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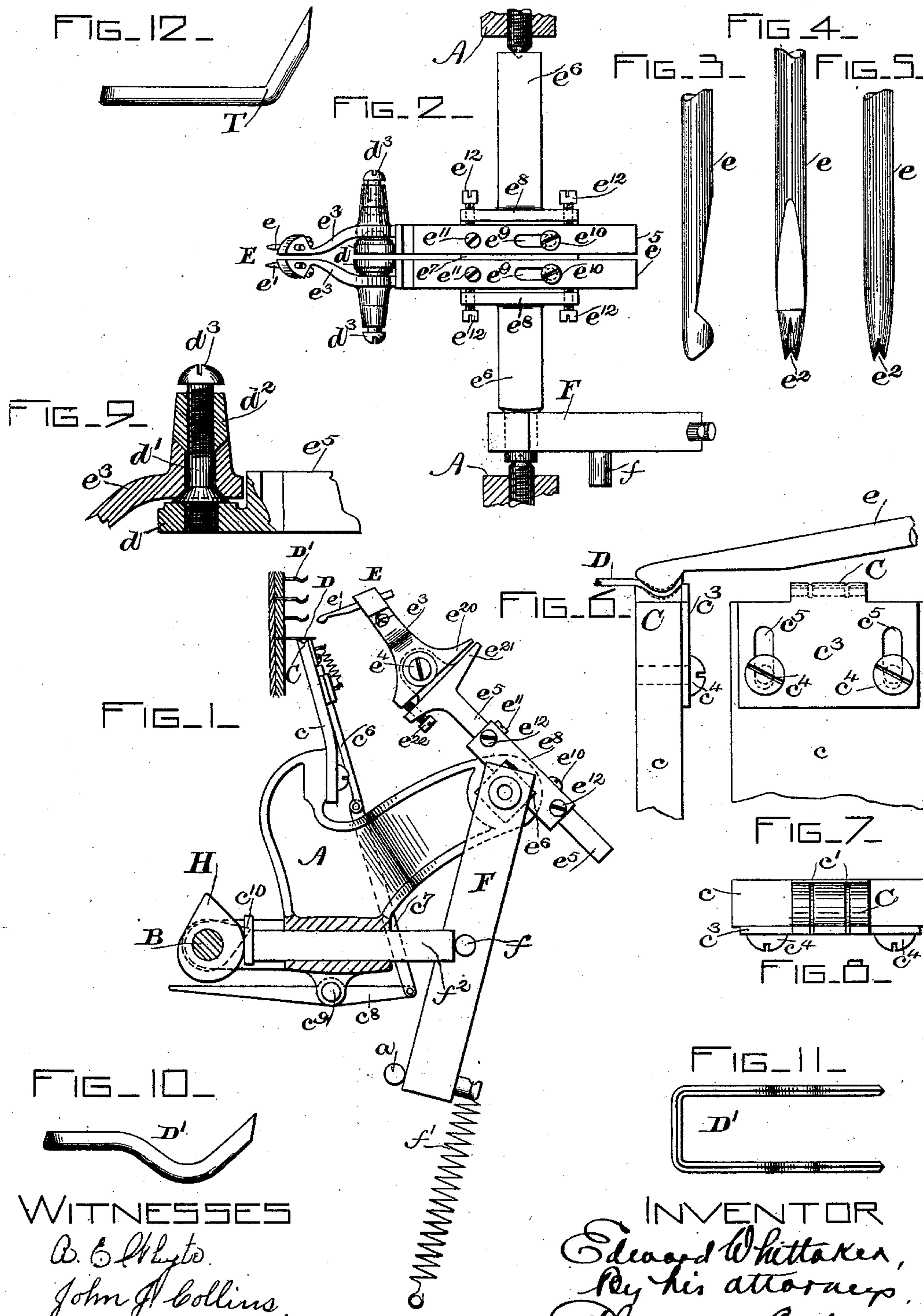
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E. WHITTAKER.

DEVICE FOR BENDING TEETH IN CARD CLOTHING.

(Application filed Oct. 14, 1897.)

(No Model.)



WITNESSES

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UNITED STATES PATENT OFFICE.

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DEVICE FOR BENDING TEETH IN CARD-CLOTHING.

SPECIFICATION forming part of Letters Patent No. 606,829, dated July 5, 1898.

Application filed October 14, 1897. Serial No. 655,203. (No model.)

To all whom it may concern:

Be it known that I, EDWARD WHITTAKER, a citizen of the United States, residing at Methuen, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Machines for Making Clothing for Carding and Napping 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.

The present invention relates generally to machines for making the clothing commonly used in the art in carding or napping machines, and more particularly to improved devices for bending or forming the teeth which, together with their flexible backing, commonly constitute such clothing.

It has, so far as I am at present advised, heretofore been the practice in the art to form the clothing for carding and napping machines in a machine which inserted in a suitable flexible backing a series of staples the legs of which projected through the backing and which were bent to form the teeth. In the machines above referred to the legs of the staples were bent over an anvil or support by a bending device which engaged the leg beyond its point of support—that is to say, between its point of support and the point of the leg—the result being the formation of an angular tooth which in practice has been found weak and liable to break at the bend or angle.

In accordance with the present invention the leg which is to form the tooth is supported at two points and acted upon by a bending or forming tool intermediate said points, and I preferably provide a former or mold into which the leg is pressed and given a predetermined shape by the action of the forming-tool, by which improved arrangement the tooth may be made curved in longitudinal contour instead of angular, a form which greatly adds to the stability and efficiency of the tooth, and the tooth is also stronger for the reason that the strain which is brought at a single point in the machines of the prior art and which tends to disrupt the metal at that point and render it weak does not occur

in the operation of my improved device, but the binding strain is distributed and is not sufficient at any given point to injuriously affect the metal.

To the above end the present invention consists of the devices and combination of devices more specifically hereinafter set forth and claimed.

In the drawings, Figure 1 represents in side elevation a preferred form of my improved forming mechanism, showing a sufficient portion of the usual type of machine for making card and napper clothing to illustrate the connection of my present invention therewith. Fig. 2 is a top plan view of the forming-tool and immediately associate parts. Figs. 3, 4, and 5 are detached views of forming-fingers. Fig. 6 is a side elevation of the former or mold and portion of forming-tool. Fig. 7 is a front elevation of the former or mold. Fig. 8 is a plan view of the former or mold. Fig. 9 is an enlarged detail of a bearing for the forming-tool. Figs. 10 and 11 are respectively side and plan views of a preferred form of tooth as formed by my improved devices, and Fig. 12 illustrates a common form of tooth by prior art.

Similar letters of reference indicate like parts in the several views.

In the drawings, A represents the front portion of the frame of a machine such as is commonly used in the art for the purpose of making the clothing hereinbefore referred to. B represents a shaft in operative connection with the feed mechanism of said machine. I have not deemed it necessary to further illustrate said feed mechanism or other portions of said machine, as from the description and illustration herein given any one of average skill in the art can readily attach my present invention thereto.

To the frame A is secured an upwardly-extending arm c, over which the staple D is projected preliminary to the bending operation. On the top of the arm c is formed the former or mold C, across which the legs of staple D project, being supported upon opposite sides thereof. The bottom of the mold C is preferably provided with the curved grooves c', (see Figs. 7 and 8,) into which the legs of the staple D are forced by the form-

ing-tool and which coöperate with the grooves in the forming-tool to prevent a lateral distortion of the legs while being formed to the desired shape.

5 E designates what I have herein termed the "bending" or "forming" tool, the function of which is to engage the legs of the staple D and force them into the former or mold C until they substantially correspond in longitudinal contour to the shape of a cross-section
10 of the mold C.

As shown, the bending or forming tool E consists of the forming or bending fingers e and e' , the ends of which are shaped to conform to the surface of the former or mold C
15 and are provided with grooves e^2 to receive and guide the legs of the staple D.

It will be of course understood that the grooves e^2 are so formed and arranged with reference to the grooves e' that when the fingers e and e' are in their depressed position the said grooves form partially-closed channels in which the legs of the staple D lie.

Each of the fingers e and e' is mounted conveniently by a suitable clamp in a carrier e^3 ,
25 which is pivoted at e^4 to a support e^5 .

I have illustrated in Fig. 9 a form of bearing for the fingers e and e' which, while by no means essential, I find in practice to give
30 good results. On the support e^5 is formed an ear d , into which is screwed a stud d' , having a conical base and a cylindrical body, the upper portion of which is threaded and receives a nut d^2 , having a conical base. The bearing in the carrier e^3 is bored to fit the body of the stud d' loosely and is held between the conical surfaces at the base of the nut d^2 and stud d' . The stud d' does not extend entirely through the nut d^2 , and a screw d^3 is
40 conveniently provided, which may be set up against the top of the stud d' to jam the nut d^2 , so that it will be locked in the desired position.

The supports e^5 are secured to and movable with a rocking carriage e^6 , which is mounted
45 in suitable bearings in the frame A, conveniently as follows: On the carriage e^6 is formed a table e^7 , which is provided with the parallel flanges e^8 , extended transversely of the carriage e^6 . In each of the supports e^5 is formed an elongated bolt-hole e^9 , through which extends the bolt e^{10} , which engages a threaded bearing in table e^7 . e^{11} are bolts having threaded bearings in the supports e^5 and the inner ends of which bear upon the surface of the table e^7 . e^{12} are bolts having threaded bearings in the flanges e^8 and the inner ends of which bear against the supports e^5 on opposite sides of the bolts e^{10} . By the last-described arrangement the supports e^5 are adjustable on the carriage e^6 independently of each other to vary the relative lateral and longitudinal position of the fingers e' and e and to move each of said fingers in a plane at
50 right angles to its axis. To the carriage e^6 is connected an actuating-lever F, fixedly secured thereto. The lever F carries a stud f ,
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which is normally held by a spring f' in contact with a slide f^2 , mounted to reciprocate longitudinally in a suitable slideway in the frame A. The shaft B carries a cam II, which bears upon the inner end of the slide f^2 and imparts a reciprocating movement to said slide as the shaft B rotates. The cam II is so timed that when the legs of the staple D
70 are brought into position over the mold C the forming-tool E is brought into contact therewith to force said legs into the former or mold C and is thereafter retracted to permit the feeding operation. The inward movement of lever F is limited by contact with the frame A or a suitable stop a .
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I find it desirable in practice to make provision for a loss of motion of the fingers e and e' in passing from their raised to their depressed position, which, as shown in the drawings, I conveniently secure as follows: The carriers e^3 are provided with the elongated bases e^{20} , and the top of each of the supports e^5 is elongated, as shown at e^{21} . In threaded
85 bearings in the top of each of the supports e^5 is an adjusting-screw e^{22} , the upper end of which bears against the base e^{20} , and each of the carriers e^3 is thus allowed a limited rocking movement independently of its support, which can be regulated by the screw e^{22} .
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While not essential to the successful operation of my improved bending mechanism, I find it advantageous in practice to provide the mold C with a movable section along its outer edge, which as the fingers e' and e enter the mold C is depressed to permit the easy entrance of said fingers and which while the legs of the staple D are held by said fingers is raised to bend the outer portion of the legs around the ends of said fingers.
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As shown, the movable section above referred to consists of the edge plate c^3 , which extends along the edge of the fixed portion of the mold C adjacent to the points of the legs of the staple D. The edge plate c^3 is mounted to reciprocate vertically on the arm c , conveniently by means of the bolts c^1 , which are secured in said arm and extend through elongated bolt-holes c^5 in the plate c^3 .
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The plate c^3 may be conveniently actuated by means of a tongue c^6 , depending therefrom and connected by a link c^7 with a lever c^8 , fulcrumed at c^9 on frame A and one end of which is held by a suitably-placed spring (not shown) against a periphery-cam c^{10} on the shaft B, which as said shaft rotates actuates said plate to secure the results hereinbefore described.
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The preferred form of tooth produced by my improved forming mechanism is illustrated in Figs. 10 and 11 and the tooth of the prior art is illustrated in Fig. 12. In the tooth of the prior art the abrupt curve or angle at T as formed by bending the tooth over its support in the machines of the prior art renders the tooth weak and, as before stated, liable to break at the point T.
110

In the improved tooth, as shown at D',

which in so far as I am at present advised cannot be successfully produced by machines of the prior art, no such abrupt curve exists and the tooth is much more stable and efficient.

The operation of my improved device has already been sufficiently described in connection with the foregoing description of the form and arrangement of parts. It may, however, be desirable to note that in the form of my invention illustrated in the drawings the forming-tool has a movement longitudinally of the tooth as well as laterally thereof—that is, it slides along the tooth while moved laterally thereof to force it into the mold C.

Having thus described my invention, I claim as novel and desire to secure by Letters Patent of the United States—

1. In a machine for making card or napper clothing, the combination with a support for the unformed tooth bearing on two points thereof, of a forming-tool acting upon said tooth between said points and cooperating grooves on the support and forming-tool, substantially as described.

2. In a machine for making card or napper clothing, the combination with a mold across which the unformed tooth is projected, of a forming-tool arranged to engage said tooth and move longitudinally and laterally thereof to force it into the mold, substantially as described.

3. In a machine for making card or napper clothing, the combination with a mold across which the unformed tooth is projected, of a forming-tool, and movable section for said mold arranged to be moved to permit the

forming-tool to enter the mold, substantially as described.

4. In a machine for making card or napper clothing, the combination with a laterally-grooved mold, of a longitudinally-grooved forming-tool, substantially as described.

5. In a machine for making card or napper clothing, a forming-tool comprising a plurality of forming-fingers arranged to have a limited independent movement during the operation of the machine, substantially as described.

6. In a machine for making card or napper clothing, a forming-tool comprising a plurality of forming-fingers, suitable mechanism for actuating said fingers, and means whereby said fingers are capable of a limited movement independent of said actuating mechanism during the operation thereof, substantially as described.

7. In a machine for making card or napper clothing, a former or mold having a movable section extending along the side thereof adjacent to the point of the tooth, substantially as described.

8. In a machine for making card or napper clothing, the combination with a forming-tool, of a rocking carriage for said tool, and means for permitting a rocking movement of said tool independently of said carriage, substantially as described.

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

EDWARD WHITTAKER.

Witnesses:

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