(No Model.) 4 Sheets—Sheet 1.

H. ERHARDT.

ELECTRIC LOCOMOTIVE.

No. 356,579. Patented Jan. 25, 1887.

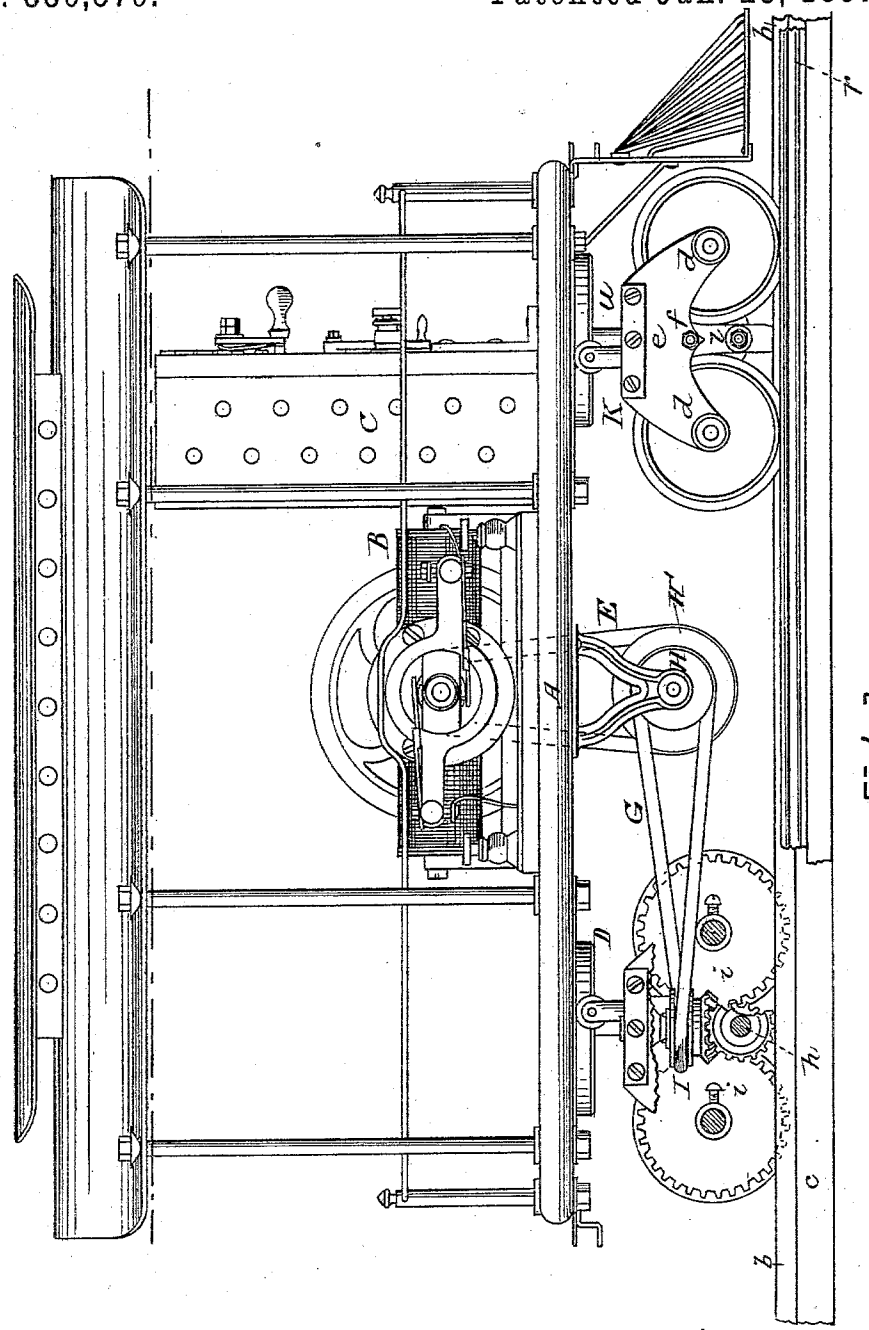

FIG. 1.

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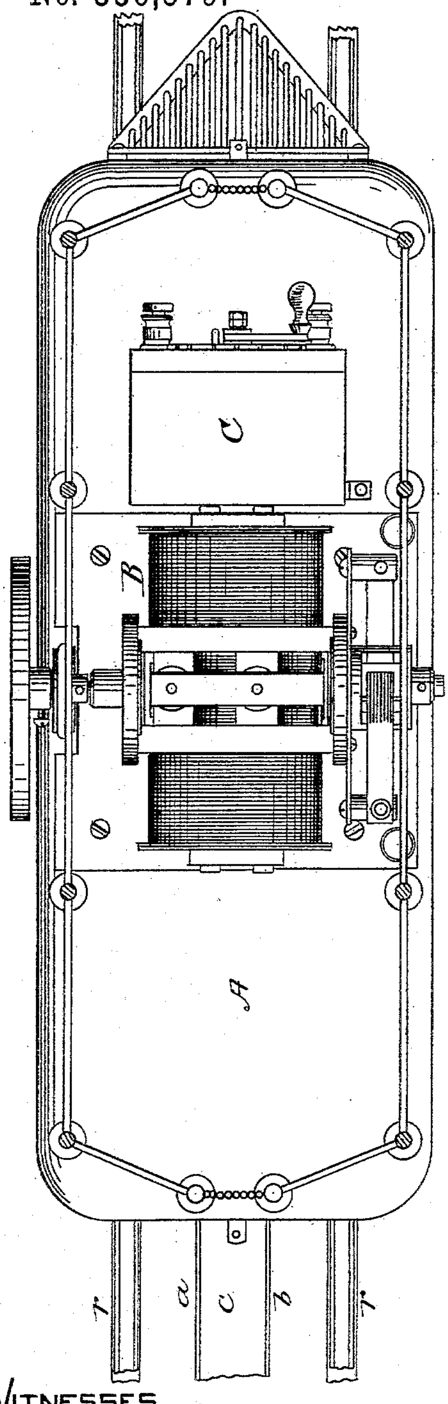

Fig. 2.

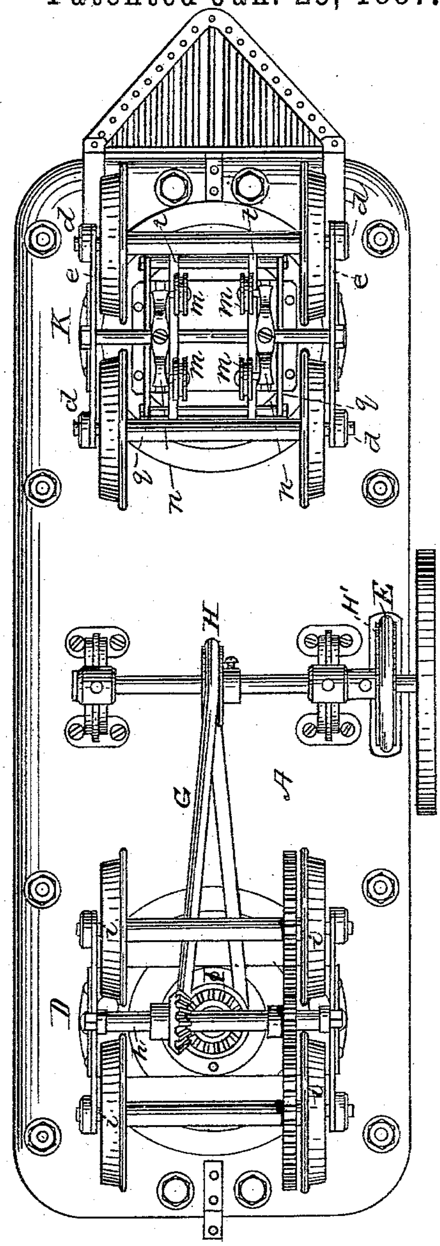

Fig. 3.

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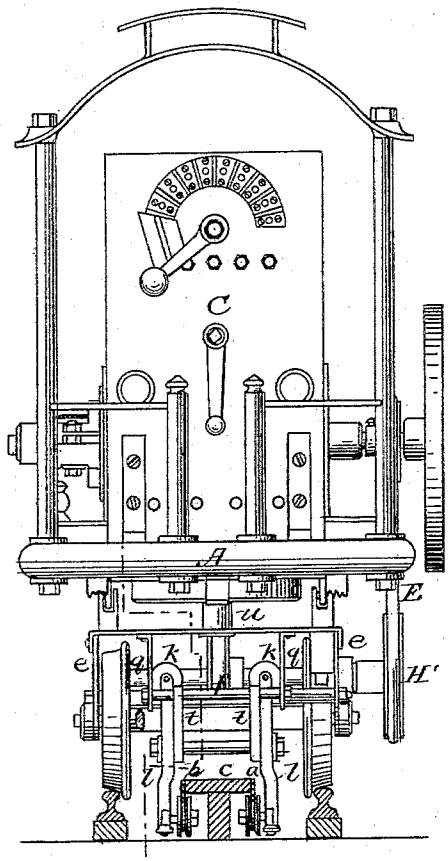

Fig. 4.

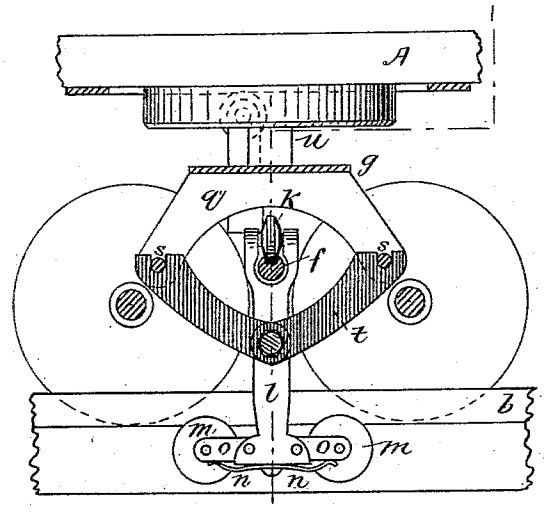

Fig. 5.

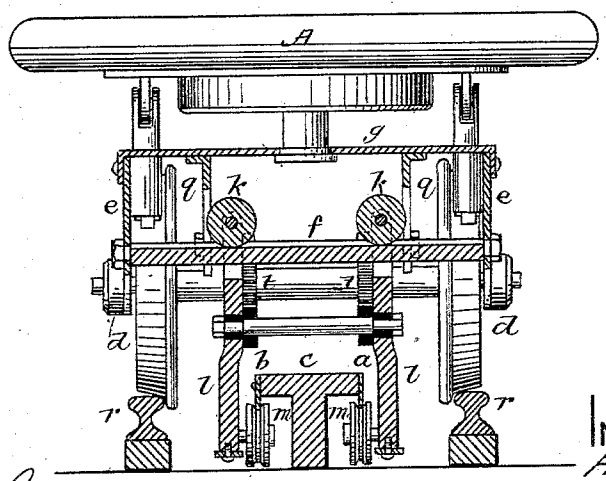

Fig. 6.

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No. 356,579. Patented Jan. 25, 1887.

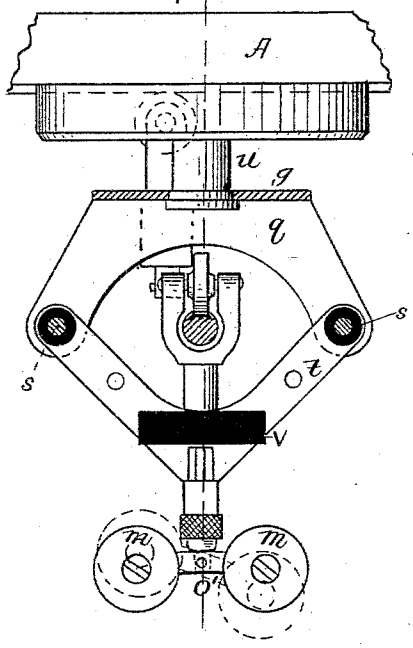

Fig. 7.

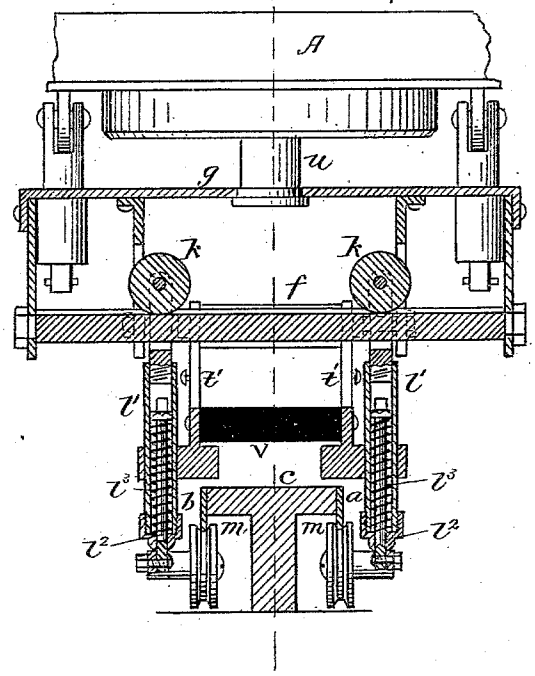

Fig. 8.

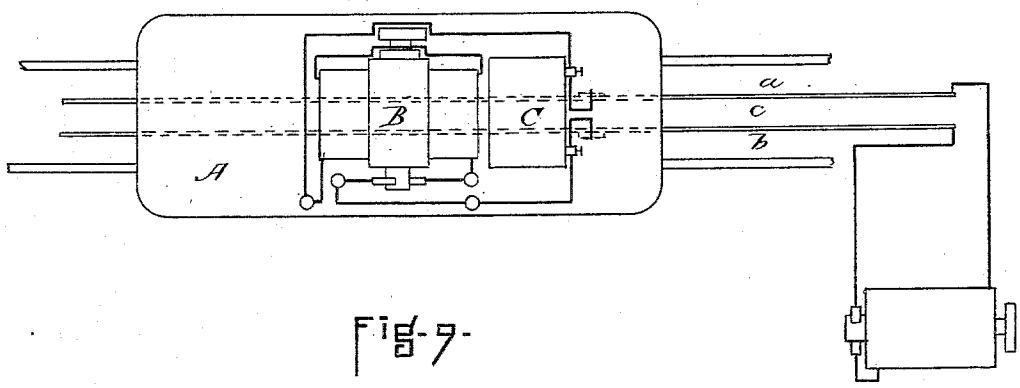

Fig. 9.

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UNITED STATES PATENT OFFICE.

HERRMANN ERHARDT, OF BOSTON, MASSACHUSETTS.

ELECTRIC LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 356,579, dated January 25, 1887.

Application filed October 12, 1885. Serial No. 179,650. (No model.)

To all whom it may concern:

Be it known that I, HERRMANN ERHARDT, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Electric Locomotives, of which the following is a specification, which, by reference to the accompanying drawings, forming a part thereof, is sufficient to enable a person skilled in the art to make and use my invention.

The invention relates to that class of electric locomotive which receives its actuating current through a pair of conductors insulated from each other and placed between the tracks on which the carriage of the locomotive runs, and specifically it relates to the mounting of the contact-wheels and to the connection of the dynamo with the driving-wheels.

In the drawings, Figure 1 is a side elevation, the driving-wheels of one side removed. Fig. 2 is a top plan on the platform of the locomotive. Fig. 3 is a bottom plan under the platform. Fig. 4 is an end elevation at the contact end of the locomotive. Figs. 5, 6, 7, and 8 are views of the details of the contact apparatus. Fig. 9 is a plan of the wiring of the locomotive.

A indicates the platform of the locomotive. B is a dynamo mounted thereon. C is a resistance-box. D is the truck which carries the drivers.

The power-pulley of the dynamo is belted, (or geared,) as shown at E, to a wheel, H, beneath the platform, and from this wheel H by a belt, G, half-crossed to a driven pulley, I, the axis of which coincides with the center of oscillation of the truck D. A proper gearing to a rotary member of a train of gearing embodied in the truck is, of course, the equivalent of the half-crossed belt. From the driven pulley I the rotary motion is transmitted to the driving-wheels resting on the track by any proper train of gearing. What is shown in Fig. 1 is a bevel-gear on the same center as the pulley I, meshing into a bevel-gear on a shaft, *h*, below the pivotal center of truck D, which shaft *h* carries gears which engage other gears on the shafts of the driving-wheels *i;* but the improvement in this part of the mechanism consists in making the center of motion of the truck oscillations the center of motion of the first wheel, I, of the driving-wheel gear, to which the power of the dynamo placed on the center of the platform of the carriage is transmitted. At the opposite end of the carriage from the driving-truck D is the contact-truck K. The electric current travels on the conductors *a b*, placed between the rails *r r* and insulated from each other by the stringer *c*, and it is to pass the current from one of these conductors *a b* to the other, through the dynamo B, by way of the resistance-box C, that electric contact is required.

My improvement in this part of the machine consists in mounting the contact-wheels in "universal" bearings, so that they may accommodate themselves to irregularities in level position and curvatures of the conductors *a b*.

The contact-truck K is a frame connected to the platform by a swivel-bearing, and furnished with boxes *d*, Fig. 1, for the wheel-journals. These boxes *d* are in cheeks *e*, Figs. 1 and 6, which cheeks are connected at top by a sill, *g*, connected by a king-bolt, *u*, with the platform of the locomotive. All this is a usual construction, and any form of truck-frame in ordinary use will serve. The cheeks *e* are further connected by rail *f*, on which roll the wheels *k*. It will readily be seen that these wheels *k* can traverse transversely of the truck-frame. The wheels *k* are each pivoted to a conducting-standard, *l*, which carries at its lower end two pivoted arms, *o*, Figs. 5 and 6, which arms *o* are pressed upward by springs *n*. Contact-wheels *m* are mounted in these arms *o* and engage the conductors *a b*. The wheels *m* which engage the conductor *a* are insulated from the wheels *m* which engage the conductor *b*, and each of them from the truck-frame in any suitable manner—such, for example, as making the wheels *k* of insulating material and removing all parts made of conducting material from dangerous proximity to the uprights *l*. A connection by a sufficiently-slack insulated conductor can now be made between the uprights *l l* and the P and N binding-posts of the resistance-box C.

Sometimes still more universality of movement and greater adaptability than is afforded by the device just described is required for the contact-wheels *m*. In each case the apparatus will be modified, as shown in Figs. 7 and 8.

The wheels *m* are journaled at opposite ends of the cross-piece *o'*, which is pivoted to the shank l^2. The shank l^2 is free to move vertically in the hollow standard *l'* up or down and around its own axis. The connection of the hollow standards with wheels *k* and their insulation from each other and their connection with the resistance-box C would be substantially as already described. A spring, l^3, draws the wheels *m* against the conductors *a* and *b*, respectively. These parts *l'*. l^2 l^3 perform the duty of part *l* in the device of which this is a modification, and the spring l^3 does also the duty of springs *k* in said device. Each pair of wheels *m* have an oscillatory movement around a vertical axis intermediate between them; but in both modifications it will be seen that the area of the conductor from the wheels *m* to the resistance-box C is constant, no matter what the position of wheels *m*.

Two forms of insulation are shown in the drawings; but any convenient way may be adopted.

In Figs. 5 and 6 a web, *q*, extends vertically downward from the sill *g* of the truck K, near each end of the sill *g*, inside of the truck-wheels, and two transverse rails, *s*, are firmly fixed in the ears of these webs *q*, one on each side of the transverse rail *f*. A yoke, *t*, of insulating material, fast, as shown, to standard *l*, and adapted to slide on the rails *s*, and with insulating washers or thimbles at the standards *l*, breaks the metallic connection between the standards *l* in the device shown in these figures.

In the form shown in Figs. 7 and 8 the rails *s* are surrounded by insulating sliding thimbles in solid tint. The yoke *t'*, which lays hold of them, may be of metal, and it and the standards *l* are insulated by the parting-block *v*, also in solid tint.

The section-line in the center of Fig. 5 shows the plane of the section shown in Fig. 6, and the section-lines in the centers of Figs. 6 and 7 show reciprocally the plane of the section in the other figures.

The device described in the contact-truck, it will be seen, is a current-collector, and the improvements of this part of the engine consist in mounting it in such a way as that it may traverse bodily transversely of the truck, and also in making the pairs of contact-wheels, one pin for each standard, not only with shanks, which are spring-drawn to the conductors *a* and *b*, but also with vertical and horizontal spring-hinges, so that they may have constant electrical connection of uniform area with the resistance-box, and yet great independence of movement among themselves; and for better understanding of this the standards, pivots, and their connections are classified in the claims as the conducting portion of the current-collector, and the contact-wheels and their arms are classified as the contacting portion of the current-collector.

I do not claim as my invention the combination of a slotted conduit containing the working-conductors of an electric railway, a car, a frame depending from said car capable of lateral movement relative to the vehicle, and a contact device movable on a vertical axis extending from said frame into the conduit and taking current from the conductors.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The combination of a couple of conducting-standards, *l*, insulated from each other and from the truck-frame, and forming the two branches of a current-collector, each of which standards is provided with a traversing-wheel, *k*, with a truck-frame, K, provided with transverse bar *f*, whereby the disturbance due to lateral displacements of the current-collectors by lateral irregularities of the conductors is neutralized, substantially as and for the purpose described.

2. The combination of conducting-standards *l*, insulated from each other, with their respective pairs of contact-wheels *m*, by pivotal and spring connections, forming a spring universal joint, which permits movements of said wheels *m* which form the contacting portion of the current-collector in various directions without changing the cross-section of the conducting portion of the current-collector between the permanent conductors *a* and *b*, respectively, and the binding-posts of the resistance-box, substantially as described.

3. In an electric locomotive, a driving-wheel truck, to which the car-body is pivoted, and which carries a train of gearing for moving the vertical wheels of the truck, in which the first wheel is horizontal, concentric with the pivotal connection between truck and car, and capable of movement independent of the oscillation of the truck and car-body around their pivotal connection, in combination with a horizontal shaft, by which said horizontal first wheel is rotated around the said pivotal connection, but without affecting it, with a dynamo on the car, from which said horizontal shaft is rotated, and with suitable power-transmitting connections between the dynamo and the horizontal shaft, and between the horizontal shaft and the horizontal first wheel, substantially as described.

HERRMANN ERHARDT.

Witnesses:
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FRED. B. DOLAN.