(No Model.) 2 Sheets—Sheet 1.

G. K. MUNRO, Jr.

MOTOR CAR.

No. 590,848. Patented Sept. 28, 1897.

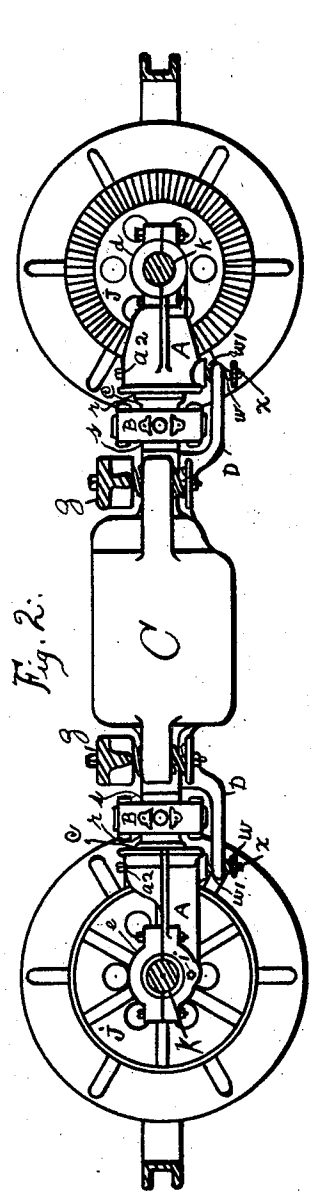


Fig. 2.

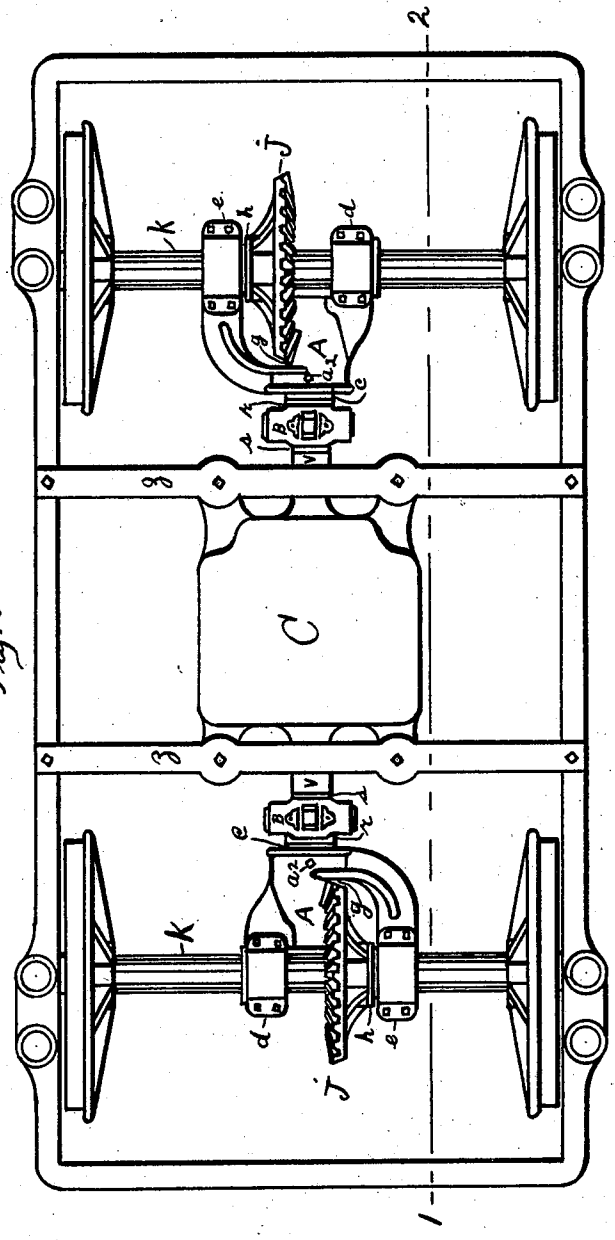


Fig. 1

WITNESSES.

Andrew. Fred. Munro.

George. Kirk. Munro. Sen.

INVENTOR.

George. Kirk. Munro. Jr.

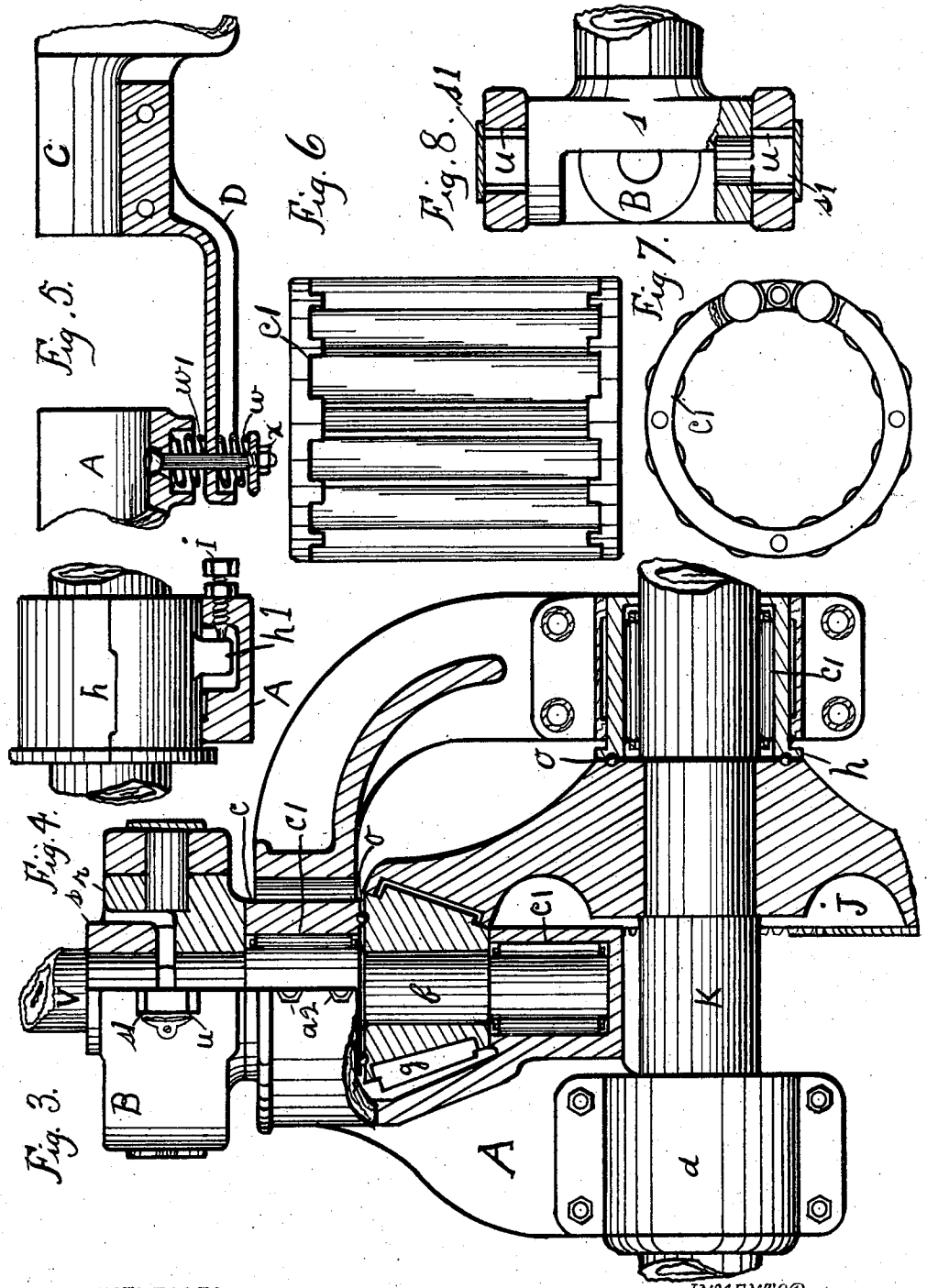
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UNITED STATES PATENT OFFICE.

GEORGE KIRK MUNRO, JR., OF DETROIT, MICHIGAN.

MOTOR-CAR.

SPECIFICATION forming part of Letters Patent No. 590,848, dated September 28, 1897.

Application filed March 25, 1897. Serial No. 629,271. (No model.)

To all whom it may concern:

Be it known that I, GEORGE KIRK MUNRO, Jr., a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented certain new and useful Improvements in Motor-Car Equipment; and I declare the following to be a clear, full, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

The object of this invention is to provide a flexible connection between the motor and the axle of the car-wheels and at the same time to provide for driving both axles and both sets of car-wheels from a single central motor.

In the drawings, Figure 1 is a plan view of the truck to which my invention is applied. Fig. 2 is a side elevation of the equipment of the truck-frame, the axles being in section. Fig. 3 is a horizontal section, on an enlarged scale, through the connections of one end of the driving mechanism and an axle. Fig. 4 is a sectional view, on a large scale, showing the means of adjusting the gear-wheel on the axle up to the pinion by which it is driven. Fig. 5 is a detail of the supporting-arm D and its immediate connections. Fig. 6 is a plan view of the roller-bearings used between the axle and the gear-wheel J. Fig. 7 is an end elevation of the roller-bearings. Fig. 8 is a plan, partly in section, of one part of the universal joint that is used to connect the motor-shaft to the pinion-shaft.

The motor C is located at the central part of the truck, and its shaft is arranged longitudinally of the truck and connects at each end by a flexible or universal joint with a short shaft, upon which is mounted a pinion that meshes with a beveled gear on the car-axle; and the features to which I call special attention are this flexible joint and the means by which the beveled pinion is arranged to be kept in mesh with the beveled gear on the axle.

The construction at one end of the truck is precisely similar to that at the other end, and a description of the construction at one end will suffice to a full understanding of the entire device.

C indicates the motor, and *v* the motor-shaft, the axis of which is lengthwise of the car-truck.

k indicates an axle of the wheels, upon which there is hung a casting in which the axle revolves. The casting has two bearings, and over the bearings are two caps *d e*, held to the bearing by suitable bolts and having preferably interposed under the caps and above the bearings roller-bearings. (Shown in detail in Figs. 6 and 7 and shown in position in Fig. 3.) The rollers of the roller-bearings are inclosed in a movable box *h*, which is provided with a lug or lugs *h'* and the end of which bears against a face of the beveled gear *j*.

The beveled gear *j* is keyed or otherwise secured to the axle of the truck, and there is interposed between the face of this gear and that face of the box *h* which lies next to it a number of balls *o* in a circular groove or track properly constructed for their reception. The box *h* is adapted to have movement along the axis of the axle *k*, and the lugs *h'* project into cavities in the cap *e* and engage with the inner ends of set-screws *i*, which pass through the web of the cap *e* and bear against the lugs *h'* and are adapted to force the box *h* against the beveled gear-wheel *j* and force that wheel into close engagement with the pinion *g*. The pinion *g* and the gear-wheel *j* are both shrouded to pitch-line both at the outer and at the inner end of the teeth, and the shrouds engage closely, and consequently the movement of the gear-wheel *j* along the axle or the similar movement of the pinion along its axle cannot bring the pinion and the gear-wheel into a closer engagement than that which is proper.

The shaft *b* of the pinion *g* is borne in a pocket-bearing in the casting A. The inner end of the shaft *b* runs on roller-bearings, and the outer end also runs in roller-bearings that are themselves borne in a shell *c*, that bears endwise against the face of the pinion *g* and is provided with roller-bearings *o'*. The shell *c* is held in position in its bearings in the main casting A by a suitable set-screw a^2.

The parts thus far described comprise the pinion and gear-wheel and the means for adjusting them in proper engagement and hold-

ing them in proper engagement under all conditions; but these gear-wheels are to be driven from the shaft *v*, and in order that they may be so driven and so allowance may be made for the twisting or rocking movement of the truck and the consequent rocking or twisting of the shaft with respect to the bearings I provide a universal-joint connection between the end of the shaft *v* and the end of the shaft *b*. The two shafts are in axial alinement, and on one of them, *b*, is borne a forked head *r*, that is swiveled to an external ring B. On the other one, *v*, is carried a forked head *s*, into which through the rectangular openings in the ring B project swivel-pins *s'*. These pins are rectangular at their outer ends and round at their inner ends and the rectangular outer end of which is shorter than the rectangular hole in which it engages. The forked head *s* swivels on the round inner ends of the pins *s'*, and the shaft, with the head and with the pins, is capable of endwise movement in the rectangular holes *u*. This form of universal flexible joint permits not only universal flection, but also permits a sufficient amount of endwise movement to compensate for the wrenching, twisting, or straining of the car-truck.

At each end of the motor is a cross-bar *z* of the main frame, and from these cross-bars the motor is hung by suitable stirrups and stirrup-plates, and from the bottom of the stirrup-plate an arm D projects in each direction toward the casting A, reaching underneath the joint which unites the two shafts and supporting at its extremity a bearing-plate on which the end of the casting A rests, preferably with a pair of interposed springs *w w'*, so arranged that any tendency to lift the end of the casting A off from the arm is counteracted by compression of the spring *w*, and any tendency of the casting A to bear down on the arm is resisted by the compression of the spring *w'*. The two springs *w w'* are arranged the one above the arm D and between it and the casting A and the other below the arm D and between it and a washer on the head of the bolt *x*.

What I claim is—

1. In combination with a car-truck, a motor mounted thereon, driving-gear mounted on the car-axle, a shaft to the motor and a shaft for the driving-gear normally in alinement with the motor-shaft, a coupling between the two shafts consisting of a forked terminal for each shaft, a ring, a swivel engagement between the ring and one of the said forks, swivel-pins engaging the other of said forks and provided with rectangular extensions that engage in rectangular holes in said ring, each rectangular hole being slightly larger in the direction of the longitudinal axis of the shaft than the pin which engages in it whereby the coupling is adapted to allow universal flection and variation of axial length of the compound shaft, substantially as described.

2. In combination with a car-truck, a motor, gearing mounted on each of the two axles of the car-truck, a motor-shaft, shafts for the gearing on each of the two axles both being in axial alinement with the motor-shaft, a coupling between the motor-shaft and each gearing-shaft comprising a ring held by swivel-pins to forks terminating said shafts and adapted to allow universal flection and variation of axial length of the compound shaft, substantially as described.

3. In a driving-gear for cars, the combination of a shrouded motor-wheel on the axle, a shrouded pinion carried in a casting borne by the axle, roller-bearings carried in boxes adapted to have end movement and provided with ball-bearing end contacts between said boxes and the motor-wheel face, substantially as described.

4. In a driving mechanism for cars, in combination with the car-truck and motor mounted thereon, driving-gear sustained by the axle, a motor-shaft and a driving-gear shaft in axial alinement and united by a coupling adapted to have a universal flection, a bearing-arm attached to one or said shafts and engaging the other with spring connection, substantially as described.

5. In a driving mechanism for cars, in combination with the car-truck and motor mounted thereon, driving-gear sustained by the axle, a motor-shaft and a driving-gear shaft in axial alinement and united by a coupling adapted to have universal flection, a bearing-arm attached to one of said shafts and engaging the other with double spring connection, substantially as described.

6. In a driving mechanism for cars, the combination of intermeshing shrouded gears and means for producing end thrust on the gears and thereby bringing the shrouds into engagement, substantially as described.

Detroit, March 23, 1897.

GEORGE KIRK MUNRO, JR.

Witnesses:

ANDREW FRED MUNRO,

GEORGE KIRK MUNRO, SR.