2 Sheets—Sheet 1.

E. S. RENWICK.

WROUGHT IRON RAILROAD CHAIR.

No. 7,734. Patented Oct. 22, 1850.

Fig. 1a.

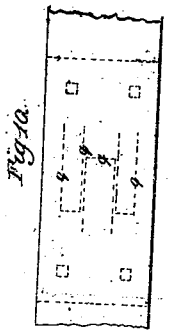


Fig. 5.

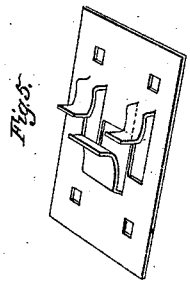


Fig. 3.

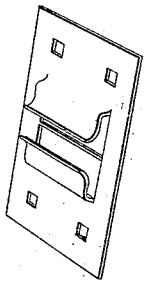


Fig. 8.

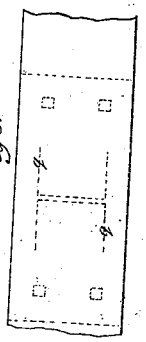


Fig. 4.

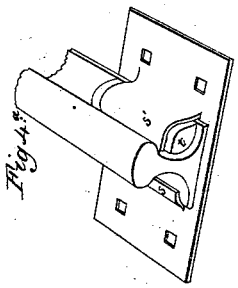


Fig. 4.

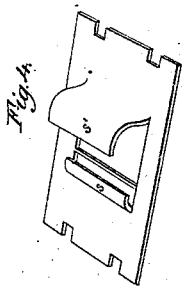


Fig. 9.

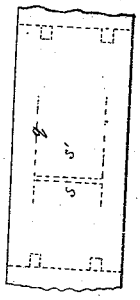


Fig. 6

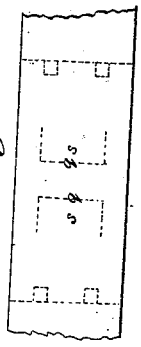


Fig. 1.

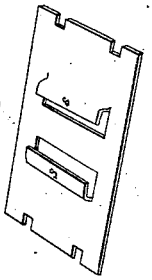


Fig. 2.

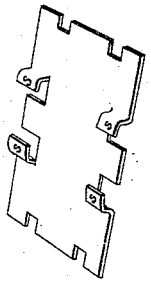
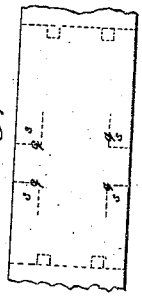


Fig. 7.



E. S RENWICK.

WROUGHT IRON RAILROAD CHAIR.

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Fig 11.

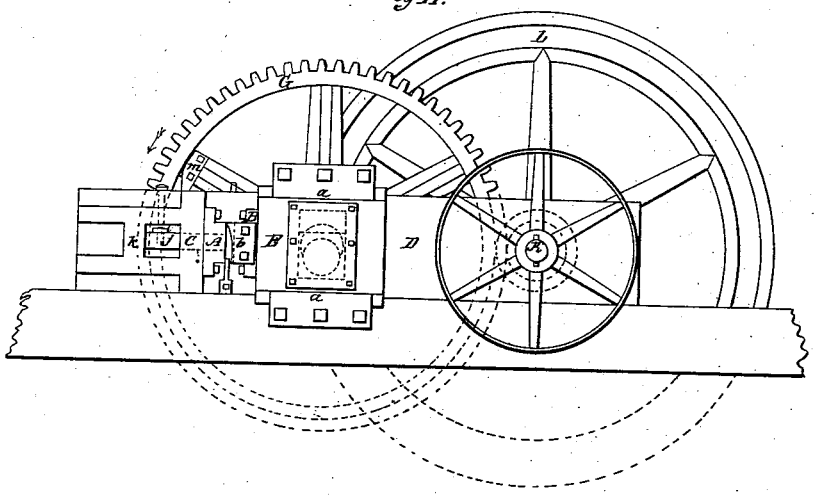
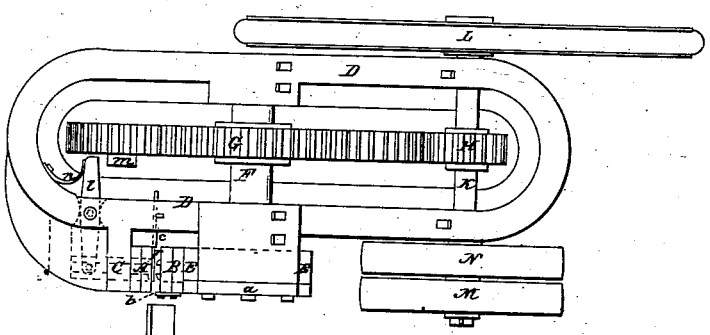


Fig. 12.



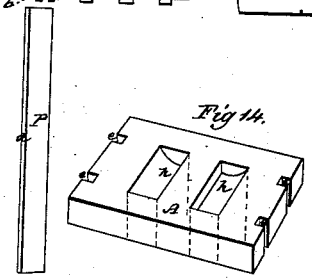


Fig 14.

Fig 15.

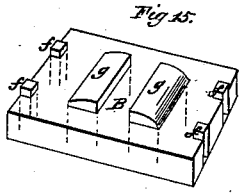


Fig. 13

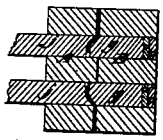
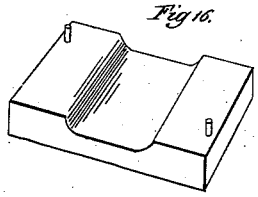


Fig 16.



UNITED STATES PATENT OFFICE.

EDWARD S. RENWICK, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVED WROUGHT-IRON RAILROAD-CHAIR.

Specification forming part of Letters Patent No. **7,734**, dated October 22, 1850.

To all whom it may concern:

Be it known that I, EDWARD S. RENWICK, of the city of Washington, in the District of Columbia, have invented a new and useful Improvement in Wrought-Iron Railroad-Chairs, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form part of this specification, and in which—

Figures 1, 2, 3, 4, and 5 represent various forms of wrought-iron railroad-chairs manufactured by my method, and Figs. 6, 7, 8, 9, and 10 represent fragments of the bars of which they are formed. Figs. 11 and 12 represent various views of a punch, and Figs. 13, 14, and 15 represent the dies in perspective and in section by which the chairs may be made.

Wrought-iron railroad-chairs have heretofore been manufactured by forming the lips of the chair, or those portions which project above the bottom of the rail and embrace its lower flange, out of those portions of the plate which extend outside of the portion of the chair on which the bottom of the rail rests. In order to form chairs by this method, it is essential that the edges of the tongues, or those portions of the plate which are to form the lips, should be first cut free from the rest of the plate, and that the tongues should then be bent over a form or mandrel of the shape of the rail which the chairs are made to support. This method of forming wrought chairs by consecutive cutting and bending is objectionable in many respects—first, because the two operations cannot be effected by direct-acting dies or punches, for after the edges of the tongues are cut loose the latter must be bent over the sides of a mandrel; second, because the chair, after it is formed upon the mandrel, must be drawn endwise therefrom in the same manner that would be necessary to remove it from a rail, and although very ingenious devices have been invented to facilitate the withdrawal of the chair from the mandrel, yet the chair-machines are necessarily of a more complicated construction than would be necessary if this operation could be dispensed with. Another objection that may be urged against this method of forming wrought-iron chairs arises from the fact that the tongues of iron which are turned up to form the lips must be bent at so sharp an angle that the fibers of the iron at the outer side of the bend are frequently ruptured, and the chair is thus rendered defective.

The object of my invention is to obviate these defects; and it consists of a railroad-chair formed from a plate of wrought-iron by simply punching tongues from that portion of the plate on which the rail is usually supported into the proper shape to constitute the lips of the chair; or, to contrast my chair with those heretofore in use, it may be stated that in them the edges of the tongues which form the lips are first cut free and the tongues are then bent from without inward toward the middle of the plate, while in my chair the tongues are punched from within outward toward the edges of the plate. In order to effect this result, I take a flat bar of iron of a width equal to that of the intended chair as it comes hot from the rolling-mill and present it endwise to a pair of dies whose faces are the counterparts of the upper and lower faces of the finished chair. One of these dies is fixed, while the other is made by some suitable mechanical device to move from and toward the fixed one and is furnished at one end with a knife. When the two are nearest to each other, the space included between their faces should be of the size and shape of a hot finished chair. The bar is introduced endwise between the dies, and as the one is forced toward the other a piece of the bar equal in size with the chair to be formed is severed from it by the knife, and as the moving die advances the projections on its face, acting upon the severed plate, punch tongue-like portions from its middle into the sockets of the other die, which tongues, when thus punched into shape, are of the proper size to constitute the lips of the chair. As soon as the dies have attained their nearest position the movable one is withdrawn from the fixed one, the finished chair is removed, and the hot bar is again thrust between the dies, which severs from it a second plate and forms it into a second chair in the same manner as the first. The operation is continued until the bar is used up, when a fresh one is presented to the machine.

The machine which I have devised for forming railroad-chairs by this method is represented at Figs. 11 and 12, and consists of a strong frame of iron and of other portions which are

secured thereto. The latter consist mainly of a die A, (represented in perspective at Fig. 14,) the counterpart of the upper face of the chair to be made, of a die B, the counterpart of the lower face of the chair, and of the machinery by which the latter die is drawn from and forced toward the former. The socket-die A is secured to a projection C on the frame D and the punch-die B is made fast to a slide E, which is moved in guides *a a* from and toward the fixed die. In order to produce this movement, the slide is slotted transversely to receive a brass box, to which an eccentric journal is fitted. The journal projects from the front extremity of a shaft F, which turns in brasses in the sides of the main frame. This shaft is fitted with a cog-wheel G, whose teeth engage with those of a pinion H on a driving-shaft K. The latter shaft carries a fly-wheel L, and is also fitted with a loose M and a fast belt-pulley N, to which the power of the prime mover of the establishment is imparted by a belt. One end of the punch-die B is fitted with a knife *b*, which moves with it. A gage *c* is adapted to the side of the frame, which limits the distance to which the bar can be introduced. Apertures *e*, corresponding in position with the spike-holes in the chair, are formed in the socket-die, and corresponding punches *f* are projected from the face of the punch-die B, so that as the latter is advanced toward the socket-die the spike-holes will be punched simultaneously with the formation of the lips. A feed-bed P is placed opposite that end of the dies at which the bar of iron is to be entered, and a fence *d* is erected upon it to guide the bar as it is shoved endwise between the dies.

When the machine is in operation, the slide E, with the punch-die B attached to it, is moved by the rotation of the eccentric journal of the shaft F toward and from the fixed die. If then a bar of iron of the proper width and thickness be introduced between the two, a piece equal in length with the distance between the gage *c* and the edge of the knife *b* will be severed from it, and as the moving die continues to approach the stationary one the punches *g g* on the former, acting upon those portions of the plate which lie over the sockets *h h* in the stationary die, sever them at one end and at both sides from the rest of the plate and force the tongues thus formed into the sockets of the stationary die, thus punching them into the proper shape to constitute the lips of the chair, while at the same time the punches *f* punch the spike-holes. As the moving die recedes from the chair thus formed the latter must be expelled from the machine to make room for the plate to form the next chair. This is effected by means of sliding plugs *j j*, whose front ends form the bottoms of the lip-sockets in the stationary die A, as represented in section at Fig. 13. These plugs extend through the support C of the fixed die and abut at their hinder ends against a projection *k* on the frame, by which they are prevented from moving during the action of the punches of the moving die. Their hinder extremities are connected with the outer arm of a lever *l*, which is pivoted to the frame and whose inner arm is acted upon by a cam or tappet *m*, secured to one of the arms of the wheel G on the eccentric-shaft F. The inner arm of the lever is also acted upon by a spring *n*, whose tendency is to keep the sliding plugs *j j* in contact with the projection *k*, against which they abut.

The tappet *m* is set in such a position that when the moving die leaves the stationary one the cam strikes the inner arm of the lever. The lever, acting upon the sliding plugs, forces them to move in their sockets and to push the chair before them, thus expelling it from the die, when it drops to the floor or into any receptacle provided for the purpose. As soon as this is effected the tappet, moving on, passes the lever and allows the spring *n* to draw the sliding plugs back in the sockets. The machine is then ready for forming another chair. In order to prevent the plate severed by the knife *b* from dropping, a stationary rest *r* is adapted to the machine, on which the plate is supported edgewise until it is formed into a chair and is expelled from the machine by the action of the sliding plugs.

The dies represented as attached to the machine are the proper ones for forming the chair represented at Fig. 1. Chairs of other forms, as represented by Figs. 2, 3, 4, and 5, may be formed by the same machine and in the same manner by removing the set of dies attached to the machine and replacing them by another pair of the form suited to the chair required to be made. The projecting portions *g g* of the moving die wear faster than the other parts, and as their edges act as knives it is essential that some provision should be made for sharpening them. This is effected by making these of detached pieces, which are inserted in sockets, as represented in section at Fig. 13, by which method of construction they can be removed and ground up. As they wear off at their faces packing *o o* is inserted behind them to compensate for the wear.

Cases may arise where it may be advisable to form the lips with great precision. In such cases I propose to move the projecting pieces *g* in their sockets by suitable machinery, by means of which they can be withdrawn within the face of the punch-die until the latter has gripped the severed plate between it and the face of the socket-die. The projecting pieces *g* will then be forced forward and, acting upon the portions of the plate with which they come in contact, will punch the tongues into the sockets of the socket-die with great precision.

In forming chairs by the method herein set forth slight fins may be produced upon the

edges cut by the punches. These should be removed by filing before the chair gets cold. This operation is easily effected by supporting the chair in a block such as that represented at Fig. 16, on which it is prevented from slipping by pins which pass through the spike-holes in the chair.

In order to exemplify more clearly the principle of my invention and that which I wish to secure by Letters Patent, I have represented in the accompanying drawings five forms of chairs, all of which are formed by the method herein set forth. Thus Fig. 6 represents a fragment of the flat bar from which a chair of the form represented at Fig. 1 is formed. The dotted lines *q q* in the former figure represent the cuts made by the entrance of the punches of one die into the sockets in the other die. It will be perceived that the portions *s s* of the plate which are formed into the lips *s s* of Fig. 1 are tongues punched from that part of the plate which would otherwise be covered by the rail when in use. Fig. 2 represents a finished chair in which the lips *s s* are formed at the edges of the chair instead of at its middle. In this example it will be perceived that the portions *s s* of which the lips are made (see Fig. 7) are also formed from the portions of the plate which would otherwise be covered by the rail. In the chair represented at Fig. 3 the lips are punched long enough to extend above the lower flange of the rail, and the dotted lines *q q* of Fig. 8 show the lines at which the bar is severed by the punching. In the chair represented at Fig. 4 one of the lips is sufficiently large to admit a wooden wedge *t*, Fig. 4ª, to secure the rail. In chairs of this form the larger lip *s'* may be made slightly oblique to the rail, in order to conform to the taper of the wedge. Cases may arise in which the lips must be longer than could be formed by dividing a portion of the plate equal in width with the bottom of the rail into two portions. In such cases the chair may be constructed with two or more lips which are not opposite each other, as at Fig. 5, where the portions of which the lips are formed lap past each other, as shown by the dotted lines *q q* of Fig. 10.

The above specimens are but a few of the many forms of chairs which could be shown, but they are sufficient to show to how great an extent this method of forming wrought-iron chairs can be carried, and to enable engineers to produce chairs of other forms. In all of these cases it will be perceived that the chair can be formed by one motion of a direct-acting die or punch and without the use of mandrels or bending-levers. It will also be perceived by reference to Fig. 13 that that part of the lips which adjoins the plain part of the chair may be an easy curve, thus avoiding all danger of breaking or straining the iron of which the lip is formed. It will also be perceived that by making the lips of chairs of this description with a gentle curve the lip may be made slightly elastic, which may prove a great advantage in allowing the rail to yield slightly as the cars are running over it.

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

A wrought-iron railroad-chair with lips formed from that portion of the plate on which the rail is usually supported, substantially as herein set forth.

In testimony whereof I have hereunto subscribed my name.

EDWARD S. RENWICK.

Witnesses:
CLEM. S. STULL,
S. W. WOOD.