No. 709,429. Patented Sept. 16, 1902.

J. H. WILLIAMS.

LOCOMOTIVE.

(Application filed Jan. 9, 1902.)

(No Model.) 4 Sheets—Sheet 1.

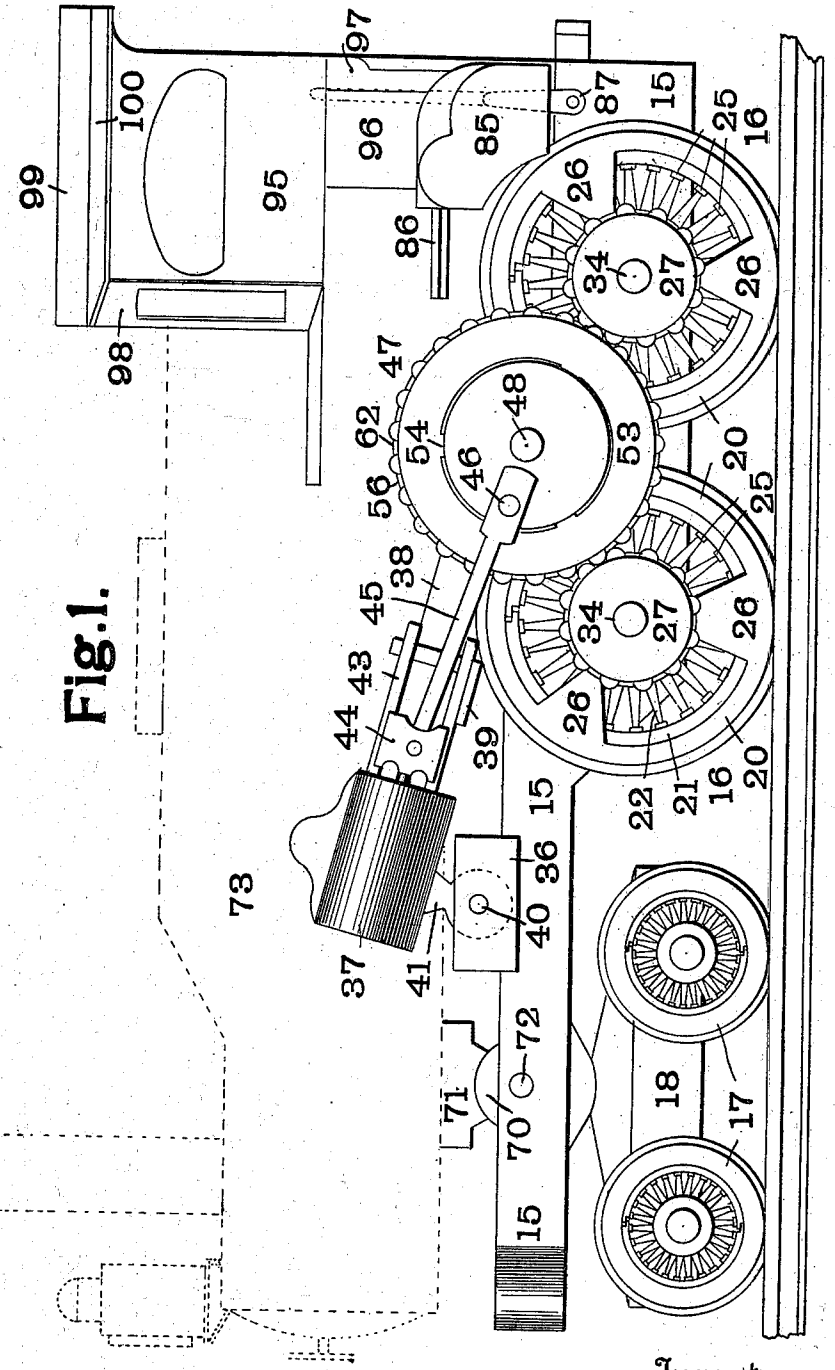


Fig. 1.

Witnesses

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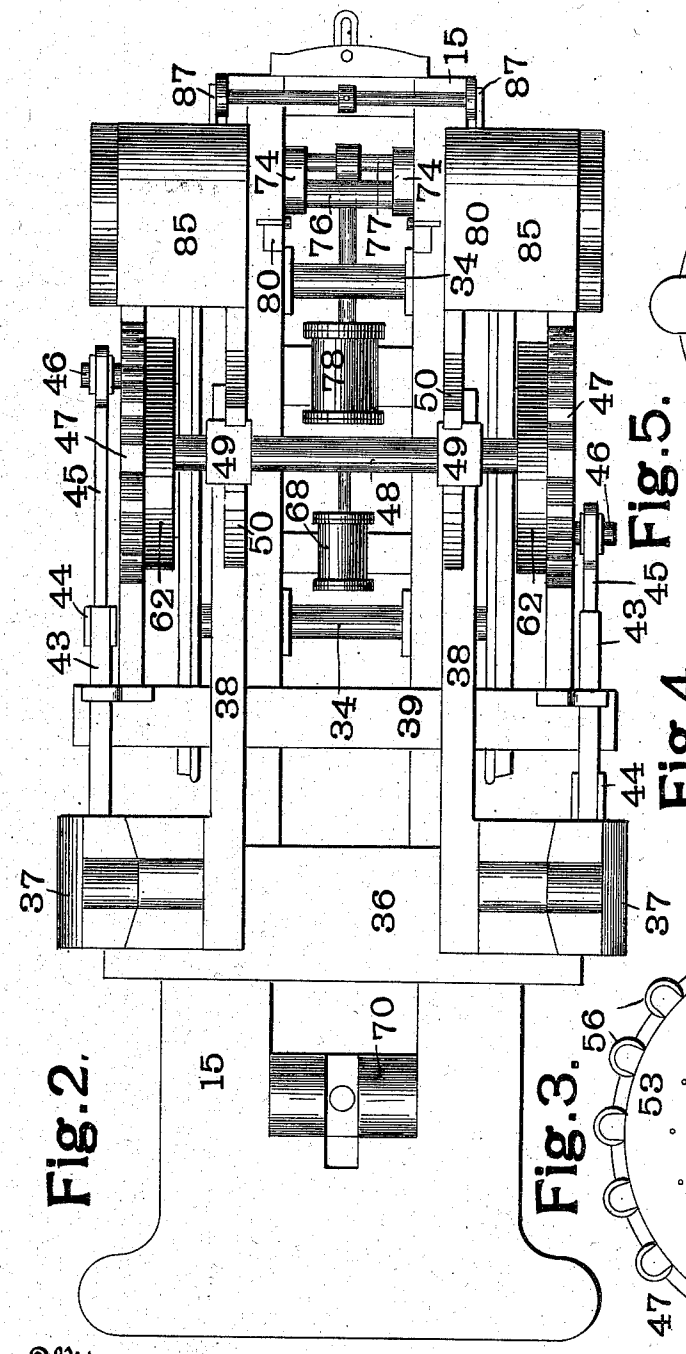


Fig. 2.

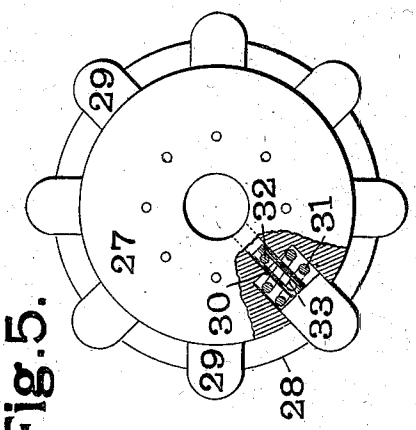


Fig. 5.

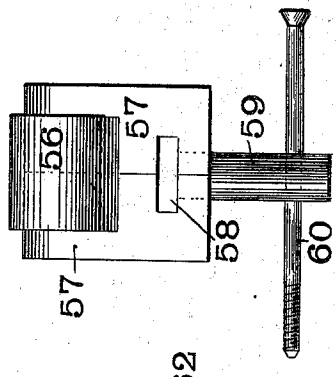


Fig. 4.

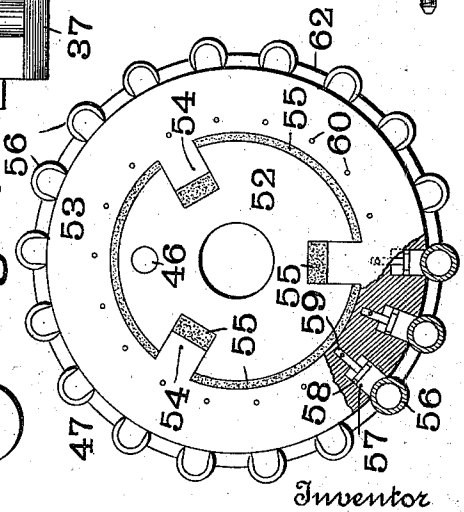


Fig. 3.

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Fig.6.

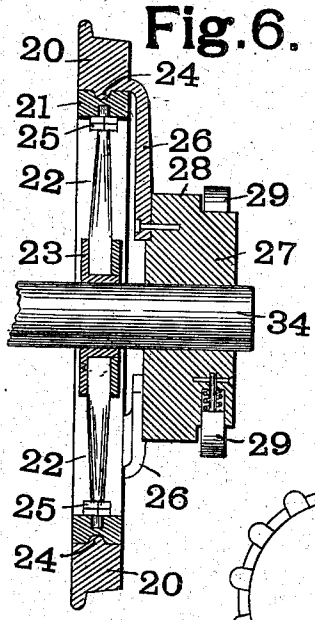


Fig.7.

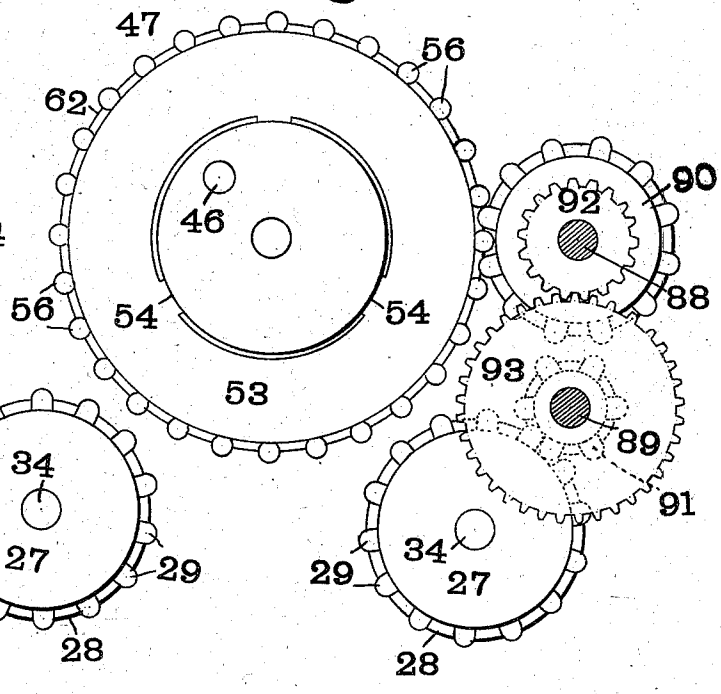


Fig.8.

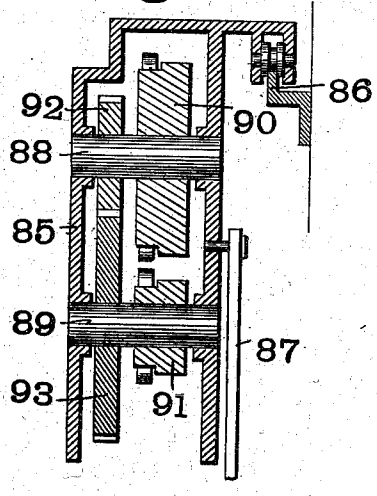
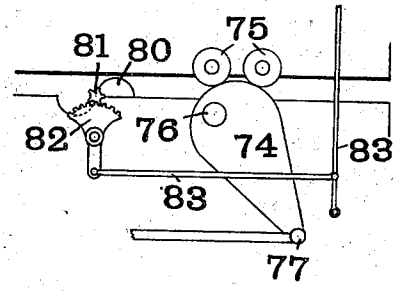


Fig.9.



Witnesses

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No. 709,429. Patented Sept. 16, 1902.

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(No Model.) 4 Sheets—Sheet 4.

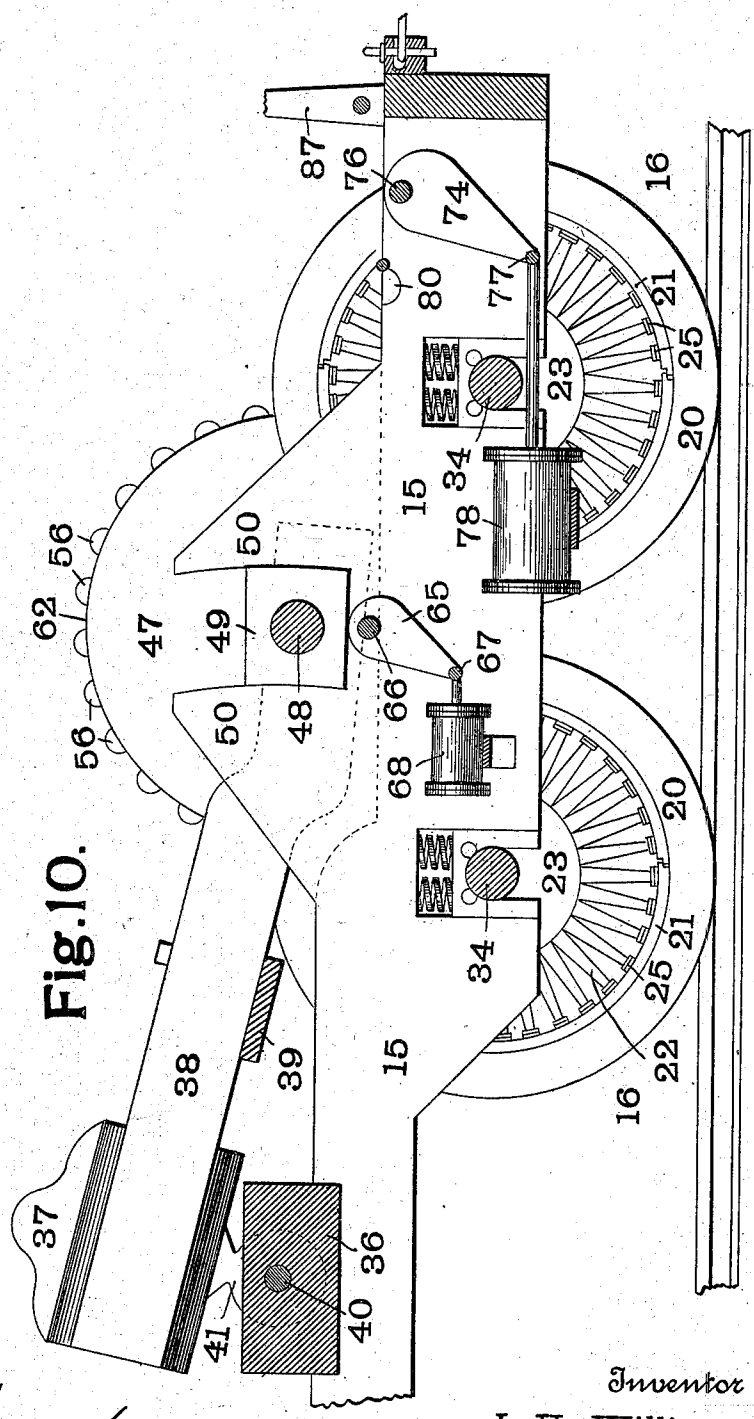


Fig. 10.

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UNITED STATES PATENT OFFICE.

JOSEPH H. WILLIAMS, OF UPPER ALTON, ILLINOIS, ASSIGNOR OF THREE-FOURTHS TO ISAAC MOORE, M. R. LINDLEY, AND H. L. DICKINSON, OF ALTON, ILLINOIS.

LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 709,429, dated September 16, 1902.

Application filed January 9, 1902. Serial No. 89,013. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH H. WILLIAMS, a citizen of the United States, residing at Upper Alton, in the county of Madison and State of Illinois, have invented a certain new and useful Locomotive, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

One object of my invention is to provide improved driving-gear for locomotives whereby greater speed can be obtained without increasing the movement of the pistons.

Another object of my invention is to improve the general construction of locomotives whereby the breakage of the parts can be more easily repaired.

My invention consists, in part, in the combination, with a frame, of drive-wheels for said frame, gear-wheels carried by said drive-wheels, toothed disk-wheels engaging with said gear-wheels, and pistons for driving said disk-wheels.

My invention also consists in various other novel features and details of construction, all of which will be described in the following specification, and pointed out in the claims affixed hereto.

In the accompanying drawings, which illustrate a locomotive made in accordance with my invention, Figure 1 is a side view, the boiler being shown in dotted lines. Fig. 2 is a top plan view, the boiler and cab being removed. Fig. 3 is a detail view, partly in section, showing one of the disk-wheels. Fig. 4 is an enlarged view of one of the roller-teeth for the disk-wheels. Fig. 5 is a detail view, partly in section, showing one of the gear-wheels carried by the drive-wheels. Fig. 6 is a central section through one of the drive-wheels and attached gear-wheels. Fig. 7 is a view showing the disk and gear wheels, together with the slow-speed gear in engagement therewith. Fig. 8 is a section through the slow-speed gear. Fig. 9 is a detail view of the devices for raising the boiler, and Fig. 10 is an enlarged sectional view through the rear part of the main frame.

Like marks of reference refer to similar parts in the several views of the drawings.

15 is the main frame of the locomotive. The frame 15 is supported at the rear by means of drive-wheels 16 and at the front by the front-truck wheels 17, carried by the front truck 18. Each of the drive-wheels 16 consists of a rim 20, felly 21, spokes 22, and hub 23. The interior of the rim 20 is provided with a rib 24, Fig. 6, which lies in a corresponding groove formed in the felly 21. The felly 21 is held against the rim 20 by means of nuts 25 on the spokes 22. There are preferably two of these nuts 25 on each spoke, one nut bearing against the felly and the other acting as a lock-nut for the first nut. The inner ends of the spokes 22 are made square and fit within a groove in the hub 23. The felly 21 is made in two or more sections, as shown in Figs. 1 and 10.

Carried by the rim 20 are radial plates 26, preferably three in number, to which are attached the gear-wheels 27. Each of the gear-wheels 27 consists of a smooth circumferential bearing-strip 28 and a row of teeth 29. The teeth enter the gear-wheels 27, as shown in Fig. 5, and are provided with stems 30, surrounded by coil-springs 31. The teeth are held in position by means of bolts 32 passing through slots 33 in the said stems 30.

34 represents the axles of drive-wheels 16.

The front-truck wheels are made in all respects similar to the drive-wheels 16, except that they are not provided with the radial plates 26, as they have no gear-wheels attached to them.

The construction of the teeth on the wheels 27 and 47 enables the said wheels to be brought into contact without danger of injury to the teeth and also prevents binding and consequent strain which would be liable to occur in rounding curves if ordinary spur-wheels were used.

36 is a cross-beam carried by the main frame 15. Pivotally mounted to the cross-beam 36 are the two cylinders 37, which in turn are attached to the side bars 38 of a second or auxiliary frame. These side bars 38 are connected by means of a cross-plate 39. The cylinders 37 are pivoted to the cross-

beam 36 by means of a bolt 40 passing through the said beam 36 and through lugs 41, carried by the cylinders.

Carried by the cross-plate 39 are slides 43, between which move the cross-heads 44 of the cylinders 37. The cross-heads 44 are connected, by means of pitman-rods 45, with wrist-pins 46, carried by disk-wheels 47. The disk-wheels 47 are mounted upon a shaft 48. The shaft 48 is carried in boxes 49, which slide in guideways 50, carried by the main frame 15. The boxes 49 are carried by the side bars 38 of the auxiliary frame, which is pivoted to the cross-beam 36. Each of the disk-wheels 47 consists of the central portion 52, which is mounted directly on the shaft 48, and an outer portion 53. The outer portion 53 is provided with inwardly-projecting lugs 54, which engage with openings in the inner portion 52. The spaces left in these openings, as well as the space between the two parts of the wheels, are filled with rubber 55 or other suitable elastic material, which will absorb any jar which is brought upon the wheels. The wheels 47 are provided with roller-teeth, which consist of a roller 56, journaled in a sectional block 57, which enters a suitable opening in the periphery of the wheels 47. Each of the blocks 57 is divided into two sections, in each of which is formed a groove 58 for the reception of the head of a bolt 59. The bolts 59 are held in the rim 53 of the wheel by means of bolts 60 passing laterally through the wheel and the said bolts 59. In addition to the roller-teeth 56, which engage with the yieldingly-mounted teeth 29 of the wheels 27, each of the said disk-wheels is also provided with a smooth circumferential bearing-surface 62, which engages with the bearing-surfaces 28 of the wheels 27.

In order to raise the disk-wheels 47 out of engagement with the gear-wheels 27, I provide two cams 65, which are mounted on a shaft 66 which engage with the lower sides of the boxes 49. These cams 65 are connected by a cross-rod 67, Fig. 10, which is connected to the piston-rod of a cylinder 68, carried between the sides of the main frame 15.

Carried near the front end of the main frame 15 is a bolster 70, to which a bed-plate 71 is pivoted by means of a bolt 72. The bed-plate 71 is secured to the under side of the boiler 73. The rear end of the boiler 73 rests on the rear end of the main frame 15. In order to raise the rear end of the boiler, I provide two cams 74, which bear against rollers 75, Fig. 9, on the under side of the rear end of the boiler. The cams 74 are mounted upon a shaft 76 and are connected by means of a cross-rod 77. The cross-rod 77 is connected with the piston-rod of a cylinder 78, by means of which the said cams are operated to raise the boiler. In order to maintain the boiler in its raised position, I provide a pair of stops 80, which are preferably semicircular in form, as shown in Figs. 9 and 10. Each of these stops 80 is provided with a spur-wheel 81, which engages with a segmental rack 82. The segmental rack 82 is actuated by means of rods 83, leading to the cam. After the boiler has been raised the stops 80, which are normally in the position shown in Fig. 10, are moved into the position shown in Fig. 9, when the boiler can be lowered against them and will be held in the proper raised position by them.

In order to reduce the speed of the locomotive, I provide a reducing-gear. (Best shown in Figs. 7 and 8.) The reducing-gear is in two parts, each of which is carried in a casing 85, which is slidingly mounted upon a track 86. The casing 85 is connected by means of operating-levers 87 with the cab, so that it can be moved into and out of position by the engineer. In each of the casings 85 are journaled shafts 88 and 89. On the shaft 88 is a gear-wheel 90, which is similar to one of the gear-wheels 27 and is adapted to mesh with the disk-wheel 47. On the shaft 89 is a gear-wheel 91, which is adapted to engage with the rear gear-wheel 27. The gear-wheels 90 and 91 are slightly out of engagement, but are connected by means of spur-wheels 92 and 93, carried on the shafts 88 and 89, respectively. It will be readily seen that when the disk-wheels 47 are raised out of engagement with the gear-wheels 27 and the reducing-gear is brought into engagement with the disk-wheels and the rear gear-wheels 27 the speed of the locomotive will be very greatly reduced.

The cab of the locomotive consists of a body 95, dust-sheet 96, and leg-post 97. The front of the cab is formed of two inclined portions 98, which slant forward toward the center of the cab, thus offering but little resistance to the air when the locomotive is in motion. The central part of the roof 99 is curved and the side parts are formed of flat inclined portions 100.

The operation of my invention will be obvious from the above description. When the locomotive is running at the normal rate, the boiler will rest upon the main frame 15 and the disk-wheels 47 will be in engagement with the gear-wheels 27. When it is desired to reduce the speed of the locomotive, fluid-pressure is admitted to the cylinder 78, so as to operate the cam 74 and raise the rear end of the boiler. The stops 80 can then be thrown in the position shown in Fig. 9 to maintain the boiler in its raised position. The auxiliary frame, consisting of the side bars 38 and cross-plate 39, can now be raised by admitting fluid-pressure to the cylinder 68, and thus actuating the cams 65. This will raise the disk-wheels 47 out of engagement with the gear-wheels 27, so that the reducing-gear contained in the casing 85 can be moved into engagement with the disk-wheels 47 and rear gear-wheels 27 by means of the connecting-levers 87. The locomotive will now be in condition to run at a low rate of speed, and hence can be handled in close quarters—as, for instance, when placing it on a turn-table

or in the roundhouse. In addition to the above advantages my locomotive has the advantage that broken parts can be more easily replaced than with any previous locomotive of which I am aware. For instance, if one of the cylinders were injured the boiler could be lifted off by removing the bolt 72, and then the auxiliary frame, together with the cylinders and disk-wheels, could be removed and another frame, together with new cylinders and disk-wheels, be immediately substituted for the injured ones and the boiler replaced.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a locomotive, the combination with a frame, of drive-wheels therefor, gear-wheels carried by said drive-wheels, disk-wheels for driving said gear-wheels, means for moving said disk-wheels into and out of engagement with said gear-wheels, and cylinders for driving said disk-wheels.

2. In a locomotive, the combination with a frame, of drive-wheels therefor, toothed gear-wheels carried by said drive-wheels, toothed disk-wheels for driving said gear-wheels, the teeth of one of said toothed wheels being yieldingly mounted, and cylinders for driving said disk-wheels.

3. In a locomotive, the combination with a frame, of drive-wheels therefor, toothed gear-wheels carried by said drive-wheels, toothed disk-wheels for driving said gear-wheels, the teeth of one of said toothed wheels being rotary, and cylinders for driving said disk-wheels.

4. In a locomotive, the combination with a frame, of drive-wheels therefor, a set of toothed gear-wheels carried by said drive-wheels, a set of toothed disk-wheels engaging with said gear-wheels, the teeth of one of said sets of wheels being in the form of rollers and that of the other set being yieldingly mounted, and cylinders for driving said disk-wheels.

5. In a locomotive, the combination with a frame, of drive-wheels therefor, gear-wheels carried by said drive-wheels and provided with yielding teeth, disk-wheels for driving said gear-wheels and provided with rotary teeth, and cylinders for driving said disk-wheels.

6. In a locomotive, the combination with a frame, of drive-wheels therefor, gear-wheels carried by said drive-wheels, each of said gear-wheels being provided with a circumferential row of teeth and a smooth circumferential bearing-strip, disk-wheels, each of said disk-wheels being provided with a circumferential row of teeth for engaging with the teeth of said gear-wheels and a smooth circumferential bearing-strip for engaging with the bearing-strips on said gear-wheels, and cylinders for driving said disk-wheels.

7. In a locomotive, the combination with a main frame, of drive-wheels therefor, gear-wheels carried by said drive-wheels, toothed disk-wheels connected with said gear-wheels, and a second frame movably mounted on said main frame and carrying said disk-wheels and cylinders for driving said disk-wheels.

8. In a locomotive, the combination with a main frame, of drive-wheels therefor, gear-wheels carried by said drive-wheels, a second frame pivotally mounted on said main frame, toothed disk-wheels carried by said second frame and connected with said gear-wheels, and cylinders for driving said disk-wheels.

9. In a locomotive, the combination with a main frame, of drive-wheels therefor, gear-wheels carried by said drive-wheels, a second frame movably mounted on said main frame, disk-wheels carried by said second frame, and reducing-gear adapted to be interposed between said gear-wheels and disk-wheels.

10. In a locomotive, the combination with a main frame, of drive-wheels therefor, gear-wheels carried by said drive-wheels, a second frame pivoted at one end to said main frame and at the other slidingly mounted in guides carried by said main frame, disk-wheels carried by said second frame and connected with said gear-wheels, cylinders carried by said second frame for driving said disk-wheels, and means for moving said second frame in said guides to disconnect said disk-wheels from said gear-wheels.

11. In a locomotive, the combination with a main frame, of drive-wheels therefor, gear-wheels carried by said drive-wheels, a second frame pivotally mounted on said main frame, disk-wheels carried by said second frame and connected with said gear-wheels, and a boiler pivotally mounted on said main frame.

12. In a locomotive, the combination with a main frame, of drive-wheels therefor, gear-wheels carried by said drive-wheels, a second frame pivotally mounted on said main frame, disk-wheels carried by said second frame and engaging with said gear-wheels, a boiler pivotally mounted on said main frame, means for raising said boiler on its pivot, and a stop adapted to be interposed between said main frame and boiler to hold the latter in its raised position.

13. In a wheel for locomotives or the like, the combination with a rim, a hub, spokes extending between said rim and hub, radial plates carried by said rim at one side of said spokes, and a gear-wheel secured to said radial plates.

In testimony whereof I have hereunto set my hand and affixed my seal in the presence of the two subscribing witnesses.

JOSEPH H. WILLIAMS. [L. S.]

Witnesses:
ISAAC MOORE,
M. R. LINDLEY.