No. 611,694. Patented Oct. 4, 1898.

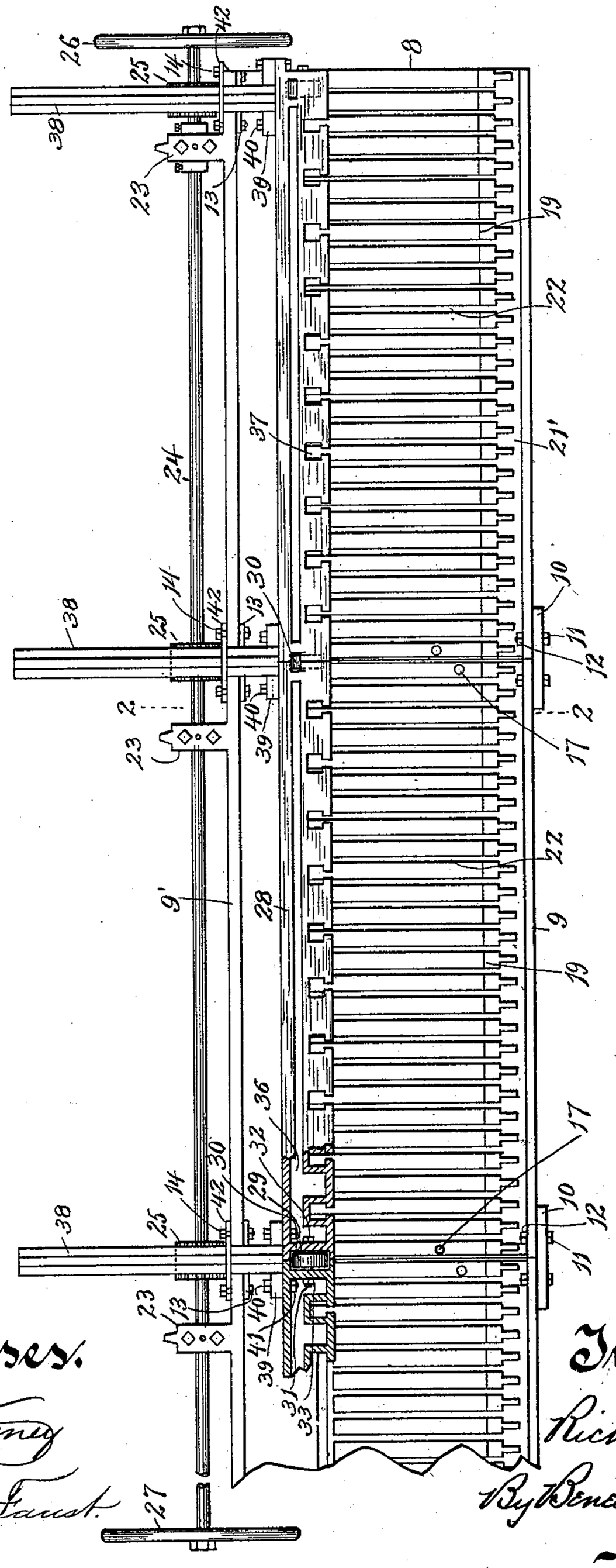
R. W. LUNDY.

MACHINE FOR STRAIGHTENING AND COOLING METAL BARS.

(Application filed Oct. 13, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



Witnesses.

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Fig. 2.

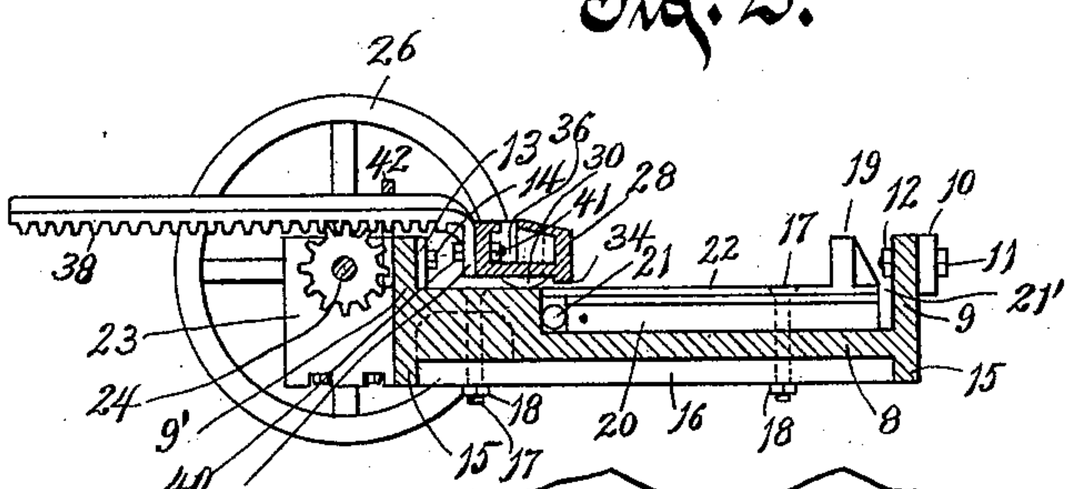


Fig. 5.

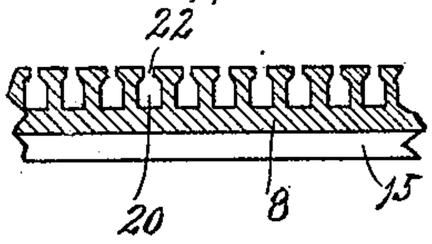


Fig. 3.

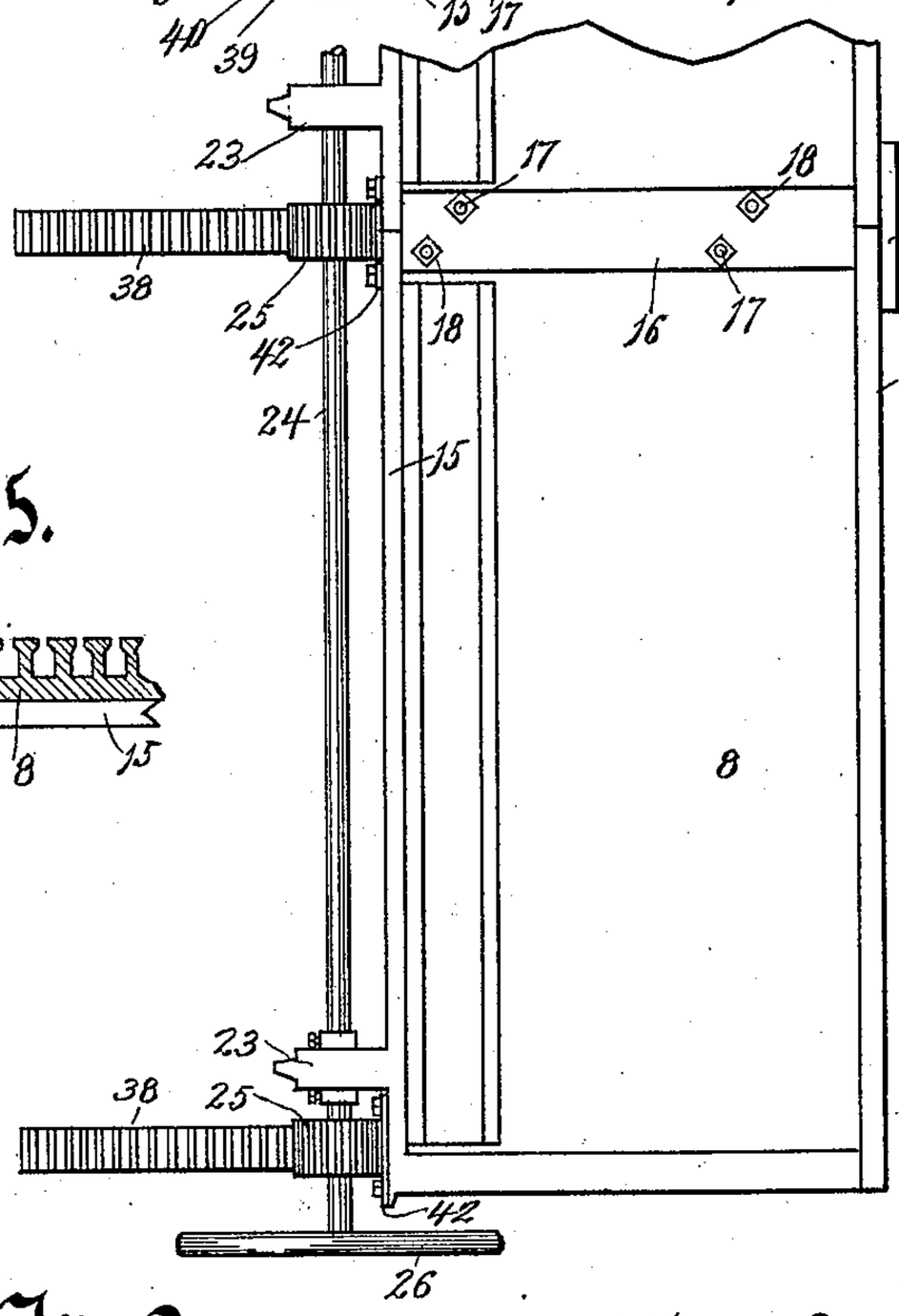


Fig. 4.

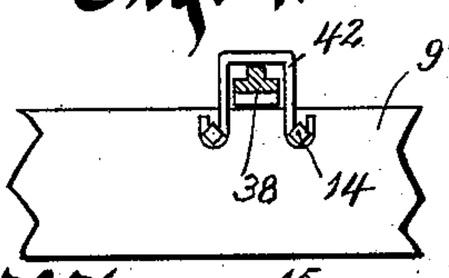


Fig. 6.

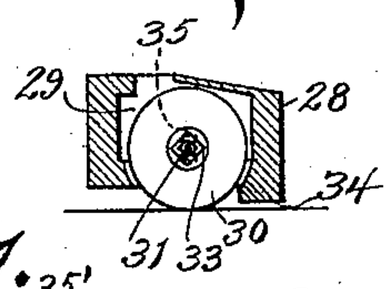
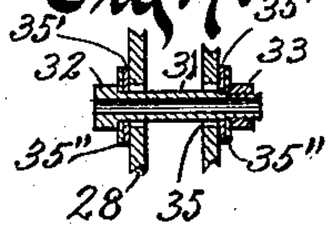


Fig. 7.



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UNITED STATES PATENT OFFICE.

RICHARD W. LUNDY, OF SOUTH BEND, INDIANA.

MACHINE FOR STRAIGHTENING AND COOLING METAL BARS.

SPECIFICATION forming part of Letters Patent No. 611,694, dated October 4, 1898.

Application filed October 13, 1897. Serial No. 655,073. (No model.)

To all whom it may concern:

Be it known that I, RICHARD W. LUNDY, of South Bend, in the county of St. Joseph and State of Indiana, have invented a new and useful Improvement in Machines for Straightening and Cooling Bars of Iron, Steel, and other Material, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention has relation to improvements in machines for straightening and cooling bars of iron, steel, and other material.

It is the common practice of manufacturers of rods and bars of iron, steel, &c., to place them when finished upon a bed of some kind to cool. These beds are sometimes made of brick and sometimes of plates of iron. They are also made of bars of railroad-iron placed close together, but with spaces therebetween, or of cast-iron gratings laid over a shallow pit, either of the latter constructions intended to hasten the cooling by providing spaces for air. As the surface of these beds is more or less uneven and as the hot bars conform somewhat to the surface upon which they are placed to cool, they are found to be more or less crooked when cold. For some purposes, however, a slight crookedness is not objectionable, but for many others—such as wagon and buggy tires, rails for door-hanger tracks, &c.—it is necessary that the bars should be straight. Machines of various kinds are used for straightening the cold bars after having been cut to the desired length; but this process is slow and expensive, and, besides, the accuracy of the work depends largely upon the eye and the care of the operator.

The object of my invention is to provide a machine for straightening bars of any length—say up to one hundred feet—immediately after said bars have been finished by the mill and while yet sufficiently hot to be straightened by pressure or by one or two blows mechanically applied, the machine being adapted to operate upon hot bars, so as to render them absolutely straight, without any additional expense for either labor or power, the invention also comprehending the cooling of the bars after having been so straightened.

With the above primary object in view the invention consists of the devices and parts or their equivalents, as hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a plan view of the machine. Fig. 2 is a section on the line 2 2 of Fig. 1. Fig. 3 is an under side view of a fragment of Fig. 1. Fig. 4 is a detail view showing a means for retaining the propelling-arm in engagement with the pinion. Fig. 5 is a longitudinal section of a fragment of the bed. Fig. 6 is a cross-section of the straightener-beam, and Fig. 7 is a detail sectional view of the hollow axle of the roller or wheel of the straightener-beam.

Referring to the drawings, the numeral 8 indicates a straightening and cooling bed, which is preferably made in sections of convenient length (six to eight feet) and in widths of three to four feet, as the capacity of the mill may require. The opposite side edges of each section of the bed are provided with upwardly-extending flanges 9 9′, which when the several sections are adjusted together are in longitudinal alinement. Across the joint of the meeting edges of the flanges 9 and adjacent to the outer faces of said flanges is a plate 10, and bolts 11 pass through said plates and through the flanges and receive upon their threaded ends nuts 12. A similar plate 13 extends across the joint or meeting edges of two of the adjacent flanges 9′, but adjacent to the inner faces of said flanges. These plates are secured to the flanges by means of bolts 14. Each section of the bed is also provided on its under surface, at opposite side edges, with depending flanges 15 15. A plate 16 is arranged lengthwise of each joint against the under side of the sections and between the flanges 15 15. Bolts 17 pass through the sections of the bed-plate and through these plates 16. The heads of the bolts are countersunk in the top surface of the bed, as clearly shown in Fig. 2, and the lower ends of the bolts receive nuts 18. By the provision of the plates 10, 13, and 16 it will be seen that the sections of the bed are securely held together at the several joints. Said joints may be further closed and made water-tight, if desired, by means of lead fillings. (Not shown.)

Each section of the bed is formed or provided near its front edge with an upwardly-

extending jaw 19. The surfaces of the sections of the bed and the inner faces of the jaws 19 are planed perfectly straight and level and at exact right angles, so that when the sections are put together the faces of said sections will be flush, and the jaws also will be flush, so as to render the whole perfectly level and in a straight line, forming practically a continuous bed and a continuous jaw.

The bed is provided with a series of elongated waterways 20, which extend in the direction of the width of the bed and which are connected at one end with each other by means of openings or passages 21, extending from one waterway to the other, (see Fig. 2,) and at their opposite ends the waterways 20 are open, as indicated by 21′. Water is supplied at one end of the bed and discharged at the other. By the provision of these waterways and connecting passages water is conveyed to all parts of the bed which come in contact with the hot bars. It is not intended, however, that the water should rise to the surface and come in contact with the bars. The bed is also provided with narrow slits or spaces 22, which extend from the top surface downwardly to the waterways 20. These spaces permit expansion and prevent the warping which occurs when one side of a solid plate is constantly kept at a higher degree of heat than the other.

The rear edge of the bed is provided at desired distances apart with projecting pillow-blocks 23, forming bearings for a longitudinal shaft 24. This shaft carries a plurality of pinions 25, which are fast thereon and are located advisably equidistant apart. Upon one end of the shaft 24 is mounted a hand-wheel 26 and on the opposite end a balance-wheel 27.

The numeral 28 indicates a straightener-beam which is coextensive in length with the bed 8 and is also preferably made in sections of from six to eight feet in length and advisably seven inches in width and three and one-half to four inches in depth. At the contiguous or meeting ends of the several sections are formed recesses 29 29, which form a space for a roller or wheel 30, said wheel being mounted on a short tubular axle 31, the ends of said axle being mounted fast in openings in the opposite side walls of the recesses. One end of the axle is formed with a head 32, and the opposite end is threaded to receive a nut 33. The several wheels 30 are advisably roller-bushed to insure ease of movement and to enable the operator to drive the straightener-beam with force when necessary. Each axle is preferably made adjustable, so as to be capable of being raised or lowered in order to permit the raising of the straightener-beam 28 in case wear on the axle and in the hub of the wheel or roller 30 should cause the beam to settle and the rib 34 on the under side of said beam to come in contact with the surface of the bed 8. This adjustability is preferably secured by forming the walls of the recesses 29 with elongated slots 35, (see Fig. 7,) the ends of the axle of the roller being mounted in said slots. By loosening the nut 33 the axle can be raised or lowered and held to adjusted position by subsequently tightening the nut.

The face of the straightener-beam and the rib 34 on the under side thereof are planed perfectly straight and true. The straightener-beam is also formed throughout its length with a water-channel 36, the channel being provided by forming the straightener-beam practically hollow. The water is introduced at one end of said beam and flows through the longitudinal channel and is discharged at the opposite end of the beam. At the points in the straightener-beam where the walls forming the bearings for the axle 31 are located the free flow of the water is not interfered with, inasmuch as the axles 31, as previously stated, are tubular, whereby the water is free to flow therethrough. To prevent the water passing through the slots 35, sheet-packings 35′ are employed, which packings are fitted to the axles, said packings being adjacent to and covering the slots. Metal plates 35″, which serve as washers, are disposed between the packings 35′ and the nut 33 at one end of the axle and the packings 35′ and the head 32 at the opposite end of the axle. The straightener-beam is also formed with slits or spaces 37, which are narrowed somewhat at their outer ends, as clearly shown in Fig. 1. These slits or spaces subserve a similar function to the slits 22 of the bed with respect to the straightener-beam—that is to say, they permit expansion and prevent warping of said beam.

The numerals 38 indicate rack-bars which are secured to and extend from the straightener-beam and are adapted to be engaged by the pinions 25, whereby when the shaft 24 is rotated a movement is imparted to the straightener-beam. These rack-bars are preferably formed at their inner ends with heads or enlargements 39, which extend across the joints formed by contiguous ends of sections of the straightener-beam and are secured to said sections by means of bolts 40, passing therethrough and through the straightener-beam. The inner ends of these bolts are threaded to receive nuts 41.

It will be noticed from the drawings that when the straightener-beam is in place on the bed 8 the rack-bars 38 are directly over the pinions 25, the teeth of said rack-bars meshing with the teeth of the pinions. By turning the shaft 24 the pinions are caused to revolve and to thereby move the rack-bars 38, and said bars in turn move the straightener-beam 28. As the rack-bars 38 merely rest or lie upon the pinions, they are liable to lift or jump upwardly out of engagement therewith, especially when the straightener-beam strikes the bar in the process of being straightened. To prevent this, I provide straps 42, (see especially Fig. 4,) which are bent over the rack-

bars and extend downwardly, their lower ends being bent into hook form, which hooks engage the bolts 14.

In assembling the parts together the straightener-beam is first placed on the bed, with its face in contact with the jaw 19, before the nuts on the axles 31 and on the bolts 40 are set.

It will be understood that this machine is more particularly designed to be used only in straightening rods and bars of small and medium sizes, and in the operation the first bar is placed on the bed close to the jaw 19, and, if it is not too heavy or too cold, its entire length will rest upon the straight and level surface of the bed. By turning the wheel 26 the straightener-beam is forced against the edge of the bar to be straightened, which, if necessary, is then turned up on its edge and the straightener forced against it, as before, and said bar will thereby be made absolutely straight throughout its entire length. The hand-wheel 26 is for the purpose of turning the shaft 24 and thereby operating the straightener-beam, while the wheel 27 is designed to compensate for the twist or spring in the shaft and to carry its end of the straightener-beam against the bar to be bent with force. The power of the machine can be increased by increasing the weight and diameter of the wheels 26 and 27. The second bar to be straightened is placed near the first and the straightener-beam operated in the same manner as before. After the first few bars have cooled sufficiently they may be removed from the bed and those remaining forced over against the jaw 19. The bars may also, if desired, be piled one upon the other to the height of the jaw 19.

Heretofore straightening-beds have been used made of solid cast-iron, having an upwardly-projecting rib on one side. Others have been used composed of open cast-iron gratings with a rib on one side, the sections, however, not being bolted together. Inasmuch, however, as the plates of such beds soon become bowed or warped by expansion of the upper surface, they do not serve the purpose for which my machine is designed. So far as I am aware a straightener in combination with a cooling-bed has never been used; nor has any attempt been made, so far as I know, to overcome the expansion of one side and consequent warping of cast-iron beds, either by leaving open spaces in the surface or by using water to keep it cooled down to a low degree of heat.

What I claim as my invention is—

1. In a straightening-machine, the combination, with a straightening-bed composed of sections joined together having a waterway therein, with means for introducing water therein and discharging therefrom, said water adapted to pass through the waterway, but not to be forced onto the upper surface of the bed, a continuous jaw, and a continuous straightener-beam on the surface of the bed and opposed to each other, and means for reciprocating one of said parts so as to move it toward and from the opposed part, in order to compress a bar therebetween.

2. In a straightening-machine, the combination with a straightening-bed provided with a series of slits in its surface, said slits adapted to permit expansion and prevent warping, a continuous jaw and a continuous straightener-beam on the surface of the bed, and means for reciprocating one of said parts, so as to move it toward and from the opposed part in order to compress a bar therebetween.

3. In a straightening-machine, the combination, of a straightening-bed having a waterway therein with means for introducing water therein and discharging therefrom, said bed also provided with a series of slits or spaces adapted to permit expansion and prevent warping, a continuous jaw and a continuous straightener-beam on the surface of the bed opposed to each other, and means for reciprocating one of said parts so as to move it toward and from the opposed part, in order to compress a bar therebetween.

4. In a straightening-machine, a straightening-bed for bars of iron, steel, and other material, said bed composed of a series of sections, each section having a waterway therein, the waterway of one section being in communication with the waterway of an adjoining section or sections.

5. In a straightening-machine, the combination, of a straightening-bed composed of sections, plates arranged beneath adjacent edges of sections of the bed, and bolts passing through the sections and through the plates.

6. In a straightening-machine, the combination, of a straightening-bed composed of sections, each section provided at opposite side edges with depending flanges, a plate extending beneath, and longitudinally of, the joint of contiguous sections, said plate being arranged between the depending flanges, bolts passing through the bed and through this plate, other plates extending across the joint of contiguous sections, at the outer edges of said sections, and bolts passing through these plates and through the sections.

7. In a straightening-machine, a straightener-beam composed of a series of sections, each section having a waterway therein, the waterway of one section being in communication with the waterway of an adjoining section or sections.

8. In a straightening-machine, a straightener-beam, provided with slits or spaces in its face adapted to permit expansion and prevent warping.

9. In a straightening-machine, a straightener-beam provided longitudinally with a waterway, and also formed with slits or spaces in its face.

10. In a straightening-machine, the combination, of a straightener-beam composed of sections, and formed with recesses at the adjacent ends of sections, axles journaled in

the opposite side walls of said recesses, and rollers mounted on the axles.

11. In a straightening-machine, the combination, of a straightener-beam composed of sections, each section having a waterway longitudinally thereof, and the adjacent ends of the sections formed with recesses, a tubular axle mounted in and extending through the opposite side walls of said recesses, and wheels mounted on said axles.

12. In a straightening-machine, the combination, of a bed a straightener-beam adapted to travel thereon, axles mounted in the straightener-beam, rollers carried on said axles, and means for adjusting the axles in their bearings.

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

RICHARD W. LUNDY.

Witnesses:

H. A. LUNDY,

O. A. SENF.