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W. J. Holman.

Railroad Rail.

No. 14,870. Patented May 13, 1856.

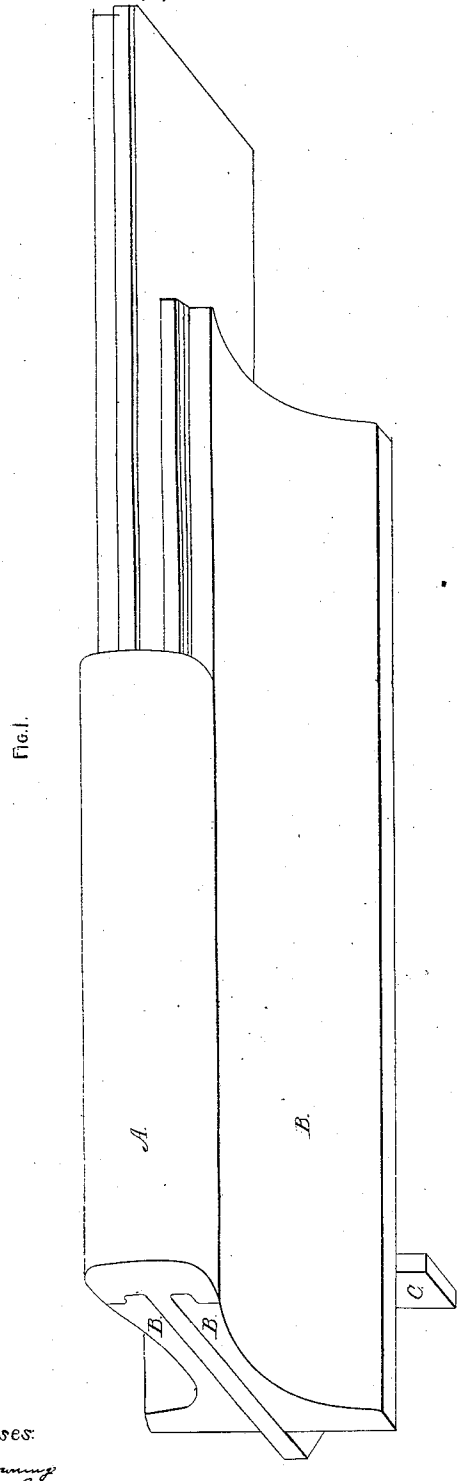


Fig. 1.

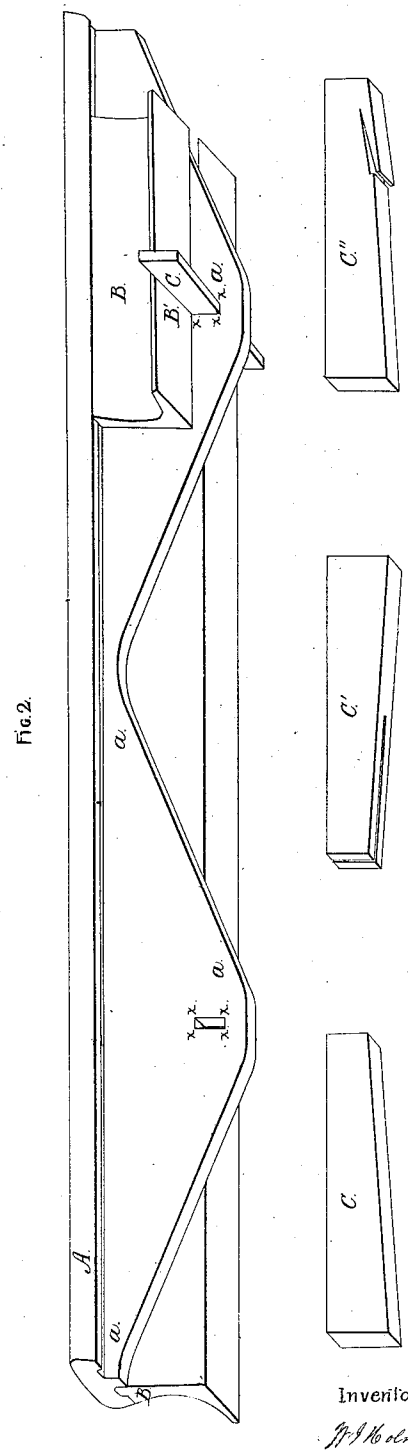


Fig. 2.

Witnesses:

C. M. Downing

Jno. C. Thomas

Inventor:

W. J. Holman

UNITED STATES PATENT OFFICE.

WILLIAM J. HOLMAN, OF INDIANAPOLIS, INDIANA.

COMPOUND RAIL FOR RAILROADS.

Specification of Letters Patent No. 14,870, dated May 13, 1856.

To all whom it may concern:

Be it known that I, WILLIAM J. HOLMAN, of Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Improvement on the Compound Three-Part Railroad-Bar, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, which forms part of this specification, and in which—

Figure 1 is a top and end view of the cap T bar or rail and side L or continuous chair rails, together with a projecting end of a securing wedge or key; Fig. 2 is a view of the T bar or cap rail with its flange or stem projecting below the continuous chair rail and showing the arrangement of the wedge for securing the same together.

A, Figs. 1 and 2 is the cap T bar or rail.

B Figs. 1 and 2 is the continuous chair rail of two parts.

C, Figs. 1 and 2 is the securing wedge or key, and C′ and C″ are varieties of keys that may be used.

B′ Fig. 2 is a view of the under side of the continuous chair rail B.

a is the flange or stem of the cap bar or T rail passing between the continuous chair rails and beneath them. *x* is the key hole in said flange. The flange, *a*, of the cap rail decreases in depth from the key hole *x* or point of fastening toward the point of support, giving a waved configuration to said flange, which waved portions should be so arranged that the projecting extremity or extremities of them below the under surface of the continuous chair rails come between the cross sleepers or bearings on which the entire rail when laid rests as is the case with other, single, swelled bars. To give intermediate stiffness vertically to said bar and consequently reduce the weight of the same for a given strength and admitting of the supports or bearings to it being placed farther apart, which results, the said waved portions not only effect to a large degree in this instance, enabling the tripartite rail, for a given weight and strength, to be supported on fewer or more distant bearings than it has yet been done, but preventing the sides of the chair rails from bilging in by concussion, and securing an advantageous union or fastening for all three bars as will be presently explained.

The superiority of the compound railroad bar over the ordinary single bar is too well known to need special comment. These compound bars are of various kinds and for such several patents have already been issued. They have been made in two parts, also in three parts. The advantages of the compound rail are better secured by the latter—the tripartite kind—than the former, both as regards "breaking joint" and in other respects, and to these well known advantages no special reference will here be made as they are incidental to the description of rail on which my invention is simply an improvement but one of considerable importance in practice. Many of these compound rails however, including those of three part construction, are defective. The tripartite rail of R. H. Middleton patented May 1853, which is simply a modification, by dividing vertically the top or cap rail, of that shown in the rejected application for patent of Cyrus Williams, June 1849, is defective inasmuch as the weight of the train in motion is borne mainly by the inner half of the divided cap rail and corresponding half of the case rail, and is defective in other respects. To this, and one of the best of the kind, the tripartite rail of B. H. Latrobe patented Sep. 1848, is greatly superior as the pressure or strain is more equally divided, and upon this form of rail my improvement is based. The usual mode of securing the three parts of this rail together is by passing a rivet or screw bolt horizontally through the upright portions of the L shaped rails which carry the cap rail on top and hold it by lips that grip a dovetail stem of the cap rail, or, by extending said dovetail stem farther down in between the two L rails, also hold it by said bolt, rivet, or key passing through all three bars. The making of the holes for the bolt, rivet or key, in all three bars however, which is shown likewise in the tripartite rail of Middleton above referred to, or even through two of the bars, is objectionable as, in a large number of rails, enhancing seriously the aggregate cost, and from the particularity requisite to make the holes so that in the several bars they will come in line for the passage of the key or bolt when the rail is put together, also objectionable on account of the inequality in contraction and expansion of the several bars forming the whole or rail proper and which throws the adjacent bolt holes out of line, sometimes where there is insufficiency of play strain-

ing the bolt and breaking it. My improvement obviates this. It only requires a bolt or key hole in the one bar of the tripartite rail to hold the three bars even more securely together thereby admitting of the freest independent expansion or contraction of the adjacent bars; and, although there is nothing new in fastening compound rails from below, of itself, and so that the cap rail or rails may (as in the rail of R. H. Middleton before referred to) be removed and turned without of necessity shifting the supporting rail or rails; and, though there is nothing new in a key or wedge fastening, of itself, and the same is but the equivalent of a bolt, still it will be found that my invention embraces important novelty, as an improvement on the rail referred to, in the peculiar formation and extension of the stem of the cap rail relatively to the other rails or bars of L form, whereby bolt or key holes through the one bar serves to hold the three bars firmer together, the freest independent expansion or contraction, longitudinally and laterally is insured, and greater stiffness, vertically and laterally, for a given amount of metal (and lightness is to be studied in a rail) is given to the tripartite rail which, by my construction, may be supported at greater distances apart and thus the number of cross ties or sleepers be economized.

From the foregoing remarks and description given of the drawing that these advantages are obtained will be obvious, the cap T bar (A) being placed between the sides of and supported upon the continuous L chair rails (B) and held firmly in place by the edges of the top of the T bar overlapping and holding together the sides of the chair L bars, while the tie is made at the bottom, or the union of the bars secured, by means of a wedge (C) driven through the aperture (*x*) in the projecting end of the waved portions of the flange or stem (*a*) of the cap bar below the bottoms of the L rails, thus firmly binding all together top and bottom, that is the three bars, by but one bolt hole, or series of bolt holes for the several waves, in the one bar; admitting of perfect freedom of contraction and expansion in each bar without strainage on the bolt or key by any slight inequality of expansion or contraction in the three bars; allowing of the speedy removal, when required, of the inner bar without disturbing the others; and insuring by the waved form to the stem or flange (*a*) of the cap bar and its arrangement between the sides of the chair rails at sundry points to a depth below said chair rails not only increased vertical stiffness so that the rail bearings may be arranged at great distances apart but strengthening the tripartite rail laterally and preventing all possibility of the chair rails bilging in at their sides, and while the waved portions thus give strength, in the most perfect manner as regards lightness or amount of material used, the extension of the flange or stem at points below the chair rails gives a means the most simple, as already explained, of binding together the three bars which make up the tripartite rail.

What I claim herein as new and useful and an improvement on the compound railroad bar referred to, and desire to secure by Letters Patent, is—

The extension at sundry points throughout its length or lengths, by waved or irregular formations, of the stem or flange (*a*) of the cap bar of the tripartite rail below and through or beyond the bottom surface of the two side or chair rails and in connection and combination therewith by key or wedge passing through the one rail only from below as and for the purposes set forth.

In testimony whereof, I have hereunto subscribed my name.

WM. J. HOLMAN.

Witnesses:
W. E. BURK,
WM. SULLIVAN.

W. J. HOLMAN.
Compound Rail.

No. 222,498. Patented Dec. 9, 1879.

Fig. 2

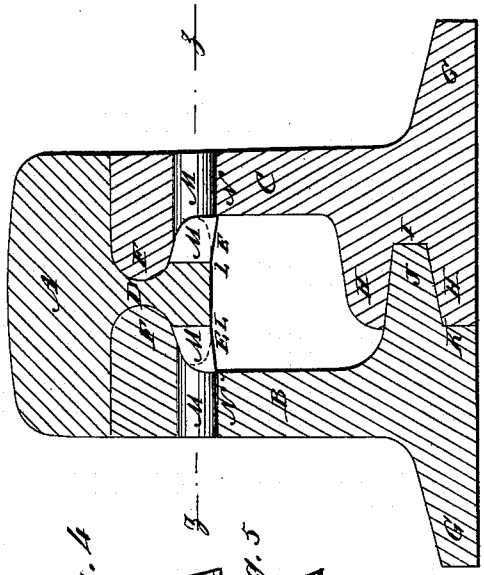


Fig. 4

Fig. 5

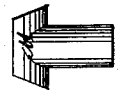


Fig. 1

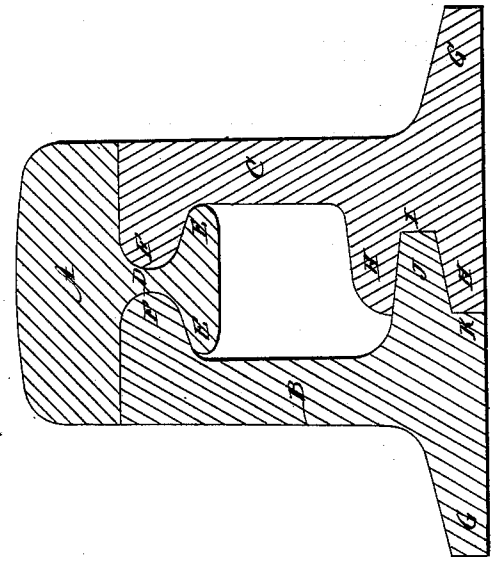
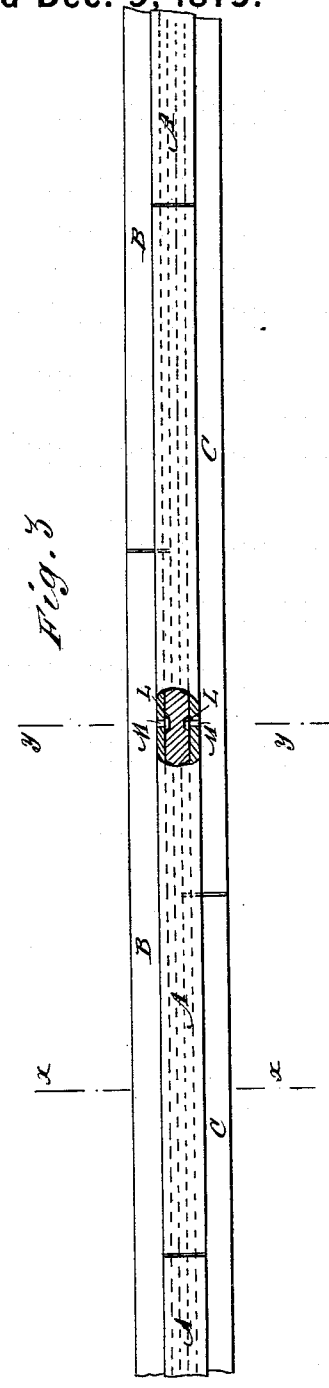


Fig. 3



WITNESSES:

C. Neveux

C. Bedgwick

INVENTOR:

W. J. Holman

BY Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM J. HOLMAN, OF FORT WAYNE, INDIANA, ASSIGNOR TO HIMSELF, DANIEL A. BEAM, OF NEWARK, NEW JERSEY, AND HENRY A. WHALEY, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN COMPOUND RAILS.

Specification forming part of Letters Patent No. **222,498**, dated December 9, 1879; application filed September 24, 1879.

To all whom it may concern:

Be it known that I, WILLIAM JENNINGS HOLMAN, of Fort Wayne, in the county of Allen and State of Indiana, have invented a new and Improved Compound Rail for Railroad-Tracks, of which the following is a specification.

The invention relates to three-part rails so formed in passing through the manufacturing-rolls that they will require no other device, appliance, or attachment to make perfectly secure rails than to place them together and spike them to the cross-ties.

The invention consists in the construction and arrangement of parts, as hereinafter described and claimed.

Figure 1 is a sectional elevation of the compound rail, taken through the line *x x*, Fig. 3. Fig. 2 is a sectional elevation of the rail, taken through the line *y y*, Fig. 3. Fig. 3 is a plan view of the rail, partly in section, through the line *z z*, Fig. 2. Figs. 4 and 5 are detailed views of a stop for locking the parts of the rail against longitudinal movement upon each other.

In outward form my improved rail resembles the old U-rail, and to distinguish it from other forms I name it the "lock-rail."

The rail is formed in three parts—a cap bar, A, and two side bars, B C. Along the central line of the under side of the cap-bar A is formed a stem, D, having flanges E upon the opposite sides of its lower part. The lower surface of the side parts of the cap-bar A is horizontal, and the spaces between the said side parts and the flanges E are in U form, as shown in Figs. 1 and 2.

The side bars, B C, are made with vertical outer sides, in line with the vertical sides of the cap A. The upper edges of the side bars, B C, fit against the shoulders of the cap A, and upon the inner sides of the upper edges of the said side bars, B C, are formed flanges F, which fit into the spaces between the shoulders of the cap A and the flanges E. The lower edges of the side bars, B C, are made flat, to rest upon the cross-ties of the track, and have flanges G formed along their outer sides.

Along the inner side of the lower edge of the side bar, C, is formed a thick flange, H, having a tapered groove, I, formed in it to receive the flange J, formed upon the inner side of the lower part of the side bar, B. Upon the lower side of the flange J is formed a shoulder, K, for the lower part of the flange H to abut against, as shown in Figs. 1 and 2.

With this construction the compound rail has a flat base to rest upon the ties, and the three parts fit snugly upon each other, and are firmly locked together, so that the compound rail can be spiked to the ties in the same way as a solid rail, and will require no further fastening to keep its parts together in engagement with each other.

The flanges H J should be made of such a thickness with respect to each other that the two side bars may be of about equal weight and strength.

In each flange E of each cap-bar A is formed a notch, L, to receive the head of a stop-pin, M. The stems of the stops M are inserted from the inner sides of the side bars, B C, in holes N, formed in the said side bars, B C, so that the outer ends of the said stems may be flush with the outer sides of the side bars, B C. The stops M are designed to prevent the cap-bar A from being moved longitudinally upon the side bars, B C, by the wheels of passing trains.

I am aware that a compound railroad-rail has been constructed of three longitudinal parts—to wit, a cap bar or rail and two side bars having base-flanges; but in such case it has been necessary to connect the side bars by means of transverse bolts, in order to prevent them spreading apart, even when spiked to the tie; whereas in my invention the inner base-flanges of the side bars are respectively constructed with recess and tenon and shoulders, of such form that the parts of the rail interlock, so that tie-bolts may be dispensed with, and said parts held in due relation by means of spikes alone.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with the cap-bar A, having the central pendent flanged rib, D E E, of the side bars, B C, having, respectively, the flange or tenon J and recess I, formed by flanges H, said tenon and recess having plane straight upper and lower sides, and the square shoulders K, formed at the lower part of said flanges J H, all as shown and described, for the purpose specified.

2. In a compound railroad-rail, the stops M in the side bars, B C, to engage with notches L in the flanges E, substantially as herein shown and described, to prevent longitudinal movement of the cap-bar A, as set forth.

WILLIAM JENNINGS HOLMAN.

Witnesses:
NEIL W. LACHLAN,
GEORGE W. JONES.

(No Model.) 3 Sheets—Sheet 1.

W. J. HOLMAN.

BRIDGE.

No. 290,054. Patented Dec. 11, 1883.

Fig. 1.

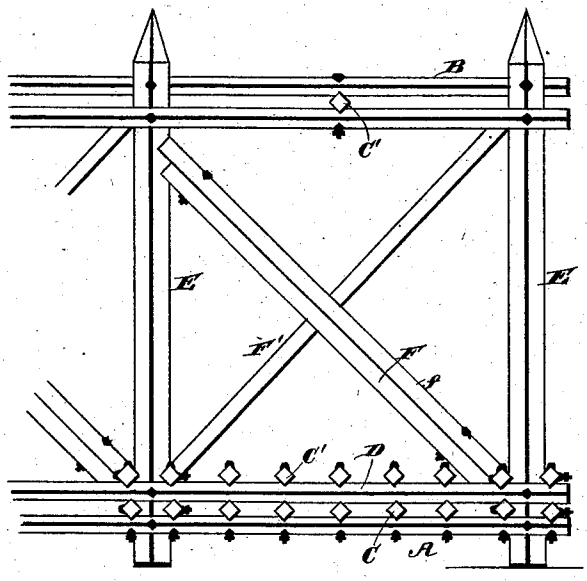
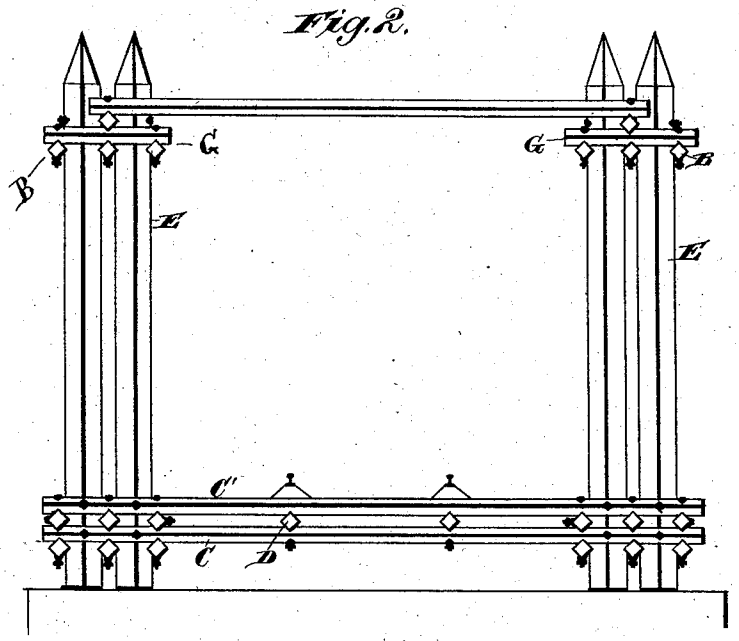
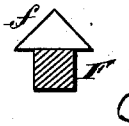


Fig. 2.



Witnesses.
Robert Everett.
J. A. Rutherford

Fig. 7.



Inventor.
William J. Holman.
By James L. Norris.
Atty

(No Model.) 3 Sheets—Sheet 2.

W. J. HOLMAN.

BRIDGE.

No. 290,054. Patented Dec. 11, 1883.

Fig. 3.

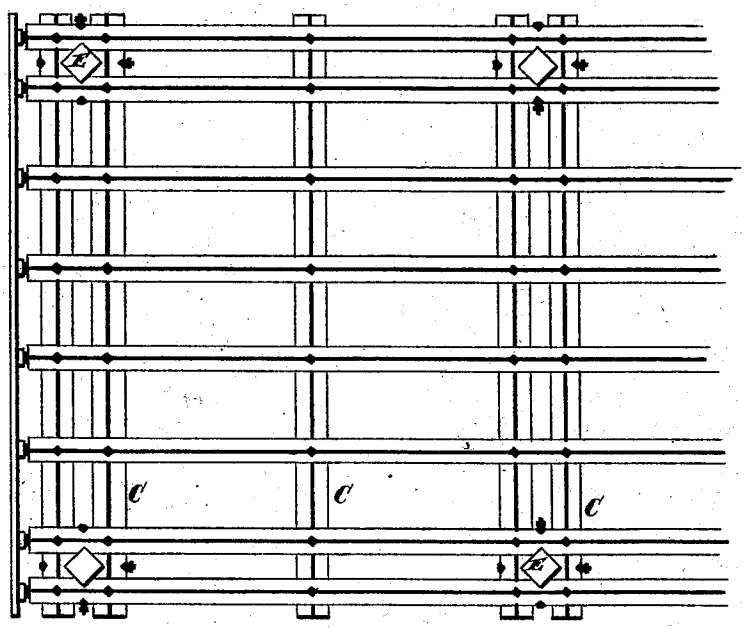
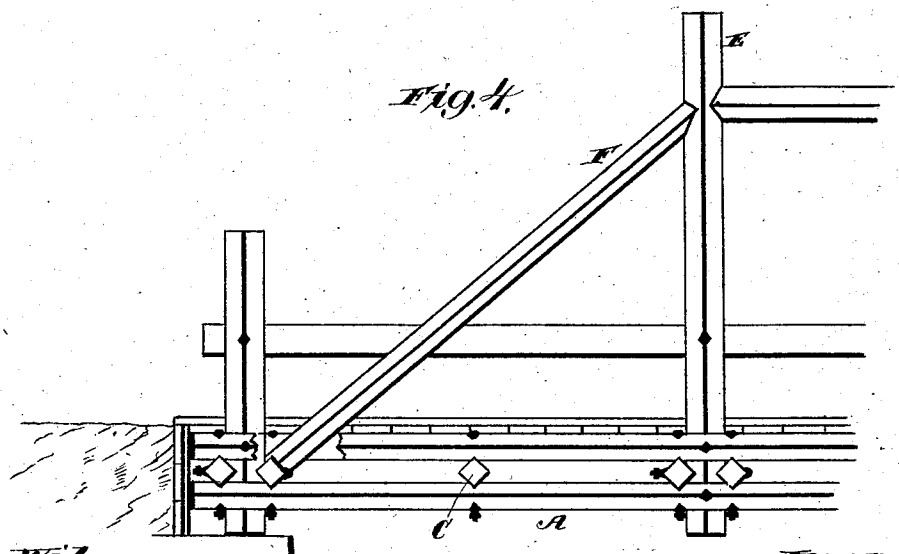


Fig. 4.



Witnesses,
Robert Everett,
J. A. Rutherford

Inventor,
William J. Holman,
By James L. Norris.
Atty.

(No Model.) 3 Sheets—Sheet 3.

W. J. HOLMAN.

BRIDGE.

No. 290,054. Patented Dec. 11, 1883.

Fig. 5.

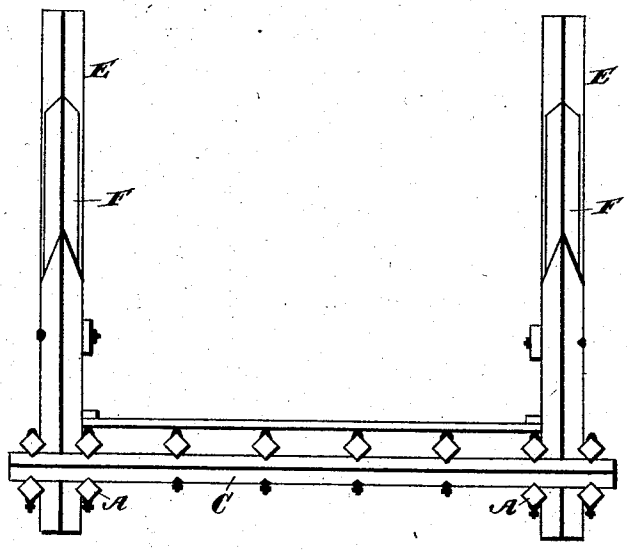
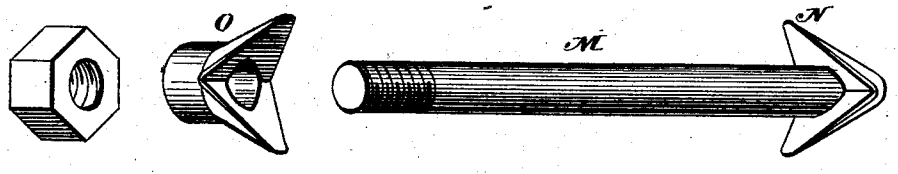


Fig. 6.



Witnesses.
Robert Everett.
J. A. Rutherford

Inventor.
William J. Holman.
By James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM JENNINGS HOLMAN, OF FORT WAYNE, INDIANA, ASSIGNOR OF ONE-HALF TO MICAJAH C. WHITE, OF MINNEAPOLIS, MINNESOTA.

BRIDGE.

SPECIFICATION forming part of Letters Patent No. 290,054, dated December 11, 1883.

Application filed May 3, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. HOLMAN, a citizen of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented new and useful Improvements in Bridges, of which the following is a specification.

The object of the present invention is to provide open or uncovered bridges in which more effectual provision is made for preventing the decay of materials, and in which the timbers are so framed, locked, tied, or secured together as to be less complicated, cheaper, and far more rigid and permanent, and will better withstand the thrusts and tension-strains to which bridges are subjected than in the ordinary methods of construction.

The invention consists in the novel construction and arrangement of parts hereinafter described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a section of a truss-bridge, consisting, essentially, of top and bottom chords, lower cross-beams for supporting a railroad-track or flooring, vertical posts, and inclined braces. Fig. 2 is an end elevation of the bridge shown in Fig 1. Fig. 3 is a plan or top view of a wagon-bridge, showing the lower chords, longitudinal and transverse floor-beams, posts, and manner of securing these parts together, with a breast-wall of planks, an end view of which is shown in Fig. 4. Fig. 4 is a side view of bridge and breast-wall of planks at end of bridge, supported by, though separated from, the ends of projecting timbers by small cast-iron bars or blocks. Fig. 5 is an end view of same without the breast-wall of planks. Fig. 6 is a detail view of the bolt employed for fastening the bridge-timbers together. Fig. 7 is a cross-section of a modified form of angular timber.

I desire it to be understood that I do not restrict my invention to the particular forms of bridges herein illustrated and specifically described, because it will be apparent that the principle or spirit of my invention can be embraced or embodied in all forms of bridges in which wooden timbers, whether horizontal, inclined, or vertical, are employed; and hence it will only be necessary to add that the particular forms of bridges herein exemplified are selected as methods by which the principle may be illustrated.

The bridge shown in Figs. 1 and 2 consists of the bottom and top chords, A B, the bottom cross-timbers, C C′, the packing-sticks D, the vertical posts E, the inclined braces F F′, and upper chord packing-block, G. These parts are all composed of pieces or sticks of timbers cut generally square in form, but set or laid in such a way that the sides thereof present angular or inclined surfaces the angles or corners of which approximately coincide with horizontal and verical lines. The lower chords, A, are each formed of two or more tiers of three parallel timbers, between which the lower cross-timbers C′ fit upon the upper tiers of timbers belonging to the lower chords. The packing-sticks D are laid so as to extend longitudinally between the cross-timbers C C′. The vertical posts E are arranged in pairs, and fit between the timbers of the chords and between the cross-timbers C C′, adjoining said parts, and the two sections of main braces F are made to foot, respectively, on the upper and lower of the two tiers of cross floor-beams framed about the lower end of posts, while the upper ends of the two sections of said braces shoulder in notches just beneath the lower of the upper chord-sticks, as is shown in Fig. 1. The various horizontal timbers constituting the bottom of the bridge structure are secured together by means of notches made in their contact or abutting surfaces or points where two timbers cross each other, these notches being always on the under side, when one stick may be above the other, so as to leave no exposed crevices for lodgment of moisture. In other words, where two timbers cross each other the top corner apex of one timber is received in a notch made in the nether or lower corner of the other timber. For securing the parts joined in this manner, I make use of a bolt, M, which has a flanged head, N, that projects on all sides from said bolt and has its interior face made inclined or shaped in such a manner as to fit snugly on, about, and around the angle or corner of the timber through which the bolt passes. The other end of the bolt has a removable cast-

iron washer, O, which corresponds in shape to the head N, and is used for the same purpose. The washer O is secured by an ordinary nut on the screw-threaded end of the bolt. The posts are secured to the bottom chords in any preferred way. For example, the posts may be notched at their lower ends for the reception of lower chord-sticks of the bottom chord, and the upper chord-sticks of said chords may be notched for the reception of the corners of the posts.

It will be understood that the bolts used for connecting the various timbers, whether the same be arranged horizontally, vertically, or obliquely, are always by their heads and washers made to conform to the plane or angular surfaces at the point of contact with the timbers into and through which the bolts are inserted, generally in conformation with the one above described. Each top chord B is, in the construction shown in Figs. 1 and 2, composed of three parallel timbers or sticks upon the same plane and an upper stick, which, together with the middle lower stick, are fitted between the double posts E, the other sticks fitting against the outer sides of said posts. A bolt passes through the three lower sticks and the two posts, and one through the two posts and included upper chord-stick, serving to hold these parts together. The upper packing-block, G, is notched on its under side and fits on the upper corners of the lower sticks of the top chord and into a notch made in the upper stick of the said chord. Bolts pass through the contact-surfaces of said sticks and packing-block. The main braces F (shown in Fig. 1) are made of a square piece of timber, to which is secured a triangular covering-piece, *f*, made by sawing a square piece of wood diagonally from corner to corner. This triangular covering-piece forms the exposed or upper surface of brace and acts as a water-shed. Timbers of a similar construction can also be used on other parts of the bridge—as, for instance, the lower tiers of upper and lower chords and floor-beams and for track-sills.

Referring to Fig. 2, it will be seen that the end posts rest directly upon the abutments or piers, and that the bottom chords and lower cross-timbers are secured to said posts above the lower ends of said posts. This necessarily causes the chords and cross-timbers to be arranged above the abutment, so that they will not lie upon the same and be exposed to the decaying influence of moisture.

In Figs. 3, 4, and 5 I have illustrated a wagon-bridge strain-beam truss, in which the bottom chords are each composed of pairs of upper and lower sticks secured to posts that rest upon the abutments and hold the chords above the latter.

In all forms of bridging, where there is danger of earth coming in contact with and of imparting moisture to the ends of the chord-sticks and feet of end posts, I would attach to the end of each chord-stick a small cast-iron block or bar, against which a breastwork of planks should be made to rest, separating the earth from the timbers and moisture from the ends of the chords and posts, as shown in Figs. 3 and 4.

I am aware of Letters Patent No. 33,629, dated November 5, 1861, and do not claim what is therein shown; but,

Having thus described my invention, what I claim is—

1. A wooden-truss bridge having its various chords, vertical posts, braces, and cross-timbers arranged with inclined water and fire shedding surfaces, the timbers where they cross each other in contact being joined together by the lower timbers fitting into a notch in the lower corners of the upper timbers, substantially as described.

2. A wooden bridge having its component timbers arranged so as to present angular surfaces the apices of which approximately coincide with horizontal and vertical lines, substantially as described.

3. The combination of double-tiered upper and lower chords and transverse floor-beams locked to each other and to packing-sticks and to and about the posts by bolts and notches, substantially as described.

In testimony whereof I have hereunto set my hand and seal in the presence of two subscribing witnesses.

WILLIAM JENNINGS HOLMAN.

Witnesses:
GEORGE L. BITTINGER,
D. A. WORDWORTH.

(No Model.) 5 Sheets—Sheet 1.

W. J. HOLMAN.

ATTACHMENT FOR LOCOMOTIVE ENGINES.

No. 546,153. Patented Sept. 10, 1895.

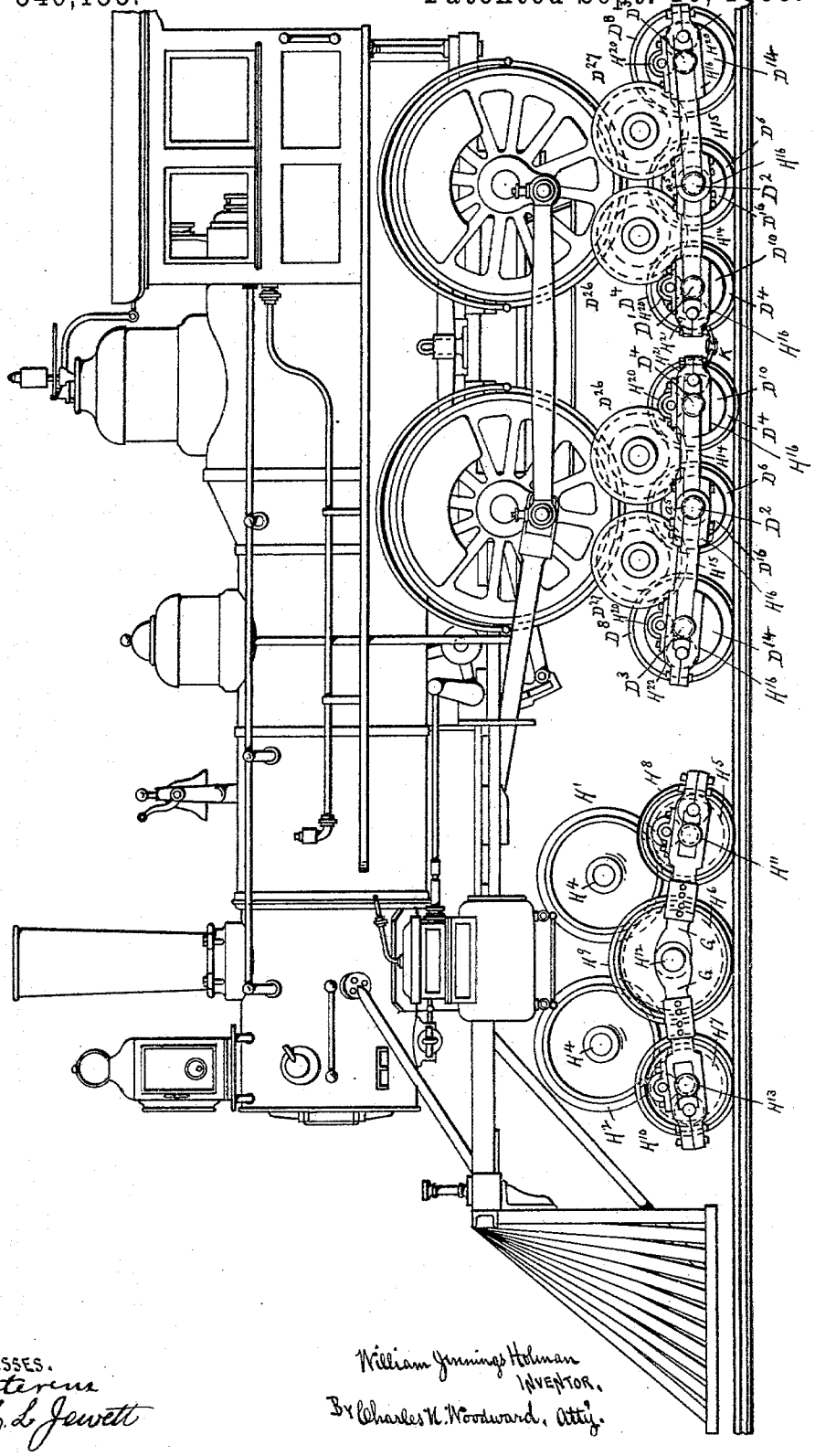


Fig. 1.

WITNESSES.
J. Westerman
R. H. L. Jewett

William Jennings Holman
INVENTOR.
By Charles N. Woodward, Atty.

(No Model.) 5 Sheets—Sheet 2.

W. J. HOLMAN.

ATTACHMENT FOR LOCOMOTIVE ENGINES.

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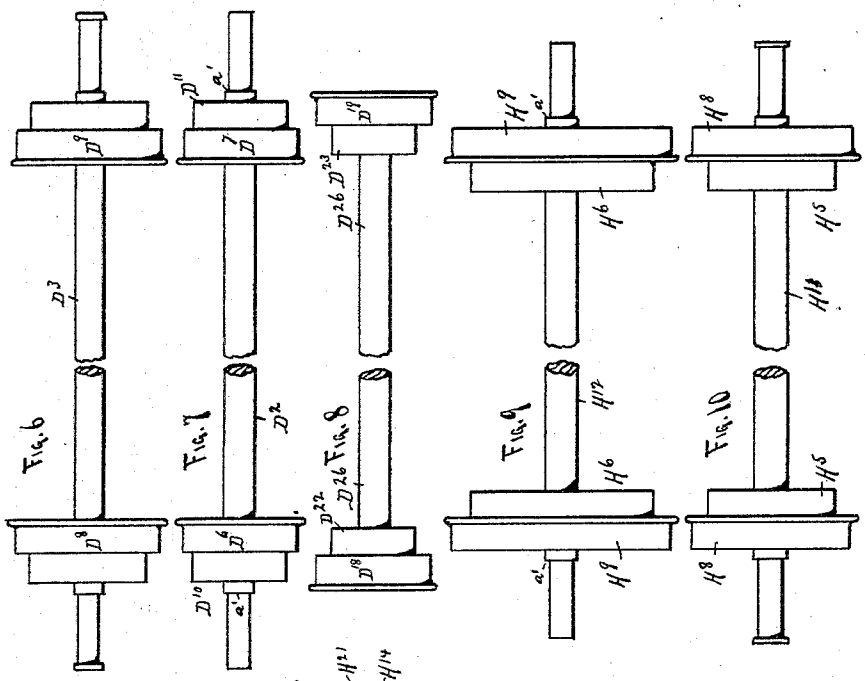

Fig. 6 Fig. 7 Fig. 8 Fig. 9 Fig. 10

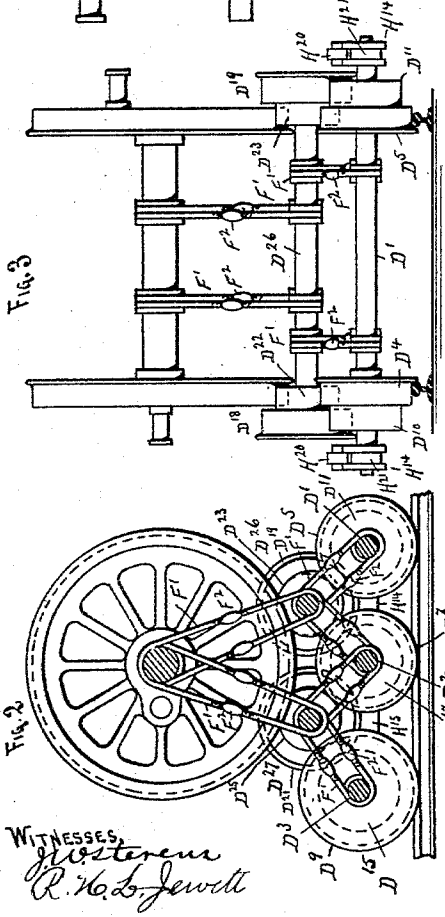

Fig. 3

Fig. 2

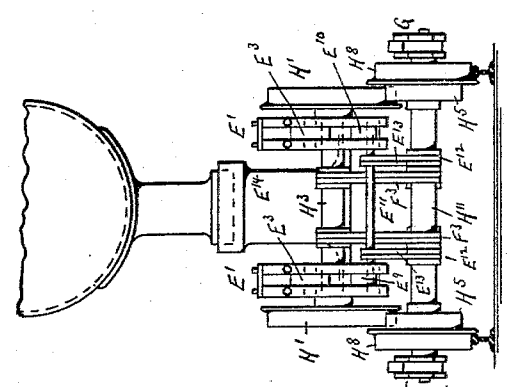

Fig. 5

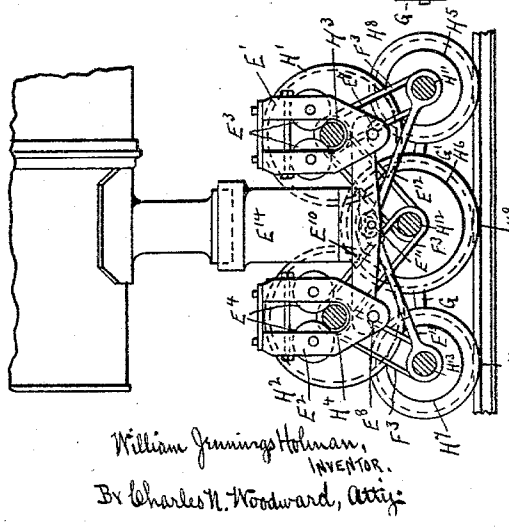

Fig. 4

Witnesses,
R. H. B. Jewett

William Jennings Holman,
INVENTOR.
By Charles N. Woodward, Atty.

(No Model.) 5 Sheets—Sheet 3.

W. J. HOLMAN.

ATTACHMENT FOR LOCOMOTIVE ENGINES.

No. 546,153. Patented Sept. 10, 1895.

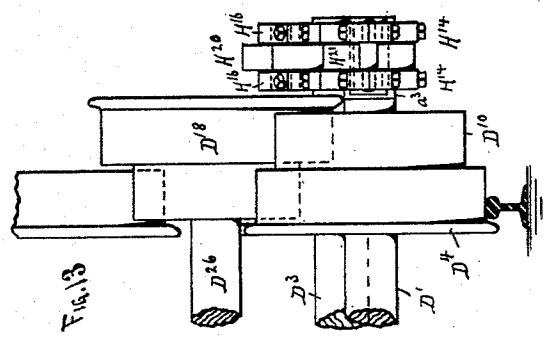

Fig. 13

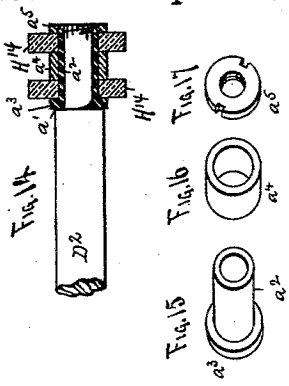

Fig. 14

Fig. 17

Fig. 16

Fig. 15

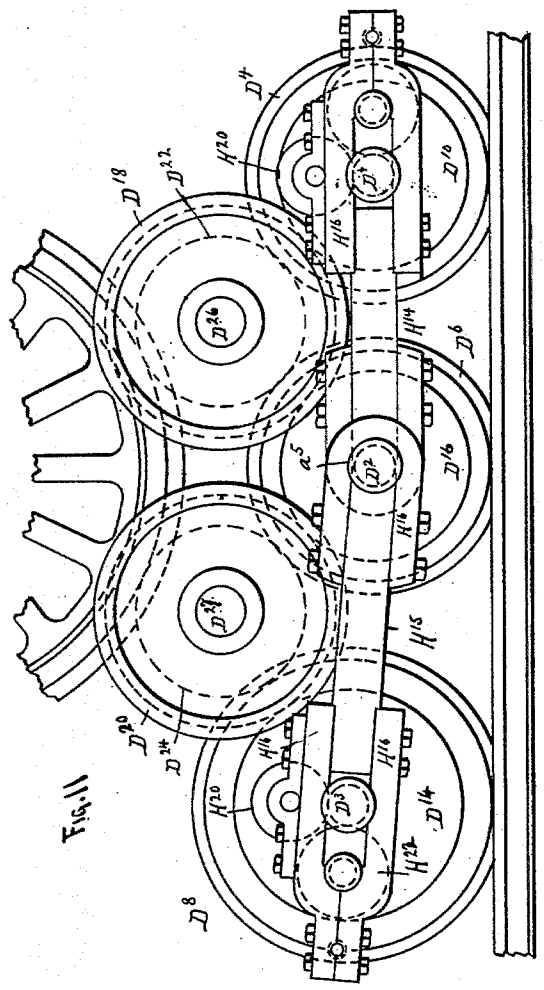

Fig. 11

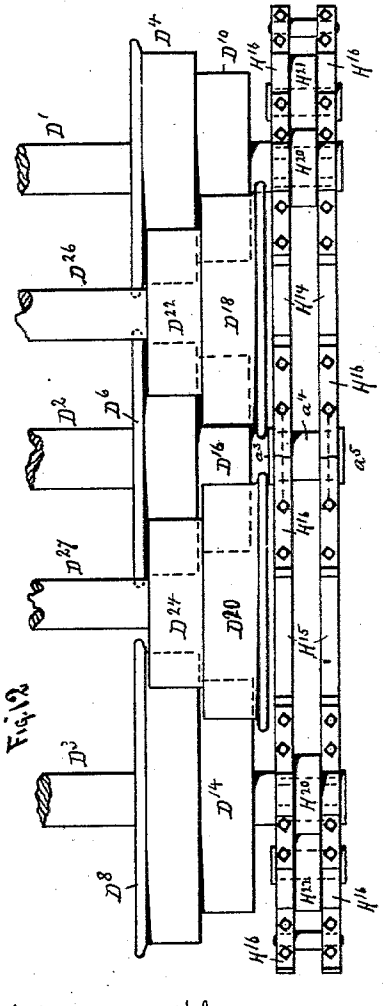

Fig. 12

Witnesses.
J. Westcott
R. H. Lofjewett

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By Charles N. Woodward atty

(No Model.) 5 Sheets—Sheet 4.

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ATTACHMENT FOR LOCOMOTIVE ENGINES.

No. 546,153. Patented Sept. 10, 1895.

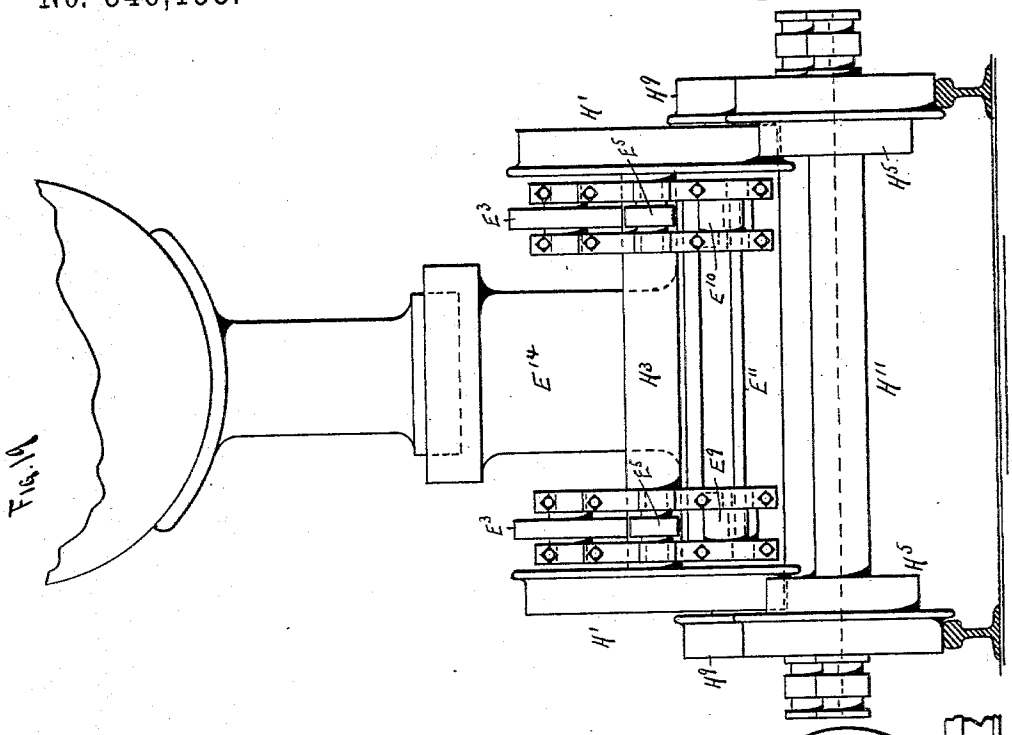

Fig. 1a.

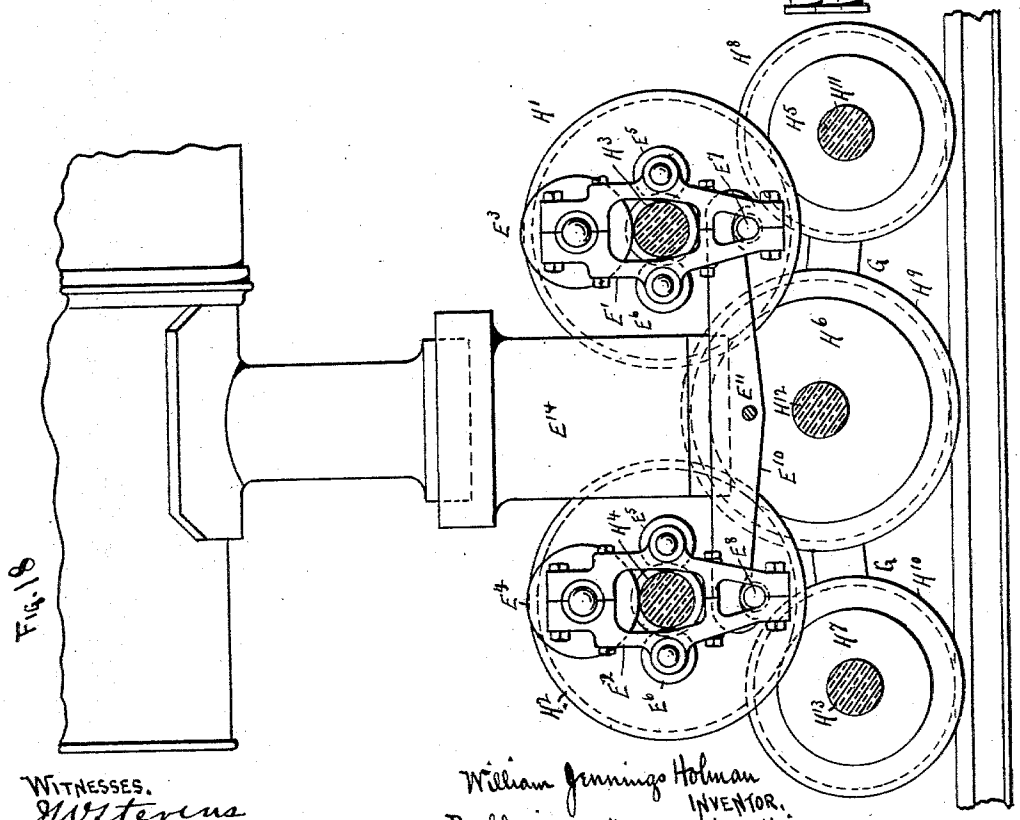

Fig. 1b.

Witnesses.
J. W. Terrens
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William Jennings Holman
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(No Model.) 5 Sheets—Sheet 5.

W. J. HOLMAN.

ATTACHMENT FOR LOCOMOTIVE ENGINES.

No. 546,153. Patented Sept. 10, 1895.

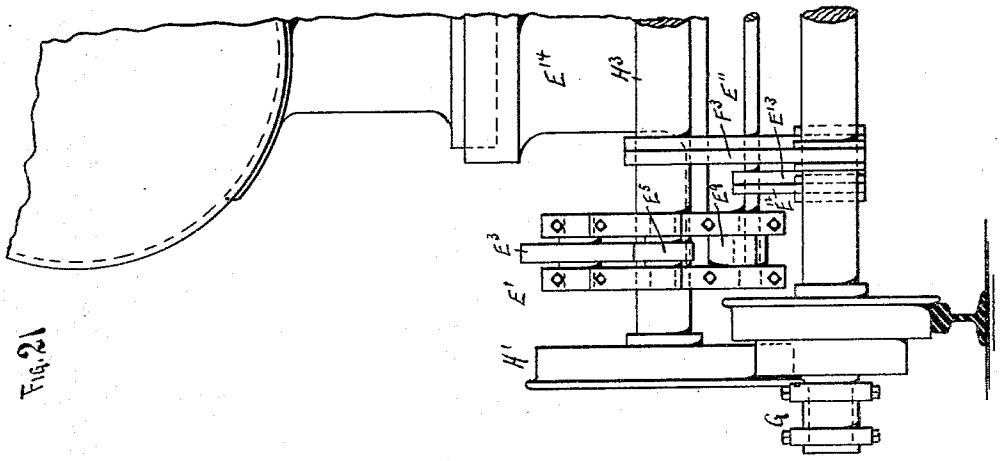

Fig. 21

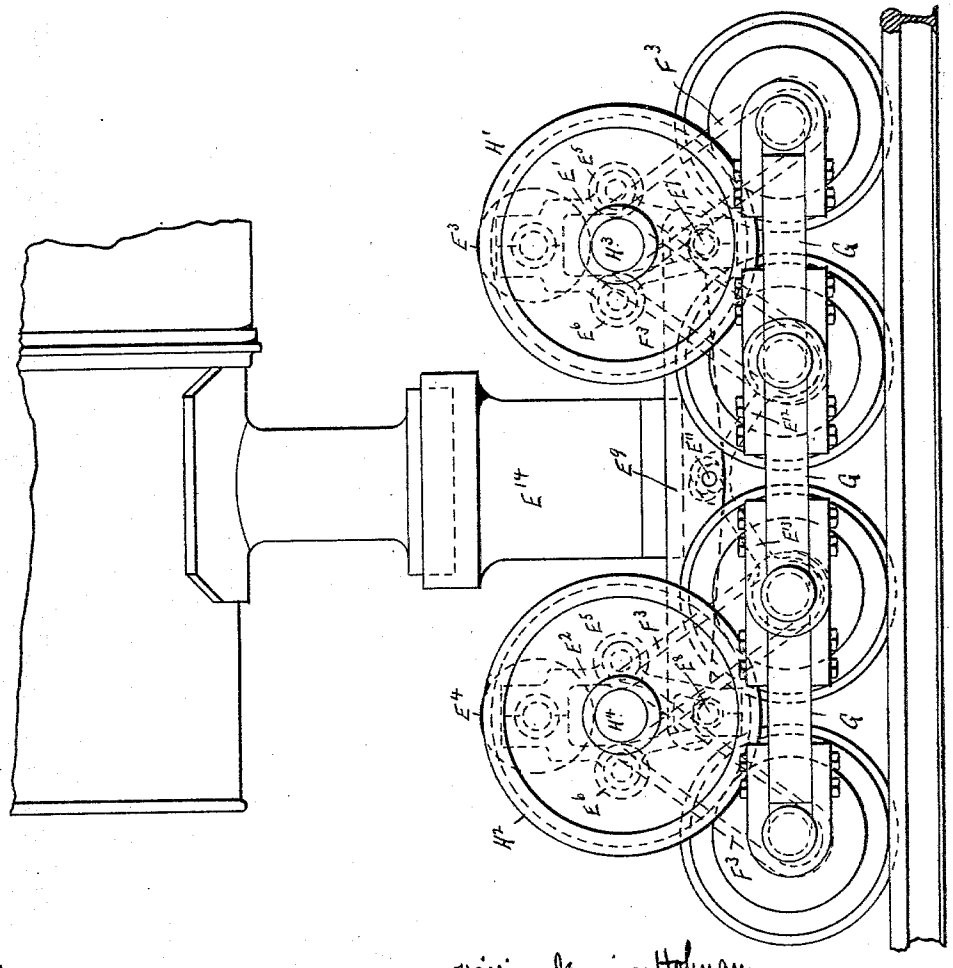

Fig. 20

Witnesses.
J. Westervelt
R. H. L. Jewett

William Jennings Holman,
INVENTOR.
By Charles N. Woodward attys.

UNITED STATES PATENT OFFICE.

WILLIAM JENNINGS HOLMAN, OF MINNEAPOLIS, MINNESOTA.

ATTACHMENT FOR LOCOMOTIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 546,153, dated September 10, 1895.

Application filed December 18, 1894. Serial No. 532,139. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM JENNINGS HOLMAN, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented new and useful Attachments for Locomotive-Engines, of which the following is a specification.

My invention relates to improvements in locomotive-engines; and it consists in the formation and use of a series of compound trucks composed of double-tread, single-flanged, axle-coupled metallic or composition friction roller-geared wheels so constructed, proportioned, and arranged as that when placed under the locomotive driving-wheels and superstructure the same horizontal position of the boiler is maintained without any expensive or material alteration of the locomotive proper.

The objects or purposes of my invention are to increase the speed, safety, and economy of railroad travel and transportation. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of an ordinary locomotive with my attachments in position on the track. Fig. 2 is an inside view of the sectional detail of one of the speeding-trucks with one of the driving-wheels of a locomotive resting upon it, showing the position and arrangement of the sectional links about the axles coupled by turnbuckles. Fig. 3 is a rear view of the same. Fig. 4 is an inside view of the "pony-truck" carrying the pilot and forward end of the boiler, showing the position and arrangement of the links, check-rods, equalizers, and pendants, and their anti-friction-rollers. Fig. 5 is a front view of the same. Figs. 6, 7, 8, 9, and 10 are detached detail views, enlarged, of the friction-geared wheels with the axles foreshortened. Fig. 11 is an enlarged side elevation of one of the speeding-trucks with a section of one of the driving-wheels resting upon it, as viewed from outside the track. Fig. 12 is an enlarged plan view of the same, and Fig. 13 is an enlarged front elevation of one side of the same. Fig. 14 is a sectional detail of a portion of one of the axles and bearing sleeves or collars and a set of the coupling-bars, illustrating more fully their construction. Figs. 15, 16, and 17 are perspective views of the sleeve, collar, and binding-nut detached. Fig. 18 is an enlarged sectional detail of the pony-truck viewed from the inside, illustrating a modification in the supporting mechanism, and Fig. 19 is a front view of the same. Fig. 20 is a view similar to Fig. 18, illustrating another modification in the manner of constructing the pony-truck. Fig. 21 is a front view of the same.

To be more specific, my attachments consist of compound trucks composed of ten flanged wheels coupled by axles of various lengths suited to the gage of the railroad, the position of the wheels in the truck and the offices they perform, there being five pairs of wheels in each truck, which may be of any kind of metal or composition best suited to durability and safety. One of these trucks I place under each pair of the locomotive's driving-wheels, and by way of distinction call them "speeding-trucks." (See Figs. 2 and 11.) One truck (when the locomotive used is so fashioned as to require it) is placed forward of the speeding-trucks, which in common railroad parlance is called a "pony-truck," the office of which is to support with stability, not absolutely rigid, in any required position the pilot and forward end of the boiler, as shown in Figs. 4 and 5. As the two speeding-trucks are substantially equivalent, I have designated the corresponding parts by like letters of reference, D' D^2 D^3 being the axles of the lower set of wheels, the axles D' having the flanged wheels D^4 D^5, the axles D^2 having the flanged wheels D^6 D^7, and the axles D^3 having the flanged wheels D^8 D^9, the wheels D^4 D^5 and D^6 D^7 being of the same diameter, while the wheels D^8 D^9 are preferably of larger diameter, as hereinafter explained. The wheels D^4 D^5 have outwardly-extended hubs D^{10} D^{11}, the wheels D^8 D^9 have outwardly-extended hubs D^{14} D^{15}, while the wheels D^6 D^7 have similar outwardly-extended hubs D^{16} D^{17}. The wheels D^4 D^5 D^6 D^7 are uniform in diameter, and the hubs of the wheels D^8 D^9 are also uniform, but larger than the hubs of the smaller wheels.

D^{26} D^{27} are the axles of the upper tier of wheels, the flanged wheels being denoted at D^{18} D^{19} D^{20} D^{21}, and resting by their treads upon the hubs of the wheels D^4 D^5 D^6 D^7 D^8 D^9, and supporting the main traction-wheels

of the locomotive upon their hubs D^{22} D^{23} D^{24} D^{25}, as shown. The forward or pony-truck wheels H′ H^2 are placed upon the axles H^3 H^4, which are shorter than the ordinary and arranged to be supported upon the inwardly-extended hubs H^5 H^6 H^7 of the flanged wheels H^8 H^9 H^{10}, the latter mounted upon the axles H^{11} H^{12} H^{13}, the central wheel H^9 being preferably larger than the wheels H^8 H^{10}, as shown. By this means the forward truck is supported in line with the other parts of the locomotive and the whole weight borne by the antifriction-rollers. The central wheel H^9 being larger than the wheels H^8 H^{10}, the tendency of the truck-wheels H′ H^2 to "climb" over the wheels upon the rails is lessened, while at the same time the strains are uniformly distributed.

Each wheel in the speeding-truck has two diameters in line with a common center. The smaller of these, for brevity, I have termed the "hub," while the larger diameter of the wheels I designate as the "major part," and these in every case are flanged, while the hubs in no case are. (See Figs. 6, 7, 8, 9, and 10.) The flanges may be on the inside margin of the periphery or tread facing outwardly, as in the case of a common car-wheel, with the hub extending outwardly, or the flange may be on the outside of the periphery facing inwardly, with the hub extending outwardly, as may be required, for best results in their positions and arrangement (see Figs. 6 and 8); or, as in case of the rail-wheels of the pony-truck, the flanges may be on the inside peripheries of the major parts facing outwardly, with the hubs extending inwardly, which places the flanges approximately around the center of the wheels, as shown in Figs. 9 and 10. The difference between the diameters of the major parts and hubs of the wheels I term "gearing," and since the peripheries of the wheels are friction-surfaces, not cogged, they are called "friction-geared wheels." It must be obvious that the sizes of the gearing may be greater or less, this to be determined by the requirement in any given construction. The gearing may be such as to double the speed of the ordinary locomotive without increasing the action of the movable parts of the engine, or impairing to any appreciable extent its efficiency in other directions. The width of the periphery or tread of the hub should in all cases be made to exceed that of the major part of the wheel by a half-inch or more, to avoid any interference of major parts, under any circumstances short of breakage and wreck, as shown in Fig. 13. The projecting corners of all hubs should be made oval or rounding somewhat, to conform, as near as may be, to the reversed form of the fillet forming the connection between the tread and flange of the wheel made to rest upon it, so as to avoid or lessen abrasion from contact in motion. The tread or periphery of the major part of the rail-wheels (the wheels in direct contact with the rails) should be beveled or conical, as any ordinary car-wheels, while all the other tread-surfaces throughout the truck-wheels, and the driving-wheels of the locomotive as well, should be made plane surfaces, corresponding with the planes of their axles, so that when placed in contact with each other in pairs their bearings would be perfect throughout.

It will be observed by referring to the drawings, Figs. 2, 3, 4, 5, 11, 12, and 13, that the wheels composing the trucks are double-tiered—three wheels on either rail coupled by their axles forming the base, with two above them on either side severally resting on the center wheels and the ones on their respective sides. In the speeding-trucks the treads of the major parts of the rail-wheels by their axles are made to conform to the rails, with their flanges inside facing the rail, the hubs extending outwardly, while the two pairs of wheels above these are so spaced by their axles that their major parts are made to rest on the hubs of the wheels beneath them. The flanges on the upper wheels are on the outside of the periphery, facing the hubs of the wheels beneath and given sufficient play to accommodate themselves to the curvature of the track. The hubs of the upper wheels extend inwardly, forming the bearings of the driving-wheels of the locomotive. (See Fig. 2.)

No change in the gage of the driving-wheels is made necessary in the application and use of my device, as more clearly indicated by reference to Fig. 13.

The size of the speeding-truck wheels for both the upper and lower tiers and the distance apart that the track-wheels should be placed will always be properly determined by the diameters and wheel-base of the drivers in a given construction, the wheels being so arranged with the drivers in place upon them that the sum of the weights through their strains will be equally distributed upon the track-wheels; but in the case of the pony-truck, the weights coming upon it vertically through the two pairs of upper wheels, as in the case shown in Figs. 1 and 4, the center rail-wheels should be enough larger than those forward and back of them to insure one-third only of the weight borne by and imparted through the upper wheels to fall upon them, while the remainder would be carried by their fellows in front and rear in equal parts, and their several sizes in this proportion should be so regulated as to carry the boiler in a horizontal position.

Having determined the size of the wheels and their positions relatively, I will now proceed to describe my method of holding them in their proper places. Each of the rail-wheels have their axles passing through their centers and projecting outwardly beyond the wheels sufficiently to admit of there being placed about those of the two extreme base-wheels two pairs of parallel coupling-bars H^{14} H^{15}, one pair on either side, made in sec-

tions and coupled about the journals by straps H^{16}, bolted to the sections between shoulders and flanges to stay them in position far enough apart to admit of antifriction-rollers, two and a half or three times the diameter of the projecting axles, to be placed between them, leaving the inner bar sufficiently removed from the wheels to prevent any contact with the flanges of the wheels in the upper tier. These antifriction-rollers are journaled into the side bars, one H^{20} at or near either end directly over the centers of the projecting axles and resting upon them, so as to carry the side bars free from any vertical contact with the revolving axles or journals, while two other antifriction-rollers H^{21} H^{22} are similarly journaled at or near either end of the side bars and placed forward and back in contact with the same journals, though slightly below an imaginary line drawn through the centers of the contiguous wheels, to prevent the upper antifriction-rollers being raised off the journals upon which they are resting from any strain, reversed motion, or other cause. The peripheries of the antifriction-rollers should be case-hardened and of such breadth as to resist all strains with minimum abrasion. I form a plain spindle on the projecting ends of the axles D^3 of the center rail-wheels of all trucks, with shoulders a' far enough from the wheels in the speeding-trucks to prevent the side bars from coming in contact with the flanges of the wheels in the upper tiers. (See Figs. 14, 15, 16, and 17.) About these spindles I place open-ended brass or cast-steel sleeves a^2, lined inside with "Babbitt" or other soft metal or composition. The rims or rings of the sleeves should have sufficient metal to resist any strain that ever would be liable to come upon them in successfully resisting any tendency of the track-wheels separating along the rails, owing to the weight upon them, after being coupled about by the four sections of coupling side bars H^{14} H^{15}, two in each section, pulling in opposite directions about them. On the inner ends of these sleeves toward the wheels projecting flanges a^3 are formed as shoulders, against which the inner section of the side bars H^{14} H^{15} are made to rest, and the length of the sleeves, measuring from the shoulders of these flanges, should exceed by a half-inch or so the space from outside to outside of the side bars at the ends where they are fixed by the shoulders and grooves and flanges of the journals of the antifriction-rollers, so that the two parallel side bars may maintain their position buckled around the two ends of the sleeves. I have separating-rings a^4 tightly fitting the sleeves between the parallel sections of the side bars to stay them in position. The outer circumference of the projecting end of the sleeve beyond the line of the side bars I have threaded to receive a thin cap a^5, with heavy flanges, the insides of which are threaded so as to screw onto the projecting ends of the sleeves, the heavy flanges forming shoulders acting as stays for the outer line of the side bars in all cases. The caps also serve the purpose of excluding dust and preventing waste of oil or grease used for lubrication. This construction affords a vertical working hinge in the center of each truck, enabling the wheels to accommodate themselves freely to any irregularities of track, as shown more clearly by reference to Figs. 11 and 12.

Having determined the size and position and held in placement the three rail-wheels of the speeding-trucks, I will proceed to complete them by placing the major parts of the two upper pairs of wheels on the bearings formed by the hubs of the central rail-wheels, and those of the adjacent wheels on either side, giving them about the same play between the flanges and the hubs as is common between the flanges of car-wheels and rails. The extreme projections of the hubs of the rail-wheels of the speeding-trucks, by means of the wheels of the upper tier, form the base or "gage" of the locomotive-drivers when in position upon the track. This would be equivalent to widening the standard-gage roads thirty-three per cent., and I claim for the trucks a reduction of the oscillatory motion of the engine sixty-six per cent. To these considerations and the fact that by raising the locomotive and inserting the trucks the construction is made "bottom-heavy" rather than "top-heavy" and the conclusion must be irresistible that the danger of derailment from irregularities of track and high-speeding will be greatly lessened in the use of my device, as compared with the common construction. There are no projections of the axle or journals on the upper wheels of any of the trucks, as shown by Figs. 3, 5, 8, 12, and 13. In like manner the drivers of the locomotives are placed on the bearings formed by the hubs of the upper tiers of wheels projecting from the major portions of the truck-wheels inwardly, giving them the same play as between the upper and lower tiers of the truck-wheels. The positions of the wheels relatively, including the drivers, and the direction of their strains in placement, are such that no appliances other than the two parallel coupling side bars would be necessary to prevent displacements, while the engineer is using ordinary care in the management and control of the engine, except in cases of unavoidable accident; but to avoid the possibility of displacement of the wheels from carelessness or other causes, short of wreck, where anything may break, I couple the axles of all the wheels in contact in all the trucks, including those of the drivers, on both sides of their centers, with slack sectional links F′ lined inside about their bearings with Babbitt or other soft metal, and regulated in their lengths by turnbuckles F^2. These links are never in tension with the wheels in full bearing, but are sensitive in disturbances, ever ready and of sufficient strength for any emergency. As

stated, the flanges of the rail-wheels of the pony-truck may be on the inside of the periphery of the major part facing the rails, with hubs projecting inwardly, as shown in Figs. 18 and 19, or where the position of the cylinders of the locomotive are made to permit it, the hubs may be made to project outwardly and the axles of the upper tier of wheels lengthened and the wheels reversed, presenting the same general appearance as one of the speeding-trucks, as shown in Figs. 20 and 21. The rail-wheels of the pony-trucks are coupled together by side bars G, in principle substantially the same as those of the speeding-trucks, as shown in Figs. 1 and 11, the upper tier of wheels in the pony-truck having but one tread each, being plane surfaces, otherwise formed as ordinary car-wheels having no projecting journals. (See Figs. 5, 19, and 21. I construct and place around the axles of the two upper wheels in the pony-truck and as near either wheel as may be without interference hangers $E' E^2$ in pairs, so spaced as to admit of antifriction-rollers $E^3 E^4$ between them and journaled into them above and about the axles, as shown in Figs. 4, 5, 18, and 19. The antifriction-rollers, through their journals, support the hangers with any weight upon them in suspension while revolving about the axles as the wheels may turn. These hangers may be formed in sections and bolted together, so as to encircle the axles, but kept from contact with them by the antifriction-rollers E^3 E^4 E^5 E^6, as more clearly shown in Figs. 4, 5, 18, and 19. At the lower ends of the hangers $E' E^2$ "rests" are formed to receive heavy round pins $E^7 E^8$, with grooves and shoulders at the ends, which are placed enough below the axles to admit the ends of the heavy equalizing-beams $E^9 E^{10}$ to rest upon them and extend from one to the other of the opposite hangers on the respective axles without interference. The greatest depths of the equalizing-beams $E^9 E^{10}$ are at their centers and the opposite beams are connected by a cross-rod E^{11}, around which, at either end and near the equalizing-beams, are placed two check-rods $E^{12} E^{13}$, extending in opposite directions and with some slack coupled about the outer axles $H^{11} H^{13}$ of the rail-wheels $H^8 H^{10}$ to prevent collision with the hangers or rollers, the equalizing-beams $E^9 E^{10}$ forming the foundation upon which a platform is supported, to which the female truck center casting E^{14} is bolted, thus completing the truck. Safety-links F^3 will also be arranged about the axles of the pony-truck similar to the links F' on the speeding-trucks and for the same purpose.

By the employment of the antifriction-roller-supported hangers in the pony-trucks I claim a saving of at least three-fourths of the ordinary journal-friction. Slack chains K couple the trucks under each separate pair of driving-wheels at their ends as additional safeguard-binders.

To one skilled in mechanical construction the points where lubrication would be required in my device will be so apparent that I have thought it quite unnecessary in the drawings to show oil-cups or other devices therefor or to refer to them in my specifications.

Place a pair of driving-wheels upon one of my trucks and draw lines tangential to the driving-wheels through their points of contact with the wheels below and produce the lines to an intersection and you have inclined lines of V shape, giving two bearing-points for each driver with an aggregate bearing-surface of sixteen inches, while with the drivers on the horizontal rail with a single bearing-surface under each the aggregate bearing-surfaces could not exceed four inches, and hence with my trucks greater adhesion and durability of surfaces in contact is secured, and, if greater adhesion, more power may be applied without slipping the drivers, which is always the limit of the power of a locomotive.

In my construction I have three wheels on either rail in each truck and two on the top of these. More would be surplusage and less would be injudicious, involving the reconstruction of the entire locomotive. The flexibility of my trucks with the locomotive resting upon them is such that at least two-thirds of the concussion and oscillations from irregularities of track are absorbed by them, imparting an ease and steadiness of motion calculated to prolong the life of the engine, road-bed, and rails, while the multiplied distribution of the weight through the wheels and over the tracks is no small factor in their preservation as well.

Since in my construction there are three bearing-points on the rail under each driver, the chances of rail-breaking are reduced more than it is proposed the speed shall be increased, and so with flange and axle breaking, while the liability of spreading the track or jumping the rails is lessened in a greater degree by the diminished and evenly distributed weights along the rails and the action of the flanges on the upper tier of wheels in the trucks.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a locomotive of a speeding truck consisting of reversely flanged wheels having inwardly extended hubs running in contact with the treads of the locomotive drivers, and flanged traction wheels coupled by their axles and running upon the track and having outwardly extended hubs supporting the treads of said reversely flanged wheels, whereby the speed of the locomotive may be increased without altering its running gear or increasing the speed of the moving parts, substantially as and for the purpose hereinbefore set forth.

2. The combination with a locomotive of a speeding truck consisting of reversely flanged

wheels having inwardly extended hubs running in contact with the treads of the locomotive drivers, and flanged traction wheels having outwardly extended hubs supporting the treads of said reversely flanged wheels, and with the axles of said traction wheels coupled by independent side rods adapted to oscillate about the central axles whereby the speed of the locomotive may be increased without altering its running gear or increasing the speed of the moving parts and the requisite flexibility secured, substantially as and for the purpose set forth.

3. An attachment for locomotives consisting of flanged wheels running upon the track and with extended hubs, reversely flanged wheels supported upon said extended hubs, and with extended hubs supporting the treads of the traction wheels of the locomotive, and coupling binder rods connecting the axles of said flanged wheels, and with anti-friction rollers therein adapted to carry the end thrust and support said coupling binder rods, substantially as shown and described.

4. In an attachment to a locomotive, flanged wheels running upon the track and having extended hubs and coupled by their axles, flanged wheels running by their treads upon said extended hubs, and with hangers upon their axles, anti-friction rollers within said hangers, and supporting them upon said axles, and equalizing bars carried by said hangers and supporting the forward end of said locomotive, substantially as shown and described.

5. In an attachment to a locomotive, three sets of flanged wheels running upon the track, the central set being the largest in diameter, and with extended hubs and coupled by their axles, two sets of flanged wheels supported by their treads upon said extended hubs and with hangers upon their axles, anti-friction rollers within said hangers and supporting them upon said axles, and equalizing bars carried by said hangers and supporting the forward end of said locomotive, substantially as shown and described.

6. In an attachment to locomotives, a series of flanged wheels mounted upon axles and running upon the track and with extended hubs, coupling rods connecting the axles of said flanged wheels, reversely flanged wheels supported by their treads upon said extended hubs, and with extended hubs adapted to support the traction wheels of said locomotive, and safety rods or chains connecting the several axles loosely, substantially as shown and described.

7. In an attachment to locomotives, a series of sets of flanged wheels running upon the track and with extended hubs, one set of said wheels being larger in diameter than the others, coupling rods connecting the axles of said flanged wheels, reversely flanged wheels supported by their treads upon said extended hubs, and with reversely extended hubs supporting the traction wheels of the locomotive, substantially as shown and described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM JENNINGS HOLMAN.

In presence of—
WM. A. PETERSON,
C. N. WOODWARD.

(No Model.) 6 Sheets—Sheet 1.

W. J. HOLMAN.

LOCOMOTIVE SPEEDING TRUCK.

No. 597,557. Patented Jan. 18, 1898.

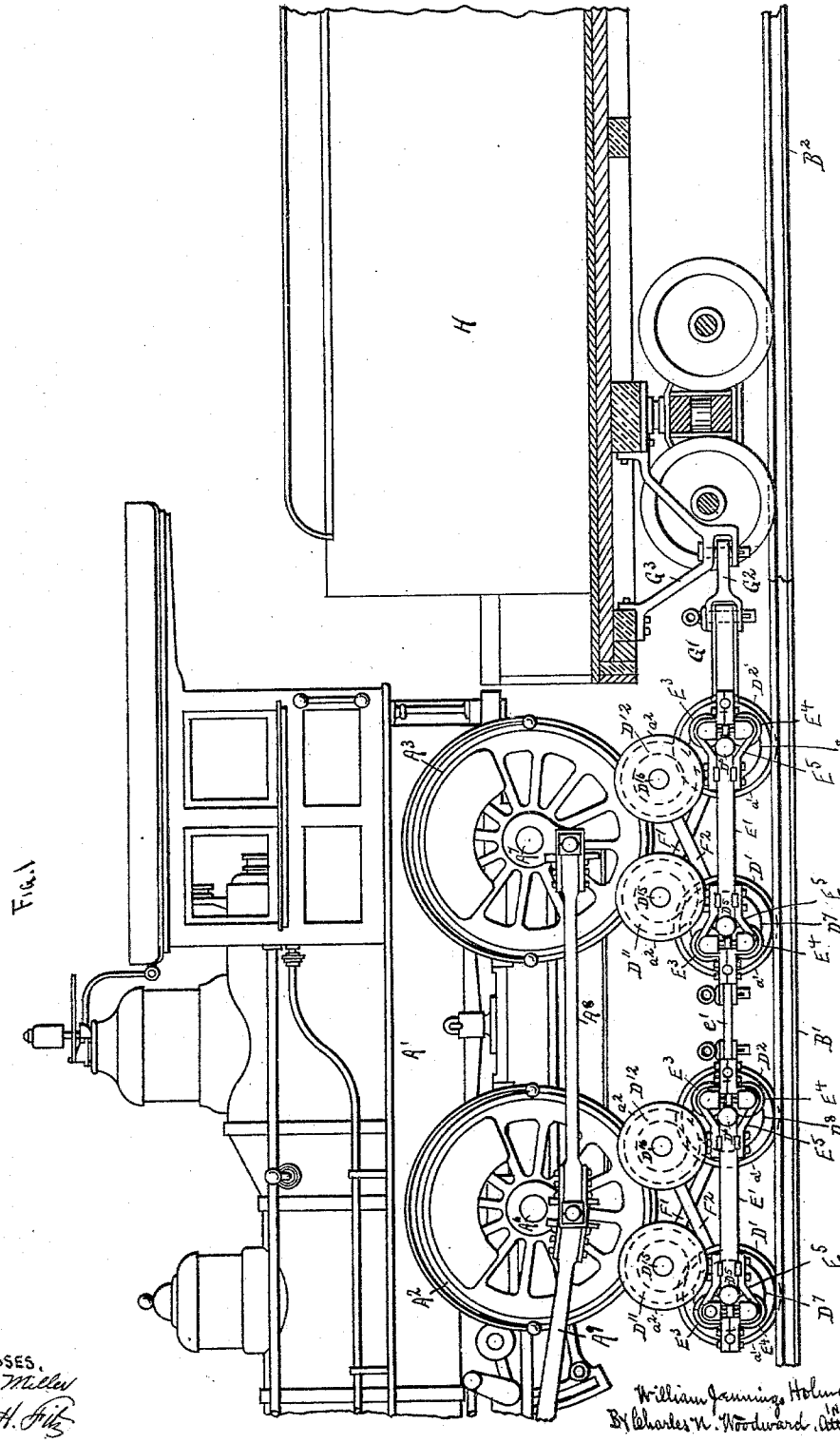

Fig. 1.

WITNESSES.
C. F. Miller
John H. Fitz

William Jennings Holman, INVENTOR.
By Charles W. Woodward, Atty.

(No Model.) 6 Sheets—Sheet 2.

W. J. HOLMAN.

LOCOMOTIVE SPEEDING TRUCK.

No. 597,557. Patented Jan. 18, 1898.

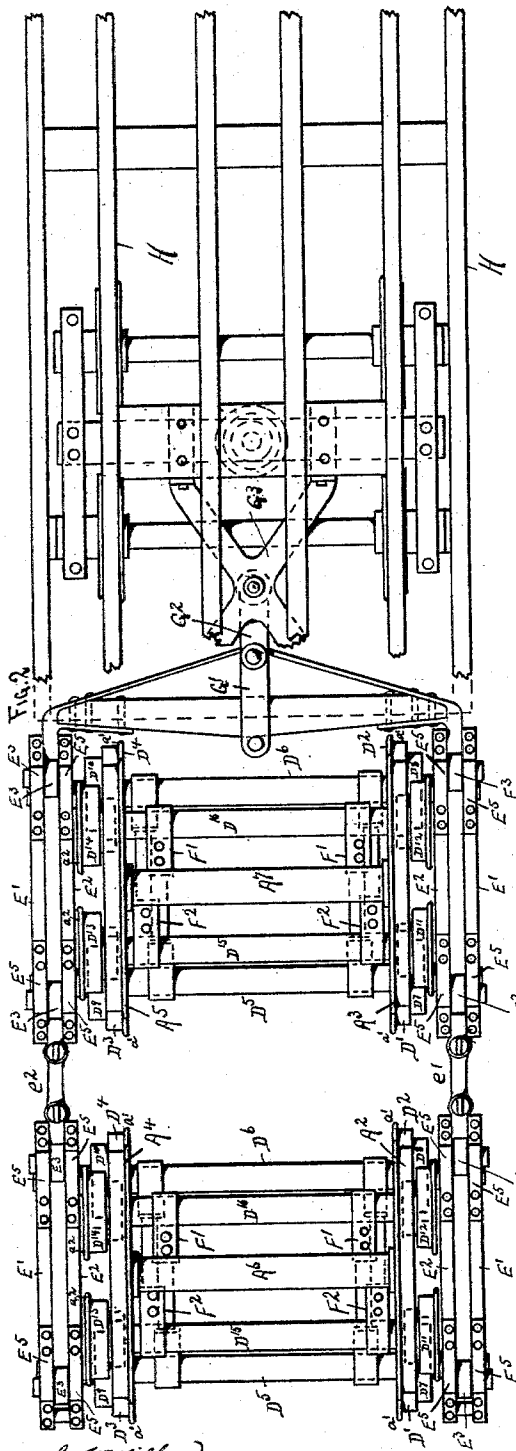

Fig. 2.

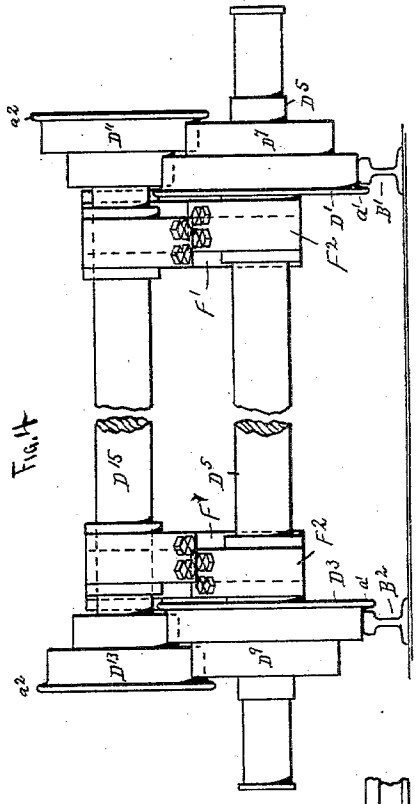

Fig. 4.

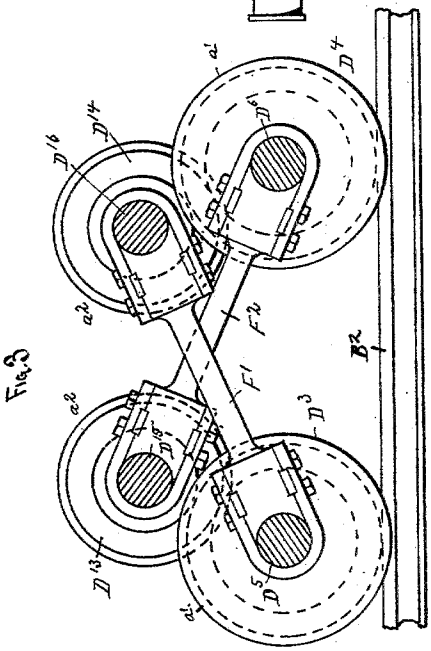

Fig. 3.

C. F. Miller
John H. Fitch
} WITNESSES.

William Jennings Holman, INVENTOR.
By Charles N. Woodward, Atty.

(No Model.) 6 Sheets—Sheet 3.

W. J. HOLMAN.

LOCOMOTIVE SPEEDING TRUCK.

No. 597,557. Patented Jan. 18, 1898.

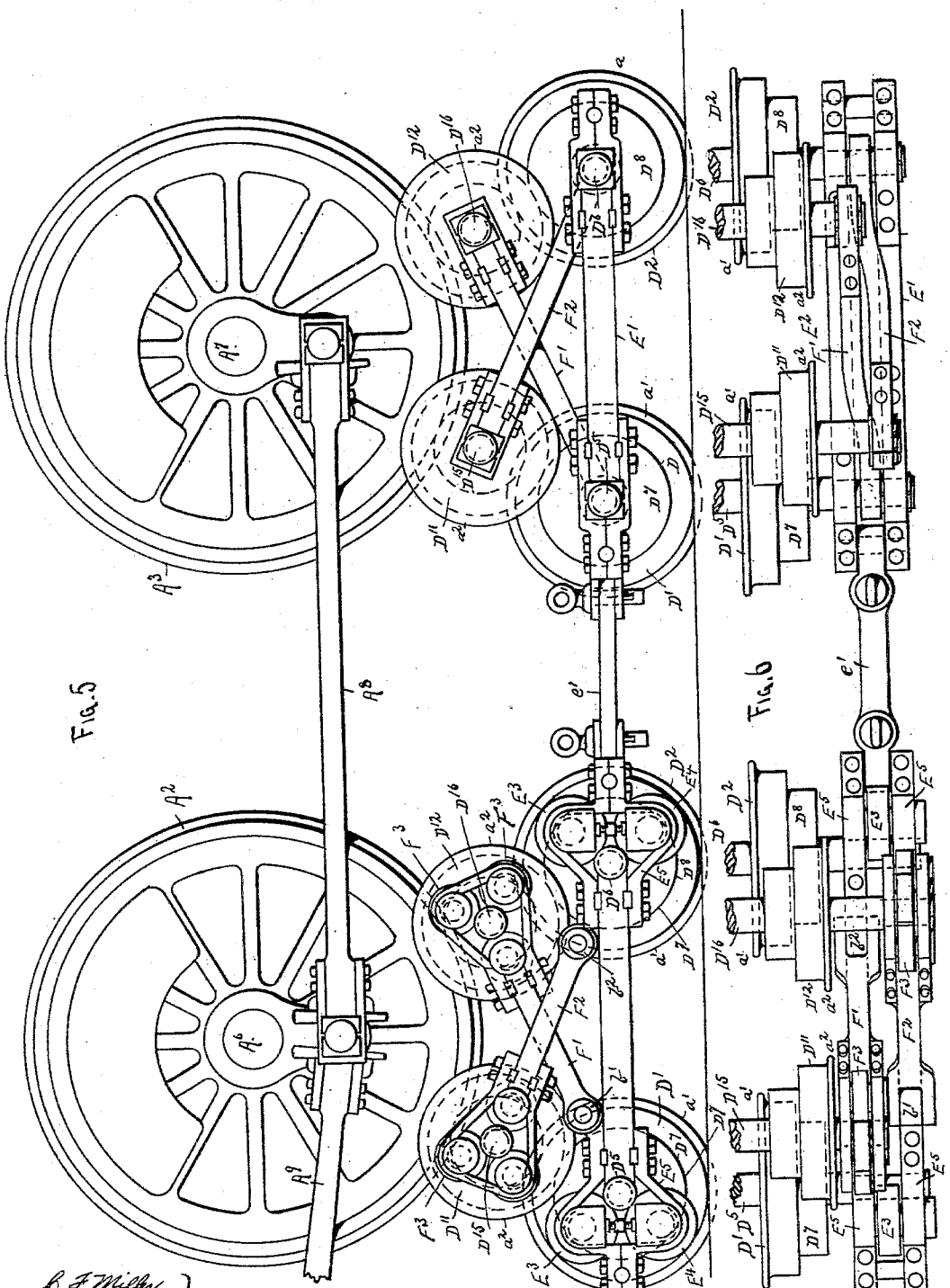

Fig. 5

Fig. 6

C. F. Miller
John H. Fitz } WITNESSES.

William Jennings Holman, By Charles N. Woodward Atty.

(No Model.) 6 Sheets—Sheet 4.

W. J. HOLMAN.

LOCOMOTIVE SPEEDING TRUCK.

No. 597,557. Patented Jan. 18, 1898.

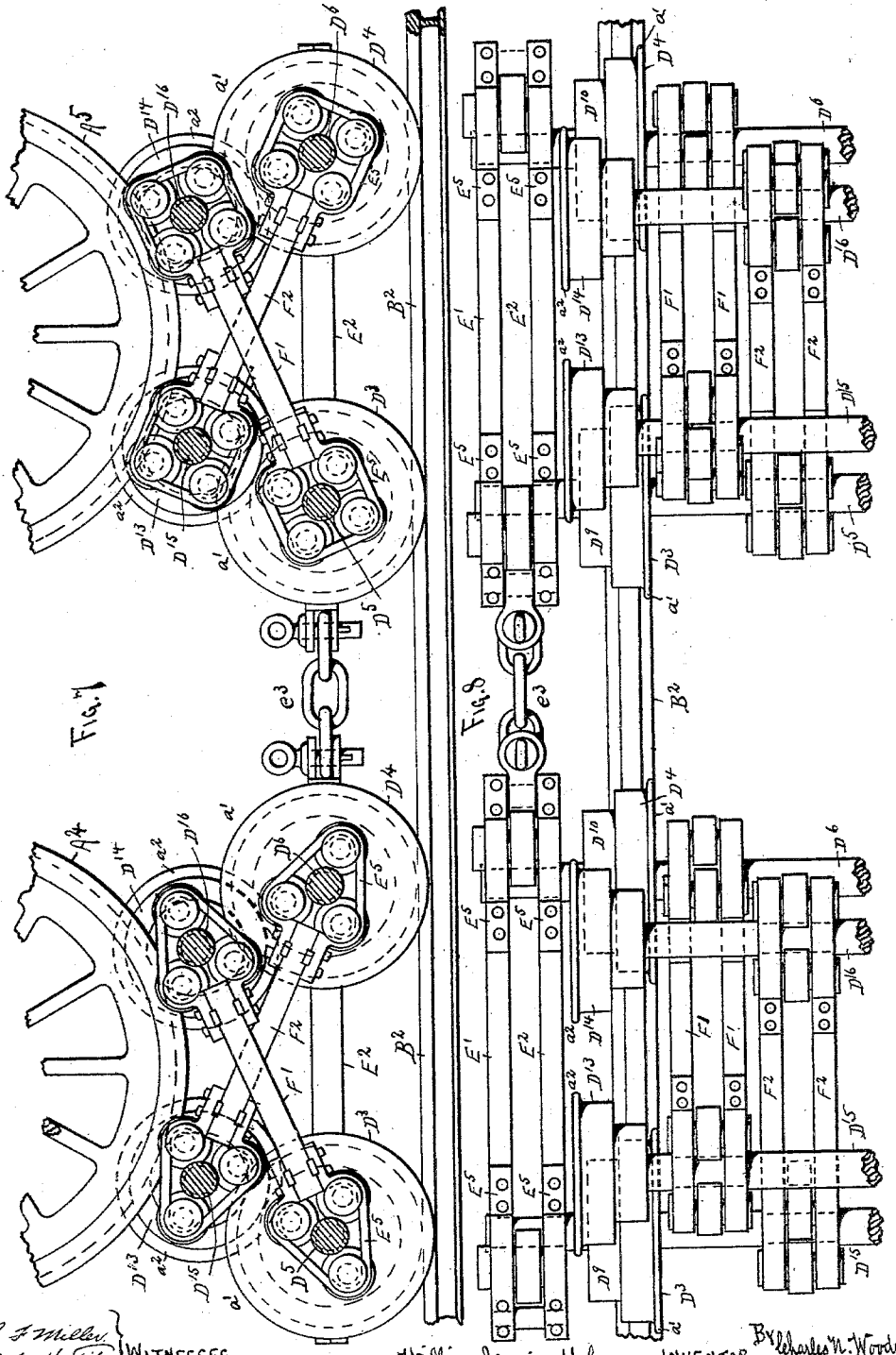

Fig. 1

Fig. 2

C. F. Miller
John H. Fitz
WITNESSES.

William Jennings Holman, INVENTOR.
By Charles N. Woodward
Atty

(No Model.) 6 Sheets—Sheet 5.

W. J. HOLMAN.

LOCOMOTIVE SPEEDING TRUCK.

No. 597,557. Patented Jan. 18, 1898.

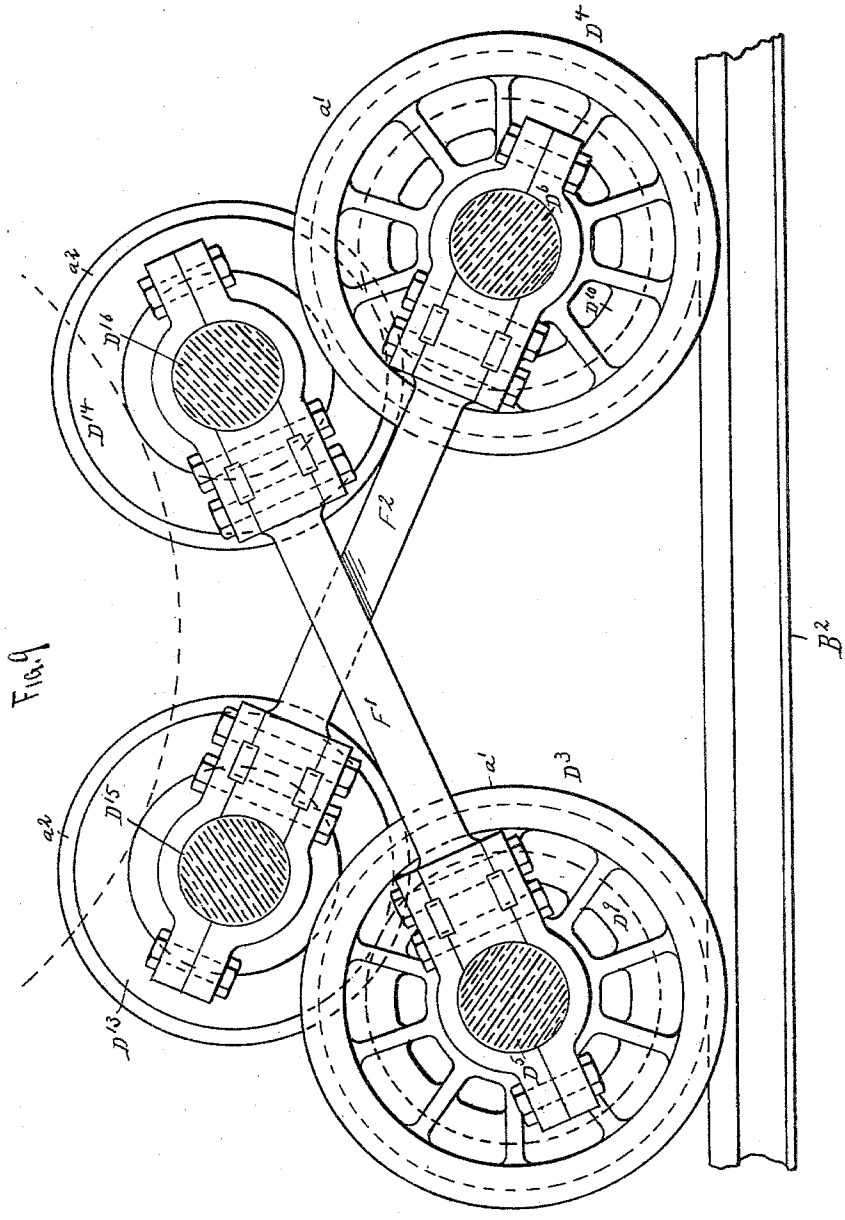

Fig. 1.

WITNESSES.
C. F. Miller.
John A. Fitz

William Jennings Holman. INVENTOR
By Charles N. Woodward, Atty.

(No Model.) 6 Sheets—Sheet 6.

W. J. HOLMAN.

LOCOMOTIVE SPEEDING TRUCK.

No. 597,557. Patented Jan. 18, 1898.

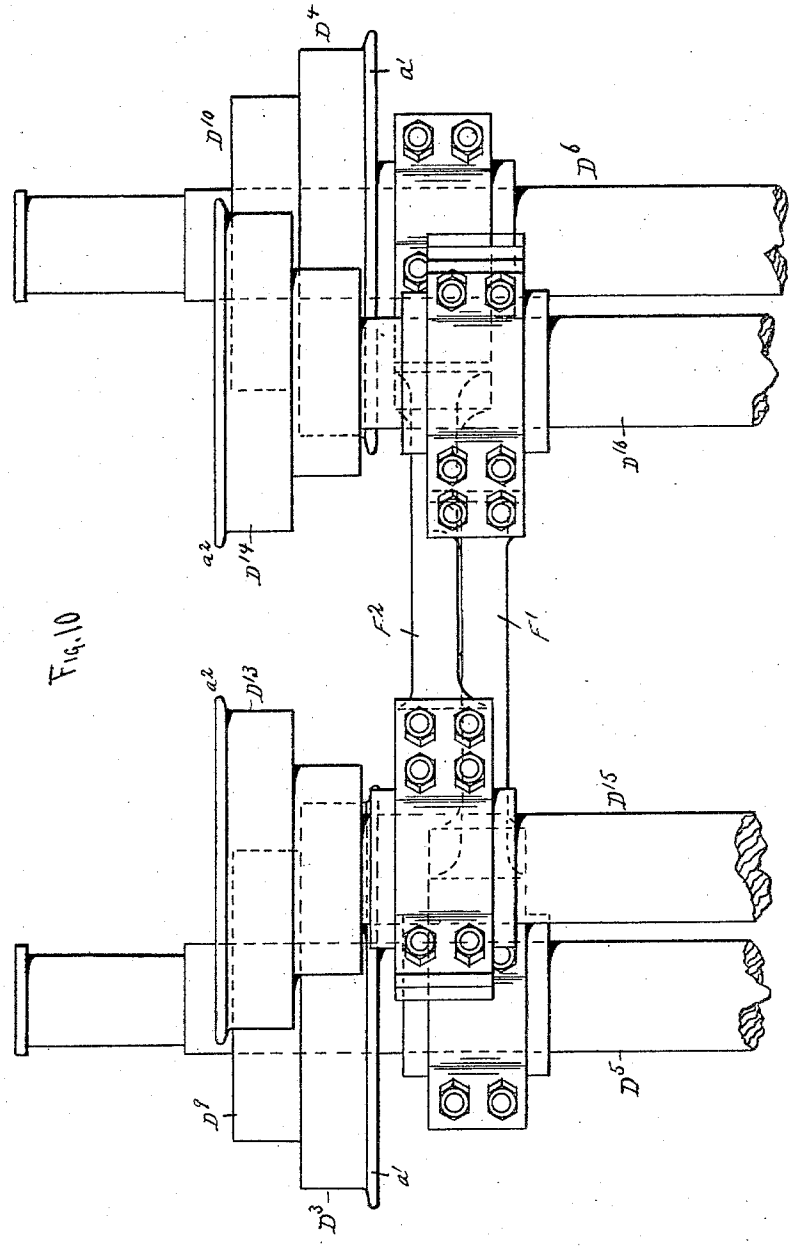

Fig. 10.

Witnesses
C. F. Miller
John H. Fitz

William Jennings Holman, Inventor
By Charles N. Woodward Attty.

UNITED STATES PATENT OFFICE.

WILLIAM JENNINGS HOLMAN, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO THE HOLMAN LOCOMOTIVE SPEEDING TRUCK COMPANY, OF IOWA.

LOCOMOTIVE SPEEDING-TRUCK.

SPECIFICATION forming part of Letters Patent No. 597,557, dated January 18, 1898.

Application filed May 7, 1897. Serial No. 635,587. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM JENNINGS HOLMAN, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have made certain new and useful Improvements in Locomotive Speeding-Trucks, of which the following is a specification.

This invention relates to trucks designed to be placed beneath the driving-wheels of locomotives to enable the speed upon the rails to be greatly increased without correspondingly increasing the piston speed of the locomotive; and the invention consists in the construction, combination, and arrangement of parts, as hereinafter shown and described, and specifically pointed out in the claims.

In this invention are comprised two pairs of traction-wheels, coupled by their axles, having inside flanges and outwardly-extended traction-hubs and running upon the rails by their larger treads, and two other pairs of traction-wheels having outside flanges and supported upon the extended hubs of the lower or rail wheels and with inwardly-extending traction-hubs supporting the treads of the main driving-wheels of the locomotive, the center lines of the axles of the upper tiers of wheels being preferably substantially in line between the center line of the main axles of the locomotive driving-wheels and the center line of the axles of the track-wheels and with the axles of the upper tiers of wheels coupled by diagonal coupling-rods to the axles or connecting mechanism of the track-wheels.

This invention further consists in coupling the train of cars to be drawn by the locomotive directly to the coupling mechanism of the speeding-trucks and relieving the locomotive from all work except that of actuating the friction-gearing of the speeding-trucks, whereby the tractive force is greatly increased and the strains equalized and the friction more evenly distributed.

In the drawings illustrating my invention, Figure 1 is a side elevation of a pair of the speeding-trucks with a portion of a locomotive mounted thereon and a portion of a tender, the latter being in longitudinal section. Fig. 2 is a plan view of the speeding-trucks and the framework of the tender with the main driving-wheels of the locomotive in position upon the trucks. Fig. 3 is an enlarged sectional side elevation, and Fig. 4 is an enlarged end elevation, of one of the speeding-trucks detached, illustrating one method of constructing the diagonal coupling-rods. Fig. 5 is an enlarged side elevation of a pair of the speeding-trucks with a pair of locomotive-drivers in place thereon; and Fig. 6 is an enlarged plan view of the speeding-trucks as shown in Fig. 5, illustrating a modification in the manner of constructing the axle-connecting rods. Figs. 7 and 8 are views similar to Figs. 5 and 6, illustrating still other modifications in the construction of the connecting-rods. Fig. 9 is an enlarged side view, and Fig. 10 is an enlarged plan view, of one of the speeding-trucks, showing still another modification in the construction of the diagonal connecting-rods.

One of the speeding-trucks will be employed under each pair of driving-wheels, and in the drawings I have shown an ordinary two-coupled locomotive; but it will of course be understood that when used under three or more coupled or "mogul" locomotives as many of the speeding-trucks will be employed as there are pairs of coupled driving-wheels.

In the drawings, by which the operation of my invention is illustrated, A′ represents the boiler and upper works of a locomotive, A^2 A^3 A^4 A^5 the main driving-wheels, A^6 A^7 the main axles, A^8 one of the parallel rods, and A^9 one of the connecting-rods, all these parts being of the usual construction, as in the operation of my invention no change is required in the construction of the locomotive.

As the two speeding-trucks shown are precisely alike, like letters of reference are used to indicate corresponding parts in both the trucks.

B′ B^2 represent the rails upon which the two pairs of wheels D′ D^2 D^3 D^4, composing the track-wheels of the truck, are adapted to run, being connected by axles D^5 D^6 and with inside flanges a', as shown. The axles D^5 D^6 are coupled, as shown, by side rods to retain them in their proper relative positions. These coupling-rods will preferably be arranged in pairs E′ E^2 and provided with antifriction-rollers E^3 E^4, secured in place by straps E^5, as shown in Figs. 1, 2, 5, 6, and 7, or with

ordinary strap connections, as shown at the right of Figs. 5 and 6, or in any other suitable manner, as circumstances may determine.

The lower or track wheels D' D^2 D^3 D^4 are each provided with outwardly-extended hubs D^7 D^8 D^9 D^{10}, having traction-surfaces and upon which the traction-surfaces of two pairs of upper wheels D^{11} D^{12} D^{13} D^{14} rest, each pair of the upper wheels being coupled by its own axle D^{15} D^{16} and having outside flanges a^2, so that they will not run off from the lower wheels. The center lines of the axles D^{15} D^{16} will come inside the center lines of the axles D^5 D^6 and will preferably be in line between the center lines of the axles D^5 D^6 and the center line of the main axles A^4 A^5 of the locomotive-drivers, so that all the strains will come directly through the centers of all the wheels and their axles. The axles D^{15} D^{16} are coupled by diagonal coupling-rods F' F^2 either to the axles D^5 D^6, as shown in all the figures of the drawings, or to the side rods or couplings of the lower or track wheels, as shown at b' b^2 at the left of Figs. 5 and 6. The diagonal coupling-rods F' F^2 will preferably be provided with antifriction-rollers F^3 where they embrace the axles, so as to reduce the friction to a minimum and largely relieve the coupling-rods from the severe strains to which they would be otherwise subjected.

I have shown the antifriction-rollers arranged in various ways in the different figures of the drawings, and have also shown the diagonal connecting-rods arranged both outside and inside the friction-gearing, as I do not wish to be limited to any specific method of arranging them.

The two sets of speeding-trucks are coupled by their side rods by swiveled coupling-rods e' e^2, as shown in Figs. 1, 2, 5, and 6, or chains e^3, strained to a tension, may be employed, as in Figs. 7 and 8, the end sought being to provide a coupling which, while holding the trucks at the same distance apart, will yet leave sufficient lateral flexibility to allow for the change of position in running around curves or over uneven sections of the tracks.

The train to be drawn by the locomotive will be connected to the speeding-trucks, thus leaving the locomotive free to actuate the friction-gearing by which the necessary motion is imparted.

The coupling is shown made to the side rods of the rear speeding-truck by a coupling-beam G', as shown in Figs. 1 and 2, and from thence by a coupling-bar G^2 to a bracket or hanger G^3, attached to the frame of the tender H, and from thence the remainder of the train will be coupled in the ordinary manner. By this arrangement the coupling is made at the lowest possible point or to the "initial" lever of the series running through the axial lines of the friction-gears to the drive-wheels of the locomotive, thereby greatly increasing the tractive force and equalizing the strains throughout all the wheels composing the trucks. The locomotive having no horizontal strains as when employed in the ordinary manner, the pressure is downward only, and this downward pressure being equally distributed upon all the various wheels composing the speeding-trucks the wear is thereby equalized and the strains uniformly distributed.

Having thus described my invention, what I claim as new is—

1. In a locomotive speeding-truck, two pairs of flanged track-wheels upon axles and running upon the rails and having extended hubs, reversely-flanged intermediate wheels upon axles and running by their treads upon the extended hubs of said track-wheels and with extended hubs running in contact with the treads of the locomotive-drivers, diagonal rods connecting the axle of one pair of said flanged track-wheels with the axle of the opposite pair of the intermediate flanged bearing-wheels, and diagonal rods connecting the axle of the other pair of said flanged track-wheels with the axle of the other opposite pair of intermediate flanged bearing-wheels, whereby the intermediate wheels are supported in position by said diagonal connecting-rods, substantially as set forth.

2. In a locomotive speeding-truck, two pairs of flanged track-wheels running upon the rails and having extended hubs and coupled by their axles, reversely-flanged intermediate wheels upon axles and running by their treads upon the extended hubs of said track-wheels and with extended hubs running in contact with the treads of the locomotive-drivers, diagonal rods connecting the axle of one pair of said flanged track-wheels with the axle of the opposite pair of said intermediate flanged bearing-wheels, and diagonal rods connecting the axle of the other pair of said flanged track-wheels with the axle of the other opposite pair of said intermediate flanged bearing-wheels, and antifriction-rollers carried by said diagonal rods and adapted to carry the end thrust, and support said connecting-rods and flanged wheels, substantially as shown and described.

3. In a locomotive speeding-truck, two pairs of flanged track-wheels running upon the rails and having extended hubs and coupled by their axles, reversely-flanged intermediate wheels upon axles, and running by their treads upon the extended hubs of said track-wheels, and with extended hubs running in contact with the treads of the locomotive-drivers, and with the center lines of the axles of said intermediate wheels in line with the center line of the axles of said locomotive-drivers and of the axles of said track-wheel, diagonal rods connecting the axles of one pair of said flanged track-wheels with the axle of the opposite pair of said intermediate flanged bearing-wheels, and diagonal rods connecting the axles of the other pair of said flanged track-wheels with the axle of the other opposite pair of intermediate flanged bearing-wheels, whereby the intermediate wheels are supported in position

by said diagonal connecting-rods, and with the strains all coming in line through the axles, substantially as shown and described.

4. In a locomotive speeding-truck, flanged track-wheels running upon the rails and having extended hubs, reversely-flanged wheels running upon the extended hubs of said track-wheels and having extended hubs running in contact with the treads of the locomotive-drivers, coupling-rods connecting the axles of said wheels, and means whereby said speeding-truck may be coupled to the train to be moved by said locomotive and the locomotive thereby relieved from all work except that of actuating the wheels composing the speeding-truck, and the strains equalized and uniformly distributed, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM JENNINGS HOLMAN.

In presence of—

C. N. WOODWARD,

LEWIS D. MANN.

No. 758,651. PATENTED MAY 3, 1904.

W. J. HOLMAN.

COMPOUND THREE PART RAIL FOR RAILWAYS.

APPLICATION FILED MAY 22, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

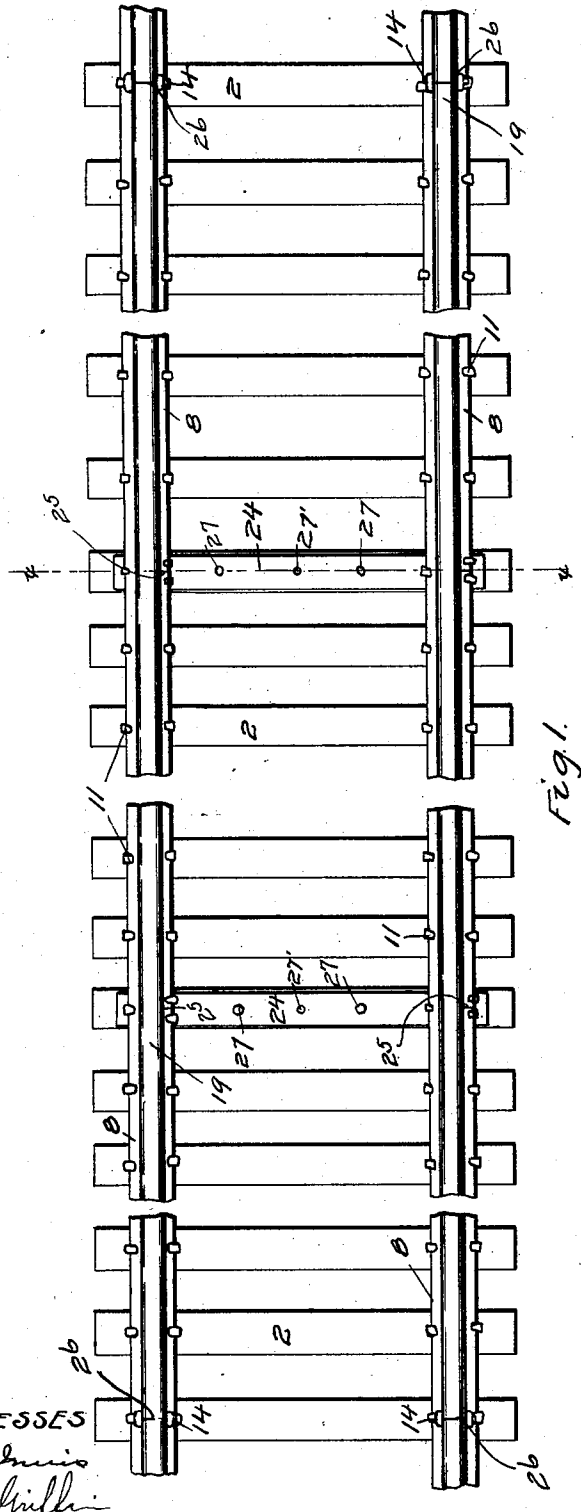

Fig. 1.

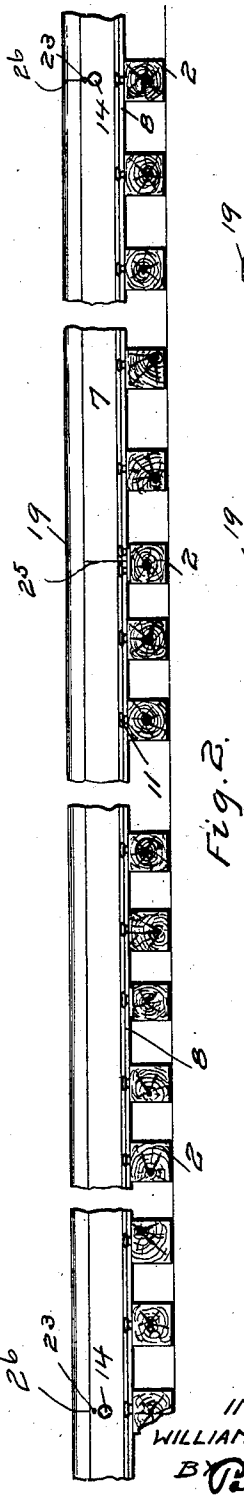

Fig. 2.

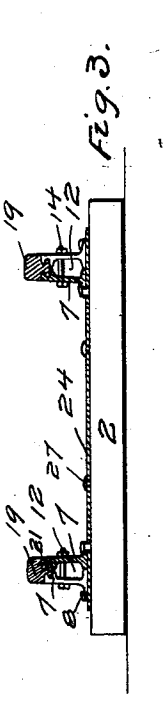

Fig. 3.

WITNESSES

M. McInnis

S. V. Griffin

INVENTOR

WILLIAM J. HOLMAN.

BY Paul & Paul

HIS ATTORNEYS

No. 758,651. PATENTED MAY 3, 1904.

W. J. HOLMAN.

COMPOUND THREE PART RAIL FOR RAILWAYS.

APPLICATION FILED MAY 22, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

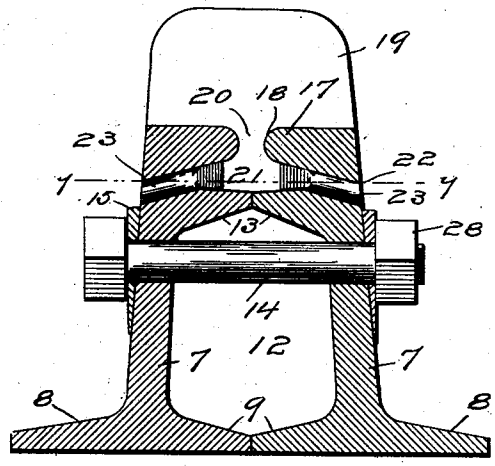

Fig. 4

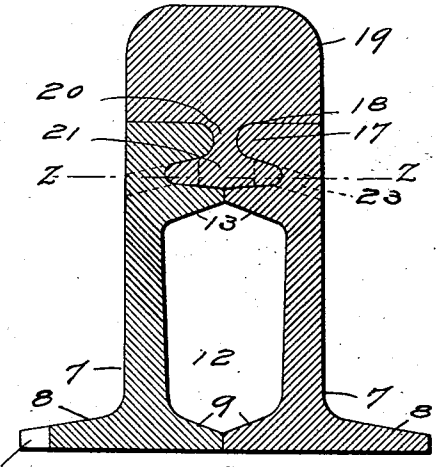

Fig. 5.

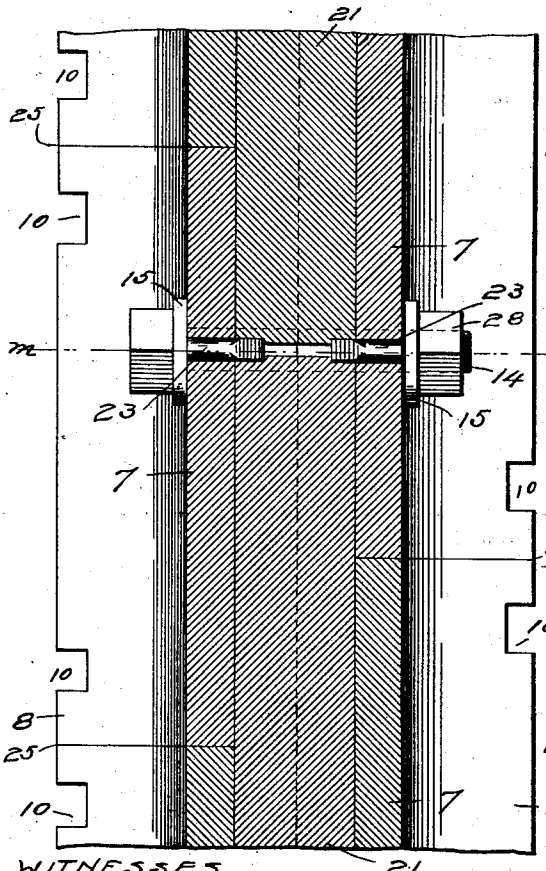

Fig. 6.

Fig. 8

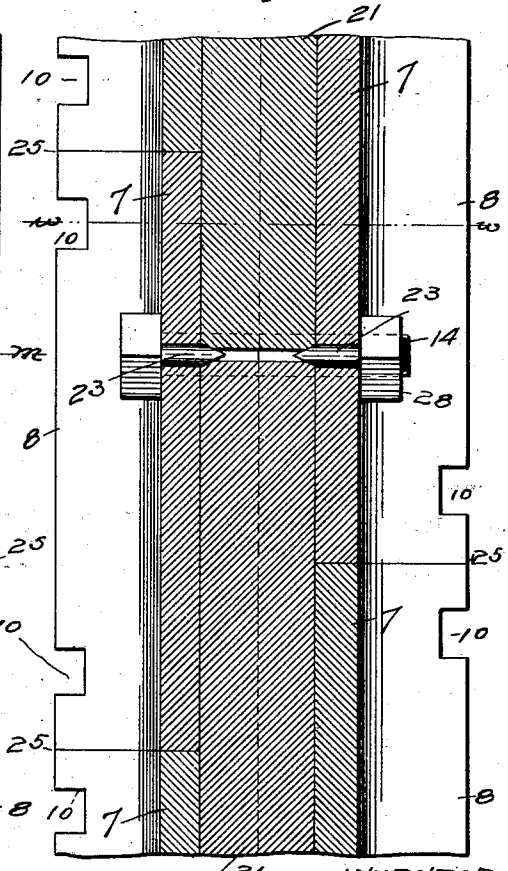

Fig. 7

WITNESSES

M M Lewis

S. V. Griffin

INVENTOR

WILLIAM J. HOLMAN

BY Paul & Paul.

HIS ATTORNEYS

No. 758,651. Patented May 3, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM J. HOLMAN, OF MINNEAPOLIS, MINNESOTA.

COMPOUND THREE-PART RAIL FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 758,651, dated May 3, 1904.

Application filed May 22, 1903. Serial No. 158,227. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. HOLMAN, of Minneapolis, county of Hennepin, State of Minnesota, have invented certain new and useful Improvements in Compound Three-Part Rails for Railways, of which the following is a specification.

My invention relates to three-part rails, and is designed as an improvement over the rail shown and described in Letters Patent of the United States issued to me December 9, 1879, No. 222,498.

The object of my invention is to provide a three-part rail requiring only two forms in the finishing-rolls to turn out complete the three parts constituting the rail.

A further object is also to provide a three-part rail which will more perfectly exclude moisture from and provide better drainage for the inner cavity of the rail.

A further object is to provide a rail capable of effectually resisting heavy lateral strains incident to high speed in moving trains over curves or in passing rapidly over sections of track where there is more or less variation in the level of the opposite points of the two track-rails, all without increasing materially the cost of the rails.

A further object is to provide a rail which will never admit of any variation in the exact alinement of abutting sections at the joints of parts directly in contact with passing wheel treads and flanges that would be calculated to endanger rolling-stock.

A further object is to provide means for enabling the trackmen to fix and securely maintain the exact gage of the rails throughout the roadway in the process of laying track without the use of the ordinary gage-bar or other similar devices.

A further object is to provide an enlarged chamber within the rails wherein insulated wires may be laid for transmission of messages or electric-light currents and be more convenient of access and removed from all danger of damage, while much of the expense incident to sustaining the wires on poles and the millions it would cost to place them under ground is entirely avoided.

Other objects of the invention will appear from the following detailed description.

The invention consists generally in various constructions and combinations, all as hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a plan view of a section of railroad-track embodying my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a section on the line $x\ x$ of Fig. 1. Fig. 4 is a cross-section on the line $m\ m$ of Fig. 6. Fig. 5 is a similar view on the line $w\ w$ of Fig. 7. Fig. 6 is a horizontal section on the line $y\ y$ of Fig. 4. Fig. 7 is a similar view on the line $z\ z$ of Fig. 5. Fig. 8 is a detail view of the stop-pin.

In the accompanying drawings similar figures refer to similar parts throughout the several views.

2 designates cross-ties on which the rails are laid. 24 represent gage and tie plates resting upon and spiked to the upper surfaces of some of the cross-ties.

7 designates the side walls of the rail having base-flanges 8 and 9.

19 is the key-bar of the rail, and 20 is a shank connecting the key-bar with its flanged pendant 21.

25 designates joints in the side-wall sections at abutting ends, and 26 represents joints between key-bar sections.

14 is a screw-bolt, headed, and 28 represents the screw-bolt nuts.

15 designates beveled washers used where the side walls are beveled.

27 designates perforations in the metallic gage and tie plates to permit spiking to the cross-ties.

10 is a recess in the side rail-flanges to provide for expansion and contraction and to prevent crawling of the rail on the ties.

12 is the rail-cavity, and 23 represents the stop-pins.

27′ designates the holes for the color-pole socket.

The side walls 7 are of any desired thickness and are made to rise from their horizontal bases, of any desired width, formed of

outwardly-extending and inwardly-abutting flanges, to any given height perpendicularly or at any inwardly-inclining angles desired, limited at their tops by a horizontal transverse line intersected and cut by the springing lines of the shank 20 of the equiformed central pendant 21 of the key-bar 19.

To secure the required bearing-in support of the key-bar and the loads passing over it and to construct while accomplishing this object a perfect lock for the key-bar, I broaden the top of the side walls by the formation of pairs of inwardly-extending flanges 13 and 17, the upper surfaces of which are but extensions of the line defining the height of the side walls 7; but it will be observed that in this construction the upper pairs of the corrugated flanges are shorter than the pair beneath them. This would be made more noticeable by placing two sections of the side walls opposite each other resting on their bases and facing inwardly and bringing them together. Here it will be seen that while the inner edges of the lower flanges of the opposite side walls abut each other and are in close contact throughout their length the space between the most extended inner portions 18 of the upper pair of flanges 17 is quite sufficient for the passage of any shank 20 required to safely connect the key-bar 19 with its equiformed flanged pendant 21 or, if not, should be made so.

The under plane surfaces of the key-bar on either side of its pendant are made in conformity with and so as to be placed upon the horizontal plane upper surfaces of the side walls when in position in the track ready for spiking to the cross-ties. While in this position the contour of the key-bar pendant will be coinciding at all points with the interior boundary-lines of the flanges of the side walls, this combination of lock and key at the upper extremeties of the side walls suggesting the name "lock and key rail," while a new feature will add nothing to the cost of rail manufacture, but will greatly increase the weight-supporting and lurch-resisting capacity of the rails of any given compound or quantity. The key-bar may be of any desired depth above the top of the side walls and any suitable width, its length in sections corresponding approximately to the length of the side-wall parts of the rail as a means of expediting and cheapening track-laying.

The key-bar 19 being the only part of the rail abraded by the passing wheels and their flanges, it is the only part exposed to wear, while the side walls 7, under the oil waste from journal-boxing, will endure indefinitely. Whatever the general uniform length of the different parts of the rail, the space between any two contiguous joints should be one-third of its length. The side walls of the rail on one side are arranged to lap or break joints with the corresponding joints on the other side of the rail and also with the joints of the cap-bars. In the same rail no two joints are allowed at the same point, and much less three, except at switches or the end of the track. This provision is for effectually obviating "low joints."

As an auxiliary to the "lock and key" in stiffening and giving rigidity to the rail I use a screw-bolt 14 at the abutting ends of each key-bar 19 throughout the roadway, which bolt is made to pass through the two side walls just below the fillets of the inwardly-inclining flanges 13 forming the roof of the rail-cavity 12, where the side walls are continuous. Bolted here the abutting ends of the key-bars must ever be in perfect alinement.

In my construction I have punched out of the side of the outwardly-extending base-flanges 8 at or near either end of each separate section of the side walls a rectangular chip 10, forming a recess of suitable width and depth to allow rail-spikes to be so driven as to give freedom in the contraction and expansion of the parts, but prevent "rail-crawling" through the action of moving trains over the roadway.

I have one or both side walls perforated for the stop-pins 23 at a point or points opposite the joints in the key-bars 19, from which joints the holes extend outwardly and downwardly through the wall where they would be cut centrally by a line defining the center of the groove filled by the extended flanges of the key-bar pendant when in position. The stop-pins 23 have square heads larger than their round stems, are put through these holes from the inside before the three parts of the rail are permanently placed together and spiked to the cross-ties, the points of the stop-pins being flush with the outside of the side walls. This arrangement of the pins will prevent any disturbance or removal of them by anybody, except by tearing up the track.

The extreme corners and ends of the extended flanges of the key-bar pendant are so shaped (see Figs. 6 and 7) as to nicely fit the heads of the stop-pins when in position and when the key-bar sections are fully expanded, with their ends in contact. In contracting these fitting surfaces would be drawn away from the stop-pins probably one-eighth of an inch on each side of the stop-pins at each end of the bar in the lowest temperature, (if sections of rails were thirty feet long,) as reliable tests have shown.

The metal gage and tie plates I use for establishing and maintaining the exact gage of the track-rails may be of any metal, of any width, thickness, or length best suited to accomplish the object in view. While not necessarily as long as the cross-ties, they should

be long enough to spike to them between the rails and to extend with them under and beyond the rails and their outermost flanges (when in position and in gage in the track) sufficiently to give the required metal backing behind or beyond the spikes driven through them and into the ties beneath to define and maintain the extreme width beyond which the rails cannot spread.

Knowing that the spike on the opposite side of the rail from a side-wall joint will have no recess in the flange opposite the joint and knowing the gage of the road, the width of the crown of the key-bar, the base of the rail between the extreme flange projections, the exact dimensions of the body of the rail-spike, its width and thickness, and having determined the depth of the chip or recess in the flange, the amount of metal between the recess and the end of the side-wall sections, this determining the amount of extreme difference between the expansion and contraction of the bar, the proper width of the recess for the spikes can be readily calculated. When so calculated and wrought, by assuming the proper ppsition for the spike-holes through the gage-plate to be in the extreme corners of the recesses in the flanges of the abutting walls farthest removed from the joint between them the holes can be so punched through the gage and tie plates that when the rails are placed with their bases on the ties and tie-plates between the two perforations for rail-spikes on the outside of the rail at one end of the said plates and one on the inside and the two perforations on the inside and one on the outside at the other end of said plates and the hook-headed (common) rail-spikes are driven through said perforations and into the ties beneath the plates with the hooks facing the rail two lines of rails are provided which will be absolutely parallel and of perfect gage.

It will be observed from the foregoing that the gage and tie plates are so perforated that by alternately reversing their ends they will meet perfectly all requirements wherever used under abutting side walls. If the plates are used under joints of key-bars, which would equally space the gage-plates throughout the roadway, the perforations should be the same at both ends of the plates—that is, with a single spike on either side of the rail, there being no recess in the flanges of the side walls at such points. This feature of the rail is important as not tending to create too many centers for contraction and expansion of the different parts composing the rail.

Having described the manner of constructing the different parts of my lock and key rail and the appurtenances and fixtures thereto pertaining, I will now proceed to give such a description of the manner of assembling the parts to form a track that will enable any one skilled in the art of track-laying to build with economy and expedition a railway employing the compound three-part lock and key rail.

A perfect rail can never make a perfect roadway unless the other conditions entering into its make-up are also perfect. Still any conditions making a track passable with the common solid T-rail could be made to answer quite as well or indeed much better where my lock and key rail is used. I shall therefore assume that the ordinary road-bed and regulation cross-ties or sleepers are used. The ties may be distributed in the ordinary way over the graded surface and spaced according to their dimensions and required service. When tie and gage plates are thought to be necessary under the joints of the key-bars, the ties should be so spaced as to have one occurring at every one-third of the sectional length of the parts of the rail. If these parts were thirty feet long, every ten feet a joint would occur in some one of the parts. Having properly distributed the cross-ties, the metal gage and tie plates should be nailed or spiked to every tie coming under joints in any of the constituent parts of the body of the rail, usually to every fifth or sixth tie. This would be done, preferably, by driving flat-headed nails or spikes through the two perforations nearest the center of the plates between the rails, the center hole 27′ in the plates being made and preserved for the point of the color-pole socket used (in connection with the transit) in lining up the track. The value of this device in defining, maintaining, and re-establishing the center line of the railway will be worth many times its cost as a labor-saving appliance to the civil engineer in charge.

If it is desired to start the track with even-ended bars, cut two of the side-wall sections of equal length smoothly and at right angles into two parts, the shorter of which in both cases being just one-half the length of the longer parts. Before cutting place the two bars side by side facing in the same direction and cut from the same ends, so that the parts side by side will be of the same length. Start the track by placing the two longest pieces with their cut ends on the starting-tie, one constituting the first section of the outside wall of one of the rails, while the other will form the initial section of the inside wall of the other rail. From this starting-point these two lines may be extended with full-length sections and should be kept five hundred or one thousand feet ahead of the men handling the other component parts of the rails. In placing these side-wall bars in line with the perforations at each end of gage-plates the abutting ends are spaced from each other or placed close together, according to the temperature at the time of laying them. The side walls being laid, a force of men will start with

the key-bar sections, commencing with full-length bars, the under surface of which on one side of each being so placed on the tops of the side walls that the starting ends and side surfaces of the different sections will be flush with each other, respectively, while the flanges of the key-bar pendant on the contacting surfaces above them will conform nicely to the outlines of the flanges of the side walls sustaining them. Having placed one of the key-bar sections in proper position on each of the two side walls, the proper location of the holes in the side walls for the bolts and stop-pins at the forward end of each key-bar can be readily determined and easily marked. As each succeeding key-bar is placed in position and properly spaced these points will be similarly located and marked throughout the roadway, so that the drillers following will have no trouble in making the holes. Having now one side wall and key-bar in position for each of the two rails, start the remaining side wall with the two shorter pieces of the bars first cut. Place these one beside each rail started, with their bases resting on the cross-ties and their cut ends on the starting-tie and near the end of the rails. As this line of work proceeds complete the drilling for bolts and stop-pins by placing them opposite those in the contiguous walls. Then insert the stop-pins with heads inside, draw and bolt the side walls together, spike them to the ties, and the work is done.

I claim as my invention—

1. A compound rail, comprising side walls having base-flanges, inwardly-turned flanges 13 provided on said walls and having abutting edges, flanges 17 also provided on said walls and spaced from each other, there being recesses in said walls between said flanges 13 and 17, a cap-bar arranged to rest upon said flanges 17 and having a neck to pass between the same and a head to enter the grooves between said flanges 13 and 17, and bolts passing through said side bars for locking them and said cap-bar together.

2. A compound rail, comprising side walls having base-flanges, bolts passing through said walls and securing them together, inwardly-turned flanges provided on said walls near the top of the same, a cap-bar having a flanged pendant on its under side adapted to pass between said inwardly-turned flanges, said walls having downwardly-inclined holes at the ends of said cap-bars, and pins fitting within said holes and arranged to engage the ends of said bars.

3. A compound rail, comprising inwardly-inclined side walls having base-flanges, bolts passing through said walls and securing them together, flanges provided on said walls and forming a longitudinal socket at the top of the same, and a cap-bar having a flanged pendant on its under side arranged to enter said socket and be locked therein when said bolts are tightened.

4. A compound rail, comprising side bars having the base-flanges 8 and 9, the edges of the latter abutting each other and their upper surfaces being inclined, webs arranged on said base-flanges, flanges 13 provided near the top of said webs and having abutting edges between which and said base-flanges 9 an inclosed chamber is formed, bolts passing through said webs and securing them together, and a cap-bar arranged upon said webs.

5. A compound rail, comprising side walls having outwardly and inwardly projecting base-flanges, the former provided with notches in their edges to receive the spikes, inwardly-turned flanges 13 near the top of said walls, bolts for locking said walls together, flanges 17 provided on said walls and having their edges spaced from one another, said walls being provided with longitudinal recesses between said flanges 13 and 17 and with downwardly-inclined holes leading from said recesses, pins arranged in said holes, and a cap-bar having a depending flanged pendant adapted to enter said recesses and engage said pins.

6. A compound rail, comprising side walls having laterally-extending base-flanges, the inner base-flanges of said walls having abutting edges, inwardly-extending flanges arranged in pairs one above another at the top of said walls, the lower pair of flanges forming the roof of the chamber or cavity between said walls and having abutting edges, and the edges of the upper pair of flanges being spaced from one another, a cap-bar having a flanged pendant depending from its under side and adapted to fit within recesses provided in said side walls between said pairs of flanges, and bolts passing through said side walls and binding them and said cap-bar together.

7. A compound rail, comprising inwardly-inclined side walls having inwardly and outwardly extending base-flanges, inwardly-extending flanges provided on the upper part of said walls, a chamber being formed between said walls and inclosed thereby and by said flanges and wherein wires may be laid, a cap-bar supported on said walls, and bolts passing through said walls and securing them together.

8. A compound rail, comprising inwardly-inclined side walls having base-flanges arranged in pairs one above another, inwardly-extending flanges on said side walls near the top thereof, a cap-bar having a flanged pendant arranged to interlock with the flanges at the top of said side walls, and bolts connecting said side walls and binding them and said cap-bar together.

9. A compound rail, comprising side walls having base-flanges, inwardly-extending flanges arranged in pairs one above another on said side walls near the upper edges thereof, a cap-bar having a flanged pendant ar-

ranged to interlock with said inwardly-extending flanges, and means for binding said side walls and cap-bar together.

10. A compound rail, comprising side walls having base-flanges, inwardly-extending flanges on said walls near the upper edges thereof, a cap-bar having a flanged pendant arranged to interlock with said inwardly-extending flanges, means for locking said cap-bars against longitudinal movement, and means for binding said walls and cap-bar together.

In witness whereof I have hereunto set my hand this 15th day of May, 1903.

WILLIAM J. HOLMAN.

In presence of—

RICHARD PAUL,

S. N. GRIFFIN.