

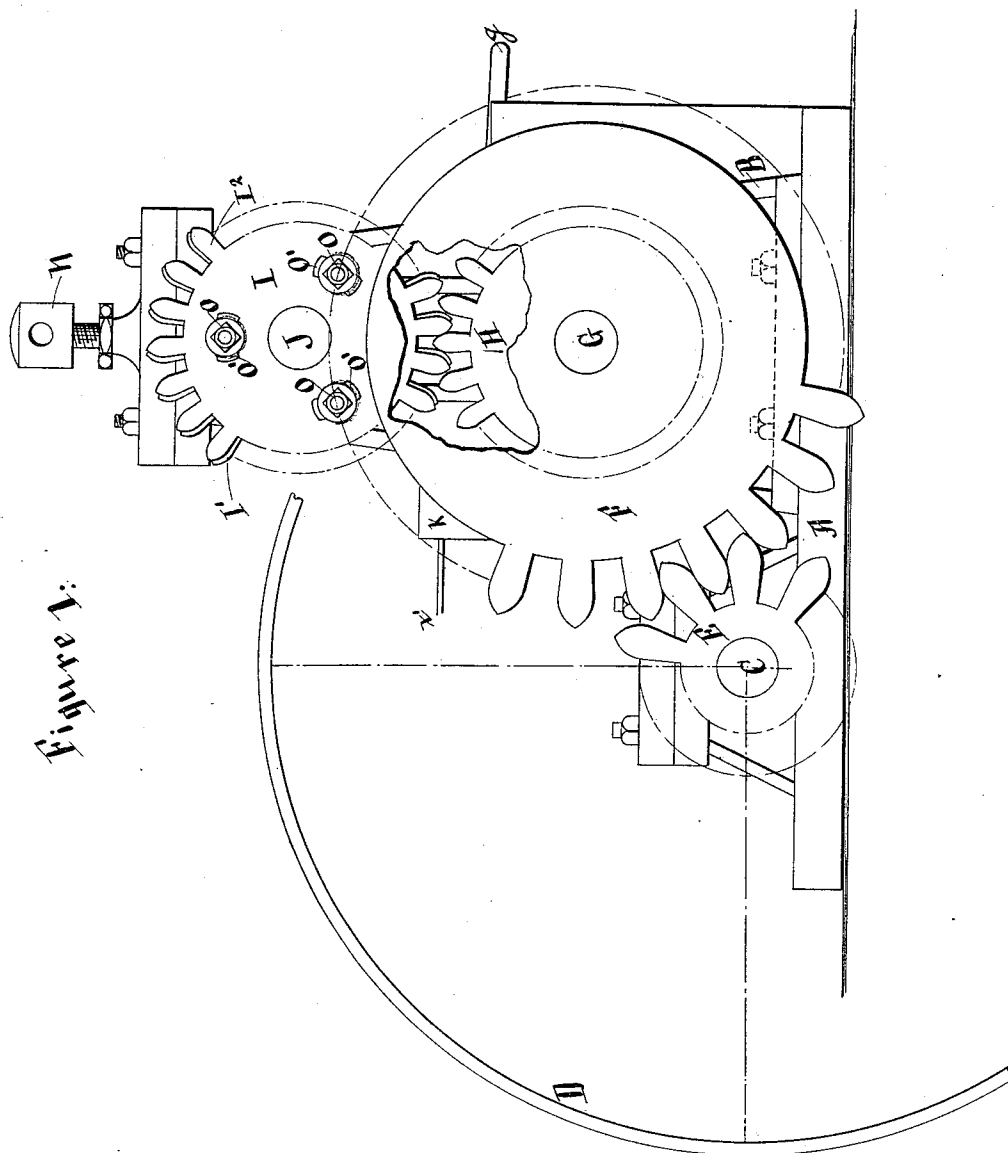
(No Model.)

3 Sheets—Sheet 1.

B. J. MALONE.
METAL CUTTING MACHINE.

No. 360,032.

Patented Mar. 29, 1887.



WITNESSES:

Joseph L. Levy
George W. Boxcher.

INVENTOR

Bernard J. Malone
BY Phillips Abbott
his ATTORNEY

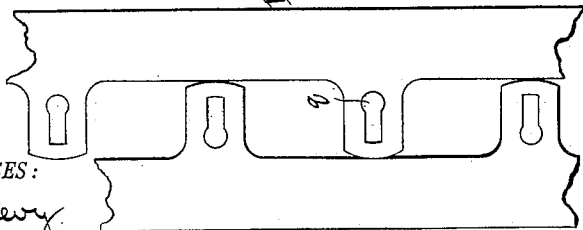
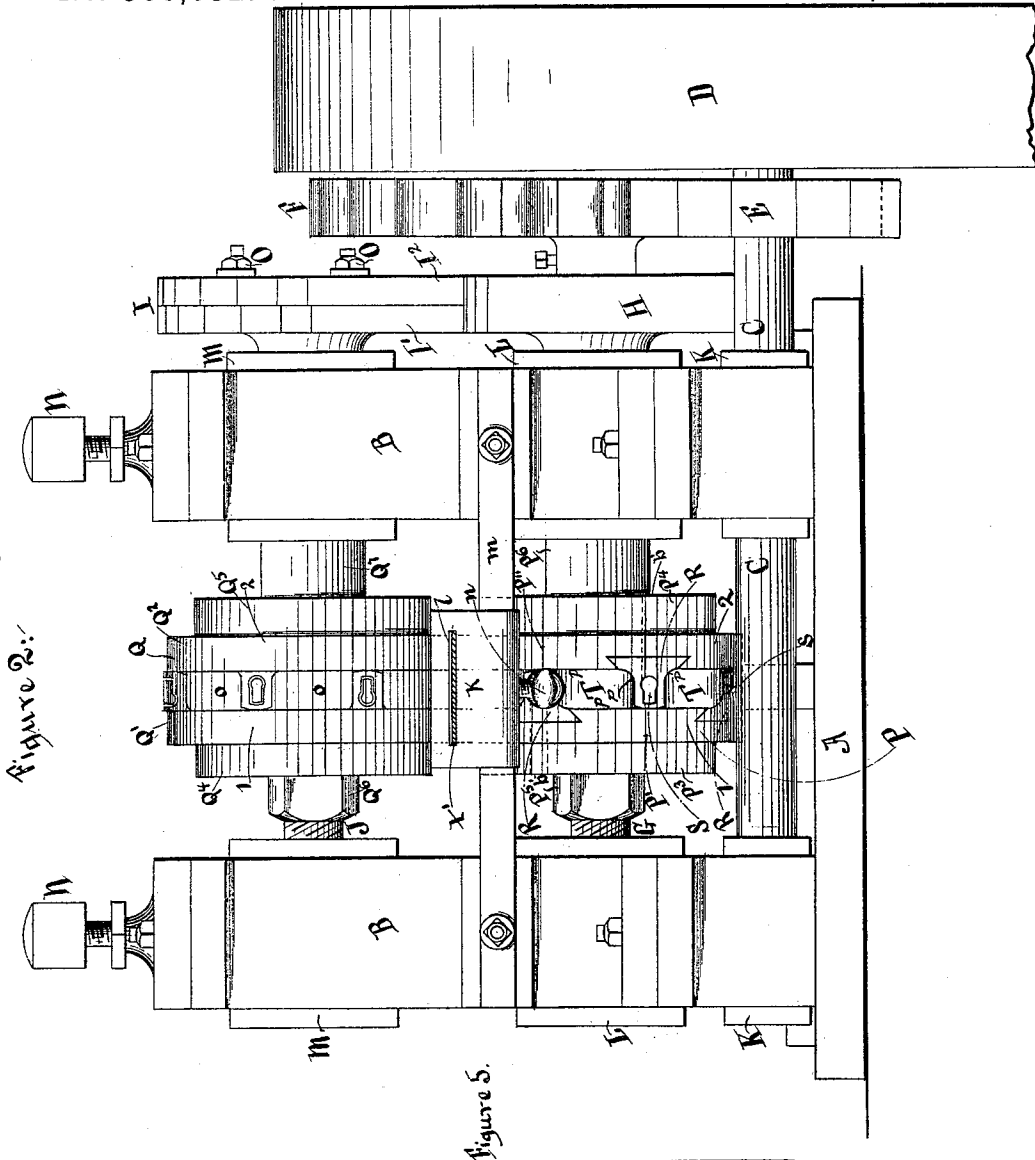
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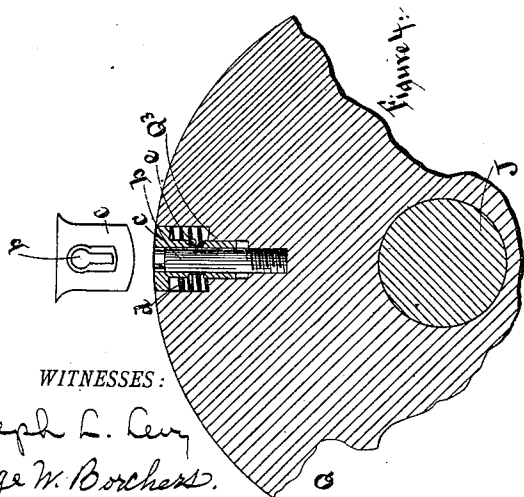
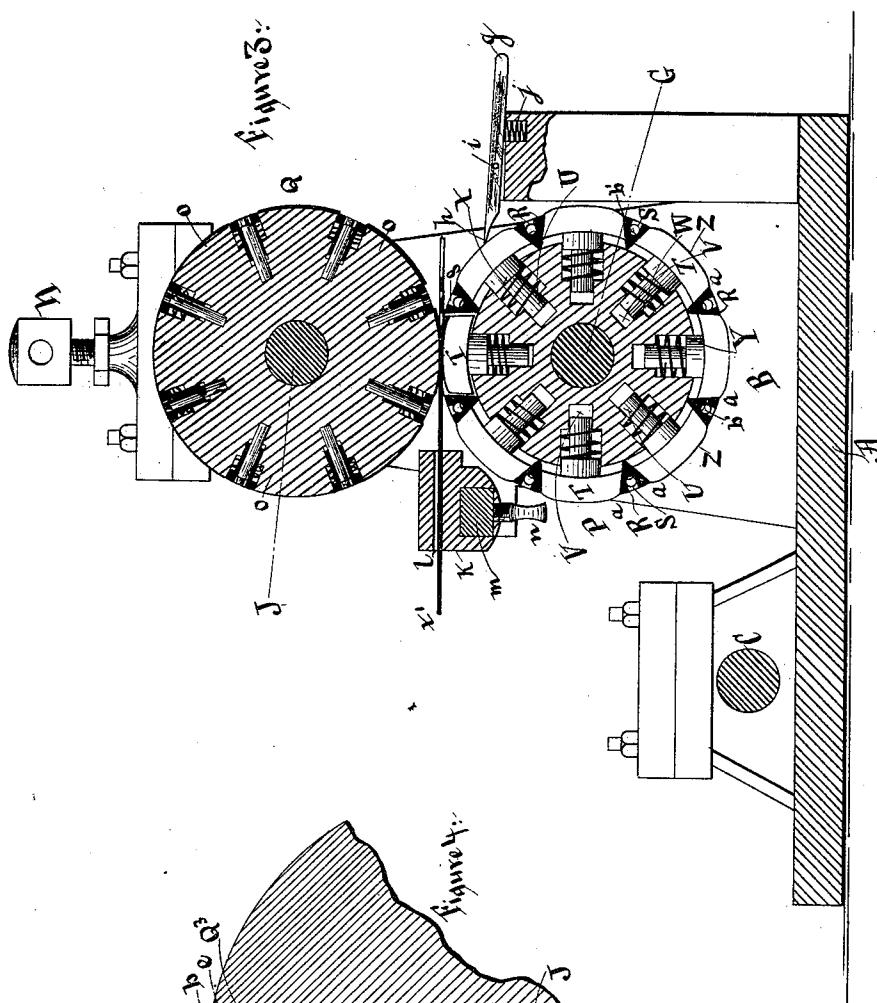
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UNITED STATES PATENT OFFICE.

BERNARD J. MALONE, OF BROOKLYN, NEW YORK.

METAL-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 360,032, dated March 29, 1887.

Application filed June 22, 1886. Serial No. 205,927. (No model.)

To all whom it may concern:

Be it known that I, BERNARD J. MALONE, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Metal-Cutting Machines, of which the following is a specification.

My invention relates to an improvement in apparatus for cutting or blanking out articles of manufacture from sheet metal and in the process practiced by the use thereof. The characteristic features of the apparatus are continuously-revolving cutting-dies and devices whereby the articles may be cut out in continuous succession, and all in one piece—that is to say, the completed article be integral—and the apparatus is so constructed and arranged that the parts of the sheet metal which are severed by the action of the cutting-dies are automatically removed from the faces thereof, and thus they are kept clear of being clogged.

In the drawings and description thereof I show my device as adapted to cut corset-clasps from sheet-steel; but I do not limit myself to such use, since it is obvious that many different articles having differing shapes and for differing uses can be made by my machine, the form of the cutting-surfaces on the dies determining the outline and parts of the articles produced by them.

In the drawings like letters indicate like parts in all the figures.

Figure 1 illustrates a side view of the machine, part of an intermediate gear-wheel being cut away to exhibit the gear-wheels behind it. Fig. 2 illustrates a front view of the machine. Fig. 3 illustrates a vertical longitudinal view of the cutting-dies and adjacent parts, partly in section. Fig. 4 illustrates an enlarged view of part of the upper cutting-die, partly in section. Fig. 5 illustrates part of a pair of corset-clasps cut on my machine.

A is the base of the machine, which supports uprights B B. These parts preferably consist of an iron casting.

C is the main or driving shaft, which supports the main driving pulley or wheel D.

E is a pinion fast on the driving-shaft C, which gears into a power-increasing gear, F, which is fast on the shaft G. Inside of the gear F, and fast to the shaft G, is a gear, H, which

meshes into another gear, I, fast on the shaft J. This shaft J is preferably placed directly over the shaft G. The shafts C, G, and J rotate, respectively, in journals K, L, and M, and the shafts G and J and the various parts attached to them are adjusted toward or away from each other by means of the set-screws N, or in any other desired manner.

The gear-wheel I is peculiarly constructed. It consists of two disks, I' and I'', both preferably of the same thickness, the edges whereof are provided with cog-teeth exactly coincident with each other. These disks are clamped to each other by means of bolts O, or in any other suitable manner, the shanks of the bolts passing through curved slots O', formed in one or both of the disks, so that by slacking up on the bolts the disks can be made to slide past each other and the cog-teeth on the respective disks moved out of coincidence with each other, the effect of which will be to widen the aggregate space occupied by the cogs, so that they will exactly fill the space between the cogs on the wheel H. Thus by the movement of these disks any wear or "backlash," so called, between these gear-wheels may be taken up and accurate movement secured. This device I was compelled to invent, because it is very desirable that the cutting-dies, hereinafter described, should run with great exactness, so that the cutting-faces thereof shall not override each other. The combined width of the two disks I' and I'', forming the wheel I, is preferably the same as that of the wheel H. It will also be observed that when the cogs on the disks have become worn on one side the disks may be slid past each other in the opposite direction, which will present different surfaces of the cogs to wear, both on the disks composing the wheel I and also on the wheel H, thus increasing the length of time these wheels can be used.

P is the lower cutting-die. It is circular, and is fastened to the shaft G and rotates with it. Q is the upper cutting-die, also circular, and is fastened to the shaft J and revolves with it. These cutting-dies may be of the same diameter, or either may be larger than the other; but the speed at which their peripheries run must be the same. Their construction is best shown at Fig. 2, and in section at Fig. 3. The lower one, marked P, is formed

of two parts, P' and P". These are counter-parts of each other, and into each of them dovetailed V-shaped blocks R are inserted, in which are formed holes or recesses S, which constitute the female die for cutting out the holes in the tabs of the corset-clasps. (Seen in Fig. 5 at q.) The V-shaped blocks R are formed of such a taper that the inner ends of adjacent blocks are farther apart than the ends at the periphery of the wheel; and as seen in Fig. 2, these blocks R project inwardly from the respective parts P' and P², into which they are dovetailed, and extend, respectively, almost across to the opposite side of the space between these two parts. The outer surface of the blocks R is flush with the periphery of the cutting-die P' and P². Thus there are left spaces between the blocks R and the inner surfaces of the parts P' and P², which are parallel-sided laterally, but are conical at the ends from within outwardly. Into these conical spaces are inserted blocks T, which exactly fill the spaces in which they are placed when in their position of greatest projection. Each of these blocks T is provided with a stem, U, which enters a recess, V, formed in the plate P' or P², as the case may be, and also with a strong spring, W, which surrounds the stem U, and is shouldered against the block or against a suitable part of the spindle, as at X, and also against a shoulder, Y, on the part P' or P², as the case may be. The blocks T are made of such size that when the springs W force them outwardly their outer face Z will project slightly beyond the periphery of the part P' and P², and will be prevented from farther outward movement by the impingement of the ends of the blocks against the tapering sides of the blocks R, and the ends of the surfaces Z are round or beveled off, as at a. The two parts P' and P² are firmly held together by side clamping plates or washers, P³ and P⁴. The nut P⁵, working on a thread cut on the shaft G, binds all firmly together, clamping the said parts against a shoulder, P⁶.

The upper cutting die, Q, is somewhat similar to the lower one, P—that is to say, it is made in two parts, Q' and Q². In the die Q there are drilled radial holes of different diameters, as best seen at Q³ in Fig. 4, and in the center of each of these holes is rigidly fastened a punch, b, the cutting-face whereof projects beyond the periphery of the die itself. The cutting-face of this punch corresponds to the shape of the holes in the tab q of the corset-clasps. The punch is surrounded by a stripper-sleeve, c, which is actuated by a spring, d. The outward movement of the stripper-sleeve c is regulated by a pin, e, which passes through a reduced part of the stripper-sleeve c. The two parts of the die Q are firmly held together by plates or washers Q⁴ and Q⁵, nut Q⁶, and shoulder Q⁷, the same as in the case of the lower die.

The upper or male die, Q, may be made all in one piece, if preferred; but for ease and econ-

omy in renewing worn parts I prefer to make it as shown and described.

The parts marked o, between the portions of the upper die through which the punches b work, are raised somewhat above the periphery of the die Q, and act in conjunction with the edges marked p on the lower die to punch out the scrap from the strip of metal, which scrap of course coincides in shape with the part marked o.

It will be seen from the foregoing that the upper die is the male die and the lower one the female.

g is what may be called a "stripper-finger" or "pick-up." It is a piece of steel, chisel-shaped at the front end, h, pivoted near the center, as at i, and is provided with a spring, j, at the rear end. The width of the front chisel-shaped end h is preferably a trifle less than the width of the blocks T.

k is a guide provided with a slot, l, through which the strips of sheet metal X' pass and are correctly guided to the cutting-dies. This guide k is preferably made to slide on a bar, m, across the machine and to be fastened by a set-screw, n, at any desired place.

The adjustment of the dies P and Q is such that their corresponding faces, 1 1 and 2 2, shall so nearly touch each other that the strip of sheet metal will be firmly clamped between these surfaces and caused to feed smoothly and without slipping through the machine as the dies are rotated. Instead of this method, however, which requires somewhat nice adjustment, any other feed-rollers or equivalent devices may be employed, either to pull or to push the metal through the dies.

The operation is as follows: The metal is first cut in strips of a width equal to two corset-clasps, with the attaching-tabs integral therewith, and this strip is passed through the slot l of the guide k and entered between the dies P and Q, and as the dies rotate the male projecting parts of the die Q shear and sever the metal against the sides and ends of the recesses occupied by the blocks T. These blocks are depressed by the pressure, and, receding, allow the scrap to be smoothly cut out, and as the dies continue to rotate, as soon as the pressure is removed from the block T, the springs W force them and the superincumbent scrap upwardly, and the point of the stripper-finger g, which is kept firmly pressed against the face of the blocks T and R by the spring j, enters under the edge of the scrap and lifts it out and away from the die, thus freeing it. The punches b during the revolution of the dies, engaging with the holes S in the die-blocks R, punch out the holes from the tabs q of the steels. The strippers c, which surround the punches b, are compressed during the time the punches are cutting out the holes in the tabs; but as soon as the pressure is removed the springs d actuate the strippers c, and the tabs are pressed off from the punches, and this is done so smoothly and forcibly that there is practically no springing or catching of the

metal on the punches. The little pieces of scrap punched out by the punches *b* pass down through passages *b'*, formed in the blocks *R*, and also through the walls of the part *P'* and *P''*, and drop away.

It will thus be seen that the corset-clasps are cut out two at a time all complete, with the tabs *g* integral with the body of the clasps, and in long lengths, which can thereafter be cut up into lengths for individual clasps, as desired. The metal may, however, be cut up into suitable lengths for the clasps before being fed to the machine, if desired.

It is obvious that the device may be made to cut clasps singly, instead of two at a time, and also that by adequate changes in the form of the cutting-dies and the depressible parts thereof other forms of corset-steels—for instance, the slotted back-steels or the perforated steels—may be cut, and also that many other articles used in the arts other than corset-steels may be cut by my method and by my machine with suitable changes in the construction of the dies, as stated. I do not, therefore, limit myself to the use of the device for manufacturing corset materials.

Having described my invention, I claim—

1. The described improvement in machines for cutting sheet metals, consisting in rotary male and female cutting-dies, in combination with automatic depressible spring-actuated parts placed in the recesses of the female die which eject the scrap therefrom, substantially as and for the purposes set forth.

2. The described improvement in machines for blanking out articles from sheet metal, consisting in rotary male and female cutting-dies, in combination with automatic spring-actuated parts located in the recesses of the female die which lift the scrap therefrom, and a spring-controlled stripper which as the dies revolve removes the scrap from the face of the dies, substantially as and for the purposes set forth.

3. The described improvement in machines for blanking out articles from sheet metal, consisting in rotary male and female cutting-dies, in combination with spring-actuated parts located in recesses formed in the female die which lift the scrap therefrom, a spring-controlled stripper-finger which as the dies revolve removes the scrap from the face of the dies, and intermeshing gear-wheels, the cogs of which are adjustable, whereby lost motion may be taken up, substantially as set forth.

4. The described improvement in machines for blanking out articles from sheet material, consisting in rotary male and female cutting-dies, in combination with spring-actuated strippers placed in recesses in the female die whereby the scrap is ejected from the said die, and intermeshing gear-wheels, the cogs of which are adjustable, whereby lost motion may be taken up, substantially as set forth.

5. The combination, in a machine for blanking out articles from sheet material, of rotary male and female dies, the female dies being

provided with spring-actuated parts located in the recesses in the same into which the male dies pass, whereby the scrap punched out by the male die will be automatically lifted from the recesses in the female die, substantially as set forth.

6. The combination, in a machine for blanking out metal, of rotary male and female cutting-dies, and a spring-controlled stripper-finger which presses upon the surface of the female die beyond the cutting-point and removes the parts cut out by the dies as the same revolve, substantially as and for the purposes set forth.

7. The described improvement in dies for blanking out articles from sheet material, consisting in duplicate parts set facing each other, so that the cutting portions are centrally located, and a male die which acts in the centrally-located parts of the double female die, whereby the dies blank out the desired articles in pairs and at the same operation of the machine, substantially as set forth.

8. The described improvement in rotary cutting-dies for blanking out articles from sheet material, consisting in male and female dies, the female die having spring-actuated parts located in the recesses therein, whereby the scrap will be automatically ejected therefrom, the faces of the dies adjacent to the cutting portions running close to each other and impinging on the material between them, so that the material being cut will be fed to the dies by the dies themselves, substantially as set forth.

9. The described improvement in rotary cutting-dies, consisting in male and female dies, the male die being provided with automatic spring-actuated strippers, whereby the material being cut is stripped from the male parts of said die, and the female die being provided with automatic spring-actuated parts placed in the recesses therein, whereby the scrap will be automatically ejected from the said depressed parts, substantially as set forth.

10. The combination, in a machine for blanking out articles from sheet metal, of a female die provided with stationary parts *R*, flush with the face of the die to support the metal, and with yielding spring-actuated parts *T*, placed in the recesses of the female die, adapted to expel the scrap from the said recesses, and a male die provided with adequate punching sections or parts, a guide to deliver the metal to the dies, and spring-actuated strippers to remove the metal and the scrap from the faces of the dies, substantially as and for the purposes set forth.

11. The combination of rotary male and female dies, an automatically-acting spring-controlled stripper-finger which removes the material being cut and also the cut-out portions from the face of the dies, and a guide to properly feed the material to the dies, substantially as set forth.

12. The combination of rotary male and female cutting-dies, the male being furnished with an automatic stripper to remove the ma-

terial therefrom, and the female being provided with spring-actuated parts which automatically remove the scrap from the recesses therein, and a stripper-finger which automatically removes both the material and the scrap from the face of the dies as they revolve against it, substantially as set forth.

13. The combination of rotary male and female cutting-dies, the male being provided with automatic strippers which remove the material therefrom and the female being provided with spring-actuated parts which automatically remove the scrap from the recesses therein, and a guide to properly feed the material to the dies, substantially as set forth.

14. The combination of rotary male and female cutting-dies, the male die being provided

with automatic strippers which remove the material from the male parts thereof and the female die being provided with spring-actuated parts placed in the recesses thereof, whereby the scrap will be lifted automatically from said recesses, a stripper-finger resting against said female die, whereby as the same is rotated the material and scrap will be removed therefrom, and a guide to properly feed the material to the dies, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 21st day of May, A. D. 1886.

BERNARD J. MALONE.

Witnesses:

JOHN H. IVES,

JOHN J. CAULDWELL.