Clark's impts in the construction of Locomotive Engines

3 Sheets--Sheet 1.

No. 120,713.

Patented Nov. 7, 1871.

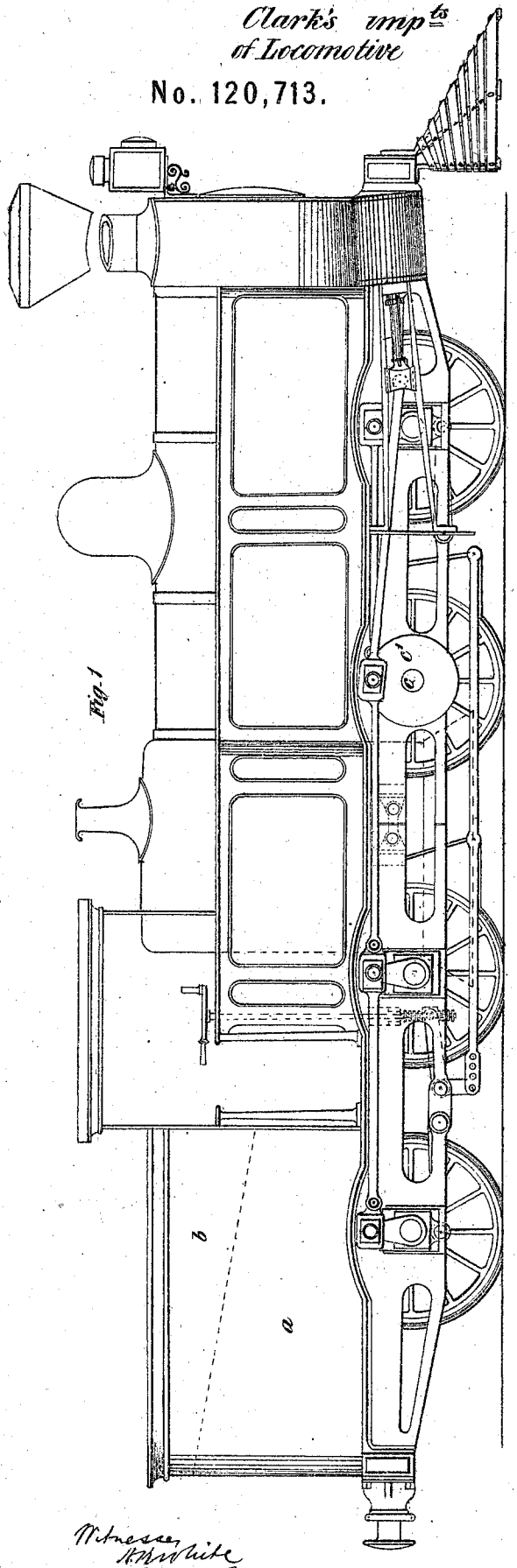

Fig. 1

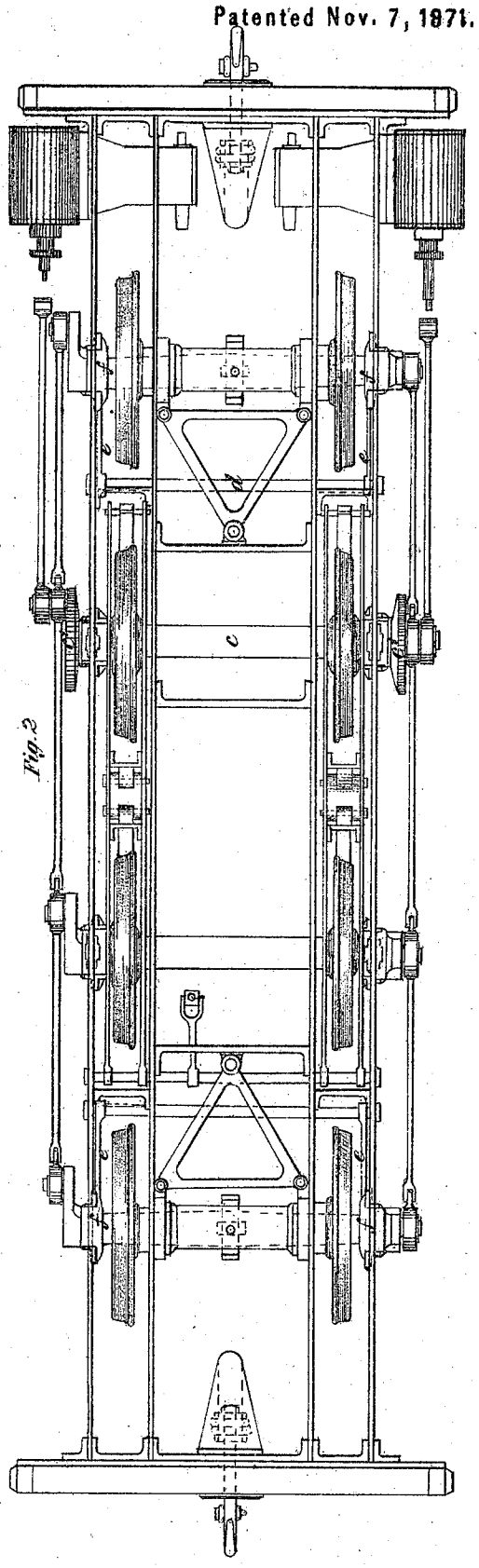

Fig. 2

Witnesses,
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Inventor
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3 Sheets--Sheet 2.

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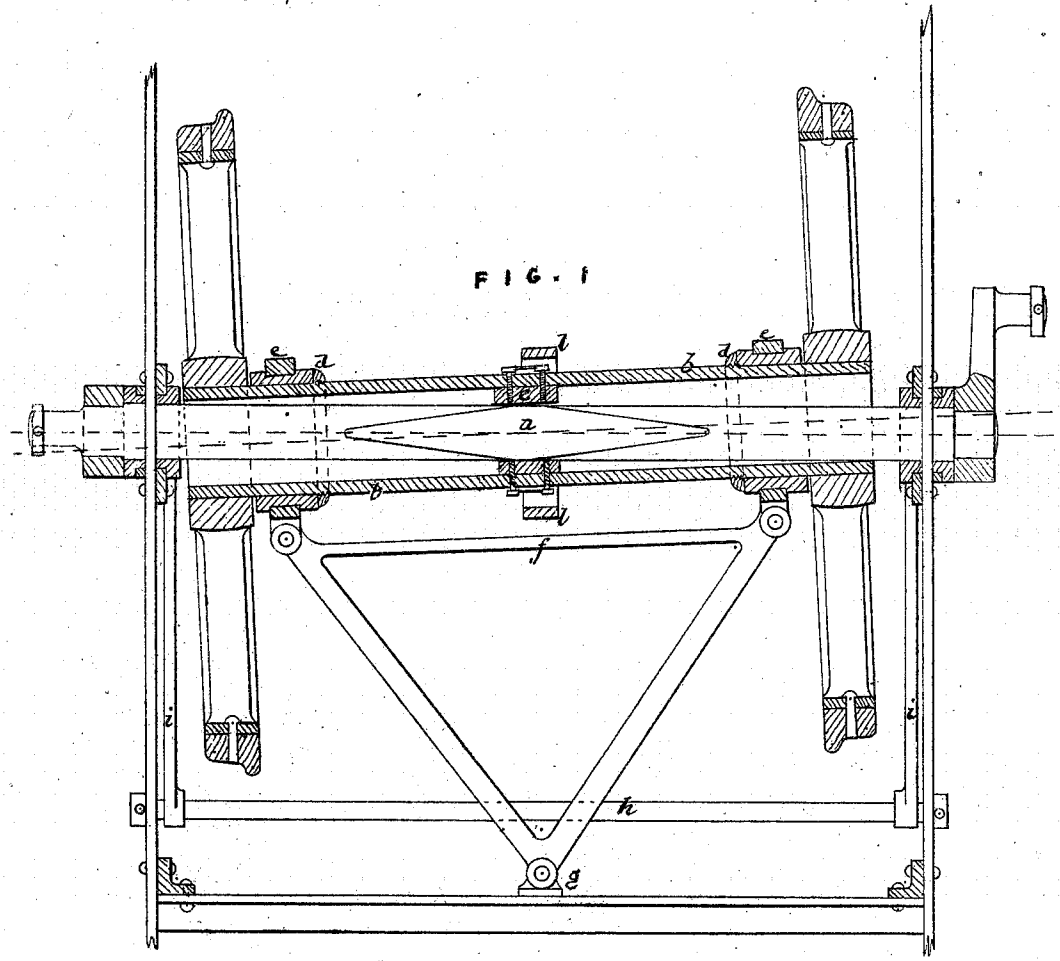
FIG. 1



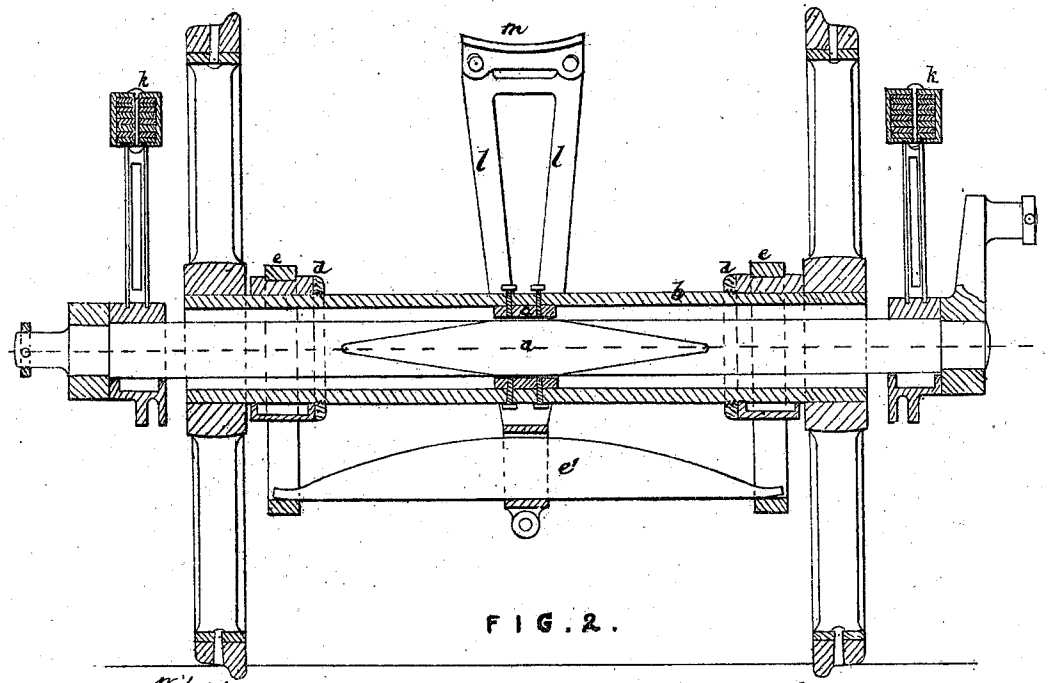


FIG. 2.

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Clark's imp^ts in the construction of Locomotive Engines

3 Sheets--Sheet 3.

No. 120,713.

Patented Nov. 7, 1871.

FIG. 4.

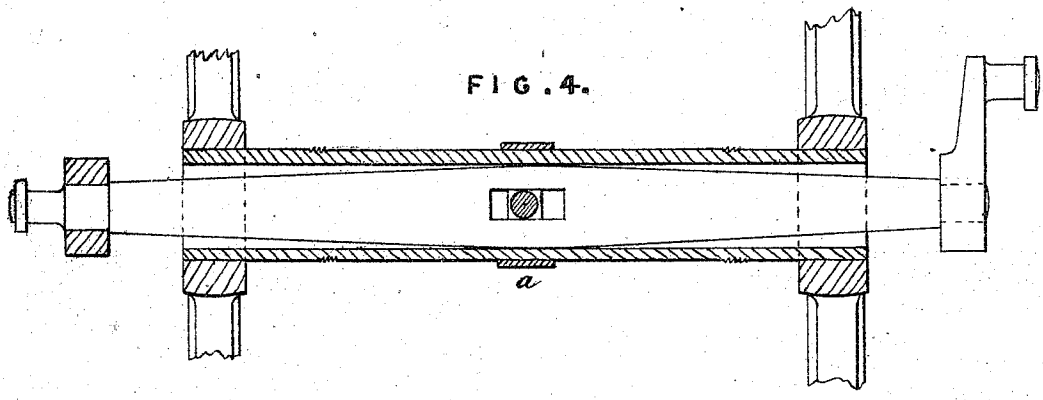


FIG. 3.

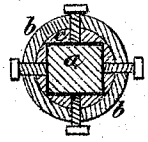


FIG. 5.

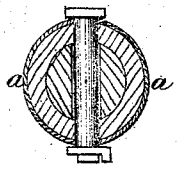


FIG. 6.

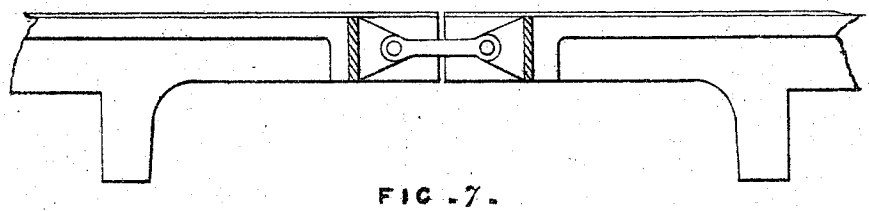
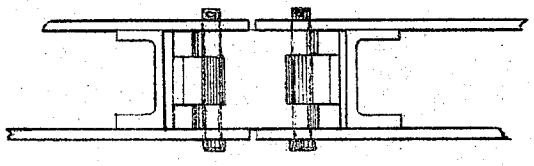


FIG. 7.



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UNITED STATES PATENT OFFICE.

JOHN CLARK, OF LONDON, ENGLAND.

IMPROVEMENT IN LOCOMOTIVE-ENGINES.

Specification forming part of Letters Patent No. 120,713, dated November 7, 1871.

To all whom it may concern:

Be it known that I, JOHN CLARK, of 44 Finsbury Circus, in the city of London, England, engineer, have invented a new and useful Improvement in the Construction of Locomotive-Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing forming part of this specification.

The object of this invention is to radiate the leading and trailing-axles of locomotive-engines, or of engine and tender combined, to enable them to pass round sharp curves more freely.

In carrying my invention into practice I construct the leading and trailing-axles hollow, inside of which I fit a central spindle, to which is fitted at each end cranks in connection with the driving-gear. The hollow axles may be called the carrying-axles, and the central spindles the driving-axles. The center part of the said spindles may be square or hexagonal to fit freely a bush fixed at the center of the hollow axle, so that it may slide therein. Thus, when the said spindle is driven, the carrying or hollow axle will be driven with it. The radial movement of the hollow axles is effected by links fixed to the framing. The said spindles are carried in bearings in the framing, and are held in a parallel plane with the other axles of the engine by horizontal rocking-shafts. The engine may have eight, ten, or even twelve wheels coupled and propelled by one pair of cylinders, either outside or inside. One purpose effected in the design is to make the load moderate on all the wheels—say not to exceed nine tons per pair—and to include all the weight for adhesion. In the eight-wheeled engine the four wheels in the center form a fixed or parallel wheel-base from seven to ten feet centers. The leading and trailing-axles radiate freely to pass curves of three chains radius. In the ten-wheeled engine the six wheels in the center form a fixed or parallel wheel-base, the middle pair being without the flange. In the twelve-wheeled engine the six wheels situated immediately behind the leading axle form a fixed or parallel wheel-base fron nine to twelve feet centers, and the leading and two trailing-axles are fitted with the radial arrangement hereinafter described. The load carried by the radial axle is entirely borne by a transverse spring or springs from a pin in the center buckle, supporting slings from a bracket fixed to the framing or boiler. Either wheel of the leading and trailing-axles is free to rise or fall about an inch and a half, to suit the "cant" or inequalities of the rail, without imparting any cross-twist to the framing, thereby securing the advantages of the American bogie as applied to engines. The said supporting-slings have a double fulcrum-pin where they are joined to the said supporting-brackets, to secure a certain amount of righting to make the engine run smooth and steady on a straight road.

I now proceed to describe more particularly my said invention, reference being made to the accompanying Sheets I, II, and III of the drawing, and forming part of this specification.

Sheet I shows the general arrangement of an eight-wheeled coupled-outside-cylinder tank-engine, Figure 1 being an elevation and Fig. 2 a plan of the same, some of the usual fittings of the engine not being represented, as they are well understood. The two side tanks and the under part of the tank *a*, over the trailing-axle, have an aggregate capacity of one thousand five hundred to two thousand gallons. The coal-box *b* contains about four tons fuel, and is fitted with a sloping bottom. The main driving-axle *c* is fitted with driving-disks *c'* in preference to cranks. *d d* are two transverse rocking-shafts carried in brackets fixed to the framing. These shafts are fitted with projecting arms or levers *e e*, having a slotted eye at their extremities to receive a coupling-pin which connects them severally with a lug cast on the under side of the boxes *f f* of the driving-axles. By this arrangement these driving-axles of the radiating axles are kept in a parallel plane with the axles of the fixed wheel-base. Fig. 1, Sheet II, is a plan in section of one of the radial axles on a three-chain curve, showing the amount of deviation from the parallel line; and Fig. 2 is a sectional elevation of the same. *a* is the central or driving-axle, which is square or hexagonal at its center. The carrying-wheels are fixed to the cylindrical hollow axle *b*. A bush, *c*, shown in transverse section at Fig. 3, Sheet III, is fitted inside the hollow axle *b*, and is free to slide along the square or hexagonal driving-axle. The hollow axle (see Sheet II) has two collars, *d d*, fixed to it, which may either be screwed or shrunk on to make the bearing part of the axle. The bearings are embraced by strong buckles *e e*, for supporting the carrying-springs *e'*.

To the said buckles *e e* is also attached a triangular link or frame, *f*, having its fulcrum or apex in a bracket, *g*, on the framing, to give the proper radiation to the wheels. *h* is a transverse rocking-shaft, carried in brackets on the framing, and having the projecting arms or levers *i i* keyed on it, which are secured to lugs on the under side of the boxes, as aforesaid. *k k* are two light springs, which may be used to sustain part of the load, and to steady the framing, if necessary. *l*, Fig. 2, is one of the supporting slings, with top bracket *m* fixed to the boiler or part of the framing. The slings have each two fulcrum-pins, which connect them to their top brackets in such a way as to allow of their oscillating, while at the same time a strong tendency is given to the slings to retain their normal vertical position. The sling embraces at its lower end the carrying spring *e'*, which is itself supported by the buckles *e e*, as already explained. Each radiating-axle is thus similarly connected by slings with the boiler or the framing of the engine, and by this connection (which leaves the hollow axles free to adapt themselves to their work) the steadiness of the engine when running on straight portions of the road is secured. In Sheet III, Fig. 3, is a section at right angles of the center part of the driving-axle, and Figs. 4 and 5 show a modification of the manner of connecting the hollow and driving-axle so as to allow of the hollow axle receiving an independent endwise motion. In this example the center of the driving-axle is considerably enlarged, so as nearly to fill the interior of the hollow axle. A slotted opening is made in it, which is fitted with a steel driving-pin and bush to slide in the said slot and connect the two axles together. The slot may either be made in the center axle, as shown, or in the hollow cylindrical axle. *a* is a strengthening-collar or band shrunk onto the hollow axle.

To avoid cross-twist in the long framing I propose to divide the framing near its middle part, and couple it by means of a link connection on each side, one of which is shown in Figs. 6 and 7.

Having now set forth the nature of my invention, and explained the manner of carrying the same into effect, I wish it to be understood that I claim—

1. Providing for the radiation of the leading and trailing-axles of locomotive-engines, when such engines are passing round curves, by fitting an inner or driving-axle within a tubular axle to which the running-wheels are secured, and so connecting these two axles together as to allow the tubular axle to rock and move endwise on the inner axle, as above described.

2. Transmitting to the carrying-springs *e'* of the leading and trailing-wheels that portion of the weight of the engine intended to be borne by them through the double fulcrum-supporting slings *l*, for the purpose of steadying the engine while running on a straight road, and allowing for the free endwise movement of the hollow radial axles when traversing a curve.

3. The means above described for maintaining the parallelism of the inner or driving-axles with the main driving-axle.

4. The means described for avoiding the cross-twist or torsion of the long framing.

In witness whereof I, the said JOHN CLARK, have hereunto set my hand and seal this thirtieth day of June, in the year of our Lord one thousand eight hundred and seventy-one.

JOHN CLARK. [L. S.]

Witnesses:
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66 *Chancery Lane.*
FRANK RUSSELL,
44 *Finsbury Circus.*

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