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T. G. AULTMAN & J. C. GASKILL.

LOCOMOTIVE SYSTEM.

APPLICATION FILED MAY 20, 1903.

NO MODEL.

Fig. 1.

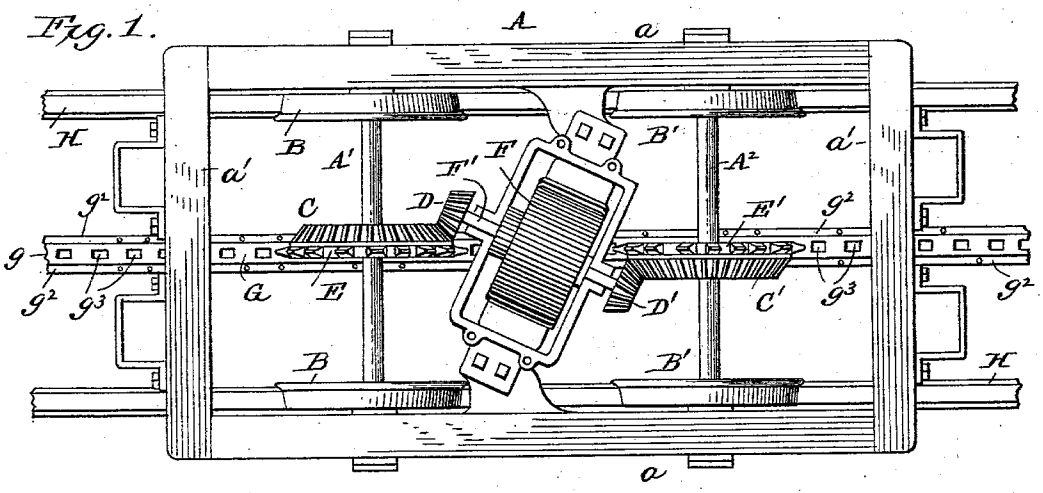


Fig. 2.

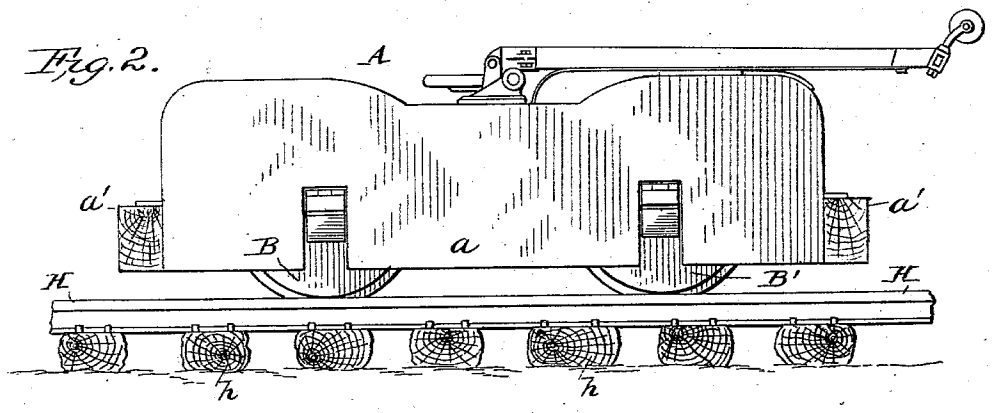


Fig. 3.

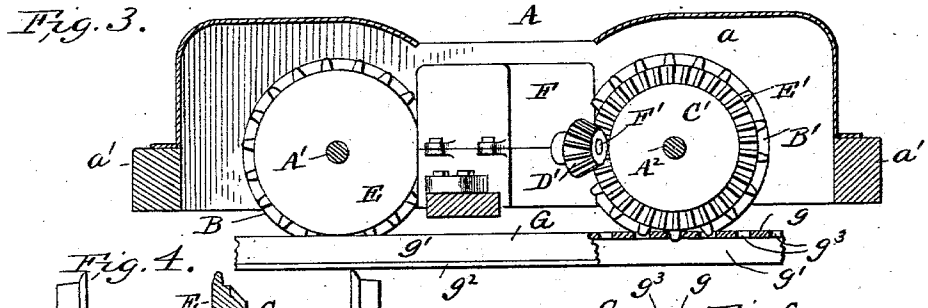


Fig. 4.

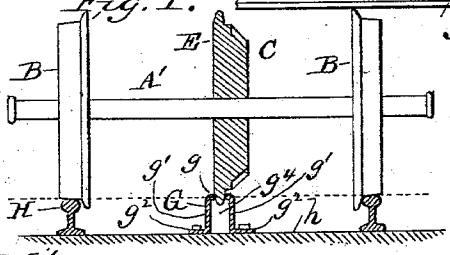


Fig. 6.

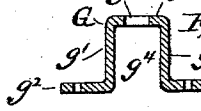


Fig. 5.

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UNITED STATES PATENT OFFICE.

THOMAS G. AULTMAN AND JAMES C. GASKILL, OF FAIRMONT, WEST VIRGINIA; SAID AULTMAN ASSIGNOR TO JOSEPH A. JEFFREY, OF COLUMBUS, OHIO.

LOCOMOTIVE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 751,893, dated February 9, 1904.

Application filed May 20, 1903. Serial No. 157,979. (No model.)

To all whom it may concern:

Be it known that we, THOMAS G. AULTMAN and JAMES C. GASKILL, citizens of the United States, residing at Fairmont, in the county of Marion and State of West Virginia, have invented certain new and useful Improvements in Locomotive Systems, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in haulage apparatus, it pertaining more particularly to the electric locomotive and the tracks which are used in coal-mines for the haulage of cars into and out therefrom.

One of the objects is to provide improved traction devices in the locomotive to act in conjunction with an improved traction device secured, preferably, at the center of the track, which devices shall be cheaper in construction and more economical in power than any of those heretofore used with which we are acquainted.

The invention relates, further, to matters which will be hereinbelow set forth.

Figure 1 is a plan view of a locomotive and a portion of a track embodying our improvements. Fig. 2 is a side view of the same. Fig. 3 is a central vertical longitudinal section. Fig. 4 is a view showing the relations of the track and sprocket-wheel. Fig. 5 is a diagrammatic plan view of a section of track. Fig. 6 is a cross-section of the rack-rail.

In the drawings a portion of a car-track system is shown, it having the main-line rails H H, resting upon and secured to the sleepers or ties h h in the usual manner.

H′ H′ represent a branch track, and h' h' are switch-rails adapted to guide cars from the main track H to the side track H′, or vice versa.

We provide means for increasing the tractive power of a locomotive, which is to be derived from its weight by employing peculiarly shaped and constructed rack-rails G. These are formed in sections of considerable length, as shown in the drawings. Each rail-section is formed by rolling a sheet or thin piece of metal in such way as to form therein the top wall g, the vertical walls g', and the bottom flanges or foot-pieces g^2 and to provide a groove g^4, which is of such depth as to receive the teeth of the driving sprocket-wheels, to be described. At g^3 g^3 slots are cut in the top wall. The foot pieces or flanges g^2 are perforated at suitable intervals, and through the perforations spikes or bolts can be passed, these perforations being arranged so as to register with the ties or sleepers upon which the main-track rails rest. By forming the traction-rails G in this way (that is to say, so rolling or bending a sheet of metal as to provide the bottom flanges, the apertured rack-engaging traction-plate g, and the plate-carrying walls or webs g') the plate g, which receives the teeth of the driving-wheel, is elevated somewhat above the ties or supporting-base of the system, and a tooth-receiving chamber is provided, as clearly shown in Fig. 6. This insures that obstructions or foreign bodies shall not lodge directly below the teeth and at the same time that they shall have clearance below the plate g. In addition to this the cost of the traction rack-rail is reduced to the minimum by thus bending or rolling it from a relatively thin sheet of metal and providing it with the sprocket-apertures g^3. These rack-rail sections G G are arranged along the central lines of the track—that is to say, half-way between the two main side rails H H. Similar sections are also employed along the branch tracks, as shown at G′. Where switches occur, short sections of rack-rail are employed, as illustrated at G^2G^3, one leading gradually from the line of the main rack-rail G to the line of the rack-rail of the branch track, and the other, G^3, lying in the line of the main rack-rails, and at these points the main rails H H′ are slotted, as shown at R R′ to permit the sprocket E E′ to pass through them and engage with the rack-sections beyond. Upon the track system thus constructed there travels a locomotive, which is indicated as an entirety by A. Preferably it is formed with a frame having side parts a a and end parts a' a'. In suitable bearings on this frame there are mounted the axle-

boxes. One axle is indicated by A′ and the other by A^2. The axle A′ is rigid with the track-wheels B B, that fit the main-track rails H or H′. With this axle there is also rigid a sprocket-wheel E, and to the sprocket-wheel there is rigidly secured a bevel-wheel C. The other axle, A^2, is similarly secured rigidly to the track-wheels B′ B′ and to a sprocket-wheel E′. The bevel-wheel C is upon one side of its sprocket-wheel E, and the bevel-wheel C′ is upon the opposite side of its sprocket-wheel. The two sprocket-wheels are in line and situated in the central vertical plane of the locomotive. The motor, which is preferably an electric one, is indicated as a whole by F, it being constructed, as usual, with suitable field parts and with a rotary armature. The armature-shaft is indicated by F′ and projects some distance beyond the body of the motor. At one end the armature-shaft has a pinion D, which meshes with the bevel-gear C. The motor is arranged on a line diagonal to the longitudinal lines and transverse lines of the motor.

By examining the drawings it will be seen that the sprocket-wheels E and E′ are so constructed and related to the track-wheels B and B′, respectively, and to the rack-rails G or G′ that the operative points of contact of the sprocket-wheels are in horizontal line with the contact-points of the main-track wheels with the rack-rails, the contact-points of the six wheels being in the same horizontal or operative plane. In consequence of this construction and arrangement of parts the power is applied to the utmost advantage. There is no slippage, the wheels all traveling with the same peripheral speed, and no lost motion between the sprocket-wheels and the track-wheels.

It will be noted that the front and rear axles are rigidly geared together. The locomotive is advanced step by step whereby one or both of the sprockets are in engagement with the rack rail or rails. This arrangement of the parts furthermore insures that the sprockets will engage properly with the rack-rail at the switches or wherever else it becomes necessary for the locomotive to span a portion of the track which is not provided with the rack-rail, as is the case at switches. Further, in view of this rigid connecting of the front and rear axles the necessity of providing the short rack-section G^2 G^3 at the sections is apparent.

While in the drawings we have shown our invention as applied to an electric haulage-locomotive, it will be understood that we do not limit ourselves to this use of it, as it may be employed on any type of haulage-locomotive irrespective of the kind of motive power.

One of the chief advantages of this traction system is that the rack-sections need only be laid at those portions of the track where inclinations are encountered. It will be thus seen that a locomotive of considerably-less weight with this system will accomplish the same results as are now accomplished by locomotives of much greater weight, the excess of weight in the latter instance being necessary to enable the locomotive to get its load up the incline. In mining operations it is especially desirable to decrease both the weight and size of the mine-locomotive as much as possible, and with our system it will be seen that the use of the rack-rails on the inclinations enables us to use a much lighter locomotive than would otherwise be the case.

The constructions and arrangement of the parts of our locomotive are such that the locomotive is at all times ready for operation both on the inclined and on the level portions of the track and that no adjustment of the driving parts of the locomotive is necessary when it passes from one of said portions to the other.

What we claim is—

1. In a traction apparatus, the combination of the main-track rails, the intermediate U-shaped thin metal rack-rail, having a row of perforations in its tread-wall and a chamber between said tread-walls and the plane of its foot-flanges, the locomotive having the sprocket-wheels secured to the axles and adapted to have their teeth mesh with the rack-apertures in the tread-wall, and the motor having its armature geared directly to both of the said sprocket-wheels, substantially as set forth.

2. In a haulage apparatus, the combination of the locomotive having a front axle with two track-wheels and a central sprocket-wheel with a bevel-gear, all rigidly secured to the said axle, a rear axle having two track-wheels, the centrally-arranged sprocket-wheel and the bevel-gear all rigidly secured thereto, the pitch-circles of the sprocket-wheels being substantially equal to the tread-circles of the track-wheels, the diagonally-arranged motor secured to said locomotive with its armature-shaft directly geared to opposite sides of the said sprocket-wheel and the track having the main rails for the track-wheels and the central U-shaped rack-rail having apertures formed in the tread portion thereof, substantially as set forth.

3. In a haulage system, the combination of a car having a front axle with two track-wheels and a sprocket-wheel rigid therewith, a rear axle with two track-wheels and a sprocket-wheel rigid therewith, a motor on the car geared directly to both of said sprocket-wheels, and a rack-rail on the track having sprocket-apertures for the said sprocket-wheels, substantially as set forth.

4. In a haulage system, the combination of the main and branch track-rails, having the permanently open passage-ways R R′ therethrough at the junction of the switches, the rack-rail and the locomotive having a power-driven sprocket-wheel adapted to engage with the rack-rail and arranged to normally pro-

ject below the tread-lines of the track-rails, substantially as set forth.

5. In an electric haulage system, the combination with the main-track rails and the branch-track rails provided at the junction of the switches with passages between adjacent fixed ends of the track-rails, and a rack-rail extending along the track-rails, of a locomotive, power apparatus thereon, and power-driven sprocket-wheels thereon adapted to engage with the stationary rack-rail and arranged to normally project below the tread-lines of the track-rails, substantially as set forth.

6. In a haulage system, in combination with the locomotive adapted to be propelled by two power-driven sprocket-wheels engaging with a rack-rail, the main-track rails and branch rails, and the rack-rail system comprising the relatively long sections arranged between the main rails and the branch rails, and the relatively short sections between the said main-track-rails at the switch-junctions, substantially as set forth.

7. In a haulage system, the combination of a main track, a branch track, an adjustable switch-track, a rack-section in alinement for operation along the lines of the main track, and located on one side of the switch-junction, a second rack-section in alinement for operation along the main track on the other side of the switch-junction, a rack-section in alinement for operation along the branch track, and a switching rack-section interposed between the first aforesaid rack-section and the rack-section for the branch track, all of said rack-sections being fixed normally in working position and adapted to engage with the driving sprocket-wheel of a vehicle moving over the said tracks, substantially as set forth.

8. In a haulage system, the combination of a main track, a branch track, an adjustable switch-track, a rack-section in alinement for operation along the line of the main track and located on one side of the switch-junction, a second rack-section in alinement for operation along the main track on the other side of the switch-junction, a rack-section in alinement for operation along the branch track, a switching rack-section interposed between the first and the third aforesaid sections, and a supplemental rack-section at the switch interposed between the first and the second aforesaid rack-sections, all of the said track-sections being normally fixed in operative position and adapted to be engaged by a driving sprocket-wheel on a vehicle moving upon the said tracks, substantially as set forth.

9. In an electric haulage system, the combination of a locomotive having a front axle with two track-wheels and a sprocket-wheel rigidly connected directly to the axle, gearing for driving said sprocket-wheel, a rear axle with two track-wheels and a sprocket-wheel rigidly connected directly to the axle, gearing for driving said rear sprocket-wheel, a motor on the car connected to the gearing for the front sprocket-wheel and to the gearing for the rear sprocket-wheel, and a rack-rail on the track having sprocket-apertures for the said sprocket-wheel, substantially as set forth.

10. In an electric haulage system, the combination of the locomotive having a front axle with two track-wheels a sprocket-wheel and a gear-wheel between the track-wheels, all rigidly secured directly to the axle, a rear axle having two track-wheels a sprocket-wheel and a gear-wheel between the track-wheels, all rigidly secured directly therewith, of an electric motor having its armature-shaft arranged to extend at one end toward one axle and at the other end toward the other axle, and geared to both said gear-wheels on the front axle and the rear axle, substantially as set forth.

11. In a haulage system, the combination with the track-rails and a rack-rail along the track having sprocket-apertures for a driving sprocket-wheel, of a locomotive having a front axle provided with two track-wheels and a sprocket-wheel rigid therewith, a rear axle provided with two track-wheels and a sprocket-wheel rigid therewith, said sprocket-wheels both arranged to engage with the said rack-rail and having their pitch-circles tangent to the tread planes of the track-rails, and power mechanism for driving both of the said sprocket-wheels synchronously relatively to the rack-sprockets, substantially as set forth.

12. In a haulage system, the combination with the track-rails and the rack-rails along the track having sprocket-apertures for the driving sprocket-wheel, of a locomotive having a front axle provided with two track-wheels and a sprocket-wheel, a rear axle having two track-wheels and a sprocket-wheel, the sprocket-wheels being arranged substantially as set forth, to have their pitch-circles rotate along the planes of the treads of the track-rails, and power mechanism for driving the sprocket-wheels synchronously, substantially as set forth.

13. In a locomotive traction system, the combination of the main-track rails, a parallel rack-rail, a front pair of wheels for the main track, a rear pair of wheels for the main track, a front sprocket or toothed wheel adapted to engage the rack-rail, a rear sprocket or toothed wheel adapted to engage the rack-rail at a point behind the front wheel, the said wheels being arranged to have the contacting or rack-engaging points of their pitch-circles in the same horizontal plane with the rail-contacting points of the track-wheels, and means for simultaneously and synchronously driving the said sprocket or toothed wheels, substantially as set forth.

14. In a railway traction system having a locomotive provided with a rack-engaging

toothed wheel or sprocket-wheel, a traction rack-rail having a series of sprocket-apertures in a relatively elevated plane, side webs or supporting-walls for the elevated plate, and bottom flanges, the apertured plate the side walls and the bottom flanges being an integral bent metallic sheet, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

THOMAS G. AULTMAN.
JAMES C. GASKILL.

Witnesses:
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C. L. SHAVER.