driving-trucks shown in Fig. 1: Therefore one of the objects of my invention consists in providing a multicylinder motor-engine 16, connected to a central longitudinal propelling-shaft 18; furthermore, one which would be in essentially good balance when running at the high speed necessary to obtain the requisite power. To accomplish these results, a double-crank motor-shaft 19 is substituted for the single crank formerly used. The cranks are arranged so as to be diametrically opposite and near each other. Then by using four motor-cylinders 20 20′ 20″ 20‴ and connecting them to the motor-shaft 19, as shown in Fig. 9, the reciprocating parts of either adjacent pair of engines, 20 and 20′ or 20″ and 20‴, continually move in opposite directions, thereby balancing their reciprocating parts and permitting a high speed without vibration, a feature highly essential to the successful running and life of the locomotive.

Instead of providing for the four cylinders two sets of valve-gears having two pairs of reversing-trucks, I use eight eccentrics, with their complements of straps and rods, and another important feature of my invention is the material reduction of the number of parts necessary to operate the four valves, thus lessening the complication and effecting a great saving in first cost and expense of maintenance. To accomplish this, the pair of eccentrics 21 21′ is mounted at one end of the motor-shaft, and each eccentric is fitted with a strap 22, having two rods 23 and 24 attached thereto. One rod, 23, is pivotally connected at 75 and the other, 24, rigidly connected to prevent the strap from revolving with the eccentric. The rods make the same angle with each other as the engines and connect to their corresponding links 17 in the usual manner. From the links the motion is transmitted to the engine-valves through a suitable valve-stem 25, which is extended through the steam-chest 26 and pivotally connected to a rocking lever 27, mounted upon the cylinder-covers 28. The rocking lever transmits the reciprocating motion of the valve and valve-stem 25 to the corresponding valve-stem 29 and valve of the adjacent cylinder. The valves are of the common D pattern and are balanced to insure their light running.

I do not wish to limit myself to the particular location of the rocking lever 27, as it may be placed in different positions and accomplish the same results. This position is chosen because of its accessibility. 

The locomotive is provided with three trucks, each having two pairs of drivers connected by side rods in the customary manner. To facilitate making repairs without the use of skill and special tools and when in use in places remote from workshops, the bevel-gear 30 is removably fastened to the enlarged driving-axle 31 farthest from the motor-engines by means of the clamp-bolts 32, thus avoiding the necessity of removing the driving-wheels when replacing the gears. To prevent any abnormal strain due to the action of the gears from coming upon the truck-frame, the gears and their shaft-bearings are mounted upon a separate and self-contained inclosing gear-frame 33, which is hinged upon the enlarged axle with its pinion-shaft end 34 resting upon the truck-frame directly under the bolster 35. This arrangement permits the driving-axle to accommodate itself to the uneven track without affecting the accurate alinement of the gears. Moreover, the gear-frame forms a protection to the gears inclosed thereby. It is essential in these locomotives to provide the simplest construction. Therefore the side frames 36 of the truck are each made of a single steel casting which has suitable semicircular recesses 37 in the ends for retaining the axle-brasses 38. At the middle of each frame a rectangular housing 39 is provided for the coil-springs 40, that support the truck-bolster 35, the end of which slidingly fits the rectangular housing of each side frame. The lower edge of each side frame is in line with the center of the semicircular recesses 37. This is very desirable, because the two frames can be bolted together and the recesses bored at one setting, thus reducing the cost of machining one-half. The side frames are fastened at their lower edge to a thin and flexible bottom plate 41, which permits the truck to adjust itself to the uneven track, but prevents it getting out of square when meeting obstructions and passing curves. The cross-strut 42 and the diagonal brace 66 resist the side sway of the locomotive. Moreover, the brace with the bolts 68 and bottom plate 41 form a housing for the pinion-shaft end of the gear-frame 33. The intermediate truck is fitted with two king-bolts, one on each side of the central shaft 43. In the foot-plate 8 are circular slots 44, so the truck may swing about its center without cramping the king-bolts. 

The double-crank motor-shaft 19, fixed upon the motor-engine 16, is connected to the front and intermediate trucks 2 and 3 by the intervention of floating-shafts 18 and knuckles in the usual manner. The rear or tender truck 15 is driven independently from the motor-shaft by the second shaft 43 and two gears 45 and 46, one fixed to the motor-shaft and the other to the fixed section of the second shaft. This construction avoids the double duty that otherwise would come upon the connections if both trucks were driven by a single main shaft, as has been the practice heretofore. One bearing, 47, of the fixed section of the second shaft is preferably located upon the motor-engines, the other, 10, upon the foot-plate 8. To reduce the angular movement of the floating-shaft 48, connecting the fixed section with the pinion-shaft upon the truck, it is best to locate the knuckle-joint 49 under the hinge or link coupling 12 between the main frame and tender-frame. The second shaft passes centrally