Jan 6, 1931. C. O. SWENSON 1,787,458

PLATE FEEDING AND PUNCHING MEANS

Filed March 23, 1928 4 Sheets-Sheet 1

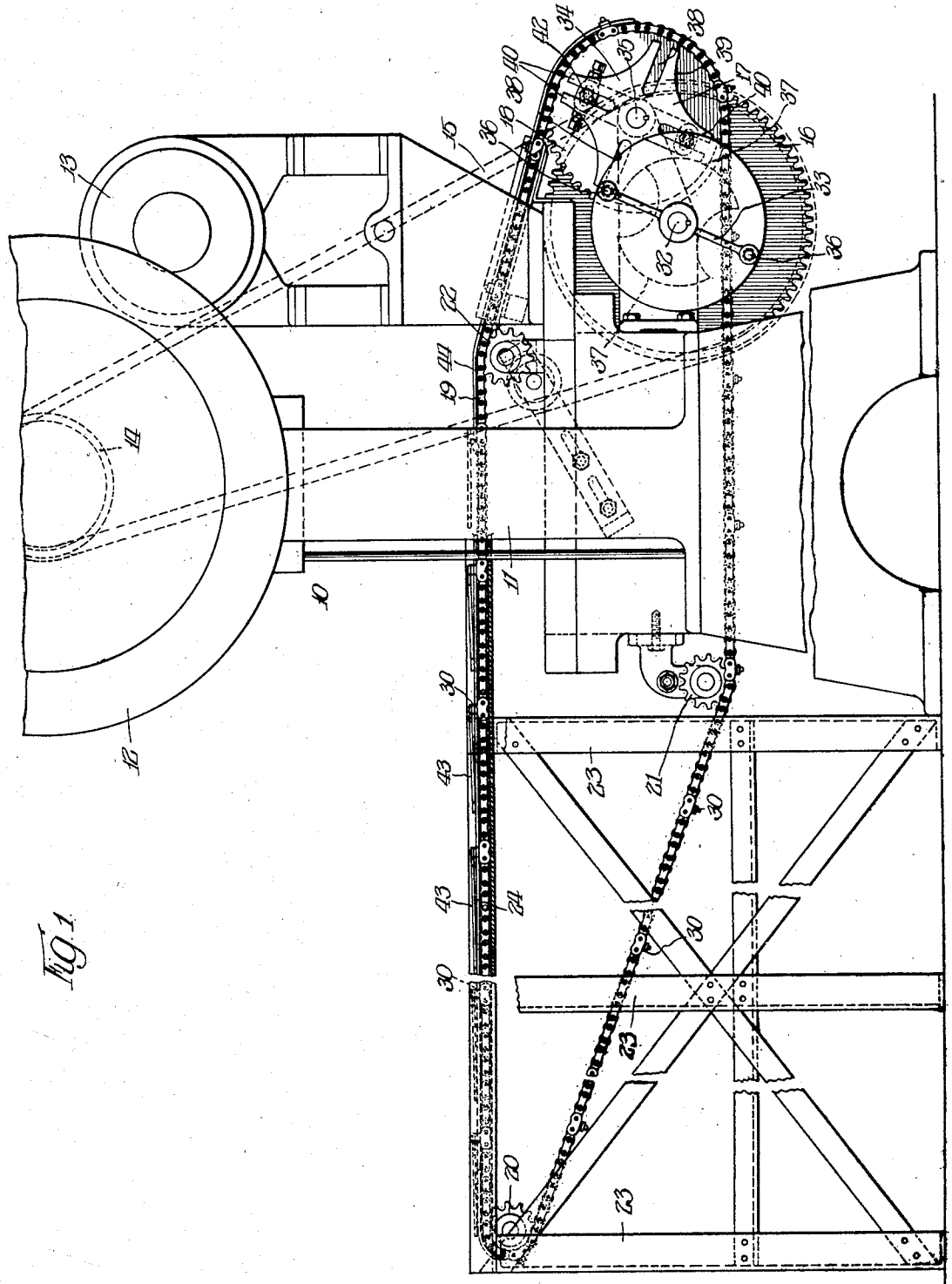


Fig. 1.

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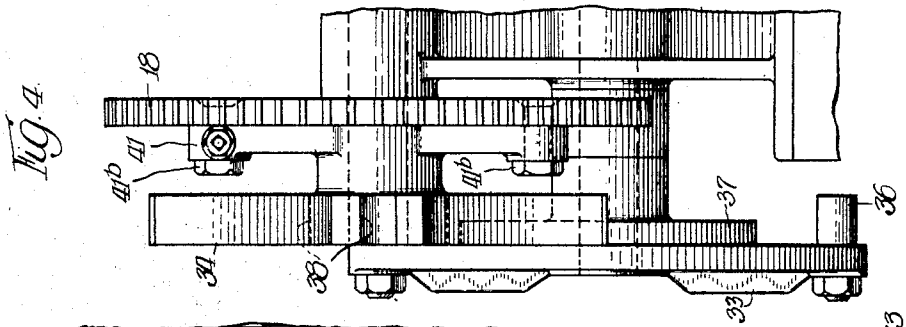


Fig. 4.

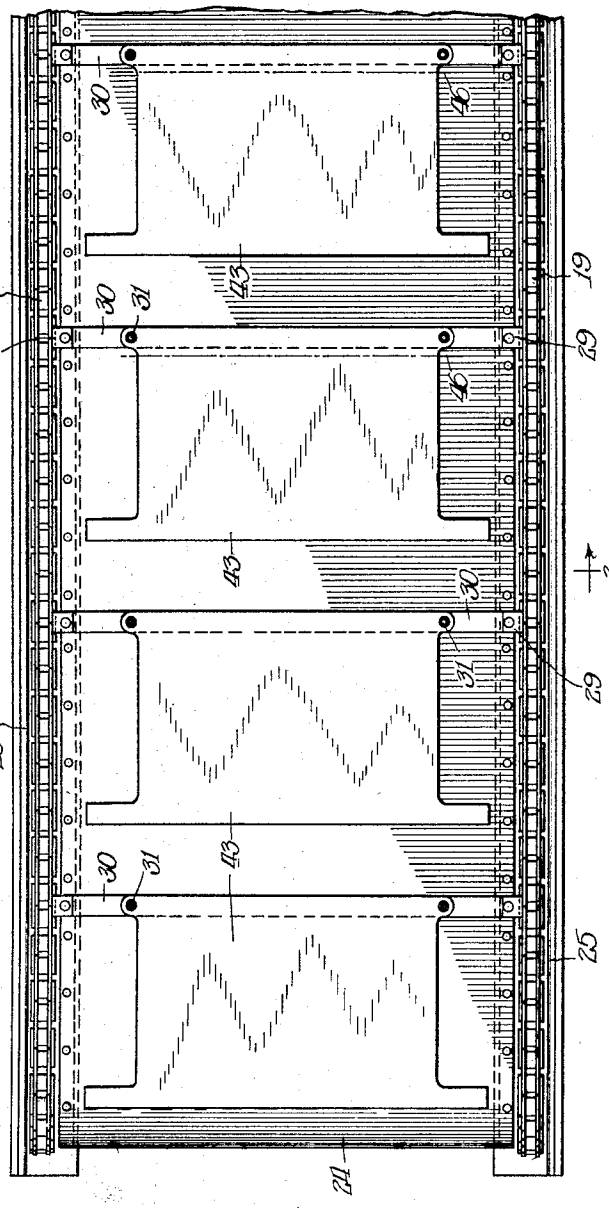


Fig. 2.

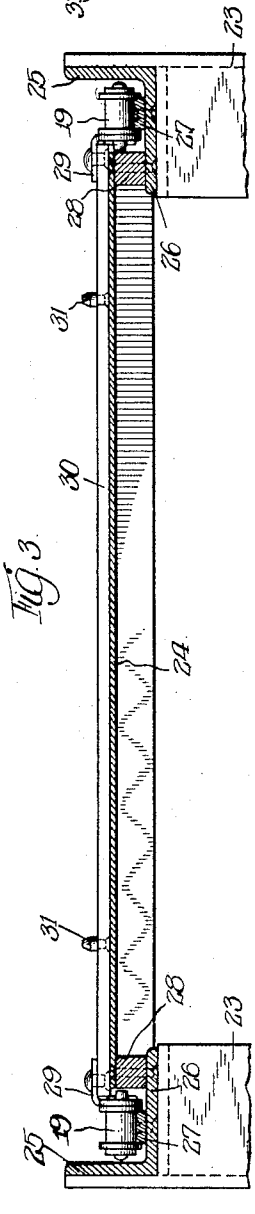


Fig. 3.

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PLATE FEEDING AND PUNCHING MEANS

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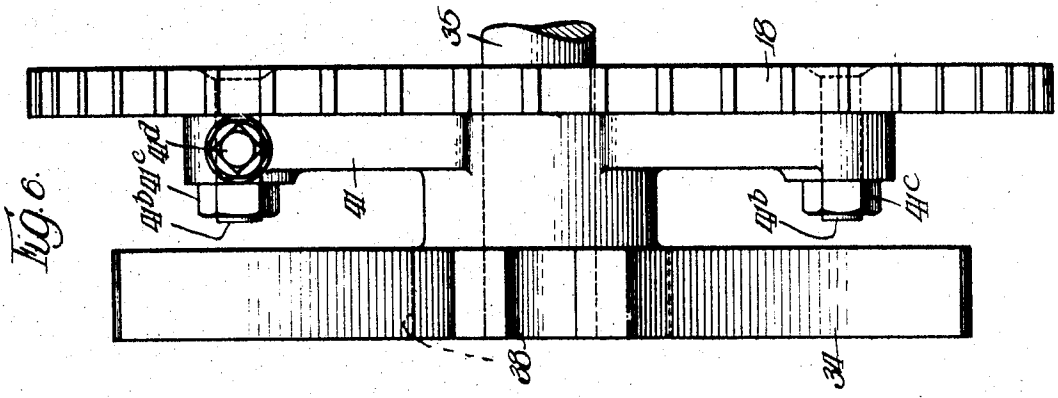


Fig. 6.

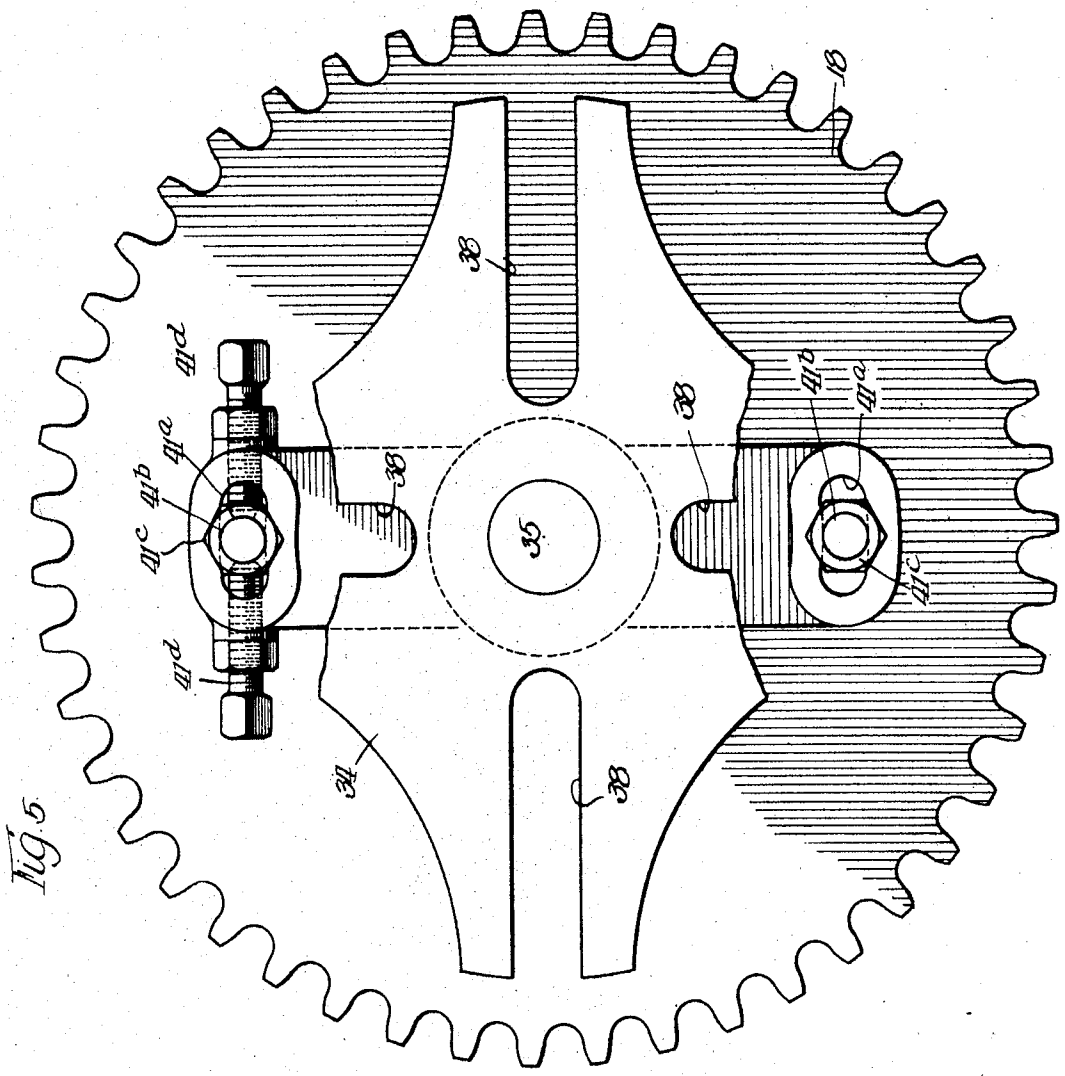


Fig. 5.

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Fig. 7

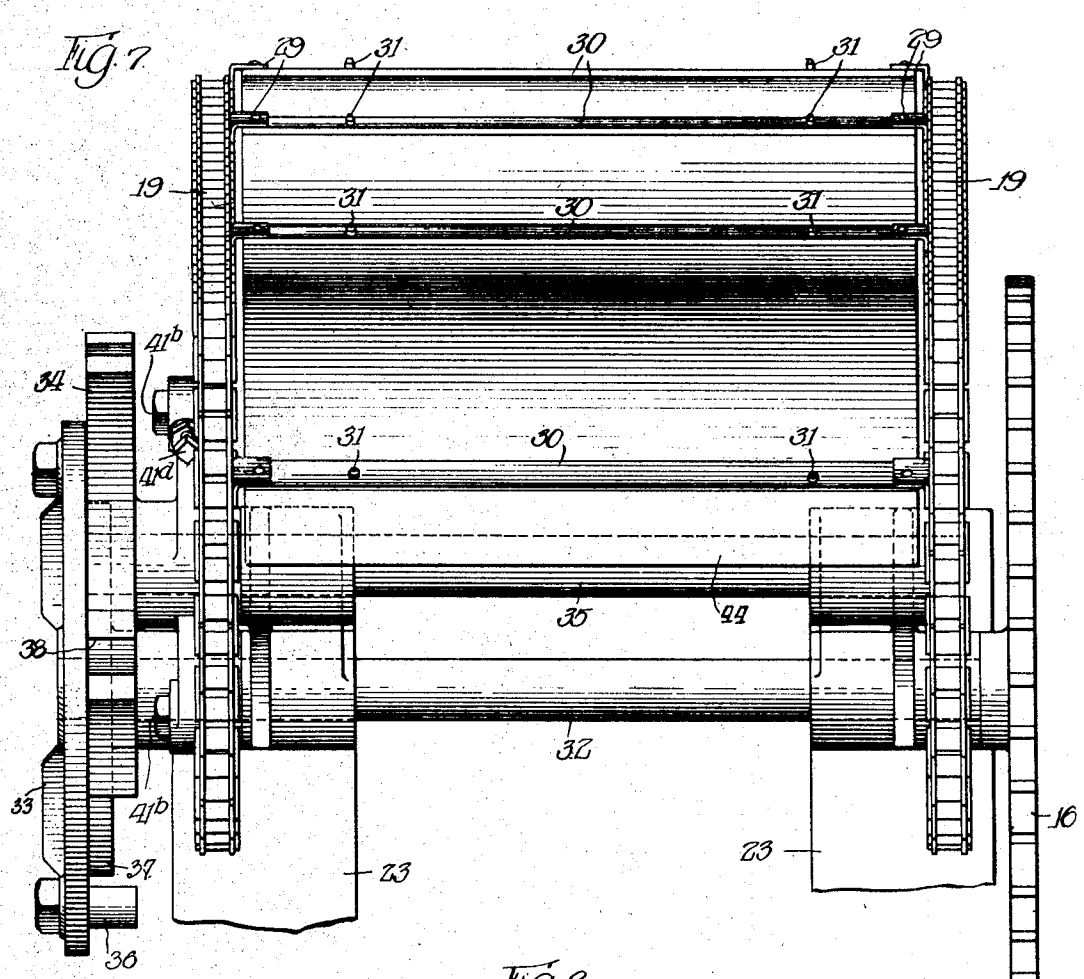
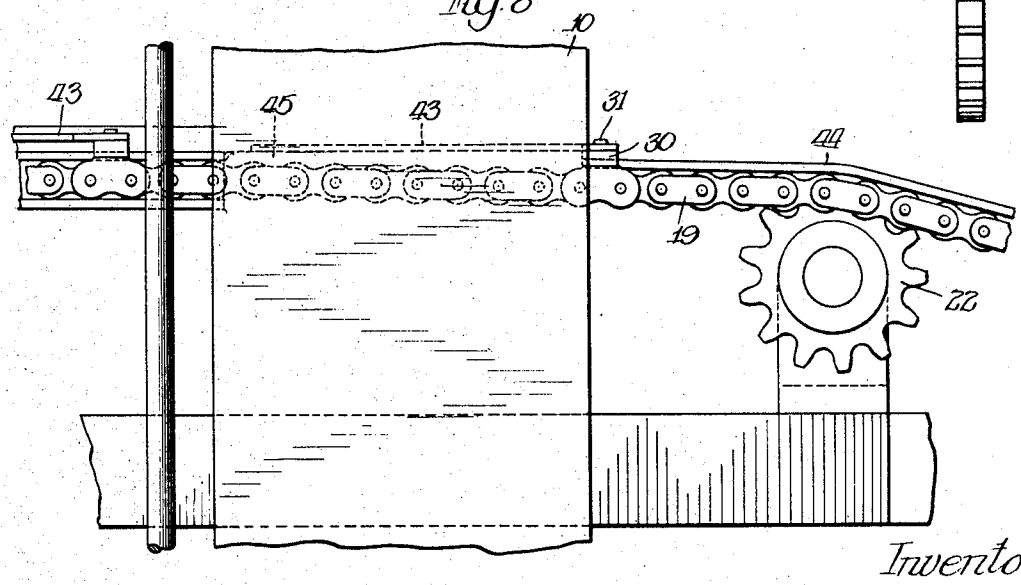


Fig. 8



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Patented Jan. 6, 1931 1,787,458

UNITED STATES PATENT OFFICE

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PLATE FEEDING AND PUNCHING MEANS

Application filed March 23, 1928. Serial No. 264,051.

The present invention relates to plate feeding and punching means.

More particularly the present invention relates to mechanism for progressively feeding articles to a punch or the like with a step-by-step movement. The invention will be described with particular reference to mechanism which is suitable for the trimming of the grids for storage battery plates. As said grids come from the molds, the edges thereof are unfinished, and it is commonly necessary to subject said grids to a finishing operation. This finishing operation is commonly performed in a punch press or the like.

An object of the present invention is to provide a feeding and punching mechanism suitable for the handling of articles such as storage battery grids, which is positive and rapid in its action and which is readily adjustable whereby the articles to be trimmed may be presented to the punch press in proper timed relationship with said press.

A further object is to provide means for feeding articles to a punch press or the like which involves a minimum of force in moving said articles and which presents said articles in succession in proper timed relationship to the punch press.

A further object is to provide a mechanism for progressively feeding articles with a step-by-step movement, which mechanism preferably includes sprocket chain drives or the like and which mechanism is readily adjustable to compensate for wear or stretch of said sprocket chain drives.

A further object is to provide means for progressively feeding articles with a step-by-step movement which is well adapted to meet the needs of commercial operation.

Further objects will appear as the description proceeds.

Referring to the drawings—

Figure 1 is a view in side elevation of one embodiment of the present invention, which embodiment is shown as carrying storage battery grids to be trimmed;

Figure 2 is a top plan view of part of the mechanism shown in Figure 1;

Figure 3 is a sectional view taken along the plane indicated by the arrows 3—3 of Figure 2 but having the grids omitted;

Figure 4 shows, on an enlarged scale, a detail of construction involving certain adjustment features of the present invention;

Figure 5 is a view in side elevation illustrating the connection between the driven element of a Geneva gear and one of the sprocket gears involved in the illustrated embodiment of the present invention;

Figure 6 is another view in side elevation of the structure shown in Figure 5;

Figure 7 is a view in end elevation on an enlarged scale, of part of the structure shown in Figure 1; and

Figure 8 is a fragmentary view on an enlarged scale of part of the structure shown in Figure 1.

The numeral 10 indicates a punch press, which punch press includes the standard 11. Said standard carries a die adapted to cooperate with a reciprocating punching member, neither the die nor the punching member being illustrated in detail, inasmuch as the details thereof do not constitute the present invention. The punch press may be provided with the fly wheel 12 and may be driven by means of a motor 13 through any preferred power transmitting means (not shown). Mounted concentrically with the fly wheel 12 is the gear 14, which may in practice take the form of a sprocket gear driving the sprocket chain 15, which chain 15 drives the sprocket gear 16. The sprocket gear 16, through a Geneva movement or other step-by-step power transmitting mechanism, indicated as a whole by the numeral 17, drives a pair of sprocket gears 18—18 constrained to rotate in unison, which sprocket gears in turn drive the sprocket chains 19—19. Said sprocket chains 19 operate as an endless conveyor, in a manner which will be referred to in detail hereinafter, for progressively carrying grids to the punch press 10. The sprocket chains 19—19 are supported at their extremities opposite to the sprocket gears 18—18 by the sprocket gears 20—20. Idler sprocket gears 21 and 22 are provided for constraining the sprocket chains 19 to travel in a predetermined path. Said sprocket gears 21 and 22

are adjustable for the purpose of taking up slack. Said sprocket gears 21, 22 and 18 are disposed on shafts which are carried by the punch press 10, or other members directly appurtenant thereto. The sprocket gears 20—20 may be carried by a frame 23, which is disposed at one side of the punch press 10. Said frame and the punch press provide mounting means for a table 24, which will now be briefly described.

The frame 23 carries a pair of angle irons 25—25 which are spaced apart and which have flanges 26—26 disposed in substantially the same plane. Riveted or otherwise secured to the flanges 26—26 are the track members 27—27, each of which carries one of the sprocket chains 19—19. Each of the flanges 26—26 is provided with a bar 28, which bars 28—28 support the table 24; the flanges 26, bars 28 and table 24 being riveted or otherwise secured together. Secured to the sprocket chains 19—19 at spaced regions along the length of said sprocket chains are brackets 29—29, which brackets have secured thereto the cross bars 30—30, each provided with upstanding pins 31—31. As the sprocket chains 29—29 travel in their paths of movement, the cross bars 30—30 are kept in right-angular relationship with said paths of movement.

The sprocket gear 16 is keyed to the shaft 32, to which is secured the driving element 33 of the Geneva movement 17. The driven element of said Geneva movement 17 is indicated by the numeral 34, which driven element is keyed to the shaft 35. The particular Geneva movement chosen for illustration is a double Geneva movement having the pair of driving pins 36—36, diametrically disposed relative to one another, and the intermediate arcuate portions 37—37. It will be understood without detailed explanation that the driving pins 36—36 cooperate with the radial slots 38—38 in the driven element 34 and that the arcuate portions 37—37 of the driving element 33 cooperate with the arcuate recesses 39 of the driven element 34 to communicate a step-by-step movement to said driven element 34.

The driven element 34 of the Geneva movement 17 is adjustably connected to the adjacent sprocket gear 18. From an inspection of Figures 4, 5 and 6 it will be noted that the driven element 34 of the Geneva movement 17 is provided on one side thereof with the attaching member 41. Said attaching member 41 is provided at its two ends with arcuate slots 41*a*—41*a* symmetrically disposed relative to one another which slots are adapted to receive bolts 41*b*—41*b* which bolts are set into the corresponding sprocket 18. Nuts 41*c*—41*c* upon the bolts 41*b*—41*b* releasably hold the attaching member 41 in rigid relationship with the adjacent sprocket gear 18. Set-screws 41*d*—41*d* mounted in the attaching member 41 and adapted to abut against the two sides of one of the bolts 41*b* permit the accurate circumferential positioning of corresponding sprocket gear 18 relative to the attaching member 41. The sprocket gears on the two sides of the machine, as illustrated by the sprocket gear 18 meshing with the sprocket chain 19, will be rigidly connected together through the shaft 35. (See Fig. 1.)

The upstanding pins 31—31 upon the cross bars 30—30 are adapted to receive battery grids 43 or other articles to be punched or trimmed. Said grids 43 are commonly provided with holes for receiving said pins 31—31. It will be noted that due to the thickness of the cross bars 30—30, the grids 43—43 are dragged along the table 34 with only their edge portions contacting with said table. Expressed in other language, said grids 43—43 are dragged along the table 24 in angular relationship with the plane of said table. When said grids 43—43 reach the punch press 10, it is preferable that they be disposed in right-angular relationship with the reciprocating punching member of said press. Accordingly, the present invention contemplates a die with a face which is in right-angular relationship with the line of movement of the punching element of the punch press. The table 24, which carries the grids up to the punch press, of course stops short of said punch press. Arranged in position to receive the punched grids after they have left the punch press is the guide wall 44, which is shaped to conform to the sprocket chain 19 in advance of the punch press 10.

The mode of operation of the above described embodiment of the present invention will be clear without detailed description. The punch press 10 will operate according to well known principles to perform repeated punching or trimming operations as long as it is being driven by the motor 13. While the punch press is operating the sprocket gear 14 will be operating in synchronism therewith to drive the sprocket chain 15 and sprocket gear 16 to communicate power to the Geneva movement 17, which in turn will communicate a step-by-step movement to the sprocket chains 19—19 for progressively dragging the grids 43—43 into position to be operated upon by the punch press 10. By reason of the pair of driving pins 36—36 upon the driving element of the Geneva movement 17, which pins cooperate with the slots 38—38 of the driven element of said Geneva movement, and by reason of the two arcuate portions 37—37 of the driving element, which cooperate with the corresponding arcuate recesses 39—39 of the driven element, a very positive feeding action is communicated to the sprocket chains 19—19. It is very necessary, of course, that the punch-

ing portion be carried in proper timed relation with the feeding of the grids 43—43. Wear in the sprocket chains might disturb this relationship. However, according to the present invention, said relationship may be reestablished very conveniently by operating the set-screws 41*d*—41*d*, whereby the angular relationship between the driven element 34 of the Geneva movement 17 and the adjacent sprocket gear 18 may be adjusted.

As shown in Figure 8, the sprocket chains 19—19 have a downward bias from the die of the punch press 10. Expressed in other language, each cross bar 30 after it passes the die 45 of the punch press 10 has a slight tendency to snap downwardly, leaving the corresponding grid 43 in substantially horizontal position upon the face of said die 45. The pins 31 in the cross bars 30 will preferably be sufficiently long to retain engagement with the grids 43 while the grids are successively disposed upon the die 44. When the punch press 10 operates the grid which happens to be located upon the die 45 is trimmed and also severed along a line indicated by the numeral 46, leaving a portion attached to the pins 31—31. The pins 31—31 will carry along the portion of the grid attached thereto until said portion drops off at the right-hand end of the machine as the parts are viewed in Figure 1. The trimmed grid, as well as the material severed from the edges thereof, will be propelled across the die 45 and along the wall 44 by the next succeeding cross bar 30 to the right-hand end of the machine as the parts are viewed in Figure 1. Any preferred sorting or distributing means (not forming a part of the present invention) may be provided to separate the trimmed grids from the excess material trimmed therefrom.

What is claimed is—

1. Feeding means for a punching machine comprising, in combination, a pair of track members, sprocket chains slidable along said track members, a substantially flat table and bars carried by said sprocket chains, said bars having means for supporting substantially flat articles and dragging same along said table in angular relationship with said table.

2. In combination, punching means including a die having a substantially horizontal face, feeding means cooperating with said punching means, said feeding means comprising a pair of endless bands, bars connected to said bands, and a substantially horizontal table between said bands and disposed at a lower level than said bars, said bars being provided with means for holding articles to be punched, said face of said die being disposed at a level to hold said articles in substantially horizontal position without freeing said articles from said holding means.

3. Feeding means for a punching machine comprising, in combination, a frame, track members carried by said frame, endless bands sliding upon said track members, bars carried by said bands, and a substantially flat table between said bands at a level below said bars, said bars being provided with upstanding studs adapted to receive and drag substantially flat plates along said table.

4. In combination, feeding means for a punching machine comprising a substantially flat table, means movable along said table for dragging flat articles along said table in angular relationship with said table, a punch having a die face, said dragging means having a bias downwardly relative to said die face whereby said flat articles may lie flatwise against said die face.

5. In combination, a plurality of spaced dragging means adapted to releasably receive flat articles, a support at a lower level than said dragging means for cooperating with said dragging means whereby said dragging means may drag said articles while said articles are in a position inclined to the horizontal, a punch press having a die face disposed upwardly of said support, said dragging means having a bias downwardly and being free to drop after passing said die face whereby said flat articles may lie flatwise upon said die face.

6. In combination, feeding means for a punching machine comprising a frame, track members carried by said frame, endless bands sliding upon said track members, bars carried by said bands, a punch having a substantially flat face, said bands being inclined relative to said flat face at a sufficient angle to cause said bars to drop below the level of said face after said bars have passed said face.

7. In combination, feeding means for a punching machine comprising a frame, track members carried by said frame, endless bands sliding upon said track members, bars carried by said bands, and a punch having a substantially flat face, said bands being inclined relative to said flat face at a sufficient angle to cause said bars to drop below the level of said face after said bars have passed said face, said bars being provided with upstanding studs adapted to receive and drag substantially flat plates to said die face.

Signed at Chicago, Illinois, this 14th day of March, 1928.

CARL O. SWENSON.