E. SIMS.

Manufacture of Metal Rakes.

No. 199,111. Patented Jan. 8, 1878.

fig. 1.

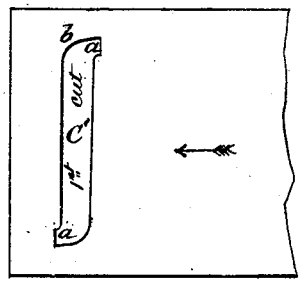


fig. 2.

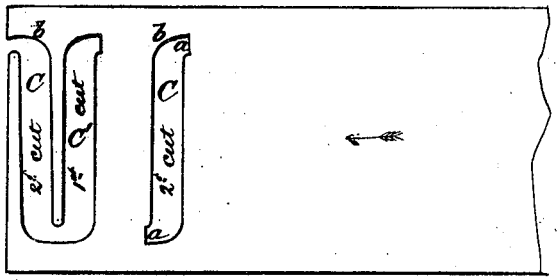


fig. 3.

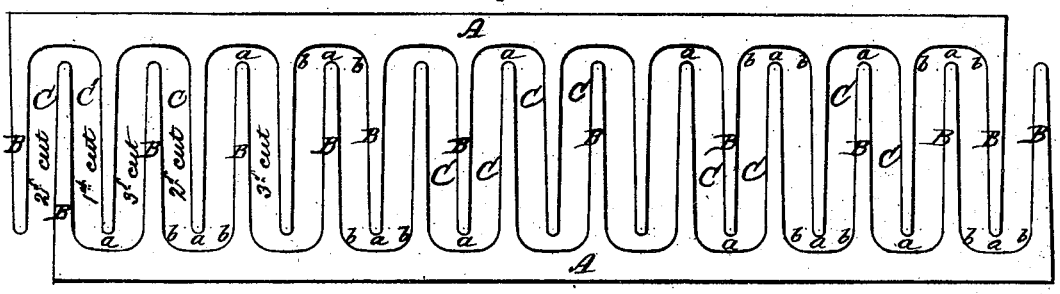


fig. 4.

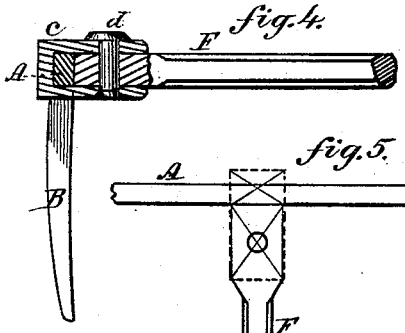


fig. 5.

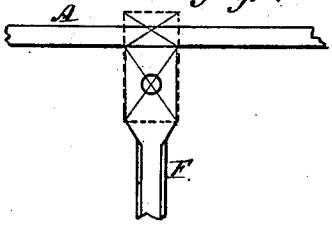


fig. 7.

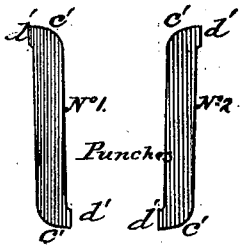


fig. 6.

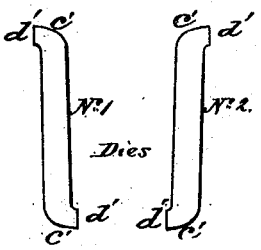
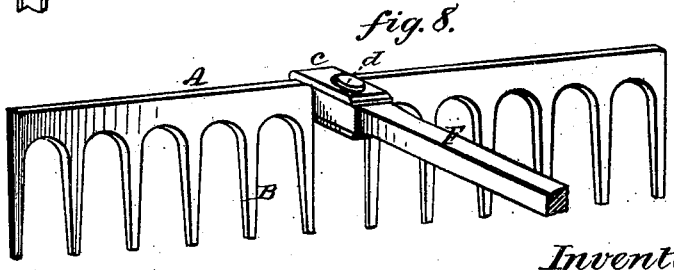


fig. 8.



Witnesses:

J. West Wagner

D. A. Poore

Inventor:

Elijah Sims,

by Johnson & Johnson

Att'ys.

UNITED STATES PATENT OFFICE.

ELIJAH SIMS, OF AURORA, ILLINOIS, ASSIGNOR TO MILTON Z. SIMS, CURTIS B. SIMS, AND JOHN A. SIMS, OF SAME PLACE.

IMPROVEMENT IN THE MANUFACTURE OF METAL RAKES.

Specification forming part of Letters Patent No. **199,111**, dated January 8, 1878; application filed July 20, 1877.

To all whom it may concern:

Be it known that I, ELIJAH SIMS, of Aurora, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in the Manufacture of Steel Rakes; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My improvement in the art of manufacturing steel rakes gives a finer finished, a more durable, and a cheaper rake than has hitherto been produced.

I cut from a plate of steel, of the proper width and thickness, two rake-head strips with broad backs, the teeth having rounded points, and the same cuts by which they are formed give the curves at the joining of the teeth with the broad stiff backs. The cuts at these points are peculiar, and are made by the rounded ends of the punches terminating in reverse side projections, the edges of which are parallel with the sides of the punch, and coincident with a line drawn through the middle of each tooth, so that half of the space around the point of each tooth is cut out by each punch, and the rounded ends of the teeth and their curved joining with the backs are formed in this way, giving the required wide spaces between the teeth and their proper length from the back, so that when the latter are cut into lengths for a twelve or fourteen inch rake, the broad backs will give the required stiffness to the teeth, which are then given the usual curve. The cuts are made in a peculiar succession by the action of two punches and corresponding slot-dies in the bed of the machine.

The shank for the handle is secured in a peculiar manner by a strap, which laps the stiff back between the teeth, to prevent lateral displacement, and is riveted to the shank, and brazed thereto and to the back.

By my plan, with one man I can cut five thousand rakes in ten hours, while by any other known method of producing steel rakes it would require one hundred men to do the same work upon the rakes ready for finishing in the same time.

I produce steel rakes of a superior quality at two-fifths of the present wholesale price of steel rakes now on the market. This is the result of my new method of producing steel rakes, and I thereby give to the public not only a superior article, but a vastly cheaper article than can be found in the trade.

In the drawings, Figure 1 represents a portion of the steel plate, showing the first cut made in producing two steel rake-head strips; Fig. 2 a similar view, showing the cuts as they progress, with the rounded half ends of the teeth and the arched space between the teeth at the back. Fig. 3 shows two complete rake-heads as cut from a plate; Fig. 4, a section of the rake and its handle-shank as united by the lapping strap; Fig. 5, a plan of the same. Fig. 6 shows the form and the distance apart of the dies in the bed; Fig. 7, the form and relative positions of the punches, and Fig. 8 the rake and its handle-shank complete.

In carrying out my invention, I use a power-press with dies and punches of the form shown, and provided with a continuous feed mechanism for the steel plate.

The dies shown in Fig. 6 are formed by openings in the bed of the machine, and are fixed, and the punches are adapted to work vertically over the dies, punching the waste metal from between and around the points of the teeth as the plate is moved forward by the feed motion, which is effected during the upward movement of the punches. The accuracy of the feed motion is effected by an adjustable device on the press; but as the construction of the press may form the subject of a separate patent a more particular description thereof is deemed unnecessary here.

The rake-heads are cut from a plate of steel about four inches wide and about one-quarter of an inch thick for a twelve or fourteen inch rake.

For convenience of description, I will designate the method of producing the rake-heads as first cut, second cut, and third cut.

The complete and separated rake-heads are shown in Fig. 3, with the wide backs A and the teeth B, the spaces C between each side

thereof, and the spaces *a b b* around the end of each tooth, forming the rounded tooth-point and the curved sides of the teeth at their junction with the backs.

The plate is adjusted in the machine with reference to its position with die No. 1 and its corresponding punch, so as to make the first cut C′, Figs. 1, 2, and 3, leaving the first end space uncut, as in Fig. 1. The cuts are across the plate, and each is separate and distinct.

The forms of the ends of the dies and punches are curved about the distance of a quadrant at the ends *c′*, and with reverse side projections *d′* parallel with the sides of the dies, so as to leave the wide spaces *a* between the point of each tooth and the curved inner side of the back only half cut, the end cuts being on opposite sides of the spaces, as at *a b b*, in order to give the proper form to the rake-back A, and to round the points of the teeth. Each cut, therefore, will give the rounded part *b* one-half of the rounded point in the end space *a*, as shown in Figs. 1 and 2. The first cut being completed of this form, the plate is fed forward the required distance for the second cut, which will then be made by the two punches simultaneously, and will make the spaces designated "second cuts," which are the first and fourth spaces, C, Fig. 2, it being understood that the space C′ was already cut by the action of one die and punch only. The third cut is made in the same manner, and cuts the third and sixth spaces from the end.

The object of the reverse projections *d′ d′* and the quarter rounds of the ends *c′* of the dies and punches is not only to proportion the length of the teeth B to the rake, but to give a clear separation and rounded point to the teeth of each head, and to give the arched shape at the junction of the teeth with the head.

In this way steel plates of indefinite lengths can be cut and divided into rake-heads of the desired size, and the teeth given the proper curve and taper, as shown in Fig. 4, ready to be "handled."

The shank F for the handle is secured to the center of the head A by a strap, *e*, which is bent the precise shape to fit over and around the head between the two middle teeth, and also over the end of the shank, which abuts against the inner side of the head, as shown in Fig. 4, the strap being secured by coincident holes in its lapping ends and in the shank to receive a strong rivet, *d*, which, in connection with brazing the strap to the shank and the back, firmly unites the parts and gives a solid connection. The strap is prevented from lateral displacement by passing between the teeth. When the shank is secured, I then polish and handle the rake for the market.

The dies and the punches are substantially parallel to each other, and their reverse end projections *d′* meet at the middle line of each tooth, and give the half cut around the point.

The state of the art shows various plans for cutting combs, curry-combs, shovel-blanks, harrow-teeth, and nails and tacks, in single and double rows, from a single plate; and that two dies have been used for making tack-strips by punching out alternate blanks or spaces by converging dies, so as to form a tack-strip adapted to be made into a spiral coil, convenient for feeding to the separating and inserting machine in the manufacture of boots and shoes, and in which the separated tacks have tapering shanks, sharp points, and shouldered heads. But such a flexible tack-strip is a very different thing from an improvement in the art of making steel rakes, so as to produce a vastly cheaper and better article than that now in use, while the method of producing such rake-strips is new, so far as I know.

I claim—

1. The within-described improvement in the manufacture of metal rakes, which consists in cutting from a strip or plate of metal, and by successive alternate cuts, as shown, two toothed blanks, from which the rakes are to be formed, properly curving the teeth and giving to them the desired taper by the means and in the manner substantially as shown and described.

2. The system of dies and punches herein described, arranged and adapted to cut the metal simultaneously from opposite sides of succeeding teeth, and at the same time form the rounded point to the teeth, in the manner and for the purpose specified.

In testimony that I claim the foregoing I have affixed my signature in the presence of two witnesses.

ELIJAH SIMS.

Witnesses:
H. H. MILLER,
J. A. SIMS.