No. 674,852. Patented May 28, 1901.

C. E. COE.

DIE AND FORMING MACHINE.

(Application filed July 23, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

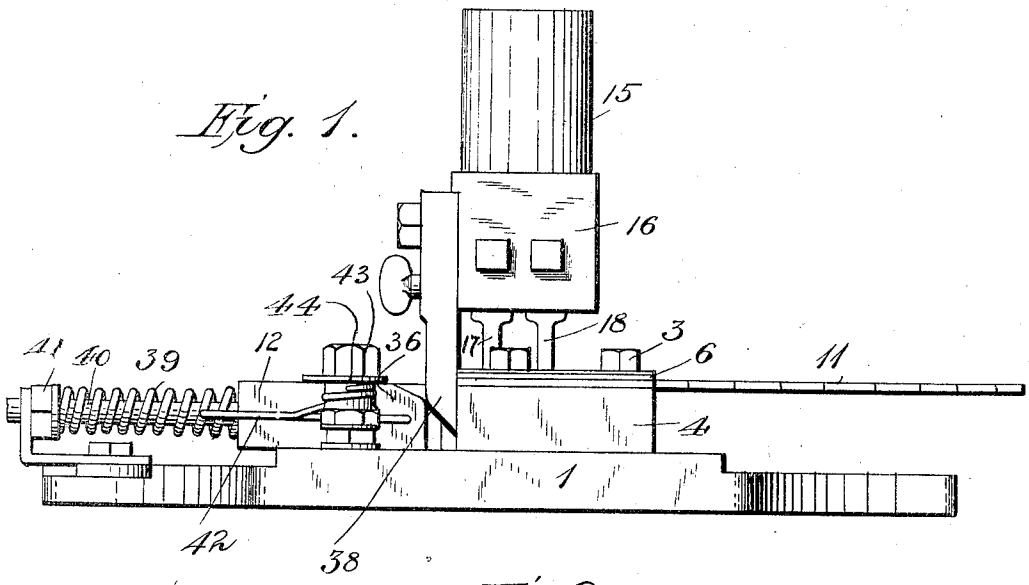
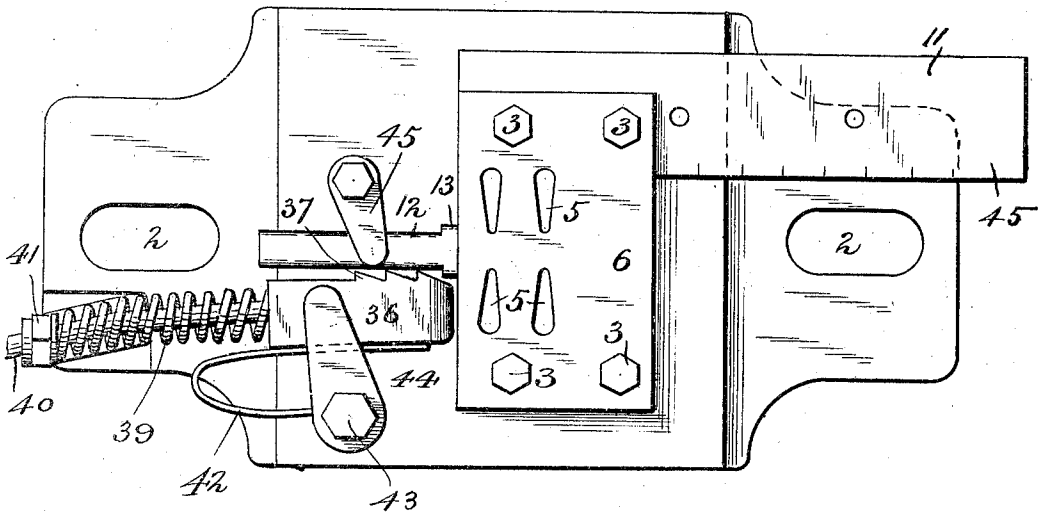


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

Fig. 8.

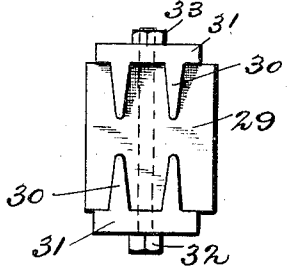


Fig. 4.

Fig. 3.

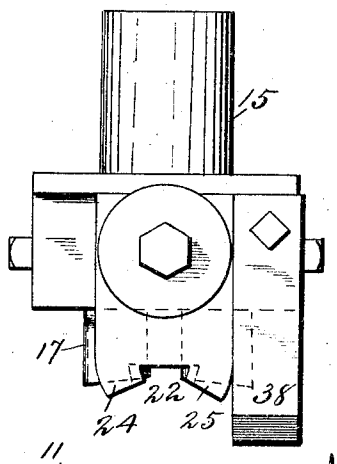


Fig. 9.

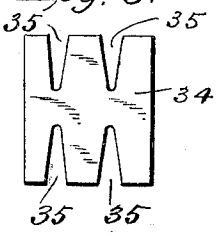
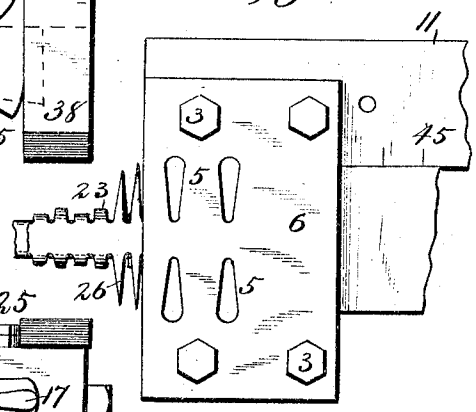
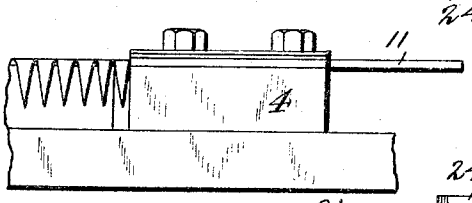


Fig. 5.





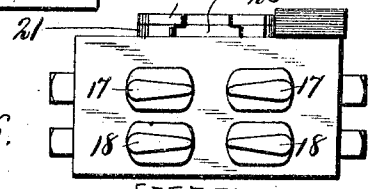


Fig. 6.

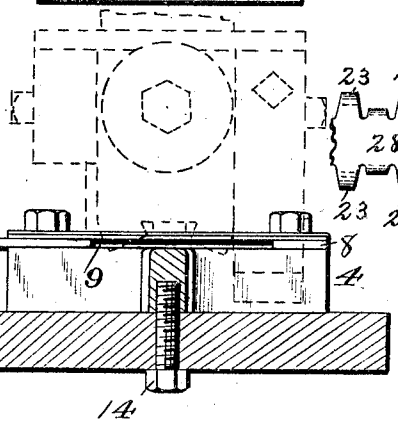


Fig. 7.

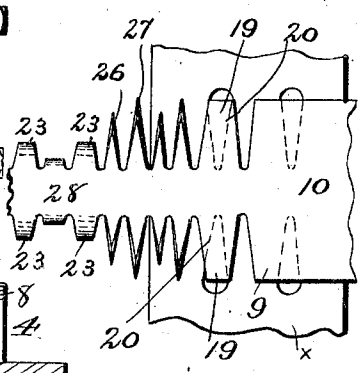


Fig. 10.

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CHARLES E. COE, OF ST. LOUIS, MISSOURI, ASSIGNOR TO DAVID T. GRAHAM, OF SAME PLACE.

DIE AND FORMING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 674,852, dated May 28, 1901.

Application filed July 23, 1900. Serial No. 24,526. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. COE, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Dies and Forming-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to dies designed especially for operating upon sheet metal; and it consists of certain novel features of construction and combination of parts the preferred form or embodiment whereof will be set forth in the following specification and illustrated in the accompanying drawings.

One object of my invention, among others, is to provide reliably-efficient means for forming from a strip of sheet metal a securing device, which I will for convenience designate a "harness-mender and belt-fastener," and while my improved die will be illustrated and described as especially adapted for forming said securing device it will be understood that with slight modifications the machine may be made ready to form various similar devices.

A further object of my invention is to provide an attachment designed to coöperate with the die proper, whereby certain points of my improved securing device may be properly bent or shaped to render the article complete as it leaves the machine, except the mere act of dividing the fastening device thus formed upon the strip of metal into separate or individual fasteners.

Another object of my invention is to provide an automatic feed for my improved cutting-machine or die whereby the strip of sheet metal will be drawn into engagement with the cutting and forming instruments, when the strip thus prepared will be ready to be operated upon by the cutting-machine, which will sever the strip at proper intervals, and thereby produce the finished belt-hook or harness-mender, the act of separating the strips being a separate and distinct operation.

In the accompanying drawings, Figure 1 is a side elevation of my improved die and forming-machine complete. Fig. 2 is a top plan view of Fig. 1. Fig. 3 shows an elevation of the cutter and former illustrated in Fig. 1 and taken from the left side of said view. Fig. 4 is a detail view of a portion of the strip of sheet metal, both formed and unformed, and an end view of the block comprising the female portion of the die. Fig. 5 is a top plan view of the parts illustrated in Fig. 4. Fig. 6 is a bottom view of the cutting-head and the teeth carried thereby and also shows the teeth and controlling-cam employed to operate the feed. Fig. 7 illustrates the side view of the block shown in Fig. 5, showing a portion of the tooth-forming block in section. Fig. 8 illustrates another form of head designed to carry the cutting-teeth. Fig. 9 illustrates a special form of die or cutting-block designed to coöperate with the teeth shown in Fig. 8. Fig. 10 is a top plan view of the female portion of the die, showing the strip of metal partly fashioned into my securing device.

I am aware that it is common to form various kinds of articles and devices from sheet metal, as by striking the same out therefrom, and my invention, as will be hereinafter clearly set forth, accomplishes the result of forming a series of teeth upon both edges of a strip of sheet metal in an original manner, inasmuch as the result is accomplished by successive steps, though by a single operation. An essential feature, therefore, of my invention is comprised in the method of thus combining or attaining two separate and distinct results in a single operation or movement of the cutting-die.

In order to clearly designate the several features of my invention and their coöperating accessories, numerals will be employed, of which 1 indicates the base-plate or body-section, which may be provided at each end with suitable apertures 2, by means of which said plate may be firmly secured in its operative position by suitable bolts, as is common. Properly secured to the base-plate, as by the bolts 3, is the female portion or body-section 4, which is provided with elongated apertures 5, said apertures being tapered or reduced in width at their inner ends in order that the points or teeth to be formed upon the metal strip may be properly shaped, as will be hereinafter pointed out.

Designed to be secured to the plates 3 to the upper surface of the body-section 4 is the stripper-plate 6, also provided with apertures corresponding to and registering with the apertures 5, as clearly shown in Fig. 2. The stripper-plate 6 is held above the body portion 4 throughout its middle portion by means of the interposed plates 7 and 8, or said stripper-plate may, if preferred, be formed so that each end thereof will be of greater thickness than the middle portion of said strip, thus insuring that the middle portion of the plate will be held above the body 4. The width or extent of the recess 9 thus provided between the plates 7 and 8 is designed to be substantially coincident with the width of the strip of sheet metal 10, upon which it is designed to operate. In order that said strip may be held to its work and properly drawn under the cutting-teeth, the plate 7 is extended outward sufficiently to form the guiding-section 11, the inner edge of which may be properly graduated for the purpose hereinafter set forth.

Designed to coöperate with the die-block 4 is the forming-anvil, comprising the elongated body-section 12, having the enlarged inner end or head 13 located adjacent to the body 4 and secured in any preferred way, as by the bolt 14, extending through the base-plate into engagement therewith, as shown in Fig. 7. The anvil and body 4 may, if desired, be formed integrally or in one piece. The height of the anvil-section is coextensive with the height of the body 4, as it is desired that the strip of sheet metal 10 shall pass from the body 4 directly onto the anvil in order that the points may be properly bent or shaped by the means hereinafter described.

In Fig. 3 I have illustrated a side view of the movable portion of the die, comprising the shank 15, as is common, which may be readily connected with the press or other source of power, while upon said shank I provide the head 16, to the lower side of which I secure or integrally form the cutting-teeth 17 and 18, preferably arranged in pairs, said teeth being the proper size to be snugly received by the aperture 5, formed in the body portion 4. By thus arranging the cutting-teeth in pairs the strip of sheet metal is operated upon both edges simultaneously, the result being shown in Fig. 10. The outer pair of teeth 18 merely blank out the strip at intervals, thereby forming the sections 19, from which two complete points or teeth are formed by each of the inner teeth 17, as indicated by the dotted lines 20—that is to say, when the strip of sheet metal 10 is first inserted it will be first operated upon by the outer pair of teeth 18, the result being that the section 19, as shown in Fig. 10, will be formed. The feeding mechanism hereinafter described will cause the section 19 to be moved directly over the inner pair of apertures 5, and thus dispose it in the path of or under the inner pair of teeth 17, the result being that a long and a short point will be formed by the downward movement of the inner teeth, each tooth 17 forming two separate and distinct points at each downward movement. It is obvious, therefore, that the operation of the outer pair of teeth 18 will be in advance of the inner pair of teeth 17 and that the result will be the formation of a section 19, ready for the action thereon of the teeth 17. The result, therefore, is the practical combination of two operations, both of which are carried out by a single reciprocation of the head 16. It will be understood that, if desired, the inner pair of teeth may be made slightly longer or shorter, the object being to insure that but two of the teeth will strike the sheet metal at once, thus requiring less force or power to operate the same than would otherwise be the case if all the teeth were of the same length.

By the arrangement of the cutting-teeth 17 and 18 just referred to it will be seen that two points are formed upon each edge of the strip of sheet metal and also one section 19 on each edge 21 at each reciprocation of the head 16, and in order to utilize the movement of said head to form or shape the teeth with respect to the central portion or body of the strip of metal I secure to the inner side of said head the tooth-forming device illustrated in Figs. 3 and 6 and comprising an inner plate 21, provided with a recess 22, the width or extent of which determines the point or place of bending the longer teeth, as indicated by the numeral 23 in Figs. 5 and 10.

Coöperating with the inner plate 21 is the outer plate 24, also provided with a recess 25 in its lower end, which, however, is of less width than the recess 22, inasmuch as said recess is designed to operate upon the shorter points 26, provided upon the edge of the sheet metal, the plate 21 being designed to operate upon the longer points 27, as above set forth.

If preferred, the plates 21 and 24 may be formed integrally from a single piece of suitable material. The strip of sheet metal 10 is so fed into the machine that the finished teeth or points will pass from the body portion 4, so as to leave the longer pair of teeth or points 27 directly under the recess 22 and immediately over the head 13 of the anvil, while the next outer shorter tooth will be disposed immediately under the recess 25, formed in the plate 24, and above the anvil-body proper or the narrow portion thereof, and the result will be that when the head is forced downward the tooth-forming plates 21 and 24 will so operate upon the points directly under them that each short tooth will be bent sharply downward at right angles to the central portion 28 and against the sides of the body 12 of the anvil, while each longer tooth immediately above the head 13 will be bent at a point thereof having substantially the same width as the base or inner portion of the shorter teeth, thereby insuring that the points

of all the teeth will be substantially of the same size. The purpose, therefore, of the head 13 and the reduced portion 12 of the anvil is to insure that each alternate long and short tooth upon each side of the strip will be bent or shaped substantially in the manner shown in Figs. 4, 5, and 10.

By the peculiar construction of the anvil 12 the finished strip of metal 10 will be allowed to freely pass outward until the entire strip has been operated upon by the machine and all of the requisite teeth or points 26 and 27 have been cut and shaped as desired, it only being necessary to take the said strip after it has passed through the machine and cut it into proper lengths, the best results being attained by providing that each securing device shall have at least three distinct teeth or points upon each edge thereof.

In Fig. 8 I have shown another form of head, as indicated by the numeral 29, and in order to attach the teeth thereto in a convenient and reliable manner I form in opposite sides thereof recesses corresponding in shape to the teeth 30, which are formed upon or constitute an integral part of the body-section 31, the teeth being secured in position by extending a suitable bolt 32 entirely through the head and anchoring the same in position by the nut 33.

By forming the teeth as shown in Fig. 8 it will be readily understood that they may be very quickly and cheaply formed by milling or otherwise cutting the same from one side of the body portion 31. This will be a much cheaper form of construction than to form the teeth as shown in Fig. 6 and then providing apertures in which they may be anchored into coöperation with the head.

In Fig. 9 I have illustrated a shearing block or anvil 34, corresponding in function to the body portion 4. (Illustrated in Fig. 4.) Instead of providing the apertures, as indicated by the numeral 5, which can only be accomplished at a great expenditure of time and labor, I cut in each side of the block 34 the recesses 35, which are designed to receive the teeth 30, and since said recesses 35 may be comparatively cheaply provided this form of cutting anvil or block may prove most desirable in practice, though I reserve the right to employ either form.

To insure that the plate 10 will be regularly moved at proper intervals, so as to cause the outer teeth 18 to strike the plate at the proper point thereon to provide the sections 19 and also to cause the inner teeth to so act upon the sections 19 already formed that a short and a long tooth will be fashioned therefrom, I provide the feeding mechanism illustrated in Figs. 1 and 2 and comprising the gripper or dog 36, provided upon its inner edge with a ratchet-face or a series of outwardly-inclined teeth 37, said teeth being designed to engage or clutch two or more of the longer shoulders or bended portions 23, and it is therefore obvious that when the gripper or dog 36 is moved outward the plate will be drawn with it, and to insure that the plate will be so acted upon at the proper instant I provide the cam-controller or wedge 38.

It will be understood that the length of the cam-controller 38 shall be of proper extent to enable it to act upon the dog 36 and move it sufficiently outward to cause the plate 10 to so move that it will be in the correct position to enable the teeth to properly perform their office. With this end in view it is important that both the length and thickness of the cam-controller 38 shall be carefully determined, inasmuch as the thickness thereof will determine the extent of the outward movement of the dog, while the length will insure that said dog shall have been moved the requisite distance to cause the plate 10 to be moved to the correct position before the teeth enter the apertures 5.

The dog 36 is held normally inward by the controlling-spring 39, properly secured in position against said dog, as by extending the same around the stem 40, the latter being properly held in position by the ear or bracket 41, carried by the base-plate. The dog or gripper is so mounted that the ratchet-face carried thereby is left free to ride over the teeth formed upon the plate 10, which result is accomplished by a spring 42, properly secured to the bolt or post 43, anchored in the plate 1. Any suitable form of housing or guide may be provided to hold the dog against upward movement, though I have shown in the drawings the simple finger or plate 44, designed for this purpose, a similar finger 45 being also provided and extended in a plane sufficiently above the anvil 12 to freely permit the plate 10 and the teeth formed thereon to pass under it, though preventing said plate from having an undue upward movement.

As is well understood, the office performed by the stripper-plate 6 is to insure that the plate 10 will not adhere to the teeth 17 and 18, but will be stripped therefrom, thereby preventing an upward movement of said plate.

By the peculiar manner of cutting the teeth or points upon the edge of the plate 10 a shearing action results, and the teeth will therefore be sharply beveled upon their outer edges, thereby producing a securing device which will readily take into the leather or other material to which it is applied, said beveling of the teeth furthermore insuring that they will be normally directed inward toward each other, thereby enabling the clenching process to be easily completed. This construction of the teeth or points 26 and 27 is therefore a very important result arising from the use of my invention. In initially feeding the plate to the machine, which must be manually performed, it becomes necessary for the operator to make a mark upon the edge of the strip of material and cause said mark to register with one of the lines or

graduations 45, provided upon the inner edge of the guiding-plate 11, in order that the teeth 17 and 18 will act upon the plate at the exact point desired. This manual operation, however, is discontinued after the plate has passed through the machine sufficiently to be acted upon by the dog 36, when the remainder of the feeding process is entirely automatic.

While I have described the preferred form or embodiment which may be adopted in materializing my invention, it will be understood that I desire to comprehend in this application all such substantial equivalents and substitutes as may be considered to fall fairly within the scope of my invention, it being understood that various substitutes and equivalents are possible.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a die and forming-machine, the combination with the die proper having apertures, of teeth adapted to fit said apertures; a stripper-plate carried by the die proper and suitable clutch mechanism adapted to engage the strip after it has passed under the teeth, and a wedge connected to the head carrying the teeth designed to operate said clutch mechanism, all substantially as specified and for the purpose set forth.

2. In a die and forming-machine, the combination with the die proper having suitable apertures, of a head provided with teeth, the latter being adapted to coöperate with said apertures in the die, and a tooth-forming anvil comprising a body portion 12 and a head 13, whereby the teeth formed upon the plate passing under the teeth will be alternately long and short, substantially as specified and for the purpose set forth.

3. In dies, the combination with the body portion having suitable apertures, of a head provided with teeth adapted to coöperate with said apertures; a stripper-plate located above said body and provided upon its under side with a reduced portion whereby an opening will be afforded for the strip of material acted upon and means to draw said strip of material through the machine whereby the outer pair of teeth will prepare sections of the strip designed to be acted upon by the inner pair of teeth substantially as specified and for the purpose set forth.

4. The herein-described die and forming-machine comprising a body portion and teeth coöperating therewith; a stripper-plate secured to said body portion and provided with a recess below the same to receive the strip of material; a tooth-forming anvil comprising a body portion 12 and a head 13 located in the path of the moving strip and means carried by the head to force one of the teeth upon each edge of the strip of material downward against the side of said body and said head whereby the shorter pair of teeth will be bent at their point of union with the body portion while the longer teeth will be bent at a point thereof having the same width as the base of the shorter teeth thereby forming a convenient harness-mender or belt-hook, substantially as specified and for the purpose set forth.

5. In a die and forming-machine, a feeding-clutch having means to engage the teeth formed upon the strip of material after it has passed under the teeth whereby said strip will be drawn through the cutting mechanism, in combination with a head carrying teeth and a wedge secured to said head and adapted to operate said clutch, all substantially as specified and for the purpose set forth.

6. The herein-described combined die and forming-machine comprising a body portion; a head having teeth adapted to coöperate with said body portion; a stripper-plate coöperating with said teeth; a tooth-forming anvil and means carried by the head to coöperate therewith whereby the teeth will be shaped in the manner specified, and additional means to automatically draw the strip of material acted upon by said die in such a manner that two complete teeth will be formed upon each side of the strip at each downward movement of said teeth all substantially as specified and for the purpose set forth.

7. In dies, the combination with a pair of blanking-teeth of a pair of point-forming teeth, said teeth being so combined into cooperative relationship that a blank will be formed upon each edge of the strip of material simultaneously with the formation of two points formed from the previous blank, all substantially as specified and for the purpose set forth.

8. The herein-described combined tooth-cutting and tooth-shaping machine comprising a die proper adapted to produce upon each edge of a strip of material a series of alternately long and short teeth; means to regularly draw the strip of material through the cutting mechanism and additional means for bending the short teeth upon each edge of, and at right angles to the strip and so bending the longer teeth upon each edge that the right-angled extension thereof will be coincident in size with the shorter teeth substantially as set forth.

9. In a combined die and forming-machine, a feeding device having a ratchet-face adapted to engage the strip of material as it passes through the cutting-dies; suitable means to hold said device normally inward against the body of the die and additional means designed to force said feeding device outward during each downward movement of the cutting-teeth, substantially as specified and for the purpose set forth.

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

CHARLES E. COE.

Witnesses:
WM. WOLTERING,
G. J. B. SKINNER.