July 31, 1934. T. M. HIESTER 1,968,296

APPARATUS FOR FORMING ARTICLES

Filed July 10, 1931 2 Sheets-Sheet 1

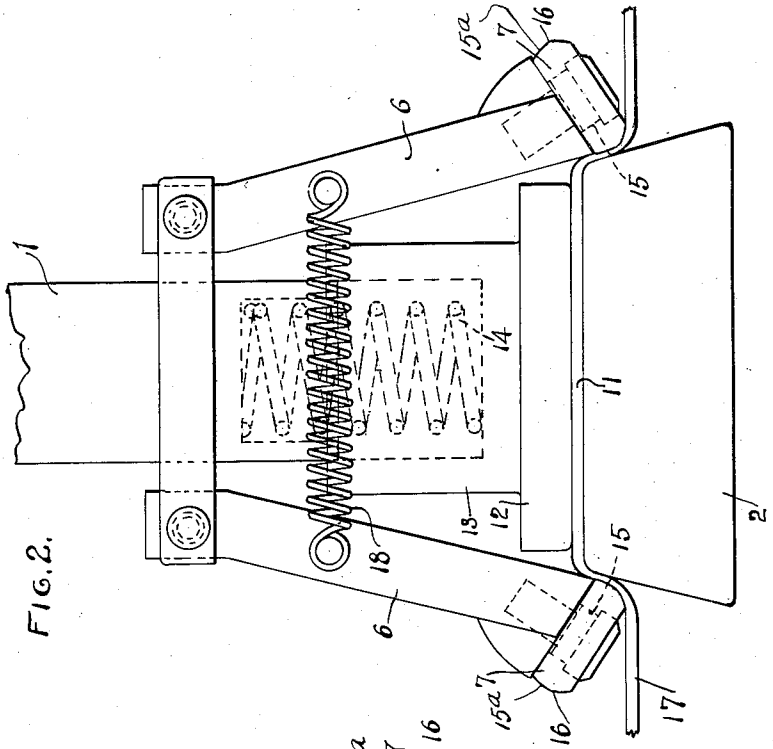


FIG. 2.

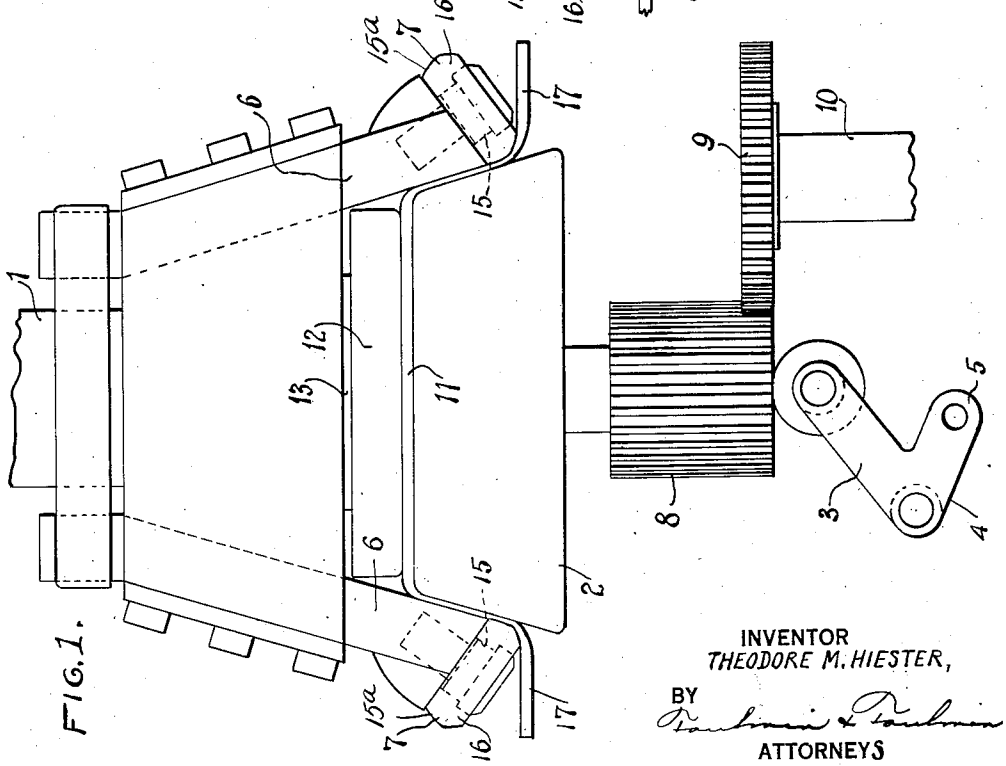


FIG. 1.

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FIG. 4.

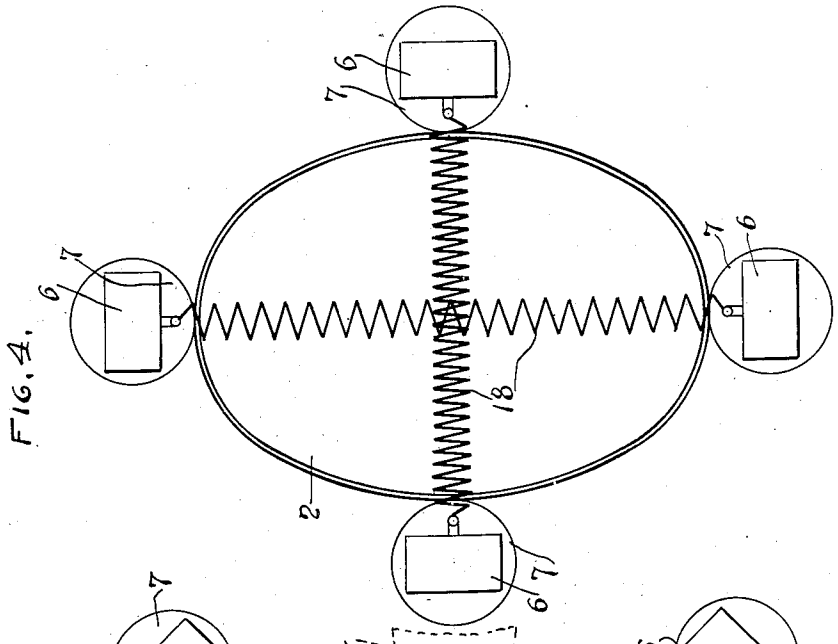
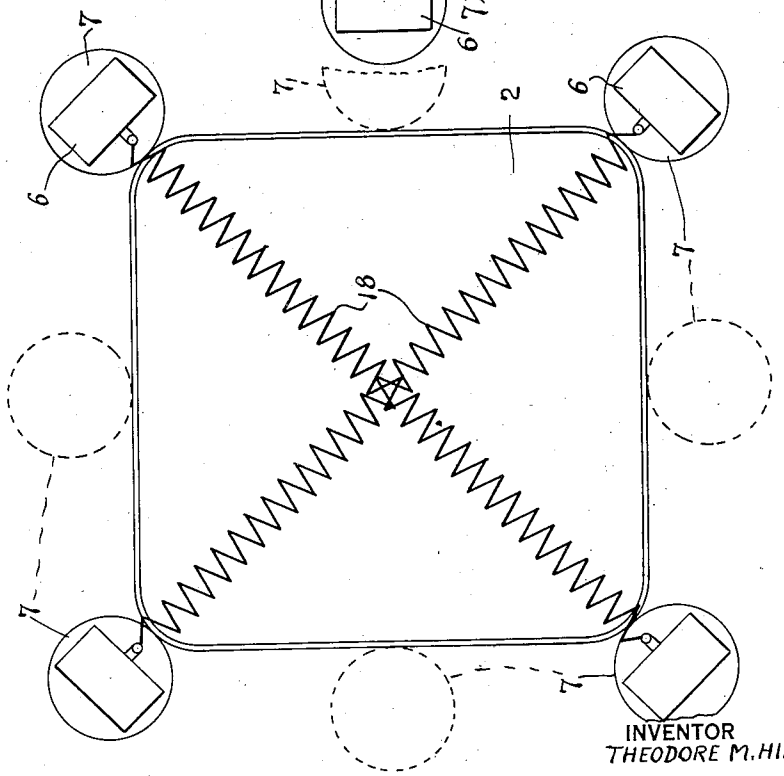


FIG. 3.



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Patented July 31, 1934 1,968,296

UNITED STATES PATENT OFFICE

1,968,296

APPARATUS FOR FORMING ARTICLES

Theodore M. Hiester, Dayton, Ohio, assignor to United Aircraft Products, Inc., Dayton, Ohio, a corporation of Ohio

Application July 10, 1931, Serial No. 549,855

2 Claims. (Cl. 113—52)

My invention relates to an apparatus for extruding sheets to form articles of different configurations.

In particular, it is my object to provide mechanism to form metal articles out of sheet metal, in which portions of the sheet are extruded, reduced in thickness and brought to a predetermined configuration by a combined method of rolling to form, rolling to reduce in thickness and extrusion by the rolling method through moving the rollers in both a circular and vertical direction, or moving the rollers in a circular path and moving the form on which the rolling and extrusion is being carried out axially relative to both the work and the rollers.

In particular, it is my invention to provide rollers, especially rollers of predetermined configuration, in conjunction with the configuration of the form on which the metal is being extruded and rolled by which the combined transverse rotative and bodily axial movement of the rollers will serve to lengthen the metal where engaged by the rollers, reduce its thickness, bring it to a predetermined configuration and, at the same time, leave undisturbed, both as to shape and thickness and location in a given plane, all the metal not engaged by the rollers.

It is my object to eliminate tearing, roughening and otherwise destroying the physical structure of the metal being treated by the forming tools by employing rollers of such desired configuration.

Referring to the drawings:

Figure 1 is a diagrammatic side elevation of a typical installation of a plurality of rollers in the act of rotating, extruding and rolling in conjunction with a form that is rotated and moved axially with respect to the rollers;

Figure 2 is a similar view where a stationary form is employed;

Figure 3 is a diagrammatic view showing the arrangement of the rollers in full and dotted lines rolling and extruding a sheet on a substantially square or rectangular form;

Figure 4 is a similar view utilizing an oval form.

Referring to the drawings in detail, 1 is a support or thrust member connected to a supporting arm of a press, either for support or for actuation, depending upon whether or not the mandrel or form 2 is stationary or reciprocates.

In the event that the mandrel 2 is stationary, as in Figure 2, the support 1 is adapted to reciprocate as well as rotate. It is preferably carried in the head of a drill press so that it may be forced downwardly and rotated simultaneously.

If the arrangement is as shown in Figure 1, the support 1 may be held stationary as to vertical movement but rotated while the mandrel or form 2 is moved vertically by the link 3 and crank arm 4 actuated at 5. If desired, both the support 1 and the form 2 may be made to rotate and reciprocate, as by adding the reciprocating means for the form 2 shown in Fig. 1 to the construction shown in Fig. 2.

The roller arms 6 and rollers 7 respectively may be retained yieldingly by the spring or suitable cam mechanism, as shown in my copending applications, Serial Nos. 549,860 and 549,856, against the work and may be retained against rotation in a stationary position, or they may be rotated. The mandrel 2 may be rotated by the gear 8, gear 9 driven from a shaft 10.

If desired, the central portion of the metal being handled as at 11 may be held by the retaining plate 12 mounted on the shaft 13 and having between its end and the interior of the shaft 1 a spring 14 which accommodates the telescopic movement between the reciprocating support 1 and its arm 6 and roller 7 and the retaining plate 12.

The mandrel or form 2 may be of any desired configuration, as will be seen in Figures 3 and 4. Its side walls should preferably be inclined at such an angle that the extruding rollers may move the extruded portion of the metal downwardly, thin it and form it without destruction of the metal or of the machine.

In order to do this, I provide the surface of the roller 7 which is rotatably mounted on the stud 15 upon its arm 6 with one side formed into a cone-shaped face, as shown at 15^a, converging upwardly and the other side such a surface 16 of arcuate character that the roller will, as a result of the component of forces involved, serve to roll down annular sections of the metal and, at the same time, not only bring them to form but serve to stretch or extrude them, but at no time will this rolling be upon more than an annular path on the metal and the metal will only be engaged by the roller and it will only be in movement where the rollers successively engage the metal so as not to pull the metal, destroy its grain, or materially modify its physical structure.

As these rollers revolve they describe a flat spiral path along the surface of the metal but they do not change the horizontal position of the untouched portions of the metal 11 and 17. They do not change the thickness of such portions of the metal.

While it is desirable for a matter of conven-

ience to position the metal by having a retaining plunger 12 engage a portion of the metal 11, yet it will be understood that it would be possible to omit this portion of the mechanism as my invention is adaptable to handle the metal without the straight unrolled portions being held or retained in any manner as they are not changed in either physical configuration or thickness.

It will be further understood that the same rolling head may be employed with different sizes and configurations of mandrels or forms due to the accommodation of the spring 18.

It will be understood that I desire to comprehend within my invention such modifications as may be necessary to adapt it to varying conditions and uses.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In combination, a form, a plurality of depending arms, rollers rotatably mounted on the surface thereof, yielding means for connecting said arms, means to rotate and reciprocate said roller arms and rollers, said rollers having an arcuate face conforming to the arc of extrusion of metal engaged by the rollers and mounted on the form.

2. In combination, a conical form, an extruding roller having its periphery adjacent one side formed into an arcuate face diverging downwardly and outwardly from the face of the form and adjacent the other side formed into a cone-shaped face converging upwardly, and means of supporting said roller with its axis at an angle to the face of said form.

THEODORE M. HIESTER.