(No Model.) 3 Sheets—Sheet 1.

C. D. SCOTT.

LOCOMOTIVE FOR TRAMWAYS.

No. 452,124. Patented May 12, 1891.

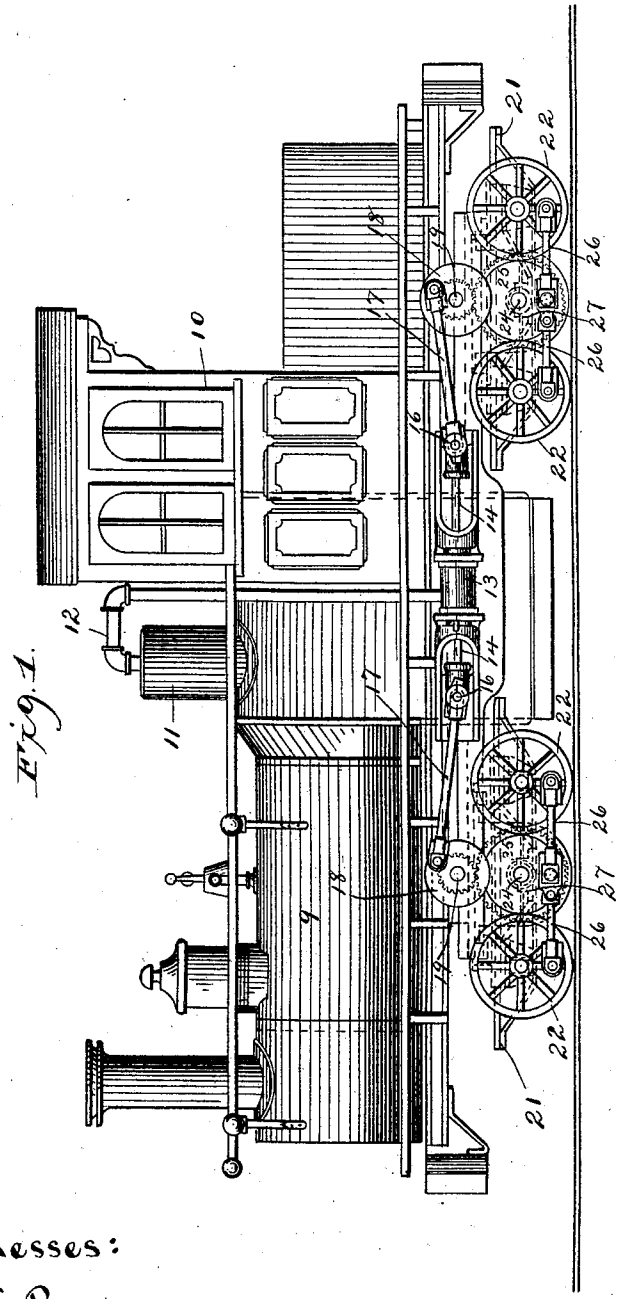

Fig. 1.

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Fig. 2

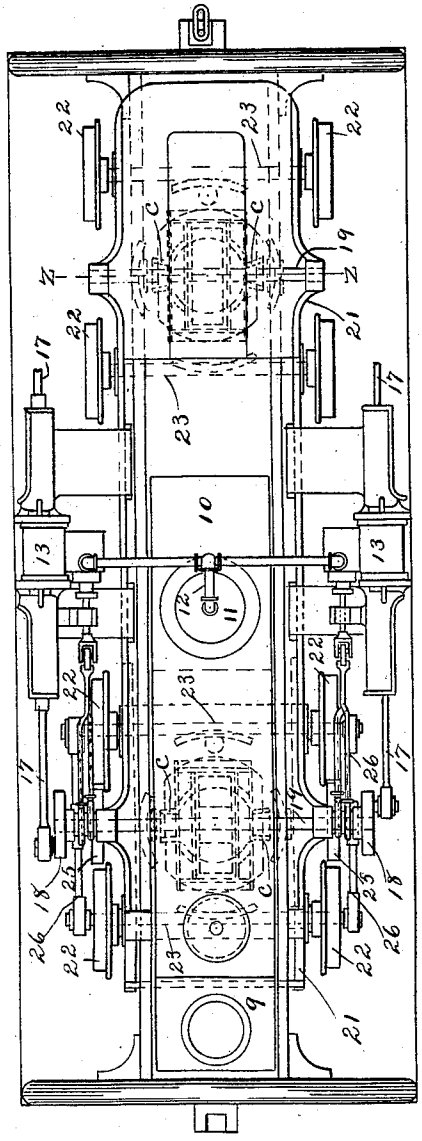

Fig. 3.

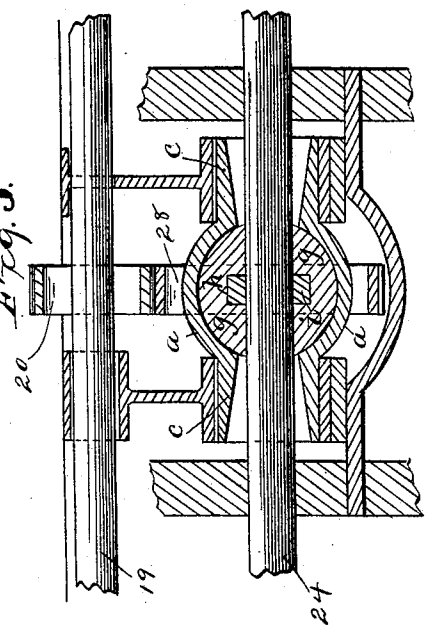

Fig. 4.

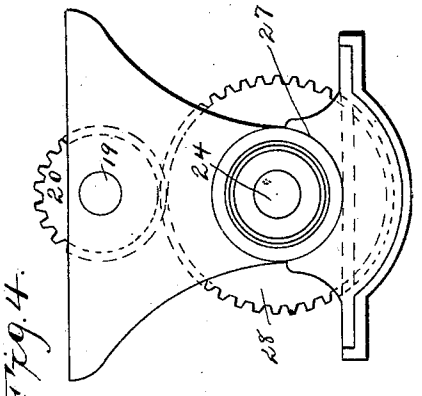

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Fig. 5.

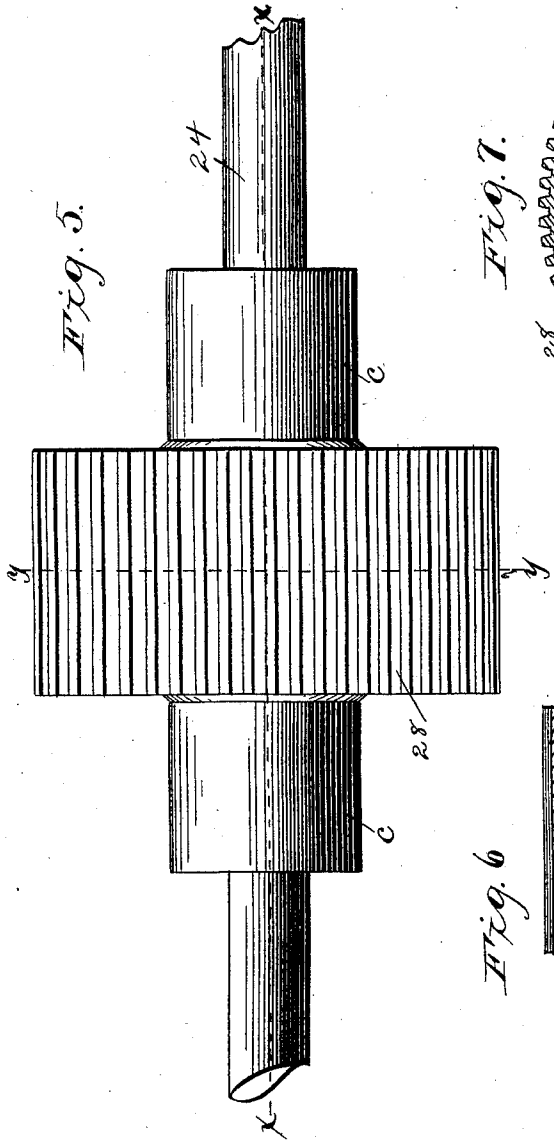


Fig. 7.

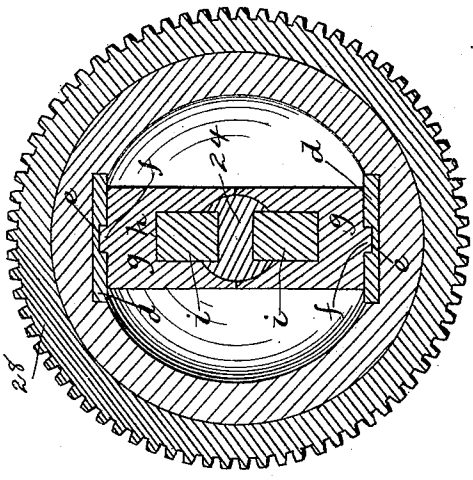
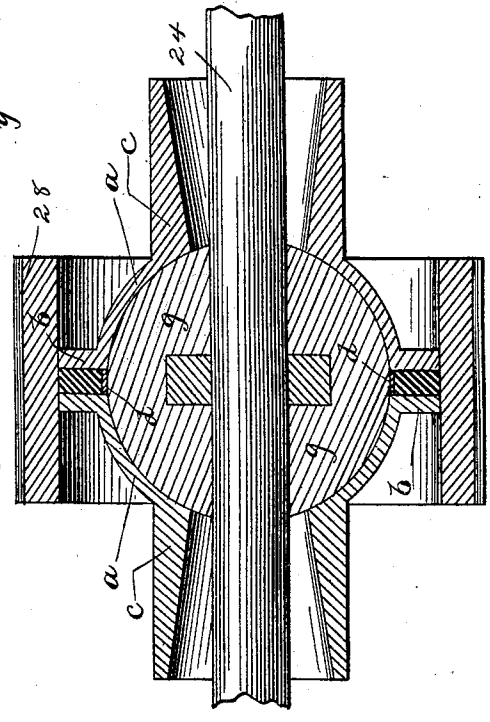


Fig. 6



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UNITED STATES PATENT OFFICE.

CHARLES D. SCOTT, OF ELDRED, WARREN COUNTY, PENNSYLVANIA.

LOCOMOTIVE FOR TRAMWAYS.

SPECIFICATION forming part of Letters Patent No. 452,124, dated May 12, 1891.

Application filed December 2, 1889. Serial No. 332,222. (No model.)

To all whom it may concern:

Be it known that I, CHARLES D. SCOTT, a citizen of the United States, and a resident of Eldred township, in the county of Warren and State of Pennsylvania, have invented certain new and useful Improvements in Locomotives for Tramways, &c., of which the following is a specification.

My invention relates to locomotive-engines intended for use on tramways; but the improvements which I have devised and which are hereinafter set forth are also applicable to locomotive-engines for use on railroads generally, the same being particularly valuable for railroads employing heavy grades.

The object of the invention is to improve the steam-cylinder of the engine and its accessories, and also to improve the trucks which support the boiler and engine frame, and to combine with said trucks certain new and useful means whereby while the boiler and engine are maintained in line the trucks are permitted to readily adjust themselves to any unevenness of the track, and to accommodate themselves to the curves of the way with little, if any, unusual friction, and without imparting their swerving, rolling, and pitching motion to the frame upon which the boiler and engine are supported. The trucks are connected to the boiler and engine main frame by means of pedestals C, circle-plates B, and trunnions A, and in my organization there is no direct connection between the two trucks, each being moved independently of the other through means of the instrumentalities between their running-gear and the cross-heads of the piston-rod of the steam-cylinder.

My improvements are explained by the following description, which should be read in connection with the accompanying drawings, forming part of this specification, and wherein like features are indicated by like figures of reference in the several views.

In the drawings, Figure 1 is a side elevation of a locomotive-engine to which my improvements are applied. Fig. 2 is a top plan view of Fig. 1 with the cab and the driving-connections of one of the trucks omitted. Fig. 3 is a cross-section through line *z z* of Fig. 2 with the shafts in full lines. Fig. 4 is an end view of, or a view at right angles to, Fig. 3. Fig. 5 is a side elevation of the adjustable-joint gear-wheel, its bearings, and shafts. Fig. 6 is a central longitudinal section of Fig. 5 through the line *x x*, and Fig. 7 is a central transverse section through the line *y y* of Fig. 5.

Referring to the drawings, 9 indicates the boiler, and 10 the cab. The boiler and engine may be of the usual patterns, and the steam is conducted from the steam-dome 11, by means of pipes 12, to the steam-cylinder 13 in the ordinary manner. The cylinder 13 (one at each side of the locomotive) is not provided with a solid head at one of its ends, as is the case in the common constructions; but the piston-rod 14 extends clean through, from end to end, and has secured to it centrally or midway between its ends the follower-head 15, as shown. A cross-head 16 is secured to each extremity of the piston-rod 14, to which a pitman 17 is attached, the opposite end of which pitman being connected to a crank-pin fixed eccentrically to the side of wheel 18, as shown. The wheels 18 are secured to shaft 19, which has bearings in the frame supporting engine and boiler, and in the center of this shaft there is fixed the small gear-wheel 20.

The truck is indicated by 21, and its wheels, two sets to each truck, by 22. The axles 23, on which wheels 22 are mounted, and the axle-boxes and pedestals G are of the usual types. Midway between the two axles 23 and immediately below shaft 19 there is arranged a second shaft 24, which carries at its ends the driven wheels 25, which are connected by pitmen 26, with the drive-wheels 22 of the truck, as seen in the drawings. The shaft 24 has its bearings in journal-boxes 27, supported on the frame of the truck, and the driven wheels 25 occupy positions between the respective pairs of drive-wheels 22. Fixed on shaft 24 midway between its bearings is the gear-wheel 28, which meshes with the smaller gear-wheel 20, fixed to shaft 19 and having its bearings on the engine and boiler frame, as explained, the center of said gear-wheel 28 coinciding with the centers of the driven wheels 25 at the end of their common shaft. This larger gear-wheel 28 is of the construction shown in Figs. 5, 6, and 7, and it serves both the function of a gear-wheel and of an adjustable joint between the truck-frame and

the frame supporting the boiler and engine, whereby the power is transmitted to shaft 24, allowing said shaft to conform to the motions of the truck-frame over rough and uneven roads and around curves.

The adjustable joint inclosed within the larger gear-wheel 28 consists of two bearings *a*, having semi-spherical interiors and rims *b*. The hub of the wheel 28 is sufficiently large to receive these bearings, and they are secured in place by screws or otherwise. The lateral extensions *c* of the bearings are tubular, and their inner surfaces are flanged outwardly, as seen in the drawings. Within the spherical portion of the bearings *a* and against the inner circumference of their hub there are secured cleats *d*, which provide a circumferential groove *e*, which receives flanges *f*, formed on the rounding surfaces of the two loose blocks *g*, said blocks being also provided with holes *h*, into which enter the short journals *i*, fixed in the shaft 24, whose ends pass out through the extensions *c* of the bearings *a*, and are supported, as stated, in journals on the truck-frame. The various parts of this structure when placed together and the bearings *a*, secured within the hub of the wheel in the manner explained, constitute practically a universal joint, permitting a rolling movement of shaft 24, but circumscribed by the flaring conformation of the inner surfaces of the extensions *c* of the bearings *a*.

The extensions *c* of bearings *a* are fixedly supported on the boiler and engine main frame, and as they do not partake of the movements of shaft 24 the gear-wheel 28 is therefore kept steady and always in gear with the smaller gear-wheel 20 on the shaft 19, which likewise has its bearings on the boiler and engine frame. It will be plain from the drawings that the revolution of wheels 18, connected, as explained, by pitmen 17 to cross-heads 16 of the piston-rods 14, causes shaft 19 and its attached gear-wheel 20 to revolve, thereby revolving gear-wheel 28, which meshes with gear-wheel 20. The connection between gear-wheel 28 and shaft 24 while such as to permit a universal movement of said shaft, also prevents said wheel from turning on the shaft, since the connection between the joint and the hub of the wheel is such as to preclude any movement of the wheel around the shaft. This shaft then revolves with the wheel, and consequently the driven wheels 25, fixed to the end of said shaft 24, also revolve and through the pitmen between said last-named wheels and the drive-wheels of the truck the latter wheels are caused to travel to move the locomotive.

The separate construction of boiler and engine frame and truck-frame, they being held together by the pedestals C, trunnions A, and circle-plates B, so that the truck-frame is free to swivel beneath the boiler and engine frame, coupled with the adjustability of shaft 24, supported, as explained, on the truck-frame, allows the truck to adapt itself to the unevenness of the roadway and to the condition of the curves of the way without disturbing the boiler and engine frame materially, which latter is maintained in line and is not subjected to the ordinary frictional strain due to the usual manner of supporting the same directly on the trucks. By my construction, also, there is no pitman connection between the drive-wheels of the two trucks, the trucks running independently of each other, and being connected independently of each other with the piston-rod of the steam-cylinder.

It is obvious that the adjustable joint herein shown and described is applicable in other connections—as, for example, it may be used in a line-shaft—the gear-teeth being changed for a smooth surface and a belt employed. In such case the pulley could be kept in line, even though the shaft were not entirely true. It is my purpose to utilize this joint wherever it may be applicable.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a locomotive-engine, the combination, with the engine-frame, of a cylinder upon either side thereof, piston-rods passing through the cylinders and having pitmen upon either end, and crank-shafts 19, mounted in said frame, of two trucks connected to the engine-frame by universal-joint connections, and gearing for transmitting power to said trucks from the crank-shafts 19, substantially as set forth.

2. In a locomotive-engine, the combination, with the engine-frame, of cylinders upon either side thereof, piston-rods passing through the cylinders and having pitmen upon either end, and crank-shafts 19, mounted in fixed bearings in said frame and each having a gear-wheel mounted between the cranks, of intermeshing gear-wheels 28, mounted in bearings in the engine-frame, and two trucks having independent frames, driven shafts 24, mounted in said truck-frames, and driving-wheels connected to the shafts 24, said shafts extending through the gears 28 and being connected thereto by universal joints, substantially as set forth.

3. The combination, with the engine-frame, the shaft 19, having a gear-wheel thereon mounted in bearings in said frame, and the intermeshing gear 28, having bearings in pedestals fixed to the engine-frame, of the truck comprising the driving-wheels, the independent truck-frame, the shaft 24, mounted in said frame, the crank-pins eccentrically connected to said shaft, and connecting-rods 26, said shaft 24 passing through the gear 28 and being connected thereto by a universal joint, substantially as set forth.

4. In a locomotive-engine, a boiler and engine frame and a pair of truck-frames, the latter connected by means of pedestals, trunnions, and circle-plates to the first-mentioned

frame, in combination with pitmen connected with the piston-rod of the steam-cylinder for moving the drive-wheels of each truck independently of the drive-wheels of the other truck, and pitmen connecting the drive-wheels of each independent truck, substantially as set forth.

5. The combination, with the boiler and engine frame and a truck whose frame is connected to the boiler and engine frame by means of pedestals, trunnions, and circle-plates, of a shaft supported on the boiler and engine frame and carrying at its end wheels, as 18, and a centrally-attached gear-wheel, a second shaft supported on the truck-frame immediately below the first-mentioned shaft, and provided with driven wheels, as 25, at its ends, and with a centrally-attached gear-wheel, as 28, meshing with the gear-wheel of said first-mentioned shaft, and an adjustable joint within the hub of gear-wheel 28, having independent bearings supported on the boiler and engine frame, and pitmen connecting driven wheels 25 with the drive-wheels of the truck, substantially as set forth.

6. The adjustable joint herein described, consisting of a hub, a pair of hollow semi-spherical sections provided with lateral bearings and with an interior groove, a pair of blocks having projections entering said groove, and also provided with holes on their flat surfaces, and a shaft provided with short journals fitting in the holes in said blocks, said shaft extending through the lateral bearings, substantially as set forth.

7. A gear-wheel having a hollow hub, in combination with two semi-spherical sides provided with hollow bearings whose inner surfaces are flaring, as explained, a pair of blocks in the form of segments of a circle, provided with ridges co-operating with grooves on the inner surfaces of the said semi-spherical sides, and a shaft having short journals fitting in holes in the flat surfaces of said block and extending through and co-operating with the said hollow bearings, substantially as set forth.

Signed at Corry, in the county of Erie and State of Pennsylvania, this 7th day of August, A. D. 1889.

CHARLES D. SCOTT.

Witnesses:
GEO. D. GILBERT,
A. F. BOLE.