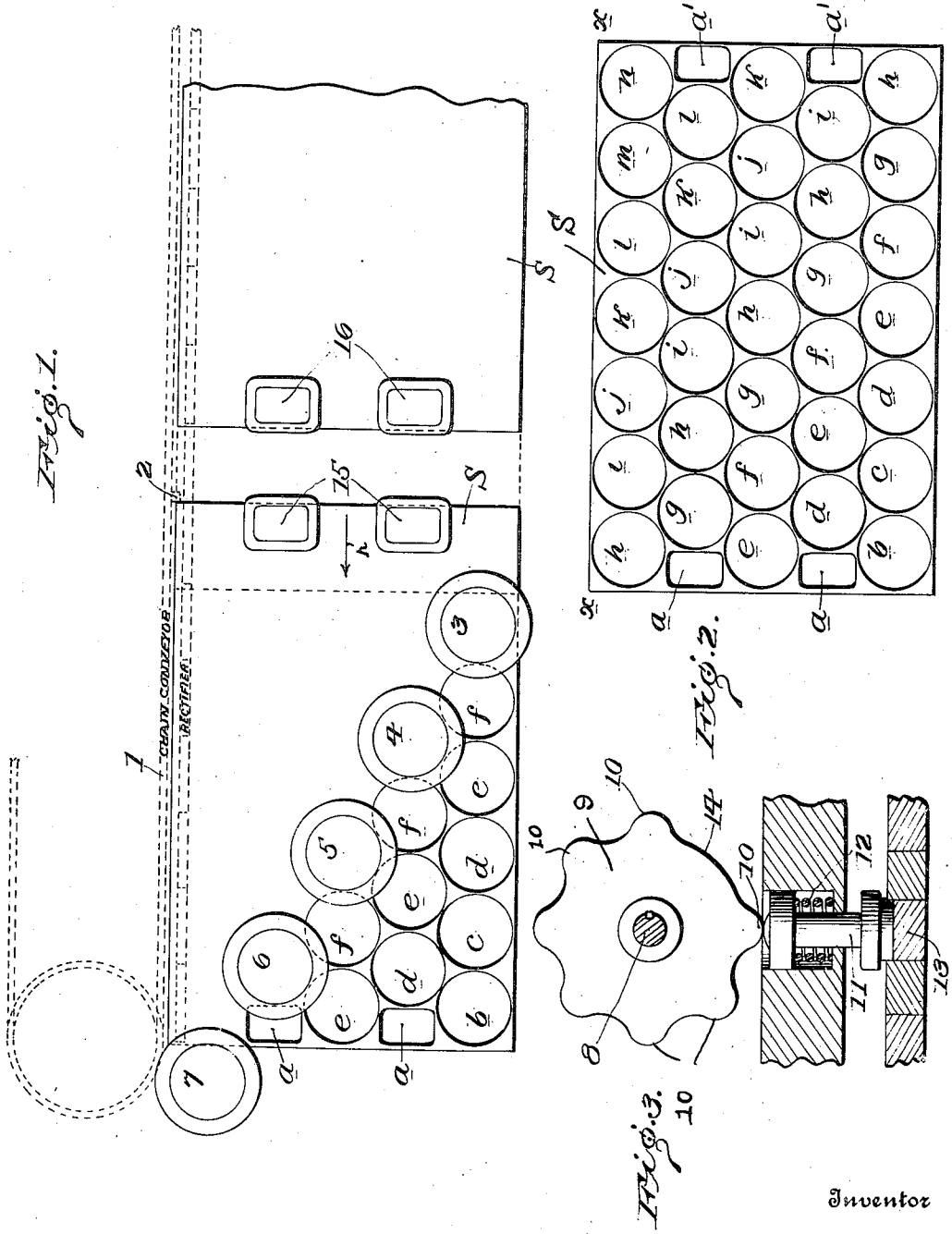
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METHOD FOR CUTTING DISKS OR BLANKS FROM UNTRIMMED COMMERCIAL SHEETS.

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METHOD FOR CUTTING DISKS OR BLANKS FROM UNTRIMMED COMMERCIAL SHEETS.

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To all whom it may concern:

Be it known that I, FRANK A. ASSMANN, Jr., a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Methods of Cutting Disks or Blanks from Untrimmed Commercial Sheets, of which the following is a description, reference being had to the accompanying drawing and to the figures of reference marked thereon.

The invention relates to new and useful improvements in a method of cutting disks or blanks from a commercial sheet, and more particularly to a method of cutting round can ends from a sheet of metal.

It is well understood that commercial sheets of tin of a given size vary slightly in length, and it has been long the practice to trim the sheet to a predetermined length or provide gaging surfaces by a preliminary cutting of the sheet so that the sheet of metal may be presented to the dies for cutting out the can ends, a maximum number of can ends cut from the sheet, and without any die overlapping the edge of the sheet during its operation. An object of the invention is to provide a method which may be used for cutting a maximum number of can ends from a commercial sheet of tin of a given size without the preliminary end trimming of the sheet or the forming of gaging surfaces.

A further object of the invention is to provide a method of the above character of cutting untrimmed commercial sheets of tin wherein blanks may be cut from the waste ends of the sheet during the presentation of the sheet to the dies for cutting the can ends.

In the drawings, which show by way of illustration one arrangement of the dies and the sheets for carrying out the above method:—

Figure 1 is a plan view showing, more or less diagrammatically, a series of dies and a feeding mechanism for presenting sheets, one after the other, to the dies for the cutting of the same;

Fig. 2 shows a sheet having been cut throughout by the improved method; and

Fig. 3 shows more or less diagrammatically one way of rendering the die idle in carrying out the new method.

While the invention in its broadest aspects is directed to a method of cutting disks or blanks of any desired shape or size from sheets of material of any character, it is more particularly directed to a method of cutting can ends from untrimmed commercial sheets of a given size and, therefore, detailed description will be given as to one way of carrying out the method of cutting can ends, it being understood that so far as the principle of the invention is concerned and the scope of the claims, other blanks than can ends may be cut from the sheet and the sheets operated upon may be of any desired material.

It is well known that the commercial sheet of tin of a given size varies as to length and that the edges are often slightly curved in one direction or the other, due to the finishing of the sheet in the mills. Prior to the present invention, it has been customary to trim the sheet to a predetermined length and straighten the edges prior to the presenting of the same to a punching machine for cutting out the ends. Another method of preparing the sheet as it comes from the mill for punching has been to cut notches in the edges of the sheet to form gaging surfaces which may be used for positioning the sheet relative to a gang of dies operating by the reversing or shifting of the sheet to cut all of the ends therefrom.

The present method is directed particularly to the cutting of the can ends from an untrimmed commercial sheet which is fed step by step to a gang of dies, and the invention consists particularly in feeding the sheet at each step the distance between the centers of two can ends which are to be cut, cutting the sheet by independently controlled dies operating simultaneously to cut certain of the can ends, and so controlling each die that it will be idle when any portion of the sheet is beneath the same except a portion of sufficient size to cut a full can end. It is well known that if a die overlaps the edge of the sheet so as to cut a segment of a can end rather than the whole disk forming the can end the die will soon be rendered useless. When the sheet is trimmed to a predetermined length, it may be fed step by step to cutting dies and the feed regulated relative to the position of the die so that the die will pass close to the edge of the sheet on one recip-

rocation and the next reciprocation pass wholly through the sheet so that there is no overlapping of the edge of the metal of the sheet during any reciprocation of the die. When, however, the sheet is not trimmed to a predetermined length, it will be readily seen that the sheet would project across the path of the die in the reciprocation of the die as the front edge of the sheet approaches the die. My method contemplates so controlling the die as to render it idle during this particular stroke, and thus avoid the die operating to cut a partial disk or segment from the sheet.

Referring to the drawings, the sheet from which the can ends are to be cut is indicated at S. The sheet is the ordinary commercial sheet which is cut at the tin mill during the process of manufacture, so as to produce so-called standard sheets of a given size. These sheets, however, as above noted, vary slightly in length. The sheets without being trimmed are placed on a suitable support and are fed to a gang of dies by a feed chain or the like, indicated at 1 in the drawings. Said feed chain is operated intermittently and is provided with suitable lugs 2 which engage the end of the sheet and feed the sheet step by step through the machine.

In one embodiment of the method, a series of dies, indicated at 3, 4, 5, 6 and 7 are used, and these dies are set in a diagonal line relative to the direction of feed, which is indicated by the arrow *r* in the drawings. Each of these dies is operated from a main shaft, such, for example, as is indicated at 8 in Fig. 3 of the drawings. This shaft carries a rotating cam 9 having a series of cam projections 10. A reciprocating die, indicated at 11 is held in raised position by a spring 12 and is forced downwardly by the cam projections 10 to cause the die to cooperate with a lower fixed die 13 in the bed of the machine for cutting and forming the can ends. These cooperating dies may be of any suitable construction, and the present illustration is diagrammatic and solely for the purpose of illustrating the principles of the invention.

It is noted that the cam projections 10 are equally spaced and are seven in number, as shown in Fig. 3. There is also a blank space 14 where there is no cam projection. It will be understood that there is a cam disk associated with each cutting die, and the cam projections of the dies 4 and 6 are six in number with two idle spaces for the purpose which will be hereinafter described.

The sheet, as above stated, is a commercial sheet and the length of the sheet from *x* to *x*, while approximately the size necessary to cut the can ends therefrom may be slightly greater but must never be less than the prescribed length from which the can ends can be cut. The sheet of metal is shown in dotted lines as presented to the first die 3. The length of the sheet *x—x* is such that the extreme forward edge of the sheet underlies the die 3, but at this time the cam disk is so timed that the blank space is directly over the die plunger and, therefore, the die will not be depressed during the interval of rest of the sheet at this position. The sheet is then fed one step forward, which brings the sheet underneath the die 3 and the can end, indicated at *b* in Fig. 2 of the drawings, will be cut.

The sheet is then fed another step forward and the can end, indicated at *c*, is cut. At this position of the sheet, the die 4 overlaps the edge of the sheet, but the cam disk for operating the die 4 is so timed that there is a blank space above the die plunger and, therefore, the die 4 will be idle and no cutting of the sheet will be performed by this die.

At the next step in the forward movement of the sheet, the can ends indicated at *d—d* are cut, the dies 3 and 4 now being active to cut can ends from the sheet. At this time, the die 5 slightly overlaps the edge of the sheet, and the operating cam disk therefor is so timed that there is a blank space above the die plunger and the die will be idle. The same is true of the dies 6 and 7; they are caused to reciprocate simultaneously with the other dies except when a die overlaps the edge of the sheet and then the die plunger is idle. After having cut the can ends *e—e—e*, the can ends *f—f—f* are cut, and then the can ends *g—g—g—g* are cut, and then *h—h—h—h—h* are cut, and so on until the can ends indicated at *i*, *j*, *k*, *l*, *m* and *n* are cut. At the cutting of the can end *n* the entire sheet is cut and may be discharged from the machine.

In Fig. 1 of the drawings there is shown a second sheet S following after the first sheet S, and the method is also illustrated of cutting out the waste ends of the sheet. There are sections between the can ends *b*, *d* and *e* from which a blank indicated at *a* may be cut, and also a similar space between the can ends *e*, *g* and *h* from which another blank *a* is cut. There are also spaces at the other ends of the sheet from which blanks *a'—a'* may be cut.

In order to accomplish this, four dies, indicated at 15—15 and 16—16 are provided, which dies may all be carried by a single head operated by a cam disk having a single cam projection with seven idle spaces. This cam disk will be so timed that, when the two sheets are in the position indicated in Figs. 2 to 4, the dies 15—15 and 16—16 will be operated to cut out the blanks *a—a* and

a'—a'. The blanks a'—a' are cut from the forward sheet, while the blanks a—a are cut from the sheet following. After this operation, these dies remain idle until the end of the sheet following reaches the position of the forward sheet, and they will then be operated to cut again the blanks a—a and a'—a'. The dies 4 and 6 are operated by cam disks having two idle spaces, for the reason that only six can ends are cut by these dies, while seven can ends are cut by the other dies. Therefore, when the die 4 overlaps the rear edge of a sheet, it must be idle and at the next step it will overlap the front edge of the following sheet and it must be idle.

From the above, it will be apparent that the method of cutting can ends from an untrimmed commercial sheet of tin consists in feeding the sheet step by step the distance between two can end centers, cutting the can ends by reciprocating dies which are so controlled that the dies are idle when the edge of a sheet is underneath a die. These can ends are cut as close together as can be cut without breaking through the metal between openings formed by the cutting of the sheet and if the sheet is to be cut to advantage, the entire length of the sheet should be as near as possible seven times the size of the can end plus the width of the thread of metal between the openings and between the openings and the end of the sheet. When the sheets are trimmed prior to punching, they will be cut to a predetermined length, depending upon the size of the openings formed or the can ends cut from the sheet. If it is trimmed before the sheet is presented to the dies, then a die may be passed close to the end of the sheet for cutting the same at one reciprocation, and then wholly within the sheet at the next reciprocation and leave a very small thread of metal between the openings and between the openings and the end of the sheet. However, if the sheets are untrimmed and are cut as they come from the mills, then this accuracy of the length is not present even with standard sheets of a given size and the reciprocating die which should pass the edge of the sheet may slightly overlap the same. By my method, however, the die is rendered idle when a portion of the sheet is beneath the same except a portion of sufficient size to cut a full can end. In the drawings the dies are shown as arranged in a diagonal line and come into operation one after the other, and it will be readily understood that they may be arranged in other ways and from certain aspects of the invention a single die may be used for cutting blanks from a narrow strip of metal, the same principle being employed of rendering the die idle as the advance edge of the sheet comes underneath the die and then beginning the cutting operations at the next step forward of the sheet when the die will be wholly over the sheet. It will be readily understood that the feeding mechanism may be of any desired character and a rectifier may be used in connection with a chain conveyor in order to bring about an accurate feed of the sheet at each forward step thereof.

As above noted, while the invention has been described for cutting can ends from commercial sheets of tin, it will be understood that it may be equally well used in cutting blanks of any kind and from any character of material, the essential feature being that the die or dies should be so controlled as to be idle when the die overlaps the edge of the sheet and would be liable to cut an incomplete blank which would be hard on the die and so render it inefficient.

Having thus described the invention, what is claimed as new is:—

1. The method of cutting blanks from untrimmed commercial sheets of a given size, comprising feeding the sheets step by step to a plurality of reciprocating dies of a given size to correspond with the size of the sheet worked upon and controlling the movements of said dies so that when any die overlies either the advanced or rear edge of the sheet the die is rendered idle.

2. The method of cutting can ends from untrimmed commercial sheets of tin of a given size comprising feeding the sheets step by step to a series of dies of a given size to correspond to the size of the sheet worked upon and operating simultaneously to cut certain of the ends, and providing controlling means whereby any die which overlies the advanced or rear edge of the sheet will be rendered idle.

3. The method of cutting can ends from untrimmed commercial sheets of tin of a given size comprising feeding the sheets step by step to a series of dies of a given size to correspond to the size of the sheet worked upon and operating simultaneously to cut certain of the ends, and providing controlling means whereby any die which overlies the advanced or rear edge of the sheet will be rendered idle, simultaneously cutting blanks from the waste sections at the ends of the sheets and causing said dies cutting said blanks to remain idle while in any other position relative to the sheet than that for cutting the waste sections.

In testimony whereof, I affix my signature.

FRANK A. ASSMANN, JR.