(No Model.) 4 Sheets—Sheet 1.

P. McILVRIED & G. NASH.

METHOD OF AND APPARATUS FOR TREATING METALS.

No. 540,267. Patented June 4, 1895.

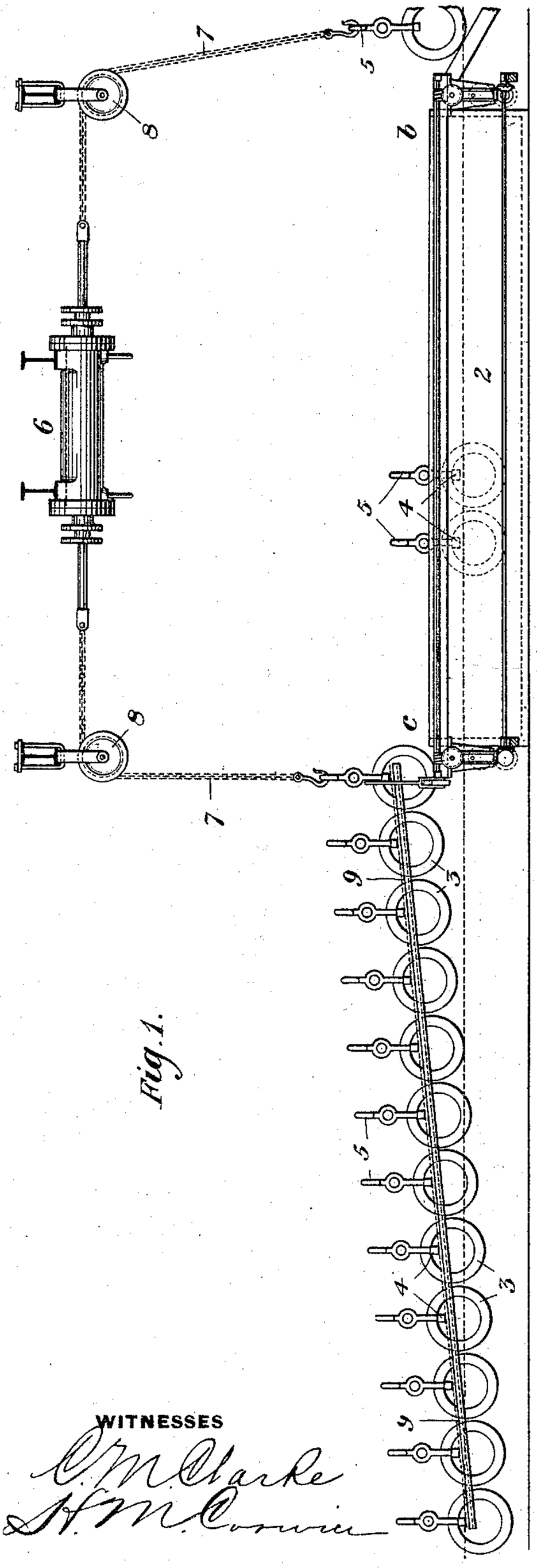

Fig. 1.

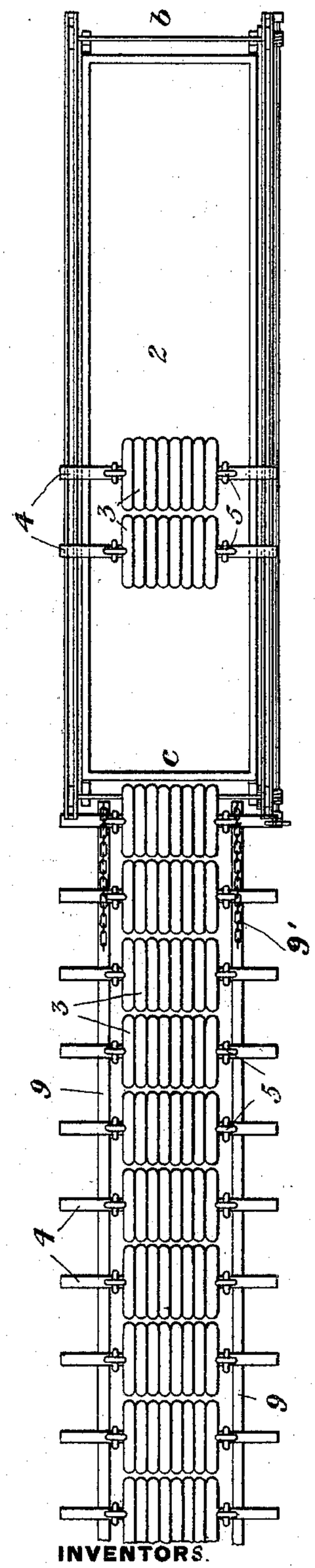

Fig. 2.

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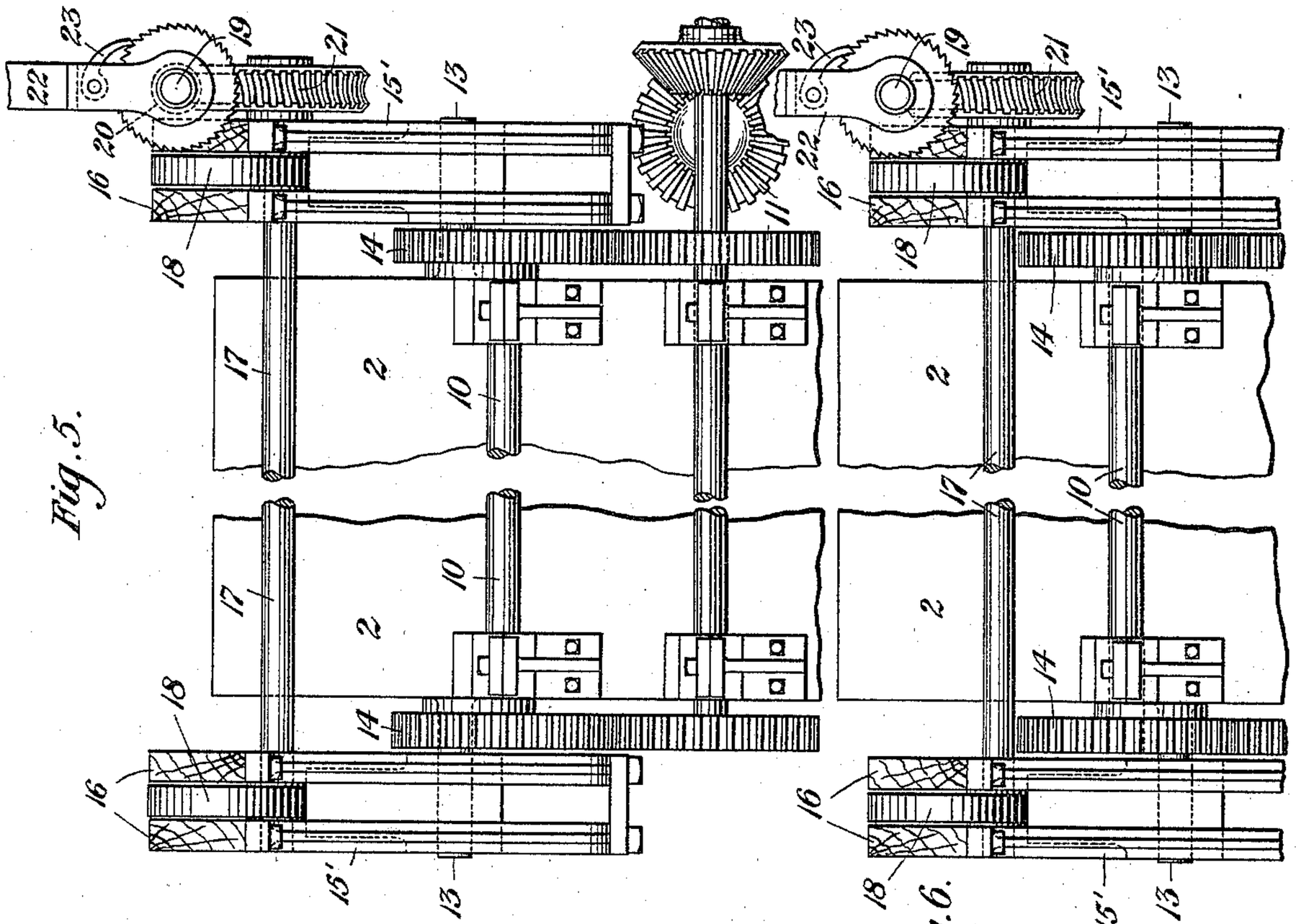

Fig. 5.

Fig. 6.

Fig. 3.

Fig. 4.

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Fig. 7.

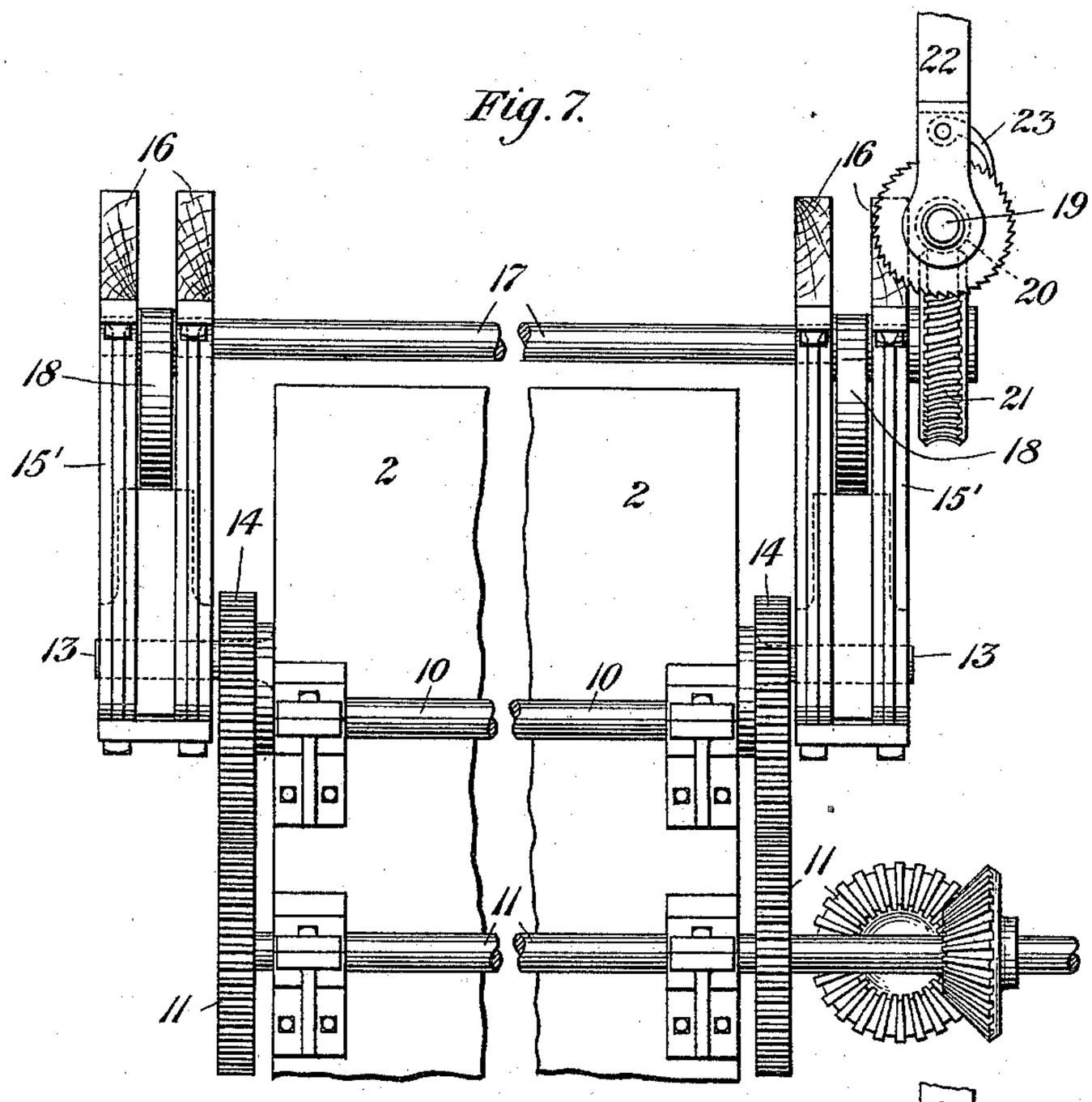
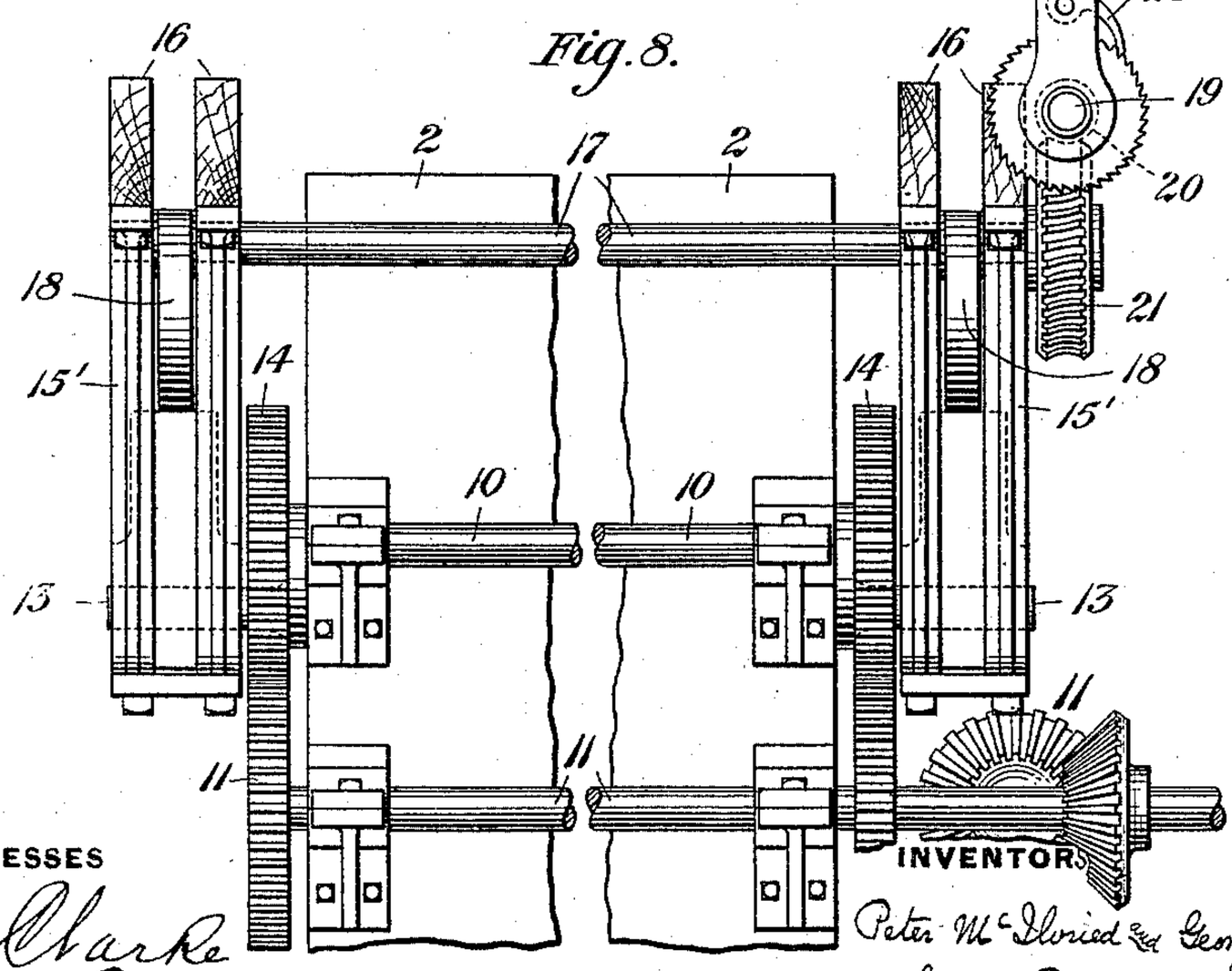


Fig. 8.



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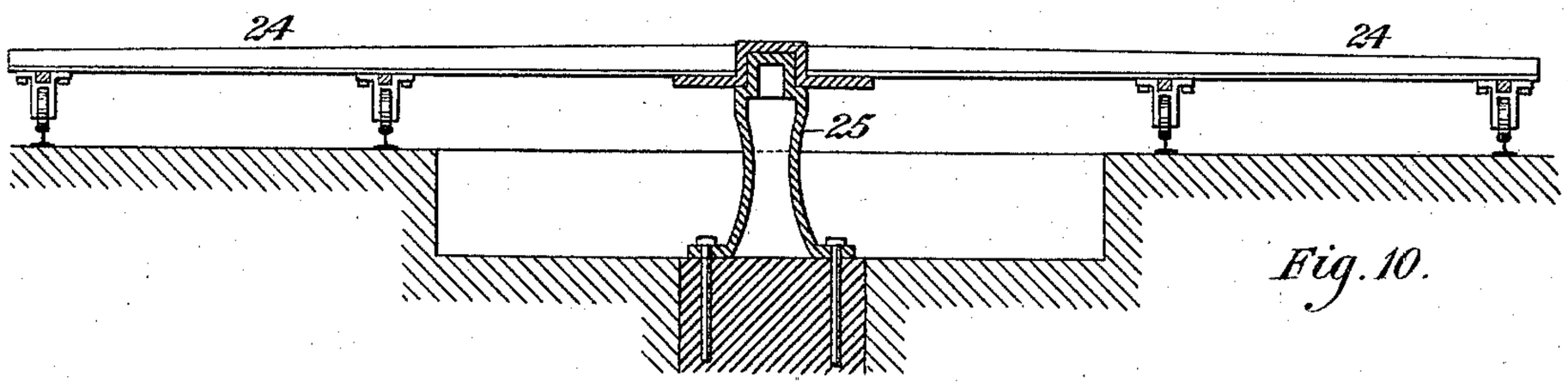

Fig. 10.

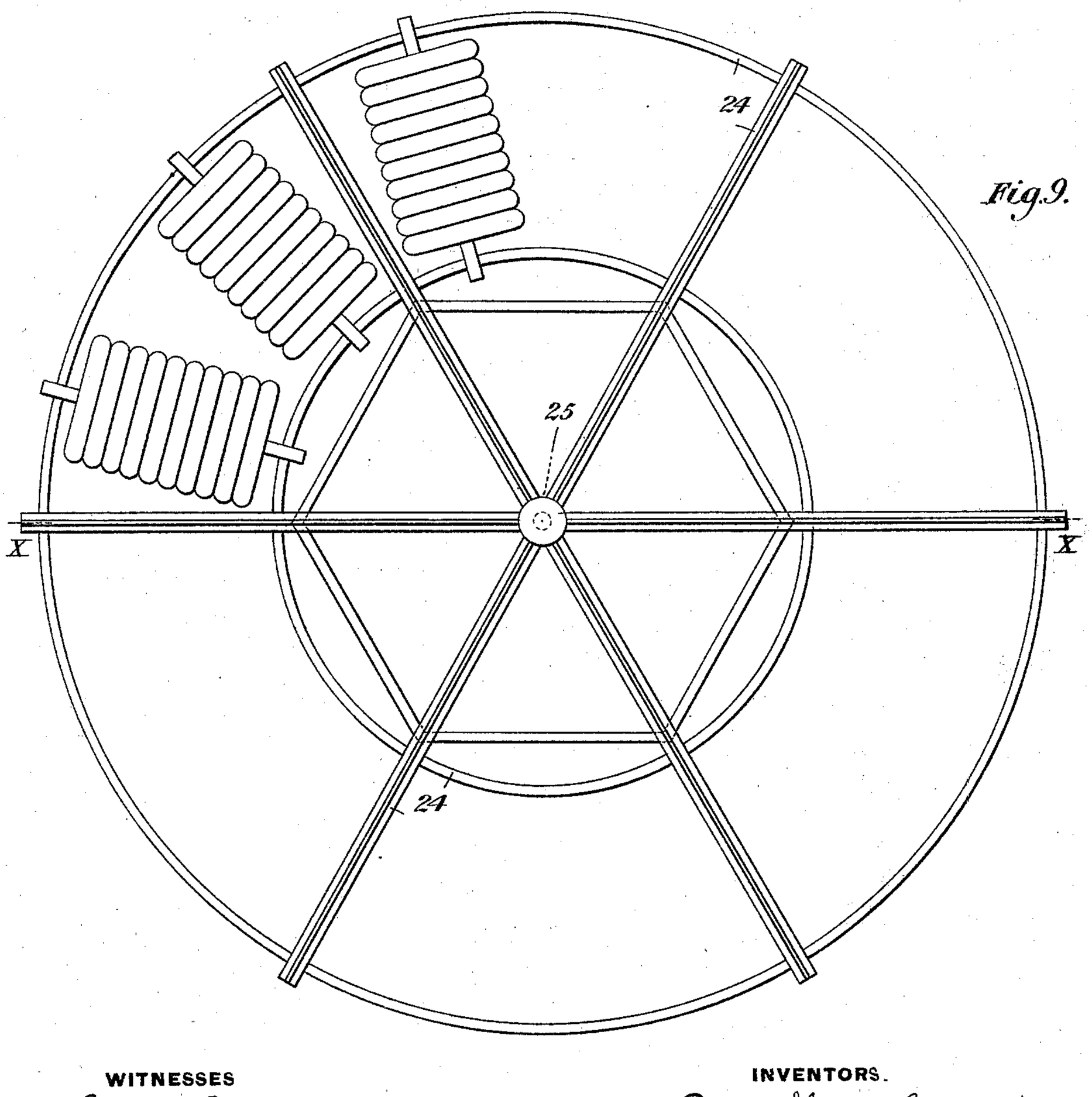

Fig. 9.

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UNITED STATES PATENT OFFICE.

PETER McILVRIED AND GEORGE NASH, OF BRADDOCK, PENNSYLVANIA.

METHOD OF AND APPARATUS FOR TREATING METALS.

SPECIFICATION forming part of Letters Patent No. 540,267, dated June 4, 1895.

Application filed March 8, 1895. Serial No. 540,948. (No model.)

To all whom it may concern:

Be it known that we, PETER MCILVRIED and GEORGE NASH, of Braddock, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Methods of and Apparatus for Treating Metals, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of the apparatus. Fig. 2 is a plan view. Fig. 3 is a side elevation on a larger scale, the tank being broken out in the middle, so as to illustrate both ends thereof. Fig. 4 is a partial plan view of one end of the tank, showing the apparatus for operating the mechanism by which the length of travel of the wire coils is determined. Fig. 5 is an end elevation. Fig. 6 is a similar view showing the carrying-bars in a different position. Figs. 7 and 8 are also end views showing different positions of the adjusting mechanism. Figs. 3 to 8, inclusive, are drawn on the same scale and are designed to illustrate the preferred form of the mechanism which we employ to carry the coils through the tank. Fig. 9 is a plan view of a modified construction of the drying apparatus. Fig. 10 is a vertical central section on the line X X of Fig. 9.

The object of our invention is to provide means for cleaning wire rods, &c., preparatory to their being drawn through the wire-drawing dies. We have conceived that the operation of removing the scale can be performed much more effectively than heretofore by carrying the rod coils through a pickling or washing tank by a series of steps which simultaneously agitate the coils and advance them from one end of the tank to the other.

In the drawings, (Figs. 1 and 2,) 2 represents the tank which is charged with suitable washing bath, either an acid solution, an alkaline solution, or mere water as desired.

The rod coils 3, 3, to be cleaned are carried by rods 4, 4, which pass through them and are provided with hooks or hangers 5, a suitable number of coils, one or more, being strung on each rod. When the coils are in the bath, the rods rest upon the edges of the tank or upon other suitable supports or rests within or outside the tank, and are moved along the same by mechanism hereinafter to be described.

To lift the rods and coils into and from the tank, we may use hoisting mechanism consisting of a double-piston or cylinder or other suitable motor 6, set above the tank and having chains 7, 7, which pass over sheaves 8, 8, and have hooks which may be engaged with the hooks or hangers 5. The operation of this motor will be readily understood by reference to Fig. 1. To lift the coils into the receiving end *b* of the tank, the piston rod is caused to move to the left, and to lift them from the delivery end *c* the piston rod is caused to move to the right.

In using the apparatus the rods carrying the coils are placed into the end *b* of the tank as above described, and after having been moved through the same they are lifted in succession from the end *c* and are placed on a traveling drier 9, which may consist of an endless chain conveyer, along which they travel slowly so that the liquid and atmospheric air may act upon the metal and cover it with a coating of rust. The endless chain conveyer above described is provided with endless chains 9′, on which the rods 4, 4, carrying the wire coils, are supported, so that as the chains are moved they will carry the coils with them.

We shall now describe, with reference to the figures on Sheets 2, 3, 4 and 5 of the drawings, the means which we employ for carrying the coils through the tank.

At each end of the tank is a shaft 10 driven through suitable shafting and gearing 11 or otherwise by a motor-shaft 12. Each shaft 10 is provided at the ends with crank-pins 13, which may be fixed to the faces of the gear-wheels 14 constituting parts of the gearing above mentioned, and on each pin is a box 15, on which slides vertically a yoke 15′ attached to the under side of the bars or rails 16 which extend along the tank parallel therewith, said yoke and bar being adjustable on the box. To adjust the bars or rails vertically, we provide at each end of the tank a shaft 17 passing through the bars at each side of the tank and provided with eccentrics 18 fixed to the shafts and bearing on the boxes. The two shafts 17 are connected by a worm-shaft 19, which extends along the side of the bars and is provided with worms 20 meshing with worm-

wheels 21 on the shafts 17. The worm-shaft 19 may be rotated by a lever 22, having a ratchet connection 23 with the shaft, and on turning the same all of the eccentrics 18 will be rotated simultaneously and equally. It is apparent that if the shafts 10 be rotated by their motor, the travel of the crank-pins 13 will cause each of the bars or rails 6 to describe a motion like that of a connecting-rod which connects two crank-pins, viz., a vertical motion and also a forward motion at the upper portions of its travel and a rearward motion at the downward portions of its travel. The bars are set in such position relatively to the upper edges of the tank or other supports, that normally at each of such motions they shall rise above the tank or supports, as shown in Fig. 5, and shall then descend below the same, as shown in Fig. 6. In rising, these bars will engage the rods 4, lift them above the tank, then carry them forward somewhat, deposit them upon the tank again, and so on at each revolution of the crank-shafts, imparting to the rods and coils vertical motions, which agitate the coils within the bath, and a forward motion which carries the coils progressively from one end of the tank to the other.

The function of the eccentrics 18 is to vary the extent of motion of the rod-coils and to enable the coils to be moved vertically within the bath without progression along the tank whenever prolonged agitation is desired. If the eccentric-shafts be turned into the position shown in Figs. 5 and 6, the bars or rails 16 will be brought to their lowest position on the boxes 15, and at each revolution of the crank-shafts 10 the bars or rails will pass above and below the edges of the tank as above described, and as shown respectively in Figs. 5 and 6. If, however, the eccentrics 18 be turned a semi revolution into the position shown in Figs. 7 and 8, the bars or rails will be raised on their boxes to such elevation above the edge of the tank that on the downstrokes of the bars the rods 4 shall not engage the tank or supports, and therefore there will be no carrying of the rods forward, but merely a vertical agitation of the coils within the bath. At intermediate adjustments of the eccentrics, the rods may be caused to rest on the tank or supports during part only of the lower portion of the travel of the bars, and a forward motion of limited extent may be thus imparted to the coils.

The apparatus thus constructed is very valuable in practice, the coils are thoroughly agitated in the bath, and the operation of cleaning is greatly facilitated.

Within the scope of our invention as defined in the claims, many changes in the form and construction of the parts may be made. We have illustrated what we deem to be the best form of apparatus, but to the skilled mechanic it will be very apparent that many equivalent mechanical devices and modifications may be substituted for those which we have shown, and the apparatus may be used for cleaning metal sheets or bars as well as coils or rods.

In Figs. 9 and 10 we illustrate a modified construction of the coater and drier. Here instead of an endless conveyer chain, we show a rotary frame 24 mounted on a central shaft or trunnion 25. As the coils are lifted from the conveying tank, they are placed on this frame, and are successively carried by its rotation to a convenient place of discharge.

We claim—

1. The method herein described of cleaning metal, which consists in carrying the metal through the bath by a succession of progressive steps in a single horizontal direction from one end of the bath to the other, with intervals of rest, and imparting to it at each step a vertical agitatory motion and a progressive forward motion; substantially as described.

2. The combination of a horizontal cleaning tank, bars or rails extending along the same, mechanism by which the motion of a crank connecting rod, *i. e.* a vertical motion and also a forward motion at the upper portion of its travel is imparted to the bars or rails, and supports or rests on which the metal to be treated is supported at each step during the intervals of its rest in the tank, whereby said bars or rails are adapted at each such motion to rise and fall relatively to the said supports or rests and to successively raise the metal, to advance it forwardly in the tank, and to deposit it on the rests or supports in succession; substantially as described.

3. The combination of a horizontal cleaning tank, bars or rails extending along the same, mechanism by which the motion of a crank connecting rod, *i. e.* a vertical motion and also a forward motion at the upper portion of its travel is imparted to the bars or rails, and supports or rests on which the metal to be treated is supported at each step during the intervals of its rests in the tank, whereby said bars or rails are adapted at each such motion to rise and fall relatively to the said supports or rests, and to successively raise the metal and to advance it forwardly in the tank, and to deposit it on the rests or supports in succession, and adjusting mechanism by which the bars or rails may be adjusted vertically to vary the moment of their travel at which they deposit the metal upon the supports or rests; substantially as described.

4. The combination of a horizontal cleaning tank, bars or rails extending along the same, mechanism by which the motion of a crank connecting rod, *i. e.* a vertical motion and also a forward motion at the upper portion of its travel is imparted to the bars or rails, and supports or rests on which the metal to be treated is supported at each step during the intervals of its rest in the tank, whereby said bars or rails are adapted at each such motion to rise and fall relatively to the said supports or rests and to successively raise the

metal and to advance it forwardly in the tank, and to deposit it on the rests or supports in succession, and adjusting mechanism by which the bars or rails may be adjusted vertically to cause them to rise and fall entirely above the level at which the metal to be treated engages the supports or rests; substantially as described.

In testimony whereof we have hereunto set our hands.

PETER McILVRIED.
GEORGE NASH.

Witnesses:
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