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4 Sheets—Sheet 1.

A. PERRY.

ROLLING MILL.

No. 537,356. Patented Apr. 9, 1895.

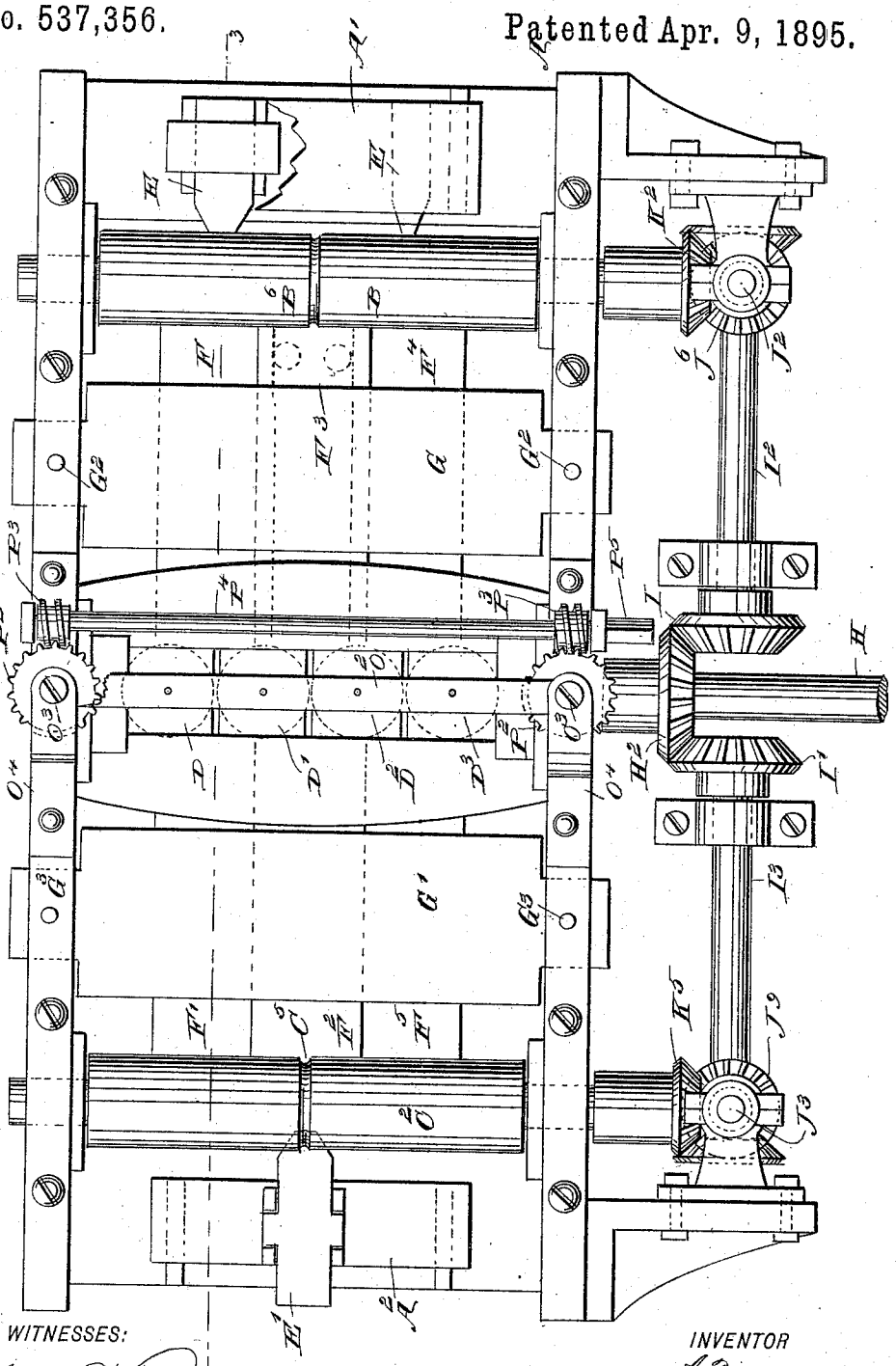

Fig. 1.

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A. PERRY.

ROLLING MILL.

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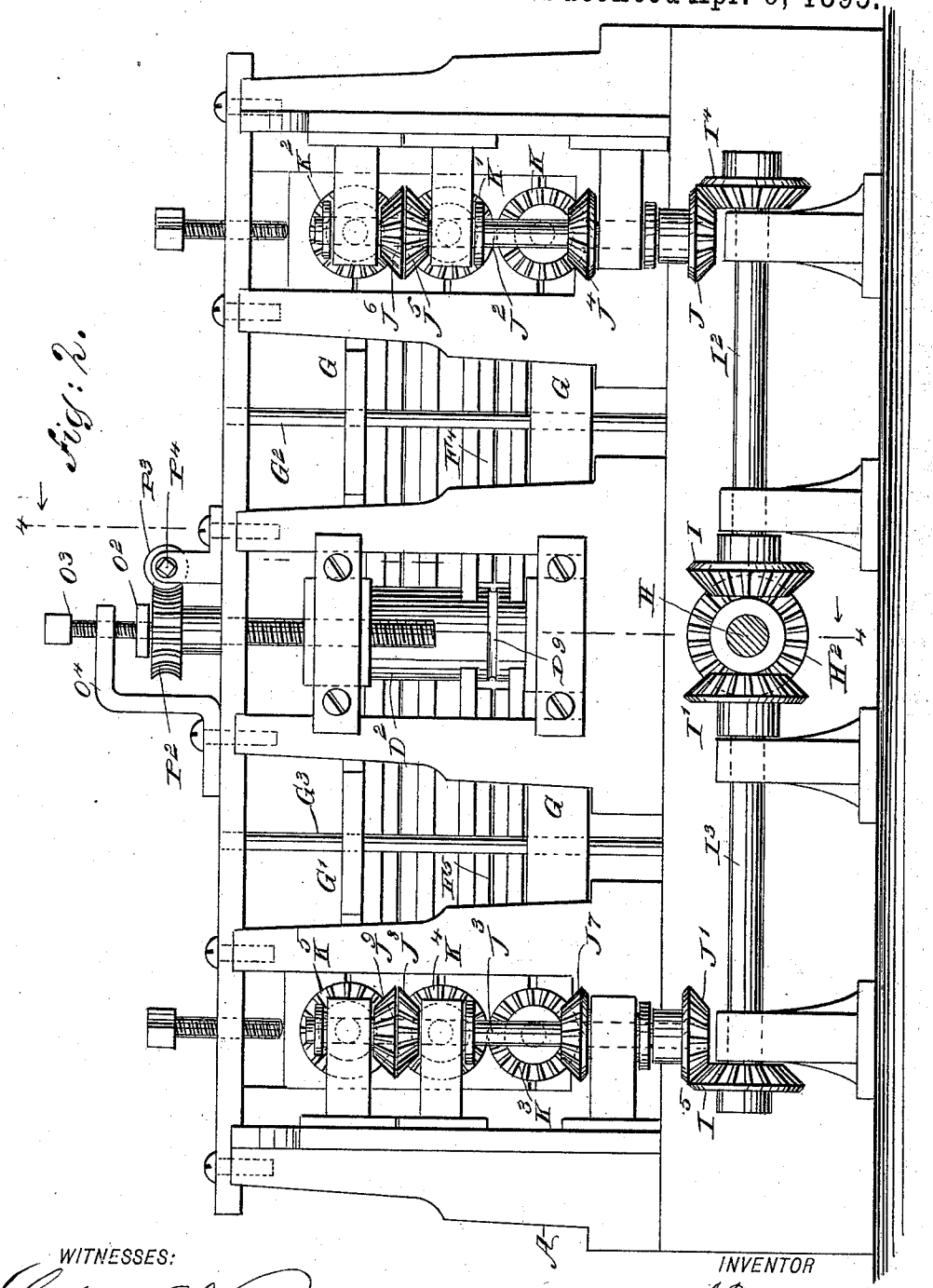
Fig. 2.



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(No Model.) 4 Sheets—Sheet 3.

A. PERRY.

ROLLING MILL.

No. 537,356. Patented Apr. 9, 1895.

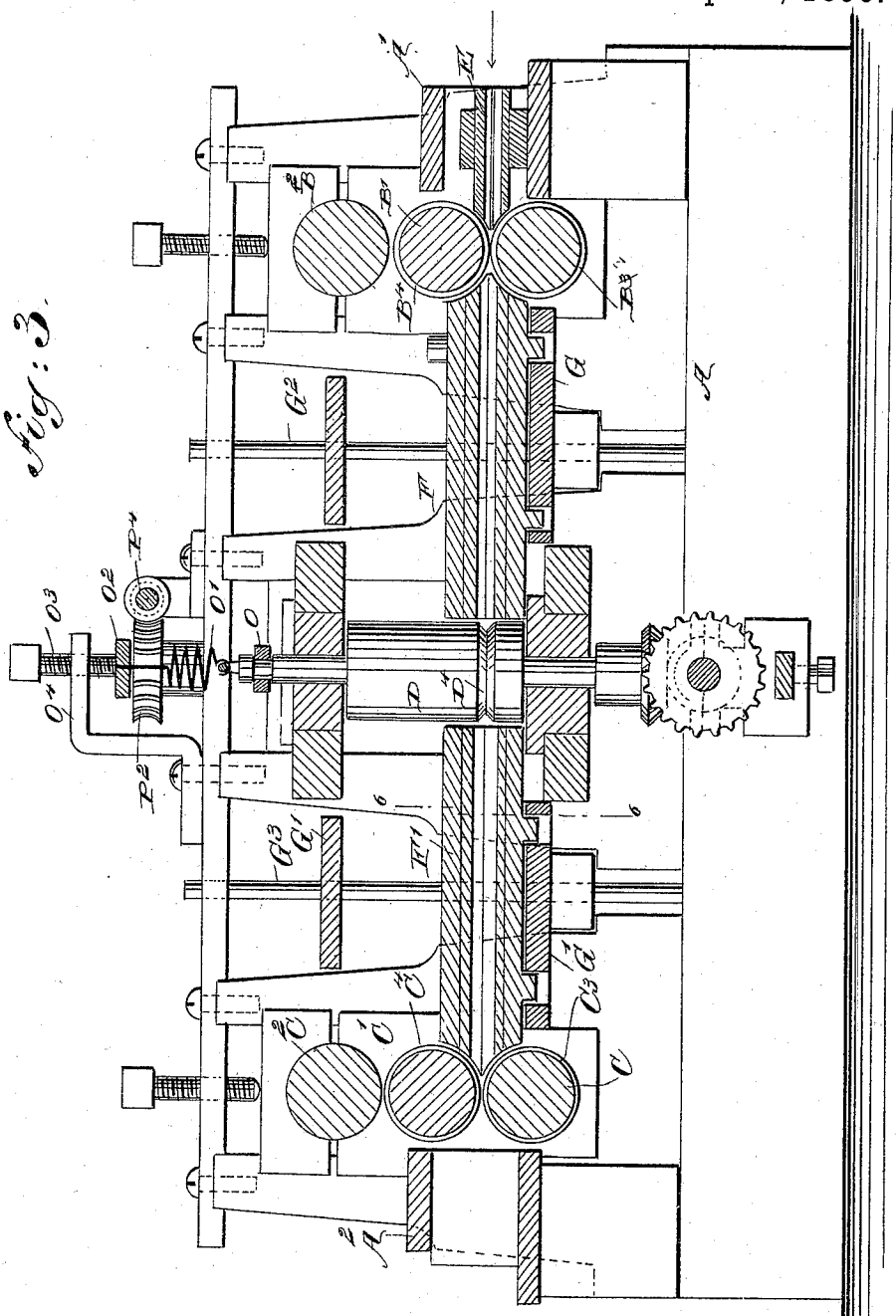

Fig: 3.

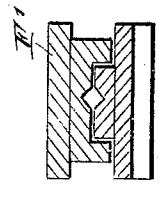

Fig: 6.

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(No Model.)

4 Sheets—Sheet 4.

A. PERRY.

ROLLING MILL.

No. 537,356. Patented Apr. 9, 1895.

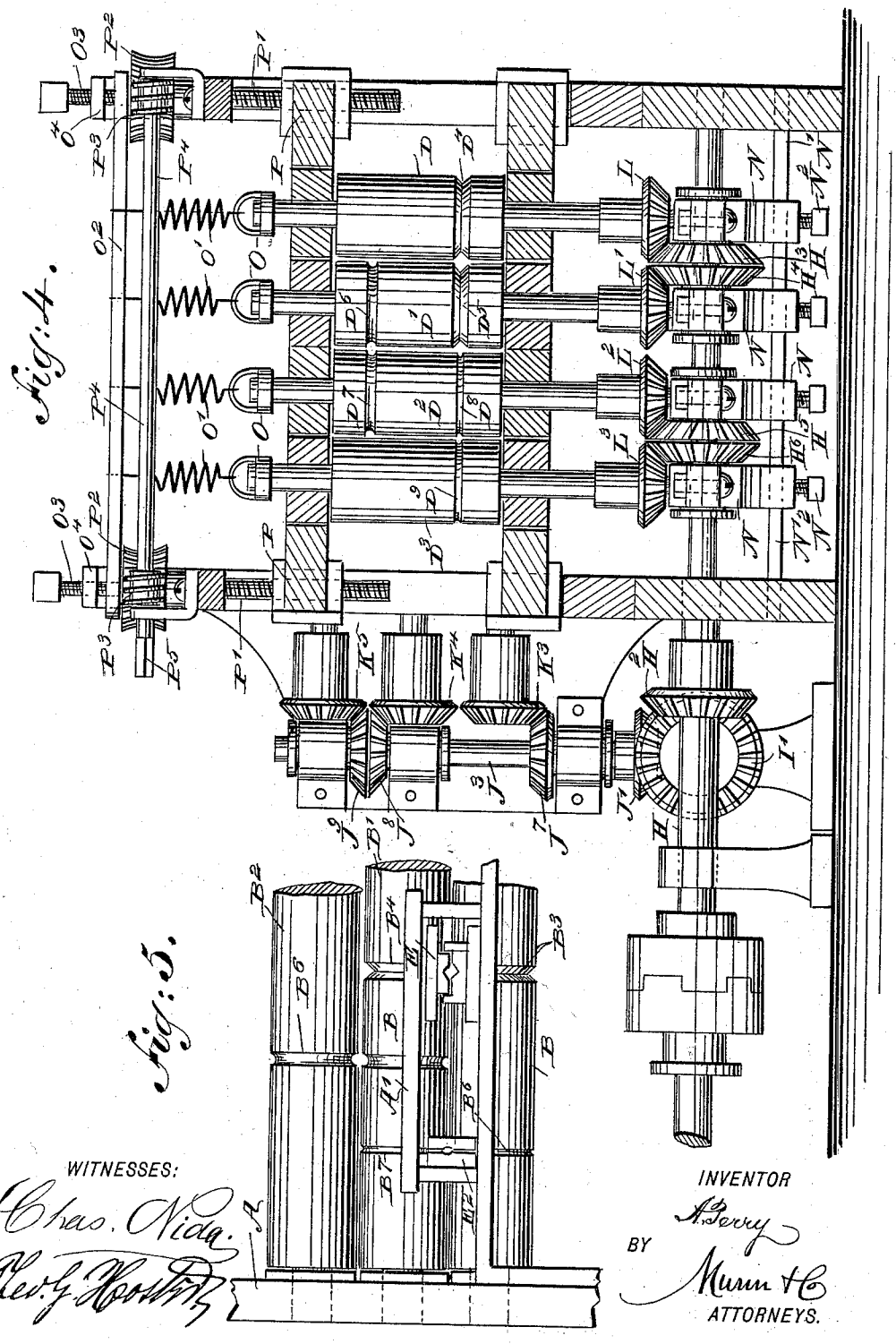

Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE.

ARTHUR PERRY, OF MIDDLETOWN, NEW YORK.

ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 537,356, dated April 9, 1895.

Application filed July 6, 1894. Serial No. 516,736. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR PERRY, of Middletown, in the county of Orange and State of New York, have invented a new and Improved Rolling-Mill, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved rolling mill, which is comparatively simple and durable in construction, very effective in operation, and arranged to quickly and accurately roll the metal into a bar of the desired shape, in one single machine.

The invention consists in certain parts and details, and combinations of the same, as will be hereinafter fully described and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the views.

Figure 1 is a plan view of the improvement. Fig. 2 is a side elevation of the same. Fig. 3 is a longitudinal sectional elevation of the same, on the line 3—3 of Fig. 1. Fig. 4 is a transverse section of the same, on the line 4—4 of Fig. 2. Fig. 5 is an end view of part of the improvement; and Fig. 6 is a transverse section of the guideway between the sets of rollers, the section being taken on the line 6—6 of Fig. 3.

The improved rolling mill is provided with a suitably constructed frame A, in the front end of which are journaled the transversely and horizontally extending rollers B, B′, B^2, arranged one above the other and forming one set of rollers. A similar set of transversely-extending horizontal rollers C, C′, C^2, is journaled in the rear end of the frame A, and intermediate of the said sets of rollers B, B′, B^2 and C, C′, C^2, is arranged a set of vertically disposed rollers comprising the rollers D, D′, D^2, D^3.

The rollers B and B′ of the front set of horizontal rollers are formed with registering annular grooves B^3 and B^4 respectively, into which the iron is first introduced through a feeding spout E, preferably made in sections, as indicated in Fig. 5, and supported in a transversely-extending support A′, forming part of the frame A. The metal in passing through the grooves B^3 and B^4 of the revolving rollers B and B′, is rolled into a shape corresponding to that of the grooves, and the bar thus formed passes through a guideway F, extending between the rollers B, B′ and the rollers D, D′, so that the bar after passing through the said guideway F, passes into the registering grooves D^4 and D^5 in the rollers D, D′. The annular grooves D^4, D^5, are somewhat less in size than the first grooves B^3, B^4, so that the bar in passing through the set of rollers D, D′, is again reduced in size. The bar after leaving the rollers D, D′, passes through a second guideway F′, which extends between the rollers D, D′ and the rollers C, C′ of the rear set of rollers, and the said guideway F′ discharges the bar into a pair of grooves C^3, C^4, see Fig. 3, so that the bar is again reduced, to finally pass through an open frame A^2, and be taken hold of by the operator provided with tongs or other means to take the bar and introduce the same into a feed spout E′ supported on the said open frame A^2, and discharging upon a pair of registering grooves C^5 in the rollers C′ and C^2. This pair of registering grooves is less in size than the previous pair of grooves C^3, C^4, so that the metal is again reduced and passes through a longitudinally-extending guideway F^2, to the vertically disposed rollers D′, D^2, to pass through a pair of registering annular grooves D^6, D^7 in the said rollers D′, D^2. The bar then passes through a guideway F^3 to annular grooves B^5, B^6 in the rollers B′, B^2, to then pass out over the support A′, and be taken hold of by the operators and pass into a feed spout E^2, held on the said support A′.

The feed spout E^2 delivers the reduced bar to a pair of grooves B^6, B^7 in the rollers B, B′. Then the bar passes through a longitudinal guideway F^4 to a pair of annular grooves D^8, D^9, in the rollers D^2, D^3, and then the bar passes through a guideway F^5 to a pair of registering annular grooves in the rollers C, C′, to be then discharged through the open frame A^2. The longitudinally-extending guideways F^3 and F^4 are held in transversely extending plates G supported on rods G^2 erected in the sides of the main frame A. The other guideways F′, F^2, F^5, are likewise held in a pair of plates G′ supported on guide rods G^3, similar to the guide rods G^2.

It is understood that the several pairs of

registering grooves through which the bar passes in the manner described are graduated in such a manner that the bar is gradually reduced and rolled into the desired shape, so that when the bar finally leaves the last pair of registering annular grooves in the rollers C, C′, the said bar is finished.

In order to impart the necessary revolving motion to all the rollers in the three sets of rollers, I provide the following device: A main driving shaft H, journaled in suitable bearings in the main frame A is provided at one end with a clutch H′ for positively connecting the said shaft H with the main shaft of the engine or other motor. The shaft H extends transversely in alignment with the shafts for the rollers D, D′, D^2, D^3, as will be readily understood by reference to the drawings.

On one side of the main frame A is secured a bevel-gear wheel H^2 in mesh on opposite sides with bevel gear wheels I and I′, secured on shafts I^2, I^3 respectively, extending longitudinally and journaled in suitable bearings as indicated in the drawings. On the shafts I^2, I^3 are secured the bevel gear wheels I^4, I^5, in mesh with bevel gear wheels J, J′, respectively secured on the lower ends of the vertically-disposed shafts J^2, J^3, respectively, journaled in suitable bearings held in brackets preferably made vertically adjustable in the main frame A.

On the shaft J^2 are secured the bevel gear wheels J^4, J^5, J^6, in mesh with the bevel gear wheels K, K′, K^2, respectively, secured on the outer ends of the shafts of the rollers B, B′, B^2 respectively. On the other shaft J^3 are secured similar bevel gear wheels J^7, J^8, J^9, in mesh with bevel gear wheels K^3, K^4, K^5, secured on the outer ends of the shafts for the rollers C, C′ and C^2 respectively. Now, it will be seen that when the main shaft H is rotated, the bevel gear wheel H^2 will impart simultaneously a rotary motion to the bevel gear wheels I, I′, and their shafts I^2 and I^3. The rotary motion of the shafts I^2 and I^3 is transmitted by the gear wheels I^4, I^5 and bevel gear wheels J, J′ to the vertically disposed shafts J^2, J^3, which by their gear wheels J^4, J^5, J^6, and J^7, J^8, J^9, impart a rotary motion to the gear wheels K, K′, K^2, and K^3, K^4, K^5, respectively, so that the front rollers B, B′, B^2, and the rear rollers C, C′, C^2, are rotated in unison, and in the proper direction, as indicated by the arrows in Fig. 3, to cause the metal to travel through the rollers as previously mentioned. For lighter work, making wire for instance, the rollers are preferably connected by pulleys and belts with the driving shaft.

On the shaft H which is preferably made square except at its bearings are secured bevel gear wheels H^3, H^4, H^5, H^6, in mesh with bevel gear wheels L, L′, L^2, L^3, secured on the lower ends of the shafts for the rollers D, D′, D^2, D^3, as will be readily understood by reference to Fig. 4. Thus when the said main shaft H is rotated, the bevel gear wheels H^3, H^4, H^5, H^6, rotate simultaneously the gear wheels L, L′, L^2, L^3, and consequently the rollers D, D′, D^2 and D^3 in such a direction that the metal bar is passed forward and backward in the manner above indicated. Thus all the rollers in the three sets are rotated simultaneously whenever the main driving shaft H is set in motion. The bevel gear wheels H^3, H^4, H^5, H^6, are each journaled with their hubs in bearings N, held transversely adjustable on a bar H′ secured in the sides of the main frame A, as illustrated in Fig. 4, so that the operator is enabled to set the said gear wheels properly in mesh with their corresponding gear wheels L, L′, L^2 and L^3, in case the size of the rollers D, D′, D^2, D^3 is changed. When proper adjustment is made, then the bearings N are secured in position by suitable set screws N^2. The lower ends of the shafts for the rollers D, D′, D^2, D^3 are journaled in the said bearings N, and consequently proper alignment can be obtained for the rollers by the adjustment of the bearings N.

In order to reduce the friction in the bearings N, caused by the latter forming steps for the shafts of the rollers D, D′, D^2, D^3, I provide the upper ends of the shafts of the said rollers with bearings O, each supported on a spring O′ secured to a transversely-extending bar O^2, held in screws O^3 screwing in brackets O^4 attached to the sides of the main frame A. The lower bearings for the rollers B, B′, B^2, B^3, are held in a plate resting on the main frame A, while the upper bearings are held in a plate P, vertically adjustable in suitable guideways in the sides of the frame A. In order to conveniently adjust this plate P vertically, I provide screw rods P′, screwing in the ends of the said plate, and mounted to turn in suitable bearings in the sides of the frame A. On the upper ends of these vertical screw rods P′, are secured the worm wheels P^2, in mesh with worms P^3, held on a transversely-extending shaft P^4 journaled in suitable bearings attached to the main frame A. One outer end of the shaft P^4 is made square, as at P^5, to permit the operator to apply a wrench or other tool for conveniently turning the said shaft P^4, to cause the worms P^3 to rotate the worm wheels P^2, and consequently the screw rods P′ to raise or lower the plate P as the case may require, and according to the direction in which the said shaft P^4 is turned.

It will be seen that by the arrangement described, the entire machine is rendered very compact, and the metal rolled into the bar does not require as much handling by operators as is the case with rolling mills as now constructed. It is further understood that different rollers having differently shaped grooves can be inserted so as to roll metal into any desired shape, it being understood that the graduated grooves in the several rollers are shaped accordingly.

Having thus described my invention, I

claim as new and desire to secure by Letters Patent—

1. A rolling mill, comprising a frame, the rollers B B′ B^2 at the front of the frame, the rollers C C′ C^2 at the rear of the frame, the rollers D D′ D^2 D^3 at about the center of the frame, the several series of rollers each being provided with three sets of annular registering grooves, the guide-ways F F′ F^2 F^3 F^4 and F^5 between the several series of rollers, and means for simultaneously operating the said several series of rollers, substantially as described.

2. In a rolling mill, the combination with a plurality of vertical rollers, of bearings for the upper ends of the said rollers, and springs secured to said bearings and to a support, substantially as and for the purpose set forth.

3. In a rolling mill, the combination with a series of vertical rollers, of bearings for the upper ends of the shafts of the said rollers, an adjustable bar, and springs secured to said bar and to the bearings, substantially as described.

4. In a rolling mill, the combination with vertical shafts, rollers thereon, and bevel gear wheels on the lower ends of the said shafts, of adjustable bearings, gear wheels mounted in said bearings and meshing with the gear wheels of the vertical shafts, and spring supported bearings for the upper ends of the said vertical shafts, substantially as described.

ARTHUR PERRY.

Witnesses:
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JAMES WRIGHT.