(No Model.) 3 Sheets—Sheet 1.

F. H. TREAT.

MACHINE FOR STRAIGHTENING RAILROAD RAILS.

No. 286,655. Patented Oct. 16, 1883.

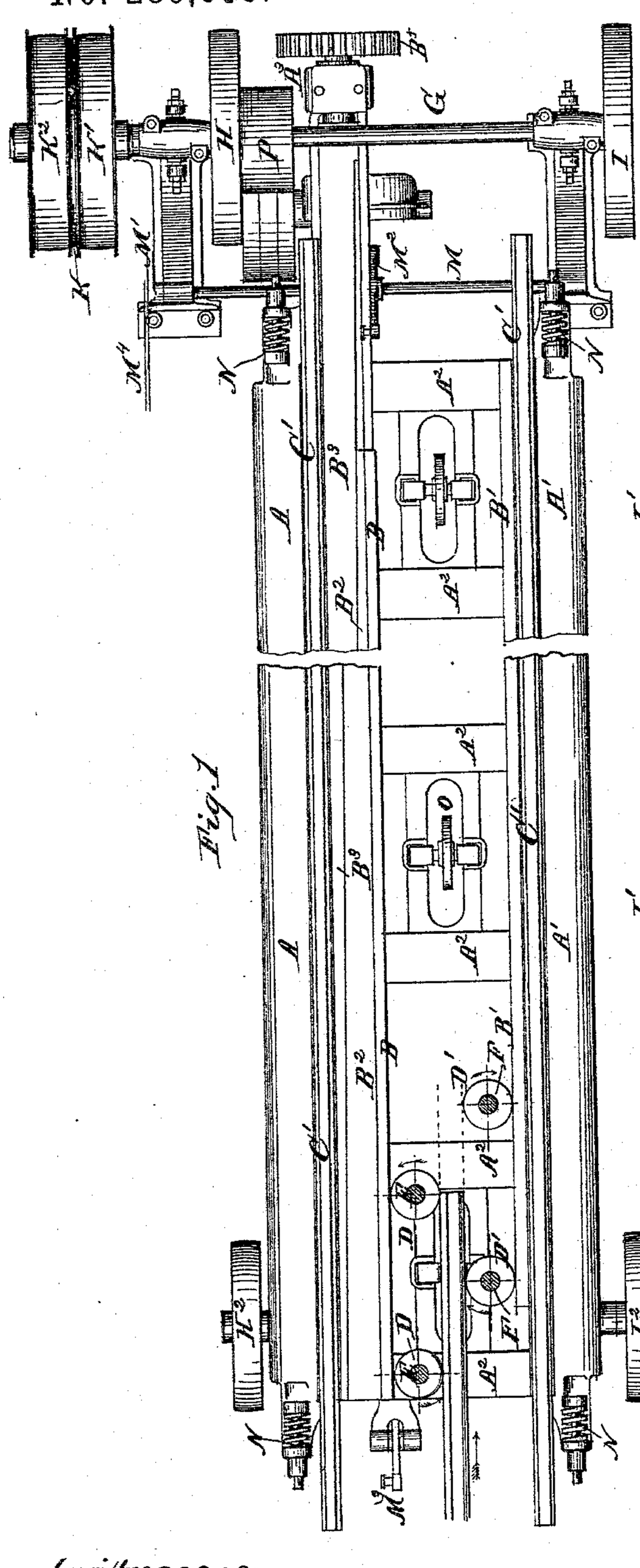

Fig. 1.

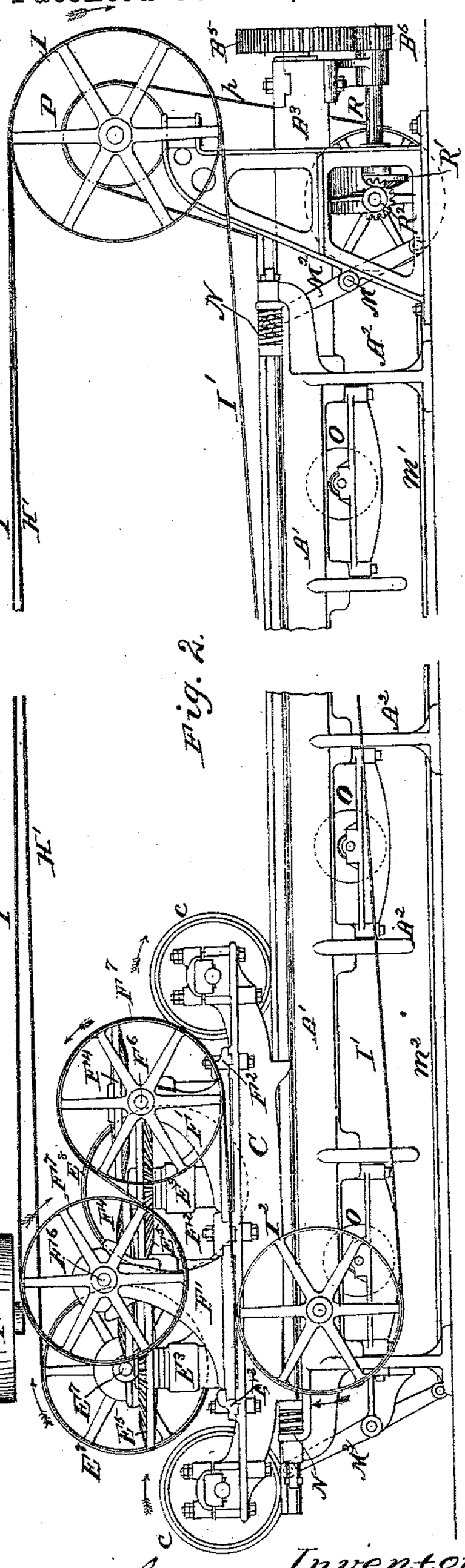

Fig. 2.

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

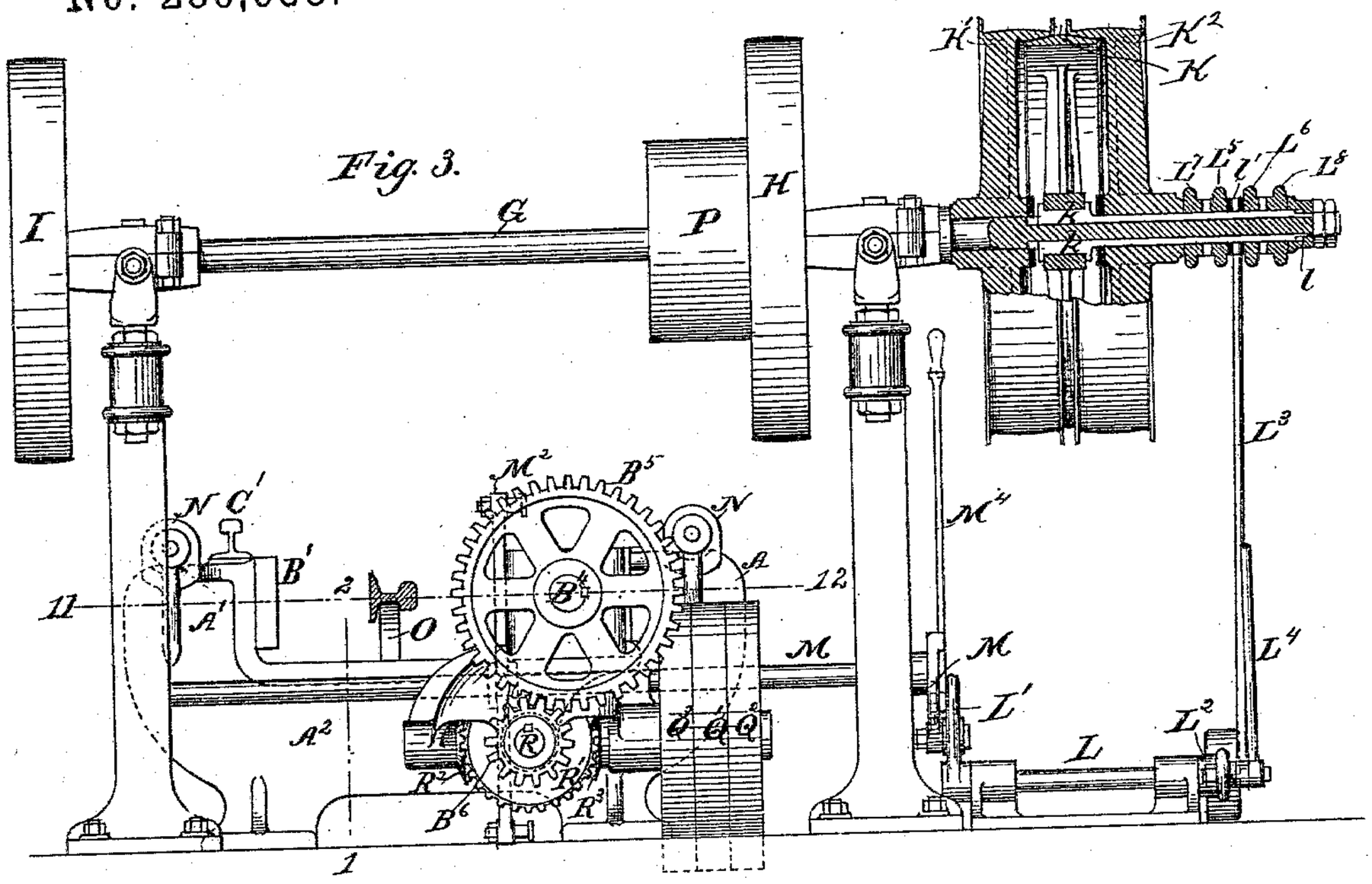


Fig. 4.

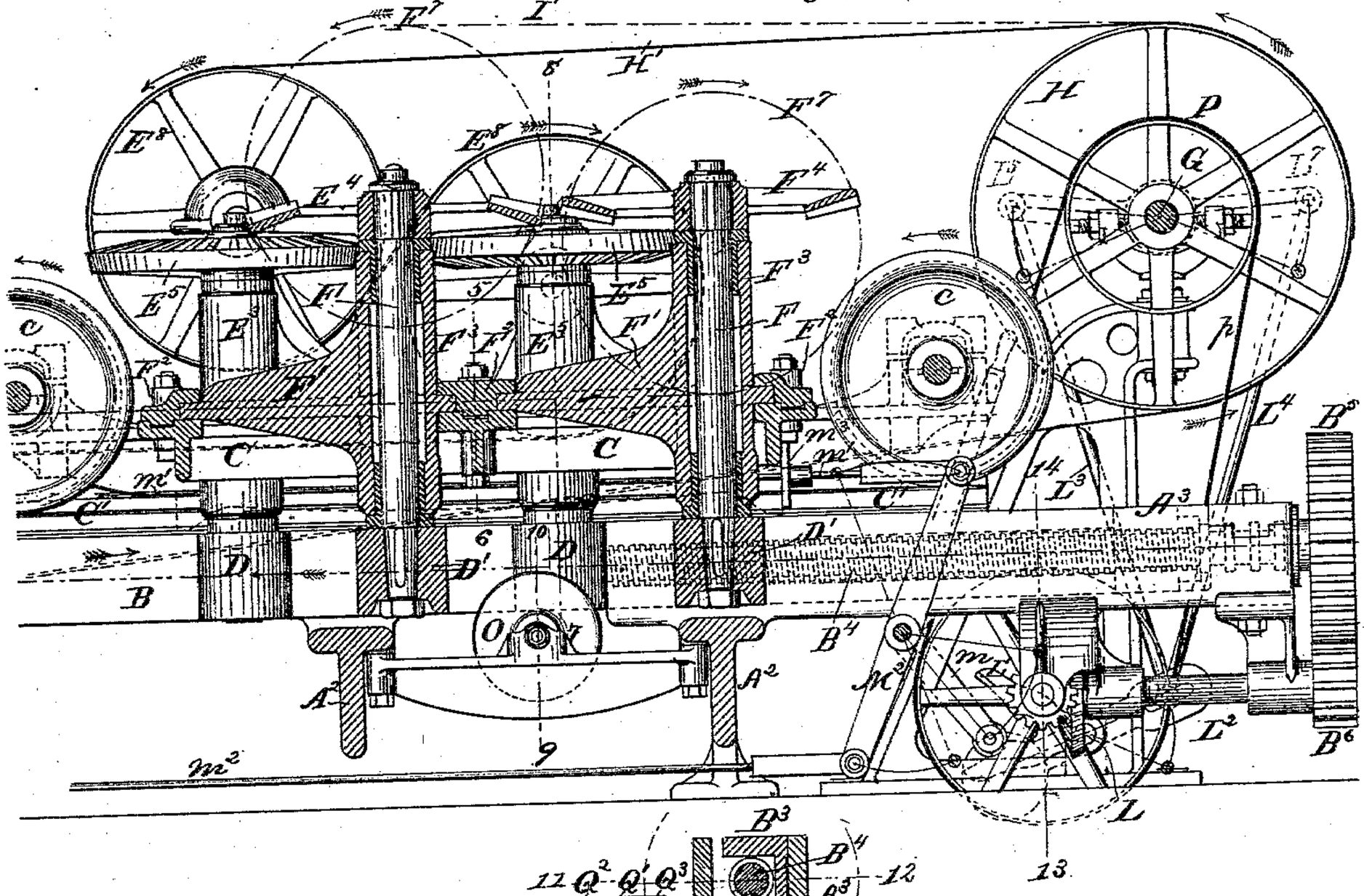
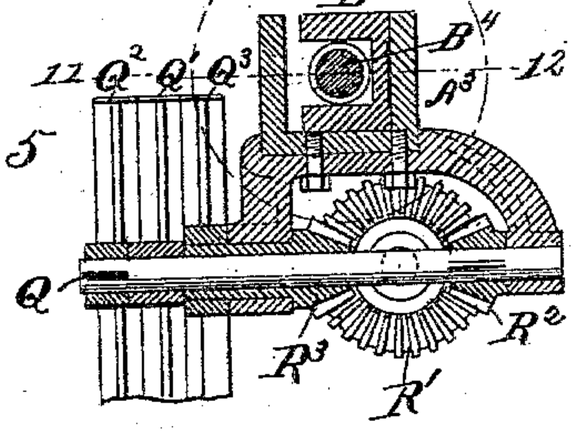


Fig. 5



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(No Model.) 3 Sheets—Sheet 3.

F. H. TREAT.

MACHINE FOR STRAIGHTENING RAILROAD RAILS.

No. 286,655. Patented Oct. 16, 1883.

Fig. 6.

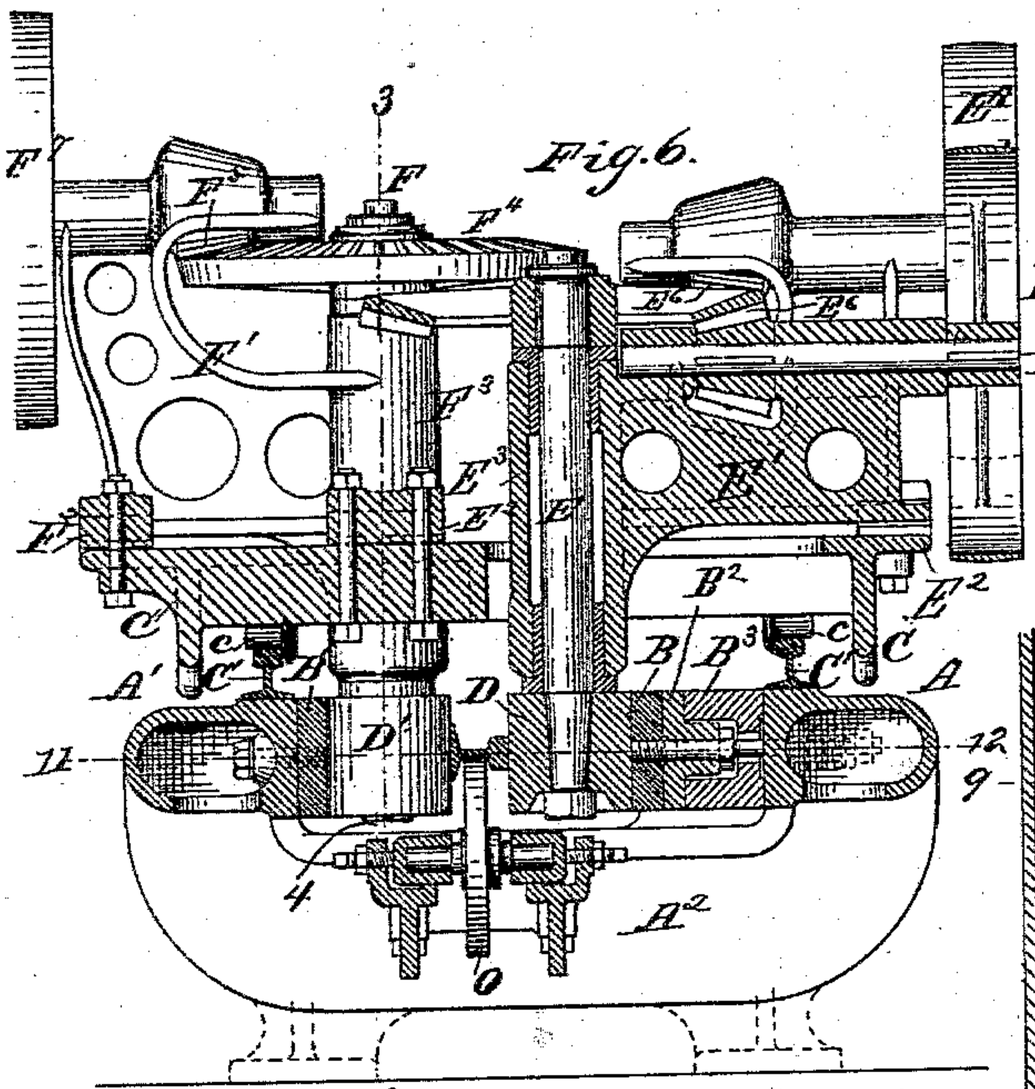


Fig. 7.

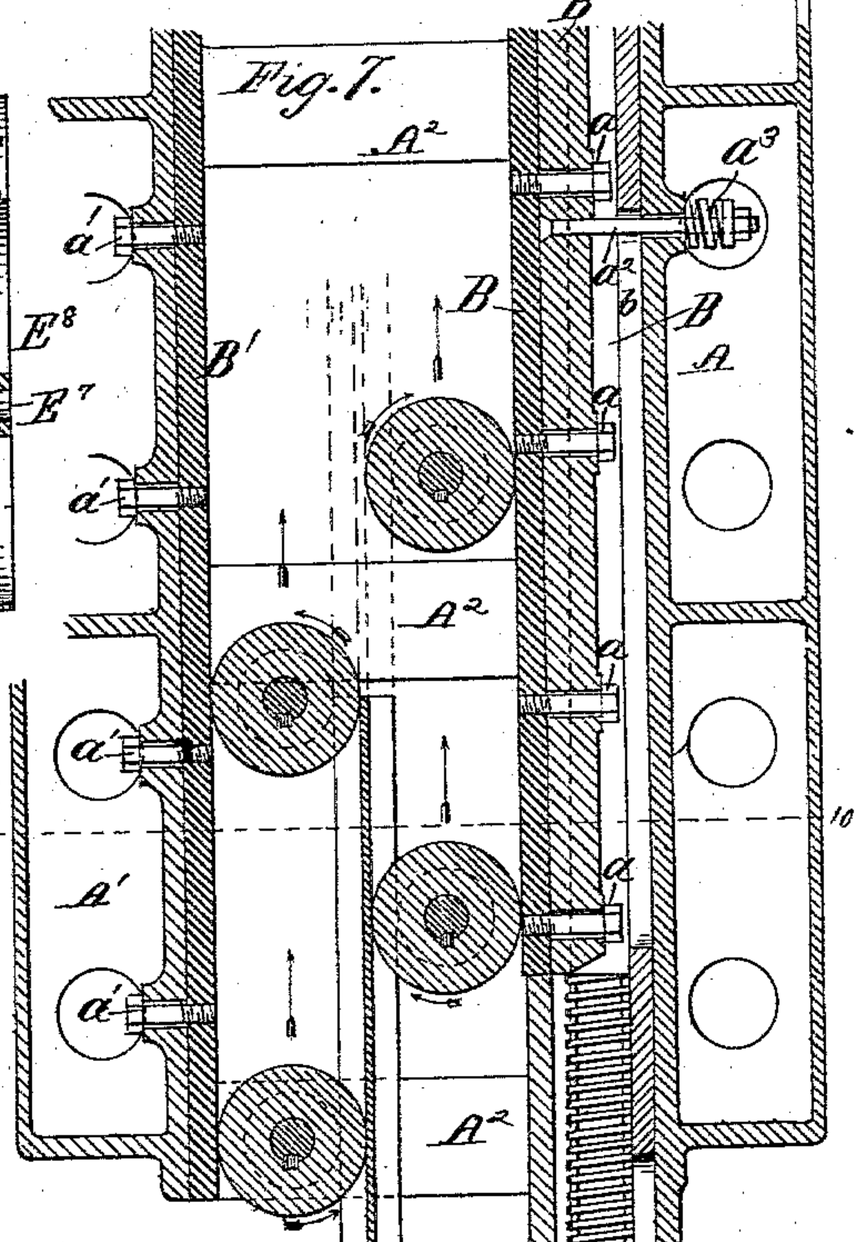


Fig. 8

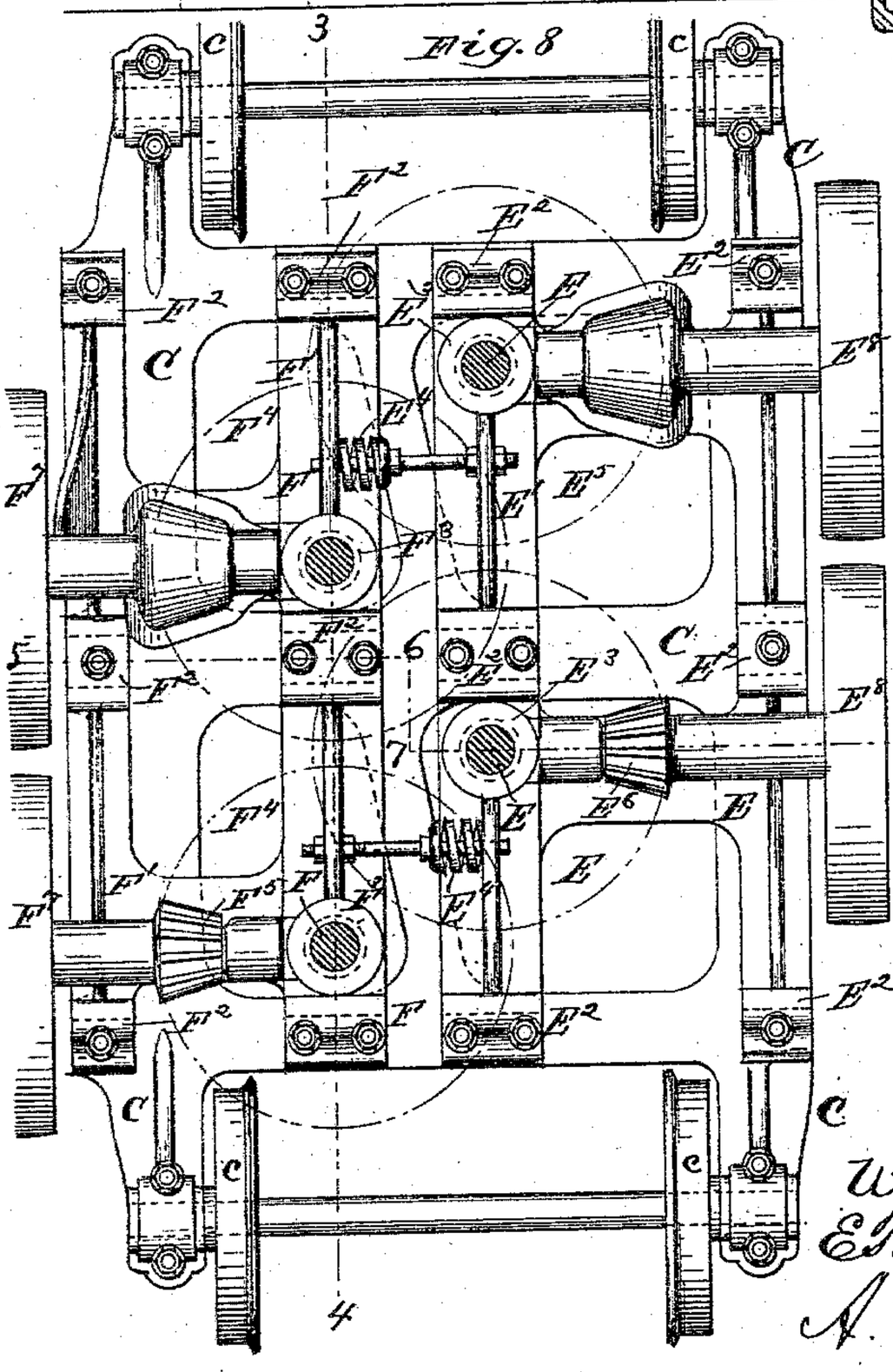
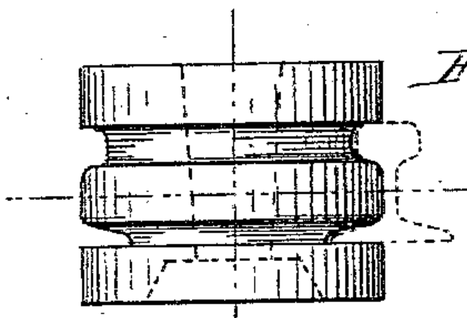


Fig. 9.



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UNITED STATES PATENT OFFICE.

FRANCIS H. TREAT, OF JOLIET, ILLINOIS.

MACHINE FOR STRAIGHTENING RAILROAD-RAILS.

SPECIFICATION forming part of Letters Patent No. 286,655, dated October 16, 1883.

Application filed January 16, 1883. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. TREAT, a citizen of the United States, residing at Joliet, in the county of Will and State of Illinois, have invented certain new and useful Improvements in Machines for Straightening Railroad-Rails and other Similar Articles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to machines for straightening railway-rails, which operate on the rails with sets of alternating rollers. Heretofore the practice has been to journal the rollers in stationary bearings, so that the lateral thrust of the rollers, due to the resistance of the rail passing through between them, was borne by their journals and bearings. This is very objectionable for many reasons, chief among which are the following: In order to sustain the great strain due to the power required for overcoming the elastic limit of an ordinary steel rail and producing a permanent set, as must be done in order to straighten a crook or bend thereof, the rollers and the journals so mounted must be made of inordinately large diameter, in consequence of which the points at which they act on the rail are thrown so far apart as to greatly detract from the effectiveness of the rollers, both as regards concentrated action and capacity of straightening crooks and bends at or near either end of a rail. The journals and bearings of rollers so mounted are subject to rapid and uneven wear. The friction incident to the operation of such a machine is very great and absorbs an undue proportion of power.

The object of my invention is to overcome the above-recited objections and others.

To this end it consists, in the main, of a machine in which the straightening-rollers are mounted on a traveling carriage and roll along fixed guides, the arrangement of the parts being such that the lateral thrust of the rollers is sustained by said guides.

In order that my invention may be clearly understood, I have illustrated in the annexed drawings, and will proceed to describe, the form of my invention in which I have embodied it in a full-sized practical machine.

Figure 1 represents a general top or plan view with all of the carriages removed except the straightening-rollers. Fig. 2 is a side elevation. Fig. 3 is an end view with the carriage removed, the reversing-pulleys being shown partly in section. Fig. 4 is a sectional view on lines 1 2 of Fig. 3 and 3 4 of Figs. 6 and 8. Fig. 5 is a sectional detail view on line 13 14 of Fig. 4. Fig. 6 is a transverse section of the carriage on lines 5 6 7 8 of Fig. 8, and of the bed on line 9 and 10 of Figs. 4 and 7. Fig. 7 is a horizontal section on lines 11 12 of Figs. 3, 5, and 6, illustrating a machine with rollers for operating on the side of a rail. Fig. 8 is a plan or top view of the carriage minus the bevel-wheels on the roller-shafts. Fig. 9 is a detail view of a roller adapted for straightening rails in lateral directions. Figs. 3, 4, 5, 6, 7, and 8 are drawn to a scale one and one-half time as large as the scale to which Figs. 1 and 2 are drawn, and Fig. 9 is drawn to a scale three times as large.

The same letters of reference indicate identical parts in all the figures.

In practice I propose to use two machines, one for straightening rails in vertical directions, and the other for straightening rails in lateral directions. The machines will be exactly alike, except that one is constructed with smooth straightening-rollers, the other with grooved straightening-rollers.

The bed of the machine is very massive, and consists of the parallel girders A A′ and the cross-beams A^2, the latter being sunk low enough to leave a clear longitudinal depression between the girders throughout the entire length of the bed. The girders of the bed constitute the guides which sustain the thrust of the straightening-rollers, due to the passage of a crooked rail through between them. The inner side of the girders are clad with straight steel plates or ways B B′, on which the straightening-rollers move and roll. These ways are accurately paralleled to each other, so as to compel the straightening-rollers to travel in straight parallel lines as they are rolled along them by the traveling carriage. Way B′ is rigidly bolted to girder A′ by means of bolts *a′*. Way B is adjustably connected to girder A in such a manner that it may be readily moved toward or away from way B′ for pur-

poses of adjustment and taking up wear, without disturbing the parallelism of the ways. To this end I arrange a wedge, D^3, between girder A and way B, a counter-wedge, B^2, being bolted to the back of said way by bolts *a*, which pass through a central longitudinal tongue formed on the counter-wedge. This tongue fits snugly in a corresponding groove in the wedge B^3, as best shown in Fig. 6, the groove being made somewhat deeper than the tongue, so as to accommodate the heads of bolts *a*. The counter-wedge has longitudinally-inclined faces on each side of its tongue, on which inclined faces the wedge operates. The way B is connected through its counter-wedge to girder A by means of bolts a^2, which pass through longitudinal slots *b* of the wedge, so that the latter may be moved endwise without interference. A stiff compressed spiral spring, a^3, is placed on each bolt a^2, between the metal of the girder and a nut on the outer end of the bolt. These springs hold the counter-wedge of way B in firm but yielding contact with the wedge B^3. The wedge is operated by means of a screw, B^4, which is swiveled in the outer end of a projecting sleeve, A^3, of the bed, and engages a nut formed on the outer end of the wedge. In the machine which I have built the incline of the wedge is one-eighth of an inch to the foot, and the screw has one inch pitch, so that each turn of the screw will effect a lateral adjustment of the way B equal to one ninety-sixth of an inch, which I have found to be sufficiently delicate for practical purposes.

The carriage C, on which the straightening-rollers are mounted, is provided with car-wheels *c* at each end, whereby it is supported on track-rails C′, laid on the girders of the bed. In the machine illustrated four alternating straightening-rollers are used, arranged in such manner that two will operate on each side of the rail. All the rollers are power-driven. I do not desire to limit myself to the use of this number. More may be used, and the additional rollers may also be power-driven, although I deem it sufficient to drive four for the proper operation of the machine. The straightening-rollers of the machine for operating on the head and foot of the rail are smooth cylinders, while those of a machine which operates on the sides of the rail are grooved cylinders, such as shown in Figs. 7 and 9. No further description will be given of the latter, it being understood that they are mounted and operated in all respects like the straightening-rollers of the machine for straightening rails in their vertical directions, which will now be explained in detail.

The two straightening-rollers D D roll on way B, the other two, D′ D′, on way B′. Each straightening-roller D is keyed, respectively, to the lower tapering end of an independent vertical shaft, E, which is journaled in a vertical sleeve-bearing, E^3, of a bracket, E′, supported at its base in cross-guides E^2 of the carriage. Each straightening-roller D′ is keyed, respectively, to the lower tapering end of an independent vertical shaft, F, which is journaled in a vertical sleeve-bearing, F^3, of a bracket, F′, supported at its base in cross-guides F^2 of the carriage. Thus each straightening-roller is free to move laterally with its bearing on the carriage independently of every other straightening-roller. The travel of the carriage on the rails C′ is to be effected by the rotation of the straightening-rollers. In order that there may be sufficient friction for that purpose between them and their ways at times when there is no rail between the rollers, the brackets of the rollers D are separated from the brackets of the rollers D′ by stiff compressed springs E^4, supported on rods, as shown. These separating-springs, whose tension may be readily adjusted by shifting the nuts on their supporting-rods, also serve to cause the rollers D to follow the adjustments of ways B. All the straightening-rollers are below the frame of the carriage, and they are arranged vertically, in order that scale peeling from the rail may readily fall clear of the rollers, and thus be prevented from accumulating to clog or otherwise impair the action of the machine.

To the upper ends of shafts E E are keyed bevel-wheels E^5 E^5, which are driven by bevel-pinions E^6 E^6 on one end of transverse horizontal shafts E^7 E^7, journaled in sleeve-bearings on fixed standards of the carriage.

To the upper ends of shafts F F are keyed bevel-wheels F^4 F^4, which are driven by bevel-pinions F^5 F^5 on one end of transverse horizontal shafts F^6 F^6, journaled in sleeve-bearings on fixed standards of the carriage. The outer ends of shafts E^7 E^7 are provided with fast pulleys E^8 E^8, and the outer ends of shafts F^6 F^6 with fast pulleys F^7 F^7. The pulleys E^8 are driven from a pulley, H, on the transverse horizontal driving-shaft G of the machine, through the medium of a belt, H′, while the pulleys F^7 are driven from a pulley, I, on said driving-shaft, through the medium of a belt, I′. The driving-shaft G is mounted on suitable stands across one end of the machine, and the belts H and I pass around idle or guide pulleys (marked H^2 and I^2, respectively) at the other end of the machine and stationary with respect to the traveling carriage. Thus the belts will drive the pulleys of the carriage in any position of the latter on the bed. The several straightening-rollers are all of the same diameter, and the pulleys and wheels for driving them are so proportioned that the rollers turn with equal speed. It will be readily understood that since the travel of the carriage is caused by the progressive rolling of the straightening-rollers on their ways or guides, and corresponds exactly with the speed with which the rollers draw a rail through between them, therefore, the travel of the carriage must be greater than the length of the rails to be straightened by about the length of the space occupied by the rollers. As the carriage approaches either end of its track the rotation

of the driving-shaft G, and consequently that of the straightening-rollers, as well as the travel of the carriage, are automatically reversed. The following are the means for accomplishing such reversals: The driving-shaft carries two loose pulleys, K′ and K², one of which is to be driven by a straight belt and the other by a crossed belt from suitable pulleys on a counter or line shaft, so as to be revolved in opposite directions. In the adjacent sides of these loose pulleys female cones are formed, adapted to the respective faces of the double male-cone pulley K, which is mounted between them on shaft G, being connected to said shaft to transmit motion thereto by suitable feathers, *k k*, which, being provided with hooks to engage the hub of the male cone, extend through the hub of loose pulley K², and afford the means for shifting the male-cone pulley in such axial directions to force it into frictional contact with either of the loose driving-pulleys K′ K², or to hold it in a middle position out of frictional contact when the machine is at rest or is to be brought to a standstill. The feathers *k k* are connected by a collar, *k′*, secured to the feathers, but loose on the shaft. On one side of this collar a lever-arm, L⁵, is mounted loosely on the shaft, and on the other side of the collar a similar lever-arm, L⁶, is loosely fitted on the shaft. The inner faces of the hubs of these lever-arms are flat and bear on the opposite sides of the collar *k′*, while their outer faces are provided with similar but reverse cams, which bear, respectively, on cams on the adjacent faces of lever-arms L⁷ and L⁸, the cam-hub of the former of which, L⁷, occupies the space between the cam-hub of lever-arm L⁵ and loose pulley K², while the cam-hub of the latter, L⁸, occupies the space between the cam-hub of lever-arm L⁶ and a washer or cap, *l*, on the shaft, all as shown in Fig. 3. Lever-arms L⁵ L⁶ are connected to the slotted arm L², fixed on one end of a rock-shaft, L, by the connecting-rod L³, and lever-arms L⁷ L⁸ are connected to the same slotted arm by connecting-rod L⁴. To the other end of the rock-shaft L is fixed a crotch, L′, by means of which the shaft is rocked in one direction or the other and to the required extent for shifting the male-cone pulley as far as may be necessary. A tappet-arm, *m*, of a rock-shaft, M, operates the crotch through an anti-friction roller mounted on a laterally-projecting stud of said tappet-arm. An upright lever, M², is fixed on rock-shaft M, and a similar upright lever, M³, is fulcrumed on a bracket at the end of the machine remote from that where lever M′ is located. Similar arms of these levers M² and M³ are connected by taut wire ropes *m′* and *m²*, so that one will transmit its motion to the other. Near each end of wire rope *m′* a tappet, *m³*, is secured to it. The carriage C strikes one of these tappets as it approaches either end of its track, and oscillates levers M² and M³, causing the tappet-arm *m* on lever M² to turn the crotch L in one direction or the other, as the case may be, whereby the double-cone pulley K is shifted through the described intermediate mechanism from one female cone to the other and its rotation reversed.

I do not limit myself to the use of the before-described reversing mechanism, because other suitable known reversing mechanisms may be used in lieu of it, and though I believe this particular reversing mechanism to be new and patentable, yet I shall make no claim for it in this patent, since I intend to make it the subject of a separate patent.

In order that the travel of the carriage may be reversed at any point on its track for the purpose of passing the straightening-rollers back and forth several times over particularly bad places of a rail, I fix a hand-lever, M⁴, on rock-shaft M, by means of which the double-cone pulley K may be shifted at pleasure, both to reverse the travel of the carriage and to stop the operation of the mechanism altogether, by shifting the double-cone pulley to a middle position between the driving-pulleys.

Suitable spring-buffers, N, are mounted on the bed at each end, adapted to check the progressive motion of the carriage in case of any derangement in the reversing mechanism, and to prevent the carriage from passing beyond and falling from its track.

A number of rollers, O, are mounted on the bed beneath the traveling carriage, and about midway between the straightening-rollers D D on the one hand and the straightening-rollers D′ D′ on the other. These rollers O serve to support and in a measure guide the rail as it is being drawn through between the straightening-rollers.

The screw for moving the wedge of the adjustable way B may be operated by any convenient or suitable mechanism. I have illustrated one practicable means of operating it from the driving-shaft G of the machine. A pulley, P, is keyed to said shaft, to drive through a belt, *p*, either one of three pulleys, Q′ Q² Q³. Pulley Q′ turns loosely on shaft Q. Pulley Q² is keyed to one end of said shaft, near the other end of which a bevel-pinion, R², is keyed. Pulley Q³ is keyed to the sleeve of a bevel-pinion, R³, which turns loosely on shaft Q. Bevel-pinions R² and R³ mesh into bevel-wheel R′ on diametrically-opposite sides thereof, so that they may drive it in opposite directions. Bevel-wheel R′ is keyed to one end of shaft R, to the other end of which a spur-pinion, B⁶, is keyed, adapted to drive a spur-wheel, B⁵, keyed to the end of screw B⁴. Normally belt *p* will run on pulley Q′. By shifting it onto either of the pulleys Q² or Q³, the screw B⁴ may be turned in one direction or the other, and the wedge properly moved to adjust way B.

The details of the machine are susceptible of various modifications, and, therefore, I do not limit myself as to some of the ensuing claims to any details of construction. While I have described the machine as more especially designed for straightening railroad-rails, it will be obvious that the invention is equally ap-

plicable to the straightening of iron and steel beams, channel-irons, and the like, such changes being made in the form of the straightening-rollers and dimensions of the parts as circumstances may require.

Having thus described my invention, what I claim is—

1. The combination, substantially as before set forth, of a traveling carriage, a series of alternating straightening-rollers mounted thereon, and stationary guides or ways along which said rollers roll, and which sustain the thrust thereof.

2. The combination, substantially as before set forth, of a traveling carriage, a series of alternating straightening-rollers mounted thereon, a fixed guide or way, an adjustable guide or way, and a wedge for adjusting the latter.

3. The combination, substantially as before set forth, of a traveling carriage, a series of alternating straightening-rollers mounted thereon, stationary guides or ways along which said rollers roll, and which sustain the thrust thereof, and reversing mechanism, substantially such as described, for reversing the travel of the carriage automatically at either end of its track, or by hand at any point.

4. The combination, substantially as before set forth, of a traveling carriage, a series of alternating straightening-rollers mounted thereon, stationary guides or ways along which said rollers roll, and which receive the thrust thereof, and rollers for supporting and guiding the rail or other article in its passage through the machine.

5. The combination, substantially as before set forth, of a traveling carriage, a series of alternating straightening-rollers mounted thereon, stationary guides or ways along which said rollers roll, and which sustain the thrust thereof, an independent sliding bearing for each roller, and springs separating opposed roller-bearings to force the rollers into frictional contact with their ways.

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

FRANCIS H. TREAT.

Witnesses:

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