

Aug. 19, 1941.

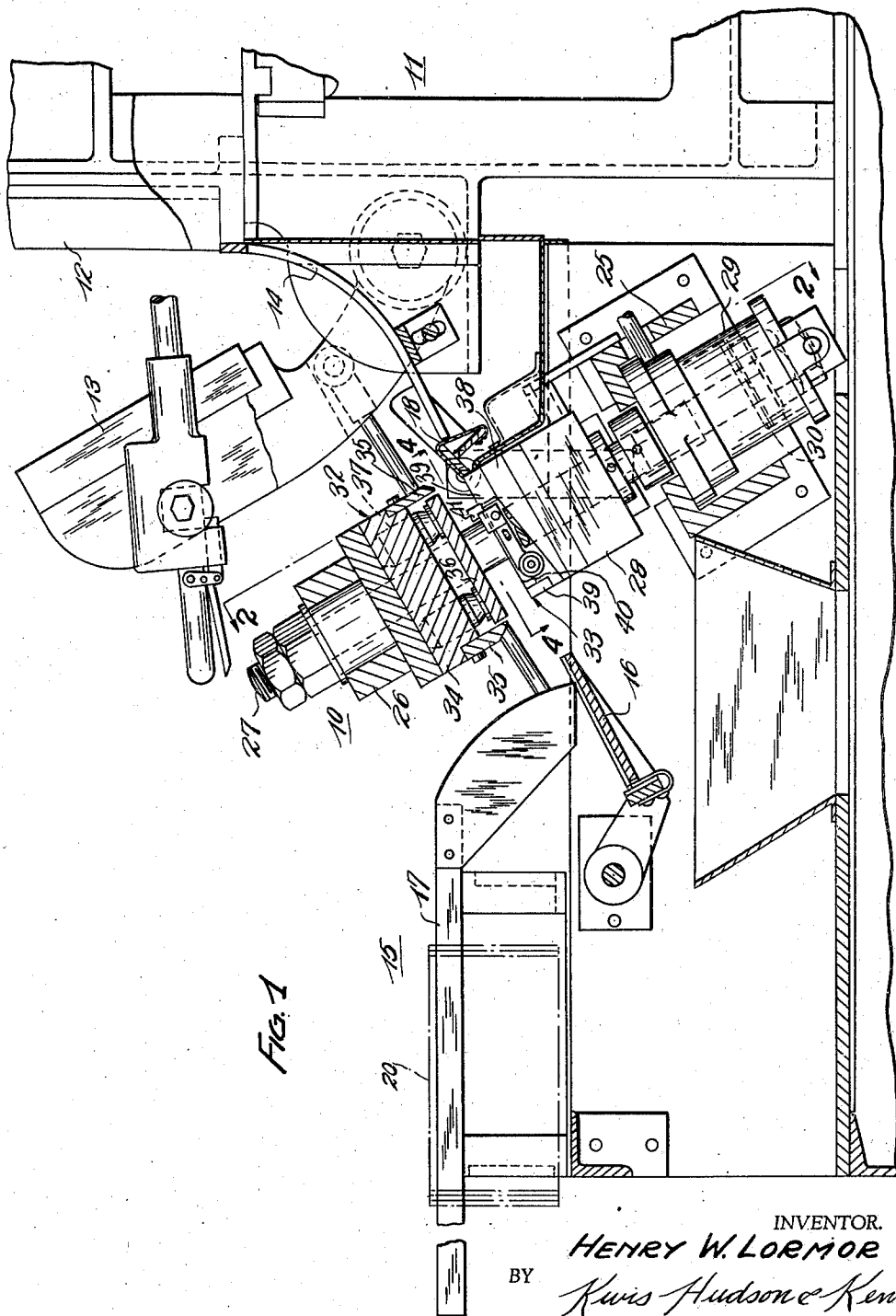
H. W. LORMOR

2,253,280

ARTICLE TRIMMING APPARATUS

Filed Feb. 5, 1940

3 Sheets-Sheet 1



Aug. 19, 1941.

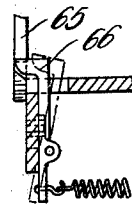
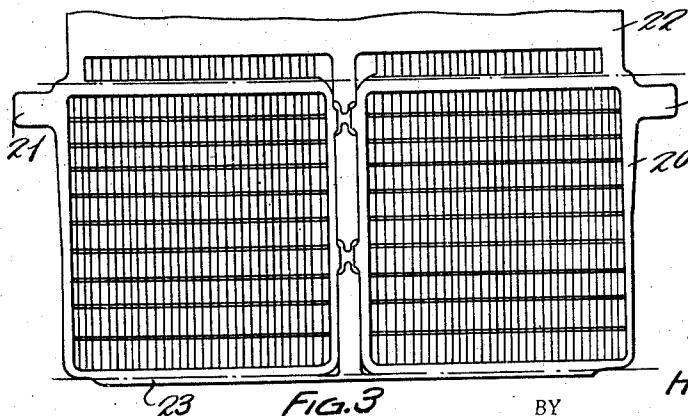
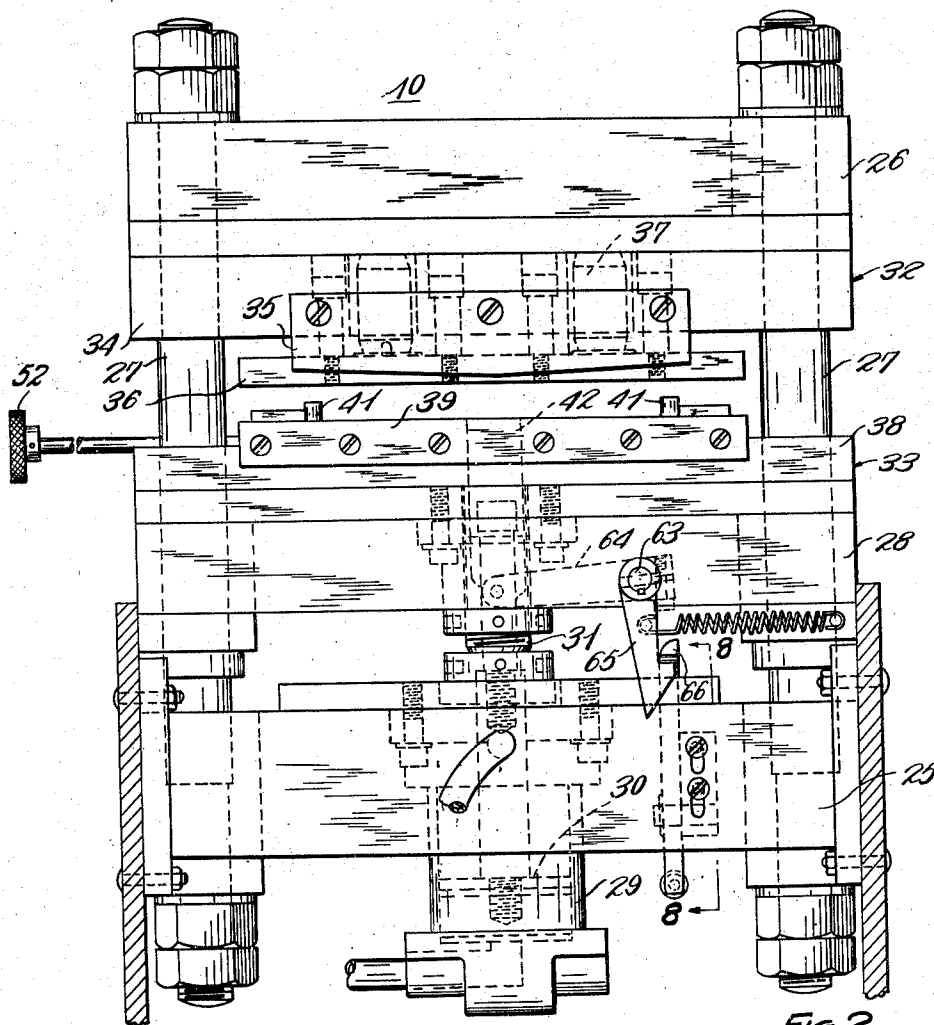
H. W. LORMOR

2,253,280

ARTICLE TRIMMING APPARATUS

Filed Feb. 5, 1940

3 Sheets-Sheet 2



INVENTOR.

HENRY W. LORMOR

Kwis Hudson & Kent

ATTORNEYS

Aug. 19, 1941.

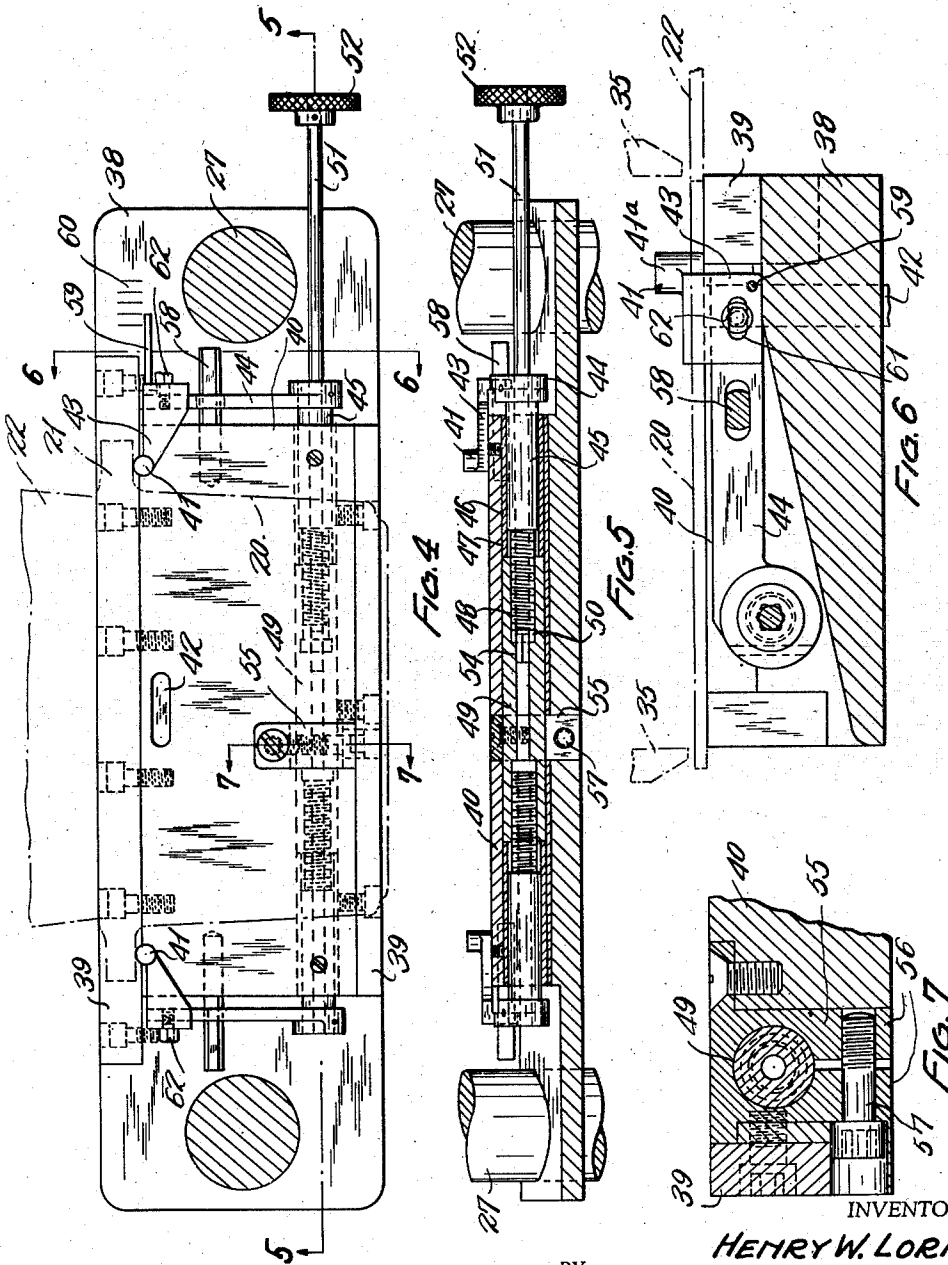
H. W. LORMOR

2,253,280

ARTICLE TRIMMING APPARATUS

Filed Feb. 5, 1940

3 Sheets-Sheet 3



INVENTOR.
HENRY W. LORMOR
Kwis Hudson Kent
ATTORNEYS

UNITED STATES PATENT OFFICE

2,253,280

ARTICLE TRIMMING APPARATUS

Henry W. Lormor, Cleveland Heights, Ohio, assignor to Willard Storage Battery Company, Cleveland, Ohio, a corporation of West Virginia

Application February 5, 1940, Serial No. 317,288

6 Claims. (Cl. 164-47)

This invention relates to die equipment for performing trimming or other operations on articles such as cast storage battery grids, and more particularly to improved means for positioning or locating the articles in the apparatus for the desired operations and enabling the apparatus to operate efficiently and accurately on similar articles of various different sizes or proportions.

An object of my invention is to provide improved apparatus having a pair of cooperating dies for operating on articles of the type having projecting lugs and in which one of the dies has article positioning stops adapted to be engaged by such lugs and arranged for variation of the spacing thereof for cooperation with articles of different proportions.

Another object of my invention is to provide improved apparatus, of the type referred to, in which adjusting means having right and left-hand threads is operable for simultaneously causing said stops to be moved toward or away from each other for varying the spacing thereof.

Still another object of my invention is to provide improved apparatus, of the type mentioned, having article positioning stops movably mounted for variation of the spacing thereof by an adjusting means and in which a locking means is adapted to be applied to the adjusting means for retaining the stops at the desired spacing.

My invention may be further briefly summarized as consisting in certain novel combinations and arrangements of parts hereinafter described and particularly set out in the appended claims.

In the accompanying sheets of drawings illustrating one embodiment of my invention,

Fig. 1 is an elevational view, with parts in section, showing manufacturing equipment including a trimming press having my improved die apparatus therein;

Fig. 2 is an elevational view of the trimming press, viewed as indicated by line 2-2 of Fig. 1;

Fig. 3 is a plan view showing a pair of connected storage battery grids and representing one form of article to be trimmed by my improved die apparatus;

Fig. 4 is a plan view of the lower die of my improved apparatus, viewed as indicated by line 4-4 of Fig. 1;

Fig. 5 is a longitudinal sectional view taken through the lower die and the stop adjusting means, as indicated by line 5-5 of Fig. 4;

Fig. 6 is a transverse sectional view taken through the lower die, as indicated by line 6-6 of Fig. 4;

Fig. 7 is a partial transverse sectional view taken on line 7-7 of Fig. 4 and illustrating the adjustment locking means; and

Fig. 8 is a detail view taken as indicated by

line 8-8 of Fig. 2 and further illustrating the ejector actuating means.

For the purpose of disclosing the construction and use of my improved die apparatus more in detail, further reference will now be made to the accompanying drawings showing my invention embodied in apparatus for producing cast storage battery grids, but it should be understood, however, that my invention is not limited to the particular arrangement of apparatus and use herein described but may be embodied in other equipment and applied to various other uses.

In Figs. 1 and 2 of the drawings I show my improved die apparatus embodied in a trimming press 10, which in turn forms a part of a grid casting and trimming apparatus of the type described more in detail in copending application, Serial No. 296,381, filed September 25, 1939. As shown in Fig. 1, this casting and trimming apparatus includes a casting machine 11 having cooperating mold members 12 and 13 for producing cast storage battery grids from molten lead or lead alloy and arranged to deliver the cast grids onto the chute 14 by which they are conducted to the trimming press 10. This casting and trimming apparatus also includes a stacking unit 15 for arranging and delivering the trimmed storage battery grids. This unit comprises a swinging stacking plate 16 adapted to receive the trimmed grids in succession from the trimming press 10 and to transfer the same onto a pair of laterally spaced rails 17.

As is described more in detail in copending application, the trimming press 10 is arranged relative to the casting machine 11 so that the grids discharged from the mold members 12 and 13 will travel by gravity down the chute 14 to the trimming press and after being trimmed will move by gravity out of the trimming press onto the swinging stacking plate 16. The feeding of the grids from the chute 14 into the trimming press is controlled by a swinging or oscillating feed stop 18 which is located at the lower end of the chute and is adapted to be raised and lowered in timed relation to the operations of the mold and trimming press.

Before proceeding with the detailed description of the trimming press 10 and my improved die apparatus used therein, I wish to explain that the articles to be operated upon, and which, in this instance are cast storage battery grids, are of the type having projecting portions or lugs which can be used for positioning or locating the articles in the trimming press 10. In Fig. 3 I show a double storage battery grid 20 of the form discharged from the mold of the casting machine 11 and representing the article to be operated upon by my improved die apparatus. This storage battery grid has a pair of oppositely projecting lugs 21, corresponding with

the projecting lugs or portions which I have just mentioned above, and by which the grid can be located in the trimming press 10 for the trimming operation to be performed therein. When the grid 20 is discharged from the mold of the casting machine, it has a gate section 22 thereon which is required to be trimmed off as excess metal or flash and may also have an extension portion or flash 23 to be trimmed from the opposite edge. The individual grids forming the double grid 20 are preferably not cut apart in the trimming press 10 but are left connected until a later point of their manufacture into storage battery plates.

The trimming press 10 in which my improved die apparatus may be used may comprise a frame or bed 25 with which a top or crown 26 is connected by the laterally spaced tie rods 27 and a bolster 28 which is reciprocally movable between such bed and crown. The press 10 includes power means for actuating the movable bolster 28 and which may be in the form of a hydraulic cylinder 29 suitably connected with the bed 25 and a piston 30 operable in the cylinder and connected with the bolster by the piston rod 31.

My improved die apparatus comprises in general a pair of cooperating upper and lower die members 32 and 33 which are connected respectively with the crown 26 and the movable bolster 28. The upper die member 32 may comprise a knife carrier 34 having a pair of knives or shear elements 35 mounted thereon and a pressure plate 36 disposed between the knives. The pressure plate 36 is movable relative to the knife carrier 34 and is normally urged away from the latter by a plurality of compression members 37 which may be in the form of springs or rubber cushions.

The lower die member 33 may comprise a die carrier 38 having a pair of spaced shear elements 39 mounted thereon opposite the knives 35 of the upper die member and with which these knives have shearing engagement when the press is closed. The lower die member also includes a plate 40 (see Fig. 4) extending between the shear elements 39 and on which the grids 20 rest when they are received in the press for the trimming operation.

For locating the grids 20 in the press 10 in proper position to be operated upon by the cooperating shear elements of the upper and lower die members, I provide the lower die member with a pair of spaced stops 41 extending above the plate 40 and arranged to be engaged by the projecting lugs 21 of the grid. As shown in Fig. 4, these stops are located just inwardly of one of the shear elements 39 and such that the grid 20 will be positioned with the flash portions 22 and 23 thereof extending beyond the shear elements 39 so that they will be trimmed off by the knives 35 when the press closes. After the grid has been trimmed the press opens and the grid is delivered therefrom onto the swinging stacking plate 16. In discharging the trimmed grid from the press the lugs 21 are disengaged from the stops 41 and, for this purpose, I provide the lower die member with an ejector 42 which operates to lift one side of the grid to permit the lugs 21 to pass over the tops of the stops 41 as the grid slides out of the press by gravity.

To enable the die members to operate efficiently and accurately on battery grids of different sizes and which have their lugs 21 spaced different distances apart, I provide for shifting

of the stops 41 for variation of the lateral spacing thereof. Although the stops 41 may be constructed in various ways and various arrangements may be provided for obtaining the desired adjustment thereof, I show these stops in this instance as being in the form of posts or pins 41a carried by bracket-like members 43. The bracket members 43 are in turn carried by arms 44 which are pinned or otherwise mounted on the outer ends of a pair of substantially aligned plungers 45. These plungers are slidable in bushings 46 which are mounted in a lateral opening or bore 47 of the plate 40.

The inner or adjacent ends of the plungers 45 have screw portions or stems 48 formed thereon or connected therewith and which have right and left-hand threads, respectively. A nut member 49 is rotatably mounted in the bore 47 between the bushings 46 and has openings 50 in its ends provided with right and left-hand threads, respectively, for screw engagement with the threaded stems 48 of the plungers 45. With the arrangement thus far described, it will be seen that by rotating the nut member 49, the plungers 45 will either be drawn toward each other or spread apart, depending upon the direction in which the nut member is rotated and the movement imparted to the plungers will also be imparted to the stops 41 carried by the arms 44 and bracket members 43.

Rotative movement may be imparted to the nut member 49 in any desired manner, such as by means of an actuating rod or shaft 51 having a handle or knurled knob 52 on the outer end thereof. The inner end of the rod 51 may have a non-circular portion 53 for driving engagement in a similarly shaped recess or opening 54 of the nut member. To accommodate the rod 51, one of the plungers 45 may have an axial opening through which the rod can be inserted or removed.

After the desired adjustment of the stops 41 has been made by rotating the nut member 49, it is desirable to lock or hold the stops against further movement. For this purpose I provide locking means which may be in the form of a clamp 55 anchored to the plate 40 and surrounding the nut member and having a pair of arms 56 adapted to be drawn toward each other by the screw 57 into locking engagement with the nut member.

In the arrangement above described it will be seen that the bracket members 43 carrying the stops 41 extend in over-lying relation to the plate 40 and may slidably rest on the face thereof. During the operation of the lug adjusting means the plungers 45 will be held against rotation by the arms 44 which are prevented from swinging by the flat sided pins 58 extending therethrough. These pins also serve as a guiding means during the lateral adjustment of the spacing of the stops 41.

For the assistance of the operator in adjusting the lateral spacing of the stops 41, I provide a visual indicating means which may comprise a pointer 59 projecting from one of the bracket members 43 and cooperating with indicia or graduations 60 on the die carrier 38. During the adjusting of the lateral spacing of the stops 41 the operator can observe the movement of the pointer 59 relative to the graduations 60 and thereby accurately adjust the stops to the desired setting.

It may be desirable to shift or adjust the position of the stops 41 with respect to the outer

edges of the shear elements 39 and to permit this to be done I may provide the bracket members 43 with slots 61 so that by loosening the screws 62, by which the bracket members are connected with the arms 44, the bracket members can be shifted inwardly or outwardly to correspondingly vary the position of the stops 41 relative to the outer edges of the shear elements 39.

The above-mentioned ejector 42 may be in the form of a plunger adapted to be projected above the surface of the plate 40 through an opening thereof located between the stops 41. This ejector may be actuated in timed relation to the operation of the trimming press and any suitable actuating means may be provided for this purpose. In Figs. 2 and 8, I show a rock shaft 63 connected with the ejector 42 by means of the lever 64 and adapted to be rocked by the coaction of the latch levers 65 and 66 to project or retract the ejector.

From the foregoing description and the accompanying drawings, it will now be readily understood that I have provided improved die apparatus which may be embodied in battery grid making machinery or various other kinds of equipment and which is adapted to accommodate different sizes of battery grids or other articles of the type having projecting portions or lugs. It will be seen furthermore that I have provided simple and efficient means for quickly and accurately adjusting the article positioning stops of the lower die member to vary the spacing thereof to suit the size of article to be operated upon.

While I have illustrated and described the improved die apparatus of my invention in more or less detail, it will be understood, of course, that I do not wish to be limited to the particular construction, arrangement and use of the apparatus herein described, but regard my invention as including such changes and modifications as do not constitute a departure from the spirit of the invention and the scope of the appended claims.

Having thus described my invention, I claim:

1. In apparatus of the character described, a pair of cooperating relatively movable die members adapted to receive therebetween and operate on articles of the type having projecting lugs, one of said members having a pair of spaced article positioning stops adapted to be engaged by said lugs and mounted for lateral movement for variation of the spacing thereof for cooperation with articles of different proportions, and adjusting means having right and left-hand threads and operable for simultaneously moving said stops toward or away from each other.

2. In apparatus of the character described, a pair of cooperating relatively movable die members adapted to receive therebetween and operate on articles of the type having projecting lugs, one of said members having a pair of spaced article positioning stops adapted to be engaged by said lugs and mounted for lateral movement for variation of the spacing thereof for cooperation with articles of different proportions, a pair of substantially aligned members connected with said stops and provided respectively with right and left-hand threads, and another member

having screw connection with said right and left-hand threads and adapted to be rotated.

3. In apparatus of the character described, a pair of cooperating relatively movable die members adapted to receive therebetween and operate on articles of the type having projecting lugs, one of said members having a pair of spaced article positioning stops adapted to be engaged by said lugs and mounted for lateral movement for variation of the spacing thereof for cooperation with articles of different proportions, a pair of substantially aligned members connected with said stops and provided respectively with right and left-hand threads, another member having screw connection with said right and left-hand threads and adapted to be rotated, and locking means adapted to be applied to the last mentioned member to hold the same against rotation.

4. In apparatus of the character described, a pair of cooperating relatively movable die members adapted to receive therebetween and operate on articles of the type having projecting lugs, one of said members having a pair of spaced article positioning stops adapted to be engaged by said lugs and mounted for lateral movement for variation of the spacing thereof for cooperation with articles of different proportions, a pair of substantially aligned members connected with said stops and provided respectively with right and left-hand threads, at least one of said members being hollow, a rotatable nut member engaging the right and left-hand threads of said aligned members and having a tool-receiving portion, and an operating member adapted to be inserted through said one member for driving engagement with the tool-receiving portion of said nut member.

5. In trimming apparatus, a pair of relatively reciprocable upper and lower dies having cooperating shear elements, a pair of spaced stops on the lower die for locating articles to be trimmed relative to the shear elements thereof, said stops being arranged for lateral movement for variation of the spacing thereof, adjusting means having right and left-hand threads and operable for simultaneously moving said stops toward or away from each other, and article ejecting means movable through the lower die intermediate said stops to disengage the articles from said stops for all positions of adjustment of the latter, said ejecting means comprising a spring-retracted plunger and means for projecting the plunger upwardly through said lower die during the opening of said dies.

6. In apparatus of the character described, a die plate having a lateral bore therethrough, a pair of plungers slidable in said bore and having portions extending toward each other and provided respectively with right and left-hand threads, arms connected with the outer ends of said plungers and arranged to extend along opposite edges of said plate, work positioning stops connected with said arms and extending inwardly of the edges of said plate, means engaging said arms to prevent rotation of said plungers, and a nut member rotatable in said bore and having screw engagement with the threaded portions of said plungers.

HENRY W. LORMOR.