No. 772,736. PATENTED OCT. 18, 1904.

J. H. MORGAN.

SWITCHING OR CROSSOVER DEVICE FOR TRACTION RACK RAIL SYSTEMS.

APPLICATION FILED MAY 6, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

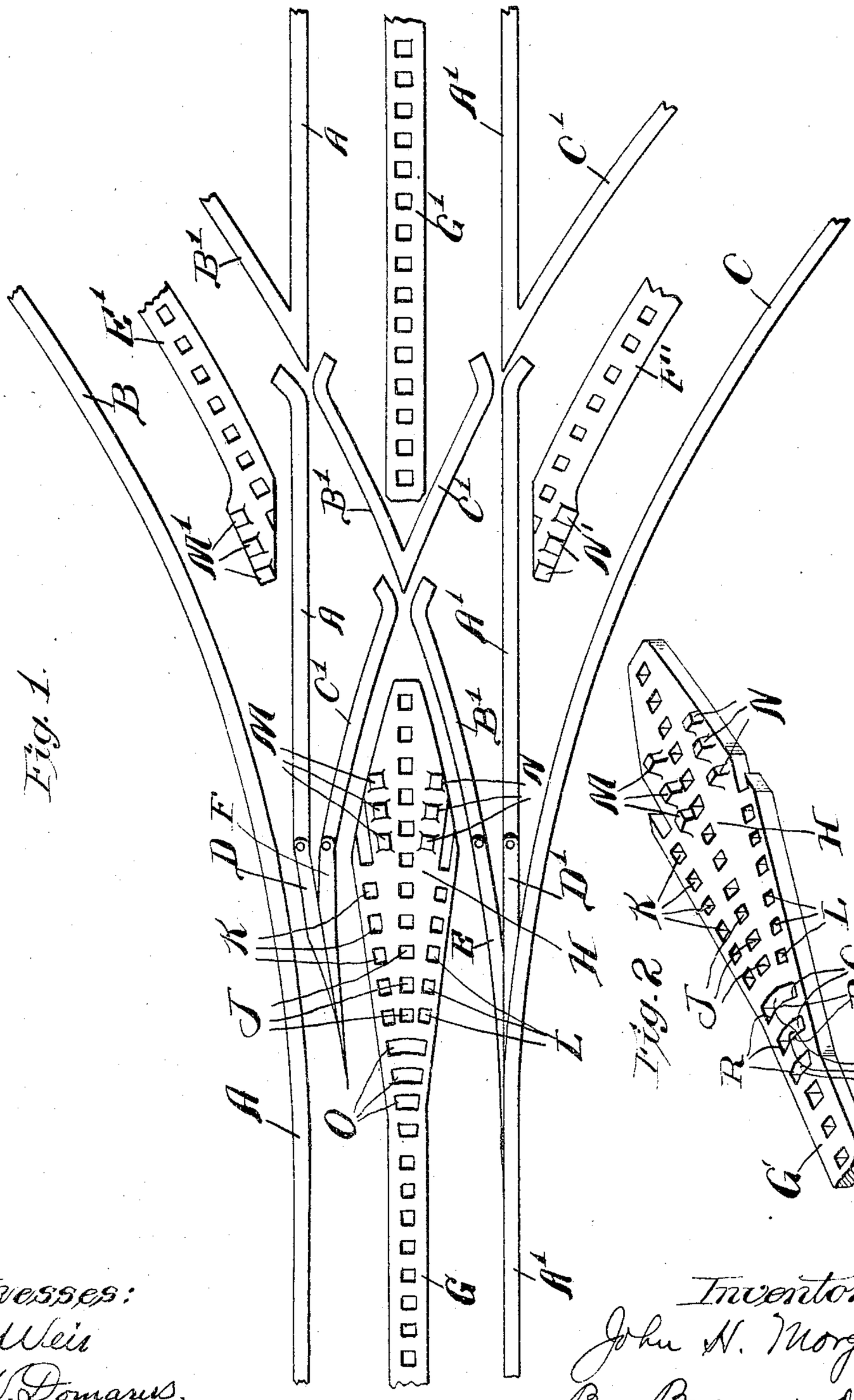

Fig. 1.

Fig. 2.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

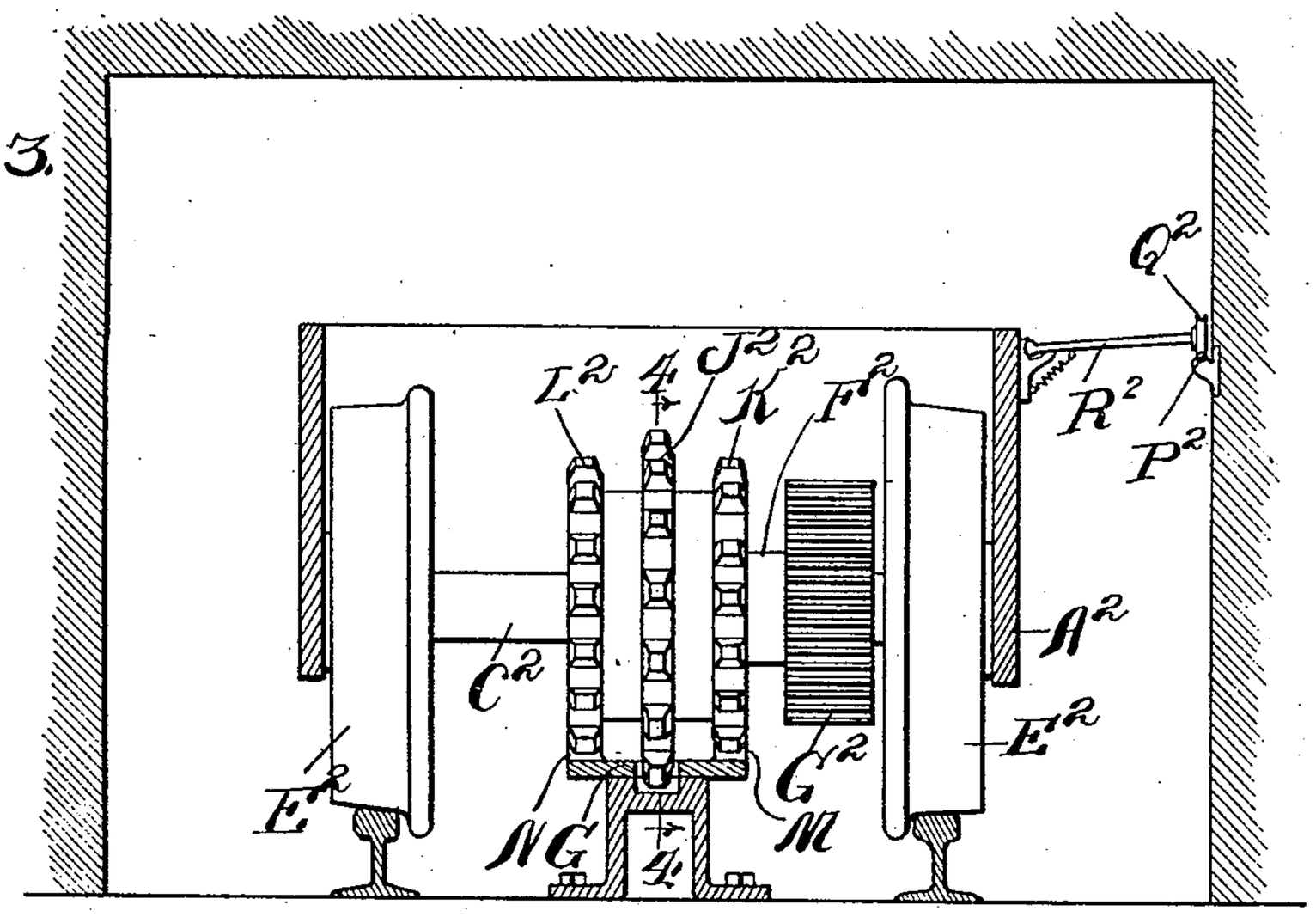
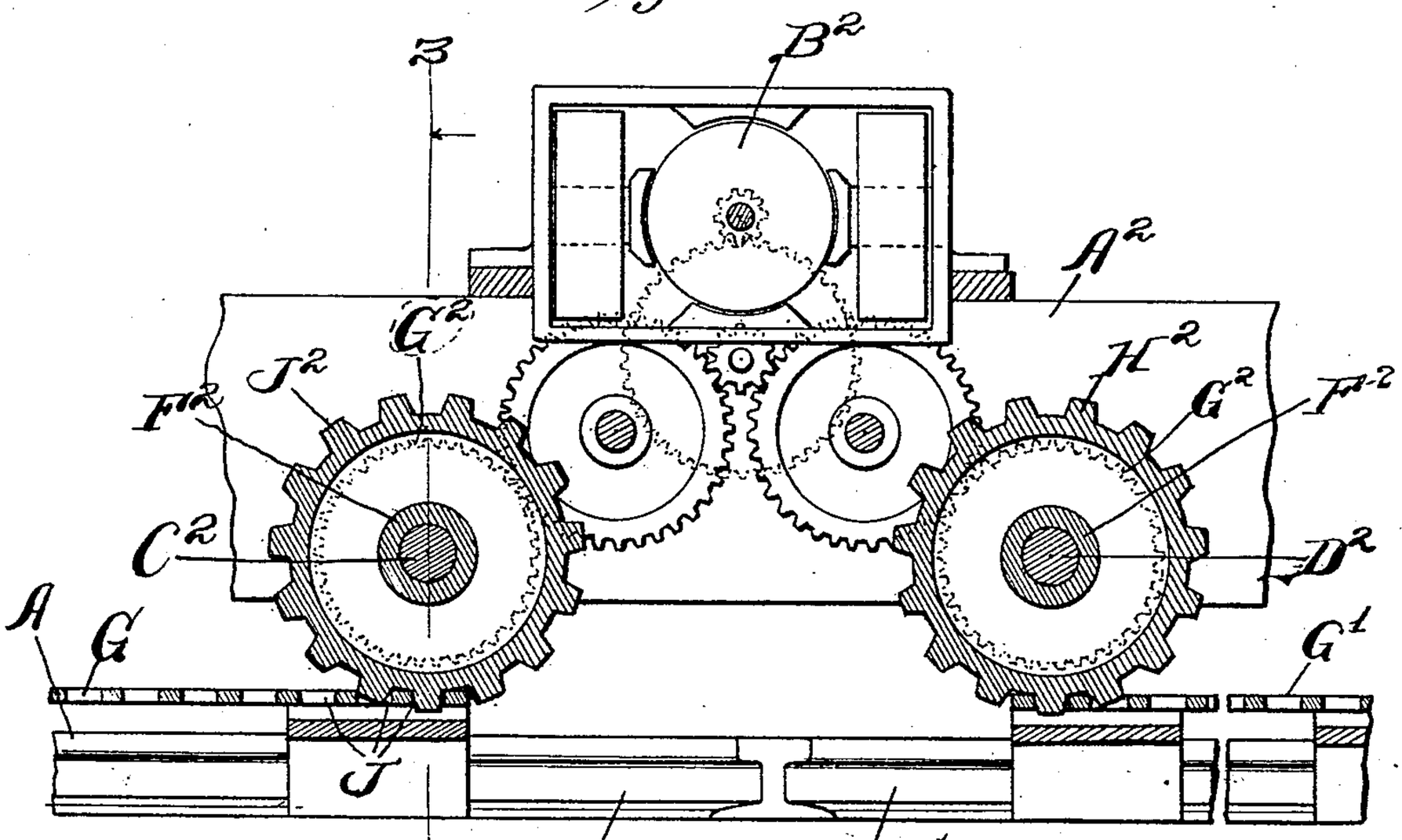


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN H. MORGAN, OF CHICAGO, ILLINOIS.

SWITCHING OR CROSSOVER DEVICE FOR TRACTION-RACK-RAIL SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 772,736, dated October 18, 1904.

Application filed May 6, 1904. Serial No. 206,652. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. MORGAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Switching or Crossover Devices for Traction-Rack-Rail Systems, of which the following is a specification.

This invention relates to switching or crossover devices for traction-rack-rail systems.

The object of the invention is to provide means at a switch, turnout, or crossover of a traction-rack-rail system, and at which points the traction-rack is interrupted to accommodate the switching and main track rails, whereby the traction-gears carried by the motor-car or truck are enabled to span the gap produced by such interruption, so that constant traction engagement between the traction-rack sections and one or more of the traction-gears is maintained while the truck or motor-car is passing over such gaps or interruptions.

Other objects of the invention will appear more fully hereinafter.

The invention consists, substantially, in the construction, combination, location, and arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings, and to the various views and reference-signs appearing thereon, Figure 1 is a view in top plan, somewhat diagrammatic, showing a switch or turnout of a traction-rack-rail system and showing the application thereto of a traction-rack in accordance with the principles of my invention. Fig. 2 is a broken detail view in perspective of the frog-piece of the traction-rack constructed in accordance with the principles of my invention. Fig. 3 is a view in transverse section on the line 3 3 of Fig. 4 looking in the direction of the arrows, showing a form of traction-gear employed in connection with the application of my invention. Fig. 4 is a view in section on the line 4 4 of Fig. 3 looking in the direction of the arrows.

The same part is designated by the same reference-sign wherever it occurs throughout the several views.

In the practical operation of a traction-rack-rail system wherein a traction-rack is employed with which engages sprocket or traction gears carried by a motor-car or locomotive and which are driven by a motor or motors carried by the motor-car or locomotive, and especially at points in the roadway where occurs a turnout, a crossover, or a switch, it is desirable to provide means whereby traction engagement is maintained between at least one of the traction-gears on the locomotive or motor-car and the traction-rack while the locomotive or car is passing over that portion of the road-bed at the switch, turnout, or crossover where the traction-rack is interrupted for the accommodation of the track-rails. Where motor-cars or locomotives having comparatively long wheel-bases are employed and carrying a plurality of traction-gears operating in the same vertical plane with each other and with the traction-rack, said gears being spaced a distance apart greater than the gaps left between adjacent ends of interrupted sections of the traction-rack, the provision of special means for maintaining a traction engagement between the traction-rack and at least one of the traction-gears on the locomotive or car is not present. When, however, the locomotive or motor-car is of comparatively short wheel-base—such, for instance, as is frequently employed in mine-haulage systems and where the traction-gears carried by the locomotive or motor-car are arranged in comparatively close relation with respect to each other—the distance between adjacent traction-gears is frequently less than the available space between proximate ends of adjacent traction-rack sections at turnouts, crossovers, or switches, where the track-rails interrupt with the continuity of the traction-racks, so as to enable a constant traction engagement to be maintained between at least one of the traction-gears and the traction-rack at the point where the truck, motor-car, or locomotive passes over an interrupted point in the length of the traction-rack.

It is among the special purposes of my present invention to provide means at a switch, crossover, or turnout in a traction-rack-rail system whereby continuity of traction engagement is maintained at the switch, turnout, or crossover or while the motor-car, truck, or locomotive is passing over the gaps in the traction-rack necessitated by the locations of track-rails at such points and whether the locomotive, car, or truck proceeds along one line of track-rails or another.

In accordance with the principles of my invention I provide the traction-rack of the main track with a frog-piece at one of the interrupted ends thereof, and which is provided with lines of rack-teeth or perforations serving as rack-teeth corresponding to the main track, and also to each of the switching-tracks, and which frog I propose to place in such relation to the track-rails of the main and switching tracks as that the corresponding line of rack-teeth or perforations therein shall occupy proper alinement with the proximate ends of the traction-racks employed with the main or switching track rails on the other side of the crossover or track rails at the points of interruption of the traction-rack, and in order to enable the engagement of a traction-gear with the traction-rack at the points where the interruptions in the traction-rack occur while the truck-car or locomotive is passing over such points I propose to provide the frog-piece forming the terminal or end of one of the main-track-rack sections and also the adjacent or proximate ends of the traction-rack for the switching-tracks with auxiliary or flanking engaging or traction teeth, and I employ a traction-gear having a central or main traction engaging portion and flanking engaging portions on opposite sides thereof, the flanking traction portions of such gears coöperating with the auxiliary or flanking traction-teeth of the rack-sections at the extremities thereof, thereby enabling the desired traction engagement to be maintained.

Referring to Fig. 1, the main track-rails are designated by reference-signs A A′, and the switch, crossover, or turnout track-rails being designated by reference-signs B B′ and C C′. The track-rails are provided with suitable switching-points D D′, and the switch, crossover, or turnout rails B′ and C′ being provided with switching-points E and F, respectively. By suitably manipulating the pivoted switching-points D D′ E F the track-rails are thrown so as to enable the truck, car, or locomotive to proceed along any desired pair of track-rails. In the particular form shown the switch-points are thrown to the position necessary to permit or enable the locomotive, truck, or car to proceed along the switch track-rails B B′. G G′ designate adjacent ends of the traction-rack for the main track-rails A A′. E′ designates the traction-rack for the switch track-rails B B′. F′ designates the traction-rack for the switch track-rails C C′. By reason of the fact of the switch track-rails B′ and C′ crossing the space between the main track-rails A A′ it is evident that the continuity of the traction-rack G G′ will be interrupted, and, similarly, the track-rails A and C′ interpose interruption to the continuity of the switch traction-rack E′, and the track-rails B′ A′ interrupt the continuity of the switch traction-rack F′. In order, however, to bring the proximate ends of these interrupted sections of the traction-racks into as close relation as possible, such ends are brought as close to the track-rails as will be permitted without interference with the truck-wheels passing along the track-rails. Even under such condition, however, a considerable gap is left between the proximate ends of the rack-sections; but to enable traction engagement to be maintained between the rack and the traction-gears carried by the locomotive, truck, or motor-car when passing over these gaps I provide the main traction-rack G with a frog-piece H at the extreme end thereof, which is fitted into the track in the space between the switch-tracks C′ B′ and as close to the point where these rails cross each other as possible, sufficient space being left to permit truck-wheels to pass along such rails. I also provide the frog H with rows of perforations or openings J K L, corresponding, respectively, and in substantial alinement with the main track-rack G G′, the branch track-rack E′, and the branch track-rack F′. The main traction-gears carried by the locomotive truck or car engage the line of traction teeth or slots J when the truck, locomotive, or car is to proceed along the main track, said line of perforations or rack-teeth J being in substantial alinement with the traction-teeth or perforations in the main track-racks G G′. Similarly the traction-gears of the truck, locomotive, or car operate along the line of rack-teeth or perforations K, which line flanks or is in inclined or curved relation with respect to the line of perforations or teeth J when the car, truck, or locomotive is to proceed along the track-rails B B′, said line of perforations K, forming rack-teeth, being in alinement with the rack-teeth or perforations of the rack-section E′, and similarly the traction-gears of the truck, car, or locomotive engage in the teeth or slots L of the frog H when the truck, car, or locomotive is to proceed along the track-rails C C′, said line of slots L being in alinement with the line of perforations of traction-rack section F′. By reason of the converging of the track-rails B′ C′ toward each other the extreme end of frog H is required to be reduced in transverse area. The line of rack teeth or openings J extends to the extreme end of such transversely-reduced end of the rack, and hence is thereby brought into such close proximity

to the proximate end of traction-rack section G′ as to enable the traction-gear carried by the front axle of the truck, car, or locomotive to pass over the gap between such abutting or proximate ends and to engage in the teeth of rack-section G′ before the gear on the rear axle of the truck is carried out of traction engagement with the line of rack-teeth or slots J at the extreme end of frog H. In the case, however, of the racks for the switch-tracks the distance between the abutting ends of the rack-sections is greater. Therefore in the case of switch track-rack E′ and in accordance with the principles of my invention I provide the frog H with a series of auxiliary rack-teeth M on the inside and adjacent to the extreme end of the line of perforations K, and similarly the rack-section E′ is provided with a series of coöperating auxiliary or flanking rack-teeth M′ on the outer flanking side of the line of the main rack-teeth formed in such section. Similarly I provide the frog H with a series of auxiliary flanking rack-teeth N on the inside and adjacent to the extreme end of the line of perforations L, and I provide the rack-section F′ of the switching track-rails C C′ with a series of auxiliary flanking teeth N′ on the outside of the line of main-rack perforations in such section F′. In this manner the line of auxiliary flanking rack-teeth M are enabled to be brought into closer relation with respect to the coöperating auxiliary flanking rack-teeth M′ of rack-section E′ than is possible with respect to the line of rack-perforations K with the main rack-perforations of rack-section E′, and similarly the series of auxiliary flanking rack-teeth N of the frog H are enabled to be brought into closer relation with respect to the auxiliary flanking rack-teeth N′ of rack-section F than is possible with the series of rack-perforations L and the main rack-perforations of rack-section F′. In practice, although I do not desire to be limited or restricted in this respect, the auxiliary or flanking rack-teeth M M′ N N′ are in the form of raised projections, as clearly shown in Fig. 2 with respect to rack-teeth M and N, and between which raised projections coöperate auxiliary or flanking sprocket-gears presently to be referred to. For a portion of its length from the point of junction between the frog H and the main rack G toward the end of such frog I provide the same with a series of transverse slots or openings O of increasing transverse length. By this provision the traction-gears may be properly directed under the directing influence of the switching-points D D′ E F, acting upon the flanges of the truck-wheels into the proper line of rack-perforations J K L, according to the pair of track-rails along which the truck, car, or locomotive is to proceed. As soon as the proper direction is thus determined by the switch-points the traction-gear enters the corresponding line of traction slots or openings J, K, or L, as the case may be, and in practice and preferably the series of transverse slots or apertures O have the engaging walls thereof (indicated, respectively, by reference-signs P, Q, and R) suitably inclined to correspond with the line of perforations J, K, or L, respectively.

Referring now to Figs. 3 and 4, reference-sign A^2 designates a truck, motor-car, or locomotive, upon which is mounted one or more motors, (indicated at B^2,) and C^2 D^2 designate supporting-axles, upon which are mounted the truck-wheels E^2. Upon each truck-axle is mounted a sleeve F^2, carrying a gear G^2, arranged to be driven from the motor B^2 by any suitable or convenient construction or arrangement of gearing so disposed as to drive said gears and sleeves in unison and in the same direction and at the same peripheral speeds. Mounted upon axles C^2 D^2 and suitably connected to or forming part of the driven sleeves F^2 are traction-gears H^2 J^2, arranged to coöperate with the main traction-racks G G′ or the switch-track racks E′ F′, according to whether the truck is to proceed along one pair of track-rails or another, as the case may be, the engagement of said traction-gears H^2 J^2, said gears being driven from the motor constituting the traction means for the locomotive, motor-car, or truck. The traction-gears H^2 J^2 are provided on opposite sides thereof with flanking gears K^2 L^2, connected or formed to rotate with said gears H^2 J^2. In practice the flanking gears K^2 L^2 are of smaller diameter than that of the traction-gears H^2 J^2, said flanking gears K^2 L^2 being designed to coöperate with the auxiliary or flanking gear teeth or lugs M N M′ N′, above referred to, and which are placed, as described, at the terminals of the rack-sections at switches, turnouts, or crossovers. The diameters of the flanking gears K^2 L^2 are enough smaller than that of the traction-gears H^2 J^2, and said flanking gears are spaced apart or separated from traction-gears H^2 J^2 a sufficient distance to avoid interference with the traction engagement of said gears H^2 J^2 with the traction-racks G G′ E′ F′, as the case may be, but in position to engage and coöperate with the raised auxiliary or flanking gears or lugs M N M′ N′.

The operation will be readily understood from the foregoing description.

Suppose it is desired to cause the locomotive, truck, or motor-car to proceed along the switch-tracks B B′. The switch-points D, D′, E, and F are shown in Fig. 1 in proper position to permit and to direct the flanged truck-wheels to proceed from the main-track rails A A′ when moving from a position to the left of Fig. 1 toward the right and onto the switch-tracks B B′. As the flanged wheels pass along the switch-points and under the directing effect of such switch-points the main

traction-gears H^2 J^2 are directed along the portions R of the transverse slots O of frog H, so as to enable the said gears to engage the line of rack-teeth, (indicated at K.) When the traction-gear on the front axle of the locomotive, truck, or motor-car reaches the end of the line of traction-rack teeth K, the traction-gear on the rear axle continues in traction or driving engagement with respect to the rack teeth or openings, so as to continue exerting a traction effort. The space, however, between the end of the line of rack-teeth K and the beginning of the rack-teeth on section E′ is greater than the distance apart of the axles C^2 D^2, and hence greater than the distance apart of the traction-gears H^2 J^2. Consequently a point will be reached where the truck, locomotive, or motor-car is deprived of traction engagement with any portion or section of traction-rack. When this point is reached, however, the flanking traction-gear K^2 or L^2, as the case may be—say, for instance, K^2—of the rear axle engages the auxiliary or flanking raised rack-teeth M, which extends to a point nearer the switch-track rack E′ than the line of rack-teeth K, thereby continuing the traction effort exerted upon the truck, car, or locomotive sufficiently to enable the opposite flanking gear, as L^2, on the front axle to engage the auxiliary or flanking rack teeth or projections M′, thereby enabling a traction engagement to be effected between the rack-section E′ and a traction-gear on the front axle before the traction engagement of the traction-gears on the rear axle and the frog H is broken, and hence enabling the gap between the frog and section E′ of the switch-track rack to be jumped over or bridged by the locomotive, car, or truck without at any time entirely breaking traction engagement between at least one traction-gear on the car, truck, or locomotive and some portion or section of the traction-rack. In the same manner if the switch-points D D′ E F are suitably thrown to permit the car to travel along the switch-tracks C C′, the flanking gear K^2 or L^2, as the case may be, on the front axle will engage with the flanking or auxiliary rack-teeth N′ in advance of the engagement of the main traction-gear H^2 J^2, as the case may be, of the front axle with the traction-rack section F′ and also before traction engagement between the opposite flanking gear K^2 L^2 of the rear axle moves out of traction engagement with the auxiliary or flanking rack-teeth N, although the main traction-gear H^2, J^2 of the rear axle may have moved beyond the end of the line of traction-rack teeth or openings L of frog H. After the flanking or auxiliary teeth M′ N′ have been passed the locomotive, car, or truck proceeds along the switch track-rails under the traction effort exerted by the main traction-gears H^2 J^2 with the traction-rack sections F′ E′ or G′, as the case may be.

It is obvious that any form of motor may be employed for driving the traction-gears. I have shown an electric motor as exemplifying the principles of my invention, and where an electric motor is employed current may be supplied thereto in any suitable or convenient manner, either through the traction-rack or from a trolley-wire or conductor carried in suitable or convenient relation with respect to the truck and adapted to supply current to the motor. In the particular form shown a side conductor or trolley-wire, (indicated at P^2,) is shown, with which contacts a trolley wheel or shoe Q^2, carried by a trolley-arm R^2, mounted upon the truck and from which circuit may be completed in any suitable, simple, or well-known manner to the motor. Similarly return connection from the motor may be effected in any convenient manner—as, for instance, through the framework to the truck-wheels and track-rails—and where the traction-rack is not utilized as a supply-conductor it may also be utilized as an additional return or ground conductor. In these respects, however, I do not desire to be limited or restricted, as many variations and changes in the construction, arrangement, and details would readily occur to persons skilled in the art and still fall within the spirit and scope of my invention.

Having now set forth the object and nature of my invention and a construction embodying the principles thereof, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent, is—

1. In a switching or crossover device for traction-rack-rail systems, the combination with main and switch track-rails, and main and switch traction-rack sections separated at the switch, crossover or turnout, the ends of the rack-sections having auxiliary flanking rack-teeth, a locomotive, traction-gears mounted thereon, said traction-gears having flanking gears arranged to coöperate with the auxiliary flanking rack-teeth, and means for driving said traction-gears, as and for the purpose set forth.

2. In an apparatus of the class described, a locomotive, traction-gears mounted thereon and having flanking gears on opposite sides thereof, and means for driving said gears, in combination with traction-rack sections, the continuity of which is interrupted at switches, turnouts or crossovers, said rack-sections having auxiliary flanking rack-teeth adjacent the proximate ends thereof with which said flanking gears coöperate, as and for the purpose set forth.

3. In an apparatus of the class described, the combination with a locomotive having traction-gears, and flanking gears arranged on opposite sides of said traction-gears, and means

for driving said gears and flanking gears, said flanking gears being of smaller diameter than the diameter of said traction-gears, of traction-racks the continuity of which is interrupted at switches, crossovers or turnouts, said racks having raised auxiliary flanking gear-teeth with which said flanking gears cooperate, as and for the purpose set forth.

4. The combination with two or more pairs of track-rails and a traction-rack section for each pair of rails and switching-track rails and switching-points, said switching-track rails interrupting the continuity of said traction-racks, said traction-racks having at the proximate ends thereof auxiliary or flanking rack-teeth, and a locomotive having traction-gears, said traction-gears provided with cooperating auxiliary or flanking gears, for the purpose set forth.

5. The combination with main and switch track-rails and switching or crossover rails, and traction-racks for each pair of main or switch track-rails, of a rack-frog having lines of rack-teeth coinciding respectively with the main and switch track-racks, said frog having auxiliary flanking rack-teeth corresponding with each switch-track rack, and a locomotive having main and auxiliary or flanking traction-gears, said main traction-gears coöperating with the main or switch track-lines of rack-teeth in said frog, and said auxiliary or flanking gears coöperating with said flanking or auxiliary rack-teeth, as and for the purpose set forth.

6. The combination with main and switch tracks, and a traction-rack for each pair of such tracks, of a rack-frog having lines of rack-teeth corresponding respectively with the lines of main and switch track-racks, auxiliary rack-teeth arranged on opposite sides of said lines of rack-teeth and the corresponding proximate ends of switch track-racks, a truck or locomotive having traction-gears, said traction-gears having auxiliary or flanking gears respectively coöperating with said auxiliary flanking rack-teeth, as and for the purpose set forth.

7. In an apparatus of the class described, a truck having a plurality of axles, a traction-gear mounted upon each axle, flanking or auxiliary gears arranged on opposite sides of each traction-gear, in combination with main and switch track-rails, a traction-rack for each pair of rails, switching or crossover track-rails interrupting the continuity of such traction-racks, and auxiliary or flanking rack-teeth arranged at the proximate ends of adjacent interrupted rack-sections and with which said auxiliary or flanking traction-gears coöperate to maintain constant traction engagement between the locomotive and the rack-wheel passing over the interrupted portions thereof.

8. The combination with a locomotive having a plurality of traction-gears, flanking or auxiliary gears for each traction-gear, of interrupted traction-rack sections, the proximate ends of said interrupted traction-rack sections having auxiliary or flanking rack-teeth with which said flanking traction-gears coöperate.

In witness whereof I have hereunto set my hand, this 3d day of May, 1904, in the presence of the subscribing witnesses.

JOHN H. MORGAN.

Witnesses:

GEORGE E. ADAMS,

H. M. KENNEDY.