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J. LEE.

METHOD OF CUTTING ENDS FROM SHEET METAL PLATES.

APPLICATION FILED DEC. 12, 1902.

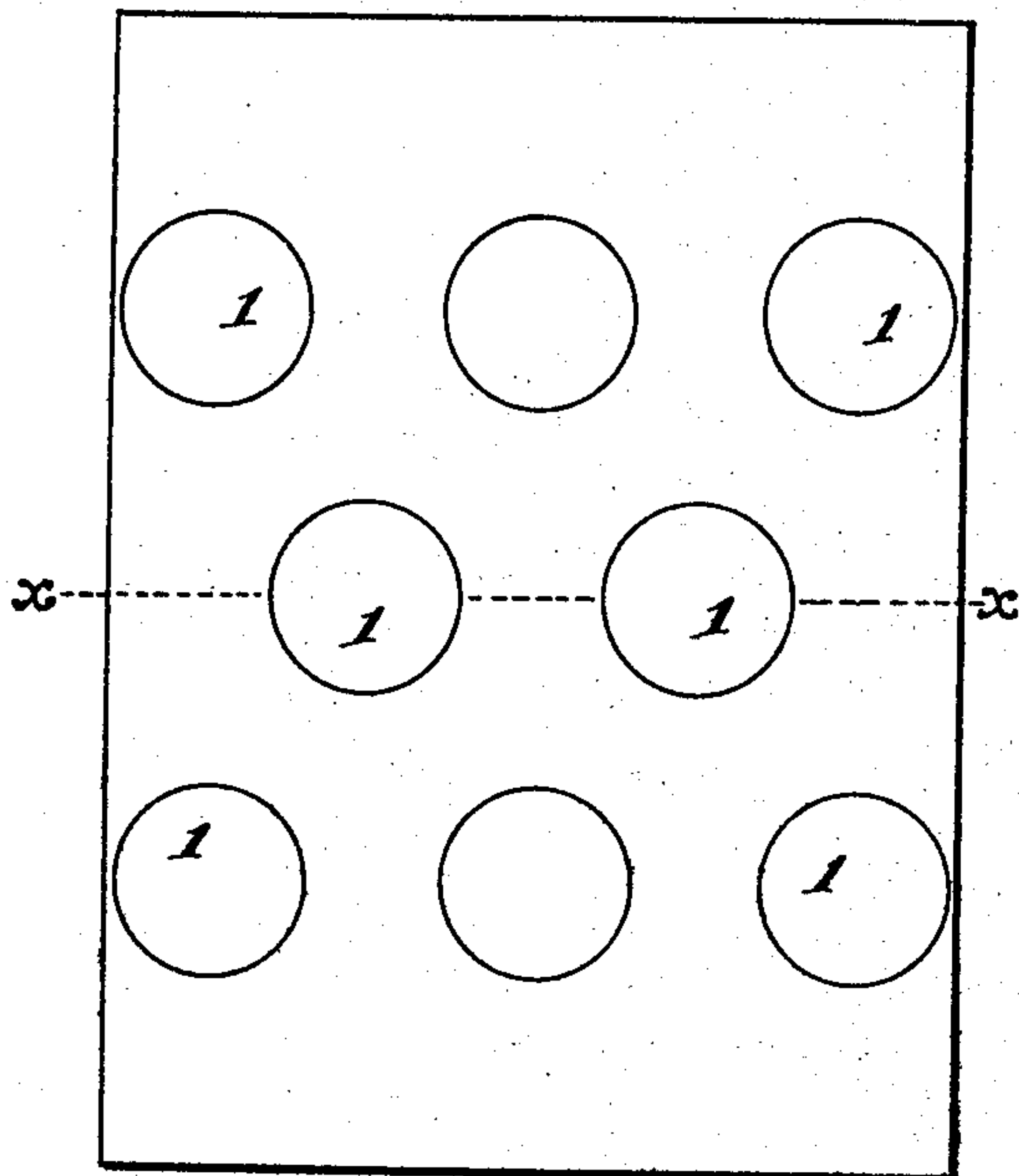


Fig. 1.

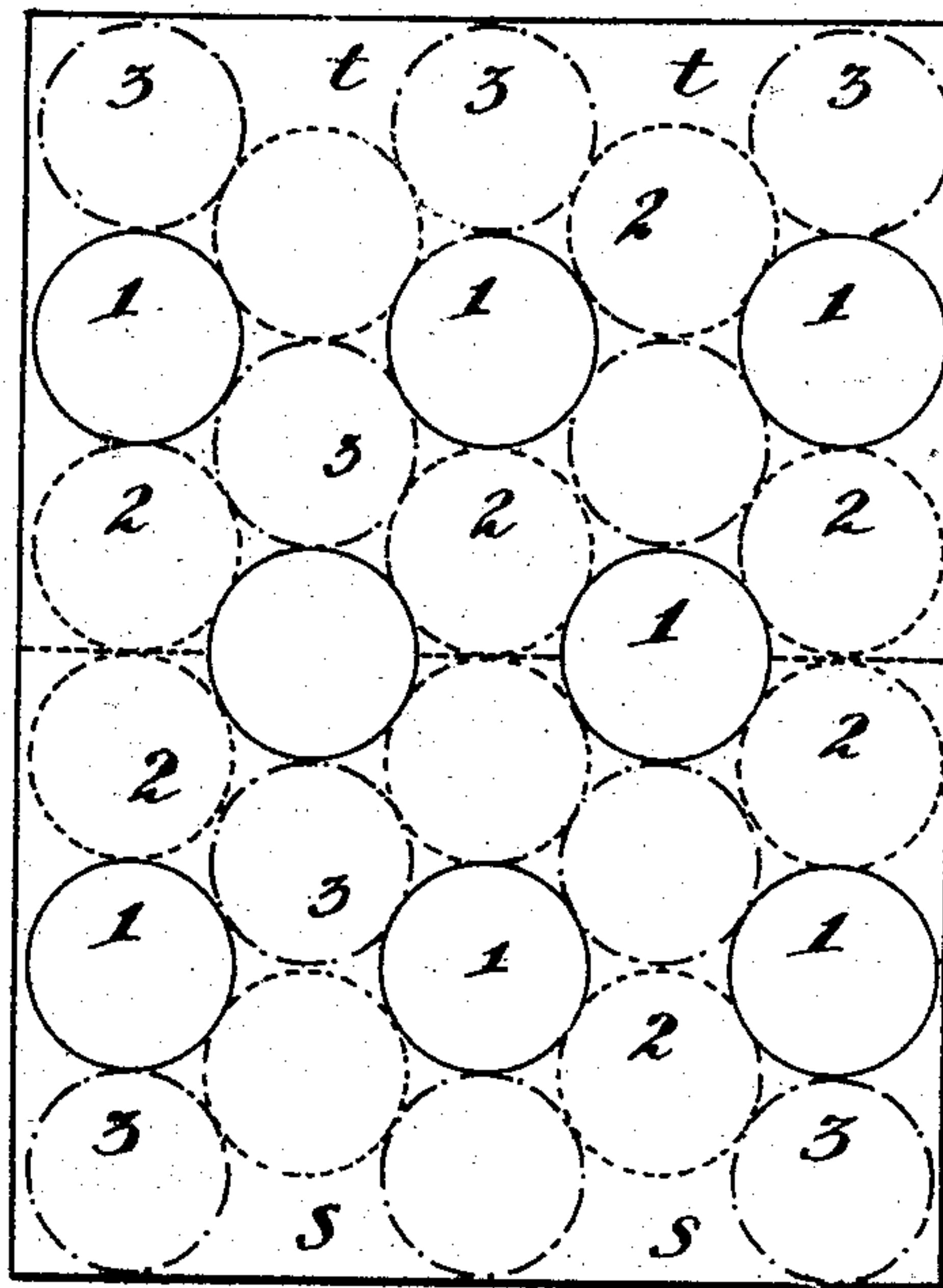


Fig. 5.

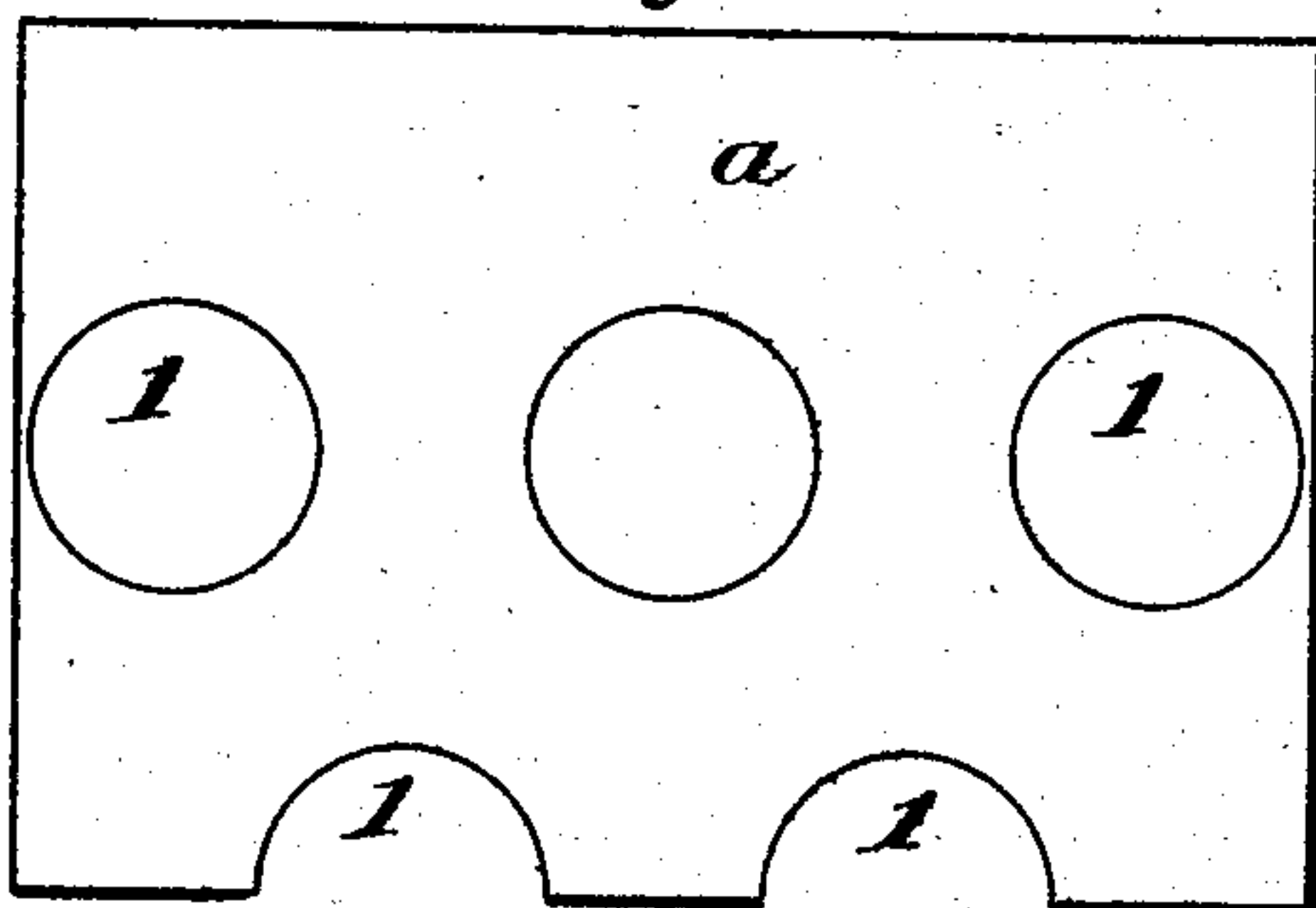


Fig. 2.

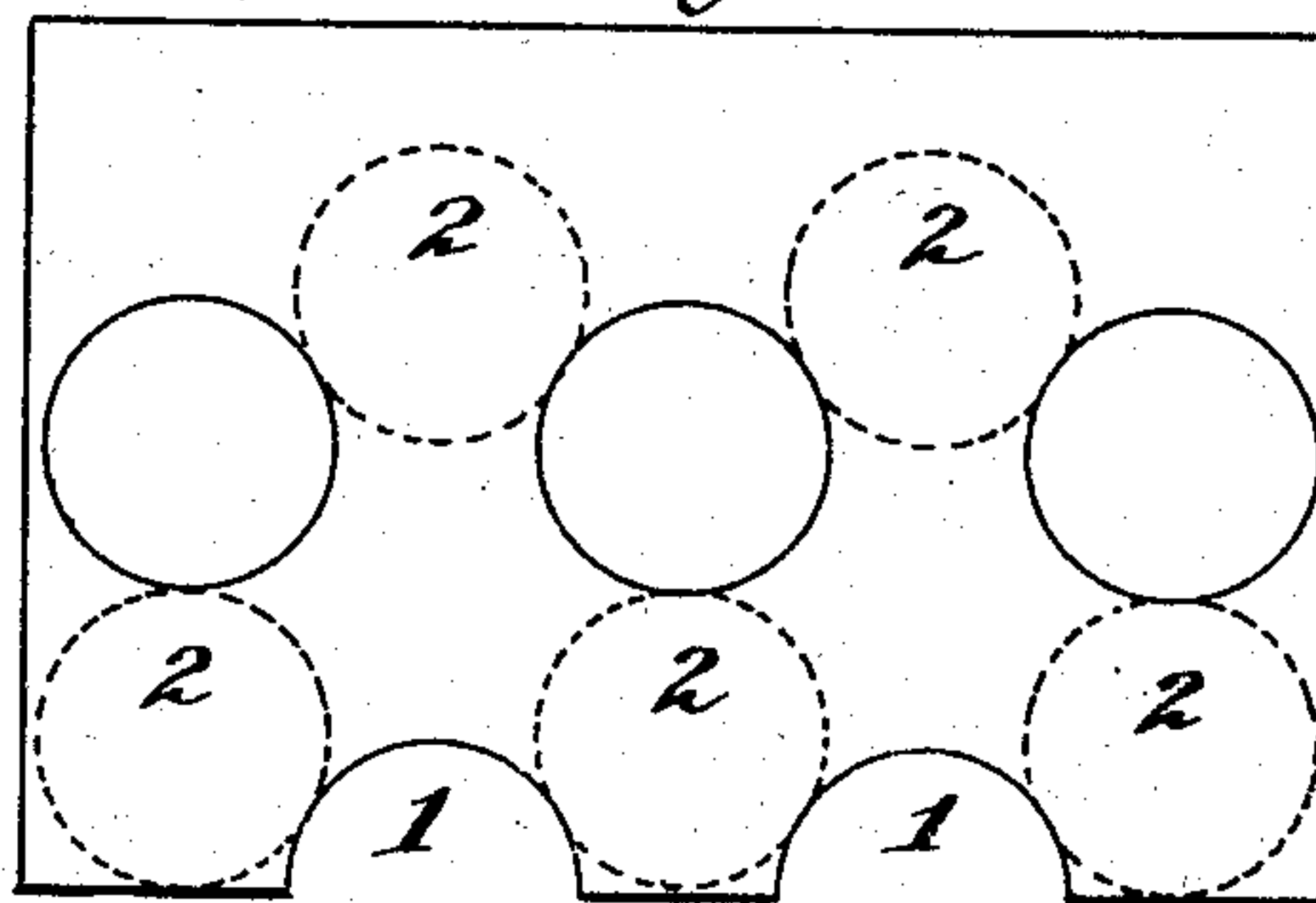


Fig. 3.

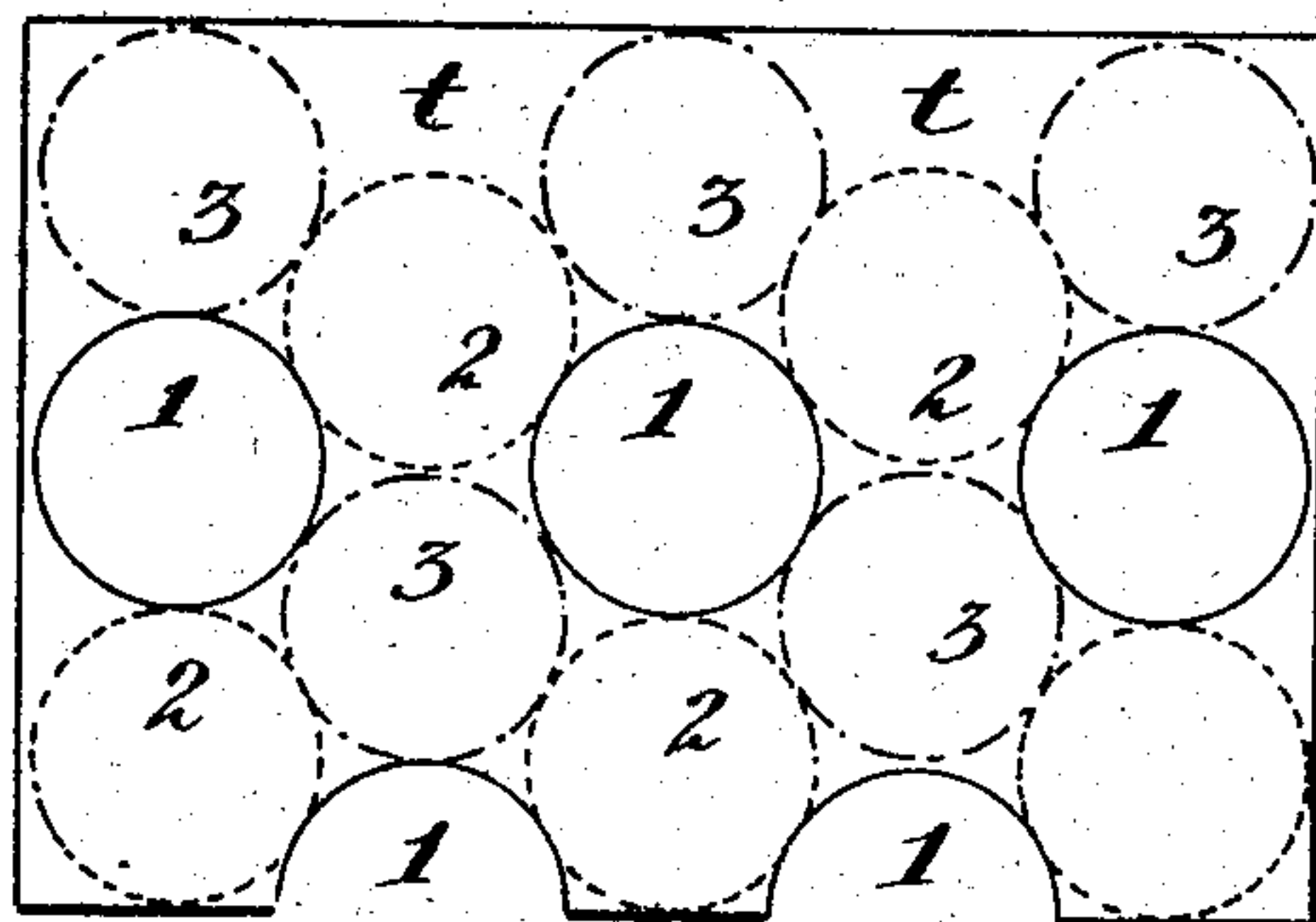


Fig. 4.

Witnesses.
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UNITED STATES PATENT OFFICE.

JOHN LEE, OF SAN FRANCISCO, CALIFORNIA.

METHOD OF CUTTING ENDS FROM SHEET-METAL PLATES.

SPECIFICATION forming part of Letters Patent No. 782,451, dated February 14, 1905.

Application filed December 12, 1902. Serial No. 134,999.

To all whom it may concern:

Be it known that I, JOHN LEE, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Methods of Cutting Ends from Sheet-Metal Plates, of which the following is a specification.

My invention relates to the cutting of ends for sheet-metal cans from plates of sheet metal; and the object of my invention is to so manipulate the plate during the operation of cutting as to obtain a greater number of can ends from a single plate than has before been practicable when using gangs of dies.

In carrying out my invention I cut from a large sheet of any suitable size a certain number of can ends by means of a staggered arrangement of cutting-dies in a suitable press. I then shear the sheet crosswise so as to form two sheets, and I then cut the remainder of the can ends from the half-sheets obversely and reversely.

In the illustration shown in the accompanying drawings, Figure 1 represents a piece of sheet metal from which by a suitable gang of dies can ends have been cut in a staggered arrangement. Fig. 2 represents in plan view one-half of the plate shown in Fig. 1 on the line *xx* after the first set of can ends have been cut. Fig. 3 shows in plan view the half-plate of Fig. 2, with additional can ends cut from it by a separate gang of dies. Fig. 4 shows the half-sheet of Fig. 3 supposed to be reversed and with an additional number of can ends cut from it by the same gang of dies which cut the second series of ends in Fig. 3. Fig. 5 is a plan view in which the halves of the original sheet after having been cut obversely and reversely have been theoretically joined together in order to show the full number of can ends cut from such sheet.

In the practice as now followed in can-factories it is always the intention to secure from a piece of sheet metal as many can ends as can be produced from the sheet by gangs or single arrangements of cutting-dies. In all cases the cutting-dies act upon a single sheet, and to afford an illustration it may be said that by such manipulation twelve can ends of the diameter

of four and five-sixteenths inches are cut from a standard plate of about thirteen and one-fourth by seventeen and three-fourths. I have discovered that by using a larger sheet, (say twenty by twenty-six,) cutting a series from the whole sheet, dividing the sheet into halves, and treating the halves of the sheet separately from both sides I can from such a plate obtain twenty-eight can ends and so increase the number of can ends in excess proportion to the increase in the size of the sheet. I thus utilize a considerable amount of valuable material which has heretofore been wasted and also leave areas of scrap suitable for smaller ends or other fittings.

In carrying out my invention and using the accompanying drawings simply as illustrative of its application to a certain size of plate, I first cut from the whole plate by means of a staggered arrangement of dies the eight can ends represented by the circles 1 in Fig. 1. I then shear the plate transversely into two halves, as represented by the lines *xx*, Fig. 1, of which one is represented by the letter *a* in Fig. 2. In the illustration shown this half-plate *a* has had removed from it three complete can ends and halves of two others. I now transfer the half-plate *a* to a second gang of dies, which in the case illustrated consists of five members, and cut from such half-plate five additional can ends, (represented by the dotted circles 2 in Fig. 3.) In referring to Fig. 3 it must be understood that the full-line circles in that figure are also the full-line circles of Fig. 2 and that the dotted circles 2 represent the first lot of can ends cut from the half-plate. I now reverse the half-plate and using the same gang of five dies cut five additional can ends, as represented by the dash-dot circles 3 in Fig. 4. I have now secured eighteen can ends, comprising the eight can ends cut from the whole plate originally and ten more can ends cut from the obverse and reverse of half the original plate sheared through transversely. I now have left the other half of the original plate, which is similar in appearance to Fig. 2 and if joined to the latter would make up the original Fig. 1. From this second half of the sheared plate I can now by using the

same gang of five dies cut first five can ends from the obverse and then five more can ends from the reverse, which gives me ten additional can ends to be added to the eighteen already accounted for. Thus from the original sheet by my method of manipulation I have cut the twenty-eight can ends represented by the circles in Fig. 5 and have utilized the metal in the original sheet to the utmost advantage and have left the minimum amount of waste material.

I am aware that it might be possible for a skilled workman using a single die and provided with absolutely accurate gages and employing the necessary time and care to produce the result shown in Fig. 5; but such a proceeding would be entirely too slow to be practical in modern can-factories. It is probable that it would be considered better and more economical to cut twenty-four can ends from a sheet as quickly as it is now done by the gang of dies than to allow the skilled workman the time to operate a single die and get twenty-eight can ends from the same sheet. The additional time required in using a single die would more than offset the saving of metal, and this comparison does not take into account the personal equation of the workman, the number of ends he may spoil in attempting to get the ultimate number, and which spoiled ends would result from carelessness on his part in adjusting the sheet to the gages.

The advantages of my device, therefore, lie in the fact that by shearing the sheet into halves after a certain number of ends have been cut from such sheet the subsequent operation can be continued by gangs of dies, the half-sheets being cut obversely and reversely, with the result that the possible ultimate number of can ends are produced from the sheet quickly and by the use of the ordinary care and skill now employed.

I have herein described and have shown in the drawings an illustrative arrangement for cutting a certain number of can ends from a certain size of sheet. It is evident, however, that larger or smaller sheets of metal can be treated in the same way to produce the same results, the essential idea being that from the whole sheet a staggered arrangement of can

ends is first cut, that then the sheet is sheared transversely, and that afterward staggered arrangements of can ends are cut from the half-sheets obversely and reversely.

Another advantage results from the cutting in staggered arrangement, as described, which is that when the ultimate possible number of can ends have been cut from both halves of the original sheet the waste material remaining is practically concentrated at two points (*s s* and *t t* in each half sheet) and instead of being thrown out can be utilized for cutting additional can ends of smaller size. No such concentrated areas of unused scrap is ever left in the present practice of cutting with gangs of dies.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The method of producing can ends which consists in first cutting from a whole sheet and by a gang of dies a certain number of such ends in staggered arrangement, then shearing the sheet so as to produce duplicate half-sheets, and then cutting from each half-sheet, obversely and reversely and in staggered arrangement, additional can ends; so that the total or ultimate possible number of can ends shall have been produced from the original sheet by gangs of dies.

2. The method of producing can ends which consists in first cutting from a whole sheet and by a gang of dies a certain number of such ends in staggered arrangement, then shearing the sheet transversely on a line diametrically of the cuttings at the middle portion of the sheet so as to produce duplicate half-sheets, then cutting from each half-sheet separately obversely and reversely and in like staggered arrangement additional can ends; so that the total or ultimate possible number of can ends shall have been produced from the original sheet by gangs of dies.

In testimony whereof I have affixed my signature, in presence of two witnesses, this 26th day of November, 1902.

JOHN LEE.

Witnesses:

L. M. SEELY,
F. M. BURT.