumentalities for clamping the disk with a slip-grip in a line substantially concentric with its edge, means coactive with said clamping instrumentalities while they are so clamping the disk to draw the latter into one of said instrumentalities into the form of a cap having its edge withdrawn from between them and left projecting at an angle to the plane originally occupied by the clamped disk, a die having its die surface inward of and extending along a line substantially concentric to the other instrumentality and in registry with the line assumed by said edge as thus left projecting and in cross-section formed concave, and means after the cap is formed to effect movement as between it and the die one relatively toward the other, whereby on account of the cross-sectionally concave form of said die surface said edge will wipe over the same during such movement and be thereby formed into a curl.

In testimony whereof I affix my signature.

AMOS CALLESON.