

Aug. 2, 1938.

F. L. BUFF

2,125,269

SHELL TRIMMER

Filed March 1, 1938

3 Sheets-Sheet 1

Fig. 1.

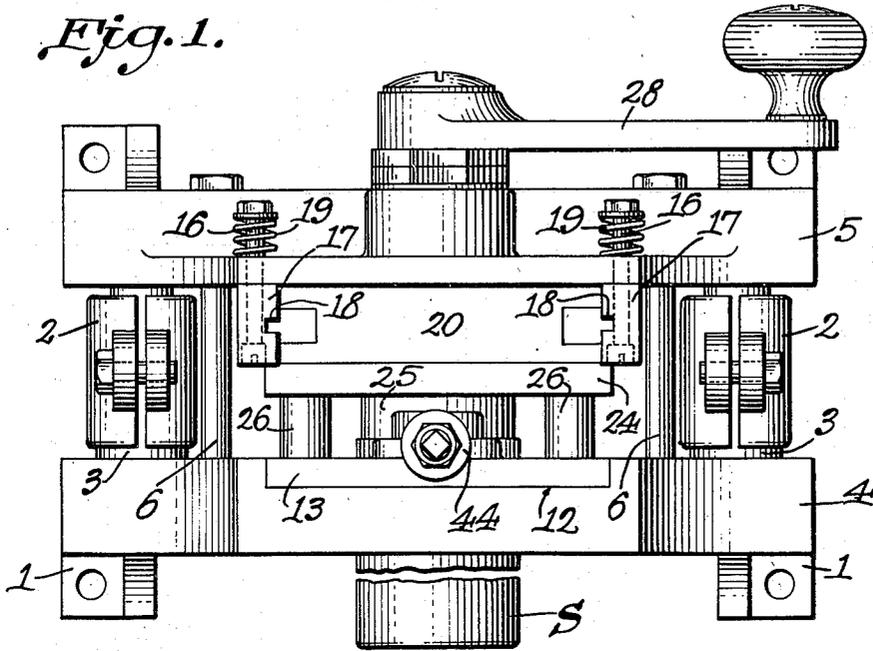
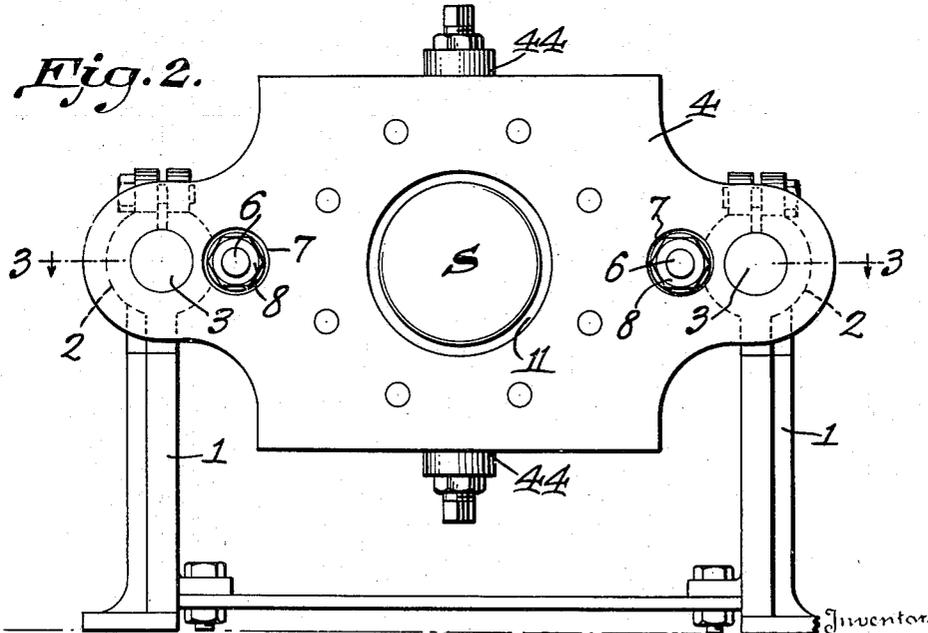


Fig. 2.



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Fig. 3.

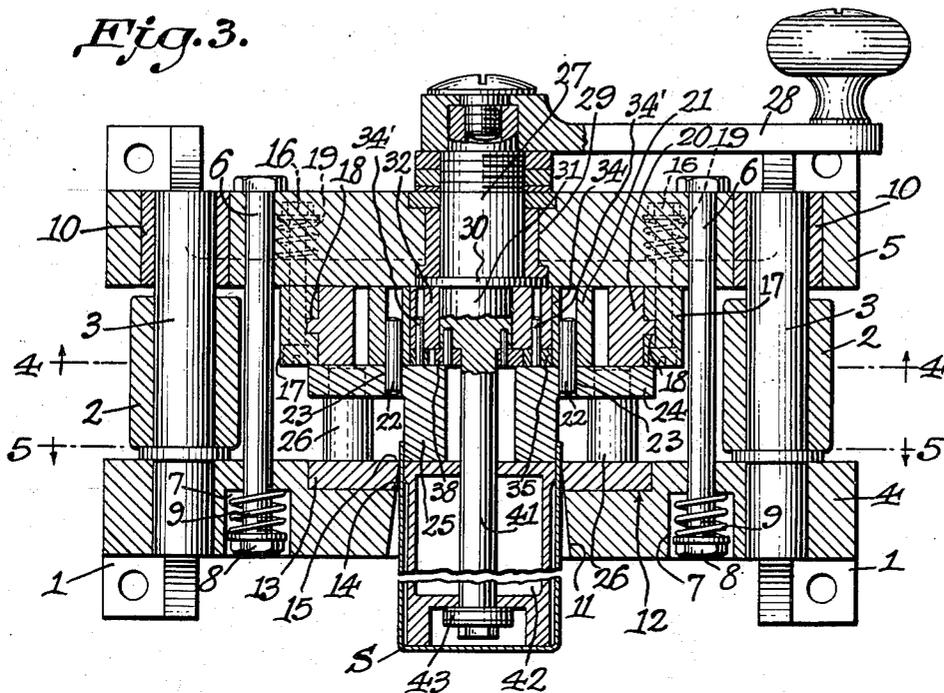
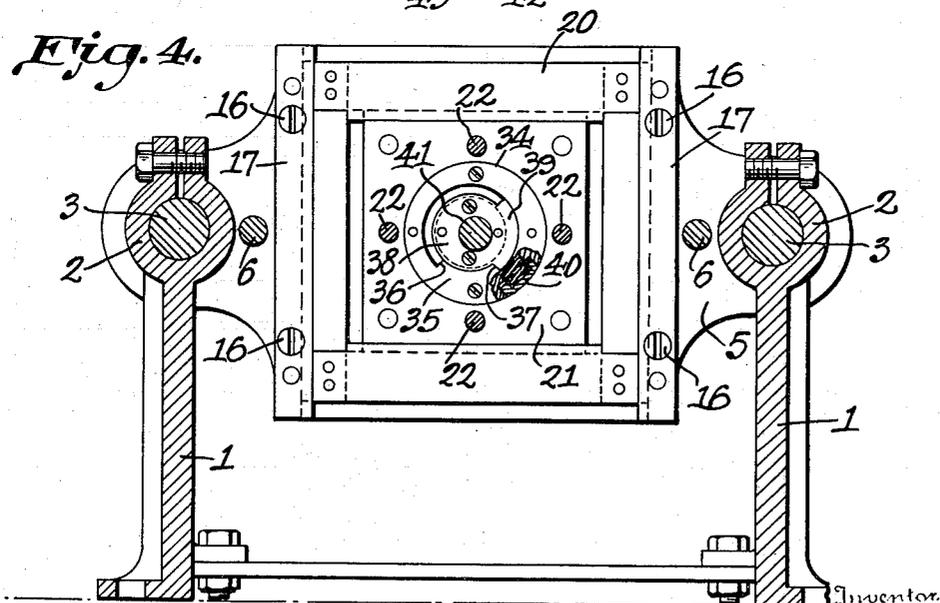


Fig. 4.



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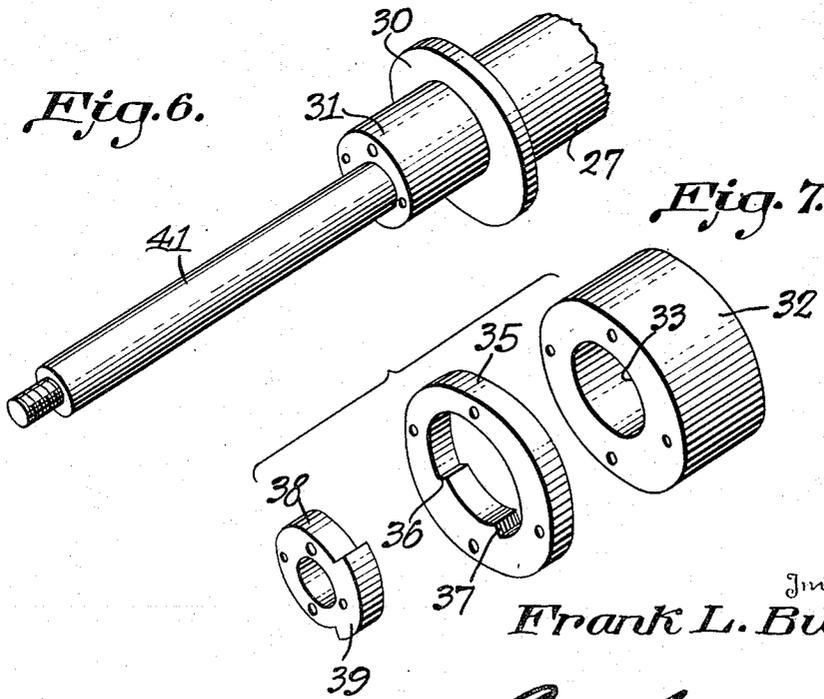
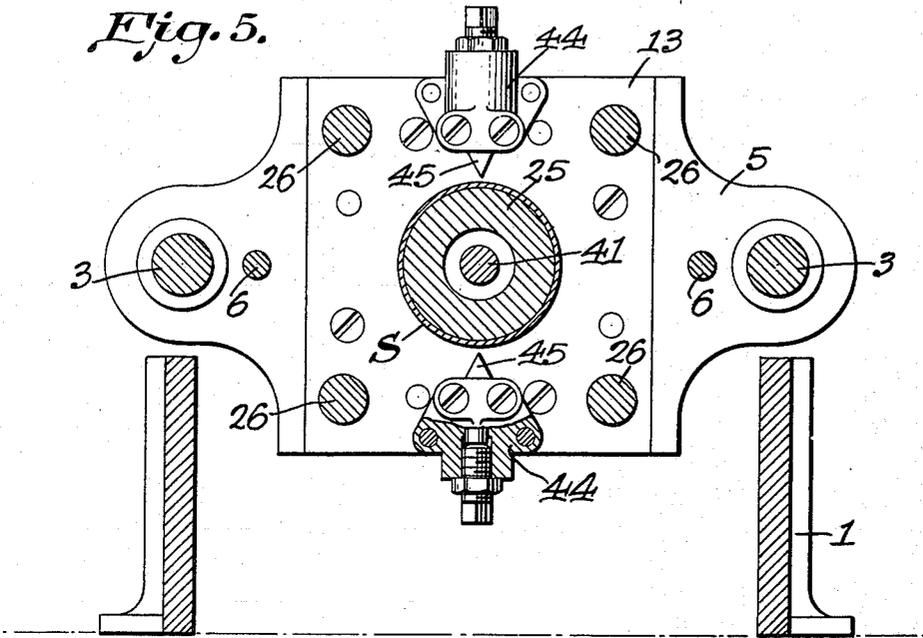
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,125,269

SHELL TRIMMER

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Application March 1, 1938, Serial No. 193,340

12 Claims. (Cl. 164—34)

This invention relates primarily to a novel power transmission mechanism adapted to generate and impart a peculiar series of mechanical movements necessary to the proper operation of certain cooperative dies and it relates more especially to cooperating shell trimmer dies of novel construction actuated by said transmission mechanism to shear off or trim the open end of a hollow or shell-like article, the operation being such as to effect a quick, positive and smooth, clean cut of the material.

A further object is to provide simple and efficient means whereby the material trimmed from the article is automatically disposed of.

A still further object is to provide simple and efficient means for actuating the device for the purpose of effecting the trimming operation.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claims, it being understood that changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as claimed.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings—

Figure 1 is a top plan view of the apparatus.

Figure 2 is an end view thereof.

Figure 3 is a section on line 3—3, Figure 2.

Figure 4 is a section on line 4—4, Figure 3.

Figure 5 is a section on line 5—5, Figure 3.

Figure 6 is a perspective view of a portion of the operating shaft.

Figure 7 is a perspective view of the clutch members forming a part of the apparatus, said members being shown separated.

It is to be understood that the mechanism constituting the present invention can be made in various forms, depending upon the nature of the work to be performed and the conditions under which it is to be used. Therefore the structure herein illustrated and described is to be considered merely one of the many types of the invention which might be made within the scope of the claims.

Referring to the figures by characters of reference, 1 designates a suitable supporting frame provided with spaced clamping sleeves 2 in which are seated the intermediate portions of guide posts 3. At one end these posts are seated within a die-shoe 4 while the other ends of the posts are seated within and support a punch holder 5

so that the two parts 4 and 5 are thus held in proper relation to each other under all working conditions. Tie-bolts 6 are seated in the punch holder 5 and extend into counterbores 7 in the die-shoe 4 where the nuts 8 on the bolts are engaged by springs 9 interposed between said nuts and the inner ends of the counterbores. The punch holder 5 has a limited sliding movement on the guide post 3 and is preferably provided with bushings 10 for engagement with the post.

The die-shoe 4 is provided with a tapered opening 11 extending from a seat or recess 12 within which is located a stationary die 13 having a tapered opening 14 surrounded by a shearing edge 15.

Connected to the punch holder 5 by means of bolts 16 are parallel guide bars 17 preferably grooved as indicated at 18, these bars being clamped yieldingly against the holder 5 by the use of springs 19 seated in the holder and exerting a constant thrust longitudinally of the bolts 16.

A slidable frame 20 is mounted between the guide bars 17 and slides within the grooves and arranged for sliding movement within the frame 20 is a cross-head 21 engaging opposed portions of the frame 20 and adapted to reciprocate along lines at right angles to the direction of reciprocation of frame 20. Coupling pins 22 are seated within the cross-head 21 and project into openings 23 formed within a flange 24 of a tubular shearing punch 25 the external diameter of which is less than the diameter of the opening 11 in the die-shoe 4. The flange 24 of the shearing punch 25 has stop pins 26 extending therefrom adapted to limit the movement of the shearing punch in one direction by coming into contact with die 13.

An operating shaft 27 is mounted for rotation in the punch holder 5 and is adapted to be operated in any suitable manner, by means of a handle 28 suitably secured thereto and movable back and forth about the axis of rotation of the shaft. A suitable bushing 29 can be provided in the punch holder for the operating shaft and a collar 30 can be provided on the shaft for securing it against sliding movement in one direction.

Formed with the shaft and extending inwardly from the punch holder 5 is a cam or eccentric 31 mounted for rotation within a ring 32 in which is formed an eccentric opening 33 for the reception of eccentric 31. This ring, which is circular, is rotatably mounted within a central opening 34 in cross-head 21. The throw of the eccentric opening 33 in ring 32 is the same as that of the eccentric 31, so that, when in normal position,

the direction of the eccentrics will be diametrically opposite and the outer surface of ring 32 will be concentric with the axis of rotation of shaft 27.

Suitably connected to the ring 32, as by means of pins 34' is a ring forming one member of a slip clutch, this ring being indicated at 35 and formed with inwardly extended spaced shoulders 36 and 37 respectively.

To the end of eccentric 31 is secured the other member of the slip-clutch which comprises a ring 38 having an arcuate wing 39. This member 38 is mounted for movement within the member 35 and the wing 39 is so located as to come against one or the other of the shoulders 36 and 37 for the purpose of limiting relative rotation of the two clutch members.

Frictional engagement between the eccentric ring 32 and the wall of the opening 34 in cross-head 21 is maintained by a spring-pressed friction shoe 40 seated in the ring 32 and adapted to thrust against the center opening 34 of cross-head 21 as shown particularly in Figure 4 to hold the ring 32 against free rotation.

Extending from the eccentric end 31 of the operating shaft 27, is a shaft extension 41 concentric with its axis of rotation and this shaft extension projects through the shearing punch 25 and through the openings 14 and 11. It projects into a pilot 42 and is held thereto by a head 43. The pilot is so proportioned as to fit within the shell S to be trimmed.

For the purpose of slitting waste material so that it can drop from the apparatus, there are provided on the inner side of the stationary die 13 preferably at points diametrically opposite the shearing punch 25, brackets 44 in which are seated cutting tools 45 preferably adjustably mounted so that when material is displaced by the shearing die, it will be forced against these tools and severed by them, the adjustment of the tools being such that they will not touch or injure the shearing die during this operation.

Normally the shearing die is concentric with the axis of rotation of shaft 27 and its extension 41 and the operating element 28 is in a predetermined position. The shell to be trimmed is fed onto the pilot 42 until its closed end comes against the pilot at which time that portion of the shell to be severed will be supported in position where it projects outwardly from the stationary die 13. The operator then swings member 28 one and one-half turns to the right (clockwise). This causes eccentric 31 to rotate within the eccentric ring 32 during the first one-half turn and at which point the arcuate wing 39 of clutch ring 38 contacts the shoulder 36 of its companion clutch ring 35, thus causing the ring 32 to rotate with eccentric 31 within opening 34 of cross-head 21 during the remaining full turn of this operation. The rotation of eccentric 31 within eccentric ring 32 serves to shift their relative eccentric positions from diametrically opposite to parallel, and while so doing moves ring 32 into a position eccentric to the axis of rotation of shaft 27, the throw of this eccentric being equal to the eccentric throws of both 31 and 32 combined, and as a consequence the cross-head 21 is moved progressively outward from the axis of rotation of the shaft during the first one-half turn of the shaft and in a circular path during the remaining full turn of this operation. During this actuation of the cross-head, a corresponding movement of the shearing punch will be effected with the result that said punch will shift laterally against the projecting material of the shell in the path there-

of, shearing it off at the cutting edge 15 after which the punch will swing in a circle and continue the shearing operation until the projecting portion of the shell has been completely severed by an outward thrust thereagainst from the stationary die 13. During this action the eccentrically moving shearing punch will force the strip of waste material against the cutting tools 45 so that they will cut the material into two pieces which thus can fall from the apparatus. The shearing punch 25 is now returned to its normal, concentric position by swinging the member 28 one-half turn to the left (anti-clockwise).

Following the foregoing operation the trimmed shell is removed and another substituted therefor whereupon the operation described can be repeated.

It is to be understood that the mechanism can be operated mechanically instead of by hand and that any suitable feeding means can be used for supplying the shells to the apparatus in lieu of hand feeding.

It will also be understood that the feature of primary importance in the present invention resides in the novel transmission mechanism by which the movable die element is actuated and that its scope of usefulness extends to the operation of any other such dies or devices as may be adapted for this manner of actuation.

What is claimed is:

1. A machine of the class described including an apertured die for receiving an article to be acted upon, a cross-head mounted for sliding movement along intersecting lines, eccentric means for actuating the cross-head, a shearing punch carried by the cross-head, an operating shaft, means actuated by the shaft for shifting the shearing punch into position eccentric to the axis of the apertured die and for imparting circular motion thereto while in such eccentric position, and means for centering a hollow article in the apertured die in position to receive the shearing punch and to be displaced thereby when the punch is actuated in an eccentric position.

2. A machine of the class described including an apertured die for receiving an article to be acted upon, means for supporting an article therein, a frame mounted for back and forth sliding movement, a cross-head to be carried by the frame and slidable therein transversely of the path of movement of the frame, a ring mounted for rotation within the cross-head and having an eccentric opening, a clutch member secured to the ring, and having an eccentric opening, an operating shaft having an eccentric seated in the ring, a clutch member secured to the eccentric portion of the shaft and within and cooperating with the first named clutch member to provide a lost motion connection between the members, a shearing punch secured to and movable with the cross-head, said shaft, cross-head and ring cooperating, when the shaft is rotated, to move the punch into or out of axial alinement with the opening in the apertured die and to impart a circular motion thereto while out of axial alinement.

3. A machine of the class described including a supporting structure, guide posts carried thereby, a die-shoe and a punch holder mounted on the posts for limited movement toward and from each other, an apertured die carried by the die-shoe for receiving a tubular article to be acted upon, an operating shaft journaled in the punch holder, a pilot carried thereby for holding an

article centered within the die, a movable shearing punch supported on the punch holder and mounted for positioning within one end portion of the centered article, and means actuated by the rotation of the shaft for shifting the movable punch radially and in a circular arc thereby to displace material of the article outwardly and relative to the stationary die.

4. A machine of the class described including a die-shoe, a punch holder, connections therebetween, a die carried by the die-shoe and having an article-receiving opening, a pilot for holding an article centered in the opening, an operating shaft carried by the punch holder, a movable shearing punch mounted on the punch holder and normally positioned coaxial with the pilot and the article centered thereby, and means actuated by the rotation of the operating shaft for shifting the movable punch on the surface of the apertured die thereby to displace material of the held article outwardly annularly from the center of said article.

5. A machine of the class described including a stationary die having an article-receiving aperture, means for holding an article centered within and projecting beyond the die, said article being tubular, a movable shearing punch insertable into the tubular article, an operating shaft, and means actuated by the rotation of said shaft, for shifting the movable punch radially and in a circular path thereby to cooperate with the wall of the aperture in the stationary die to displace material of the article outwardly away from the axial center thereof.

6. A machine of the class described including a stationary die having an article-receiving aperture, there being a shearing edge extending around the aperture, a shearing punch normally positioned coaxial with the apertures, means for holding a tubular article centered within the opening and around the shearing punch, an operating shaft, and means actuated by said shaft when rotated, for moving the shearing punch radially from normal position and in a circular path, thereby to cooperate with the shearing edge of the stationary die to shear material of the article outwardly away from the axial center thereof.

7. A machine of the class described including a stationary die having an article-receiving aperture, there being a shearing edge at one end of the aperture formed by the wall thereof, means for holding a tubular article centered within said aperture, a shearing punch insertable into one end of the centered article and normally coaxial with the aperture, an operating shaft, and means actuated by the shaft when rotated, for sliding the shearing punch on the surface of the apertured die away from its coaxial position and in a circular path, thereby to cooperate with the shearing edge of the stationary die to shear material outwardly from the article in the opening.

8. A machine of the class described including a die-shoe, a punch holder, means for supporting the same for relative sliding movement, an apertured die carried by the die-shoe and having a shearing edge at the aperture, a frame slidably mounted on the punch holder, a cross-head slidable within the frame along lines extending transversely of the lines of movement of the frame, an operating shaft having an eccentric portion, an eccentric ring mounted on said portion and mounted for actuation thereby, said ring being rotatably mounted within the cross-head, a shearing punch secured to and movable with the cross-head and normally positioned

coaxial with the opening in the stationary die and for insertion into one end of the centered article in said opening, and means for rotating the shaft to actuate the cross-head and move the shearing punch away from coaxial position and in a circular path, thereby to shear outwardly from the centered article that portion of the material surrounded by the shearing punch.

9. A machine of the class described, an apertured stationary die, means for holding a tubular article centered within said aperture, a shearing punch normally positioned coaxial with the aperture and for insertion into one end of the centered article, an operating shaft, means actuated by the rotation of said shaft for imparting an eccentric movement to the shearing punch to shear outwardly from the centered article that portion of the material surrounding the shearing punch, and cutting means adjacent to the path of the shearing punch when moving in an eccentric position for cooperation with said punch to sever sheared off material surrounding the punch.

10. In a device of the class described, the combination and arrangement of parts including a substantially supported driven operating shaft, a cross-head element normally positioned concentric with the axis of rotation of the shaft and adapted for attachment of other mechanism to be actuated thereby, means actuated by rotation of the operating shaft in one direction to move said cross-head element to a position eccentric to the axis of rotation of the shaft and thence through a circular arc while so positioned, means to secure the cross-head against rotation and means actuated by rotation of the shaft in reverse direction to restore the cross-head to its normal concentric position and thus to impart a like series of mechanical movements to the mechanism thereto attached.

11. In a device of the class described, a substantially supported operating shaft adapted to receive motivating energy, a cross-head element normally positioned coaxial with said operating shaft and adapted to impart energetic movement to other mechanism attached thereto for actuation thereby, means actuated by rotation of the operating shaft in one direction to shift the cross-head into an eccentric position and thence through a circular arc while so positioned, means to secure said cross-head against rotary movement and means for restoring it to its normal concentric position, cooperating dies including a stationary element substantially supported in axial alignment with the said operating shaft, and a movable element secured to and actuated by the said cross-head to displace material of an article to be acted upon.

12. A machine of the class described including a supporting structure, guide-posts carried thereby, a die shoe and a punch holder mounted on the posts to secure them against relative lateral movement, a power transmission unit having an operating shaft journaled in the punch holder and adapted to receive rotating energy, a cross-head element having a centrally located circular opening normally positioned concentric with the axis of rotation of the shaft and around a projecting portion thereof and adapted for attachment of other mechanism for actuation thereby, and means actuated by rotation of the shaft in one direction for shifting the cross-head to a position eccentric to the axis of rotation of the shaft and thence in a circular arc while so positioned, means actuated by rotation of the

shaft in a reverse direction for restoring the cross-head to its normal concentric position, a stationary die element carried by the die-shoe having a centrally positioned aperture located coaxially with the operating shaft and adapted to receive a shell-like article to be acted upon, the aperture being formed to fit snugly the lateral external dimensions of said article and forming a cutting edge at the face of the die, means for securing the article in proper position within the die while being acted upon, a movable die secured to and movable with the cross-head

and having a shearing punch formed to fit within the open end of the shell-like article to be acted upon and having a lateral cutting edge securely supported on a plane with the face of the said stationary die and adapted to cooperate therewith to cut away that portion of the article projecting beyond the face of said stationary die by cutting outwardly from within the article and automatic means for disposing of the material thus trimmed from the article.

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