

side bars 12 journaled on the wrist pins 13 of the driving wheels. The supplemental wheels will be driven from the ordinary driving wheels. This may be done in various ways but I prefer to impart the movement to the supplemental wheels from the driving wheels by providing connecting rods 14 which are journaled on wrist pins 15 on the supplemental wheels 3 and on wrist pins 16 on the side bars 12 close to the wrist pins 13. Thus the supplemental wheels are rotated at the same rate as the ordinary driving wheels, but owing to their smaller diameter their peripheral speed is much less and the power of the locomotive increased with of course a corresponding decrease in speed.

We may now consider the method of supporting the journal boxes 10 of the supplemental wheels. Each journal box has a link 17 connected with it, which link runs parallel to one of the connecting rods 14, and is pivotally connected with the journal box 5 of the driving wheel in front, to form with one of the connecting rods 14 a parallel motion which, within the limits of movement of the box of the supplemental wheel, maintains the center of the supplemental wheel at a constant distance from the center of the ordinary driving wheel adjacent to the wrist pin by which the connecting rod driving the supplemental wheel is journaled on the side rod. The links 17 are preferably rigidly secured to the boxes 10 of the axles of the supplemental wheels. These links thus form the sole means of holding the boxes of the supplemental wheels in position longitudinal of the locomotive.

It is advisable to utilize the springs 6 of the main driving wheels to cushion the locomotive when the supplemental wheels are in use. For this purpose I employ the following mechanism:—18 are equalizer levers, each pivoted on the hanger of one of the springs 6. The forward end of the forward equalizer lever is pivotally connected with the lower end of the link 19, the upper end of which is pivoted on a suitable part of the frame of the locomotive. The rear end of the forward equalizer lever and the forward end of the rearward equalizer lever are each pivotally connected by means of a link 20 with an equalizer lever 21, which is vertically movable on the frame of the locomotive, its pivot 22 being movable in a short slot 23 in the frame. The rearward end of the rearward equalizer lever 18 is pivotally connected to the lower end of the link 24, the upper end of which is pivotally connected with the equalizer lever 25. The rearward end of this equalizer lever 25 is pivoted at 26 on the frame of the locomotive. It is evident from this construction that by pressing the boxes 10 of the supplemental wheels downwardly by upward pressure against the equalizer levers 21 and 25 the weight of the locomotive

may be supported on the supplemental wheels through the medium of the springs 6, the links 19, the forward equalizer lever 18, the links 20, the equalizer lever 21, the rearward equalizer lever 18, the link 24, and equalizer lever 25. For the purpose of imparting this movement to the said journal boxes 10 I pivot on each of the equalizer levers 21 and 25 a toggle lever 27, of which 28 is the central pivot. The lower part of each toggle lever is pivotally connected with the journal box 10 below it. Gearred Steam Locomotive Works

29 is an arm extending upwardly from the upper portion of each toggle lever. These arms 29 are pivotally connected with links 30, which are pivotally connected with the longitudinal bar 31. This bar is suitably connected with the piston rod 32 of a cylinder 33, which may be operated by steam or air, as may be convenient, to longitudinally move the bar and thus operate the toggle levers 27. These toggle levers are shown in Fig. 2 in the position they assume when the supplemental wheels are forced downwards and the ordinary driving wheels thus raised. It will be readily seen that by swinging these toggle levers rearwardly that the journal boxes of the supplemental wheels will be lifted and the supplemental wheels thus raised from the track. It will also be seen that when the supplemental wheels are in use the weight of the locomotive is supported upon them solely by means of the connections described with the equalizer system and the links 17 connecting the journal boxes of a supplemental wheel and the driving wheel forward of it. It will be understood of course that the parts described are duplicated on the opposite side of the engine. www.gearredsteam.com

I will now describe the means provided for driving the idle wheels of the locomotive and the tender from the supplemental wheels. A longitudinal shaft 34 is provided which runs over the axles of the supplemental wheels and idle wheels from the rear axles of the tender to the axles of the bogie of the locomotive. This shaft is carried in suitable bearings 35 supported on the axles it crosses. Owing to the fact that the height of the axles of the supplemental wheels varies, as already described, and as, of course, the axles of the tender and the axles of the bogie are not always parallel to the axles of the supplemental wheels, it is necessary that universal telescopic joints 36 be formed in the shaft 34 between the supplemental wheels and the normally idle wheels of the bogie, between the supplemental wheels and the normally idle wheels of the tender, and also between the two trucks of the tender. This permits of the necessary play of the shaft up and down, laterally, and longitudinally without impairing its efficiency as a driver. To the axles of the supplemental wheels, the axles of the bogie, and the axles