(No Model.)

W. H. SOLEY & W. W. PERKINS.

ELECTRIC LOCOMOTIVE.

No. 482,594. Patented Sept. 13, 1892.

Fig. 1.

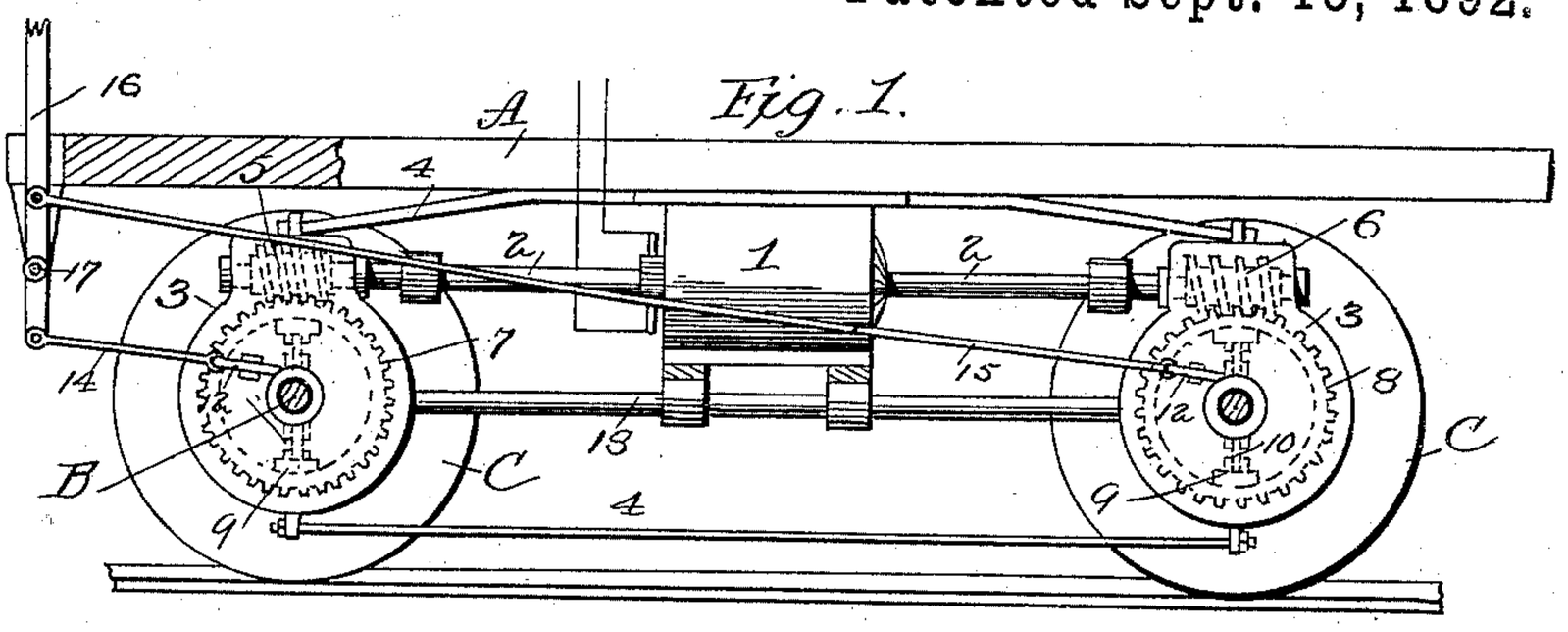


Fig. 2.

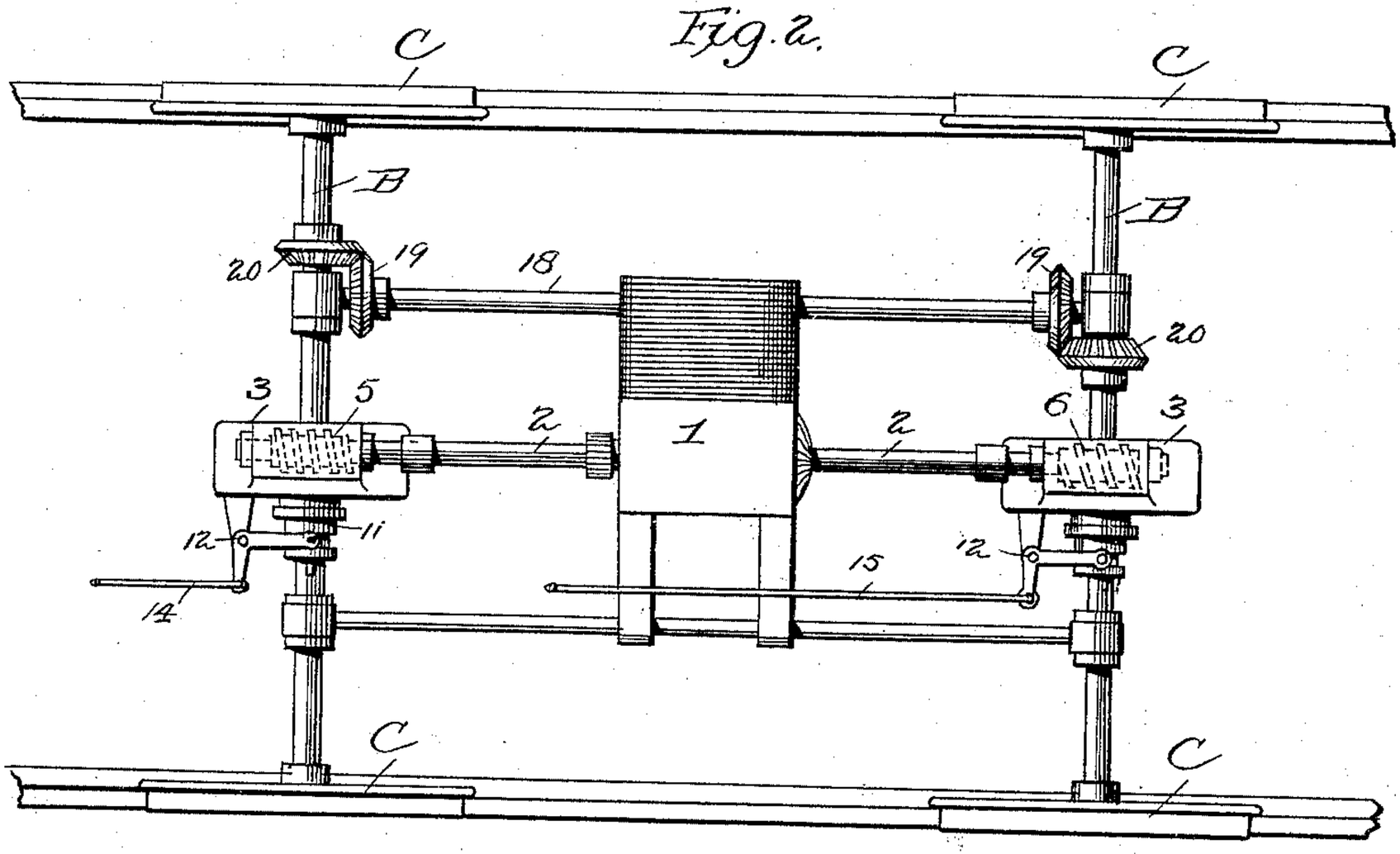
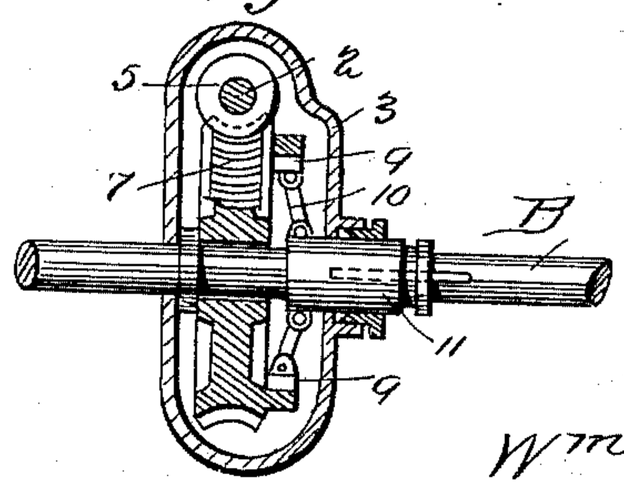


Fig. 3.



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UNITED STATES PATENT OFFICE.

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ELECTRIC LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 482,594, dated September 13, 1892.

Application filed January 7, 1892. Serial No. 417,311. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. SOLEY and WILLIAM WASHINGTON PERKINS, citizens of the United States of America, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electric Locomotives, of which the following is a specification, reference being had therein to the accompanying drawings.

It is the object of our invention to provide an electric locomotive having traction-wheels of substantially the same size and differential driving mechanism between the motor and the front and rear axles which will permit the car to run at a high or low rate of speed, as desired, while the speed of the motor is maintained at a uniform rate.

In providing the differential mechanism we aim to use such gearing as will avoid the objectionable rattle and noise which are noticeable in many of such apparatus as heretofore built, will admit of a compact arrangement of parts, will not be subjected to undue wear and tear in starting or when thrown into gear, and will permit the truck to run free when descending a hill.

Our invention includes the combination of devices hereinafter set forth.

In the drawings, Figure 1 is a side view of a truck embodying our invention. Fig. 2 is a plan view of the same, and Fig. 3 is a detail view of one of the boxes inclosing the worm-gearing and clutch.

In the drawings the framework A, the axles B, and the traction-wheels C are of usual construction. We aim to maintain the traction-wheels of equal size and to secure the variations in speed and power by providing a driving-gearing between one axle and the motor-shaft which will be differential relatively to the gearing between the opposite end of said shaft and the other axle.

The motor 1 is located between the axles, and its shaft 2 extends from each side over the front and rear axles. Its ends are journaled in casings or boxes 3, supported on the axles and braced by the rods 4. On the ends of this shaft and within the casing are secured the worms 5 and 6, which mesh, respectively, with the worm-wheels 7 and 8 loose on the axles. Each worm-wheel has a friction-surface on its side to be engaged by the friction-shoes 9 on the toggle-arms 10, pivoted to the sleeve 11, which projects through a packing-gland on the casing and is engaged by a bell-crank lever 12. The sleeves are splined to the axles, and when either one or the other of the clutch-shoes is thrown into engagement with its worm-wheel its axle will be revolved accordingly. The clutch and gearing are thus located within the box or casing, which may be filled with oil to keep the parts properly lubricated. The worm-wheels and worms of each pair of driving connections, while being the same as to size, differ in respect to the pitch and number of the teeth, so that the motion of the motor-shaft may be communicated to the axles differentially while maintaining itself a constant unvarying rate of speed—that is to say, the pitch of the teeth and threads of the rear pair is such as to drive the rear axle at a lower rate of speed than the gearing at the front axle, but with greater power—and in order that the two sets of gearing may be thrown into and out of gear with their respective shafts alternately connections 14 and 15 are made from the bell-crank levers 12, and these are pivoted to the lever 16 above and below the fulcrum 17 thereof, so that the motion of the lever which throws one clutch out of gear will throw the other into gear, or by moving the lever to its intermediate position both the clutches will be out and the locomotive will then run free, as when going downgrade, or the motor will run free when at rest, the speed of the motor being maintained at all times. It will be seen from the above that the differential driving mechanism consists in arranging between the ends of the motor-shaft and the front and rear axles, respectively, gearing which is different at one end from that of the other with respect to the pitch and number of the teeth, while the sizes of the parts, together with the traction-wheels, are maintained equal with relation to each other.

In starting the car, the rear slow-speed gearing is first employed and the friction-clutch may be maintained, so as to allow the shoes

to slip at first to secure a gradual action and avoid straining the parts, and the car having started, the shoes are forced hard into place and the full power obtained, after which the rear gearing may be released and the front high-speed gearing thrown into action. The same action will take place in going around curves or in climbing hills, where the greatest power is obtained, the rear low-speed connection being employed, while the front connection is thrown out of gear. In order that the two axles may be connected independently of the motor connections above described, so that both axles will be driven simultaneously, whether the front or the rear driving connection is in gear, we employ a shaft 18, having beveled pinions 19 at its ends, meshing with the pinions 20 on the axles. This shaft is journaled in boxes on the axles and its intermediate portion may serve as a support for the motor-frame. Should the front gearing be in use and the front traction-wheels slip, then the traction will be secured through the rear wheels, and, on the other hand, if the rear gearing be used the front traction-wheels will act to supplement or take the place of the rear traction-wheels.

We claim as our invention—

1. In combination, the truck, the motor, a driving connection between the front of the said motor-shaft and the axle, and a second driving connection between the rear of said shaft and the rear axle, said connections being differential with respect to each other, clutches on the axles, and an idler connection between the axles independent of the motor and its connected mechanism, substantially as described.

2. In combination, the truck, the motor, the driving connections therefrom to the front and rear axles, respectively, the clutches, and the idler connections between the axles, comprising the shaft and the miter-gears, the said shaft being in connection with the motor-frame, substantially as described.

3. In combination, the truck, the motor, the differential worm-gearing between the front and rear ends of said motor-shaft and the front and rear axles, the casings or boxes inclosing said gearing, the friction-clutches, also located within said casings and having sleeves extending through packing-glands thereon to the outside, and means for operating the clutches connected to the projecting sleeves, substantially as described.

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

WILLIAM H. SOLEY.
WILLIAM WASHINGTON PERKINS.

Witnesses:
WM. H. YELLAND,
WM. O'NEIL.