

(No Model.)

T. DONAHUE.

TEMPERING UNITED LENGTHS OF BAND STEEL.

No. 249,909.

Patented Nov. 22, 1881.

Fig. 1.

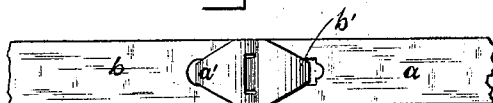


Fig. 2.

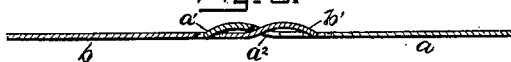


Fig. 3.

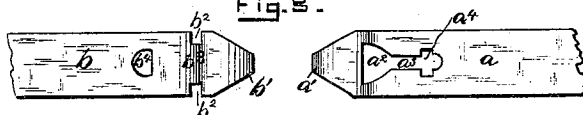


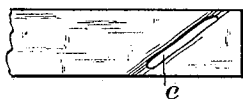
Fig. 4.



Fig. 5.



Fig. 6.



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TEMPERING UNITED LENGTHS OF BAND-STEEL.

SPECIFICATION forming part of Letters Patent No. 249,909, dated November 22, 1881.

Application filed December 22, 1880. (No model.)

To all whom it may concern:

Be it known that I, THOMAS DONAHUE, of the city, county, and State of New York, have invented certain new and useful Improvements in Tempering United Lengths of Band-Steel; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part thereof, is a clear, true, and complete description of my invention.

It is well known that the tempering of band-steel is usually effected by the longitudinal passage of the steel in long lengths through the heating-baths, (usually of melted lead), and also through a cooling-bath, (usually of oil,) and to render the process continuous, and to attain uniform results, numerous lengths of the band-steel are united at their ends, so as to enable the steel to progressively and continuously make its tour through the tempering apparatus.

Heretofore much trouble and expense has attended the preparation of band-steel for tempering, with relation to the union of the ends, said union having been heretofore attained either by punching holes in the steel and riveting them with an overlapping joint, or by wrapping the overlapped portions with fine wire, or by the use of an attachable clamping-joint. The riveting method is expensive, and if not accurately performed the joints are liable to displacement while passing through the tempering apparatus; and, moreover, such joints do not readily pass over, under, between, and around the rolls employed in said apparatus. The wire-wrapped joint is specially liable to displacement, and is also expensive in the labor requisite therefor, and the attachable clamping-joint is open to the same objection as to displacement, and it is also an inconvenient one with respect of easy passage through the tempering apparatus. It is also true that in proportion as these prior methods of forming the joints have provided against accidental disconnection, they have involved additional labor for a disconnection of said ends after the tempering has been completed.

It is obvious that the accidental separation of ends during the tempering operation is not

only attended with delays, trouble, and expense, but also with inequality in the character of the temper, in that during such delays the steel is variably exposed both to the heating and the cooling medium, and it is well known that, in view of the fact that the long lengths of tempered band-steel are generally cut into short lengths for use, it is important that these latter, in the matter of temper, should be as nearly alike as possible, and this is specially true of "corset-steels," in connection with the manufacture of which my present invention was prompted, and its practical value fully developed.

I seek to reduce the cost of uniting and disconnecting the ends of band-steel in tempering, and also to reduce the liability of accidental separation to a minimum, and thereby attain not only economy, but also to render the tempering of band-steel absolutely uniform.

The main feature of my invention consists in tempering united lengths of band-steel by passing the lengths united by interlocked ends through the tempering apparatus, whereby with minimum manipulation the lengths of steel are readily and directly united or disunited, but nevertheless so securely maintained in connection as not to be liable to accidental separation.

I prepare band-steel for tempering by employing an interlocking joint which requires the addition of no such extraneous elements as rivets, wrapping-wire, or clamping-joints, as in all cases heretofore employed.

The desirable characteristic capacities of a joint applicable in accordance with my invention are a capacity to afford resistance to tensile strain, coupled with a capacity to withstand the unlocking tendencies incident to a thrusting action, because both draft and thrust are experienced during the passage of the band-steel through the tempering apparatus; and, although I have devised a novel joint possessing these capacities, and hereinafter lay special claim thereto, I do not limit the main feature of my invention to that particular joint, for many others heretofore known, as in bale-ties, cask-hoops, &c., may be employed in lieu of my novel joint with more or less satisfactory

results, and I therefore also describe and show a form of well-known joint (not novel with me) which is well adapted for my purposes.

To more particularly describe my invention, I will refer to the accompanying drawings, in which Figure 1 represents, in plan, two ends of band-steel united in accordance with my invention. Fig. 2 represents the same in longitudinal central section. Fig. 3 represents the same in plan view detached. Figs. 4, 5, and 6 represent, respectively, similar views of a joint not devised by me, but well adapted for use in accordance with the main feature of my invention.

The two ends of band-steel *a* and *b* to be united are each placed into a die-press and are stamped and cut as follows: The piece *a* is tapered at its end and is bent or curved, as at *a'*, and back of said bent surface an irregular locking-slot is cut or punched having a triangular outline at *a²*, a straight slot at *a³*, and a transverse slot at *a⁴* near its end opposite the triangular end. The piece *b* is similarly tapered and bent, as at *b'*, and cut or punched at each side thereof at the base of the taper, to afford a transverse open slot, *b²*, on each side of the neck *b³*, and also a central aperture, *b⁴*, at the rear of and in line with the neck *b³*. The piece *b* may properly be termed the male end and the piece *a* the female end. The curved or bent ends prevent the tips thereof from unduly projecting upward, and causes each to be partially housed, respectively, in the transverse slot *a⁴* in piece *a* and in the aperture *b⁴* of piece *b*, thus enabling the joint to freely pass between rolls, as well as over them. The thrusting action is provided for by the abutment of the tips with the edges of the slot or aperture which they occupy when the two pieces are in the same plane, and also when not in the same plane, by the contact of the surfaces of the slots at *a³* and *b²* with the surfaces respectively coincident thereto. The tensile strain is provided for by the wide end of the slot at *a³* of piece *a* in contact with the neck *b³* of piece *b*. It will be readily seen that such joints are readily and cheaply formed, that the ends are readily connected or disconnected, when desired, and that at the same time there exists little, if any, liability of accidental displacement incident to a thrusting movement.

As an equivalent of the particular joint devised by me for use in accordance with the main feature of my invention, I have selected for illustration, in Figs. 4, 5, and 6, one of many interlocking joints from such as have heretofore been employed in bale-ties and cask-hoops, and in which tensile strain is only required, but which, by reason of their peculiar (and in this respect accidental) structure, are suited for my purpose, because of their capacity to resist unlocking or disconnection during such

thrusting movements as are incident to the tempering operation. This joint is formed, as shown, by means of an angular slot, *c*, in one piece, and two open side slots, *d*, appropriately located with reference to each other in the other piece, so that the length of the angular slot, being greater than the width of the steel, readily receives one end of the fellow piece, and when these pieces are straightened the two side slots, *d*, engage with the sides of said slot near each end thereof.

I am well aware that in the art of nail-making the plates used therein have heretofore been connected end to end by means of a dovetail joint while in the machine, and immediately in front of the punches which cut or punch nails from said plates, so as to provide against injury to the punches or cutters in working upon the terminal end of each plate, as would be liable if fed singly; and I am also aware that in the preparation of sheet-iron or tin-plate for roofing purposes sheets of iron or tin-plate have been connected end to end by means of open "tinners' joints," and then passed consecutively beneath rolls for closing said joints, and thence through baths of melted tin or other metal for soldering or further closing said joints and permanently uniting the sheets of metal into a long strip, and also meantime coating the same with metal from the bath. In neither of these instances, however, were the joints employed at all suitable for my purposes, nor were said prior connections of plate to plate or sheet to sheet made with reference to the attainment of objects sought by me, or the attainment of any results analogous to those accruing by reason of my invention.

Having thus described my invention I claim—

1. The improvement in tempering band-steel, which consists in passing through the tempering apparatus consecutive lengths of steel united by interlocked ends, substantially as described.

2. The interlocking joint for use in connection with tempering band-steel consisting of the two ends of steel provided, respectively, with the transverse straight-sided slot *b²*, on each side of the neck, and the longitudinal straight slot *a³*, terminating in the triangular opening *a²*, substantially as described.

3. The male end tapered and bent and provided with the neck, the transverse slots on each side of said neck, and the aperture in line therewith, in combination with the female end tapered and bent and provided with the longitudinal and transverse slots, substantially as described.

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