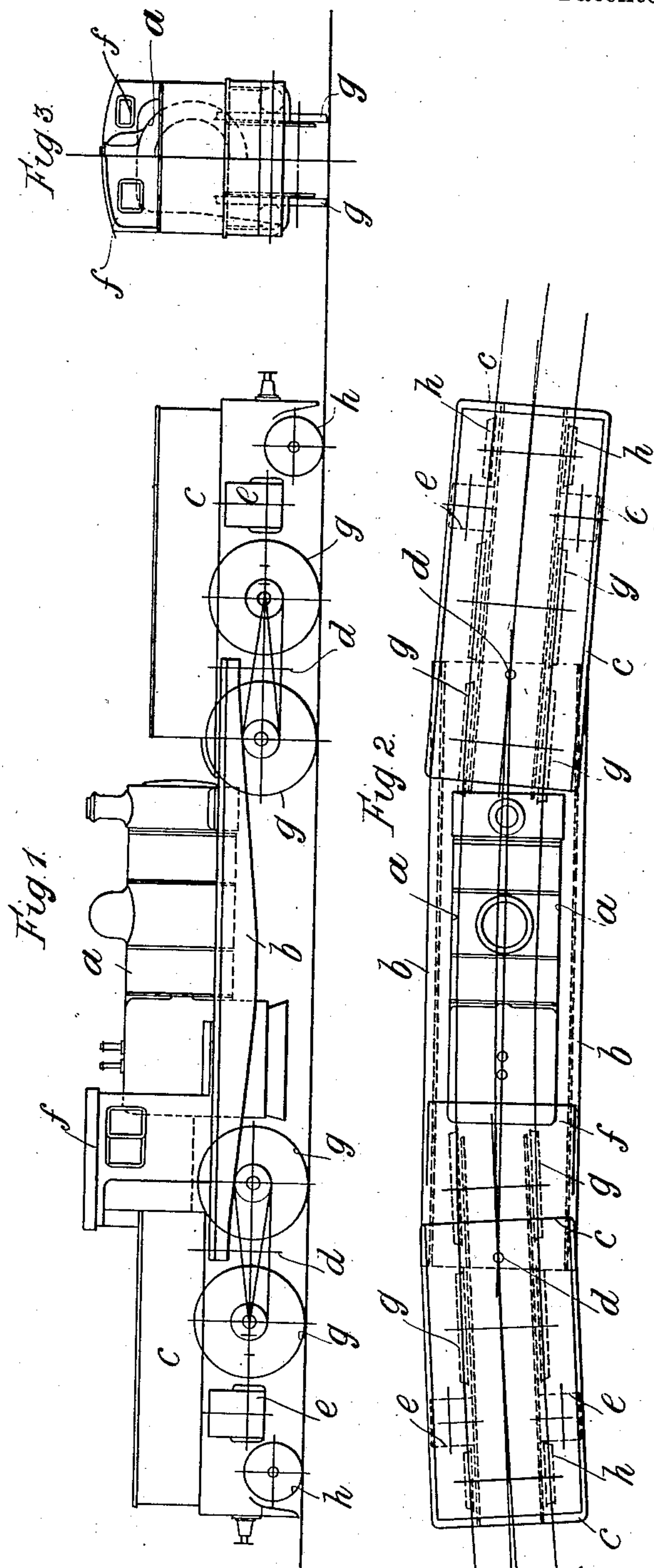


912,303.

H. W. GARRATT.
LOCOMOTIVE ENGINE.
APPLICATION FILED JULY 25, 1908.

Patented Feb. 16, 1909.



WITNESSES:

Edw. D. Spring
W. P. Burke

INVENTOR

Herbert William Garratt

W. B. Munn
ATTY.

UNITED STATES PATENT OFFICE.

HERBERT WILLIAM GARRATT, OF STAMFORD HILL, ENGLAND.

LOCOMOTIVE-ENGINE.

No. 912,303.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HERBERT WILLIAM GARRATT, a subject of the King of Great Britain, residing at 25 Leweston Place, Portland avenue, Stamford Hill, in the county of Middlesex, England, have invented new and useful Improvements in and Relating to Locomotive-Engines, of which the following is a specification.

My invention consists of improvements in and relating to locomotive engines, and particularly to locomotive engines of the double bogie type, the principal object of my improvements being to admit of a combination of an extremely large boiler having a low center of gravity and large driving wheels if required on both bogies, the boiler and its fittings being carried in a frame of the shortest length practicable and connected substantially without overhang at both its ends by swivel centers to two self driven bogie tanks which carry the coal and main water supply as well as the steam cylinders and driving mechanism for the wheels.

Owing to the gage of the rails being fixed the result of the usual arrangement of combining a large boiler with large wheels is the raising of the center of gravity to an undue height, as a boiler larger than will go in between the wheels must be placed above them, and the larger the wheels or the boiler, or both, the higher becomes the center of gravity until it is dangerously high.

There are already various forms of locomotive engines of the double bogie type, designed, and among these are the "Fairlie" the "Kitson-Meyer" and the "Mallet". The leading features of the Fairlie system, as set out in Fairlie and Perkin's specification No. 2616 of 1872, are the application of steam to bogie frames or swiveling trucks, the construction of double boilers with a central or common fire box, and the employment of a long rigid frame, termed the carrier frame, on which the boiler fuel bunkers and water tanks rest, and which is placed above the bogie frames, and carries at or near each end a pin or head on which the said bogie frames swivel. An example of the Kitson-Meyer or Meyer-Lindner type is shown in "Engineering" of 12th April 1907, and in "Cassier's Magazine" of February 1904 there is an article dealing with a number of types of double bogie engines.

According to my said invention I carry the boiler in a frame slung between two self

driven bogie tanks so that it may be as low down as possible leaving simply the necessary clearance for the ashpan above the rail level. Unlike the carrier frame in the Fairlie and other types of double bogie engines, I terminate my carrier frame at the swiveling heads or centers where it rests on and is connected to the bogie tanks, and I thus obviate the objectionable and dangerous overhang of the long frames with their superimposed weight of the aforesaid types. I may adopt any suitable form of boiler and any convenient method of slinging its carrier frame, so long as the swivel centers are at the ends in order to avoid overhang of the frame as above described.

In the accompanying sheet of drawings I illustrate one example of how my invention may be carried into practical effect.

Figure 1 is a side elevation of a locomotive engine constructed according to my invention. Fig. 2 is a plan view showing the same on what is known as a five chain curve. Fig. 3 is an end view, showing half of one end and half of the other end of the engine.

In these views, *a* designates the boiler which may be of any suitable type, for example a boiler of the locomotive type or a water tube boiler may be adopted owing to the large space available; *b* a carrier frame or cradle for the boiler of any suitable construction and of the requisite strength; *c* the two bogies and tanks thereon; *d* the pins or swivel centers by which the ends of the carrier frame *b* are connected respectively to the two bogies; *e* steam cylinders which with the necessary driving gear are mounted on each of the bogies and in the positions indicated or in any other convenient position as may be desired according to the arrangement, number and coupling of the wheels; *f* the cab for the driver; *g* driving wheels of which there are four shown coupled on each bogie in this instance, but any other suitable number may be employed; and *h* leading or trailing wheels on each bogie. It will be obvious from the description and drawing that in this arrangement the boiler can be carried so as to bring the center of gravity to the lowest point possible and practicable, and it will also be readily understood that the firebox may be of great width and capacity.

The coal and water tanks are principally carried on and so form part of the self driven bogie tanks *c*, and are not as in the aforesaid double bogie types of locomotive engines

placed on the carrier frame. In my arrangement these tanks and their whole weight are on the bogies, say the fuel and water tanks with half the driving gear on one bogie and the water tank with the other half of the driving gear on the other bogie, thus tending to keep the bogies steady as against the disturbing forces of the steam acting on the pistons, which in previous double bogie engines has caused the bogies to have a wriggling movement, especially at high speeds. My locomotive is thus in three portions articulated as shown and described, these three portions consisting of two self-driven bogie tanks with large wheels or in fact any sized wheels on both bogies, and the boiler with its fittings and some details on the boiler frame, and this construction enables the locomotive to travel round sharp curves with the very great advantage that the center line of the whole length of the central portion, when so traveling round curves, forms a chord of the circle, which is the center line of the rails forming the said curve.

As already stated I obviate the objectionable overhang common to other existing types of double bogie engines by terminating the carrier frame *b* at the swiveling centers *d* where it is connected to the bogies. This is a great and important advantage when going round curves as it counteracts the tendency of the engine to overbalance and thus improves its stability. In prior constructions of the double bogie type the projection or overhang of the frame beyond the swivel centers and the heavy weight thereon has rendered the whole locomotive unstable, particularly when rounding curves. I am further enabled to place the tanks centrally instead of having them, as in ordinary constructions, at the sides, which is disadvantageous as side tanks limit the diameter of the boiler, and this weight at either outside edge of the frame directly reduces the stability of the locomotive. Further the carrier frame is relieved of the weight of these tanks, and the tendency of the locomotive to roll is immensely lessened.

If required an additional water tank may be placed beneath the barrel of the boiler, if that be of locomotive type, thus still further lowering the center of gravity.

The whole of the space between the sides of the carrier frame, above and below, subject to the limitations of the loading gage of the railway is available for the boiler and fire box, which can thus be of great diameter and width respectively.

As the boiler is entirely between the self-driven bogie tanks, in my arrangement, I can employ wheels of any required diameter, on both bogies, and all of these wheels may be utilized for tractive purposes if required thus enabling the full weight of the engine, water, fuel, and bogie tanks to be used for ad-

hesion, whereby I obtain an engine of very great tractive force combined with speed, large water and fuel capacity, and a low center of gravity irrespective of the size of the driving wheels. Further a very excellent look-out is provided for the driver owing to the low position of the boiler; and owing also to the space available, the water and coal tanks although of great capacity, can be kept low and flat, thus greatly assisting to render the engine stable.

My improved construction of engine gives a normal footplate as compared with the inconvenient one at the side as in the Fairlie type; and further if required a cab *f* can be placed at each end of the boiler. The distribution of weight on the bogies is greatly superior to the Kitson-Meyer type of engine. In my improved type, the weights on each bogie are equal or practically so, whether the engine is empty or in full working order, whereas in the Kitson-Meyer engine, this varies considerably; as the water and coal are consumed, thus affecting the adhesion of the wheels.

The steam may be conveyed from the boiler to the cylinders *e* by any suitable means, for instance, by pipes and a ball and socket joint at the center of the bogie center or in any ordinary way by means of flexible connections, and the exhaust returned in a similar manner, or through the bogie center bearings, which may be provided with suitable ports and passages in the bearing surface.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A double bogie locomotive comprising a pair of bogies, a frame having its ends supported by the bogies, a boiler, and fittings carried by said frame, driving mechanism carried by the bogies, and pipes connecting said driving mechanism with the boiler.

2. A double bogie locomotive comprising a frame, a pair of bogies, means for pivoting each end of the frame to the bogies, a boiler and fittings carried by said frame, steam cylinders, and driving mechanism carried by said bogies, and pipes connecting said cylinders with the boiler.

3. A double bogie locomotive comprising a frame, a boiler and cab carried thereby, a pair of bogies, swiveled heads connecting each end of the frame to one of the bogies with a minimum overhang, steam cylinders on the bogies, driving mechanism connecting said cylinders with the wheels of the bogies, pipes connecting said cylinders with the boiler, main water and fuel tanks carried by the bogies.

4. A double bogie locomotive comprising a frame, a boiler and cab carried thereby, a pair of bogies, swiveled heads connecting each end of the frame to one of the bogies with a minimum overhang, steam cylinders

on the bogies, driving mechanism connecting said cylinders with the wheels of the bogies, pipes connecting said cylinders with the boiler, main water and fuel tanks carried by the bogies, and a water tank carried under the frame.

In testimony whereof I have signed my

name to this specification in the presence of two subscribing witnesses.

HERBERT WILLIAM GARRATT.

Witnesses:

HERBERT ROWLAND ABBEY,
LEONARD HARRISON.