May 27, 1924.

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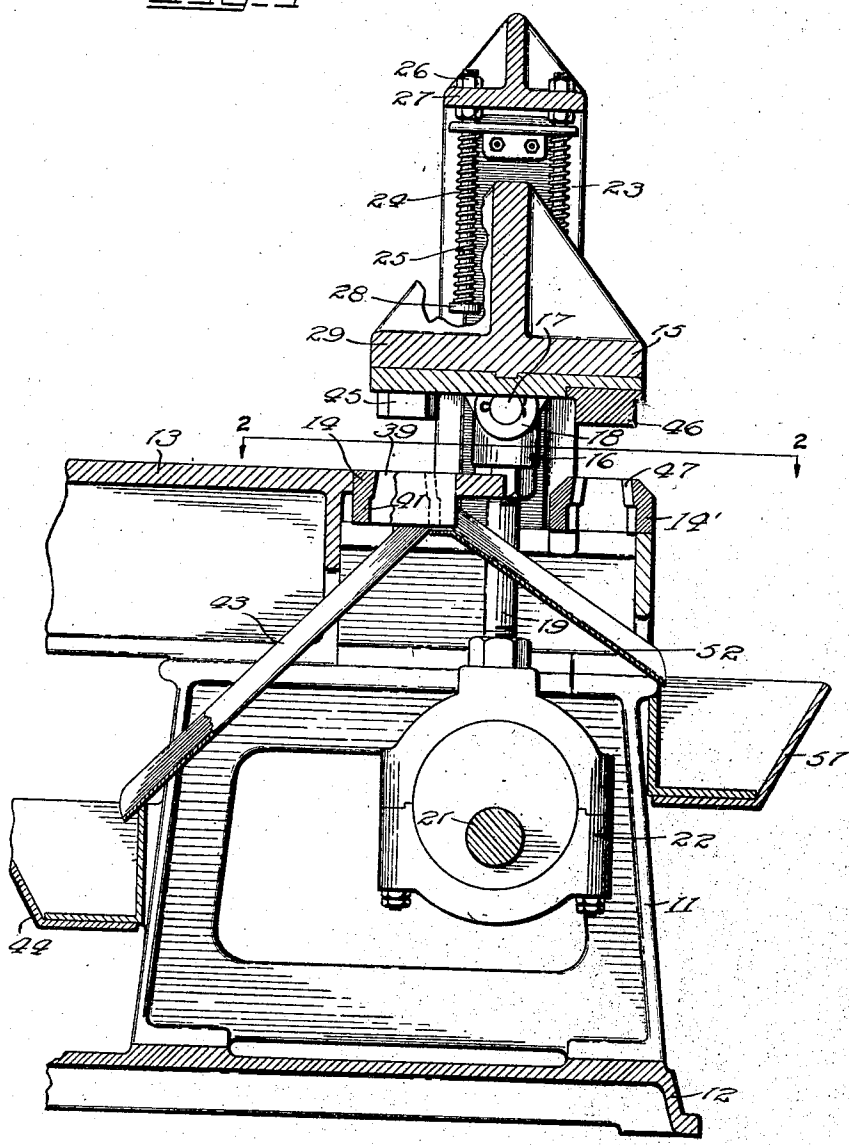
F. RUDOLPHI

BLANK SHEARING APPARATUS

Filed Dec. 5, 1921

3 Sheets-Sheet 1

Fig. 1



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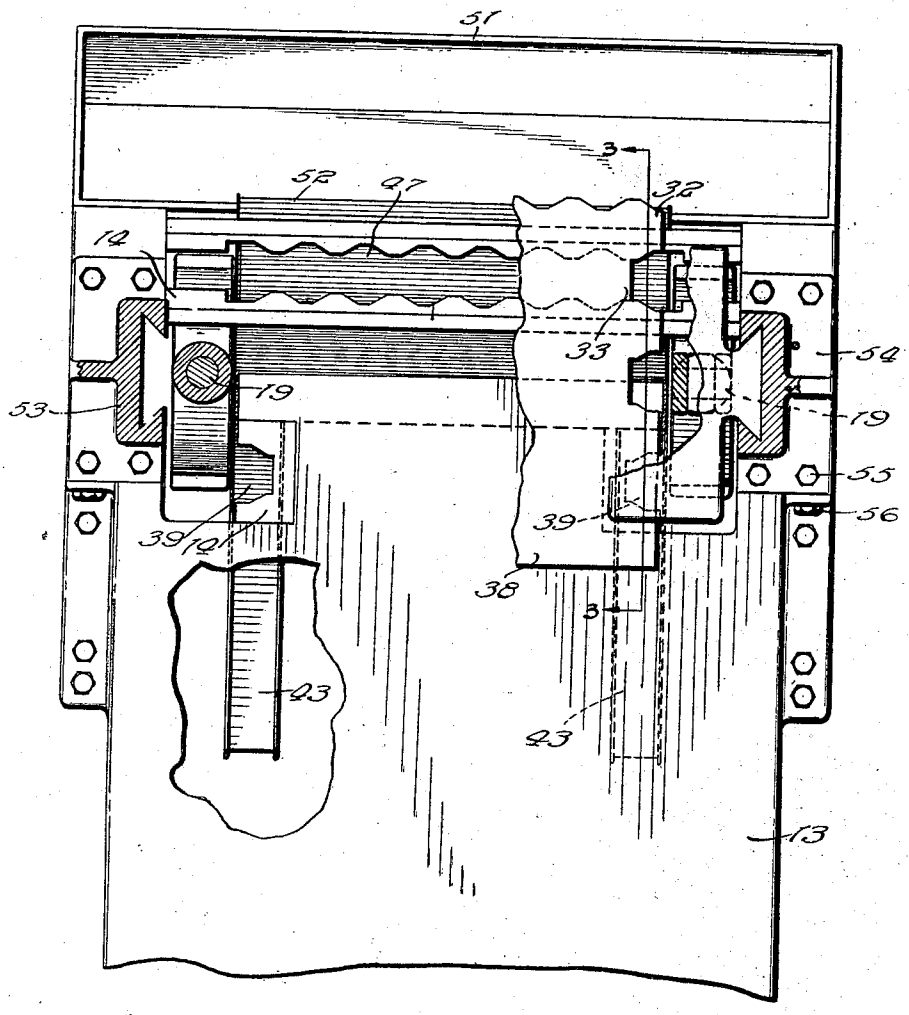
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Fig. 2



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Fig. 3

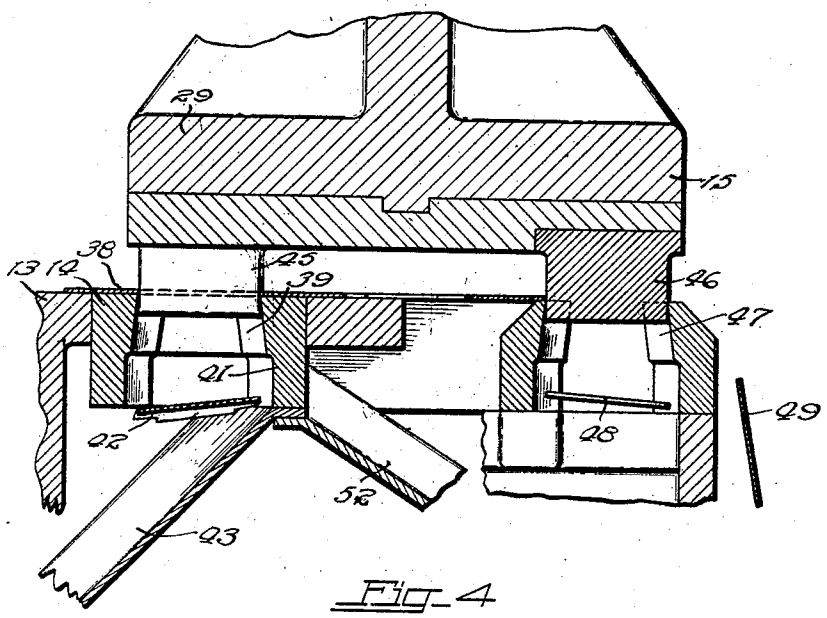
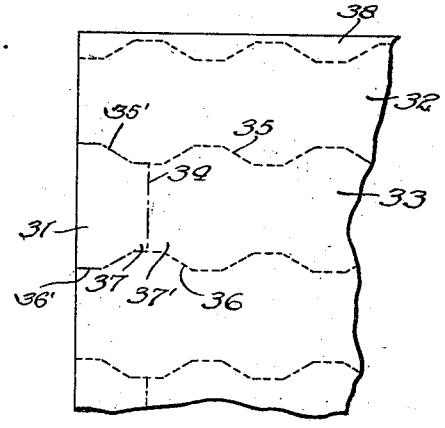


Fig. 4



Frank Rudolphi, INVENTOR.
BY Munday, Clarke & Carpenter ATTORNEYS

Patented May 27, 1924. 1,495,806

UNITED STATES PATENT OFFICE.

FRANK RUDOLPHI, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO AMERICAN CAN COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

BLANK-SHEARING APPARATUS.

Application filed December 5, 1921. Serial No. 519,938.

To all whom it may concern:

Be it known that I, FRANK RUDOLPHI, a citizen of the United States, residing in Montclair, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Blank-Shearing Apparatus, of which the following is a specification.

This invention relates in general to shearing machines and has more particular reference to an improvement in such machines whereby recovery pieces from the metal sheet being operated upon may be obtained in an efficient and rapid manner and without deformation by buckling or other causes.

It is the present custom where automatic machinery is employed in the cutting of a number of articles from a sheet of tin plate, to first sever the sheet into strips by a shearing machine and subsequently to feed the strips so obtained through a press for the cutting of the desired articles. When the resultant article is of a circular configuration it is the common practice to cut such circular disks from adjacent rows of the tin plate in a staggered formation. This permits a more economical cutting of the sheet and provides a minimum amount of wastage. In order to make use of an automatic feed in connection with a press cutting the desired articles, it is usually necessary for the strip to contain one row of disk spaces. The strip is so formed to accommodate the staggered formation of cutting of the round disks by being provided with a scroll or undulating edge which permits the same economy as if the disks were directly cut from the sheets in staggered formation.

In the cutting of this staggered strip it is found that spaces occur at the ends of the strip which are not sufficient in size to make a complete disk. It is desirable from the standpoint of economy, and is the customary practice when a condition of this kind occurs, to cut from the spaces left other smaller shapes known in the art as the recovery. The method usually employed for obtaining the final recovery consists in first removing the metal containing the recovery space from the strip and thence feeding the same into a recovery press where the final recovery is cut. To accomplish the removal of the metal strip, a transverse cut is made by a cutting edge offset from the face of and in a plane slightly beneath that of the shearing die. By this method the transverse line across the end of the strip and the shearing line along the edge of the strip are cut at slightly different periods of time with the result that the recovery end is buckled and distorted. It has been found in practice that this distortion seriously interferes with the correct feeding and cutting of the recovery end in a recovery press, and it is toward a removal of this trouble that my present invention is directed.

A principal object of my invention is the provision of apparatus for completely severing and removing the recovery pieces from a metal sheet prior to the blanking or cutting out of the main strips or rows of disk spaces.

A further and more comprehensive object of the invention is the provision in a machine of this character of shearing elements for individually severing the recovery pieces and the main blanks from the sheet without causing buckling or distorting of either of said parts.

Another important object of the invention is the provision of regular shearing dies and recovery dies operating simultaneously and through the same power means, the mounting of the movable parts of both sets being preferably of unitary or integral construction.

Still another object of the present invention is the provision of a recovery attachment of simple and effective structure and operation consisting of parts easily applied to shearing machines of approved construction.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings,

Figure 1 is a transverse vertical section through a shearing machine to which the apparatus, embodying my invention, is applied;

Fig. 2 is a plan view partially in section taken substantially on the line 2—2 in Fig. 1;

Fig. 3 is an enlarged detail section taken substantially on the line 3—3 of Fig. 2; and

Fig. 4 is a plan view of a portion of a metal sheet prior to the cutting of the strips

therefrom, the outline of the staggered disk spaces being indicated by dotted lines.

The apparatus illustrated in the drawings as an embodiment of my invention, comprises a body frame 11, supported upon a base 12, and in turn supporting a table 13, in which are secured female die members 14, 14′, adapted to cooperate with movable cutting edges on a die member 15. The die member 15 is intermittently reciprocated by the usual mechanism employed for this purpose, consisting, in the present instance, of cross-heads 16, secured to a rod 17 having bearings 18 in the die mounting and operated through vertical shafts 19 by gearing and cam or other suitable mechanism in the frame 11, this mechanism being operated by a power shaft 21 having bearings in brackets 22. The die member 15 is slidable upon guides 23 and its weight is counterbalanced by springs 24 which surround the rods 25 secured by nuts 26 to a frame yoke member 27 mounted upon the table 13. The lower ends of the rods 25 are provided with collars 28 which support the springs 24.

The blanks are fed in any preferred manner over the table 13 and upon the stationary die parts 14, 14′, and in order that the subsequent operation may be readily understood, attention is now directed to Fig. 4. Reference numeral 31 indicates the recovery piece which is removed prior to the cutting out of the strip portions or rows of disk spaces 32 and 33. With the usual type of shearing machine the sheet is first cut along that portion of the lines 35 and 36 that are shown in Fig. 4 to the right of the line 34, or in the complete or full sheet 38 that portion of the lines 35 and 36 that extend between the transverse lines 34. The lines 34 are next severed and finally the ends of the shearing lines indicated in Fig. 4 as 35′ and 36′ are cut. As has been heretofore stated, this results in subjecting the corners 37 and 37′ to unusual strain with consequent distortion both of the recovery piece 31 and the strip portions 32 and 33. To obviate this difficulty I provide mechanism, to be now described, for completely removing the part 31 prior to the cutting out of the strips along the lines 35 and 36.

The tin sheet, generally indicated by the reference numeral 38, is positioned between the die members 14, 14′ and 15, the member 14 being provided with apertures 39 of the general configuration of the recovery pieces 31. These apertures are flared outwardly from the top and enlarged in the lower part of the die member, indicated at 41, to permit the cut out recovery piece 42 to fall readily therethrough. Chutes or guideways 43 are provided beneath the apertures 39 for directing the recovery pieces into a trough-like receptacle 44.

The movable die member 15 has at each end thereof, and positioned at the side from which the metal sheets are fed, cutting edges 45 adapted to cooperate with the apertures 39 to completely cut out the parts 31 from the sheets prior to the shearing of the strips which is done by a cutting die edge 46 secured in and extending along the outer side of the member 15. The shearing die edge is of the scroll or irregular formation of the strip portions outlined in Fig. 4, and cooperates with an aperture 47 of similar configuration to cut out the strips from the sheet. Referring to Fig. 3, it will be observed that the two strips 48 and 49 are cut by a single operation of the die, the one falling through the aperture 47 and the other over the edge of the female die and both being directed into a receptacle 51, a chute 52 being provided to guide the strip 48 into said receptacle.

The cutting edges 45 and 46 are spaced apart in such manner that the edges 45 operate upon the irregular rows two steps in advance of their reaching the aperture 47.

As the sheet is advanced in a direction crosswise of the rows the width of two rows with each step, the alternate irregular rows are successively positioned over the aperture 47 and when so positioned the recovery pieces will have been completely removed, leaving the sheet with long rows 32 and short rows 33 in alternate relation. In this manner the recovery piece is subjected to but a single die action, all of its edges being cleanly severed by the cutting edge 45, and the action of the specially formed cutting edge 46 results in a complete and clean severing of the long and short strips.

The lower or female die members 14, 14′, are secured in place by the ends 53 and extensions 54 of the yoke member 17 and these extensions 54 are secured to the table 13 by bolts 55 and 56, or in any preferred manner.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. Apparatus for cutting blanks from metal sheets in shape to have can ends and the like formed therefrom, comprising in combination dies for shearing the main blanks and dies operating on the sheets in a position in advance of the shearing dies to completely remove portions of said sheets not usable for forming the articles to be formed from said blanks.

2. Apparatus for cutting blanks from metal sheets in shape to have can ends and the like formed therefrom, comprising in combination dies for shearing the main blanks and dies operating in advance of said shearing dies for removing from the sheets parts which would be of irregular and non-usable form in the subsequently cut main blanks.

3. Apparatus for cutting from metal sheets strips formed of rows of can ends providing spaces, comprising shearing dies for severing said strips from the sheets, and dies acting on the sheets in position in advance of said shearing dies for completely cutting out irregular spaces at the ends of alternate rows of can end providing spaces.

4. Apparatus for cutting blanks from metal sheets, comprising in combination dies for cutting strips from the sheets in accordance with a staggered lay out of adjacent rows of can end providing spaces, and dies acting upon the sheets in advance of said first mentioned dies for removing irregular spaces occurring at the ends of alternate rows prior to the cutting out of said rows to form the blanks.

5. Apparatus for cutting blanks from metal sheets in shape to have can ends and the like formed therefrom, comprising in combination scroll shearing dies, and dies acting upon predetermined parts of the sheets in advance of said shearing dies to remove parts of the sheets not usable in subsequent operation upon the scroll blanks.

6. Apparatus for cutting blanks from metal sheets in shape to have can ends and the like formed therefrom, comprising in combination dies for shearing the main blanks and simultaneously operating dies positioned in advance of said main shearing dies for entirely removing parts of the sheets not usable in the subsequently cut can end providing blanks.

7. Apparatus for cutting blanks from metal sheets in shape to have can ends and the like formed therefrom, comprising in combination dies for cutting out the main blanks, and dies for cutting out recovery pieces not desired in the main blank form, said dies acting upon the sheets to individually and completely cut out said blanks and said recovery pieces in different positions.

8. Apparatus for cutting blanks from metal sheets in shape to have can ends and the like formed therefrom, comprising in combination main shearing dies, and dies for removing parts of the sheets not desired in the main blanks, said individual sets of dies having distinct and complete action upon the portions of the sheet operated upon thereby without subjecting either the main blanks or the recovery pieces to the strain of successive cutting actions likely to cause buckling or distorting of the metal.

FRANK RUDOLPHI.