(No Model.) 3 Sheets—Sheet 1.

G. H. HOWE.

CRANK BENDING MACHINE.

No. 382,426. Patented May 8, 1888.

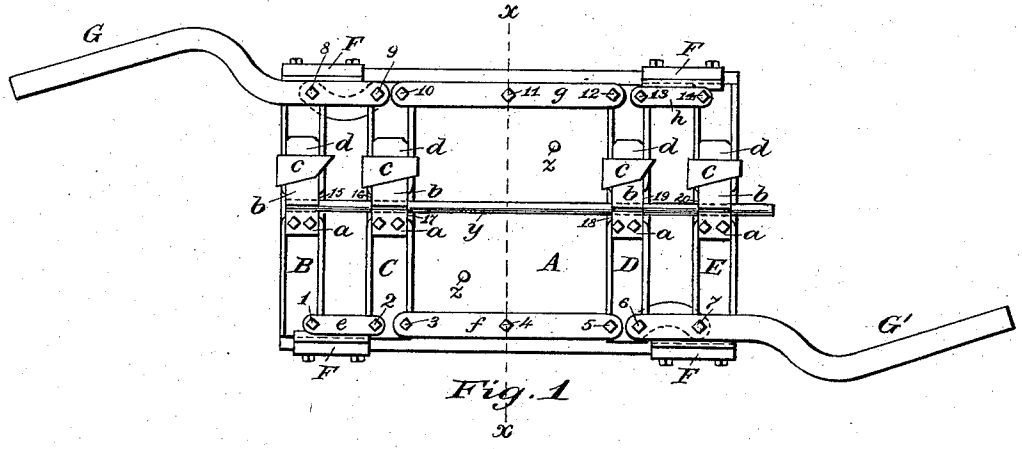


Fig. 1

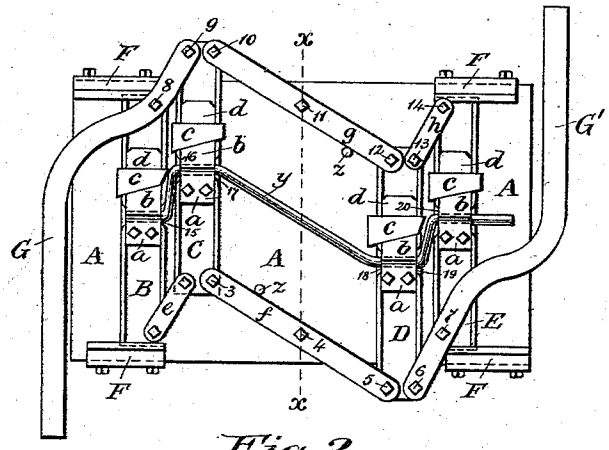
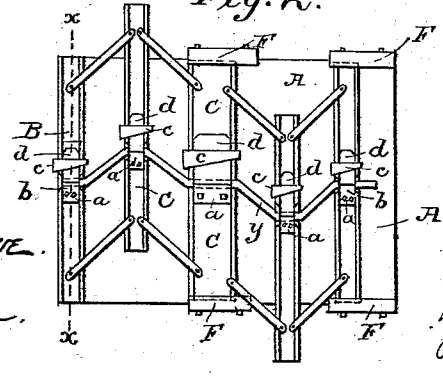


Fig. 2.

Fig. 2a.



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G. H. HOWE.

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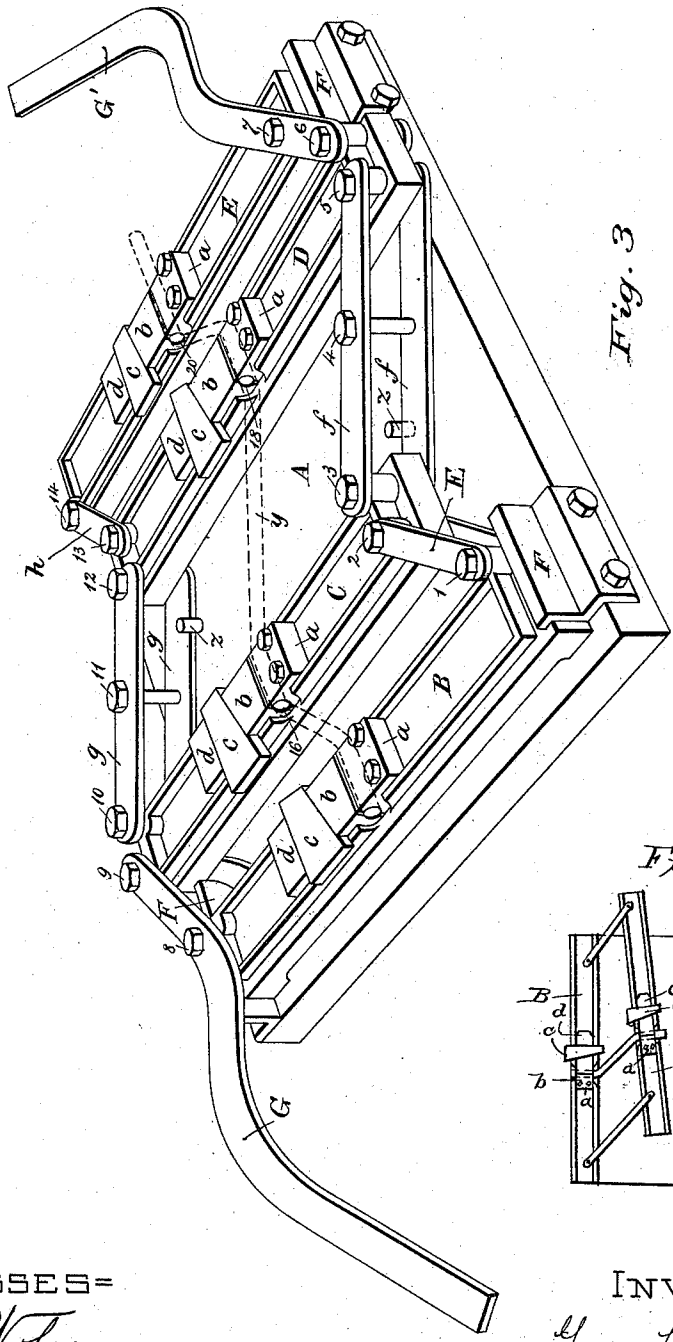


Fig. 3.

Fig. 3.ª

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G. H. HOWE.

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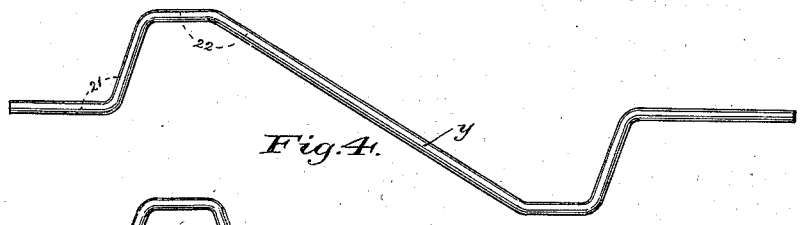


Fig. 4.

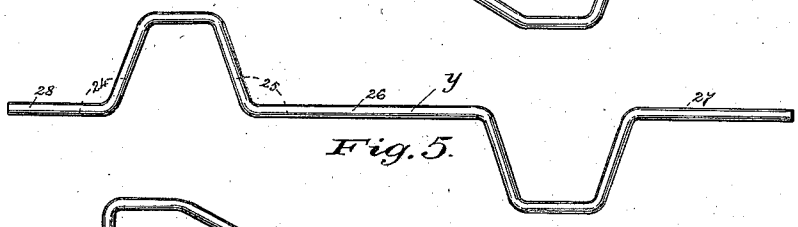


Fig. 5.

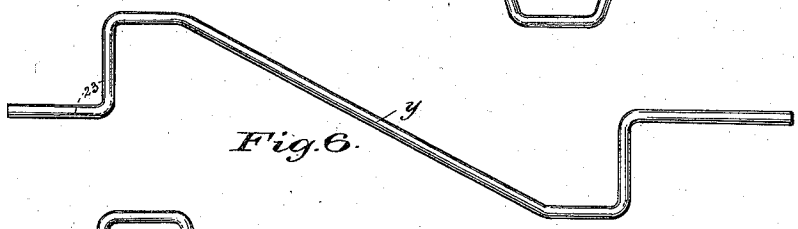


Fig. 6.

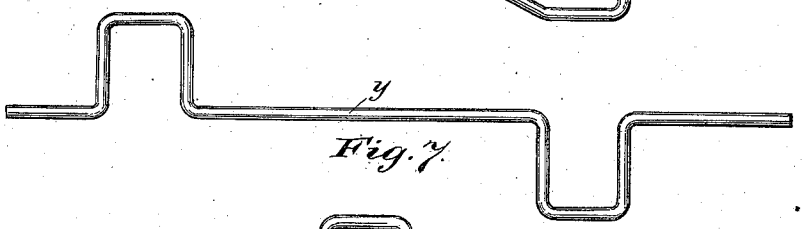


Fig. 7.

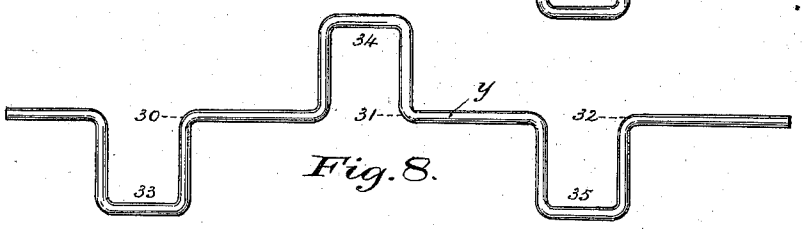


Fig. 8.

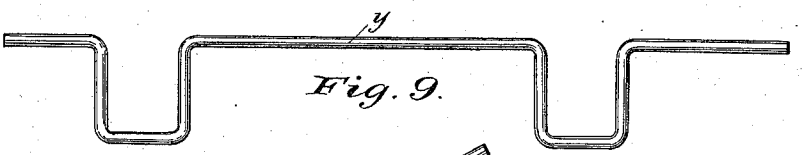


Fig. 9.

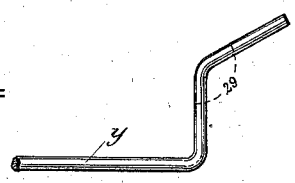


Fig. 10.

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UNITED STATES PATENT OFFICE.

GEORGE HUTCHINS HOWE, OF HOOSICK FALLS, ASSIGNOR TO JAMES A. EDDY, OF TROY, NEW YORK.

CRANK-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 382,426, dated May 8, 1888.

Application filed February 29, 1888. Serial No. 265,708. (No model.)

To all whom it may concern:

Be it known that I, GEORGE HUTCHINS HOWE, a citizen of the United States, residing at Hoosick Falls, county of Rensselaer, and State of New York, have invented certain new and useful Improvements in Machines for Bending Cranks in Bars, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to machines for bending cranks in bars; and its nature and object will be more fully hereinafter described, and pointed out in the claims.

Referring to the accompanying drawings, in which similar letters and figures of reference designate like parts, Figure 1 is a plan view of a machine embodying my invention, the position of the various parts before the bending operation commences being therein shown. Fig. 2 is a plan view showing the position of the parts at the completion of the bending operation. Fig. 2^a is a plan view of a modification of my invention, showing the position of the clamping-bars after the cranks are formed in the bar held by them. Fig. 3 is a perspective view showing the bar partly bent. Fig. 3^a is a plan view of a modification of my invention for forming the crank shown in Fig. 10. Figs. 4, 5, 6, 7, 8, 9, and 10 are views of some of the different forms of crank-bars, which may be bent with a machine embodying my invention.

I have represented in the drawings and will herein more particularly describe a machine for bending a bar in crank form, as shown in Fig. 4, and will then proceed to point out the manner in which the other forms of cranks shown in the other figures may be bent by a machine embodying my invention. The form of crank shown in Fig. 4 is designed to be used in a combined mower and hay-tedder as a crank-shaft for the tedder-forks, an application for a patent on which said combined mower and hay-tedder, filed by James A. Eddy, of Troy, New York, is now pending in the United States Patent Office.

A is a rectangular block of metal, which serves as a bed-plate. To each corner of the bed-plate is securely bolted a way or guide, F, in which the bars B and E at opposite ends of the bed-plate slide toward one another. The bar B is pivoted to a parallel bar, C, by links *e* and the lever G, the distances from the pivots 1 and 2 and from the pivots 8 and 9 being equal. A parallelogram is thus formed by the bars B and C and their link-connections. The link beneath the lever G is, however, curved, in order to clear the guide F adjacent thereto; but the distance between its pivotal connections to the bars B and C is equal to that between the points 1 and 2. The bars D and E are pivoted together similarly to B and C. The bars C and D are pivoted together by the links *f* and *g*, the distances between the points 10 and 12 and 3 and 5 being equal. The links *f* and *g* are pivoted at the middle of their lengths to studs 4 11, secured in the bed-plate A. A lever, G', forms one of the link-connections between the bars D and E, and is similar to and corresponds with the lever G, the levers, however, in the present instance, moving in opposite directions.

Each of the bars B, C, D, and E are provided with the fixed boxes *a*, bolted to them on their upper sides, and suitably recessed to receive the bar *y*, which is to be bent. A second fixed box, *d*, is also secured to each of the bars B, C, D, and E. A movable box, *b*, is interposed between each of the fixed boxes *a* and *d* and slides in ways in the bars. A wedge, *c*, is interposed between the boxes *b* and *d*, and the face of the box *b* adjacent to the wedge is inclined to receive it, and as the wedge is forced or driven between the boxes *d* and *b* it moves the box *b* up against the bar *y*, the box *b* being recessed to correspond to the contour of the bar *y*. *z z*, Figs. 1, 2, and 3, are stops to determine the angles at 21 and 22, against which stops the links *f* and *g* are moved.

The operation of the machine is as follows: The bar of metal *y* to be bent, if too heavy to be easily bent cold, is first heated to the requisite temperature and clamped to the bars B C D E, the bar *y* being transverse to the length of the bars B C, &c., which are in position as shown in Fig. 1, the points 15, 16, 19 and 20, on which the metal *y* to be bent rests, being in line. The operators then move the levers G G' up to the position shown in Fig. 2. The bars

on B and E move directly toward each other in the ways or guides F F, through their link-connections, and the bars C and D move diagonally toward the line *x x*, forming the cranks, the bars B and E moving sufficiently toward the line *x x* to compensate for the diminution in the length of the bar *y* by the formation of the cranks therein. It is obvious that in place of using two levers G G' one might be used; but I prefer to use two for ease of manipulation. When the parts have been moved to the position shown in Fig. 2, the wedges *c* are driven out and the bar *y*, now bent into the shape therein shown, is removed. Instead of moving the bars all up toward the line *x x*, it is evident that the bar B might be fastened to the bed-plate A and the other bars moved up toward it, in which case the guides F F for the bar E would necessarily have to be increased in length. Of course, if the bar B were fast to the bed-plate A the links *f* and *g* would not be pivoted at 11 and 4, and the bar B would correspond to the line *x x*. If the distance between the points 15 and 16 is equal to that between 1 and 2 and 8 and 9, it is evident that the metal between 15 and 16 will be neither upset nor drawn. The same is of course true of that between the points 17 and 18 and 19 and 20, the bars B, C, D, and E remaining parallel. If it is desirable to upset the metal between any of these points—as, for instance, between 15 and 16—the distance between these points should be made greater when the machine is in the position represented in Fig. 1 than the distance between the pivotal connections of the two bars B and C. It is evident in this case, when the bars B and C are moved up into position shown in Fig. 2, that the distance between the points 15 and 16 is less than that in Fig. 1, for it is apparent that the distance between the points 15 and 17 is greater in Fig. 1 than in Fig. 2. The reverse construction would be employed if it were desired to stretch the metal, and the distance between the boxes or clamping devices on B and C, or between the points 15 and 16, would be less in Fig. 1 than the distance between the points 8 and 9 and 1 and 2. This distance would of course be greater when in position represented in Fig. 2 than in Fig. 1, and the metal would consequently be drawn. If it is desired to make the angle 21 equal to the angle 22, (see Fig. 4,) it would be necessary that the distance between the points 8 and 9, 10 and 11, 1 and 2, 3 and 4 should be equal; but inasmuch as the distance between 10 and 11 in the construction shown is greater than 8 and 9, &c., the angle 22 is greater than the angle 21. To bend the crank shown in Fig. 5, in which the angle 24 is equal to the angle 25, the distance between 15 and 16 should be equal to the distance between 10 and 11. In this case there would be a stationary clamping-bar equal in width to the portion 26 of the crank, fastened to the bed-plate A on the line *x x*, and the clamping-box in this bar would be on a line with those in the bars B and E. If the bar B were fastened to the bed-plate A, the bar placed on the line *x x*, Fig. 1, would of course be moved toward the bar B in guides similar to F F. (See Fig. 2ª.) To bend the crank shown in Fig. 6, in which the angle 23 is a right angle, the bars C and B would be moved up against the metal between them. Of course a similar construction would be followed to bend the right-angled crank on the other end of the bar *y*.

The form of crank shown in Fig. 7 would be bent similarly to that shown in Fig. 5, except that the bars forming the cranks would be moved up against the metal between them. To bend three or more cranks in a bar, as shown in Fig. 8, the bar B would be fastened to the bed-plate, and the bars holding the portions 30, 31, and 32, &c., would be moved directly toward it, and the bars holding the parts 33, 34, and 35, &c., obliquely or diagonally toward it. To form the crank shown in Fig. 9, the same construction would be employed as that in forming the bar shown in Fig. 7, except that the bars C and D would be moved in the same instead of in opposite directions.

To form the crank shown in Fig. 10, the two bars B and C would only have to be used if it were desired to form such a crank on one end of the bar only, the distance between 8 and 9 would be less than that between 1 and 2, and the bar C would thus be oblique to the bar B, which would be fastened to the bed-plate, and as the bar C is swung toward the bar B the angle 29 would be formed. (See Fig. 3ª.)

It is obvious that if it is desired to form a single crank in the end of the bar *y*, in which the angle 29 is a right angle, only the bars B and C would be necessary; or if it is desired to form such a crank in each end of a bar at the same time, that the bars C and D would be fastened to the machine or to the bed-plate, and the bars B and E would be moved obliquely or diagonally toward them.

If two or more cranks are to be bent in a bar, it might be desirable to move the clamping-bars by screw or other pressure.

It is obvious that many other forms of cranks may be bent with a machine embodying my invention without departing from the spirit of my invention; but I have described enough of the different forms in order that any one skilled in the art may thoroughly understand my invention.

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

1. In a crank-bending machine, two or more bars provided with clamping devices to hold transverse to the lengths of the bars the metal to be bent and linked together at their opposite ends, substantially as and for the purpose specified.

2. In a machine for bending cranks in bars, the combination of a fixed bar and a movable bar linked at or near both ends thereto, both bars provided with clamping devices to hold

the bar to be bent transversely to the length of the clamping-bars, and means to swing the linked bar diagonally toward the fixed bar to form the crank, substantially as and for the purpose described.

3. In a crank-bending machine, the combination of a series of bars, each provided with a clamping device to hold the bar to be bent transverse to its length, said bars being linked together at their opposite ends and pivoted by links to the bed-plate of the machine, and means, substantially as described, for moving the crank-forming clamping-bars diagonally toward the pivot-points and the axial clamping-bars directly thereto, as and for the purpose set forth.

4. In a crank-bending machine, the combination of a series of parallel bars linked together at or near their opposite ends and pivoted by links to the machine, and provided with transverse clamping devices to receive the bar to be bent, and means for moving the crank-forming bars diagonally toward the pivots on the machine and the axial bars directly thereto, as and for the purpose specified.

5. The combination, in a crank-bending machine, of a series of parallel bars formed or provided with clamping devices to hold the bar of metal to be bent transversely to their length, said bars being linked together at or near their opposite ends and pivoted by links to the bed-plate of the machine, and the guides for guiding the movement of the axial clamping-bars perpendicularly toward the pivot-points, substantially as and for the purpose specified.

6. The combination of the perpendicularly-moving bars B and C, and the diagonally-moving bars C and D pivoted thereto and to each other at or near their opposite ends, said bars being provided with clamping devices to hold the metal to be bent transverse to their length, and all being pivoted by links to the bed-plate of the machine, substantially as and for the purpose specified.

In witness whereof I have hereunto set my hand this 27th day of February, 1888.

GEORGE HUTCHINS HOWE.

Witnesses:
DANFORTH GEER,
HUGH POMEROY BLACKINTON.