

of each truck of the tender I gear the longitudinal shaft 34 by means of skew bevel gearing 38. Thus when the supplemental wheels are driving the locomotive the normally idle wheels of the locomotive and tender may be simultaneously driven by means of the shaft 34 and gearing 38.

As it is necessary that the idle wheels of the bogie and tender should run free when the ordinary drivers are in engagement with the track, I provide the axles of the supplemental and idle wheels with clutches 41 whereby the bevel gearing 38 on each axle may be thrown in or out of clutch with the axle. The clutches are sliding clutches of ordinary description. A detail of one of these clutches is shown in Fig. 7. I prefer to employ clutches of the ordinary positive type, and 42 is a movable part of such a clutch. A shifter ring 43 is journaled in a suitable groove in the movable part 42. A shifter 44 is pivotally connected with the shifter ring. The upper end of this shifter is provided with a projection 45 whereby the shifter may be moved. A projection 46 is formed at the under side of the shifter and extends into a short transverse slot 47 formed in a part 48, suitably secured to or forming part of a stationary part of the frame. A coil spring 49 is secured at one end to a stationary part and at the other to the lower part of the shifter 44. It thus tends to hold the clutch in engagement and the projection 46 close to the inner end of the slot 47. Mechanism must be provided whereby these clutches are simultaneously placed in and out of clutch when the supplemental wheels are lowered or raised. I illustrate for this purpose a longitudinal bar 50 provided with joints 51 wherever necessary to permit of the swinging of the bogie of the locomotive or the trucks of the tender. This bar is guided in any suitable manner, and is provided with diagonal slots 55 engaging the projections 45. It is evident that by moving this bar longitudinally a lateral movement will be imparted to the shifter 44 to engage and disengage the clutches. This longitudinal bar is operated from one of the longitudinal bars 31 which impart the vertical movements to the supplemental wheels. For this purpose I employ a cranked lever 52 suitably fulcrumed on the frame of the locomotive. One part of this lever is necessarily outside the frame and the other inside. The inner part of this lever is connected by means of the pivoted link 53 with the longitudinal bar 50. The outer and upper part of the lever is connected by a similar link 54 with one of the longitudinal bars 31. Thus the bar 50 moves simultaneously with the bar 31, and the clutching and unclutching of the bevel gearing 38 is simultaneous with the downward and upward movements of the supplemental wheels.

It will be noted that the springs 49 yield to prevent any breakage if the longitudinal bar is moved to shift the movable part of the clutches into gear when the two clutch parts are not in proper position for the clutch faces to engage, the spring subsequently snapping the parts of the clutch together as soon as a proper position has been reached by the rotation of the axle with which the movable part of the clutch rotates. There is a little backward or forward play of the clutches on the axle of the idle wheels compared with the clutches of the supplemental wheels, owing to the fact that the axles of these idle wheels ordinarily are capable of a swinging motion to follow the curves of the track, and this causes movements of the projections 45 in the slots 55 in the bars 50, but the springs 49 will take care of this lost motion without impairing the engagement of the clutches, until the bars are operated in the manner described to shift the clutches. From this construction it follows that either the ordinary drivers or the supplemental wheels and normally idle wheels may be used to drive the engine. As these supplemental and idle wheels are considerably smaller in diameter than the ordinary drivers there is a corresponding increase of power obtained when using these drivers, but, of course, with a decrease in speed. The engine is thus given ample power to climb a grade, and is given an added traction on the rail, which is particularly necessary when pulling heavy loads on slippery rails. When running on a level the weight of the locomotive is transferred to the ordinary driving wheels, and the engine becomes, for all practical purposes, an engine of ordinary construction.

What I claim as my invention is:—

1. A locomotive provided with ordinary driving wheels; normally idle wheels; means for raising the driving wheels clear of the track; and means for driving the idle wheels when the ordinary driving wheels are so raised. Geared Steam Locomotive Works

2. A locomotive provided with ordinary driving wheels; normally idle wheels; means for raising the driving wheels clear of the track; means for driving the idle wheels from the ordinary driving wheels; and means for freeing the idle wheels when the ordinary driving wheels are in engagement with the track. www.gearedsteam.com

3. A locomotive provided with ordinary driving wheels; normally idle wheels; means for driving the idle wheels from the ordinary driving wheels; and means for freeing either sets of wheels at will.

4. A locomotive provided with ordinary driving wheels; normally idle wheels; supplemental wheels; means for lowering the supplemental wheels to raise the driving wheels; means for driving the supplemental wheels and idle wheels from the ordinary driving