

D. P. ROBINSON.
DIE CUTTING MACHINE.
APPLICATION FILED MAY 28, 1909.

941,953.

Patented Nov. 30, 1909.
3 SHEETS—SHEET 1.

Fig. 1.

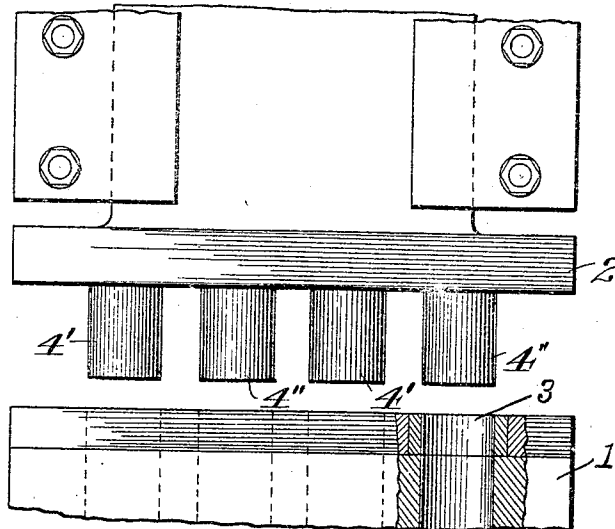


Fig. 2.

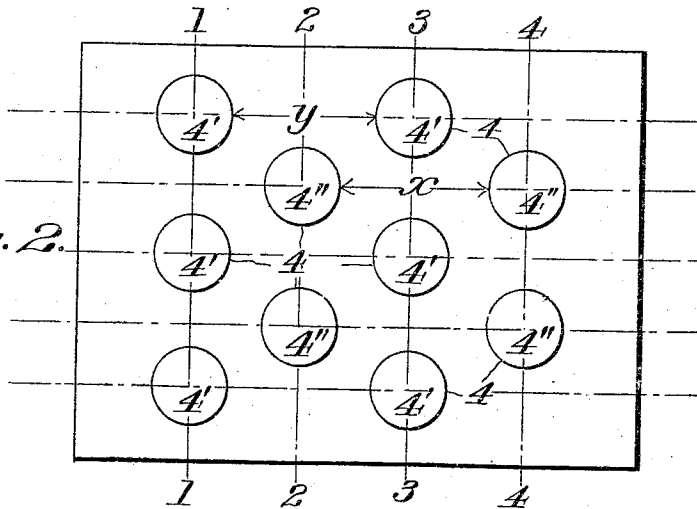
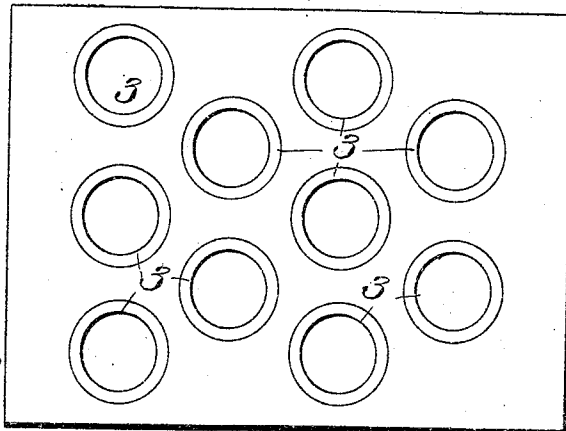


Fig. 3.



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Fig. 4.

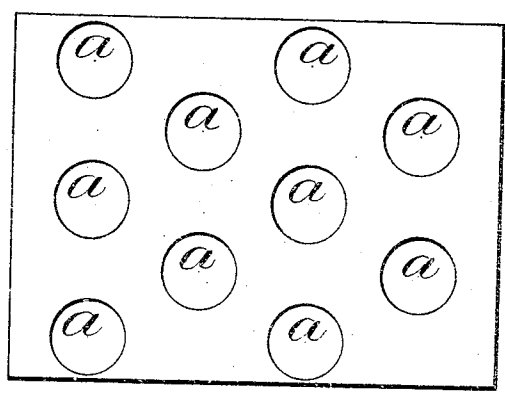


Fig. 5.

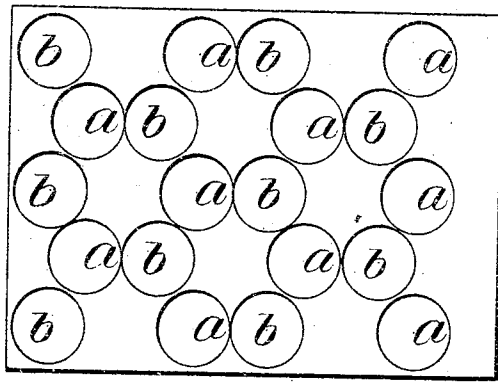
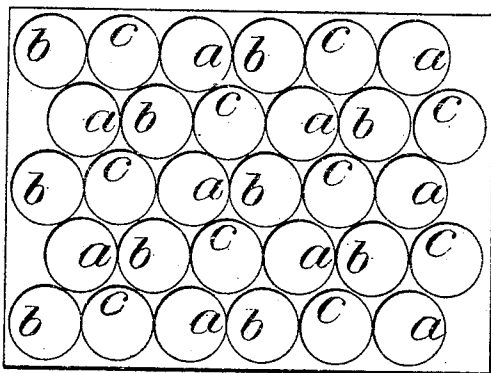


Fig. 6.



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3 SHEETS—SHEET 3.

Fig. 7.

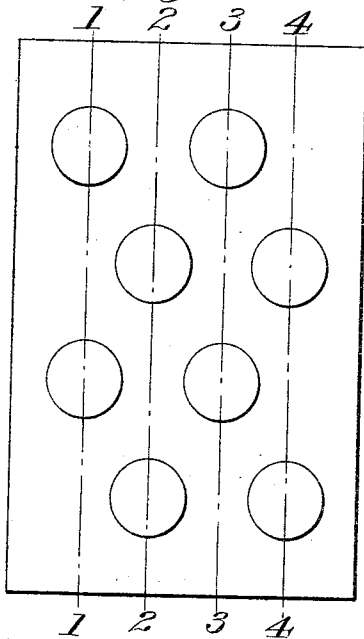


Fig. 8.

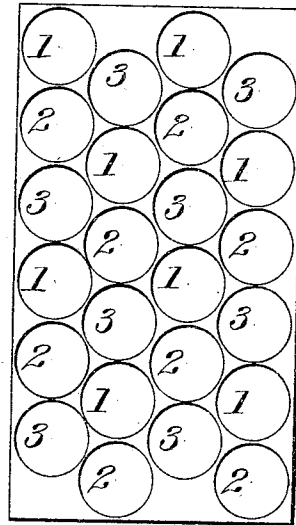
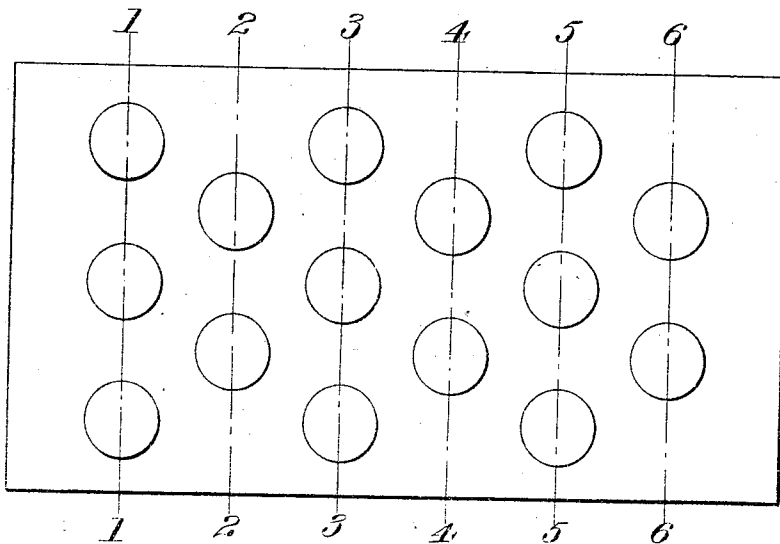


Fig. 9.



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UNITED STATES PATENT OFFICE.

DANIEL P. ROBINSON, OF BALTIMORE, MARYLAND, ASSIGNOR TO CONTINENTAL CAN COMPANY, OF BALTIMORE, MARYLAND, A CORPORATION OF NEW JERSEY.

DIE-CUTTING MACHINE.

941,953.

Specification of Letters Patent.

Patented Nov. 30, 1909.

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To all whom it may concern:

Be it known that I, DANIEL P. ROBINSON, a citizen of the United States, residing at Baltimore, in the State of Maryland, have
5 invented certain new and useful Improvements in Die-Cutting Machines, of which the following is a description, reference being had to the accompanying drawing and to the letters and figures of reference marked
10 thereon.

The invention relates to new and useful improvements in die-cutting machines, and more especially machines of this character wherein the disks or blanks are cut from a
15 sheet of metal or other material, by a series of operations by a gang of dies.

It has been found that in cutting round blanks or disks from a sheet, that said sheet may be cut to the greatest advantage as to
20 waste material, provided the disks or blanks are cut in a staggered relation to one another.

In my prior patent No. 915,042, granted March 9th, 1909, I have shown a die-cutting
25 machine wherein a staggered arrangement of disks may be cut from a sheet of metal or other material in four strokes by the same gang of dies, by shifting the sheet or reversing the same end for end between each
30 operation of the machine.

An object of the present invention is to provide an arrangement of a gang of dies whereby the sheet may have a staggered arrangement of disks cut therefrom by the
35 same gang of dies in three operations.

In the drawings,—Figure 1 shows a part of a dies press having my improved arrangement of dies therein; Fig. 2 is a bottom plan view of the reciprocating head, showing the arrangement of the male dies; Fig. 3 is a top plan view of the bed plate, showing a similar arrangement of the female dies; Fig. 4 shows a sheet of metal which has received one operation from my
45 arrangement of dies; Fig. 5 is a similar view of the sheet after the same has been reversed end for end, and a second series cut from said arrangement of dies; Fig. 6 is a similar view, showing the sheet shifted
50 laterally, and a third series cut from said sheet by my arrangement of dies; Fig. 7 is a bottom plan view, showing a slightly modified arrangement of the male dies; Fig. 8 shows a sheet cut by the arrangement of
55 dies shown in Fig. 7; Fig. 9 is a bottom

plan view, showing still another modified arrangement of the male dies.

In carrying out my invention, any suitable die press may be used which includes a supporting bed and a reciprocating head. 60 The particular means for reciprocating the head forms no part of the present invention, and may be of any usual form of construction. I have shown herein a portion of such a machine, which consists of a bed
65 plate 1 and a reciprocating head 2. The bed plate 1 is preferably provided with the female dies 3, which may be of any desired construction, and the reciprocating head carries the male dies 4, which also may be
70 of any desired construction.

My present invention relates to the arrangement of the dies relative to one another, whereby a certain arrangement of disks or blanks may be cut from a sheet by
75 a plurality of operations of the same gang of dies. In describing the arrangement of the dies I will, therefore, refer to the arrangement of the male dies, and it will be understood, of course, that the female dies
80 are so arranged as to coöperate with the male dies.

As shown in Fig. 2, the male dies are arranged in four parallel rows 1—1, 2—2, 3—3, and 4—4, extending in one direction
85 across the die-carrying head, while said dies are arranged in five parallel rows extending in the opposite direction across the head, as indicated by the dotted lines in Fig. 2.

I have shown three dies 4', 4', 4', which
90 constitute row 1, while there are two dies 4'', 4'', which constitute row 2. It will be seen that the dies 4'' are symmetrically staggered, relative to the dies 4'. The row 3—3, also consists of three dies 4', 4'; while the
95 row 4—4, consists of two dies 4'', 4''. The dies in the rows 3—3 and 4—4, are also symmetrically staggered relative to one another; that is to say, the dies 4'' are arranged in rows at right angles to one
100 other, across the die-carrying head, and centrally disposed intermediate the parallel rows of the dies 4', in the same direction across the die head. The distance between the dies 4', 4', in the rows 1—1 and 3—3, indicated by y in Fig. 2, is slightly greater
105 than twice the diameter of a die, so that in subsequent operations upon a sheet, two disks may be cut from said sheet in the space referred to. The distance between the dies
110

4'', 4'', in the rows 2—2 and 4—4, indicated by x in Fig. 2, is also slightly greater than twice the diameter of a die. It will also be observed that the dies are arranged in an even number of rows, extending in one direction across the die head, and, therefore, the dies 4'' in the outside row 4—4, are staggered relative to the dies 4' in the opposite outside row 1—1. By arranging the dies in this staggered relation to one another, I may reverse the sheet end for end, and thereby reverse the position of the dies relative to the first cutting operation upon the sheet.

Referring to Fig. 4, I have shown therein a sheet of metal or other material, from which a series of disks a have been cut by one operation of my arrangement of dies.

In Fig. 5 I have shown the sheet reversed end for end, and again presented to the same gang of dies, and a series of disks b cut therefrom. It will readily be seen that if there were an odd number of rows, or if the row 4—4, be omitted, then the disks in the outer rows 1—1, 3—3, would be similarly disposed, and a reversing of the sheet would bring the die head into the same position relative to the sheet as in the first operation. By this staggered arrangement, however, of the outer rows, I am able to reverse the sheet and reverse the arrangement of the disks which are out from the sheet by a second operation. Inasmuch as the disks between the rows 1—1 and 3—3, and also between the rows 2—2 and 4—4, are spaced a distance slightly greater than twice the diameter of a die, the sheet may be shifted endwise relative to the gang of dies, as shown in Fig. 6, and a third series of disks c cut from the sheet, which completes the entire cutting of the sheet. By the three operations of the same gang of dies, I have, therefore, cut a staggered arrangement of disks, which enables me to reduce the waste material to a minimum, and I have cut the entire sheet in three operations of the same gang of dies.

Looking at my arrangement of dies from another standpoint, it will be noted that any three adjacent dies are located at the angles of a substantially equi-lateral triangle and that the distance between the cutting dies is such that a disk may be cut in a subsequent operation from the material left after an operation by said three dies with only sufficient waste material between the opening formed by the cutting of said disk and the openings formed by said dies to hold the material together. In other words, the center of the disk is an equal distance from the center of the openings cut by said dies and said distance is slightly greater than the diameter of the die. This triangular arrangement of the dies is necessary in order that the three operations above described may be performed by the same gang of dies.

In Fig. 7, I have shown an arrangement

of dies wherein there are an even number of rows 1—1, 2—2, 3—3, and 4—4, and the dies in the row 4—4, are staggered relative to the dies in the row 1—1. In each row there are the same number of dies, in this arrangement of my dies. I have also shown the dies herein spaced so that the distance between the cutting edges of the dies in the rows 1—1, 2—2, 3—3, and 4—4, is slightly greater than twice the diameter of a die.

In Fig. 8 I have shown a sheet of material cut by three strokes of the gang of dies, arranged as shown in Fig. 7, the sheet, of course, being changed end for end to reverse the relation of the dies relative to the sheet and shifted laterally in order to position the same for the third operation. While I have shown in Fig. 7 a slightly different arrangement of the dies, it will be seen, however, that the essential features of the outer rows being staggered relative to one another in one direction across the head, and the distance between adjacent dies in the rows extending in one direction across the head, being slightly greater than twice the diameter of the die are present. It is by maintaining these essential features of the arrangement, that I am able to reverse the sheet end for end, and shift the same laterally, so as to cut in three operations the entire sheet, cutting in each operation an equal number of disks, and cutting in the three operations a staggered arrangement of disks relative to one another.

In Fig. 9 I have shown an arrangement of dies wherein there are an odd number of dies. The dies are arranged in rows 1—1, 2—2, 3—3, 4—4, 5—5, and 6—6, in precisely the same manner as shown in Fig. 2, with the exception that I have added two rows of dies 5 and 6. It will readily be seen that by this arrangement I may cut the sheet in three operations in precisely the manner described in connection with the arrangement of dies shown in Fig. 2, and that in the operation I will cut an odd number of disks, instead of an even number, as in the arrangement shown in Fig. 2.

While I have described the sheet as reversed end for end, it will be understood, of course, that by this expression I intend to cover the reversing of the sheets side for side, the turning of the sheet over, or any other manipulation of the sheet, whereby the same is reversed relative to the dies.

While I have described my machine as especially adapted for cutting a sheet of metal in three operations, cutting in each operation an equal number of disks, it will be understood that from certain aspects of the invention, the sheet may be presented for two operations, cutting a series of disks a and then a reverse series of disks b , after which the sheet may be presented to another machine, in which only eight disks are cut,

omitting the two end disks *c, c*, at the right of the sheet in Fig. 6.

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

1. A die-cutting machine for cutting a plurality of disks from a sheet of metal or other material, including a gang of dies arranged in parallel rows with the dies in adjacent rows symmetrically staggered relative to one another, and the dies in the outer rows extending in one direction staggered relative to the dies in the opposite outer parallel row, the distance between the cutting edges of the dies in the rows extending in one direction, being spaced slightly greater than twice the diameter of a die and the distance between the cutting edge of the dies in the rows extending at right angles to said first named rows being slightly less than the diameter of a die.

2. A die-cutting machine for cutting a plurality of disks from sheet metal including a gang of dies arranged in an even number of parallel rows in one direction, and in any number of parallel rows in a direction at right angles thereto, the dies in adjacent rows being staggered relative to one another, the distance between the cutting edges of the dies in the rows extending in one direction, being slightly greater than twice the diameter of the dies, and the distance between the cutting edges of the dies in the rows extending at right angles to the first named rows, being slightly less than the diameter of the dies, whereby a sheet of metal may be presented to said gang of dies

and cut, reversed end for end and again cut, moved sidewise and again cut, so that the entire sheet may be cut in three operations, cutting therefrom a staggered arrangement of disks and cutting in each operation an equal number of disks.

3. A die cutting machine for cutting a plurality of disks from a sheet of metal or other material, including a gang of dies arranged with the centers of any three dies located at the angles of a substantially equilateral triangle, and the distance between the cutting edges of the dies being such that a disk may be cut in a subsequent operation of the same diameter as the dies, from the material left after an operation by said three dies, and only sufficient waste material left between the opening formed by said disk and the openings formed by said dies to hold the material together, the dies at one extreme side of said gang being staggered relative to the dies at the opposite extreme side whereby a sheet of metal may be presented to said gang of dies and cut, reversed end for end, and again cut, moved sidewise and again cut, so that the entire sheet may be cut in three operations, cutting therefrom a staggered arrangement of disks and cutting in each operation, an equal number of disks.

In testimony whereof I affix my signature, in presence of two witnesses.

DANIEL P. ROBINSON.

Witnesses:

EUGENE G. MASON,
C. L. STURTEVANT.