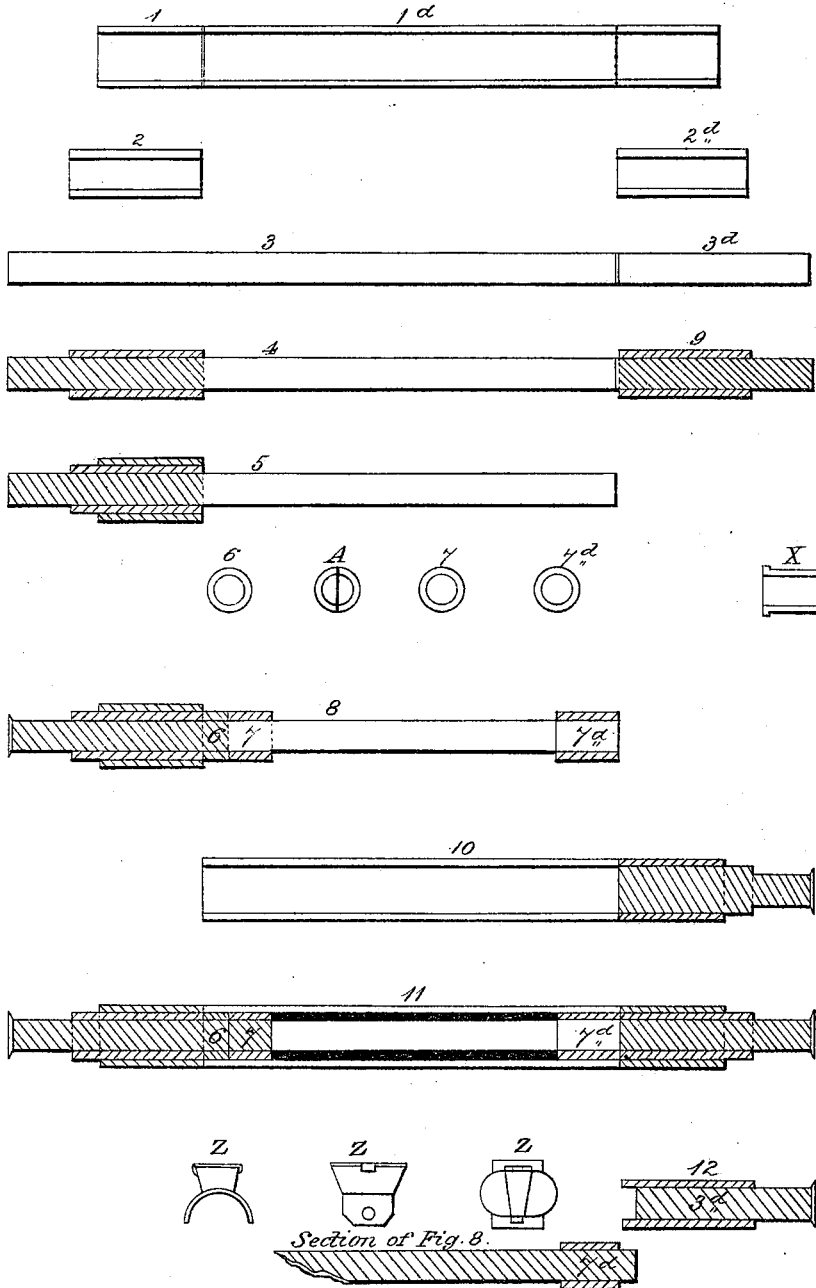


E. J. MALLETT.

Car-Axle.

No. 26,194.

Patented Nov. 22, 1859.



Witnesses:

Alexander Galt of Norfolk Virginia  
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# UNITED STATES PATENT OFFICE.

EDWARD J. MALLETT, OF NEW YORK, N. Y.

## RAILROAD-CAR AXLE.

Specification of Letters Patent No. 26,194, dated November 22, 1859.

*To all whom it may concern:*

Be it known that I, EDWARD J. MALLETT, of the city and county and State of New York, have invented a new and improved mode of remedy to modify the extra friction on the wheels of locomotives and railway-cars while passing around a curve; and I do hereby declare that the specifications annexed hereto and the drawings herewith are as exact and descriptive an illustration of my said inventions as I am capable of giving.

The nature of my invention to modify or remedy the extra friction consists in the peculiar and novel manner of running one axle within the other and then coupling them in the manner described by the specifications and drawings referred to.

To enable others to construct and use my said inventions, I do hereby refer to drawings and specifications and the figures and letters thereon.

Although in the said drawings and specifications I have described a method, materials, and dimensions, yet I wish it understood that I do not strictly confine myself to that particular method or those precise dimensions or materials, because science and practical skill, by some trifling deviation of process, might accomplish the same end.

Various unsuccessful methods have been devised to accommodate the different velocities of wheels of the same size which in running around a curve must necessarily pass over unequal extent of surface in equal time. It is known that in attaching both wheels rigidly to the axle of a locomotive or railway car any difference produced in the length of the parallel rails by the deviation from a straight line will compel the outer wheel (for a part of the increased distance) to drag or slide and the contact of the flange of the outer wheel against the rail causes so much abrasion that where curves are sharp and frequent it has been found necessary to renew or reband the wheels every six or eight months and to relay the rails (at the curves) every two or three years.

The undersigned has devised a novel method of running one axle within the other, and a novel method of affording independent revolutions to each wheel by attaching them to separate axles, and a novel method of connecting and securely coupling them for the performance of the service required.

By this new contrivance the sliding or dragging process of the outer wheel is remedied, and in consequence of the subdued friction a greater speed can be maintained and a heavier burden can be carried around a curve with the same power than when both wheels are fixed on the same axle, and not only can the draft and the speed be augmented and the friction modified, but the safety of life and property will be greatly enhanced. This method of running the wheels will also obviate the necessity of elevating the outer track, as is now done at the curves.

The annexed drawing represents my invention in consecutive sections and then as a whole.

I have assumed the whole length of the axle to be 6 feet and 7 inches and the distance from outside to outside of the wheel hubs to be 5 feet and 2 inches. I call each bearing (or outside journal) 6 inches and the shoulder between the journal and the wheel hub  $2\frac{1}{2}$  inches.

I first draw an iron tube on cylinder 5 feet 2 inches long, three-quarters of an inch thick and 6 inches outer diameter, and while it is hot I saw off one-sixth of it, and the cylinder thus cut will appear as represented in Figure 1 and Fig. 1<sup>a</sup>. I then draw another tube or cylinder of iron, to be  $4\frac{1}{2}$  inches outer diameter, three-quarters of an inch thick and 5 inches, more than twice the length of Fig. 1. I cut this in the center, and it appears as represented in Fig. 2 and Fig. 2<sup>a</sup>. I then make a solid 3 inches diameter and 6 feet 7 inches long and cut off a piece 6 inches longer than Fig. 2, and the whole piece thus cut will appear as represented in Fig. 3 and Fig. 3<sup>a</sup>. I then put Fig. 2 to a red heat and drive one end of Fig. 3 through it to project 6 inches, and it appears as represented in Fig. 4. If it is immersed in salt water while at a black heat, an oxid will immediately form, which, with the shrinkage of the cylinder will cause the parts to adhere firmly and inseparably. If this is doubted, then weld them or use rivets. I then put cylinder 1 to a red heat and force Fig. 4 into it, allowing cylinder 2 to project  $2\frac{1}{2}$  inches for a shoulder. Let these parts be united by the same process as was done with Fig. 4, and 1, 2, and 3 may be considered as solid at their parts of contact and will appear as represented in Fig. 5. It then can be placed in the lathe and trued and a jour-

nal turned for the bearing in the usual way, and Fig. 5 is ready for the next process, which is to turn the long part of the solid to a smooth and uniform surface and then  
 5 make a movable ring  $2\frac{1}{2}$  inches wide and three-fourths of an inch thick (see Fig. 6) to be slipped on the solid as far as the shoulder. The outer diameter of the ring should be  $4\frac{1}{2}$  inches, so as to fit snug into  
 10 the large cylinder  $1^a$ , and it should be placed in one end of the large cylinder and three holes (equidistant) drilled through cylinder  $1^a$  and  $2^a$  and at the same points through the ring, say  $1\frac{1}{4}$  inches from the end of cylinder  
 15  $1^a$ , and thus pierce the ring in the center. The ring should then be slipped to its place on the solid, and a journal made (see Fig. 7) four inches wide, which should touch the ring, or rather not quite touch it. This journal should revolve freely inside of the large  
 20 cylinder  $1^a$ , but should be securely fastened to the solid. Then make another like journal (see Fig.  $7^a$ ) but six inches wide and fasten it securely to the extreme end of the  
 25 solid, and these parts will then appear as represented in Fig. 8, and will be ready to be fitted to the wheel. The revolving ring may be made of two semicircles (see Fig. A) and come together in its place with dowels,  
 30 but in that case it will need four screw bolts to secure it; but if it is in one piece three bolts will suffice. We now take cylinder  $2^a$  and unite it to the solid  $3^a$  by a like process as was done in the first instance, so as to  
 35 leave a journal or projection of six inches (see Fig. 9), then force it into one end of the cylinder  $1^a$ , leaving  $2^a$  to project  $2\frac{1}{2}$  inches, for a shoulder, as was done in the first instance, and these parts can be made  
 40 solid, as far as the dotted lines in Fig.  $1^a$ . These three pieces will then appear as represented in Fig. 10. A mandrel should then be run to the bottom of cylinder  $1^a$ , giving it a smooth and even inside surface to accom-  
 45 modate the free revolutions of the journals 7 and  $7^a$ , but the ring should be a tight fit. The journal  $7^a$  should not quite touch the bottom of the cylinder  $1^a$ , for if it does severe and unnecessary friction will ensue. These  
 50 parts after the bearing or outer journal is turned, will be ready for the wheel, and Figs. 8 and 10 will come together, as represented in Fig. 11. Then send the screw bolts through cylinder  $1^a$  and nearly, but not  
 55 quite, through the ring, and the two axles cannot get asunder, while they can freely and firmly revolve one within the other. I have given an additional preventive to the pulling apart of the wheels by letting two  
 60 screw bolts through cylinder  $1^a$  to drop inside of the wide journal  $7^a$ .

We now have an axle which, with wheels attached, presents the appearance of those in present use and which can at once be put  
 65 to the cars now in use; but in this axle each

wheel can revolve backward or forward independent of the other. It is evident that the wheels cannot get nearer together, nor can they separate, if the couplings are properly made and secured. This arrangement,  
 70 I think, attains the long sought desideratum of enabling the outer wheel, at a curve, to travel over its increased distance without sliding or dragging. It must be constantly borne in mind that there is no more friction  
 75 on any of the parts of this axle than on those in present use so long as the track is straight, for on a straight track both wheels must and will revolve exactly alike. When the wheels arrive at a curve the pressure of the outer wheel against the rail causes severe friction at the joint or point of union of cylinder 1 and cylinder  $1^a$  or where  
 80 Figs. 8 and 10 meet; but as this is a longitudinal pressure it is capable of any resistance. But the intensity of this pressure only occurs at a curve, and hence, it is of unfrequent and short duration.

At the joint or point where Figs. 8 and 10 meet I have attached a box to contain tallow or other congealed lubricating substance. This box should have a spring in the top, so contrived as when closed to press upon the tallow. If the friction at the joint is sufficient to heat the metal, it will dissolve  
 90 the tallow and lubricate itself and also grease the narrow journal 7 both in its revolutions and its pressure against the ring; but if the friction is not sufficient to heat the metal then no grease will be required. A like constructed box is attached to cylinder  $1^a$  where the wide journal  $7^a$  revolves inside, and at the bottom of the large cylinder  $1^a$ , so these self-greasing boxes will spontaneously afford the necessary supply, or  
 105 Fig.  $3^a$  may be made, say,  $1\frac{1}{2}$  inches shorter, and when forced into  $2^a$  and projecting 6 inches for the journal it will leave a cavity of  $1\frac{1}{2}$  inches, as is represented in Fig. 12, and if these two parts are then forced into  $3^a$   
 110 these three united pieces will represent Fig. 10. The solid 3 must in this case be as much longer as  $3^a$  is shorter, see section of Fig. 8, and when Figs. 8 and 10 come together the end of the solid 3 will enter and fill the  
 115 cavity, just avoiding contact with Fig.  $3^a$ , and the cavity in Fig.  $2^a$  will serve as a bush journal in which the solid 3 will freely revolve, or the axles might be made to revolve one within the other, without journal  
 120 or bush, like the joints of a spy glass, and be quite as strong, but they would be subjected to greater friction, because the surfaces in contact would be increased. The same screw bolts which are used in the couplings can be conveniently used in attaching the boxes, as appears. The screw bolts can have square heads and be sent home with  
 125 a wrench.

The vertical friction on the bearings or 130

outer journals and the lateral friction on the rings or flanges of those journals subjects them to such wasting attrition that the outer ends of the axle soon become obsolete.

5 Their substitution, in lieu of the present mode of turning journals for the bearings, will be a great salvage of time, convenience, and material, and every train should carry an extra set in case of need.

10 The journals which revolve inside the large cylinder and which are secured firmly to the solid (1) may be adjusted in the manner described, or the large cylinder may be bushed at those points and allow the solid  
15 (1) to revolve in the bushes.

The ring when secured in its place not only forms a permanent coupling for the axles, but acts like what might be called a

bush journal to steady the solid (1) in its revolution. The journals which revolve on  
20 the solid if slipped to their places at a red heat, and receive a salt water bath at a black heat, will, in my opinion, require no further fastening.

What I claim is—

25 The construction and arrangement of the parts as represented for the purpose of forming an axle, on which the wheels shall have an independent motion, the whole constructed substantially as described for the  
30 purpose set forth.

Florence, Italy, June 1, 1859.

E. J. MALLET.

Witnesses:

ALEXANDER GALT,  
WALTER GOULD.